BAYFIELD STREET TRANSPORTATION IMPROVEMENTS



Bayfield Street
Conceptual Design and Municipal Class Environmental Assessment

Phase 1: Needs And Justification Report (Draft)

Project Number: CA0008215.3476

Date: April 12, 2024

Barrie

BAYFIELD STREET CONCEPTUAL DESIGN AND MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

PHASE 1: NEEDS AND JUSTIFICATION REPORT

CITY OF BARRIE

DRAFT V. 2

PROJECT NO.: CA0008215.3476
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A TRAFFIC ANALYSIS REPORT

1 Introduction

1.1 Study Purpose

The City of Barrie (the City) has retained WSP Canada Inc. (WSP) to complete a Municipal Class Environmental Assessment (MCEA) Study for transportation improvements on Bayfield Street from Grove Street to the City of Barrie limits.

Bayfield Street is a key gateway in and out of the City of Barrie and represents a major regional commercial / retail hub in Simcoe County and transportation conduit through the City, as well as providing a key interchange with Highway 400.The Ontario Ministry of Transportation (MTO) is planning to replace the existing Highway 400 Bayfield Street interchange and crossing structure starting in 2026. To further support these planned improvements by the MTO, the City of Barrie plans to improve the traffic operations, active transportation facilities and other road-related improvements to this key gateway, the City has initiated this MCEA Study to identify preferred solutions and designs for Bayfield Street between Grove Street to the City limits in the near-term and long-term. The MCEA Study will be carried out in accordance with the approved planning process for a Schedule C undertaking. Through the MCEA process, a preferred design will be selected taking into consideration:

- Potential impacts to the social, cultural, economic and natural environments;
- Public, agency and Indigenous consultation; and,
- Technical / engineering considerations.

This project will assess near-term and long-term transportation improvements that support all modes of travel (pedestrians, transit users, cyclists and motorists). This project will build upon recommendations in the City's Transportation Master Plan (2019), as well as other related studies, policies and plans, and includes the following components:

Near-term Implementation

- Assessment and identification of active transportation improvements to incorporate with MTO’s interchange replacement project extending from Grove Street to Coulter Street.
- Assessment and identification of auto capacity and active transportation improvements to connect to MTO’s interchange replacement project extending from Coulter Street to Cundles Road.
- Assessment and identification of interim active transportation improvements extending from Cundles Road to Hanmer Street.
- Assessment and identification of localized intersection improvements at Bayfield Street and Grove Street.

Long-term Corridor Planning

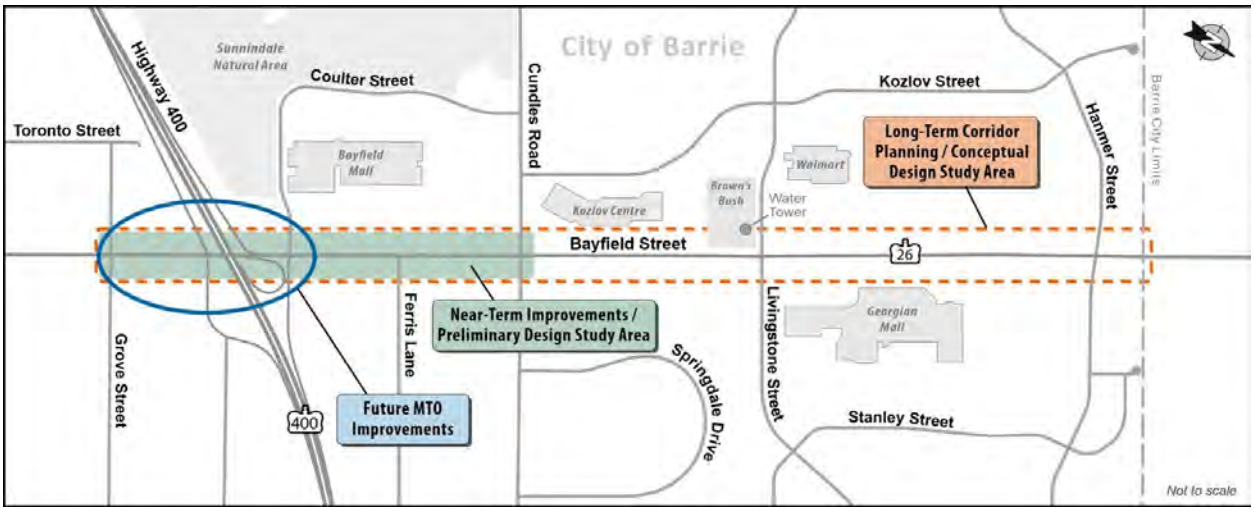
- Development of a long-term transformative plan to reflect planned changes in land-use that includes a mix of medium density residential and commercial uses. The plan will embrace complete street principles and aims to achieve an enhanced pedestrian and cyclist friendly realm while balancing the role this corridor plays as a regional connector. This plan will extend from Grove Street to the City limits.

Completion of an MCEA Study is the step towards implementation of large municipal infrastructure projects. The MCEA Study must be completed prior to undertaking subsequent project phases that include detailed design, property acquisition, utility relocations and construction.

1.2 Study Area

The project study area consists of Bayfield Street between Grove Street to the City limits, as shown in **Exhibit 1-1** below.

Exhibit 1-1: Study Area



1.3 Background Studies

Two Environmental Assessment Studies were previously completed within this corridor:

- A Schedule C Municipal Class Environmental Study for Bayfield Street from Grove Street to Cundles Road, carried out by the City of Barrie in 2013; and,
- An Addendum in 2017 to the Preliminary Design and MTO Class Environmental Assessment (MTO Class EA) for Highway 400 within the Town of Innisfil, City of Barrie, and the Township of Springwater, classified as a Group 'B' project under the MTO Class EA for Provincial Transportation Facilities (2000).

The current Bayfield Street MCEA Study will update the recommendations of the 2013 MCEA study for Bayfield Street, and will integrate the recommended design with MTO's plans for the Highway 400 interchange at Bayfield Street. Given the length of time since the last MCEA Study, as well as the change in the transportation and planning context of the surrounding region, the City and the Study Area for Bayfield Street, this Study will fully carry out the MCEA Phases 1 through 4 in order to provide a recommendation that is appropriate to the updated existing and future conditions. The assessment of the current planning context and existing conditions are discussed in **Chapter 3** and **Chapter 4**.

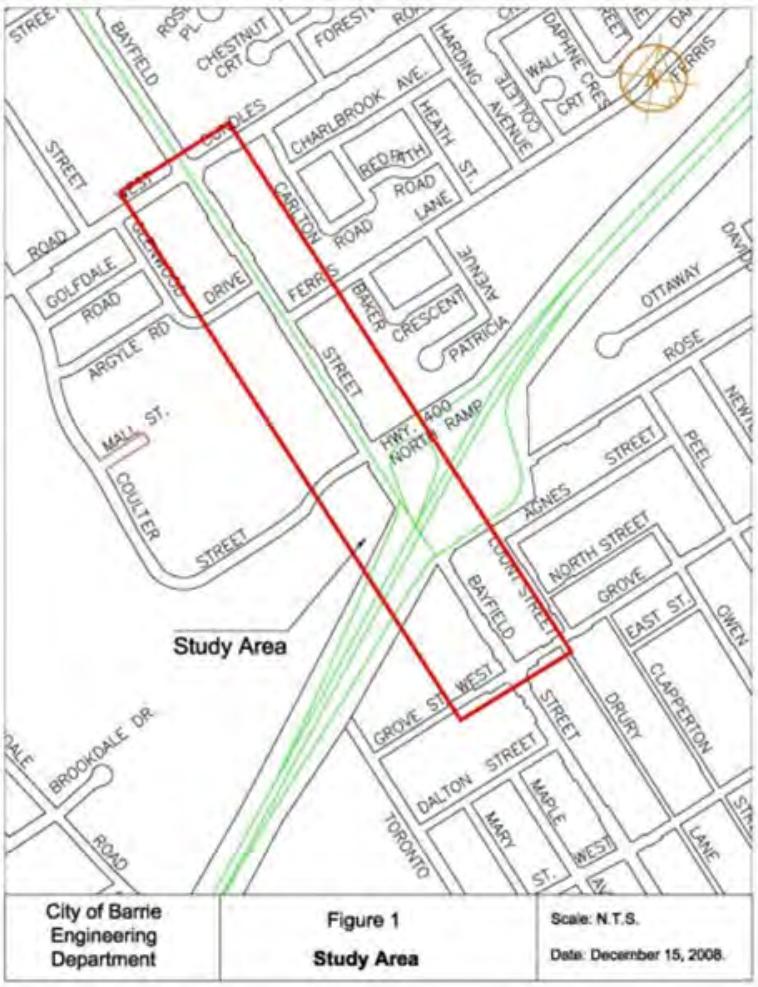
1.4 Environmental Study Report for Bayfield Street from Grove Street to Cundles Road (2013)

The City of Barrie previously completed a Schedule C MCEA Study in accordance with the Ontario *Environmental Assessment Act* (EA Act) to review long-term needs for the Bayfield Street corridor between Grove Street and Cundles Street. In 2013, an Environmental Study Report was prepared documenting Phases 1 through 4 of the MCEA process. The Study Area for the 2013 MCEA limited to Bayfield Street between Grove Street and Cundles Street, as shown in **Exhibit 1-2** below. The current MCEA study will consider a larger Study Area extending from Grove Street to the City boundaries.

The City of Barrie retained two separate consultants to complete this Study. The findings of the previous EA Studies that were carried out are summarized below. The Environmental Study Report, which documents the MCEA process followed, is on file with the City.

- **Phases 1 and 2 - Ainley Group/ Dillon Consulting** (2005): This phase of the project identified problems and opportunities as well as planning level alternatives to address them. An evaluation process was followed to select a preferred planning solution to address traffic deficiencies affecting the eleven corridors crossing Highway 400 (Duckworth Street, St. Vincent Street, Bayfield Street, Sunnidale Road, Anne Street, Dunlop Street, Tiffin Street, Essa Road, Harvie/Big Bay Point Road, Mapleview Drive, and Salem/Lockhart Road).
- **Phases 3 and 4 - AECOM Canada Ltd.** (2013): This phase of the project identified alternative design solutions and carried out an evaluation process to determine a recommended plan. The study process was documented in an Environmental Study Report. The northern and southern project limits are at the intersections of Bayfield Street with that of Cundles Road and Grove Street, respectively (see **Exhibit 1-2** below).

Exhibit 1-2: Bayfield Street Class EA Study Area (AECOM, 2013)



1.4.1.1 *Phase 1 – Identification of Problems and Opportunities*

During Phase 1, the following information was collected to identify problems and opportunities:

- Collection and summary of existing traffic volumes in each corridor;
- Finalizing future traffic volumes expected in each corridor based on the 1998 Official Plan population projection of 175,000 people;
- Developing a detailed inventory of existing traffic lane arrangements (through lanes and intersection turning lanes) in each corridor;
- Assessment of existing through lane capacities versus future demand volumes in each corridor;
- Assessment of existing intersection operations in each corridor;
- Assessment of motor vehicle collision histories in each corridor; and,
- Summary of identified deficiencies.

As a result of the data collection, background research and inventories, the following problems and opportunities along this corridor were identified for this MCEA Study:

- Future traffic demand volumes are well in excess of the available capacities. To have in-place a traffic handling strategy that will adequately accommodate the planned growth in the City, significant improvements will be required to provide additional Highway 400 crossing capacity.
- The identified opportunity was to investigate traffic infrastructure and operational improvements that were appropriate for both the roadway corridor and the intersections.

1.4.1.2 *Phase 2 – Assessment and Evaluation of Alternative Solutions*

Phase 2 consisted of the development and evaluation a number of alternative planning solutions. These alternatives are solutions that were developed at a macro level to address the problems and opportunities identified in Phase 1 of the Study. As part of the Highway 400 Crossing Study, the following Planning Level Alternative Solutions were developed and evaluated, as shown in **Table 1-1**.

Table 1-1: Planning Alternative Solutions

Alternative Solutions	Description	Recommended
Alternative 1: Do Nothing	No changes to the existing roadways.	No
Alternative 2: Alternative Solutions (Non-Structural)	Introducing traffic flow improvement measures such as: basic operational improvements, Transportation Demand Management programs, and traffic signal improvements, where appropriate, to better manage existing and future traffic in the crossing road corridors.	Partial
Alternative 3: Divert Traffic to Alternative Corridors	Diverting traffic to other roadways. This would require the establishment of new Highway 400 crossing corridors to assist in handling the traffic increases.	Yes
Alternative 4: Alternative Transportation Modes	Additional provisions for alternative modes of transportation, such as public transit and bicycles for travelers using the corridors.	Partial

Alternative Solutions	Description	Recommended
Alternative 5: Road Widening in Existing Corridors	Widening of the roadways in each corridor as well as the addition of turn lanes where appropriate.	Yes

The evaluation method used to select a preferred alternative was based on feasibility, constructability, conformity to City policies, and information obtained through discussions with agencies.

- Based on the results of the evaluation it was concluded that road widening, and new road crossings would be required as a component of the future transportation system. The results led to the identification of necessary minimum and maximum lane configurations.
- Screenlines or groupings of corridors were applied to determine if some of the eleven corridors would be more effective in handling the traffic increases than others. This allowed for the assessment of potential trade-offs in providing the widening in one corridor rather than others. The analysis helped in the identification of the target number of lanes to be provided in each of the eleven corridors.

The preferred planning solution for Bayfield Street from Cundles Road to Grove Street consisted of:

- A proposed structure over Highway 400 with six through lanes, one turning lane, and one speed change lane, for a total of eight lanes on the structure.
- Widening of Bayfield Street by one through lane in each direction, for a total of six through lanes (three in each direction) from Cundles Road to Grove Street, plus operational improvements at intersections.
- Recommended inclusion of sidewalks on both sides of the structure and roadways.

1.4.1.3 *Phase 3 – Assessment and Evaluation of the Alternative Design Concepts for the Preferred Solution*

Phase 3 was carried out to develop and evaluate a number of alternative design concepts for the preferred solution identified in Phase 2. To select the preferred design alternative, an evaluation process was carried out to highlight the differences in net impacts associated with the various alternative solutions and to determine the advantages and disadvantages of each. The evaluation was based on feasibility, constructability, conformity to City policies, public input, and information obtained through discussions with agencies. The alternative design solutions considered are found in **Table 1-2.**

Table 1-2: Design Alternatives

Alternative Design Concepts	Project Description
Alternative 1	Reconstruct to six through lanes with continuous centre turn lane, turning lanes at intersections and bridge improvements as appropriate, with standard boulevards and sidewalks in accordance with City of Barrie standard cross-sections for seven lanes of pavement, transitioning to four through lanes and one turning lane west of Grove Street to match the existing. Pavement width: 17.5 m (Grove Street) – 25 m (from Highway 400 northerly) Right-of-way width: 26.5 m (min.) – 40 m (max.)

Alternative Design Concepts	Project Description
Alternative 2	Reconstruct to six narrower through lanes with continuous centre turn lane, turning lanes at intersections and bridge improvements as appropriate with 2.0 m curb faced sidewalk without boulevards, transitioning to four through lanes and one turning lane west of Grove Street to match existing. Lane width: 3.25 m wide with 4.0 m centre turn lane from Highway 400 northerly 3.5 m wide turn lane from Highway 400 – Grove Street Pavement width: 16.5 m (north of Grove Street) – 23 m (from Highway 400 north) Right-of-way width: 26.5 m (min.) – 32.5 m (max.)
Alternative 3	Reconstruct to six through lanes with turning lanes at intersections as appropriate with raised median, standard sidewalk, and reduced boulevards, transitioning to four through lanes and one turning lane west of Grove Street to match existing. Pavement width: 17.5 m – 25 m Right-of-way width: 26.5 m (min.) – 34 m (max.)

Alternative Design Concepts	Project Description
	*With this alternative, “left outs” would be restricted from all driveways, and “left ins” would be permitted at major driveways
Alternative 4	Reconstruct to six through lanes with continuous centre turn lane and turning lanes at intersections as appropriate with reduced boulevards and standard sidewalks, transitioning to four through lanes and one turning lane west of Grove Street to match existing. Pavement width: 17.5 m (Grove Street) - 23.8 m (from Highway 400 north). Right-of-way width: 26.5 m (min.) – 35.8 m (max.)
Alternative 5	Addition of High Occupancy Vehicle (HOV) lanes. This option was discussed by the project team, and it was decided not to carry this option forward for further analysis because Bayfield Street is not a designated commuter route, it accommodates a heavy vacation traffic load that does not rely on mass transit methods, and the corridor is not conducive to HOV use. It may be possible in the future to accommodate HOV lanes within the widened Bayfield Street should transit ridership along this route increase to levels which warrant a higher order transit system such as bus rapid transit (BRT).
Alternative 6	Reversible lanes, rather than additional lanes. This option was determined to be not practical from an operations perspective, and it creates safety issues that are difficult to address. Therefore it was decided not to carry this alternative forward.

Alternative Design Concepts	Project Description
Alternative 7	Roundabouts in place of intersections. The use of roundabouts in place of signalized intersections was considered by the project team. Given the volumes on Bayfield Street, it is likely that roundabouts on this road would be a minimum of 3 lanes wide and have a total of 4 legs. The speeds along Bayfield Street in addition to the volumes would require the use of splitter islands to divert traffic. It is estimated that a 3-lane roundabout would require an inscribed circle of approximately 50 to 70 m diameters with an inner circle of approximately 30 m diameter. Based on this sizing for a roundabout there would be significant property impacts, displacing several existing businesses and residences. In the past the MTO has been reluctant to allow the use of roundabouts to accommodate traffic movements off and onto the access ramps for major highways. It is unlikely that the use of a roundabout at this location would be acceptable to the MTO. For these reasons, the use or roundabouts was not carried forward.

The Ministry of Transportation (MTO) Highway 400 Transportation Environmental Study Report (TESR) (2004) recommended the closure of Rose Street at the Highway 400 northbound on-ramp as part of the proposed interchange modifications. Therefore, Alternatives 1-4 include the closure of Rose Street.

Because the land uses west of Highway 400 (primarily commercial) vary significantly with those east of Highway 400 (primarily residential), the recommended roadway improvements differ for each section. **Table 1-3** includes the details of the preferred design alternatives that were selected to:

- Accommodate future traffic volumes;
- Provide for sidewalks and minimal impacts on emergency access times; and,
- Have less impact on existing abutting properties.

Table 1-3: Preferred Design Alternatives

Section	Recommended Improvements	Rationale
East of Highway 400 to Grove Street	• One additional through lane in each direction immediately east of the northbound off ramp that transitions to the existing five 3.3 m wide lane cross-section at Grove Street • Raised center median that restricts left-in and left-out movements to increase safety • Cross-access easements where design can be accommodated • Provision of 1.5 m boulevard	• Increased pedestrian safety through provision of boulevard • Increase in turning movement safety by limiting left outs with raised median • Opportunity for additional landscaping by considering trees in the median and grass boulevards during detailed design
At the Highway 400 Interchange	• Three 3.75 m wide through lanes in each direction • One 3.5 m wide ramp lane to the East to South (E-S) ramp • 1.5 m raised median • Realignment of the northbound on-ramp and northbound off-ramp and southbound on-ramp and southbound off-ramp	• Improvements to vehicle capacity and intersection operations • In agreement with MTO plans, upgrades the interchange ramps at Highway 400 and the Bayfield Street • Minimizes property impacts

Section	Recommended Improvements	Rationale
	• Relocation of signalized intersections at Highway 400 southbound off-ramp / Coulter Street and northbound off-ramp / northbound on-ramp • Sidewalks both sides with curb-faced placement through ramps and structure • Realignment of Coulter Street to accommodate widening of Highway 400 and for consolidation of intersections with the North to East/West (N-EW) ramp • Closure of Rose Street to and from Bayfield Street as per the TESR	
West of Highway 400 to Cundles Road	• Three 3.3 m wide through lanes each direction • 1.5 m raised median • Intersection improvements such as increased curb radii and enhanced left turn bays at Ferris Lane and Cundles Road • Closure of westbound left turning movements from Bayfield Street onto Glenwood Drive • Safer left turning lanes at intersections and at specific accesses to businesses • Reduced number of eastbound and westbound left turning movements from Bayfield to businesses just west of Glenwood Drive • Enhanced left turn storage bay and taper at Ferris Lane with right-in / right-out access at Glenwood Drive	• Improvements to traffic operations • Increased pedestrian safety through provision of a boulevard • Increase in turning movement safety by limiting left-in / left-out movements with raised median

Section	Recommended Improvements	Rationale
	• Potential for improved landscaping/streetscaping with raised medians • 1.5 m boulevard spacing • Cross-access easements between private property owners where design can be accommodated • Sidewalks both sides	

1.4.1.4 *Phase 4 – Environmental Study Report*

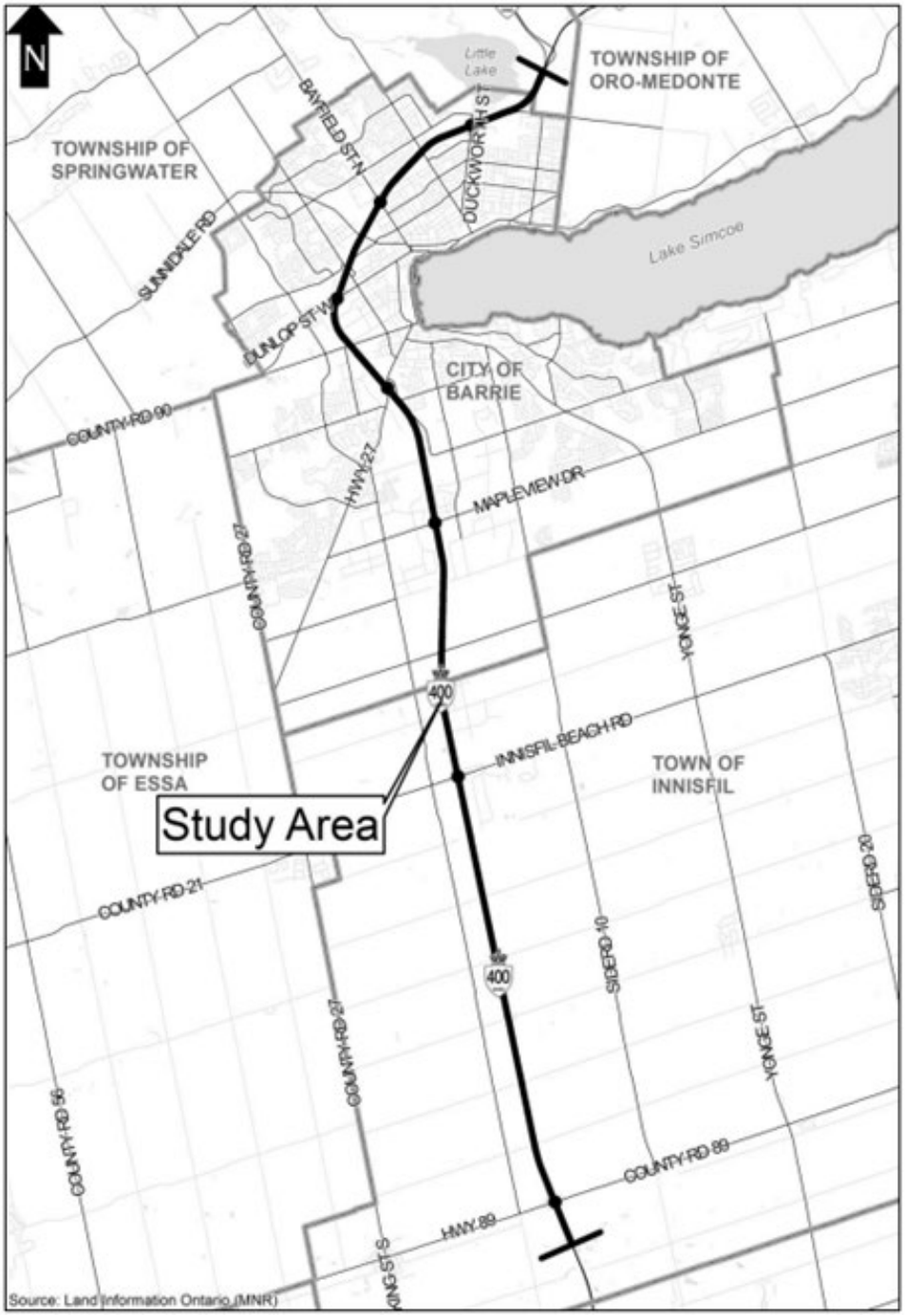
An Environmental Study Report (ESR) was prepared that documented Phases 1 through 4 of the Barrie Highway 400 Crossing Roads Study. A copy of the ESR is on file with the City of Barrie.

1.5 Transportation Environmental Study Report Addendum for Highway 400 (2017)

In 2001, MTO undertook a Planning and Preliminary Design Study to identify needed improvements and widening requirements along 30 km of Highway 400 from 1 km south of Highway 89 to the Junction at Highway 11. A Transportation Environmental Study Report (TESR) was made available for public review in 2004 and in 2006 received Environmental Clearance to proceed to further stages of design. AECOM (formerly URS Canada Inc.) was retained by MTO to undertake an MTO Class EA and Preliminary Design Study Update to address the changes throughout the corridor.

A TESR Addendum was prepared as part of the study update to revisit the approved plan outlined in the 2004 TESR to incorporate future (2031) traffic projections and address associated capacity, operational and safety needs. The study was carried out in accordance with the approved planning process for a Group 'B' project under the MTO Class EA for Provincial Transportation Facilities (2000). The project limits are within the Town of Innisfil, City of Barrie, and the Township of Springwater within the County of Simcoe, Ontario (see **Exhibit 1 3**). Consistent with the Recommended Plan outlined in the 2004 TESR, current traffic projections indicate that the Highway 400 corridor needs to be widened to 10 lanes (five lanes in each direction including four general purpose lanes and one HOV lane) throughout the majority of the study area (transitioning at the north end to eight general purpose lanes prior to the junction at Highway 11) by 2031.

Exhibit 1-3: Study Area for the 2017 Transportation Environmental Study Report (TESR) Addendum for Highway 400 (AECOM, 2017)



Changes to the 2004 TESR approved plan for this section of Highway 400 at Bayfield Street include the following:

- Additional property required for the improvements to the Highway 400 /Bayfield Street interchange in the northeast and southwest quadrants along Bayfield Street;
- Improvements to the geometry of the Bayfield Street eastbound to Highway 400 southbound ramp and the Bayfield Street westbound to Highway 400 northbound ramp;
- Addition of a right-turn lane on the Highway 400 southbound to Bayfield Street eastbound / westbound ramp;
- Widening of Bayfield Street to six (6) lanes within the MTO right-of-way to meet the 2031 traffic forecast needs;
- The addition of two (2) noise walls (one (1) on the west side of Highway 400 south of Anne Street and one (1) on the west side of Highway 400 north of Duckworth Street), and the extension of noise walls recommended in the 2004 TESR (refer to Section 6.2.3 for further information on noise mitigation); and,
- The replacement of 13 culverts.

A general description of the changes to the 2004 TESR at the Highway 400 and Bayfield Street interchange is provided below:

The approved 2004 TESR included a Parclo A / Diamond interchange at the Highway 400 / Bayfield Street Interchange which is the existing configuration with minor improvements to accommodate the Highway 400 widening. This study considered the following three interchange configurations to address the 2031 planning horizon traffic capacity:

1. Alternative 1: Parclo A / Diamond;
2. Alternative 2: Parclo / Diamond with Roundabouts; and,
3. Alternative 3: Diverging Diamond.

Alternative 2 has a small footprint, resulting in minimal impact, and is cost-effective. However, it fails to provide acceptable levels of traffic operations for the 2031 horizon year and does not address future traffic volumes. Alternative 1 and 3 both result in acceptable traffic operations but given Alternative 1's conventional interchange configuration, it is projected to operate well at a relatively lower construction cost, with possible mitigation strategies to address its impact on properties. Furthermore, Alternative 1 is consistent with the long-term planning throughout the corridor as it was part of the approved plan from the 2004 TESR, making it the preferred alternative for interchange improvements at Bayfield Street.

Subsequent to the evaluation of the preferred alternative, additional modifications to the 2004 approved plan were considered to optimize the preliminary design including the following:

- Improvements to the geometry of the Bayfield Street eastbound to Highway 400 southbound ramp including a larger horizontal alignment radius near the Bayfield Street bullnose; and,

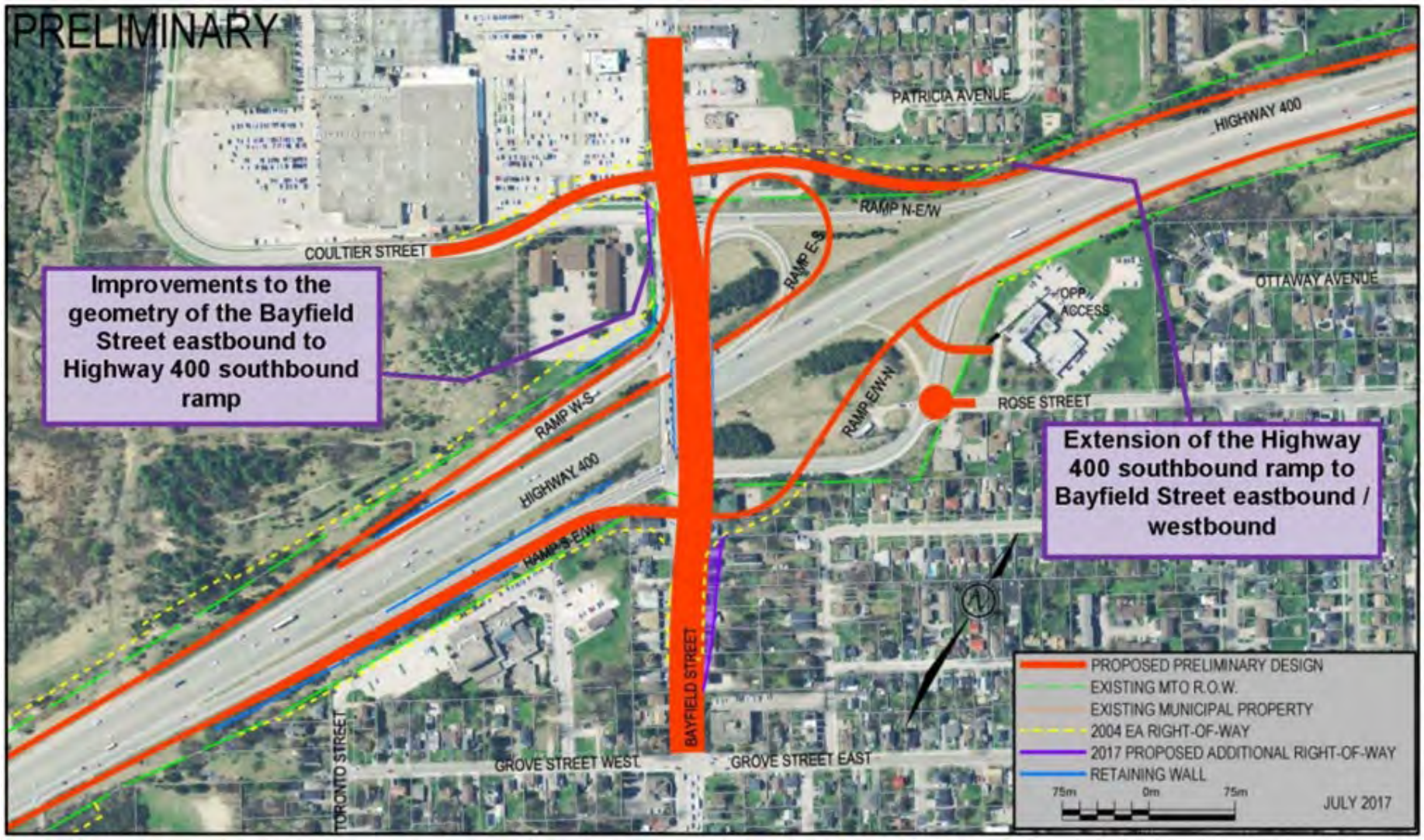
- The Highway 400 southbound ramp to Bayfield Street eastbound / westbound was extended with the bullnose relocated further north to improve sight distance.

After the evaluation of the preferred alternative, additional modifications to the 2004 approved plan were considered to optimize the preliminary design (shown in **Exhibit 1-4**) including the following:

- Widening of Bayfield Street to six lanes within the MTO right-of-way to match the City of Barrie's planned future cross-section of Bayfield Street (three lanes in each direction);
- Improving the geometry of the Bayfield Street eastbound to Highway 400 southbound ramp including a larger radius near the Bayfield Street bullnose;
- Extending the Highway 400 southbound ramp to Bayfield Street eastbound / westbound and relocate the bullnose further north to improve sight distance and safety;
- Changes to the property requirements from the 2004 approved plan in the southwest and northeast quadrants of the Highway 400 / Bayfield Street interchange, and;
- Closure of Rose Street.

As part of the improvements to the Highway 400 / Bayfield Street interchange and as outlined in the 2004 TESR, Rose Street will be closed and a cul-de-sac will be provided to remove direct access from Rose Street onto the Highway 400 northbound on-ramp to improve safety at the interchange. As Rose Street currently provides access to Highway 400 from the Ontario Provincial Police (OPP) Station in the northeast quadrant of Highway 400 and Bayfield Street, further discussions will take place with the OPP and Infrastructure Ontario concerning the provision of a direct on-ramp to Highway 400 from the station that would not be open for public access. The OPP station has since been demolished and a direct ramp is no longer required. The County of Simcoe has since identified the site for future social housing. The City has requested that the MTO provide pedestrian connectivity to Bayfield Street to support existing residents and new residents at the housing site.

Exhibit 1-4: Changes to the 2004 Approved Plan at Bayfield Street



2 Legislative and Policy Context

2.1 Provincial

2.1.1 Environmental Assessment Act (EAA), 1990

The Ontario *Environmental Assessment Act* (EAA), and the associated Codes of Practice, require proponents to examine and document the environmental effects that might result from major projects or activities. The purpose of the Act is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation, and wise management of the environment in the Province (RSO1990, c. 18, s.2).

The Act sets a structure for a systematic, rational, and replicable environmental planning process that is based on five key principles, as follows:

- **Consultation with affected parties:** Consultation with the public and government review agencies is an integral part of the planning process. Consultation allows the proponent to identify and address concerns cooperatively before final decisions are made. Consultation should begin as early as possible in the planning process.
- **Consideration of a reasonable range of alternatives:** Alternatives to include functionally different solutions to the proposed undertaking as well as alternative methods of implementing the preferred solution. The “do nothing” alternative must also be considered.
- Identification and consideration of the effects of each alternative on all aspects of the environment: This includes the natural, social, cultural, technical, and economic environments.
- Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects: The evaluation shall increase in the level of detail as the Study moves from the evaluation of alternatives to the proposed undertaking to the evaluation of alternative methods.
- **Provision of clear and complete documentation of the planning process followed:** This will allow traceability of decision-making with respect to the project. The planning process must be documented in such a way that it may be repeated with similar results.

2.1.2 Municipal Class Environmental Assessment

The EAA allows for certain “classes” of routine projects that have predictable environmental effects that can be readily managed to follow a streamlined EA process, referred to as a Class EA. Provided the approved process is followed, projects and activities included in a Class EA do not require individual review and approval under the EAA. This project is being conducted in

accordance with the MCEA process for Schedule C projects, described in the MCEA guide (October 2000, as amended in 2007, 2011, 2015 & 2023).

The Class EA planning process requires the integration of sound engineering judgement, prudent long-term planning and protection of all aspects of the environment (natural, social, economic, and cultural). This includes consultation with the public and affected agencies, to obtain comments and input throughout the decision-making process before identifying a preferred alternative. The overall result of the Class EA process is the identification of a recommended plan that considers and minimizes impacts on the environment. The MCEA process is made up of five phases:

- **Phase 1:** Identify the problems/opportunities to be addressed and the needs and justification;
- **Phase 2:** Development and evaluation of alternative solutions;
- **Phase 3:** Development and evaluation of alternative design concepts;
- **Phase 4:** Preparation of an Environmental Study Report for public review; and
- **Phase 5:** Implementation.

Since projects undertaken by municipalities can vary in their environmental impact, projects are classified under the MCEA in terms of “Schedules.” The project Schedule dictates which phases of the MCEA process must be completed before proceeding to implementation.

The following provides a high-level overview of the current MCEA Schedules.

Exempt Projects

On March 3, 2023, the Government of Ontario enacted Amendments to the MCEA process approved under the EAA. Under the amendments, projects that were formerly Schedule A and A+ projects, including various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities and new facilities that are limited in scale and have minimal adverse effects on the environment, are now exempt from the requirements of the EAA under the amended MCEA process. These projects may now proceed without any process requirements under the MCEA.

Schedule B

Schedule B projects have the potential for some adverse environmental effects. As such, the proponent is required to undertake a screening process, involving mandatory contact with directly affected public and relevant review agencies, to ensure that they are aware of the project and that their concerns are addressed through the planning and decision-making process.

Schedule B projects must complete Phases 1 and 2 of the MCEA process to proceed to implementation. At the completion of the Schedule B MCEA process, a Project File Report is made available for public and stakeholder review for a period of 30 days. During this time, a

request may be made to the Ministry of Environment, Conservation and Parks (MECP) to require a higher-level of study (e.g., an individual or comprehensive EA approval before being able to proceed) or that conditions be imposed (e.g., require further studies) on the grounds that the project could introduce adverse impacts on constitutionally-protected Aboriginal or Treaty rights under Section 16 of the EAA. This was previously known as a “Part II Order” or “bump up” request.

Schedule B projects generally include improvements and minor expansions to existing facilities. Examples include the construction of new water storage facilities and water/wastewater conveyance facilities (pumping stations), among others.

Schedule C

Schedule C projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified by the MCEA process. Schedule C projects require that an Environmental Study Report be prepared and filed for review by the public and review agencies.

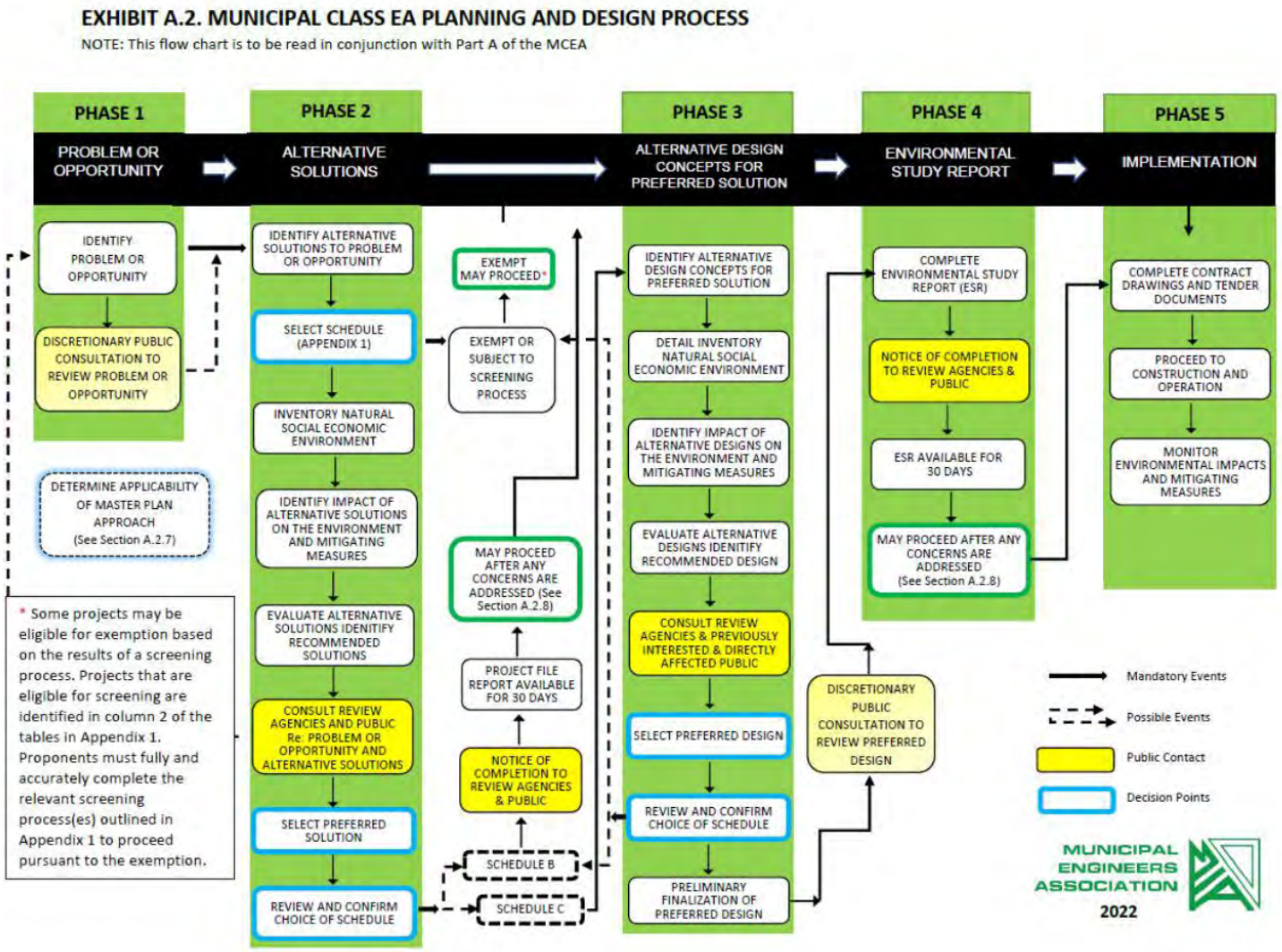
Schedule C projects must complete Phases 1, 2, 3 and 4 of the MCEA process to proceed to implementation. At the completion of the Schedule C MCEA process, an Environmental Study Report is made available for public and stakeholder review for a period of 30-days. During this time requests may be made to MECP for a higher-level of study or that conditions be imposed, as described above for Schedule B projects.

Schedule C projects generally include the construction of new facilities and major expansions to existing facilities. Examples of a Schedule C project include construction of a new water system including water supply and distribution system, construction of a new road, or expansion of a wastewater treatment plant.

Agreements or commitments to further study and mitigation measures identified as part of the MCEA process must be followed through and implemented during later stages of design and construction.

The MCEA process is illustrated in Exhibit 2-1.

Exhibit 2-1: MCEA Process (MEA, 2023)



2.1.3 Provincial Policy Statement, 2020 and Draft Provincial Policy Statement, 2023

The Provincial Policy Statement, 2020 ("PPS") provides policy direction on matters of provincial interest related to key land use planning issues such as housing, infrastructure, economic development, transportation, and the protection of environmental resources. In accordance with Section 3(5) of the Planning Act, all land use decisions are required to be consistent with the PPS. Section 1.0 of the PPS, 2020 establishes policies associated with efficient land use and development patterns that support healthy, livable, and safe communities.

Policies applicable to transportation projects such as this one include the following:

1.1 Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns

1.1.1 Healthy, livable and safe communities are sustained by:

e) promoting the integration of land use planning, growth management, transit-supportive development, intensification and infrastructure planning to achieve cost-effective development patterns, optimization of transit investments, and standards to minimize land consumption and servicing costs;

g) ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs;

Section 1.6 of the PPS provides policies relating to **Infrastructure and Public Service Facilities**:

1.6.1 Infrastructure and public service facilities shall be provided in an efficient manner that prepares for the impacts of a changing climate while accommodating projected needs. Planning for infrastructure and public service facilities shall be coordinated and integrated with land use planning and growth management so that they are:

a) financially viable over their life cycle, which may be demonstrated through asset management planning; and

b) available to meet current and projected needs.

1.6.3 Before consideration is given to developing new infrastructure and public service facilities:

a) the use of existing infrastructure and public service facilities should be optimized; and;

b) opportunities for adaptive re-use should be considered, wherever feasible.

1.6.7 Transportation Systems

1.6.7.1 Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs.

1.6.7.2 Efficient use should be made of existing and planned infrastructure, including through the use of transportation demand management strategies, where feasible.

1.6.7.3 As part of a multimodal transportation system, connectivity within and among transportation systems and modes should be maintained and, where possible, improved including connections which cross jurisdictional boundaries.

1.6.7.4 A land use pattern, density and mix of uses should be promoted that minimize the length and number of vehicle trips and support current and future use of transit and active transportation.

1.6.8 Transportation and Infrastructure Corridors

1.6.8.1 Planning authorities shall plan for and protect corridors and rights-of-way for infrastructure, including transportation, transit and electricity generation facilities and transmission systems to meet current and projected needs.

1.6.8.2 Major goods movement facilities and corridors shall be protected for the long term.

1.8 Energy Conservation, Air Quality and Climate Change

1.8.1 Planning authorities shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and preparing for the impacts of a changing climate through land use and development patterns which:

a) promote compact form and a structure of nodes and corridors;

b) promote the use of active transportation and transit in and between residential, employment (including commercial and industrial) and institutional uses and other areas;

c) focus major employment, commercial and other travel-intensive land uses on sites which are well served by transit where this exists or is to be developed, or designing these to facilitate the establishment of transit in the future;

d) focus freight-intensive land uses to areas well served by major highways, airports, rail facilities and marine facilities;

e) encourage transit-supportive development and intensification to improve the mix of employment and housing uses to shorten commute journeys and decrease transportation congestion;

f) promote design and orientation which maximizes energy efficiency and conservation, and considers the mitigating effects of vegetation and green infrastructure; and

g) maximize vegetation within settlement areas, where feasible

A Proposed Provincial Planning Statement was issued by the Government of Ontario in 2023 for public consultation. The Proposed Provincial Planning Statement would replace the existing PPS, 2020 and A Place to Grow: Growth Plan for the Greater Golden Horseshoe. In the Proposed Provincial Planning Statement, the above-noted policies from Section 1.6 remain unchanged from the PPS, 2020. The policies under Section 1.8 contain minor changes to the

policy language. The principles expressed under Section 1.1.1 also remain as noted in the following draft policies:

2.3 Settlement Areas and Settlement Area Boundary Expansions

2. Land use patterns within settlement areas should be based on densities and a mix of land uses which:

a) efficiently use land and resources;

b) optimize existing and planned infrastructure and public service facilities;

c) support active transportation;

d) are transit-supportive, as appropriate; and

e) are freight-supportive.

3. Planning authorities should support general intensification and redevelopment to support the achievement of complete communities, including by planning for a range and mix of housing options and prioritizing planning and investment in the necessary infrastructure and public service facilities.

2.1.4 Places to Grow Act, 2005

The purposes of the *Places to Grow Act* are:

> a) to enable decisions about growth to be made in ways that sustain a robust economy, build strong communities and promote a healthy environment and a culture of conservation;
>
> b) to promote a rational and balanced approach to decisions about growth that builds on community priorities, strengths and opportunities and makes efficient use of infrastructure;
>
> c) to enable planning for growth in a manner that reflects a broad geographical perspective and is integrated across natural and municipal boundaries;
>
> d) to ensure that a long-term vision and long-term goals guide decision-making about growth and provide for the co-ordination of growth policies among all levels of government.

The *Places to Grow Act* enables the development of regional growth plans that guide government investments and land use planning policies.

2.1.5 Growth Plan for the Greater Golden Horseshoe, 2020

As enabled under the *Places to Grow Act*, A Place to Grow: Growth Plan for the Greater Golden Horseshoe (Office Consolidation May 2020) (“the Growth Plan”) contains policies regarding population and employment projections that form the basis for planning for growth in

municipalities within the Greater Golden Horseshoe (GGH) Area, including the City of Barrie. The Growth Plan guides decisions on a number of matters including transportation and infrastructure planning, land use-planning, urban form, housing, natural heritage, and resource protection.

Within the Growth Plan, the Bayfield Street study area is delineated as a “Built-Up Area”. Areas within delineated built boundaries, such as built-up areas, are intended to absorb the majority of growth within the GGH area over the 2051 planning horizon. The City of Barrie is recognized as a Primary Settlement Area (PSA) within the Plan (Schedule 8) with 298,000 residents and 150,000 jobs being forecasted for the 2051 horizon (Schedule 3).

Under Section 3.2.1, the following Integrated Planning policies are identified:

2. Planning for new or expanded infrastructure will occur in an integrated manner, including evaluations of long-range scenario-based land use planning, environmental planning and financial planning, and will be supported by relevant studies and should involve:

> a) leveraging infrastructure investment to direct growth and development in accordance with the policies and schedules of this Plan, including the achievement of the minimum intensification and density targets in this Plan;
>
> b) providing sufficient infrastructure capacity in strategic growth areas;
>
> c) identifying the full life cycle costs of infrastructure and developing options to pay for these costs over the long-term; and
>
> d) considering the impacts of a changing climate.

Other related policies include:

3.2.2 Transportation – General

3. In the design, refurbishment, or reconstruction of the existing and planned street network, a complete streets approach will be adopted that ensures the needs and safety of all road users are considered and appropriately accommodated.

3.2.3 Moving People

4. Municipalities will ensure that active transportation networks are comprehensive and integrated into transportation planning to provide:

> a) safe, comfortable travel for pedestrians, bicyclists, and other users of active transportation; and
>
> b) continuous linkages between strategic growth areas, adjacent neighbourhoods, major trip generators, and transit stations, including dedicated lane space for bicyclists on the major street network, or other safe and convenient alternatives

2.1.6 Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe

The GGH region has experienced substantial growth over the last several decades. As this growth continues into the next 30 years, the region and its transportation system will face intensified challenges coupled with changing demographics, shifting work-live patterns, climate change impacts and accelerated advancement of new technologies.

The purpose of the GGH Transportation Plan is to provide a 30-year vision for mobility across the region to guide and align planning and investments by the province and other transportation providers that will:

- Fight gridlock and improve road performance
- Get people moving on a connected transit system
- Support a more sustainable and resilient region
- Efficiently move goods

Applicable long-term policy directions include:

- Safety: Plan and design the road network to support safety, mobility and convenient, efficient travel for all users, regardless of age, ability or mode of travel.
- Travel demand management: Reduce or shift the need to travel, particularly during peak hours, promote and incent telecommuting, flexible work hours, and alternative modes.

Create a safe, connected, and comprehensive active transportation network

42. Improve local and regional cycling linkages by working with municipalities, Indigenous communities, private landowners, conservation authorities and agencies such as Metrolinx to expand cycling routes, infrastructure and amenities identified in and connecting to the Province-wide Cycling Network.

Improve safety for active transportation users

67. Develop and implement approaches aimed at eliminating transportation-related fatalities and serious injuries, including:

> a. Using a complete-streets lens to evaluate the needs of all transportation users, particularly vulnerable road users, such as the design of safety improvements or modifications at bridges, highway interchanges (particularly in urban areas), under and overpasses, intersections and high-volume and high-speed roads.

2.1.7 Lake Simcoe Protection Plan & Phosphorus Reduction Strategy

Phosphorus is a key water quality concern in Lake Simcoe. The Lake Simcoe Protection Plan commits the Province, working with the Lake Simcoe Region Conservation Authority (LSRCA), local stakeholders, municipalities and other partners, to develop a comprehensive Phosphorus

Reduction Strategy. The Phosphorus Reduction Strategy is based on a vision of shared responsibility and the continual reduction of phosphorus loading in Lake Simcoe over time.

Urban stormwater runoff from rain and melting snow washes pavement and other hard surfaces of contaminants and debris, which either go directly into Lake Simcoe or its inflowing rivers and streams.

Specific policies include:

4.5-SA - Within five years of the date the Plan comes into effect, municipalities, in collaboration with the LSRCA, will prepare and implement comprehensive stormwater management master plans for each settlement area in the Lake Simcoe watershed.

4.17-SA - Within three years of the date the Plan comes into effect, the MOE will:

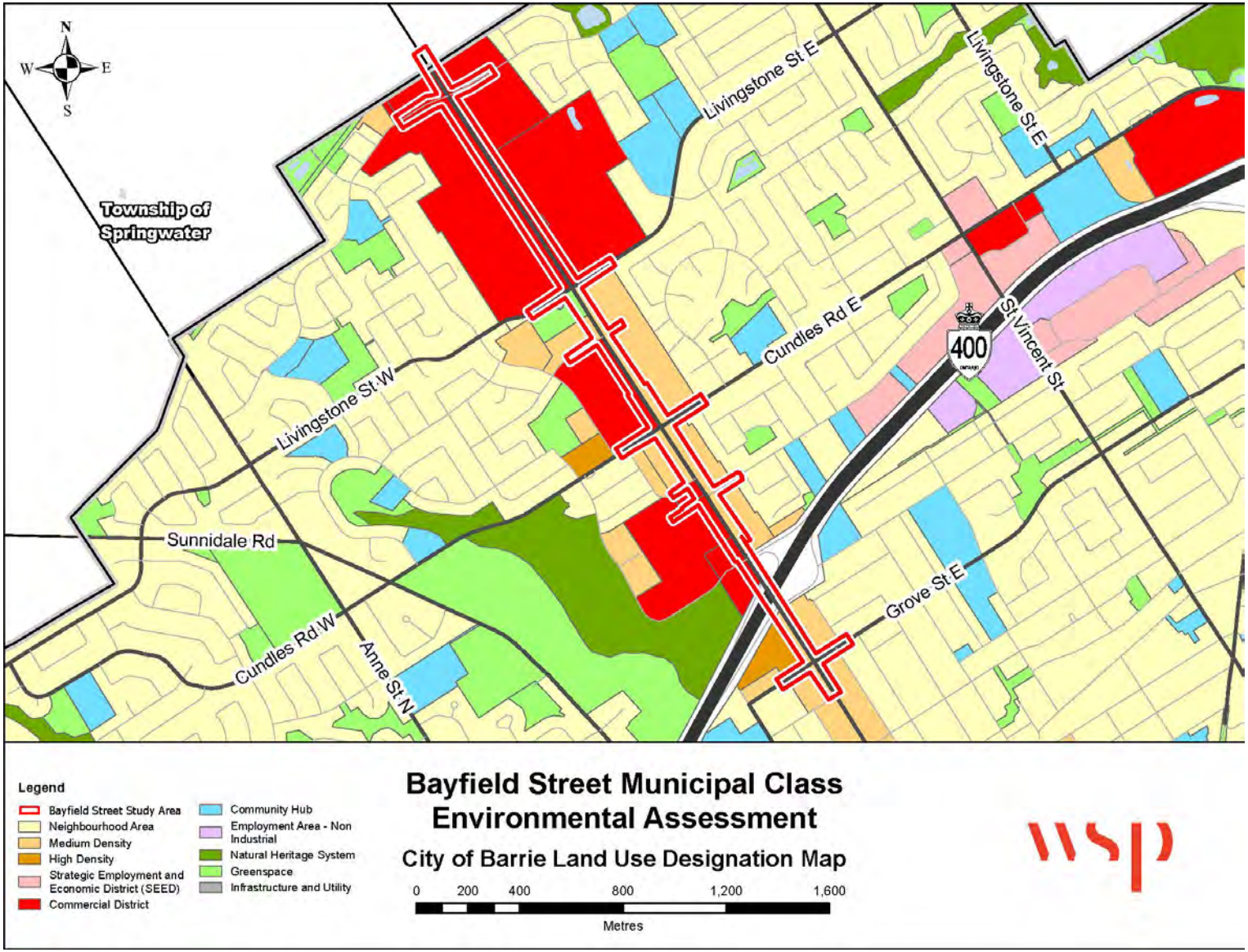
review measures…to reduce water quality impairment, including the contribution of phosphorus loadings to the Lake Simcoe watershed from construction activities;

2.2 Municipal

2.2.1 City of Barrie Official Plan, 2023

The Official Plan of the City of Barrie was adopted by Council on March 7, 2022 and approved with modifications by the Minister of Municipal Affairs and Housing on April 11, 2023. The Official Plan contains policies to guide Barrie's growth to the year 2051 and responds to the community's land use, development, and conservation goals. Land use designations applicable to the study area are identified on Map 2 of the Official Plan and include Medium Density, Commercial District, and Greenspace designations (see **Exhibit 2-2**)**.**

Exhibit 2-2: City of Barrie Land Use Designation Map



Medium Density

The Medium Density designation is intended to facilitate an increase of densities and built form in the city. Permitted uses include: residential, home occupation, community facilities, public service facilities, parks and other open space areas, commercial, retail as part of a mixed-use development, institutional, office (including major office), assisted living / long-term care homes / and other co-housing opportunities, supportive housing, and hospitality and tourism. In these areas, development is encouraged to be mixed use, combining two of the following uses: residential, commercial, retail, institutional and office use development.

Commercial District

Development on lands designated Commercial District includes the following permitted uses: retail (including major retail), commercial, office (including major office), community and public service facilities, institutional, health services, mobility hubs, assisted living / long-term care homes / and other co-housing opportunities / supportive housing / and residential, as part of a mixed-use development containing retail or commercial uses, parks and other open space areas, hospitality and tourism, and farmers market and pop-up retail market. Development on lands designated Commercial District are planned to accommodate a mix of land uses. A combination of two or more of the Commercial District's primary permitted uses is encouraged, either within one building or in multiple buildings, on the same property or parcel. Residential development is encouraged to be in the form of stacked townhouses and apartment buildings.

Greenspace

The Greenspace designation identifies lands for parks and other outdoor recreational and functional open spaces. Development within the Greenspace designation may be subject to the natural heritage protection overlays identified in **Exhibit 2-4**. Where appropriate, the natural heritage protection overlay policies shall prevail over the land use designation policies in this section. Permitted uses include: passive and active recreation uses, such as recreation facilities or recreation spaces, community and rain gardens, or urban agriculture installments, naturalized areas, celebration spaces, marina or boat launch, low impact development facilities and stormwater management facilities / ponds, cemeteries, and City-owned renewable energy infrastructure

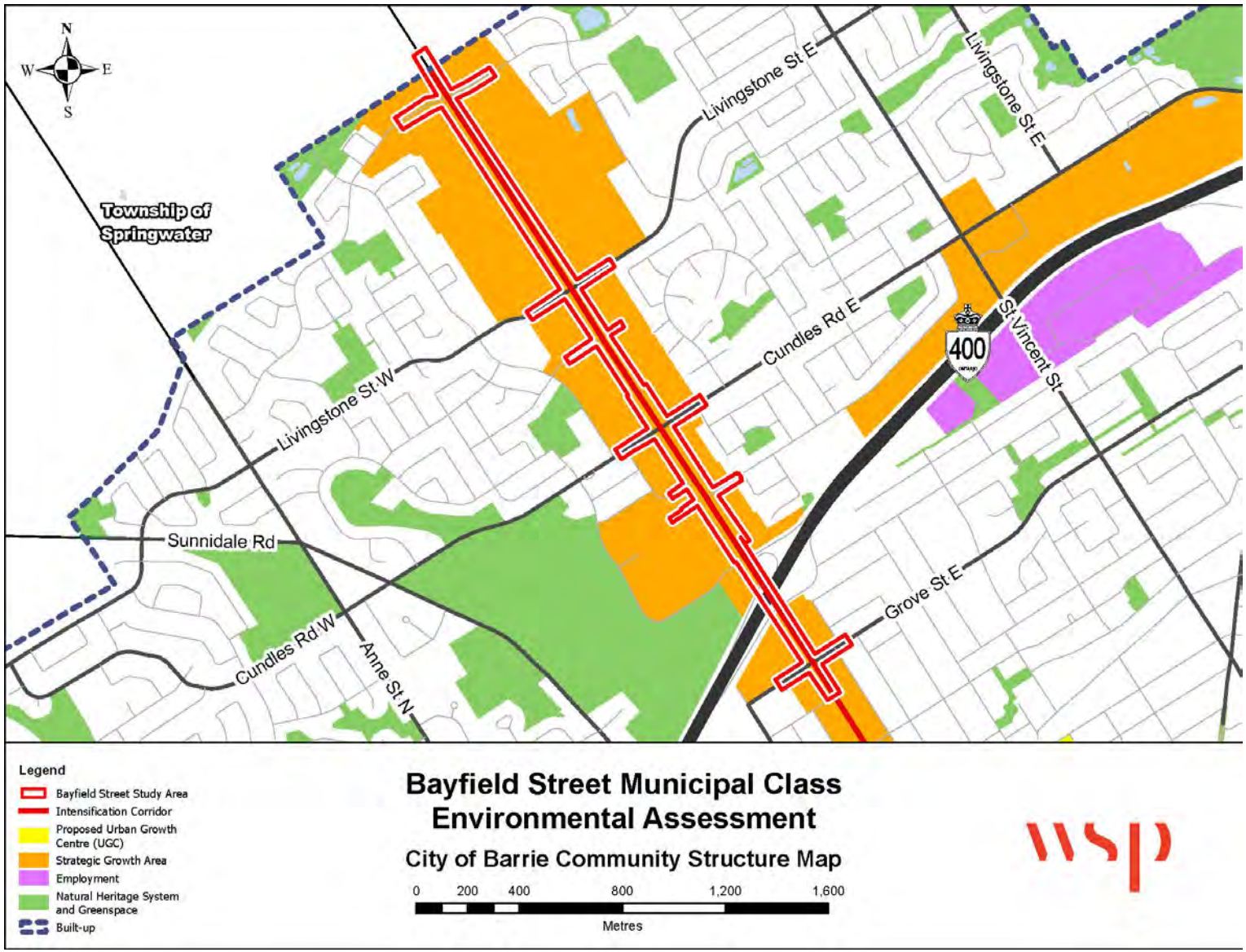
Community Structure

To supplement the land use designation policies, relevant policies in regard to community structure (**Exhibit 2-3**) have also been identified. The study area is identified as an Intensification Corridor and Strategic Growth Area. "Intensification Corridors are areas planned for higher-density and mixed-use development along arterial streets that connect Barrie's growth centres (p20)."

"Strategic Growth Areas are intended as focal points and long-term centres of residential growth, commerce, jobs and social interaction (p17)." They are intended to become complete

communities, planned as mixed-use areas that incorporate residential development and a range of other uses. “The City will identify and plan to provide flexible street designs in Strategic Growth Areas. Flexible streets will generally include mountable curbs and multi-use space for pedestrians that can be converted to parking for vehicles when needed, as well as moveable infrastructure and furnishings (p18).”

Exhibit 2-3: City of Barrie Community Structure Map



NATURAL HERITAGE SYSTEM AND GREENSPACE

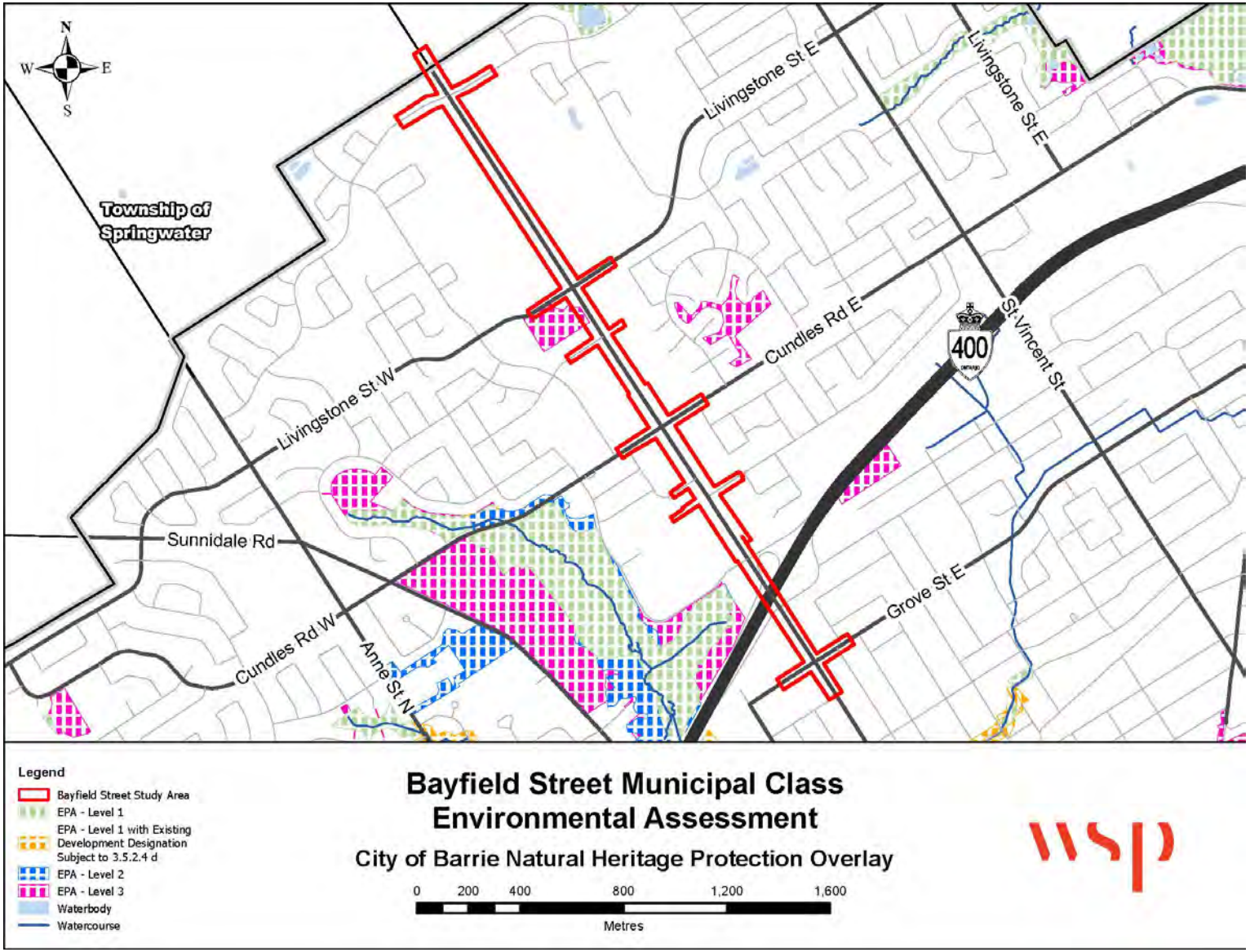
The Natural Heritage System and Greenspace include valleys, water systems, and their associated tablelands that are essential to the landscape and the community – they contribute to the overall environmental and social values and health of the city and wider region.

The natural heritage protection overlay (**Exhibit 2-4**) policies apply in addition to the land use designations. Within the study area, an Environmental Protection Area – Level 3 is identified.

Environmental Protection Area – Level 3

Level 3 resources represent more regionally or locally significant features and supporting components of the Natural Heritage System network including: regionally significant life science areas of natural and scientific interest; woodlands greater than 0.5 hectares and less than 4.0 hectares; woodlands within 30.0 metres of a Level 2 feature; wetlands less than 0.5 hectares in size; cultural thicket or meadow communities contiguous with woodland and wetland patches; and connectivity linkages.

Exhibit 2-4: Natural Heritage Protection Overlays



MOBILITY NETWORK ELEMENTS

Highway 400

To guide the function of Highway 400, as well as appropriate development adjacent to the highway, the following policies apply:

- The City will work with the Province to secure improvements to accommodate the City's broader mobility network objectives, including to existing and new Highway 400 interchanges and at Strategic Growth Areas.
- The City will work with the Province to ensure the use and function of Highway 400 as a regional transportation corridor and gateway to northern Ontario by optimizing the municipal road network to accommodate intra-city passenger and goods movement travel needs
- The City will work with the Province to provide restoration and enhancement of the landscape within and adjacent to the right-of-way of Highway 400

Arterial Streets

Bayfield Street is classified as an Arterial Street, designed to carry the highest vehicle volumes. To guide the function of arterial streets, as well as appropriate development adjacent to these streets, the following policies apply:

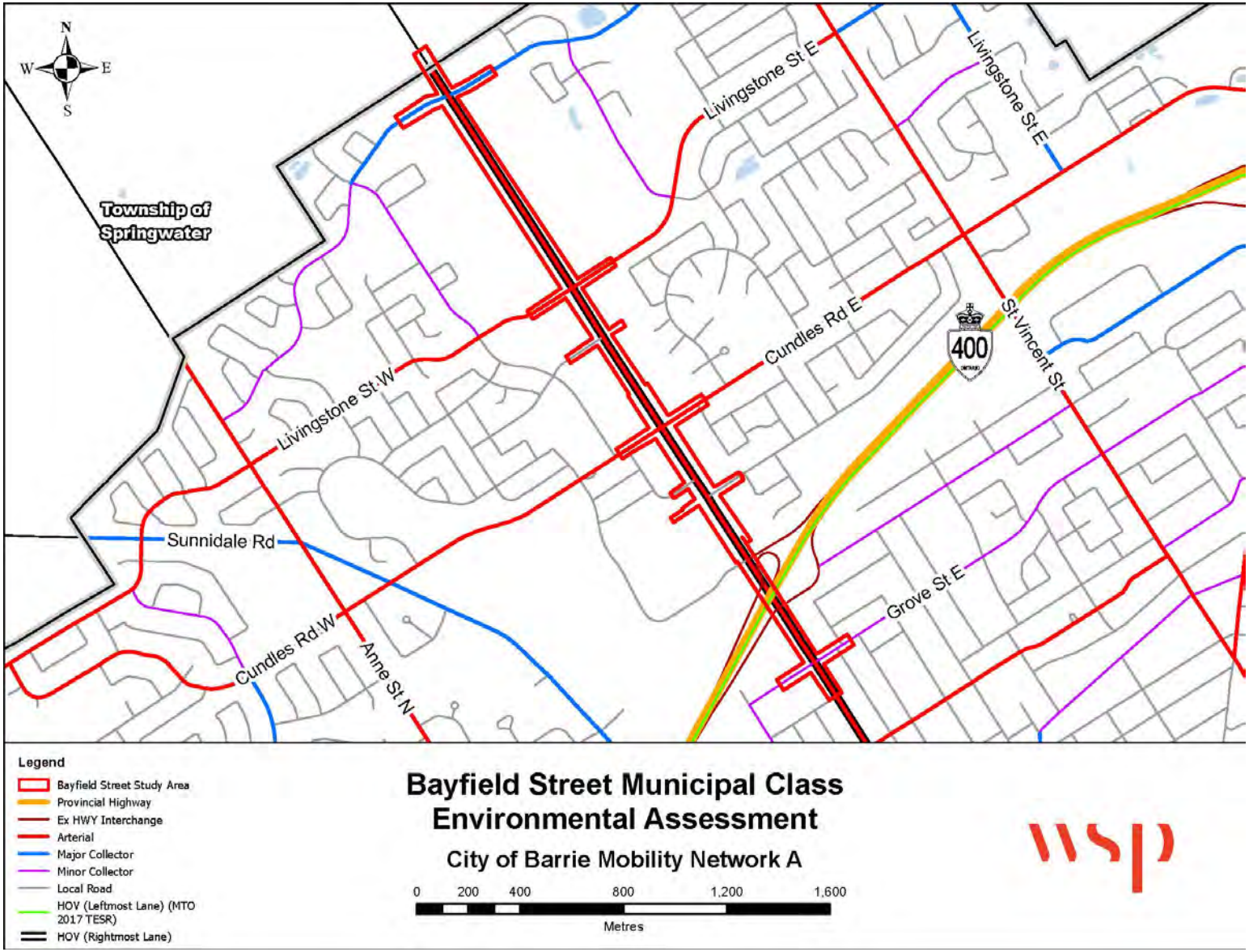
- Arterial streets will be planned and designed to respond appropriately to the community and urban structure and shall follow the complete streets and relevant urban design policies set out in this Plan
- Arterial streets will be designed to accommodate all transportation modes, and, where necessary and/or feasible, high-occupancy-vehicle (HOV) or bus lanes and separate bike lanes
- Construction and redevelopment of arterial streets shall incorporate the ACES-ready design elements as identified in this Plan and the City's engineering standards

Access to arterial streets will be carefully controlled and managed following industry best practices. Accordingly, arterial street access:

- Should be avoided wherever possible and should be made via the closest collector street. Direct access will only be considered in instances where no other feasible alternatives exist and the approval of such access is in the best interest of the City, based on planning and engineering objectives (feasible alternatives include the establishment of a mutual access agreement with neighboring properties or purchase of an easement to utilize existing access on an adjacent property)
- May be restricted when the arterial street has 4 lanes or more (or is planned for 3 lanes or more)

- Will be restricted to right-in/right-out when the arterial street has 6 lanes or more (or is planned for 6 lanes or more)
- Will be restricted to right-in/right-out when access is in proximity to signalized intersections
- Will not be permitted for individual residential driveways
- Accesses and intersections requiring signalization shall be planned to provide 400.0 metre spacing between adjacent signalized intersections, though the City may consider reduced spacing in the Urban Growth Centre

Exhibit 2-5: Mobility Network



Active Transportation Elements

Active transportation is an important form of transportation that the City strongly supports through the development of a complete, connected, diversified and equitable transportation network (see **Figure 8**). Relevant policies related to the cycling network include:

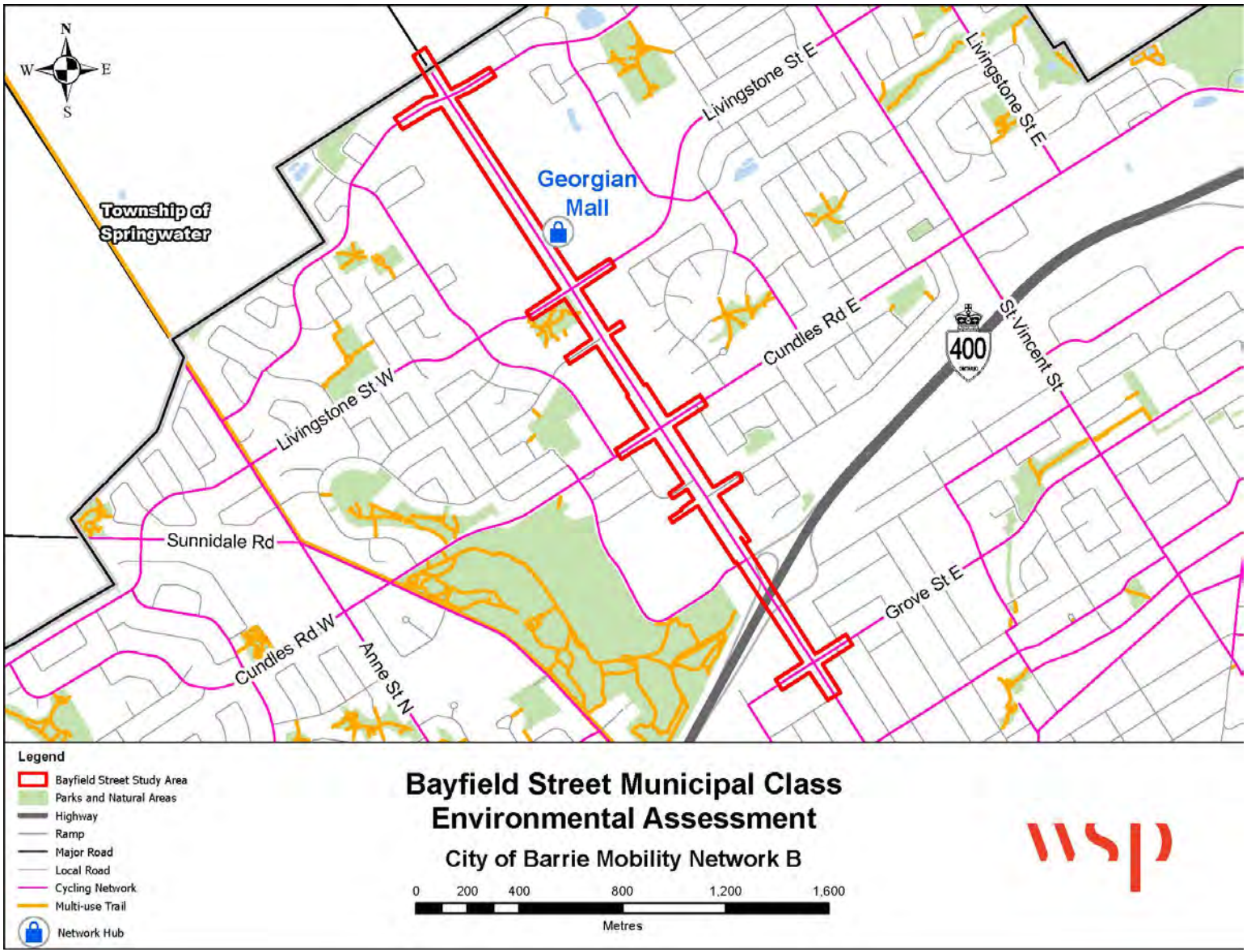
The cycling network is part of the active transportation network and shall be planned as part of the larger mobility network. With few exceptions, all arterial and collector streets shall be designed to incorporate dedicated cycling facilities and/or paved shoulders wherever possible

The cycling network includes all types of cycling facilities within road corridors as well as off-road trails through parks and other natural areas to provide direct routes as well as to enhance recreational opportunities

The City will strive to include cycling facilities on Highway 400 crossings where feasible

The City will strive to include cycling facilities as part of corridor reconstruction projects (on collector streets and arterial streets) wherever feasible and all new corridors shall include cycling facilities (following recommendations contained within the Transportation Master Plan).

Exhibit 2-6: Mobility Network B



Mobility Network

Barrie's mobility network is built upon a hierarchy of transportation infrastructure elements. Each infrastructure element has a specific role and performance metrics, including traffic volume, right-of-way (ROW) width, and capacity for transit, cycling, and walking. Policies relevant to this study include:

The plan to 2051 for the mobility network is identified in **Exhibit 2-5** and **Exhibit 2-6**. The planned mid-block right-of-way (ROW) widths are shown in Exhibit 2-7.

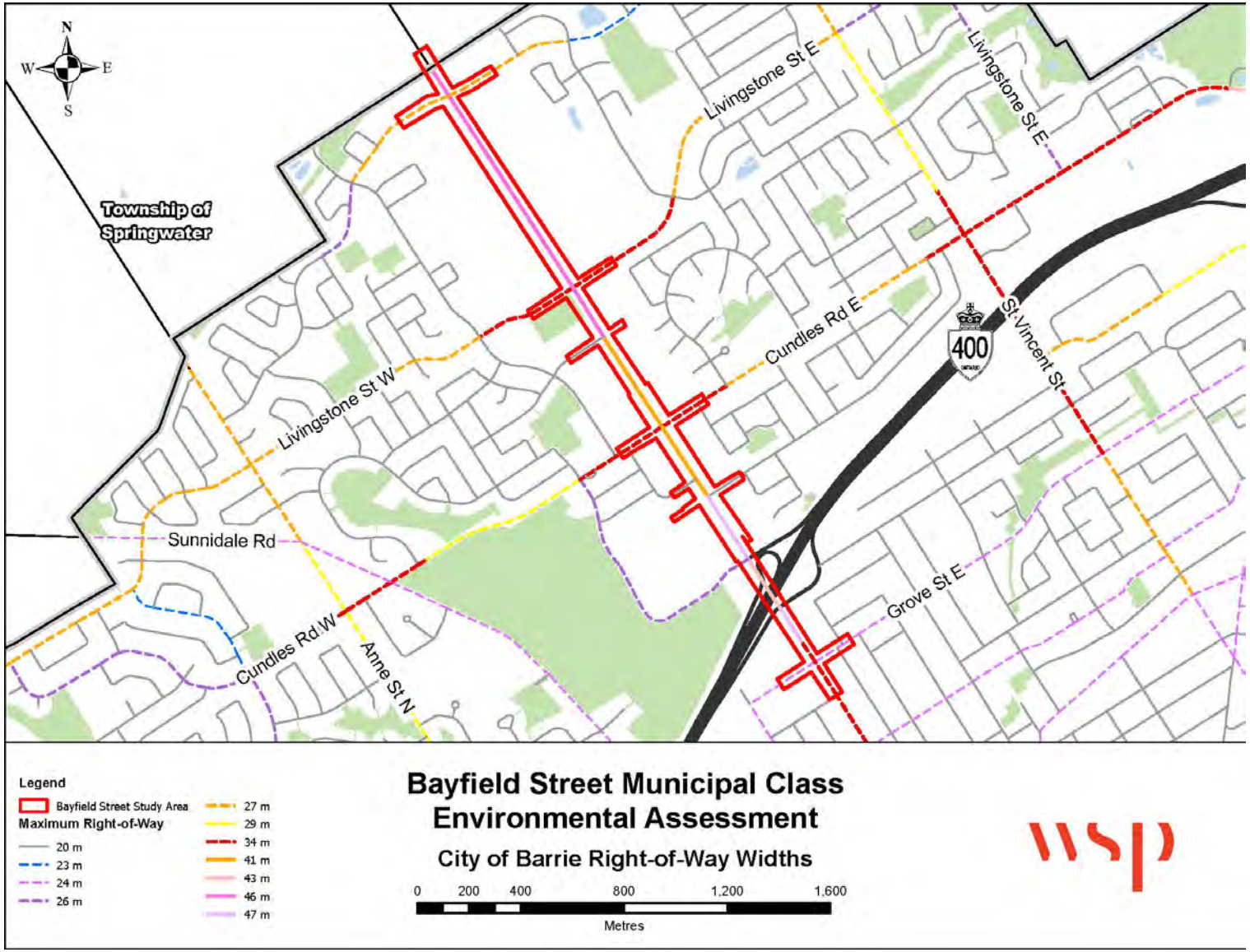
Road widenings will generally align with the mid-block right-of-way widths identified in **Exhibit 2-7**. The future corridor protected right-of-way widths along Bayfield Street are as follows:

- Grove Street to ±100 m north of Grove Street – 34 m
- ±100 m north of Grove Street to Rose Street/Highway 400 – 47 m
- Coulter Street to Ferris Lane – 47 m
- Ferris Lane to Heather Street – 41 m
- Heather Street to Hanmer Street – 46 m

In some cases, road widenings may be in excess of the mid-block right-of-way widths identified in **Exhibit 2-7** to accommodate:

- Intersection improvements associated with, but not limited to, daylighting triangles, auxiliary lanes, transit priority lanes, and active transportation:
- Realignment of offset intersections
- Highway interchanges or crossings
- Active transportation
- Municipal infrastructure
- Additional lands required to accommodate grading for any of the preceding items
- Any other Transportation Master Plan road widening requirements

Exhibit 2-7: Right-of-Way Widths

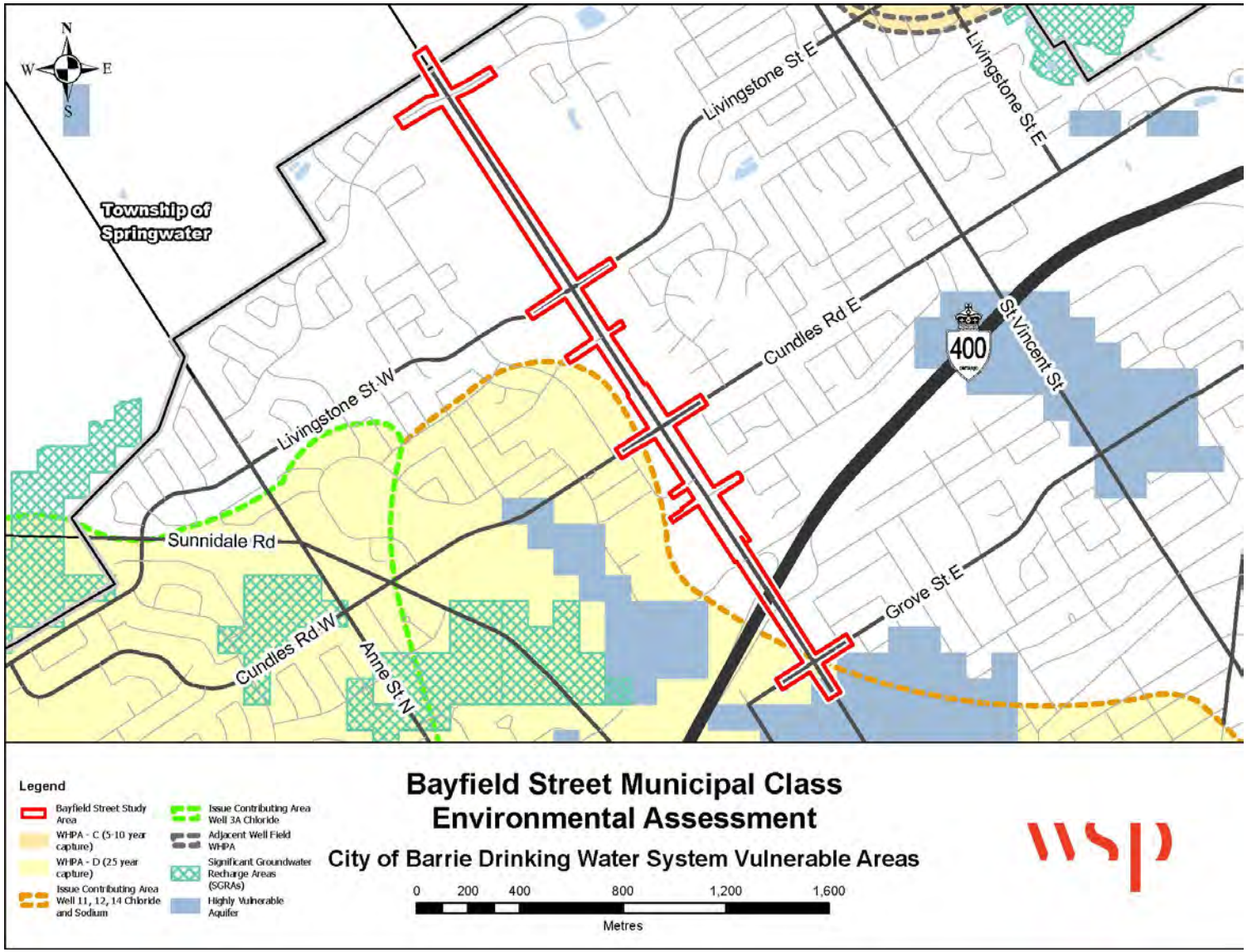


Drinking Water Policies

To protect vulnerable areas, identified in **Exhibit 2-8**Error! Reference source not found.**,** as wellhead protection areas, intake protection zones and issues contributing areas, the City of Barrie's Official Plan prescribes that all run-off, except for clean run-off, is to be directed outside of vulnerable areas or to storm sewers.

Any lands shown **Exhibit 2-8**as located within the boundary of a conservation authority are also subject to the policies of those authorities.

Exhibit 2-8: Drinking Water System Vulnerable Areas



2.2.2 City of Barrie Comprehensive Zoning By-Law, 2009

As of 2024, the City of Barrie is in the process of creating a new comprehensive Zoning By-law, designed to implement the vision and policies of the City's recently approved Official Plan (December 2023).

The applicable areas impacted in the Bayfield Street corridor (see **Exhibit 2-9**) and their respective zoning by-law provisions with regards to permitted land uses are listed below.

RESIDENTIAL

Residential Apartment Dwelling First Density (RA1)

- Permitted uses include, dwellings: apartment, converted, semi-detached duplex, single detached, and three or more-unit, boarding/ lodging/ rooming house (large and small), walk-up apartment, bed and breakfast, childcare, home occupation, second suite, assisted living facility, dormitory, group home, library, place of worship, social services facility

Residential Multiple Dwelling First Density (RM1)

- Permitted uses include, dwellings: converted, semi-detached duplex, and single detached, boarding/ lodging/ rooming house (small), bed and breakfast, childcare, home occupation, detached accessory dwelling unit, second suite, group home, and place of worship

Residential Multiple Dwelling Second Density (RM2)

- Permitted uses include, dwellings: converted, semi-detached duplex, single detached, and three or more-unit, boarding/ lodging/ rooming house (large and small), block/cluster/street/stacked townhouse, walk-up apartment, bed and breakfast, childcare, home occupation, detached accessory dwelling unit, second suite, assisted living facility, dormitory, group home, library, place of worship, social services facility

COMMERCIAL

Transition Centre Commercial (C2)

Permitted uses include:

- Commercial: automotive service station, bakery, bank, hospitality, retail, transportation, event venues, fitness centers, florist and garden supply, funeral services, healthcare, data processing centre, trade centre, parking lot, and various service establishments
- Institutional: arena, art gallery, assembly hall, assisted living facility, city hall, college, university, commercial school, community centre, childcare, library, place of worship, and social services facility

- Residential: Dwelling Unit(s) in conjunction with permitted commercial uses except defined automotive uses, group home

Shopping Centre Commercial (C3)

Permitted uses include:

- Commercial: arcade or game establishment, automotive repair and service stations, bakery, bank, hospitality, retail, transportation, event venues, fitness centers, florist and garden supply, healthcare, kennel, data processing centre, parking lot, and various service establishments
- Institutional: art gallery, assembly hall, commercial school, community centre, childcare, library, place of worship, and social services facility
- Residential: Dwelling Unit(s) in conjunction with permitted commercial uses except defined automotive uses

General Commercial (C4)

- Permitted uses include:
- Commercial: adult entertainment, automotive services, bakery, bank, hospitality, recreational facilities, retail, transportation, event venues, fitness centers, florist and garden supply, funeral services, healthcare, data processing centre, trade centre, parking lot, marina, and various service establishments
- Institutional: arena, art gallery, assembly hall, commercial school, community centre, childcare, library, place of worship, and social services facility
- Residential: Dwelling Unit(s) in conjunction with permitted commercial uses except defined automotive uses

INSTITUTIONAL

Institutional (I)

- Permitted uses include: assembly hall, assisted living facility, child care, community centre, group home, library, medical office, place of worship, private academy/ philanthropic or religious school, social services facility, training and rehabilitation centre; accessory residential uses in conjunction with permitted institutional uses

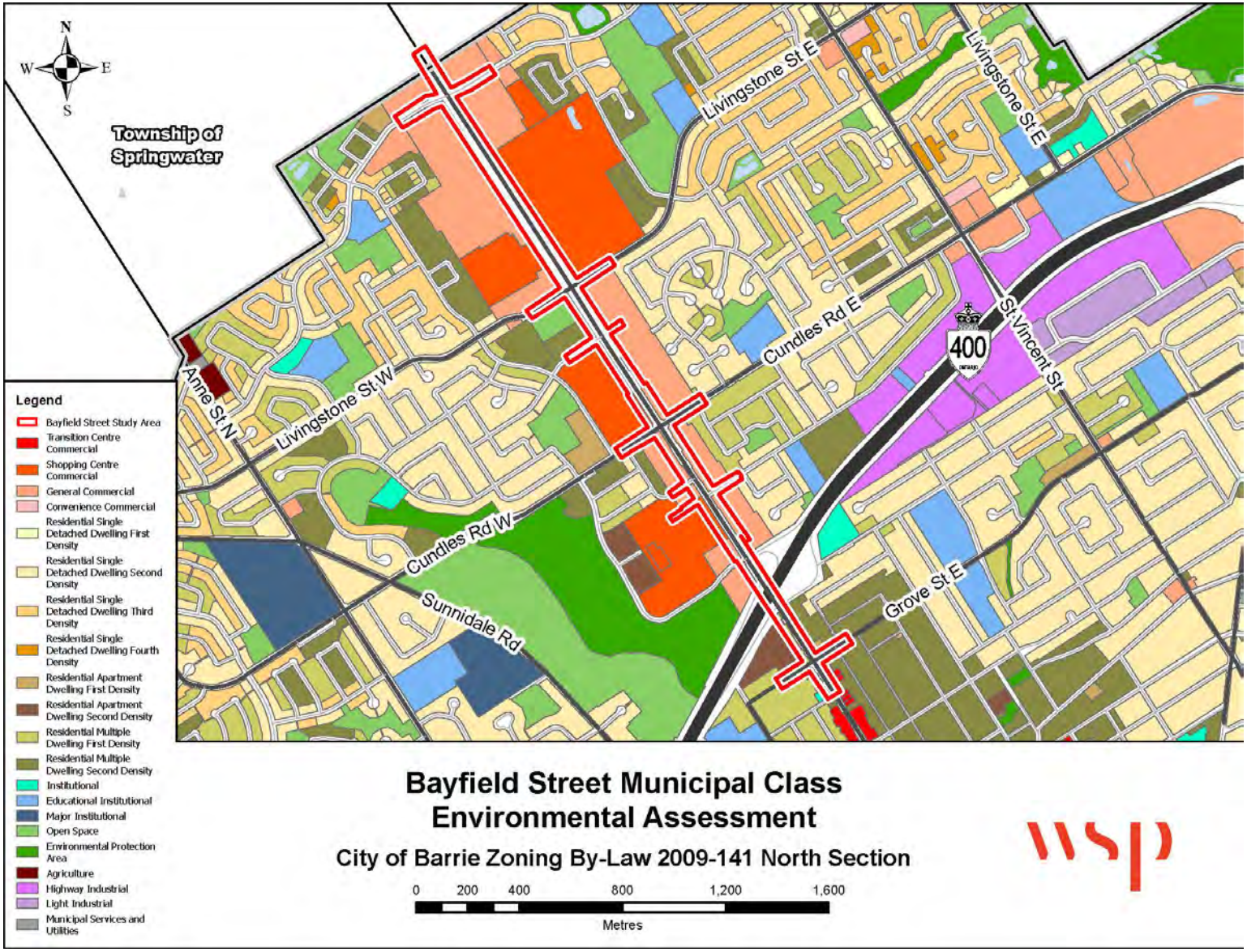
OPEN SPACE

Open Space (OS)

- Permitted uses include:

- Active: art gallery, bandstand, boat house, bowling green, golf, marina, interpretive centre, park, picnic area, playground/field/court, community centre, swimming and wading pool, skating rink, yacht club
- Passive: ecological management measures, environmental monitoring and conservation, lookout points, naturalized buffer, natural restoration and enhancement activities, nature and bicycle trails, cross-country skiing

Exhibit 2-9: Zoning By-Law 2009-141 North Section



2.2.3 City of Barrie Transportation Master Plan (TMP), 2019

2.2.3.1 City of Barrie TMP – Transportation Policy

Prepared for the City of Barrie by WSP (2019), the Transportation Master Plan (TMP) outlines the City's vision for all modes of transportation, identifying current gaps and growth-related needs. It evaluates various network alternatives and proposes a recommended action plan for all modes of transportation. The study area spans the entire City of Barrie, including approximately 2,300 hectares of land added in January 2010. This section summarizes key recommendations from the Transportation Master Plan.

The City of Barrie, located along the western shores of Lake Simcoe, has been one of the fastest growing communities in all of Canada. With the addition of the secondary plan areas to the southern portion of the City, the current population is expected to grow from approximately 145,800 to 253,000 persons by 2041.

The TMP examined the current natural and social environment of the City of Barrie, as well as the economic environment of the City. It also accounted for the following transportation infrastructures within the City of Barrie:

- Active transportation;
- Public transportation;
- Motorized transportation; and,
- Railway crossings.

The City of Barrie needs a transportation system that will accommodate growth to 2041. The opportunity exists to plan a transportation system which:

- is safe, efficient and accessible with choices in mobility;
- fosters the use and development of a sustainable transportation network;
- provides a public transit system that can offer a real alternative to private automobile use; and,
- provides a network of on-road and off-road pedestrian and cycling facilities that allow the use of active transportation modes as an alternative to the automobile.

The Master Plan considers other planned transportation projects that will have an impact on the City of Barrie's transportation network. To analyze the impact of growth on the City's road network, traffic models were developed to assist in determining where improvements to the transportation network need to occur.

Highway 400 Interchanges

A traffic assessment of all current Highway 400 interchange ramp terminals and adjacent major intersections within the City was conducted. The assessment included intersection capacity analysis using Synchro and SimTraffic software and revealed that the Bayfield intersection was

among several interchanges currently experiencing some capacity constraints at the following locations on Bayfield Street at:

- Bayfield Street and Ferris Lane;
- Bayfield Street and Coulter Street/ Highway 400 southbound off-ramp;
- Bayfield Street and Highway 400 northbound ramp;
- The 2017 MTO TESR Update identified road capacity and network improvements on Highway 400 corridor and interchanges, including at the Bayfield Interchange:
- A modified Parclo A/ Diamond with geometric improvements;
- Eliminate connection from Rose Street to the northbound on-ramp and Bayfield Street;
- Widen Bayfield Street to 6 lanes see (Exhibit 2-10).

Additionally, changes in MTO-Recommended improvements includes the Highway 400 Corridor – Bayfield Interchange, where the bridge structure and 2 additional lanes of motor vehicle is recommended.

Table 2-1 shows the proposed improvements to Highway 400 interchange ramps and crossings that differ from the recommendations in the MTO 2017 TESR update.

Table 2-1: Proposed Improvements to Highway 400 Interchange Ramps and Crossings, Horizon 2041

Highway 400 Interchange/ Crossing	Location	2016 Network	MTO 2017 TESR Update	2018 TMP Proposed Network
Proposed HOV at Interchanges				
Bayfield Street Interchange	Bayfield Street	No HOV	No HOV	Convert 2 General Purpose Lane to HOV

Anticipated that further traffic studies, feasibility studies or reviews will be required at several locations to validate the extent and impact of said improvements.

Table 2-2 summarizes the proposed changes to the recommendations of the 2014 MMATMP and additional road improvements, as well as the road improvements identified in the 2014 Multi-Modal Active Transportation Master Plan (MMATMP).

Table 2-2: Proposed Improvements, Horizon 2041

Road	From	To	Road Classification	2016 Network	2019 TMP Proposed Network	Changes from 2014 MMATMP
Bayfield Street	City Northwest Limits	Cundles Road	Arterial	6 lanes + TWLTL	6 lanes (including 2 HOV) + TWLTL	No
Bayfield Street	Cundles Road	Highway 400 SB Off- Ramp	Arterial	4 lanes + TWLTL	6 lanes + TWLTL	No
Bayfield Street (Highway 400 Crossing)	Highway 400 SB Off-Ramp	Highway 400 NB Off-Ramp	Arterial	4 lanes + TWLTL	6 lanes + TWLTL	No
Bayfield Street	Highway 400 NB Off-Ramp	Grove Street	Arterial	4 lanes	4 lanes + TWLTL	No
Bayfield Street	Grove Street	Sophia Street	Arterial	4 lanes	4 lanes + TWLTL	1 new TWLTL

TWLTL=Two-way left turn lane

High Occupancy Vehicle (HOV) Lanes and Transit Priority

Additionally, the 2019 TMP recommends HOV Lanes and Transit Priority along Bayfield Street. The corridors will connect transit hubs and will be enhanced with transit priority measures to complement the HOV networks (see **Exhibit 2-11**). It is important to note that HOV lanes are not roadway widening, but are conversion of existing or future proposed lanes. The proposed HOV lanes on City's roads are curbside (rightmost) travel lanes to be used by transit vehicles, as well as vehicles carrying two or more people. It is intended that the implementation of Transit Priority network would use the recommended HOV lanes along the Bayfield Street corridor.



Exhibit 2-10: Number of Proposed Lanes, Proposed Network - 2041

City of Barrie Transportation Master Plan

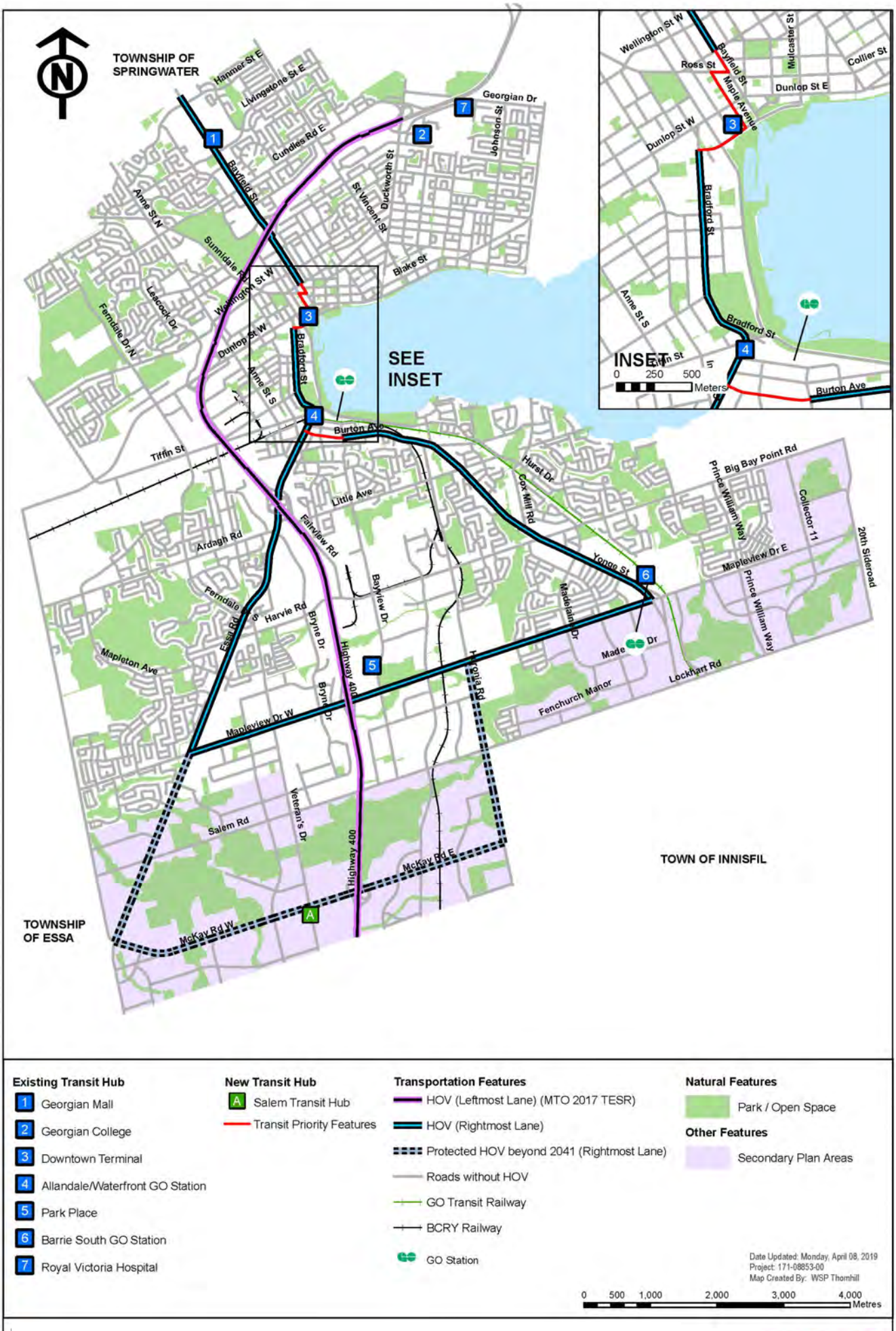


Exhibit 2-11: Recommended High Occupancy Vehicle (HOV) Corridors

City of Barrie Transportation Master Plan

Table 2-3 outlines the road sections, indicating the total number of travel lanes where HOV lanes are proposed, along with the changes in HOV lane configurations compared to the 2014 MMATMP.

Table 2-3: Proposed HOV Lanes, 2041

Road	From	To	2018 TMP Proposed Road Network	Including 2 HOV Lanes?	Included in 2014 MMATMP Recommended Network?
Bayfield Street	City Northwest Limits	Rose Street / East Ramp Terminal	6 lanes + TWLTL	Yes	Yes
Bayfield Street	Rose Street / East Ramp Terminal	Sophia Street	4 lanes + TWLTL	Yes	NEW

Road Improvements

The TMP recommends major improvements that are critical to address capacity needs and are required for prioritization, including the widening of Bayfield Street from Cundles Road to Grove Street by 2031. The TMP also recommends traffic calming on Bayfield Street through the reallocation of roadway space to other modes, such as cycling or transit, between Hanmer Street East from Stanley Street to Bayfield St: 4 Lanes to 2 Lanes + TWLT + Bike Lanes

Intensification Areas

Several zones have been designated for intensification to foster mixed-use communities, promoting higher population and employment densities, favoring transit-oriented development, and decreasing dependence on automobiles. The intensification corridors for Bayfield Street are as follows:

- Primary Corridor: Bayfield Street from Highway 400 to Sophia
- Secondary Corridor: Bayfield Street from Northern Limits to Highway 400
- Primary Node: Bayfield / Grove
- Secondary Node: Bayfield/Cundles, Bayfield/Livingstone

2.2.3.2 *City of Barrie TMP – Active Transportation Strategy*

The TMP recognizes that implementing active transportation infrastructure in intensification areas, such as Bayfield Street, can offer individuals of all ages and abilities, accessible and

equitable mobility options. Bayfield Street is currently not a route that is widely used by active transportation users.

The City of Barrie is serviced by its local bus service, Barrie Transit, operating 11 two-way fixed routes covering the city and surrounding municipalities (Borden). Barrie Transit offers 15-minute corridor service on major routes like Bayfield Street and Yonge Street. It also links to all GO Train hubs in Barrie. The service operates around 48 conventional transit buses and caters to roughly 2.7 million passenger trips annually.

Select areas in the City's preferred active transportation network lack planned capital or road projects. In these spots, the proposed on-road facilities might require road reconstruction or property acquisition. On Bayfield Street from Cundles Road East to the City of Barrie boundary, cycle tracks are proposed (see **Exhibit 2-12**).

As part of this recommendation, the TMP directs the City to undertake a two-phase Corridor Planning and Municipal Class EA Study for Bayfield Street to assess the future land-use and built-form goals.

As part of this study, the City is recommended to assess the feasibility of constructing a trail bridge parallel to the Highway 400 / Bayfield interchange. This bridge would span over Highway 400, connecting Toronto Street to Coulter Street. The proposed bridge could provide an alternate active transportation connection from Bayfield Street, and connect users to existing trails, and current and future development.

The City is also directed to assess a road diet on Bayfield Street between Hanmer Street East from Stanley Street for the purposes of accommodating bike lanes.

As part of the Bayfield MCEA Study, these recommendations will be developed into alternative planning solutions and, if applicable, alternative design concepts, and evaluated against transportation and environmental criteria to determine their appropriateness.

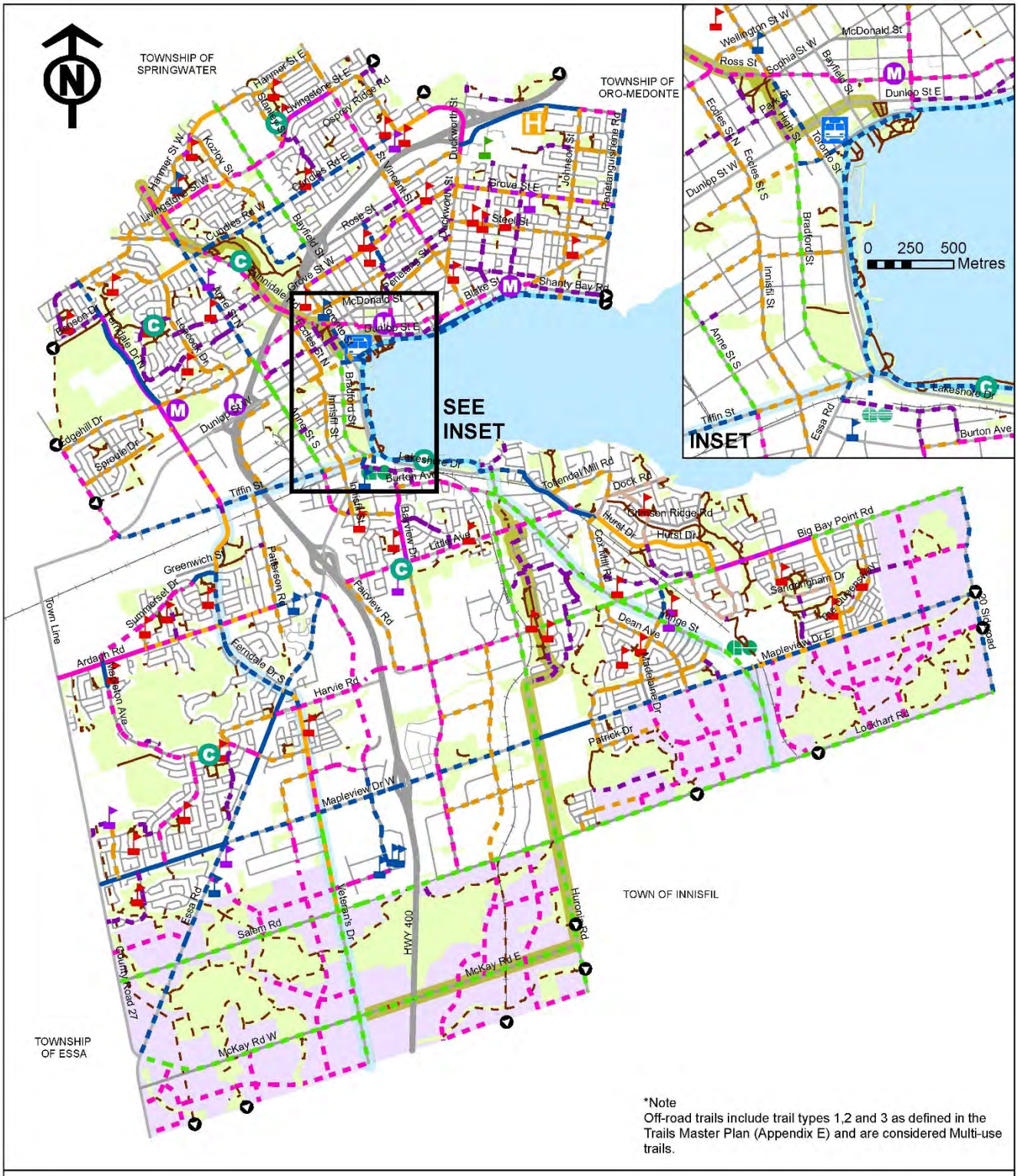


Exhibit 2-12: Cycling and Multi-Use Trail

City of Barrie Transportation Master Plan

2.2.3.3 *City of Barrie TMP – Transit Technical Memorandum*

The following Barrie Transit routes operate through Bayfield Street:

- Route 1 Welham/Georgian Mall: operates between Park Place and Georgian Mall and travels along Welham Road, Huronia Road, Little Avenue, Bradford Street, Maple Avenue and Bayfield Street.
- Route 4 East Bayfield/South GO: operates between Barrie South GO Station and East Bayfield between Hammer Street and Livingstone Street and travels along Prince William Way, Big Bay Point Road, Hurst Drive, Bradford Street and Bayfield Street.
- Route 7 Bell Farm/Bear Creek: operates between Park Place and Georgian College and travels along Mapleview Drive, Mapleton Avenue, Ardagh Road, Patterson Road, Tiffin Street, Bradford Street, Maple Avenue, Bayfield Street, Grove Street and Bell Farm Road.

Transit operations will be considered as part of the Bayfield Street MCEA study.

2.2.4 City of Barrie Transit Vision Plan, 2021 – On-Going

Development of the Barrie Transit Vision began in 2021 and is currently in the process of development. The Transit Vision will largely be based off foundation built in the City of Barrie Transportation Master Plan 2019 developed by WSP.

The Transit Vision focuses on creating:

- **A new 2025 transit network** that considers a comprehensive assessment of the current transit network and includes adjustments to improve mobility for residents of Barrie while maintaining operational cost-neutrality from existing funding.
- **Future planning past 2025** to ensure that the transit network is resilient as Barrie grows and changes.
- **A Bus Stop Infrastructure Plan** in efforts to align new bus stops and bus stops improvements with the new network and future development.

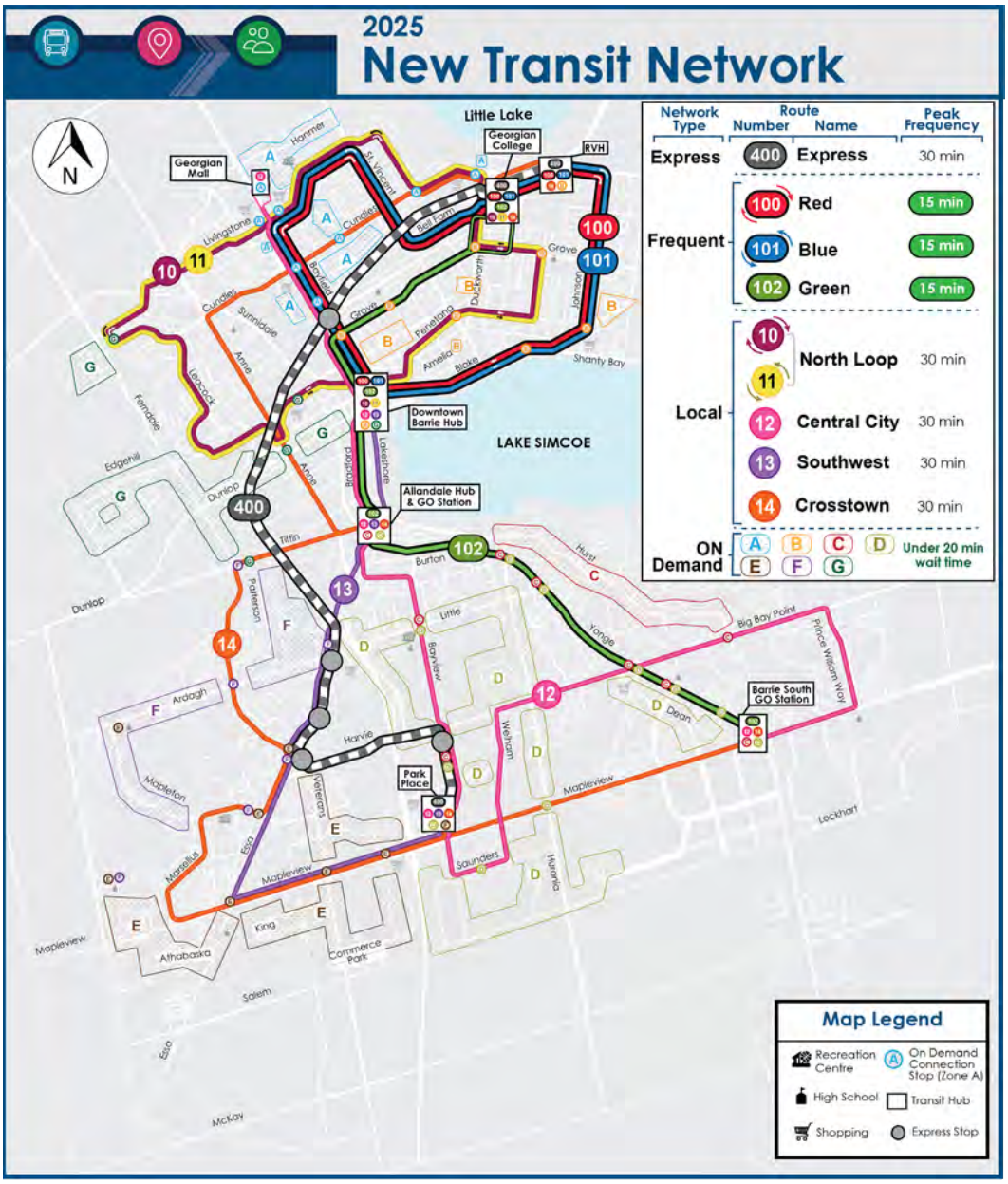
On June 21, 2023, City Council approved the implementation of a new transit network for Barrie. The development of new transit network was part of the Transit Vision project. Key highlights of the new network include improved frequency, reduced trip times, better access to employment areas, coverage to new areas of the city and improved travel freedom for riders. A new transit network is to be implemented in two phases with first phase beginning in 2024 and second phase expected for completion in 2025. The new transit network will provide the following:

1. Express service: Directly connecting users between Bayfield Street, Essa Road, Royal Victoria Regional Health Centre (RVH) / Georgian College and Park Place via a bus route on Highway 400.
2. Frequent services: 70% of existing transit customers will have access to a 15-minute frequent route for a portion of their trip.

3 Trip times: There will be an approximate 13% reduction in cross city transit trips.
4 Employment access: Residents will have access to 24% more jobs within 30-minute transit travel time.
5 New transit coverage in the following areas: King, Caplan, Benson, Hanmer, Lakeside Terrace, Amelia and Morrow.
6 Capital budget reduction: The new transit network would result in a shift in peak vehicle needs resulting in more than $10 million in capital cost savings for purchasing or replacing vehicles within the 10-year plan.
7 Operating budget cost neutral: Service changes are designed to be cost neutral in terms of operating hours due to the Transit ON Demand service model which enables service to efficiently maintain and expand coverage in areas of the city with low transit demand.
8 Improved travel freedom: The new network looks to connect as many people to as many destinations possible.

The new transit network, shown in **Exhibit 2-13**, envisions 15-minute service along the Bayfield Street corridor. This includes 4 transit routes travel through the Study Area, while 4 transit routes intersect Bayfield Street.

Exhibit 2-13: Barrie Transit Proposed 2025 Network



2.2.5 City of Barrie Climate Change Adaptation Strategy, 2017

While climate change is being experienced across the globe, the impacts on natural and human systems are being felt at the local level. The City of Barrie recognizes the threat that climate change poses, both to its community and to City operations. While the City is already undertaking mitigation efforts to reduce greenhouse gas emissions, adaptation efforts are also needed to increase local resilience to the consequences of climate change. The purpose of the

Climate Change Adaptation Strategy is to mainstream adaptation actions into City operations and to reduce the risks climate change poses to Barrie's physical, economic, social, and ecological systems.

The development of this Strategy was guided by ICLEI's (Local Governments for Sustainability) Canada's Building Adaptive and Resilient Communities Program, a 5-Milestone adaptation planning framework for local governments. The planning process was complimented by extensive cross-departmental and community engagement. This ensured that impacts and actions identified were a priority both to the City, as well as to the community as a whole.

Research on local climate projections identified over 60 climate change impacts for Barrie. Risk and vulnerability assessments narrowed them down to 28 priorities. The City brainstormed adaptation actions through surveys, workshops, and national best practice reviews. After analysis by the Project Team, 59 priority actions were selected for the Strategy.

These actions align with the seven goals of the Strategy, which outline the high-level intentions that Barrie will strive towards:

- Maintain Public Health and Safety
- Minimize Risks to Buildings and Properties
- Strengthen Infrastructure Resilience
- Help Local Businesses and the Tourism Industry Adapt to Changing Conditions
- Protect Biodiversity and Enhance Ecosystem Functions
- Minimize Disruption to Corporate Services
- Build Community Resilience

A sample list of actions that are applicable to the Bayfield Street MCEA Study are:

- CC.2 Integrate climate change considerations into Barrie's existing plans and policies (e.g. Multi-Modal Transportation Plan, Transportation Master Plan, Emergency Management Plan, etc.)
- 1.7 Consider impacts and risks of increased disease vectors in design of storm water infrastructure (e.g. avoiding ponding/standing water).
- 2.2 Develop an education and incentive program to promote lot level storm water controls (e.g. rain barrels, rain gardens, down spout disconnections etc.,)
- 7.6 Create naturalized and edible landscapes on City land using existing resources.

A preliminary implementation schedule was created for prioritized actions to ensure prompt and effective implementation. This flexible schedule allows adjustments based on changing data, funds, or staff availability during the adaptation planning process.

The Strategy ensures the City adapts to climate change effectively, using best climate science and local insights. The City will maintain community collaborations and integrate adaptation into daily operations during implementation.

2.2.6 City of Barrie Inspiring Climate Change Action in Barrie: Community Energy and Greenhouse Gas Reduction Plan, 2022

Climate change is associated with various environmental, health, and economic impacts, each affecting members of a community differently. Local climate action can lead to many co-benefits such as shifts to more sustainable behaviors, efficient resource use, enhanced resilience, improved public health, and greener and more sustainable local economies. In 2019, Barrie City Council declared a climate emergency and adopted a Climate Change Mitigation Plan to reach Barrie's corporate GHG emissions target of net-zero by the year 2050. On March 28, 2022, Barrie City Council approved the Community Energy & Greenhouse Gas Reduction Plan. The plan includes actions and strategies for improving energy efficiency and reducing community wide Greenhouse Gas (GHG) emissions.

The Plan aims to promote awareness of current community energy consumption, identify energy efficiency opportunities, and help meet community climate priorities. The Plan contains a vision and principles, Big Moves with associated goals and strategies, and guidance for implementation.

The Vision of the Plan is: The City is adopting a proactive and holistic approach that will provide positive environmental, social, economic, and health benefits for all.

The Plan's Principles are:

- Pursue local climate action for economic benefits;
- Recognize the link between environment, health, and climate action;
- Embrace innovative, evidence-based climate solutions;
- Educate and inspire residents and businesses for environmental change;
- Develop equitable strategies enhancing residents' quality of life;
- Benchmark against best practices for continuous improvement;
- Enable positive environmental actions among Barrie residents; and,
- Collaborate with residents, organizations, and businesses for climate goals.

The Plan outlines four 'Big Moves' - buildings, transportation, circular economy, natural environment and land use:

- Buildings: Near-zero emissions in new and existing buildings;
- Transportation: Near-zero emissions from transportation;
- Circular Economy: Waste reduction through a circular economy; and,

- Natural Environment and Land Use: Livable neighbourhoods that support energy efficiency, mixed-use, complete communities, and environmental protection.

The Plan recognizes that transportation is responsible for more than 55% of the community-wide emissions, with most of this attributed to personal vehicles. The Transportation Big Move involves five strategies that prioritize a shift away from single-occupancy, fossil-fuel-powered vehicles to other modes of travel, listed below:

1 Providing a network of safe streets and trails to promote walking, cycling and rolling; Advancing local transit options as a viable alternative to personal automobile use; Working with Metrolinx to increase GO Train use and provide seamless connections for users in Barrie;
2 Making it more convenient to charge electric vehicles at home and across the city; and,
3 Promoting and supporting car-sharing programs.

The applicable Transportation Big Moves are #1 and #2 in the preceeding list. The Bayfield Street MCEA Study will develop and assess transportation solutions for a complete street design that promotes walking, cycling and rolling, as well as supporting local transit operations.

2.2.7 City of Barrie Drainage Master Plan (DMP), 2019

The Drainage Master Plan (DMP) was adopted in 2019. The DMP is a broad level assessment which details the drainage deficiencies identified in the study area, the respective improvement options, evaluation of alternatives, and the development of a preferred alternative solution for implementation.

The study area includes the entire City of Barrie excluding the Sophia Creek watershed, Mulcaster drainage area and Annexation Lands.

The DMP preferred approach to address the drainage deficiencies includes alternatives applicable to Bayfield Street, which are outlined below.

An assessment of the Stormwater Management Facilities to Reduce Phosphorus Discharges Technical Memorandum (2013) was completed as a component of the Drainage and Stormwater Management Master Plan (DSWMMP) to identify and prioritize stormwater management retrofit opportunities within the City of Barrie with the primary goal of reducing phosphorus discharges. In addition to the recommended Stormwater Management Facilities (SWMF) retrofit opportunities, the assessment provided recommendations for new SWMF's to improve water quality treatment and peak flow attenuation, which includes construction of:

- Retrofit No.17: Kidds Creek Watershed, Southwest of Bayfield St. between Coulter St. and Highway 400, in southeast corner of Sunnidale Park.

Further, the DMP also proposes **Project No. 145 (SWMF Retrofit No. 84 - LTGM):** a stormwater management facility retrofit to increase the permanent pool and active storage volume for water quality treatment and peak flow attenuation. The retrofit will have an overall

positive impact on the project environments and be beneficial to the Little Lake Watershed. The retrofit will require the acquisition lands, including a portion of 509 Bayfield Street.

These recommended retrofits will be considered as part of the stormwater works that will be carried out in support of the Bayfield Street MCEA Study.

2.2.8 City of Barrie Wastewater Collection Master Plan (WCMP), 2019

The Wastewater Collection Master Plan (WCMP) was adopted in 2019 by the City of Barrie. Its purpose is to identify the preferred solution requirements to the year 2041 for collecting and conveying wastewater from homes and businesses to the wastewater treatment facility, with consideration and flexibility for ultimate build-out of Barrie. At the time of this report, an update to the WCMP is being prepared.

The study area for this WCMP includes the entire municipal jurisdiction of the City of Barrie.

The 2019 WCMP is an update to its Water Supply, Water Distribution and Storage, Wastewater Collection and Treatment Plans, required as per the Barrie-Innisfil Boundary Adjustment Act of 2009. The updates outline necessary water and wastewater projects for city growth, covering residential and employment expansion, intensification per Provincial policy, and city-wide servicing design and delivery optimization. The status of the recommendations in the 2013 Master Plan were updated in addition to the identification of new system improvement projects.

A performance assessment of the existing wastewater collection system was completed as part of this study where a hydraulic model was used to assess system performance under various conditions, highlighting areas with capacity issues and improvement needs. Based on the evaluation results, expansion and upgrade of the existing wastewater collection system was identified as the preferred alternative. This includes a 2-year, 5-year, 10-year and 25-year storm existing system performance assessments identified trunk sewer sections, with diameters greater than 375mm, where the depth ratio (d/D) is greater than 0.7 on Bayfield Street.

The recommendations of the WCMP will be considered during the wastewater works that will be carried out in support of the Bayfield Street MCEA Study.

3 Study Area Profile – Existing Conditions

3.1 Transportation

3.1.1 Road Network

The existing road network (see **Exhibit 3-1**) within the preliminary study area includes Bayfield Street which spans across nine intersecting roads and the Highway 400 interchange. The City of Barrie's 2019 TMP provides a classification for each road in the study area.

Table 3-1 lists Bayfield Street and the nine intersecting roads, along with their corresponding classification, from the southern limit of the study area to the northern limit.

Exhibit 3-1: Existing Road Network

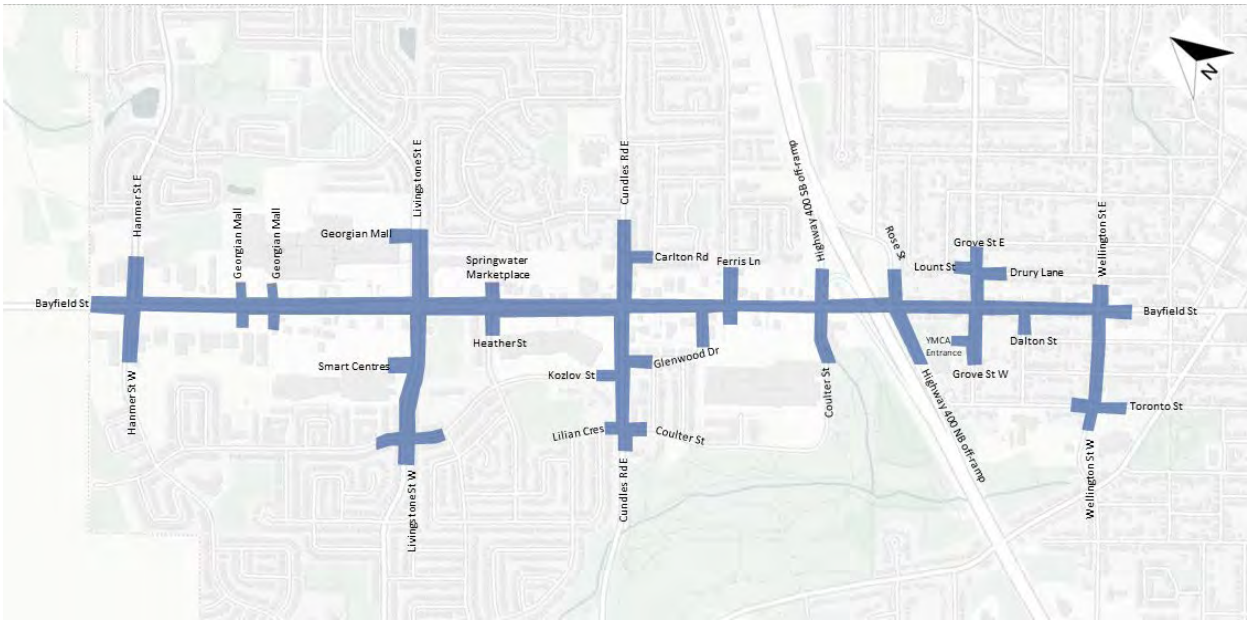


Table 3-1: Road Classifications for Study Area

Road Name	Road Classification
Bayfield Street	Arterial
Grove Street	Minor Collector
Rose Street	Minor Collector
Coulter Street	Local Street
Ferris Lane	Local Street
Glenwood Drive	Local Street
Cundles Road	Arterial
Heather Street	Local Street
Livingstone Street	Arterial
Hanmer Street East, West	Major Collector (East), Minor Collector (West)

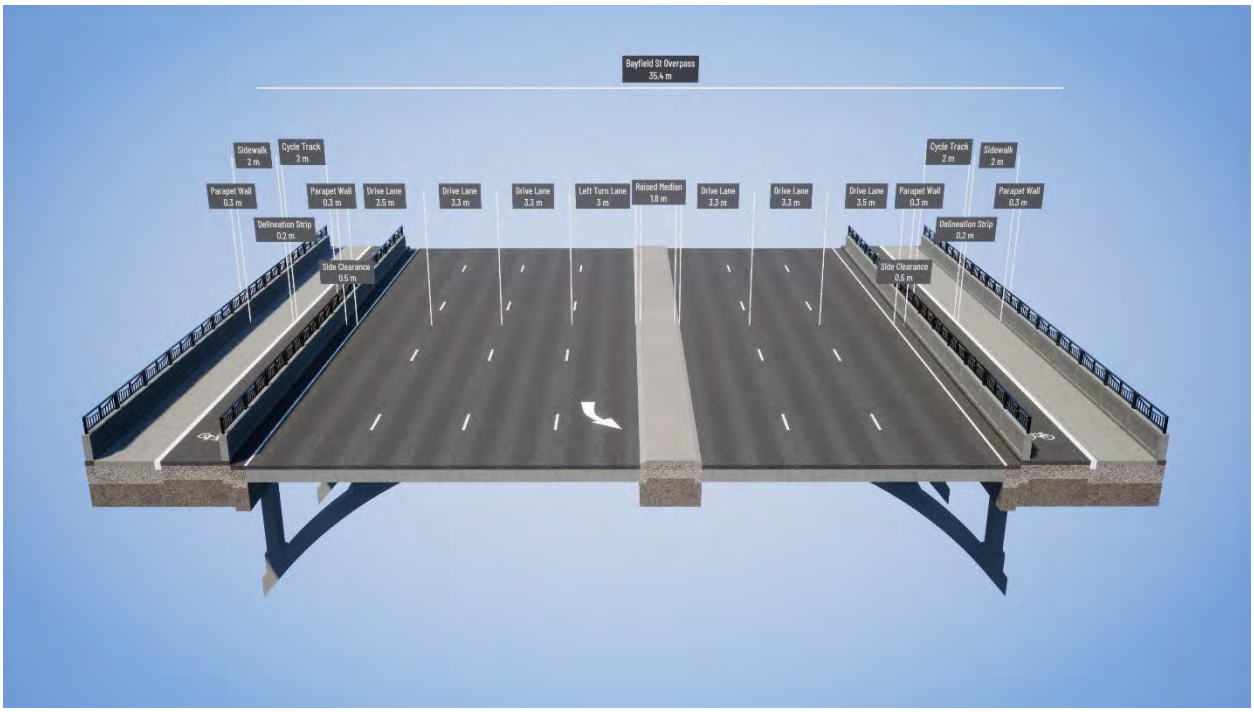
Travelling northbound along Bayfield Street from Grove Street to Rose Street, there are two lanes with the curbside through-right lane allowing right turns onto Rose Street. Although Rose Street leads to an exit onto Highway 400 North, there is no direct access from Bayfield Street to Highway 400 North. Rose Street is planned to be closed by the MTO as part of their future plans for Highway 400. Travelling southbound from Rose Street to Grove Street, there are three lanes approaching the intersection with one through right lane, one through lane and a 60 m-long storage lane for left turns onto Grove Street. The typical existing cross section of Bayfield Street from Grove Street to the Highway 400 interchange is demonstrated in **Exhibit 3-2**.

Exhibit 3-2: Existing Bayfield Street Typical Cross Section (Grove St - Hwy 400)



Within the MTO interchange, travelling northbound along Bayfield Street from Rose Street to Coulter Street, there are two lanes with the curbside lane providing access to the Highway 400 South interchange. Three lanes approach the intersection at Bayfield Street and Coulter Street with two through lanes and one 45 m-long storage lane for left turns onto Coulter Street. Travelling southbound from Coulter Street to Rose Street, the curbside lane provides a channelized right turn onto Highway 400 South. Three lanes approach the intersection at Bayfield Street and Rose Street with two through lanes and one 120 m storage lane for left turns onto Rose Street. MTO is proceeding to detailed design of the interchange based on the TESR recommendations with consideration to the City of Barrie's input for additional Active Transportation facilities. A concept presented to the MTO for consideration is demonstrated in **Exhibit 3-3**.

Exhibit 3-3: Bayfield Street/Highway 400 Overpass Concept



Between Coulter Street and Ferris Lane, there is one through lane and one through right turn lane in both the northbound and southbound directions with a two-way left turn (TWLT) lane median. The TWLT lane transitions into a 50 m dedicated left turn lane when approaching the intersection at Bayfield Street and Ferris Lane. There is an auxiliary right lane in the southbound direction which provides access to retail and commercial developments.

Travelling northbound along Bayfield Street, from Ferris Lane to Cundles Road, there are two through lanes with the curbside lane providing access to commercial developments. Glenwood Drive connects to the west side of Bayfield Street approximately 65 m from the intersection at Bayfield Street and Ferris Lane. From Glenwood Drive to Cundles Road there is a TWLT lane median which transitions to a 45 m dedicated left turn lane approaching the intersection at Bayfield Street and Cundles Road. The roadway is separated by a 40 m-long concrete curb median leading up to the intersection at Bayfield Street and Cundles Road. The existing intersection also features a channelized right turn onto Cundles Road East. Travelling southbound along Bayfield Street from Cundles Road to Glenwood Drive, there is one through lane and one through-right lane which provides access to commercial developments and allows right turns onto Glenwood Drive. The TWLT median breaks at the connection with Glenwood Drive and allows for entry into and exit out of Glenwood Drive from the northbound lanes of Bayfield Street. The median continues south, past Glenwood Drive, and transitions to a 40 m dedicated left turn lane approaching the intersection at Bayfield Street and Ferris Lane. The typical cross section of Bayfield from the Highway 400 interchange to Cundles Road is demonstrated in **Exhibit 3-4**.

Exhibit 3-4: Existing Bayfield Street Typical Cross Section (Hwy 400 – Cundles Road)



There are three lanes in each direction along Bayfield Street, from Cundles Road to Heather Street with an additional TWLT median along the center of the roadway. Travelling northbound along this segment, there are two through lanes and one through-right lane. Travelling southbound along this segment, there are two through lanes and one through-right lane which transitions into a dedicated channelized right turn approaching the intersection at Bayfield Street and Cundles Road. The TWLT median transitions into a 60 m-long dedicated left turn storage lane at the northbound approach for the intersection at Bayfield/Heather and a 65 m-long dedicated left turn lane at the southbound approach for the intersection at Bayfield Street and Cundles Road. There are also 14 m-long concrete medians leading up each intersection.

There are three lanes in each direction along Bayfield Street, from Heather Street to Livingstone Street with an additional left turn median along the center of the roadway. In both directions along this segment, there are two through lanes and one through-right lane approaching each intersection. The left turn median allows a 65 m-long dedicated left turn lane at the northbound approach for the intersection at Bayfield Street and Livingstone Street and a 93 m-long dedicated left turn lane at the southbound approach for the intersection at Bayfield Street and Heather Street. There is a 46 m-long concrete median along the center of the roadway leading up to the intersection of Bayfield Street and Livingstone Street. There is a 15 m-long concrete median along the center of the roadway that is setback 4.5 meters from the stop bar at the intersection of Bayfield Street and Heather Street.

There are three lanes in each direction along Bayfield Street, from Livingstone Street to Hanmer Street with an additional TWLT median along the center of the roadway. In both directions along

this segment, there are two through lanes and one through-right lane approaching each intersection. The TWLT median transitions into a 47m-long dedicated left turn lane at the northbound approach for the intersection at Bayfield Street and Hanmer Street and a 170 m-long dedicated left turn lane at the southbound approach for the intersection at Bayfield Street and Livingstone Street. There are two additional signalized intersections between the two major intersections which allow traffic to enter and exit Georgian Mall as well as other major retail developments along the roadway. The existing lane configurations of each intersecting road is also observed in this section. At Bayfield Street and Grove Street, the eastbound and westbound approaches of Grove Street have one through right lane and one left turn storage lane. At Bayfield Street and Coulter Street, the westbound approach provides one through right lane and one dedicated left turn lane for the incoming one-way traffic from exit 26 on Highway 400 South. Travelling westbound along Coulter Street, there is one right turn lane to the Bayfield Mall access that merges with the shared through lane. The eastbound traffic is not permitted to travel through the intersection due to the highway off-ramp. The eastbound approach provides a shared right-left turn lane. At Bayfield Street and Ferris Lane, the eastbound approach from the Bayfield Mall exit and the westbound approach from Ferris Lane have one through right lane and one left turn storage lane. At the Bayfield Street and Glenwood Drive (unsignalized) T-intersection, Glenwood Drive's eastbound approach provides one shared through-right-left lane in each direction. At Bayfield Street and Cundles Road, the eastbound and westbound approaches of Cundles Road have one through right lane, one through lane and a dedicated left turn lane that transitions from a TWLT median. At Bayfield Street and Heather Street, the eastbound approach from Heather Street and the westbound approach from a retail plaza exit have one through-right lane and one left turn storage lane. At Bayfield Street and Livingstone Street, the eastbound and westbound approaches of Livingstone Street have one right through lane, one through lane and one left turn storage lane. The approaches are also separated by concrete medians along the center of the roadway. At Bayfield Street and Hanmer Street, the eastbound approach of Hanmer Street West has one through-right storage lane, one through lane and one dedicated left turn lane that transitions from a TWLT median. The westbound approach of Hanmer Street East has one dedicated right turn lane that transitions from a shared through-right lane, one through lane and one dedicated left turn lane that transitions from a TWLT median. The typical cross section for Bayfield Street from Cundles Road to Hanmer Street is demonstrated in **Exhibit 3-5**.

Exhibit 3-5: Truck Routes / Restrictions



The City of Barrie's Traffic By-Law (Schedule 14) lists the permissive truck routes throughout the city. Bayfield Street provides a truck route from the northern limit of the city, past Grove Street, to Collier Street. Cundles Road provides a truck route from Anne Street, past Bayfield Street, to Duckworth Street. Glenwood Drive provides a truck route to the Bayfield Mall access from Bayfield Street. Trucks are not permitted past the mall access along Glenwood Drive or on Grove Street East, Coulter Street and Hanmer Street East. There is no signage restricting trucks on Grove Street West, Ferris Lane, Heather Street, Livingstone Street West (from Ferndale Drive North to Bayfield Street), Livingstone Street East (from Bayfield Street to St. Vincent Street) and Hanmer Street West; however they are not listed as permissive truck routes in the City's By-Law.

3.1.2 Transit Network

Barrie Transit currently operates three bidirectional routes along sections of the Bayfield Street study corridor (See **Exhibit 3-6** for route details). These routes operate on weekdays before 5:30 AM until approximately at midnight. The 100-express route (Red and Blue) runs between 7:00 AM and 10:30 PM on weekdays. During peak periods the corridor is served by 7 buses per hour, resulting in an average service frequency of 8-10 minutes. In off-peak times the frequency drops to 3 buses per hour with an average wait time of 20 minutes. The combined daily ridership for all routes along the Bayfield Street corridor is 5,800 boardings.

The segment of Bayfield Street between Wellington Street and Grove Street (south of the study corridor) is served by Route 7. Additionally, Routes 6 and 8 cross the corridor along Livingstone Street.

Exhibit 3-6: Barrie Transit System Routes 2023 (Source: City of Barrie, 2023)



The Bayfield Street Corridor plays an important role for Barrie Transit as it is defined as one of the City's intensification corridors. It runs directly through a defined growth area and provides a direct connection to the urban growth centre. The corridor contains three of the system's express stops and offers Barrie Transit routes a seamless connection between two transit hubs:

the Georgian Mall Transit Hub located at the northern end of the corridor and the Downtown Transit Hub located at the southern end of the corridor, beyond the study area limits. Routes 1 and 4 additionally continue south to serve Allandale Waterfront GO Rail station (with onward inter-regional rail and bus services), Park Place (Route 1) and Barrie South GO (Route 4). The link to the Downtown Transit Hub is a key aspect for transit system users as all the system's routes converge at the Downtown Transit Hub. The Downtown Transit Hub provides users with the opportunity to transfer onto other routes, enabling connections to various destinations throughout the city.

The Bayfield Street Study Corridor has twelve bus stops; however four bus stops do not have activity information available. The remaining eight bus stops on the corridor Exhibit relatively low activity, averaging between 30-150 boardings and alightings daily. Bus stop activity (boardings and alightings) at all bus stops along the Study Corridor is shown in **Exhibit 3-7**.

Along the Bayfield Street corridor, amenities provided vary depending on the bus stop. Nine of the twelve bus stops on the corridor include a bench and shelter, while the two bus stops located at the Bayfield Street and Coulter Street intersection only provide shelters (no bench) and the stop located on the western side of Livingstone Street West and Bayfield only includes a bench. A map of amenity types and location for bus stops is provided in **Exhibit 3-8**.

All bus stops situated on the Bayfield Street corridor are deemed as accessible. **Exhibit 3-9** provides an overview of where accessible stops are located along the corridor.

Exhibit 3-7: Daily Bus Stop Activity Bayfield Corridor

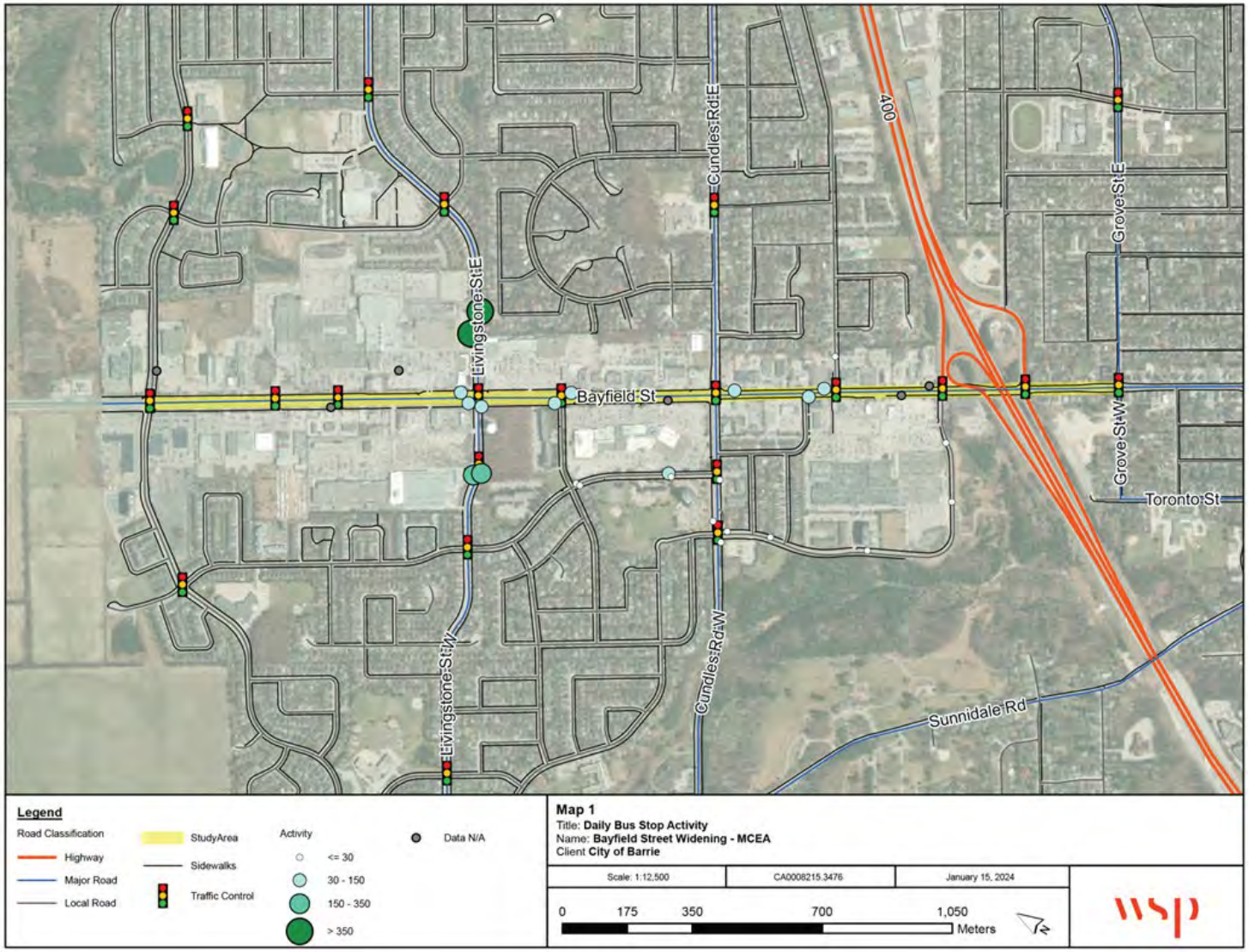


Exhibit 3-8: Existing Bus Stop Amenities

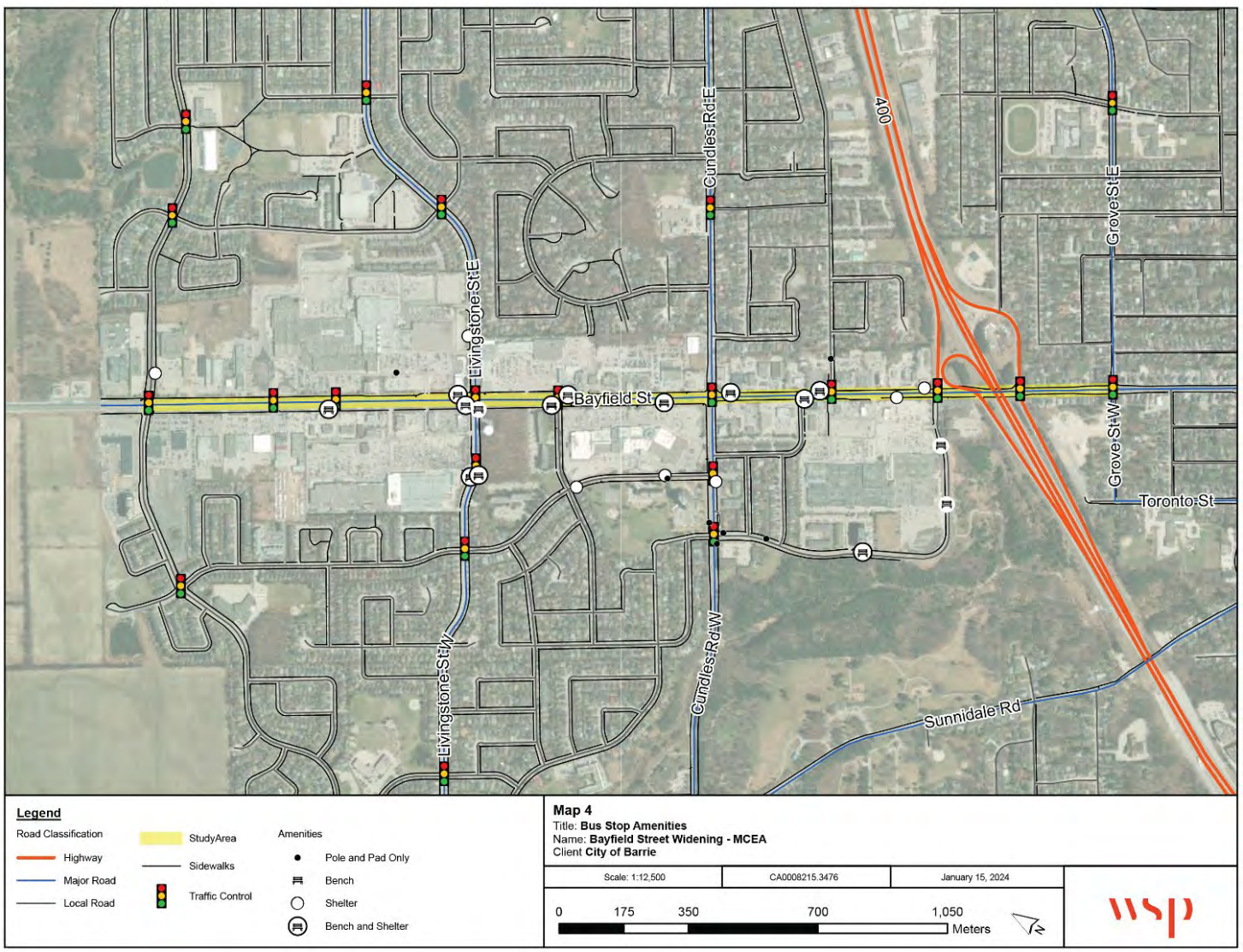
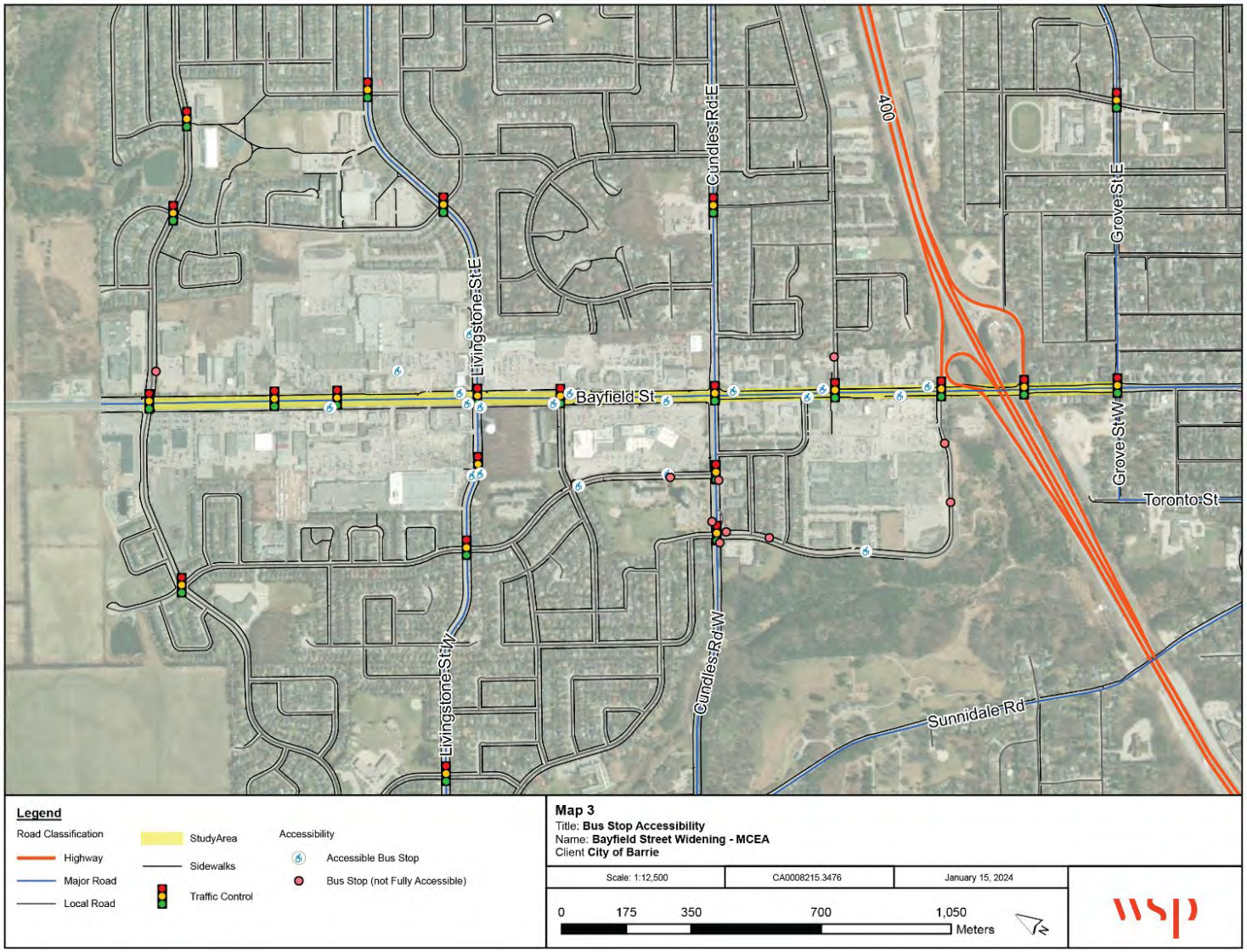


Exhibit 3-9: Existing Accessible Bus Stop Locations



3.1.3 Right-of-Way Characteristics

The MTO's concept design shows that the existing right of way (ROW) width for the most constrained section along Bayfield Street, south of the Highway 400 interchange is 20 m to 28 m. The existing ROW widths along Bayfield Street, north of the Highway 400 interchange, from Coulter Street to Cundles Road range from 28 m to 34 m. Between Cundles Road and Livingstone Street, the ROW widths vary from approximately 37 m to 46 m. From Livingstone Street to Hanmer Street the ROW width varies from 46 m to 49 m.

The City of Barrie's Official Plan, 2023, lays out the future corridor protected ROW widths for major roads in the network including Bayfield Street. As noted in **Section 2.2.1**, the future corridor protected ROW widths along Bayfield Street are as follows:

- Grove Street to ±100 m north of Grove Street – 34 m
- ±100 m north of Grove Street to Rose Street/Highway 400 – 47 m
- Coulter Street to Ferris Lane – 47 m
- Ferris Lane to Heather Street – 41 m
- Heather Street to Hanmer Street – 46 m

These protected ROW widths do not serve as the conclusive right-of-way (ROW) dimensions that will be recommended from this MCEA Study. Rather, these recommended protected ROW are maintained for the purposes of long-term corridor protection. These ROW widths will remain protected even should the Study recommendations suggests narrower widths to address the impacts associated with the current built environment.

3.1.4 Existing Accesses

Bayfield Street contains a high frequency of accesses, due to the residential land uses south of Highway 400 and the commercial uses north of the highway. There are 26 accesses to Bayfield Street from Grove Street to south of the highway, all of which serve residential uses except for two commercial accesses to one property. Two of the residential properties have two accesses, while the remaining properties have only one access each. Many of the residential properties have driveways with zero setback to the side property line and many of the driveways are double wide.

Accesses north of Highway 400 serve commercial land uses. Access widths range from 6 m wide to 14.9 m wide, with some accesses shared by neighbouring properties. Most properties have two accesses per lot, with either both accesses off Bayfield Street or one of the two accesses off of a side street. Access spacing ranges from 1.9 m to 30 m. The average access spacing is 17.2 m.

Accesses on the west side of Bayfield Street between Coulter Street and Glenwood Drive are generally well managed. Bayfield Mall has two accesses off Bayfield Street: one signalized access at the intersection of Bayfield Street and Ferris Lane and one access approximately 87

m south that restricts the outbound movements to right turns only. Other accesses to Bayfield Mall are off of side streets, with adequate corner clearances. The access to 336 Bayfield Street (Baton Rouge Grillhouse) has a small corner clearance of 5 m, but this spacing may be acceptable since the access is restricted to right in/right out movements only and a side street access is provided for vehicles making a southbound left turn at Ferris Lane.

Accesses on the east side of Bayfield Street and accesses on both sides of Bayfield Street from Glenwood Drive to Cundles Road and on the east side of the road from Cundles Road to Heather Street are much more frequent and closely spaced. Accesses are well managed from Livingstone Street to Hanmer Street, with most accesses having restrictions for right in and/or right out movements only or signalization at high volume accesses. Of the 15 accesses to this segment, 7 accesses are unsignalized and provide full movement access. Accesses spacing is 20 m or greater.

3.1.5 Existing Active Transportation Facilities

PEDESTRIAN FACILITIES

There are sidewalks present along the entire length of Bayfield Street within the study area. The majority are narrower than the City's current standard width of 2.0 m having been built prior to this standard.

Along the east side of Bayfield Street, the most constrained sidewalk width from Grove Street to Rose Street is 1.4 m, from Rose Street to Coulter Street is 1.5 m, from Coulter Street to Heather Street is 1.2 m, from Heather Street to Livingstone Street is 1.1 m, from Livingstone Street to Georgian Mall South is 1.6 m, from Georgian Mall South to Georgian Mall North is 1.4 m and from Georgian Mall North to Hanmer Street is 1.5 m.

Along the west side of Bayfield Street, the most constrained sidewalk width from Grove Street to Coulter Street is 1.3 m, from Coulter Street to Ferris Lane is 1.2 m, from Ferris Lane to Cundles Road is 1.3, from Cundles Road to Heather Street is 1.2 m, from Heather Street to Georgian Mall North is 1.4 m and from Georgian Mall North to Hanmer Street is 1.6 m.

Existing Accesses along Bayfield Street from Grove Street to Cundles Road on both sides of the roadway. From Cundles Road to Heather Street, there is no buffer along the east side (other than the curb) until the last block before Heather Street where a grass buffer is present. There are grass buffers present along the full length of the segment on the west side of the roadway from Cundles Road to Heather Street. From Heather Street to Hanmer Street, there are grass buffers present along the full length of the segment on both sides of the roadway. The existing buffers are between the sidewalks and the back of the curb.

Marked crosswalks are also provided at all signalized intersections. All crosswalks in the study area are high visibility ('ladder' style), except for the intersections at Hanmer Street and at the two Georgian Mall accesses, as well as the east, west and south legs at Coulter Road, which have standard crosswalks (parallel lines), and the north leg at Rose Street / Highway 400

northbound off-ramp, which has no marked crosswalk. The west leg of the unsignalized intersection at Glenwood Drive also has no marked crosswalk. **Table 3-2** shows the crosswalk lengths for the intersection of the corridor. The average crosswalk length is 23.0 m with the longest crosswalk measuring 39.8 m and the shortest crosswalk measuring 10.5 m. These crosswalks are linear except for the crosswalks at Cundles Road which are skewed and can be an accessibility concern, especially for users with sight loss.

Table 3-2: Crosswalk Length by Intersection Approach (source: measured using Google Maps)

	Crosswalk Length by Approach (m)			
Intersection with Bayfield Street	**North**	**East**	**South**	**West**
Grove Street	18.3	16.6	22.5	14.3
Rose Street	-	26.5	20.4	22.2
Coulter Street	18.6	12.8	22.3	16.3
Ferris Lane	21.0	17.3	20.3	18.2
Glenwood Drive	-	-	-	15.3
Cundles Road	26.0*	22.5*	21.8*	21.8*
Heather Street	34.0	10.5	30.5	15.0
Livingstone Street	33.3	23.8	39.8	24.2
Georgian Mall South	29.8	16.5	30.0	17.0
Georgian Mall North	32.3	22.0	33.5	21.5
Hanmer Street	31.8	23.0	30.0	23.9
Average	23.0 m			

CYCLING FACILITIES

The only constructed cycling facilities in the study area run along Grove Street and Hanmer Street. However, the existing TMP (2019) lays out an Active Transportation Strategy that includes planned cycling facilities along Bayfield Street, Grove Street, Coulter Street, Cundles Road and Livingstone Street. The type of cycling facility proposed along Bayfield Street is a cycle track. The type of cycling facility proposed along Grove Street is a signed bike route, while there is an existing bike lane east of Bayfield Street. The type of cycling facility proposed for both Coulter Street and Cundles Road is an in-boulevard pathway. The type of cycling facility proposed for Livingstone Street is a buffered bike lane. There are no proposed cycling facilities for Heather Street. The existing cycling facility on Hanmer Street is a bike lane that transitions into a buffered bike lane east of Bayfield Street.

3.1.6 Safety Report

A safety assessment report was prepared for the study area. The report analyzed collision data coupled with a field investigation to identify trends and patterns to understand potential contributing factors. The analysis also included the use of safety performance functions and empirical bayes analysis (a statistical inference method) to estimate the safety benefits for the countermeasures proposed.

A copy of the report is on file with the City of Barrie.

COLLISIONS

Right of Way Characteristics

The analysis revealed certain patterns. Fridays were identified as the day with the highest collision frequency, which could be related to increased tourist traffic. Most collisions occurred between 12 PM and 7 PM, aligning with the peak traffic period. The months from October to January, particularly December, recorded the highest collision frequencies.

In terms of road conditions, 22% of all collisions occurred with wet road surfaces, a figure slightly higher than the provincial average. Conversely, only 8% of collisions occurred with ice/snow road surface conditions, lower than the provincial average. This suggests that the increase in collisions during winter months is more likely related to increased tourist traffic rather than winter maintenance issues. Lastly, 21% of collisions occurred during non-daylight conditions, which is lower than the provincial average.

The study analyzed collisions at intersections and road segments. The intersections with the highest collision frequencies are summarized in **Table 3-3**.

Table 3-3 – Intersections with Highest Collision Frequencies

Location	Total Collisions	Total Injuries
Cundles Road	168	14 (8%)
Livingston Street	156	15 (10 %)
Highway 400 southbound off-ramp / Coulter Street	141	17 (12%)

Most intersections saw predominantly rear-end collisions, which typically result in lower severity; however, certain intersections presented higher than typical proportions of angle and turning movement collisions, which carry a higher risk of injury.

The segment between Heather Street / Springwater Market Place and Cundles Road had the highest collision frequency with 55 total collisions, 8 (15%) resulting in injuries. The sections between Cundles Road and Glenwood Drive, and between Ferris Lane and Highway 400 southbound off-ramp / Coulter Street had the second highest collision frequencies, with 20 total collisions each. Injury collisions were only reported at the latter segment, with 2 occurrences (10%). Most road segments primarily saw rear-end collisions. The high incidence of angle and turning movement collisions along road segments is likely due to conflicts associated with the high density of high-volume (commercial) driveways and the presence of a TWLTL on a multi-lane roadway.

13 collisions, involving cyclists, resulted in 8 resulting injuries. A significant number (77%) of these collisions occurred at intersections; 5 out of these 10 intersection collisions involved a turning motorist colliding with a cyclist likely riding on the sidewalk. This suggests a need to review safety measures for cyclists, especially at intersections and driveways.

SAFETY PERFORMANCE FUNCTIONS AND EMPIRICAL BAYES ANALYSIS

The study used empirical bayes analysis and collision prediction methodology from the Highway Safety Manual (HSM) to compare the observed safety performance with the expected safety performance in the study area. Local intersection and road segment safety performance functions (SPFs) from Niagara Region were applied since the City of Barrie does not have a set of SPFs based on local data.

Intersections with the highest potential for safety improvement (PSI) values over a five-year period were Grove Street East, Highway 400 southbound off-ramp, Livingstone Street East, Cundles Road East, and Ferris Lane. These intersections combined for 64% of the total PSI of the study area. Road segments with the highest PSI values over a five-year period were Livingstone Street East to Cundles Road East, Cundles Road East to Glenwood Drive, and Glenwood Drive to Ferris Lane. The road segment between Livingstone Street and Cundles Road East accounted for 15% of the length and 74% of the PSI of the study corridor.

FIELD INVESTIGATIONS

Pedestrian and Cycling Facilities

The current built infrastructure is based on standards of the day at the time of construction, so of which do not reflect current standards. These are opportunities along the study area corridor to improve the following items:

Access management:

- Install a centre median and remove the TWLTL to reduce the potential for turning
- Consolidate accesses to commercial properties along Bayfield Street where possible, particularly near intersections and at developments served by multiple accesses

Intersections

- Reduce corner radius at intersections using vertical curb, truck aprons, or pavement
- markings to reduce right-turn speeds
- Implement centreline hardening/median nose extensions at intersections to reduce left-turn radius and speeds
- Walking
- Widen sidewalks to City's 2.0 m standard width
- Consider midblock crossings along the Bayfield Street corridor to reduce instances of pedestrians jaywalking at unmarked locations
- The addition of tactile walking surface indicators (TWSIs) would improve accessibility
- The addition of cycling facilities can help prevent sidewalk riding
- Pedestrians could benefit from longer crossing times at signalized intersections

Cycling

- Providing physically separated facilities for cyclists increases the safety of both cyclists and pedestrians. It would also encourage more people to cycle for short trips.

Transit

- To mitigate delays and improve reliability, transit priority treatments should be considered for SBL at LivingStone St E / Bayfield Street and WBT movements at Cundles Rd E./ Bayfield Street

- Transit stops should be upgraded in accordance with Barrie's Transportation Design Manual and Ontario's Transit Supportive Guidelines
- Midblock bus stops should be relocated closer to a controlled crossing

3.2 Land Use

A comparison between aerial imagery and the Official Plan of Barrie (Barrie, 2023) show that the existing land uses within the study area are primarily Medium Density Residential, Commercial District, and Greenspace land uses. The study area is located along the Bayfield Street Corridor with the northern portion being occupied mostly by businesses. Land uses south of the corridor are of a mixed-use, consisting of both residential and non-residential uses.

Within the study area, there are a number of active development applications as summarized in **Table 3-4** and shown on **Exhibit 3-10**. This information was obtained from the City of Barrie Development Projects webpage on date February 10, 2024.

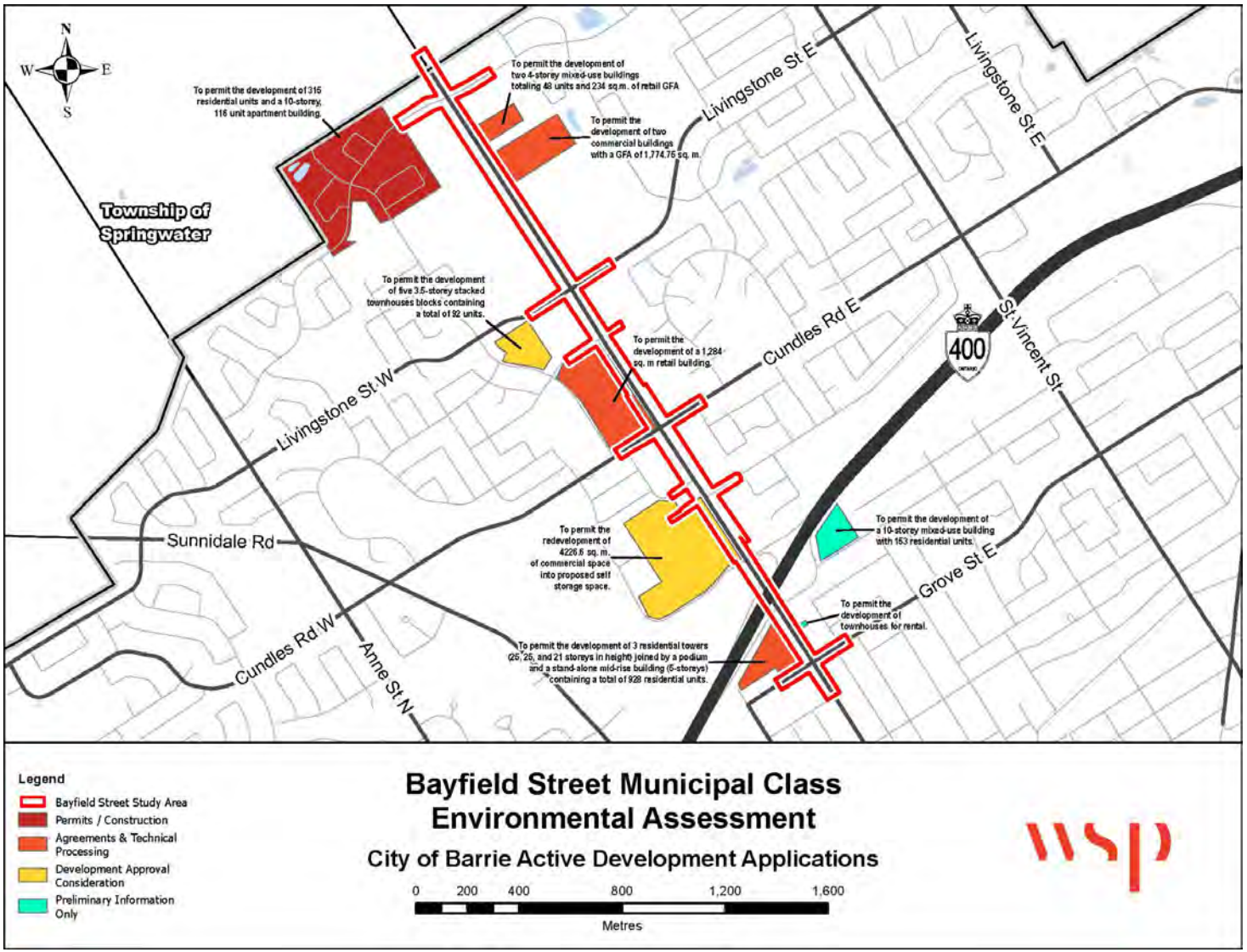
Table 3-4: City of Barrie Active Development Applications

Map ID	Location	Description	Current Status
2861	West of Bayfield Street, North of Livingstone Street; 30 Hanmer Street West.	Part Lot Control D12-366: To permit the development of 315 units. Site Plan application D11-1716-(D28-185): To permit the development of a 10-storey, 116 unit apartment building located at 30 Hanmer Street West.	The development is built.
2906	Southwest corner of Bayfield Street & Grove Street	To permit the development of a 3-storey, 9-unit apartment building.	File closed, site occupied by medical office.
16079	101 Kozlov Street	To permit the development of five 3.5-storey stacked townhouses blocks containing a total of 92 units. The existing 7-storey apartment building will remain.	The application for a Zoning By-law Amendment was approved by Council on October 2, 2017.
21542	10, 14, 18, 20, 22, 24 Grove Street West	To permit the development of a two-phased development comprised of 3 residential towers (25, 25, and 21 storeys in height)	At the Council meeting of March 26, 2018, By-laws 2018-30 (Official Plan Amendment) and 2018-31 (Zoning By-law Amendment) were recommended for approval. The By-laws established 2 phases of development with a Holding provision attached to Phase 2 (23 and 22-storey towers on west section of the site), with conditions related

Map ID	Location	Description	Current Status
		joined by a podium and a stand-alone mid-rise building (5-storeys) containing a total of 928 residential units. Phase 1: Tower 1 (21 storeys), Tower 2 (25 storeys) with an 8 storey link and 5 storey podium between them for a total of 502 residential units. Phase 2: Tower 3 (25 storeys) and 12 storey link for a total of 426 residential units.	to a Section 37 agreement, a parking study and an easement for adjacent owners. On December 14, 2022, a recommendation to approve the Site Plan application (D11-021-2021) was bought forward to the Council. Council approved the application. On May 4, 2023, a notice of intention to remove the holding provision (D30-029-2022) was circulated.
31368	251 Bayfield Street	To permit the development of townhouses for rental.	On March 4, 2021, a pre-consultation application was circulated. On April 15, 2021, a technical review meeting was held.
31395	20 Rose Street	To permit the development of a 10-storey mixed-use building with 153 residential units.	On December 14, 2022, a Pre-Consultation (D28-087-2022) application was circulated.
33946	521 Bayfield Street	To permit the development of two commercial buildings with a Gross Floor Area	On February 23, 2022, a Site Plan application (D11-001-2022) was circulated.

Map ID	Location	Description	Current Status
		(GFA) of 1,774.75 square metres (sq. m.).	
34779	535 Bayfield Street	To permit the development of 2 mixed-use buildings totaling 48 units. Building 3: a 4-storey, 27-unit mixed-use building with 118 sq. m. of retail GFA. Building 4: 4-storey, 21-unit mixed-use building with 116 sq. m. of retail GFA.	On June 1, 2023, a Site Plan Application (D11-009-2023) was circulated.
34918	320 Bayfield Street	To permit the redevelopment of 4226.6 sq. m. of commercial space into proposed self-storage space.	On December 14, 2022, a recommendation to approve an Official Plan Amendment and Zoning By-law Amendment (D30-007-2022) application was bought forward to the Council. Council approved the applications.
36568	400 Bayfield Street	To permit the development of a 1,284 sq. m retail building.	On January 19, 2023, a Site Plan Application (D11-029-2022) was circulated.

Exhibit 3-10: City of Barrie Active Development Applications



3.3 Utilities

The following is a high-level summary of utilities within the study limits. As part of the MCEA study process, the project team will be engaging with utilities owners on existing and future utility plant. Additionally, a Subsurface Utility Engineering Quality Level C ("QL-C") investigation will be undertaken to identify and map all underground utilities and services for the corridor within the study limits, including all side roads within the survey limits, to identify potential utility conflicts.

Table 3-5 summarizes the existing above-ground utilities along Bayfield Street from Grove Street to Hanmer Street.

Table 3-5: Summary of Utilities Present Along Bayfield Street Within the Study Area

From	To	Location on Bayfield Street	Hydro Poles	Hydro Feeder Poles	Light Standards	Fire Hydrants
Grove Street	Rose Street	East	0	4	0	2
		West	5	-	5*	-
Coulter Street	Ferris Lane	East	7	-	4*	-
		West	-	1	4	3
Ferris Lane	Cundles Road	East	8	-	4*	-
		West	1	-	5	2
Cundles Road	Heather Street	East	-	-	10	3
		West	9	-	1*	4
Heather Street	Livingstone Street	East	3	-	5	3
		West	5	-	1	3
		East	18	-	20	-

From	To	Location on Bayfield Street	Hydro Poles	Hydro Feeder Poles	Light Standards	Fire Hydrants
Livingstone Street	Hanmer Street	West	18	-	-	8

*Light standards combined with hydro poles

3.3.1 Alectra

Hydro poles are located on the west side of Bayfield Street between Grove Street and the northbound Highway 400 off-ramp. Hydro poles are located in a buffer between the sidewalk and back of curb. Additionally, there are feeder poles along the east side of Bayfield Street between Grove Street and the northbound Highway 400 off-ramp.

From Coulter Street to Ferris Lane, hydro poles are located along the east side of Bayfield Street with one feeder pole located on the west side of Bayfield Street. Hydro poles along the east side are located in a buffer between the sidewalk and back of curb.

From Ferris Lane to Cundles Road, the hydro poles are located mostly along the east side of Bayfield Street except for one hydro pole at the southwest corner of the intersection at Bayfield Street and Cundles Road. Hydro poles along the east side are located in a buffer between the sidewalk and back of curb.

From Cundles Road to Heather Street, hydro poles are located along the west side of Bayfield Street. There is also a high voltage line of poles along Cundles Road.

From Heather Street, passing Livingston Street, up to Hanmer Street, hydro poles are located along both the east and west side of Bayfield Street.

Near Livingstone Street, poles are significantly larger. If the area is to redevelop, poles may need to be taller to accommodate higher voltage circuits.

The minimum clear zone from back of curb to pole would be 0.5 m, and the target distance is at least 1.0 m.

3.3.2 Other Public and Private Utilities

There are various utility boxes located along Bayfield Street from Grove Street to Hanmer Street including the intersections at Grove Street (southwest corner), Coulter Street (northwest corner), Cundles Road (northeast corner), Heather Street (southeast corner) and Livingstone Street (southwest corner). The providers for these utility boxes are not identified at this time and will be confirmed as part of the Subsurface Utility Engineering work.

Signal controller boxes should be located away from daylighting triangles to ensure visibility for motorists, to minimize conflicts with sidewalks, cycling facilities and to allow opportunity for pedestrian connections from buildings.

Additionally, there are several light standards observed along the Bayfield Street within the area of study on both the east and west sides of Bayfield Street. These are typically located in a buffer between the sidewalk and back of curb.

MTO's subsurface utility engineering drawings for the Highway 400 interchange at Bayfield Street show various utility lines that run along Bayfield Street from Grove Street to Rose Street and from the Highway 400 southbound off-ramp to the midpoint between Coulter Street and Ferris Lane:

- Gas main (GM) lines running along the west side of Bayfield Street with the gas service (GS) lines extending across the Bayfield Street roadway from the GM lines to service properties on the east side.
- One Water Main (WM) line runs along each the east and west side of Bayfield Street. From Coulter Street, two WM lines run along the southbound lanes. The WM lines are intersected by Water Service (WS) lines that run across the roadway.
- Hydro (H) lines mostly run along the east side of Bayfield Street.
- Communication lines for Rogers and Bell run mostly along the east side of Bayfield Street with TELUS lines running across the west side.
- Additionally, Sanitary (SAN) and Storm Sewer (STM) connections are present along Bayfield Street within the limits of the survey.

None of information provided in the drawings/survey are Quality Level A (QLA). The Quality Level of the information in the drawings/survey provided range from B to D.

3.3.3 Water

Existing watermain runs along Bayfield Street within the study limits. New local waterman is proposed on Grove Street, 150 m west of Bayfield Street to Bayfield Street.

Within the study area, from Grove Street to Hanmer Street, there are fire hydrants observed along Bayfield Street, with a total of eight on the east side and 20 on the west side.

3.3.4 Wastewater

There is existing sanitary sewer along Bayfield Street. New sanitary sewer is proposed in the following areas:

- Bayfield Street – Coulter Street to Cundles Road
- Grove Street – 150 m west of Bayfield Street to Bayfield Street

The sanitary sewer preliminary design will include a new sanitary sewer system including new main, maintenance holes and services laterals to property line to replace the existing system.

The design shall be in accordance with the City of Barrie Sanitary Sewage Collection System Policies and Design Guidelines.

As part of the sanitary sewer design, the sub-catchment area boundaries will be confirmed and a sanitary drainage area plan will be prepared, and hydraulic computations and analysis of the proposed sanitary sewer system will be completed confirming pipe size requirements following the City's sanitary sewer design sheet. Sanitary sewer laterals are to be replaced to the limit of the future municipal ROW.

3.3.5 Stormwater

A drainage analysis of existing and proposed conditions will be undertaken to identify quantity and quality control within the ROW as part of the development of alternative design concepts during Phase 3 of the MCEA study. Documentation of existing conditions will include identification of wells, description of watershed boundary / catchment area(s), land use, existing drainage, existing sewers, existing culverts / structures, storm events including Regional storm, and environmentally sensitive areas. There is existing storm sewer along Bayfield Street. Some noted improvements include:

- New storm sewer, Grove Street – 150m west of Bayfield Street to Bayfield Street
- There will be new outlets for both sewers installed on the north side of the Coulter Street intersection installed as part of the MTO interchange replacement project.
- New storm sewer, Bayfield Street – Coulter Street to Cundles Road.

3.4 Natural Environment

A Natural Environment Report will be prepared in support of the Bayfield Street MCEA Study. The purpose of the Natural Environment Report is to document the existing natural environment conditions within the study area, to support the evaluation of alternative solutions and designs, and to provide a preliminary impact assessment of the preferred alternative.

A desktop review of the natural environment includes the review of planning legislation and policy documents. Applicable natural environmental legislation and policies have been included in the overall review of the legislative and policy context documented in **Section 2**.

At the time of this report, one site visit has been completed to inform the Natural Environmental report. An Ecological Land Classification (ELC) and botanical inventory was completed on September 18, 2023. The primary natural feature identified within the study area is a mature Sugar Maple woodlot near the municipal water tower. This woodlot is identified as an Environmental Protection Area – Level 3 in the City of Barrie Official Plan, 2023, which represents a regionally or locally significant feature. The while remainder of the vegetation features observed were either highly disturbed or beyond the anticipated widening impact areas. No Species at Risk have been recorded during this site visit. Further field surveys are planned for Spring 2024.

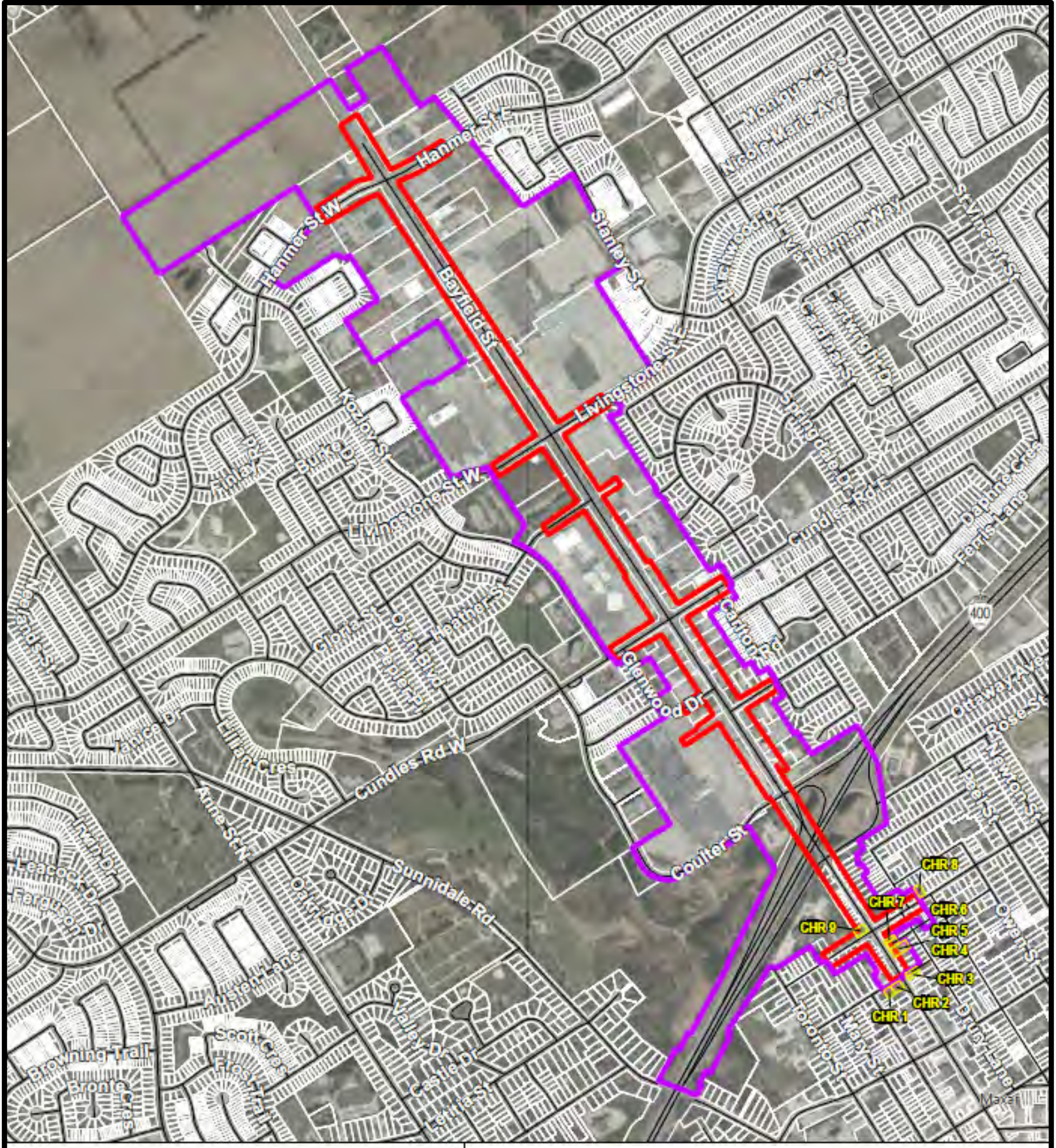
3.5 Cultural Environment

A Cultural Heritage Report has been prepared in support of the MCEA study. The purpose of the Cultural Heritage Report is to establish the historical context of the study area, identify known and potential heritage properties through information gathering and fieldwork, and develop an inventory of built heritage resources and cultural heritage landscapes. As part of the Cultural Heritage Report, the following tasks were completed:

- Background research, including consultation of primary and secondary sources and review historical maps/aerial imagery to gain an understanding of the historical evolution of the Study Area;
- Online data collection and submission of agency information requests to the City of Barrie, Ontario Heritage Trust, and the Ministry of Citizenship and Multiculturalism (MCM) to determine the presence of protected and potential built heritage resources and cultural heritage landscapes within the Study Area;
- Conducting a field investigation to document the Study Area's existing conditions, confirm the presence of protected heritage properties, and identify potential built heritage resources and/or cultural heritage landscapes;
- Creating an inventory of built heritage resources and cultural heritage landscapes with Statement of Cultural Heritage Value or Interest (SCHVI) and list of heritage attributes for protected properties and high-level description and preliminary list of heritage attributes for potential heritage properties; and,
- Assessing the potential impacts from the proposed works to identified built heritage resources and cultural heritage landscapes and recommending conservation and mitigation measures where impacts are anticipated.

Following the completion of the background research, information gathering, and field review, an inventory of built heritage resources and cultural heritage landscapes within, and adjacent to, the Study Area was created. As a result of this review, nine Cultural Heritage Resources (CHRs), all Built Heritage Resources (BHR), were identified within or adjacent to the study area. All are located south of Highway 400. A map of the cultural heritage resources is included in .

As part of the development of alternative solutions and alternative designs during the MCEA process, avoidance of potential built heritage resources is recommended from a cultural heritage perspective, if possible.



Legend

- Cultural Heritage Study Area
- Bayfield Street Study Area
- Cultural Heritage Resources

Source: County of Simcoe (2022)

Exhibit 3-11: Cultural Heritage

Title: **Identified Cultural Heritage Resources**
Name: **Cultural Heritage Report: Bayfield Street MCEA**
Client **City of Barrie**

Scale: 1:15,000	CA0008215.3476	November 21, 2023

0 125 250 500 750 1,000 m

N

4 Needs Assessment

4.1 Existing Transportation Conditions

In order to assess the needs of the transportation system, the first step is to establish the condition of the existing transportation network in the study area. It must be noted that MTO considers Bayfield Street as an east-west corridor and Highway 400 with North-South orientation; however, the City of Barrie considers Bayfield Street as a north-south running roadway. **Therefore, for this Study, the orientation of both Bayfield Street and Highway 400 was considered north-south**.The following subsections provide a profile of the existing transportation conditions within the study area network. The profile of each component describes current service levels and the role and function within the existing network. As part of the Bayfield Street MCEA Study, a traffic analysis report was carried out for the existing (2023) conditions and is available in **Appendix A**.

4.1.1 Traffic Volumes – 24 Hour Counts

The City has provided the mid-block Automatic Traffic Recorder (ATR) counts for two of the sections of Bayfield Street. **Table 4-1** provides 24-hour volume data from the ATR counts for sections on Bayfield Street, west of Hanmer Street as well as at Highway 400.

Table 4-1: 2041 24-hour ATR volumes on Bayfield Street

Location	Data year	Total	% Heavy Trucks	% Medium Trucks	% Light Trucks	% Buses	% Cars	% Bikes
Bayfield Street between Hanmer Street and the City Limits (southbound (SB) and northbound (NB))	October 2018	22,211	2%	2%	25%	1%	70%	0%
Bayfield Street at Highway 400 (SB and NB)	May 2022	23,273	16%	4%	20%	0%	59%	1%

The ATR data, as presented in **Table 4-1**, suggests that buses and bikes constitute around 0-1% of total traffic volumes. The light trucks and medium trucks account for 20-25% and 2-4% of total traffic demand, respectively. Approximately 16% of 24-hour Bayfield Street volumes at Highway 400 were recorded as heavy trucks, whereas between Hanmer Street and the City limits, the heavy trucks percentage was minimal (approximately 2%).

4.1.2 Traffic Volumes – Peak Hour Turning Movement Counts

The existing (2023) turning movement volumes for the weekday morning and afternoon peak hours are presented in Exhibit 4-1, Exhibit 4-2 and Exhibit 4-3. As there are a number of entrances to businesses in between the intersections, traffic volume balancing was not conducted except between the Highway 400 ramp terminal intersections.

Exhibit 4-1: Existing Weekday AM and PM Peak Hour Turning Movement Volumes - Bayfield Street Corridor

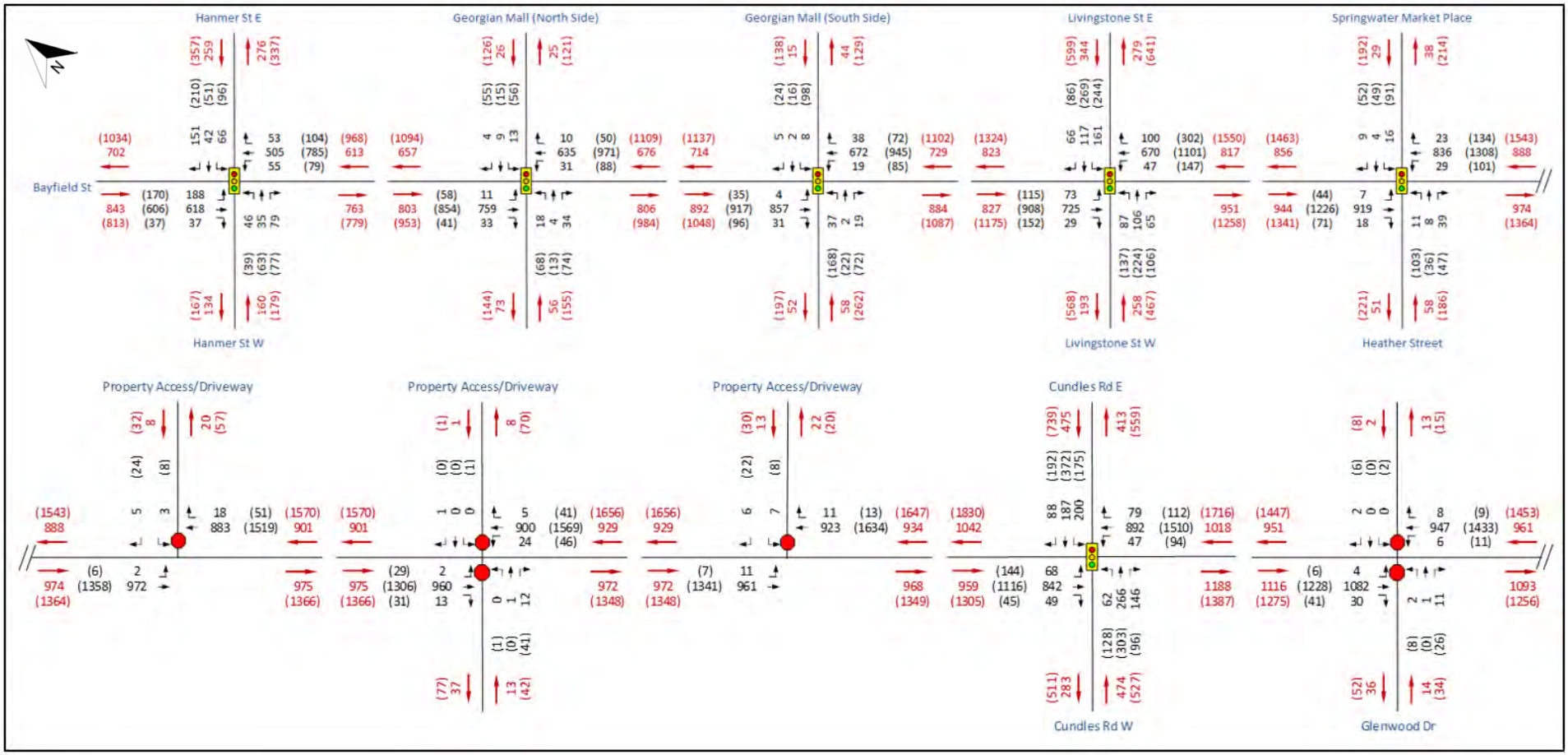


Exhibit 4-2: Existing Weekday AM and PM Peak Hour Turning Movement Volumes - Bayfield Street Corridor (Continued)

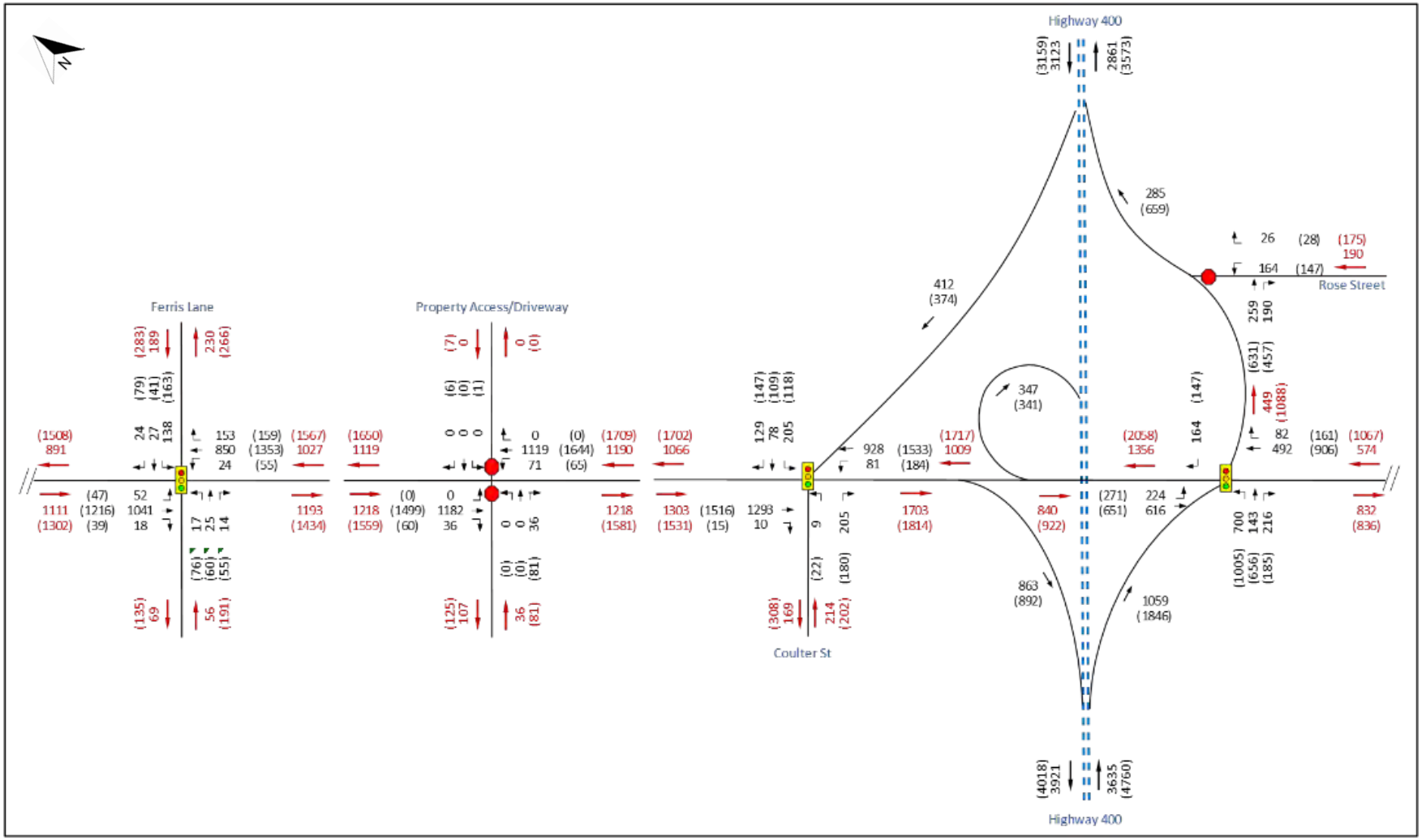
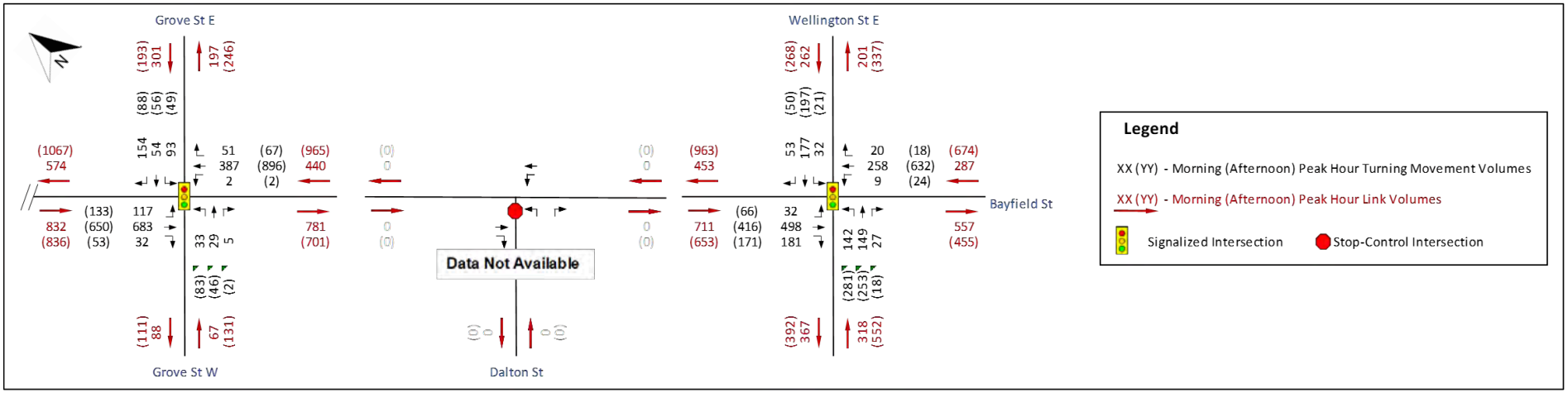


Exhibit 4-3: Existing Weekday AM and PM Peak Hour Turning Movement Volumes - Bayfield Street Corridor (Continued)



4.1.3 Existing Travel Patterns

The ATR data, as presented in **Table 4-2**, suggests that buses and bikes constitute approximately 0-1% of total traffic volumes. The light trucks and medium trucks account for 20-25% and 2-4% of total traffic demand, respectively. Approximately 16% of 24-hour Bayfield Street volumes at Highway 400 were recorded as heavy trucks, whereas between Hanmer Street and the City Limits, the heavy trucks percentage was approximately 2%. Based on the existing volume diagram shown in **Exhibit 4-1**, **Exhibit 4-2** and **Exhibit 4-3**, for the morning peak hour the southbound direction is critical and for the afternoon peak hour, the northbound direction is critical. In both peak hours as well as in both directions, the highest volumes are on the segment between the two Highway 400 ramp terminals because of the volumes to and from Highway 400 north and south.

The travel pattern within the study corridor would require evaluation based on the existing study subarea EMME based on macro model inputs. Since the models from MTO are anticipated to be obtained in the future, this information will be provided as part of the next phase of reporting. By looking at the exiting peak hour volumes, **Table 4-2** below shows approximate travel patterns between Bayfield Street and Highway 400 observed for the AM and PM peak hours.

Table 4-2: Existing Travel Patterns between Bayfield Street and Highway 400 for the AM and PM peak hours

From/To		Bayfield Street North	Bayfield Street South	Highway 400 South	Highway 400 North
Highway 400 North (East of Bayfield Street)	AM peak hour PM peak hour	12% 9%	25% 14%	-	-
Highway 400 South (West of Bayfield Street)	AM peak hour PM peak hour	60% 53%	26% 22%		-
Bayfield Street South	AM peak hour PM peak hour	40% 57%	-	14% 15%	45% 27%

From/To		Bayfield Street North	Bayfield Street South	Highway 400 South	Highway 400 North
Bayfield Steet North	AM peak hour PM peak hour	-	16% 23%	17% 18%	67% 59%

Transit Use and Mode Share

The information related to transit use and mode share will be provided along with the next phase of reporting as this will be extracted from the EMME Macro models. The existing transit routes are described in detail in **3.1** of this report.

4.1.4 Existing Signalized Intersection Operations Including Terminal Ramp Approaches

Summaries of the existing intersection traffic operations at the signalized intersections including ramp terminal approaches are shown in **Exhibit 4-4** and **Exhibit 4-5** respectively, for the AM and PM peak hours. Overall, the Highway 400 interchange ramp terminal intersections operate with severe congested conditions at the off-ramps with Level of Service (LOS) “F”, volume to capacity (v/c) ratios greater than 1.0 as well as with long queue lengths mainly for the PM peak hour conditions. Other intersections such as at Livingstone Street East/West, Cundles Road East/West, and Ferris Lane also operate with LOS “E/F” for turns from eastbound or westbound approaches mainly during afternoon peak hour.

It should be noted that the operational evaluation of intersections was based on the Synchro modelling. The results will be update with a detailed micro simulation modelling once the data pertaining traversal matrices from the EMME based macro models are available.

The average speed data between the intersections have indicated that excessive speed reductions happen between Georgian Mall (South Side) and Livingstone Street East/West, and between Coulter Street and Grove Street. The reduction of speed near the ramp terminals is due to the presence of on-ramps and off-ramps with high volumes. Based on the traffic volume information at Georgian Mall (South Side) and Livingstone Street East/West intersections, the modelling results have indicated good speed on this section. However, the speed data received from the City (based on two runs during the peak hour) has shown very low speed on this section. If the travel time/speed survey data received is correct, the speed reduction at the above location should be due to vehicles turning in and out of properties/businesses causing obstruction on through vehicles. The City will undertake further speed surveys to confirm the observation. Detailed Synchro results and included in **Appendix A**.

Exhibit 4-4: Summary of Intersection Evaluation Results using Synchro – Existing (2023) AM Peak Hour*

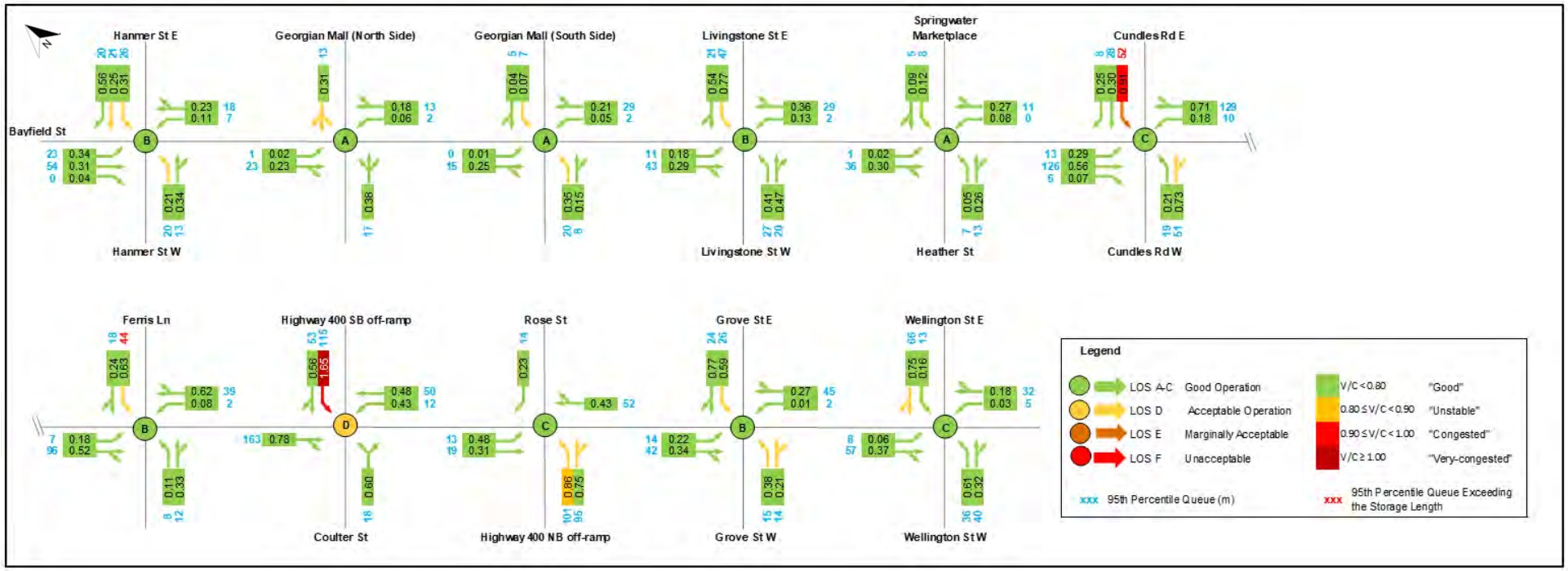
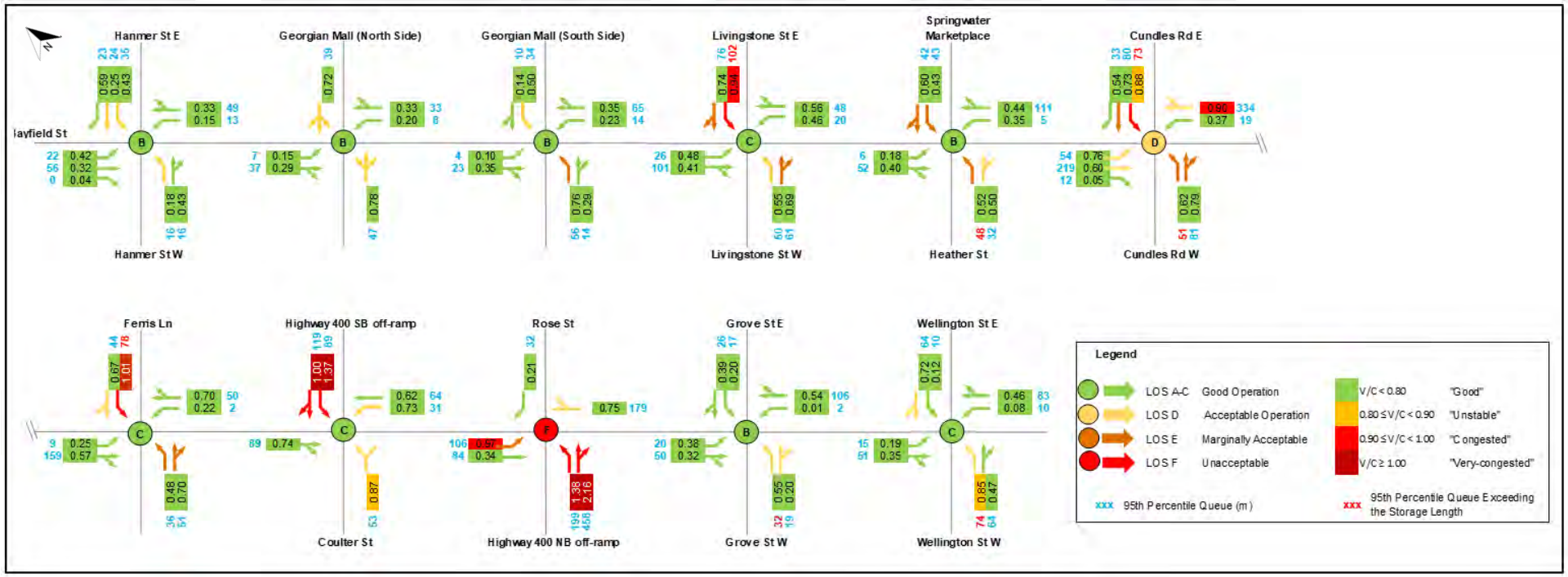


Exhibit 4-5: Summary of Intersection Evaluation Results using Synchro – Existing (2023) PM Peak Hour*



4.1.5 Existing Link Operations

Link operations in terms of LOS for the intersection approaches are shown in **Exhibit 4-6** and **Exhibit 4-7,** respectively for the AM and PM peak hour conditions. Average speeds, based on the travel time survey results, between the intersections are also shown. Based on these figures, all the approaches on Bayfield Street operate with average LOS “D” or better.

Given that the intersections are close together, the operation of each section was considered based on the operation of the approach section at the intersection (i.e. north side intersection for northbound direction and south side intersection for the southbound direction). The LOS used was based on the approach delay.

The following sections operate with LOS “E” or “F” either for the AM or for the PM peak hour conditions:

At ramp terminal intersections:

- Highway 400 SB off-ramp with LOS “F” for both AM and PM peak hour conditions.
- Highway 400 NB off-ramp with LOS “F” for the PM peak hour condition.

Crossing roads:

- EB and WB approaches at Livingstone Street with LOS “E” for the PM peak hour condition.
- WB approach at Heather Street with LOS “E” for the PM peak hour condition.
- EB and WB approaches at Cundles Road with LOS “E” for the PM peak hour condition.
- EB and WB approaches at Ferris Lane with LOS “E/F” for the PM peak hour condition.

Average speed on Bayfield Street sections between the intersections show low speeds (<20 km/h) at the following sections:

- Sections between Georgian Mall (South Side) and Livingstone Street (Southbound direction for the AM peak hour): The travel time survey data for this section shows low speed that may be due to vehicles turning in and out of the accesses or driveways to properties/businesses on either side of Bayfield Street causing obstruction of through vehicles. However, based on the intersection approach LOS, it is expected to have good speed at this section. The city is conducting further speed studies to confirm the above observations.
- Sections between Coulter Street and Grove Street: the reduction of speed near the ramp terminals are due to the presence of on-ramps and off-ramps with high volumes.

Exhibit 4-6: Existing (2023) Link Operations – AM Peak Hour*

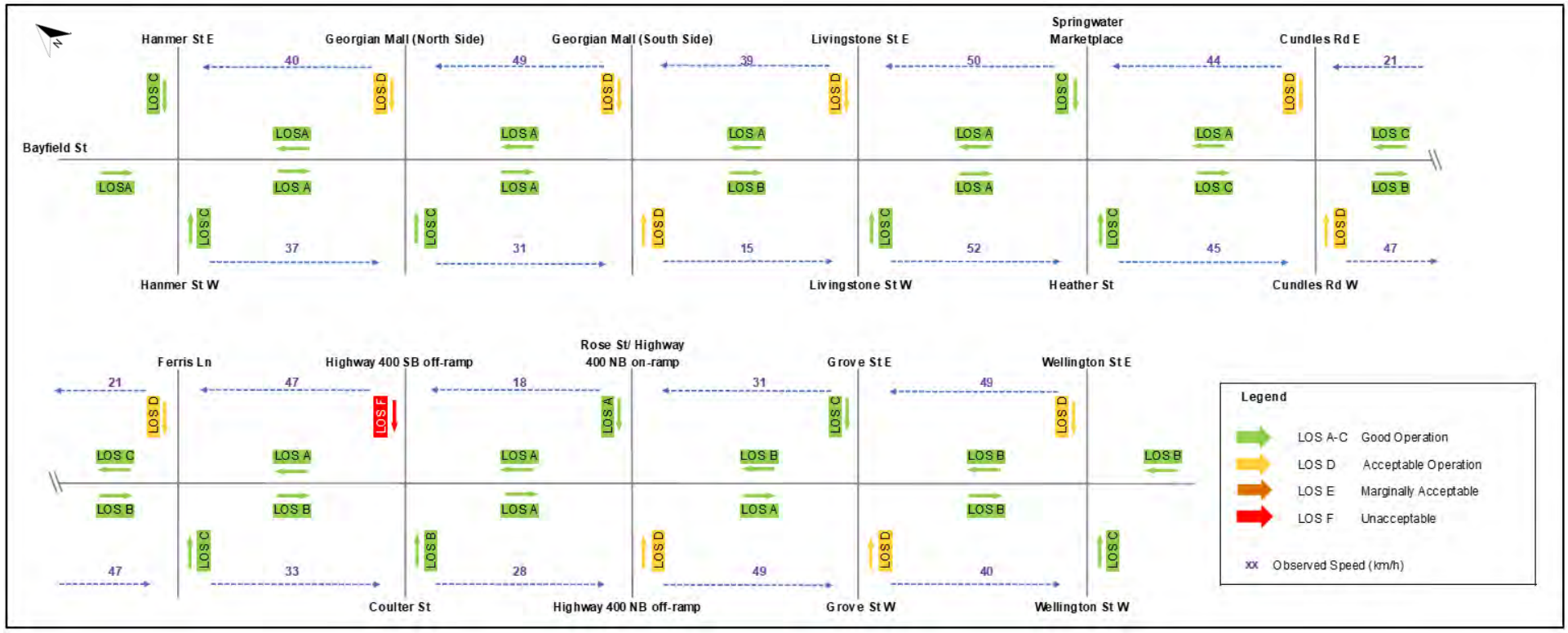
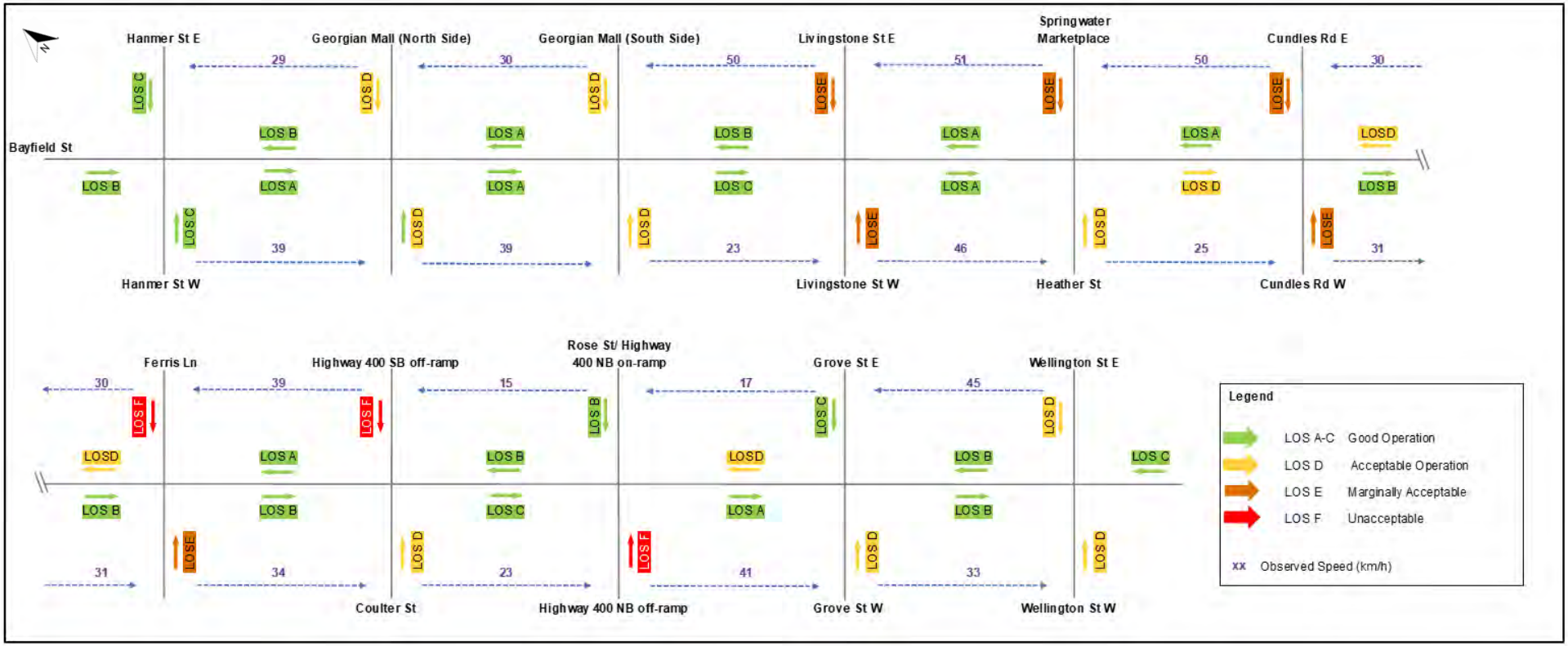


Exhibit 4-7: Existing (2023) Link Operations – PM Peak Hour*



4.1.6 Storage Lengths and Queuing Including Terminal Ramp Queueing

The available storage lengths and the maximum of 95th percentile queue lengths for the turning movements at the intersections for the AM and PM peak hour conditions are shown in **Table 4-3**. Wherever the queue lengths exceed the available storage lengths are shown highlighted.

Table 4-3: Existing (2023) Conditions Queues

Intersection	Turning Lanes	Available Storage Length (m)	Maximum of AM and PM Hour Queue Length (m)*
Bayfield Street at Hanmer St East/West (Signalized)	SBL	64	23
	SBR	63	0
	NBL	46	13
	EBL	45	20
	WBL	182	35
	WBR	177	23
Bayfield Street at Georgian Mall-North Side (Signalized)	SBL	48	7
	NBL	48	8
Bayfield Street at Georgian Mall-South Side (Signalized)	SBL	49	4
	NBL	51	14
	EBL	72	56
	WBL	50	34
Bayfield Street at Livingstone Street East/West (Signalized)	SBL	168	26
	NBL	65	20
	EBL	97	50
	WBL	92	102
Bayfield Street at Heather Street/Springwat	SBL	93	6
	NBL	65	6
	EBL	32	48

Intersection	Turning Lanes	Available Storage Length (m)	Maximum of AM and PM Hour Queue Length (m)*
er Marketplace (Signalized)	WBL	66	43
Bayfield Street at Cundles Road East/West (Signalized)	SBL	64	54
	NBL	44	19
	EBL	46	51
	WBL	42	73
	WBR	42	33
Bayfield Street at Glenwood Dr (Stop-controlled)	SBL	52	0
	NBL	21	1
Bayfield Street and Ferris Lane (Signalized)	SBL	40	9
	NBL	50	2
	EBL	43	36
	WBL	29	78
Bayfield Street and Coulter Street/Highway 400 SB off-ramp (Signalized)	NBL	50	31
	WBL (SB off-ramp to SB Bayfield St)	410	115
	WBT/R (SB off-ramp to NB Bayfield St and WB Coulter St)	145	119
Bayfield Street at Rose Street/Highway 400 NB off-ramp (Signalized)	SBL	121	106
	EBL (NB off-ramp to NB Bayfield St)	613 (each)	199
	EBT/R (NB off-ramp to SB Bayfield St and EB Rose St)	365	458
	WBR	215	32
Bayfield Street at Grove Street East/West (Signalized)	SBL	47	20
	NBL	34	2
	EBL	23	32
	WBL	28	26
	SBL	26	15

Intersection	Turning Lanes	Available Storage Length (m)	Maximum of AM and PM Hour Queue Length (m)*
Bayfield Street at Wellington Street East/West (Signalized)	NBL	28	10
	EBL	73	74
	WBL	32	13

4.1.7 Existing Travel Times

The 2023 weekday AM and PM peak hour travel time and speed data for the Bayfield Street sections from Hanmer street East/West to Wellington Street as obtained from the City are shown in **Table 4-4** and **Table 4-5** for the morning and afternoon peak hours, respectively.

The southbound direction is more critical in both the morning and afternoon peak hour. The southbound travel time for the study area corridor is around 5.9 minutes in the AM peak hour and 6.5 minutes in the PM peak hour. The northbound travel time is lower by approximately 0.5 minutes compared to the southbound direction in both the peak hours.

Similarly, the average speed in the southbound direction is observed to be lower than northbound direction during both the peak hours. The travel speed is below 20 km/h (highlighted in orange) particularly on the Bayfield Street sections between Georgian Mall (South Side) and Livingstone Street East/West, and between Coulter Street and Grove Street. The reduction of speed is attributed to the presence of access/driveways connected to commercial properties or businesses and the on/off-ramps from Highway 401.

The City is conducting further speed studies to confirm the above observations.

Table 4-4: Existing Travel Time and Speed – AM Peak Hour

Bayfield Street Section		Southbound Direction		Northbound Direction	
From	To	Travel Time (min)	Average Speed (km/h)	Travel Time (min)	Average Speed (km/h)
Hanmer Street East/West	Georgian Mall (North Side)	0.6	37.1	0.4	40.3
Georgian Mall (North Side)	Georgian Mall (South Side)	0.6	31.2	0.2	49.2
Georgian Mall (South Side)	Livingstone Street East/West	1.5	15.2	0.6	39.2
Livingstone Street East/West	Heather Street/Springwater Marketplace	0.3	51.6	0.3	50.3
Heather Street/Springwater Marketplace	Cundles Road East/West	0.6	45.4	0.6	44.1
Cundles Road East/West	Ferris Lane	0.4	47.3	0.9	21.3
Ferris Lane	Coulter Street/Highway 400 SB off-ramp	0.5	32.8	0.4	46.8
Coulter Street/Highway 400 SB off-ramp	Rose Street/Highway 400 NB off-ramp	0.5	28.1	0.8	17.6
Rose Street/Highway 400 NB off-ramp	Grove Street	0.3	49.0	0.8	30.6
Grove Street	Wellington Street	0.6	40.1	0.5	49.4
Corridor Average - Hanmer Street East/West to Wellington Street		5.9	31.2	5.4	34.2

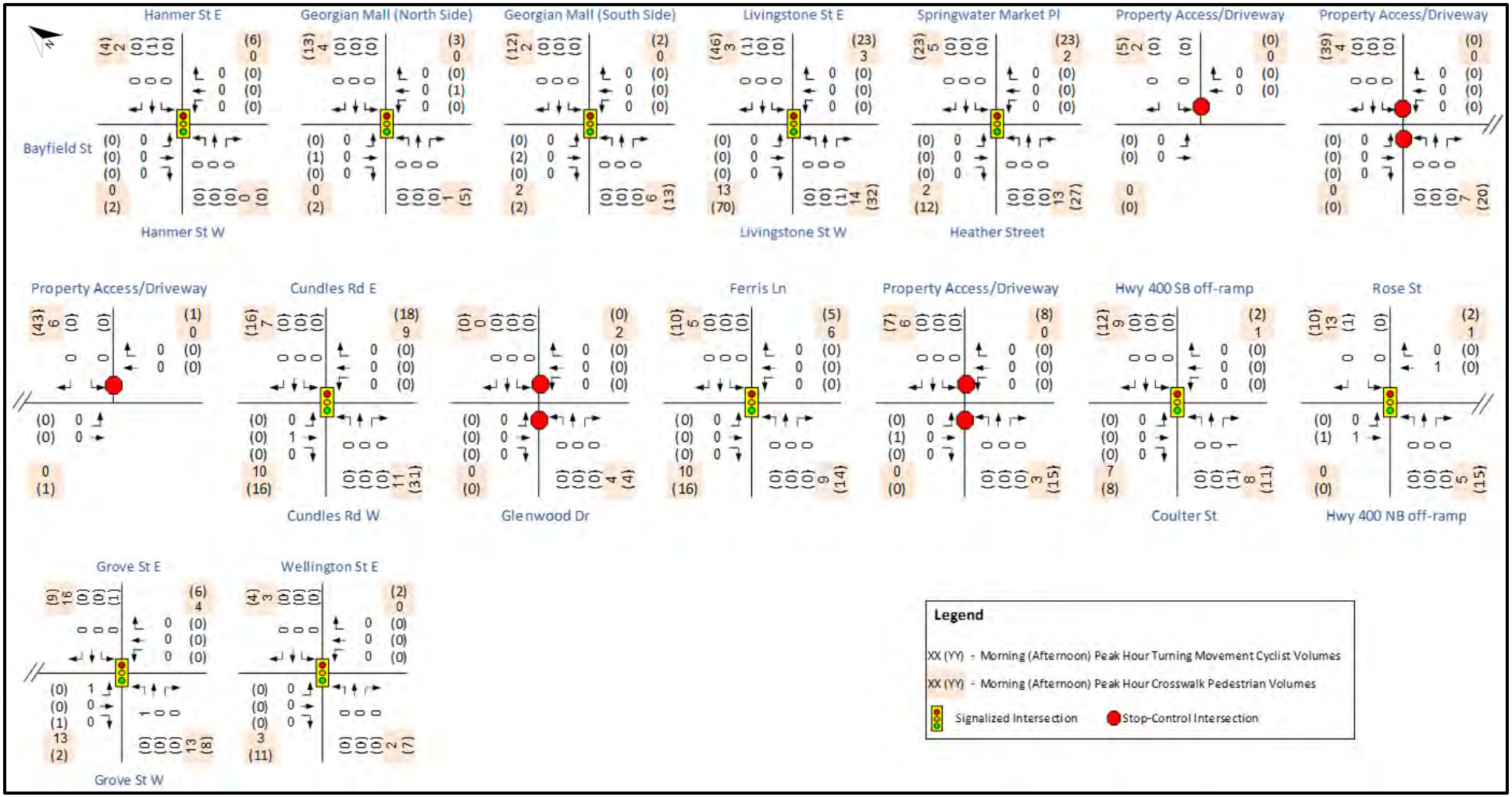
Table 4-5: Existing Travel Time and Speed – PM Peak Hour

Bayfield Street Section		Southbound Direction		Northbound Direction	
From	To	Travel Time (min)	Average Speed (km/h)	Travel Time (min)	Average Speed (km/h)
Hanmer Street East/West	Georgian Mall (North Side)	0.6	38.6	0.7	29.3
Georgian Mall (North Side)	Georgian Mall (South Side)	0.3	38.8	0.6	30.3
Georgian Mall (South Side)	Livingstone Street East/West	1.0	22.6	0.5	50.3
Livingstone Street East/West	Heather Street/Springwater Marketplace	0.3	46.1	0.3	51.1
Heather Street/Springwater Marketplace	Cundles Road East/West	1.0	25.4	0.5	50.1
Cundles Road East/West	Ferris Lane	1.0	30.6	0.5	30.3
Ferris Lane	Coulter Street/Highway 400 SB off-ramp	0.5	34.4	0.5	38.5
Coulter Street/Highway 400 SB off-ramp	Rose Street/Highway 400 NB off-ramp	0.6	22.8	0.9	14.5
Rose Street/Highway 400 NB off-ramp	Grove Street	0.4	41.2	1.0	16.5
Grove Street	Wellington Street	0.9	32.6	0.5	44.5
Corridor Average - Hanmer Street East/West to Wellington Street		6.5	28.2	5.9	30.8

4.1.8 Pedestrian and Cyclist Activities

The existing (2023) pedestrian and cyclist volumes for the weekday morning and afternoon peak hours are presented in **Exhibit 4-8**. The afternoon peak hour pedestrian volumes at the crosswalks are observed higher than the morning peak hour. The cyclist information at the crosswalks is not available. However, the cyclist volumes travelling along the mainstream of traffic on the roadways range from 0-2 per hour at the study area intersections.

Exhibit 4-8: Existing Weekday AM and PM Peak Hour Pedestrian and Cyclist Volumes - Bayfield Street Corridor



4.1.9 Summary of Existing Capacity Needs

Based on the traffic operational analysis of existing AM and PM peak hour conditions, the following sections have shown inadequate capacity:

- Bayfield Street in the northbound direction from Ferris Lane to Cundles Road,
- Bayfield Street in the southbound left-turning movement to Highway 400 northbound on-ramp/Rose Street,
- Highway 400 southbound off-ramp,
- Highway 400 northbound off-ramp,
- Westbound left turn movement at Livingstone Road,
- Westbound left turn movement at Ferris Lane, and
- Westbound left turn movement at Cundles Road.

The following sections operate with approach LOS “E” or “F” either for the AM or for the PM peak hour conditions:

- Highway 400 southbound off-ramp,
- Highway 400 northbound off-ramp,
- Eastbound and westbound approaches at Livingstone Street,
- Westbound approach at Heather Street,
- Eastbound and westbound approaches at Cundles Road, and
- Eastbound and westbound approaches at Ferris Lane.

The following crossing roads on Bayfield Street or on off-ramps have shown 95th percentile queue lengths greater than the available storage lengths on the turning lanes:

- Westbound lane at Livingstone Street
- Eastbound lane at Heather Street
- Eastbound lane and westbound lane at Cundles Road
- Westbound lane at Ferris Lane
- Highway 400 northbound off-ramp
- Eastbound lane at Grove Street

Overall, the segment of Bayfield Avenue between Cundles Road to Grove Street would require either capacity improvement, turn lane improvements or signal control improvements to achieve satisfactory operations under existing conditions. Traffic to and from accesses/businesses on either side of Bayfield Street would require appropriate control or restrictions so that the turning vehicles do not obstruct the through movements (as indicated by the mid-block speed

reductions). Traffic from Highway 400 off-ramps were metered due to congestion/capacity constraint.

4.2 Future Conditions

In the next stage of the MCEA process, the City's transportation model will be updated based on input from the MTO GGHv4 model. The updated model will be used to provide forecasted modelling for traffic and transit conditions along the corridor and assist with the evaluation and screening of the alternative designs.

Future transit plans and updated frequency and headways will be reviewed with alternative designs to identify integration opportunities and potential design alternatives.

The road and transit design will also be informed by the City Transportation Master Plan that is currently being updated.

4.3 Operational and Geometric Needs

4.3.1 Driveway and Access Management

The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR) provides guidelines for access management and geometric design elements related to accesses. An overview of the relationship between access management and safety is provided. Proper access management reduces the number of potential conflict points and the complexity of movements on a roadway. As the number of access points are reduced and spaced further apart, driving along the corridor is simplified and there are fewer locations requiring a driver's attention. Access management techniques may include total prohibition of accesses, indirect access to arterials from local or collector roads, or the use of parallel service roads. Medians and auxiliary turn lanes can restrict or reduce the complexity of movements at accesses.

Accesses to corner lots should typically be provided off of side streets and accesses should be limited to one access per property. The recommended spacing between two-way accesses on an arterial road with commercial land uses is 20 m. The recommended spacing for one-way accesses is 25 m. Recommended corner clearances are 5 m.

The existing access design and spacing on Bayfield Street does not meet the current industry guidelines for access management. There are often two accesses per lot and the average spacing between accesses is 17.2 m. The closest accesses have a separation distance of 1.9 m. The TAC GDGCR highlights that roads with full access control have half the rates of fatal collisions than roads with no access control. While there are no recent fatalities, improved access management on Bayfield Street would improve traffic operations, reduce angle collisions, and improve safety, particularly for pedestrians and cyclists.

4.3.2 Sight Distance Review

A sight distance review was conducted to identify deficiencies for existing intersections and accesses. A focused review was conducted for the accesses north of Highway 400, where opportunities for improving sight lines could be considered through the preliminary design. Scenarios reviewed at full-movement commercial accesses were left turns from stops and right turn from stops. Only right turn from stop sight distances were reviewed at right in/right out accesses. Based on a design speed of 60 km/h, the required sight distance for a left turn from stop would be 130 m. The required sight distance for a right turn from stop is 110 m. The review found that available sight distances were deficient at the following properties:

- 319 Bayfield Street: Sight distances deficient for both right turn and left turn from stop
- 347 Bayfield Street: Sight distances deficient for both right turn and left turn from stop

Other accesses had sightlines obstructed by temporary signs. This MCEA study presents opportunities to consider relocating sightline obstructions.

4.3.3 Vertical and Horizontal Alignment

Bayfield Street has significant existing longitudinal grades generally in the southbound direction. Grades between Grove Street and Rose Street/Highway 400 northbound off-ramp are approximately 6%. North of Highway 400, grades are 1.7% from Coulter Street to approximately 90 m south of Ferris Lane. A vertical curve starts approximately 90 m south of Ferris Lane and transitions to 3.1% grades from Glenwood Drive to Cundles Road. Grades become less steep north of Cundles Road, decreasing to approximately 2.5% to a local high point near the intersection of Bayfield Street and Heather Street. North of the highpoint, grades become downhill in the northbound direction and continue to a local low point approximately 380 m north of Livingstone Street, after which grades become flatter. The existing vertical alignment falls within the TAC GDGCR recommended maximum gradient of 6% on undivided urban arterials roads on a rolling topography.

There are no changes to the horizontal alignment of Bayfield Street north of Coulter Street/Highway 400 southbound off-ramp or south of Rose Street/Highway 400 northbound off-ramp. A minor change in alignment is present at the highway overpass.

4.4 Traffic Safety Needs

A detailed Safety Assessment Report is on file with the City of Barrie. A summary of the assessment is provided in the following section.

4.4.1 Intersections

The report summarizes collisions by severity and impact type at each of the 11 intersections in the study area. The Cundles Road intersection presented the highest collision frequency, with 168 total collisions, 14 (8%) resulting in injury. The Livingstone Street intersection had the second highest collision frequency, with 156 total collisions, 15 (10%) resulting in injuries. The Highway 400 SB Off-ramp / Coulter Street intersection had the third highest collision frequency, with 141 total collisions, 17 (12%) resulting in injury. The Grove Street intersection had the fourth highest collision frequencies with 109 total collisions, 19 (17%) resulting in injuries. All other intersections presented fewer than 100 total collisions during the 5-year analysis period. Most intersections have rear-end collisions as the predominant impact type.

The following intersections in the study area presented higher than typical combined proportions of angle and turning movement collisions:

- Cundles Road: 34% of a total of 167 collisions (57 angle and turning movement combined).
- Grove Street: 35% of a total of 109 collisions (38).
- Heather Street / Springwater Market Place: 45% of a total of 58 collisions (26).
- Highway 400 NB Off-ramp / Rose Street: 28% of a total of 83 collisions (23).
- Hanmer Street: 37% of a total of 63 collisions (23).
- Georgian Mall North Access: 61% of a total of 13 collisions (8).
- Glenwood Drive: 42% of a total of 19 collisions (8).

Based on additional details, including direction of travel, movement, road surface condition, and apparent driver action, for predominant impact types at each intersection, some patterns that stand out include:

- Most predominant impact types at intersections consist of rear-end collisions. These are primarily in the northbound or southbound direction, which aligns with the directions of high traffic volumes; and
- Angle and turning movement collisions were also common impact types.

4.4.2 Table Mid-block Segments

There is a total of 10 road segments in the study area. The segment between Heather Street / Springwater Market Place and Cundles Road presented the highest collision frequency, with 54 total collisions, 8 (15%) resulting in injury. The sections between Cundles Road and Glenwood

Drive, and between Ferris Lane and Hwy 400 SB Off-ramp / Coulter Street presented the second highest collision frequencies, with 20 total collisions each. Injury collisions were only reported at the latter, with 2 occurrences (10%). Other road segments had total collision frequencies ranging between 1 and 14 during the 5-year analysis period, with injury collisions ranging between 0 and 3. Table Most road segments have rear end collisions as the predominant impact type. Similar to intersections, this is typical of urban road segments. However, angle and turning movement collisions are the predominant impact type, or represent a very high proportion of total collisions, at 7 out of 10 road segments in the study area, as follows:

- Heather Street / Springwater Market Place to Cundles Road: 40% of a total of 54 collisions (22 angle and turning movement combined).
- Glenwood Drive to Ferris Lane: 100% of a total of 11 collisions.
- Cundles Road to Glenwood Drive: 50% of a total of 20 collisions (10).
- Hanmer Street to Georgian Mall North Access: 90% of a total of 10 collisions (9).
- Ferris Lane to Hwy 400 SB Off-ramp / Coulter Street: 30% of a total of 20 collisions (6).
- Livingstone Street to Heather St / Springwater Market Place: 44% of a total of 9 collisions (4).
- Georgian Mall South Access to Livingstone Street: 33% of a total of 12 collisions (4).

The high incidence of angle and turning movement collisions along road segments in the study area is likely due to conflicts associated with the high density of high-volume (commercial) driveways and the presence of a TWLTL on a multi-lane roadway. Table

4.4.3 Summary

The high number of vehicles turning in and out of the numerous commercial properties and the presence of a TWLTL on a multi-lane roadway has resulted in a significant number of midblock collisions.

Implementing bicycle facilities will increase the complexity of left-turn movements along Bayfield Street. Should the City proceed with the implementation of bicycle facilities on Bayfield Street, some of the following remedial measures will need to be implemented:

- Remove the TWLTL to reduce the number of conflicting movements; and,
- Consolidate accesses to reduce the number of conflict points, where possible.

Based on the findings from the collision analysis and field investigation, long-term recommendations to be incorporated as part of the future design of Bayfield Street have been developed. These recommendations will be considered in the development of alternative solutions and alternative designs as part of the MCEA study process.

Future Design Recommendations

- Relocate stop bars at commercial accesses to be closer to the crosswalks;
- Increase pedestrian and vehicle clearance intervals so they are consistent with OTM Book 12 guidance;
- Provide side street pavement markings (e.g., stop bar, centre line and crosswalk) at all intersection approaches;
- Reduce distance between commercial access stop bars and crosswalks;
- Provide ladder crosswalk markings at intersections;
- Install pedestrian countdown timers at all signalized intersections;
- Relocate or remove midblock bus stops;
- Install pedestrian level lighting at all crosswalks at Livingstone Street;
- Provide left-turn guide lines for the eastbound dual left-turn movement at the Highway 400 Northbound off-ramp;
- Extend the north sidewalk of the Highway 400 southbound on-ramp to provide a crosswalk that is perpendicular to the ramp. Vehicle and pedestrian sightlines should be considered when proposing the crossing configuration; and
- Install crosswalk markings and TWSIs at Highway 400 southbound on-ramps.
- Install a centre median and remove the TWLTL to reduce the potential for turning movement and angle collisions near commercial accesses;
- Consolidate accesses to commercial properties along Bayfield Street where possible, particularly near intersections and at developments served by multiple accesses;
- Install a multi-use pathway (MUP) between Hanmer Street to Cundles Street;
- Reduce corner radius at intersections using vertical curb, truck aprons, or pavement markings to reduce right-turn speeds;
- Implement centreline hardening/median nose extensions at intersections to reduce left-turn radius and speeds;
- Redesign transit stops in accordance with transit stop design guidelines to increase accessibility for transit passengers;
- Install pedestrian facilities at intersections consisting of accessibility features (e.g., TWSI, accessible pedestrian signals);
- Provide continuous eastbound cycling facilities along Hanmer Street;
- Install a traffic signal to provide a controlled crossing at the commercial access between Heather Street and Cundles Road to reduce the likelihood of pedestrians crossing at midblock locations; and

- Remove right-turn channels at Cundles Road, reduce corner radius, and realign crosswalks.

4.5 Streetscape Considerations

Bayfield Street is a premier gateway within the City and consideration should be given to creating a contextually appropriate streetscape that offers high quality pedestrian infrastructure and enhances the public realm.

Interim Considerations

Due to corridor ROW constraints, opportunities to create a high-quality streetscape will be limited in the immediate term. Considerations to be prioritized during the interim include:

- Enhancement of pedestrian scaled connections throughout the corridor to facilitate safe, comfortable and attractive pedestrian crossings and corridors through the installation of sidewalk connections, and the potential to incorporate active transportation infrastructure.
- Preservation of existing trees and vegetation to maintain existing tree canopy to the greatest extent possible.
- Installation of new tree and landscape planting enhancements where feasible, to increase tree canopy and ecological value through the corridor.
- Potential inclusion areas of respite to facilitate pedestrian movement and comfort through the area. Potential to ingrate amenities with public transit system.

An important consideration for tree planting within both the interim and longer-term improvements is the requirement for adequate soil volume. The many benefits of an increased tree canopy are only realized when trees reach a mature age, ensuring adequate soil volume is achieved will greatly increase the potential for tree plantings to reach a mature age.

Future Design Considerations

If expansion of the City ROW is recommended through this MCEA study, opportunities to create an enhanced and unified streetscape through the corridor should also be considered. These additional considerations can include:

- Strategic site furnishing network that enhances the navigability of the street and to enhance the service potential of social spaces. These furnishings can including benches, bicycle racks, waste and recycling receptacles which will assist in creating a unified vision throughout the corridor.
- Pedestrian and accent lighting which, along with the street furnishings, will assist in creating a unified vision throughout the corridor and enhance the pedestrian experience.
- Incorporation of gateway features, such as public art and signage to highlight the corridor as an important entrance into the City. Inclusion of public art also creates an

opportunity to incorporate local, historical and Indigenous commemoration further enhancing the unique character areas within the corridor.

- Potential inclusion of green infrastructure measures which may include low impact development (LID) elements including bioswales, rain gardens and absorbent landscapes to enhance climate resiliency of the corridor.

5 Consultation Approach

5.1 Communication and Engagement Plan

A Communication and Engagement Plan was developed for this MCEA study to guide stakeholder and public engagement activities. Communications with stakeholders commenced early in the study to ensure all stakeholders are made aware of the study; given the opportunity to share issues and concerns; and participate in the decision-making process.

Based on our knowledge of the Bayfield Street study area, key **local** stakeholders who will likely be affected by the study and/or be considered an influencer includes:

- Barrie Residents
- City of Barrie Staff
- City of Barrie Committees and Boards
- City Council
- Local Property Owners
- The Business Community
- Local Developers
- Emergency Service Provider

Key **Regional or Provincial** stakeholders who are more likely to be considered influencers include:

- Simcoe County:
- Provincial Parliament
- Lake Simcoe Region Conservation Authority (LSCRA)
- Local and County Agencies:
- Neighbouring Municipalities
- Provincial Ministries
- Public Utilities
- Transportation Agencies
- **Indigenous Communities** comprises all Indigenous communities whose land is in close proximity to Bayfield Street, which includes:
  - Beausoleil First Nation
  - Chippewas of Georgina Island First Nation
  - Huronne-Wendat First Nation
  - Curve Lake First Nation
  - Mississaugas of the Scugog Island First Nation
  - Williams Treaties First Nation
  - Metis Nation of Ontario (Barrie South Simcoe)

- Their primary interests will likely include potential findings that are culturally significant such as in an archaeological dig; environmental impact of the proposed redevelopment; economic opportunities; and, consultation and engagement rights.

Communication Tactics

There are many communication tactics that will be adopted over the course of the study, both on an ongoing or milestone-specific basis, to widely promote, inform, and educate the target audiences. The following sections provide an overview of the tactics that will be used throughout this study (ongoing tactics) and those leveraged specifically for the PICs. The tactics include:

Phase 1 Consultation Activities

During phase 1 of the project the Consultation Plan was developed and submitted to the client which outlined all Communication and Engagement activities and strategies throughout the Project. Notice of Commencement letters were sent to all stakeholders on the Project contact list to notify parties the project was commencing, highlighting the project website where they could participate in surveys, and inform them of the opportunity to provide comments. A project website was launched that included the study overview, project schedule, contact information, and interactive tools such as a survey, idea board, and interactive map. An Internal Technical Advisory Committee meeting took place on January 15, 2024, to discuss project issues with internal City of Barrie staff and the Ministry of Transportation. An External Technical Advisory Committee meeting will be held to provide a forum for regulatory authorities and approval agencies to provide feedback and guidance to the project team. This will occur around the time of the first PIC. The first PIC will be held virtually during Phase 1. This will be presented through a pre-recorded video on the project website.

Phase 2 Consultation Activities

A second PIC will be held during phase 2. There will also be internal and external technical advisory committee meetings held during phase 2. It is likely there will be a community pop up event to further engage the public, advertise the project and reach audiences who may not typically attend a PIC.

5.1.1 Indigenous Community Activities

The City will consult with Indigenous Communities at minimum of four occasions during the study:

- Notice of Study Commencement
- PICs No.1 and No. 2 for the Municipal Class EA process.
- Notice of Study Completion and filing of the Environmental Study Report

While the interests will vary among the various Indigenous Communities to participate in this study, it is likely that their focus will be on:

- Potential findings that are culturally significant such as in an archaeological dig.
- Potential environmental impact of the proposed redevelopment..
- Economic opportunities.
- Consultation and engagement rights.

These issues will be further refined as discussions with the Indigenous Communities are commenced.

- Public Information Centres

PIC No. 1

The first PIC will provide an overview of the study, summarize the study area's existing conditions, constraints, and opportunities, and identify a preliminary list of alternative solutions developed to address the Problem and Opportunity Statement. WSP will refine the alternative solutions immediately after the first PIC at the beginning of Phase 2 of the Municipal Class EA process. Given that the PIC will be virtual, the Project Team will develop PowerPoint presentation with members of the technical team giving an overview of key elements of the study.

PIC No. 2

WSP will host a second PIC that will reflect the public feedback received in the initial PIC as well as provide updated design concepts, options, drawings, visualizations and relevant information. The Project Team will provide a response to outstanding issues discussed at the first PIC and a schedule that outlines the next steps in the planning, design, and construction process.

For each of the PICs WSP will provide a summary of the PIC which will be forwarded to staff within 10 business days following the event. The Project Team will also track comments received and develop appropriate responses.

Community Pop-ups or Signs

People often prefer to be "engaged where they are" as opposed to being asked to take time out of their day to engage. Strategic "pop-up" engagements provide the opportunity to hear from residents and visitors of a community in a relaxed, casual setting, including those who may typically participate in traditional forms of community engagement, such as open houses. There may be opportunities to set-up-controlled pop-ups with project information and promotional tool distribution.

Municipal signs have also been more recently used to "intercept" people along their trip promoting a project webpage or specific events. At a smaller scale, intercept signs (24' x 36") can also be prepared using the study brand and promotional information and placed at key decision-making points.

Further information on all consultation, communication and engagement activities can be found in the Communication and Engagement Plan, 2023.

6 Problem and Opportunity Statement

Bayfield Street is the key gateway into the City of Barrie. It represents a major regional commercial, retail hub in Simcoe County and transportation conduit through the City and connects a key interchange with Highway 400. Currently, Bayfield Street ranges from five to seven lanes of vehicular travel with sidewalks that is arterial in character. From Grove Street to the City limits, Bayfield Street travels though medium density residential, commercial and greenspace land uses.

In coming years, the transportation and land use context of Bayfield Street will evolve. This corridor evolution is being driven by several planned improvements to the City. These include, but are not limited to:

1. The upcoming widening of the MTO's Highway 400 and improvements to the interchange at Bayfield Street;
2. The identification of Bayfield Street by the City as an intensification corridor planned for higher-density and mixed -use development connecting to the City's growth centre; and,
3. The identification of Bayfield Street as a future cycling network by the City of Barrie

In anticipation of Bayfield Street's transformation, there is both an opportunity and a need to consider the long-term evolution of Bayfield Street so that it appropriately serves all roadway users (i.e. pedestrians, cyclists, transit users and motorists). Given its location as they key gateway into the City, its major connection to Highway 400, its planned intensification and its existing safety concerns, Bayfield Street should be assessed and evaluated for a redesign into a safe, comfortable and vibrant complete street that encourages staying. Additionally, to improve the safety of the corridor both in the short term and in the long term, interim implementations and intentional design can be integrated into the planning and design of Bayfield Street.

7 Next Steps

Phase 1 of the MCEA Study has been summarized in this Need and Justification report and the draft Problem and Opportunity Statements. The Problem and Opportunity Statements will be reviewed and confirmed with the City, the public and stakeholders before being finalized.

The next phase of work for the Bayfield Street MCEA Study will be Phase 2: development and evaluation of alternative solutions. This involves identifying alternative planning solutions to address the Problem and Opportunity Statements. Alternative planning solutions represent all reasonable means of addressing the stated transportation problems and opportunities, as well as achieving the project objectives. In addition to 'doing nothing' (i.e., maintaining the status quo), alternatives to address a corridor revitalization typically include a complete street approach reviewing the motor vehicle capacity requirements, addition of active transportation, and landscaping and streetscaping opportunities. The alternative planning solutions will be evaluated against their ability to reasonably address the identified problems and opportunities, with consideration of the constraints identified in the early stages of the study, to identify a preferred solution(s).

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APPENDIX

A TRAFFIC ANALYSIS REPORT

BAYFIELD STREET CONCEPTUAL DESIGN AND MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT STUDY

PRELIMINARY TRAFFIC ANALYSIS REPORT– EXISTING CONDITIONS



BAYFIELD STREET MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT STUDY

PRELIMINARY TRAFFIC ANALYSIS REPORT - EXISTING CONDITIONS

CITY OF BARRIE

RFP: FIN2023-120P

PROJECT NO.: CA0008215.3476-CA
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1 Introduction

1.1 Introduction

The City of Barrie has initiated Conceptual Design and Municipal Class Environmental Assessment (MCEA) for the Bayfield Street corridor, between Grove Street and the City Limits. MTO considers Bayfield Street as an east-west corridor and Highway 400 with North-South orientation; however, the City of Barrie considers Bayfield Street as a north-south running roadway. **Therefore, for this Study, the orientation of both Bayfield Street corridor and Highway 400 was considered north-south**. This corridor provides connectivity to regional shopping centres and is a designated MTO connecting link between Highway 400 and Highway 26. Currently, Bayfield Street is five lanes from Grove Street to Cundles Road and Seven lanes from Cundles Road to the City limits with a central two-way-left-turn lane. The City's Bayfield ESR (Schedule C Municipal Class Environmental Assessment 2013), 2014 and 2019 Transportation Master Plans (TMP) as well as the MTO's Highway 400 Transportation Environment Study Report (TESR) all confirms the need for the corridor widening to seven lanes with median turning lanes and sidewalks. This EA study is essential to advance the implementation of transportation infrastructure upgrades for the Bayfield Street corridor. These upgrades encompass roadway widening, intersection improvements, and the establishment of active transportation infrastructure for pedestrians and cyclists. It provides an opportunity to improve the study area corridor by carrying high volume of pedestrian/vehicular traffic in a safe and efficient manner.

As part of the EA study, a detailed Traffic Operational Analysis is being undertaken to evaluate the existing (2023) traffic conditions and assess traffic impacts with a range of design alternatives for the future horizon years of 2032 and 2041. The objective of this study is to identify the preferred alternative design that could improve the accessibility for all road users under the future conditions.

The following tasks were conducted under existing and future conditions traffic analysis:

- Reviewing existing road network in terms of lane configurations and intersection controls.
- Establishing existing peak hour traffic volumes used for traffic analysis.
- Conduct Synchro analysis of intersection for the base existing conditions to evaluate intersection performance based on indicators such as Level of Service (LOS), delay, and volume-to-capacity ratio (v/c Ratio), queue length etc. of intersection turning movements.

- Update the Travel Demand Model network to reflect the current 2023 conditions within the City of Barrie. Using provided 2023 population, households and employment data, run a base year model and analyze the conditions of the roadways. Extract Traversal matrices and/or intersection approach volumes, by various auto and truck classes. In addition, provide transit volumes and AT growth rates.
- Develop a microsimulation model of the corridor using Aimsun software for the existing condition (AM and PM peak periods). The model will replicate the existing lane and intersection configuration and the existing intersection control. The model's traffic demand (cars, trucks etc.) will be developed based on the traversal matrices from the Travel Demand Model for the study subarea (either using City's TMP model/Ministry's EMME based GGHM v4 model) and using real data set comprising of all existing turning movement counts at the intersections along the corridor as well as travel time data for the AM and PM peak hours.
- Calibrate and validate existing microsimulation model and conduct evaluation of existing conditions.
- Update the Travel Demand Model for the 2032 and 2041 conditions and extract Traversal matrices and/or intersection approach volumes, by various auto and truck classes for the development matrices for the microsimulation analysis. In addition, provide transit volumes and AT growth rates.
- Develop microsimulation models for future Do-Nothing and other alternate scenarios for 2032 and 2041 conditions based on traffic demand from future updated Travel Demand Models.
- Conduct detailed traffic analysis within the study area to confirm needs and justification of problems, signal timings and appropriate configuration of Bayfield Street corridor for future conditions.

1.2 Study Area

The study area for the Bayfield Study Class EA study extends from Hanmer Street (north) to Grove Street (south). As presented in Figure 1-1, the study area incorporates 17 intersections, including the Highway 400 interchanges and many property accesses/driveways.

Figure 1-1: Study Area



Note: Bayfield Street corridor is assumed to run as a north-south corridor in the report

The following intersections are included within the study area:

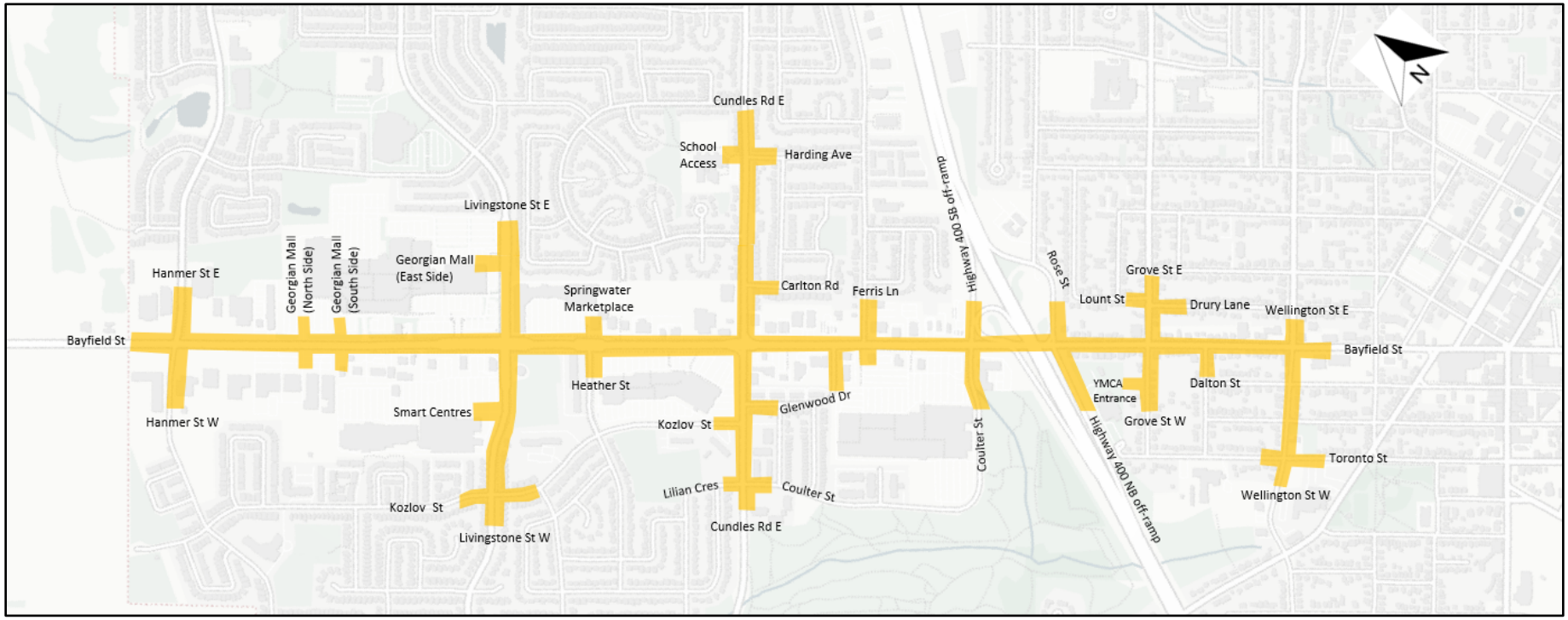
- Bayfield Street and Hanmer Street East/West
- Bayfield Street and Georgian Mall (North Side)
- Bayfield Street and Georgian Mall (South Side)
- Bayfield Street and Livingstone East/West
- Livingstone Street West and Smart Centres
- Bayfield Street and Heather Street/Springwater Marketplace
- Bayfield Street and Cundles Road East/West
- Cundles Road East and Carlton Road
- Cundles Road West and Glenwood Drive
- Bayfield Street and Glenwood Drive
- Bayfield Street and Ferris Lane
- Bayfield Street and Coulter Street/Highway 400 SB off-ramp
- Bayfield Street and Rose Street/Highway 400 NB off-ramp
- Bayfield Street and Grove Street East/West
- Grove Street East and Drury Lane
- Grove Street East and Lount Street
- Grove Street West and YMCA Entrance

Even though, the actual study is for Bayfield Street from Grove Street to the City Limits, a larger corridor section of Bayfield including one intersection on either side (within 1 km distance) of the study corridor will be included with all the intersections and major crossing roads as well as Highway 400 interchange in the network model for evaluation using microsimulation. The first major signalized intersection on the crossing road beyond each intersection will be considered for inclusion in the model if there is a potential for queue spillback from these major adjacent intersections that could potentially affect the performance of the intersections within the corridor if they are located within 500 metres.

The broader study area, which incorporates a total of 25 intersections, was established for the purpose of microsimulation-based traffic analysis and is presented in Figure 1-2. This includes:

- Additional two intersections on Bayfield Street at Dalton Street and Wellington Street located on south side of Bayfield Street.
- Signalized intersection located within 500 metres on crossing roads, which are as follows:
    - Livingstone Street East and Georgian Mall (East Side)
    - Livingstone Street West and Kozlov Street
    - Cundles Road East and Harding Avenue
    - Cundles Road West and Kozlov Street
    - Cundles Road West and Coulter Street/Lilian Crescent
    - Wellington Street West and Toronto Street

Figure 1-2: Broader Study Area – Bayfield Street Corridor for Microsimulation Analysis



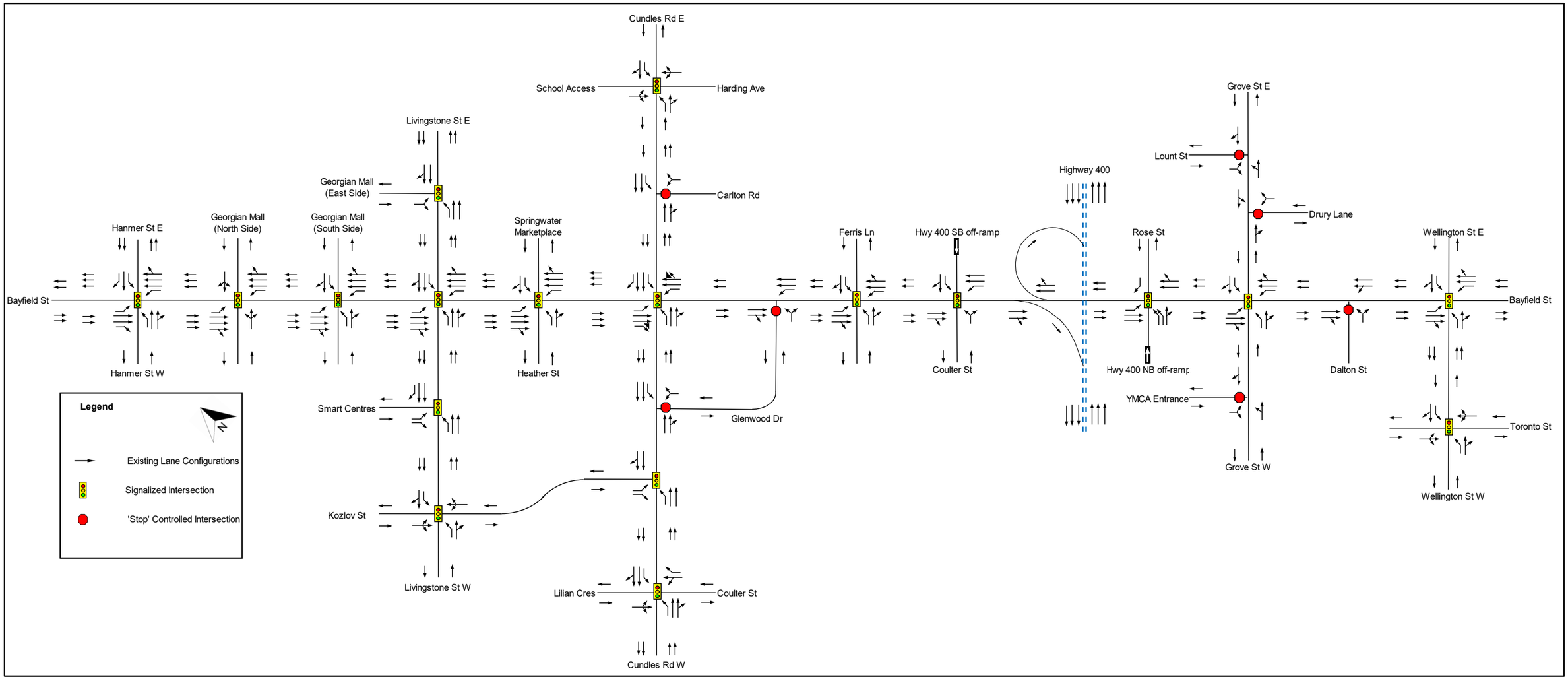
Note: Bayfield Street corridor is assumed to run as a north-south corridor

Within the study area, the posted speed limit on Bayfield Street corridor is 50 km/h. The study area corridor is provided with the two-way-left-turn lane (TWLTL), such that the network configurations along the Bayfield Street are as follows:

- Between Hanmer Street and Cundles Road: 7 lane cross-section (3 through lanes in each direction plus median TWLTL)
- Between Cundles Road and Coulter Street: 5 lane cross-section (2 through lanes in each direction plus median TWLTL)
- Between Coulter Street and Wellington Street: 4 lane cross-section (2 through lanes in each direction) with additional left-turn lanes at intersections.

The existing lane configurations and control types for the study area intersections are presented in Figure 1-3. It must be noted that trucks are permitted on the Bayfield Street study area corridor, however on-street parking is not allowed on the Bayfield Street within the project limits.

Figure 1-3: Existing Intersection Lane Configurations – Bayfield Street Corridor*

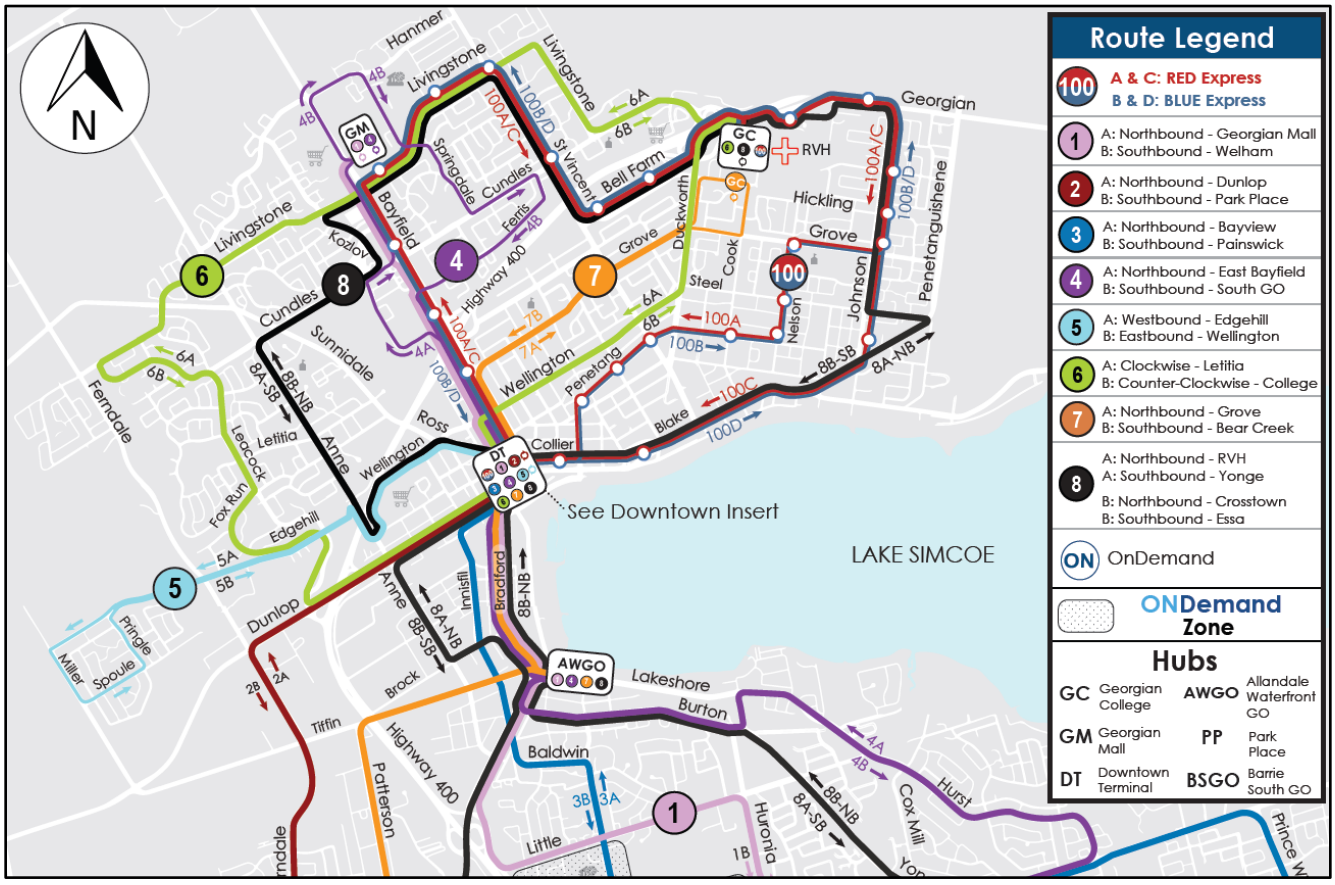


*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

1.3 Transit Network

Within the study area, there are currently four (City of Barrie) bus routes operating on Bayfield Street - Routes # 100, 1, 4 and 7. The transit routes operating within the study area are presented in Figure 1-4. As presented in Figure 1-4, all the study area transit routes converge at the Downtown Terminal (DT).

Figure 1-4: Existing Transit Network



Source: Barrie Transit Routes

Route 100, which provides connection to Georgian College (GC) and DT, operates on Bayfield Street between Livingstone Street and Wellington Street seven days a week. This transit route operates with approximate headway of around 22 minutes during weekday peak hours, and 45 minutes during the weekend peak hours.

Route 1 (Route 1A operates in the northbound direction and Route 1B operates in the southbound direction) serves Bayfield Street between Georgian Mall (North side) and Wellington Street with an approximate headway of 30 minutes during weekday and Saturday peak hours. The Route operates with frequency of 30/60 minutes during Sunday peak hours.

Route 4A, which connects Georgian Mall (GM) with Barrie South Go (BSG) in the northbound direction, travels northbound on Bayfield Street between Wellington Street and Coulter Street and then converge on Bayfield Street via Cundles Road to enter the Georgian Mall parking access located just north of Livingstone Street on the east side. Similarly, Route 4B connects GM and BSG in the southbound direction and travels northbound on Bayfield Street between Georgian Mall (North Side) and Hanmer Street, and then converge on Bayfield Street via Ferris Lane. On weekdays and Saturday peak hours, this route serves with an approximate headway of 35 minutes, and 55 minutes during Sunday peak hours.

The segment of Bayfield Street between Wellington Street and Grove Street is served by Route 7, which provides connection to GC, DT, Park Place and Allandale Waterfront Go. The Routh 7A travels on Bayfield Street in the northbound direction and Route 7B in the southbound direction. This Route serves with approximate frequency of 30 minutes during weekday and Saturday peak hours, and 60 minutes during Sunday peak hours.

2 Existing Traffic Conditions

2.1 Traffic Data

Significant amount of data and information were received from the City for this study to support the existing conditions traffic operational analysis. The section provides a summary of the relevant data available.

2.1.1 Traffic Signals

The City of Barrie has provided the existing signal timing plans for all the study area intersections. The study area intersections are currently operating with a coordinated semi-

actuated signal control plan for the northbound and southbound directions. The intersections from Hanmer Street East/West to Georgian Mall (South Side) are coordinated with a cycle length of 110 seconds, whereas intersections located south of the Georgian Mall (South Side) are coordinated with cycle length of 100 seconds in the morning peak hour and 150 seconds during the afternoon peak hour. The Bayfield interactions of Grove Steet East/West and Wellington Street East/West are coordinated with cycle length of 100 seconds in both the morning and afternoon peak hours. The intersection evaluation was conducted using existing signal timing plans supplied.

2.1.2 Traffic Turning Movement Counts (TMCs) and Automatic Traffic Record (ATR) Counts

This section provides a summary of traffic data received from the City and Ministry of Transportation Ontario (MTO) which includes intersection Turning Movement Count (TMC) data, Highway 400 mainline and ramp volumes, and mid-block Automatic Traffic Recorder (ATR) counts obtained so far. TMCs were collected for an eight-hour period (capturing AM, mid-day, and PM peak periods). The survey dates for the data range from 2017 to 2023. Most of the data for the major intersections were from 2023. Table 2-1 provides a list of intersections and accesses with the available TMCs along with their collection dates. Table 2-2 provides a list of available ATR data.

Table 2-1: List of available Turning Movement Count (TMC) Data and Highway 400 Mainline/Ramp Volume

Data Obtained from City of Barrie					
Intersection	**Data Set 1**	**Data Set 2**	**Data Set 3**	**Data Set 4**	**Data Set 5**
Bayfield Street and Hanmer Street East/West	11-Dec-18	-	-	-	8-May-23
Bayfield Street and Georgian Mall (North Side)	13-Dec-18	-	-	-	21-Mar-23
Bayfield Street and Georgian Mall (South Side)	11-Dec-18	-	-	-	21-Mar-23
Bayfield Street and Livingstone Street East/West	11-Dec-18	-	11-Nov-21	18-May-22 13-Oct-22	21-Mar-23
Bayfield Street and Heather Street/Springwater Marketplace	11-Dec-18	-	11-Nov-21	-	-
Driveway/Property Access south of Heather Street	-	-	-	-	14-Nov-23

Data Obtained from City of Barrie					
Intersection	**Data Set 1**	**Data Set 2**	**Data Set 3**	**Data Set 4**	**Data Set 5**
Driveway/Property Access between Heather Street and Cundles Road	-	-	-	-	14-Nov-23
Driveway/Property Access north of Cundles Road	-	-	-	-	14-Nov-23
Bayfield Street and Cundles Road East/West	11-Dec-18	-	11-Nov-21 8-Dec-21	24-May-22	21-Mar-23
Bayfield Street and Glenwood Drive	-	-	-	-	6-Dec-23
Bayfield Street and Ferris Lane	11-Dec-18	-	11-Nov-21 8-Dec-21	-	21-Mar-23
Driveway/Property Access between Ferris Lane and Coulter Street	-	-	-	-	14-Nov-23
Bayfield Street and Coulter Street/Highway 400 SB off-ramp	11-Dec-18	-	11-Nov-21 8-Dec-21	18-May-22	21-Mar-23
Bayfield Street and Highway 400 SB on-ramps	-	-	8-Dec-21	-	-
Bayfield Street and Rose Street/Highway 400 NB off-ramp	13-Dec-18	-	11-Nov-21 8-Dec-21	24-May-22	21-Mar-23
Bayfield Street and Grove Street East/West	11-Dec-18	-	8-Dec-21	-	21-Mar-23
Bayfield Street and Wellington Street	25-Sept-18	17-Dec-20	-	-	5-Apr-23
Wellington Street and Toronto Street	-	-	-	-	5-Apr-23
Grove Street East and Lount Street	-	-	-	-	14-Nov-23
Grove Street East and Drury Lane	-	-	-	-	14-Nov-23
Grove Street West and YMCA Entrance	-	-	-	-	14-Nov-23
Cundles Road East and Harding Avenue	-	-	-	-	22-Mar-23
Cundles Road East and Carlton Road	-	-	-	-	14-Nov-23
Cundles Road West and Glenwood Drive	-	-	-	-	14-Nov-23
Cundles Road West and Kozlov Street	26-Jun-18	15-Dec-20	-	-	22-Mar-23
Cundles Road West and Coulter Street/Lilian Crescent	19-Jun-18	15-Dec-20	-	-	22-Mar-23

Data Obtained from City of Barrie					
Intersection	**Data Set 1**	**Data Set 2**	**Data Set 3**	**Data Set 4**	**Data Set 5**
Livingstone Street East and Georgian Mall (East Side)	-	-	-	13-Oct-22	22-Mar-23
Livingstone Street West and Smart Centres	-	-	-	-	22-Mar-23
Livingstone Street West and Kozlov Street	-	-	-	-	22-Mar-23

Data Obtained from MTO				
Location	**Data Set 1**	**Data Set 2**	**Data Set 3**	**Data Set 4**
Bayfield Street Intersection at Coulter Street/Highway 400 SB off-ramp	-	-	-	Apr-2022
Bayfield Street Intersection at Rose Street/Highway 400 NB off-ramp	-	-	-	Apr-2022
Rose Street Intersection at Highway 400 NB on-ramp	-	-	-	Apr-2022
Highway 400 SB off-ramp	Jun-2016	-	-	-
Highway 400 N-S on-ramp	Jun-2016	-	-	-
Highway 400 S-S on-ramp	Jun-2016	-	-	-
Highway 400 NB off-ramp	Jun-2016	-	-	-
Highway 400 NB on-ramp	Jun-2016	-	-	-
Highway 400 north of Bayfield St			Nov-2019	Mar-2022
Highway 400 south of Bayfield St		Apr-2017		

The MTO counts for the Highway 400 ramp terminal intersections were not considered for the traffic analysis as the most recent 2023 counts received from the City were available. Also, the ramp volumes received from MTO were adjusted using the City's 2023 ramp-terminal intersection TMCs.

Table 2-2: List of available ATR Data

Location	Data Set 1	Data Set 2
Bayfield Street between Hanmer St East/West and the City Limits	1-Nov-17	18-Oct-18
Bayfield Street between Highway 400 SB on-ramps and Rose Street/Highway 400 NB off-ramp	13-Jun-17	18-May-22

2.1.3 Travel Time and Speed Data

The 2023 weekday AM and PM peak hour travel time and speed data for the Bayfield Street study area sections from Hanmer street East/West to Wellington Street was obtained from the City. Table 2-3 and Table 2-4 provide the existing travel times and average speeds along the Bayfield Street corridor in the both the southbound and northbound directions for both the morning and afternoon peak hours, respectively.

The southbound direction is more critical in both the morning and afternoon peak hour. The southbound travel time for the study area corridor is around 5.9 minutes in the AM peak hour and 6.5 minutes in the PM peak hour. The northbound travel time is lower by approximately 0.5 minutes compared to the southbound direction in both the peak hours.

Similarly, the average speed in the southbound direction is observed to be lower than northbound direction during both the peak hours. The observed average speed along the Bayfield Street Corridor ranges between 31-34 km/h during the morning peak hour and 28-31 km/hr during the afternoon peak hour. The travel speed reduces below 20 km/hr (highlighted in orange) particularly on the Bayfield Street sections between Georgian Mall (South Side) and Livingstone Street East/West, and between Coulter Street and Grove Street. The reduction of speed is attributed to the presence of access/driveways connected to commercial properties or businesses and the on/off ramps from Highway 401.

The existing time to travel on the Bayfield Street between Hanmer Street East/West and Wellington Street is presented graphically in Figure 2-1 and Figure 2-2 for the morning and afternoon peak hours, respectively. The average speed on Bayfield Street sections is presented in Figure 2-3 and Figure 2-4 for the morning and afternoon peak hours, respectively.

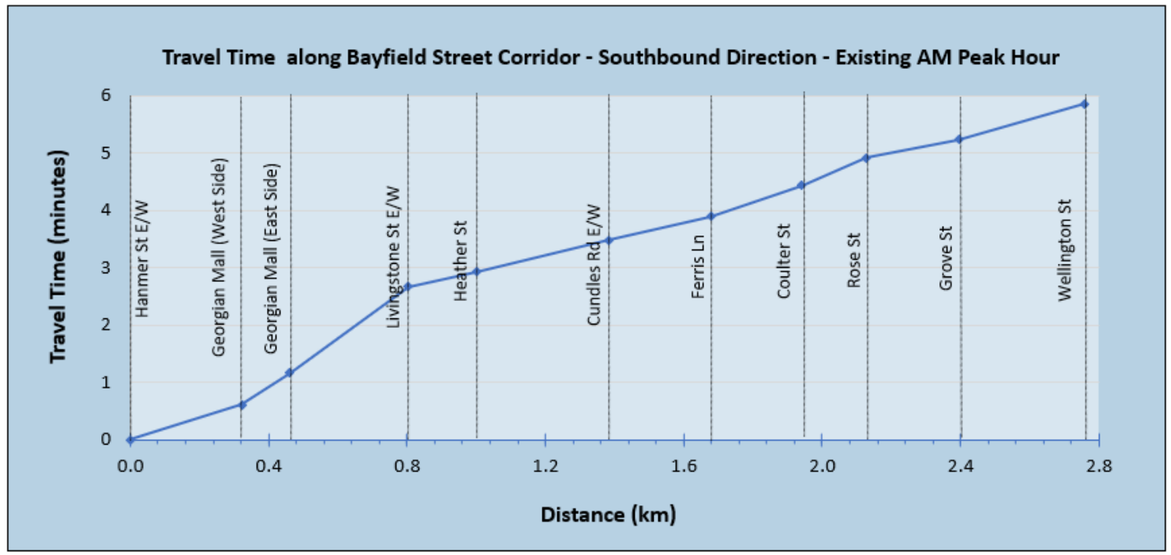
Table 2-3: Existing Travel Time and Speed Data – AM Peak Hour

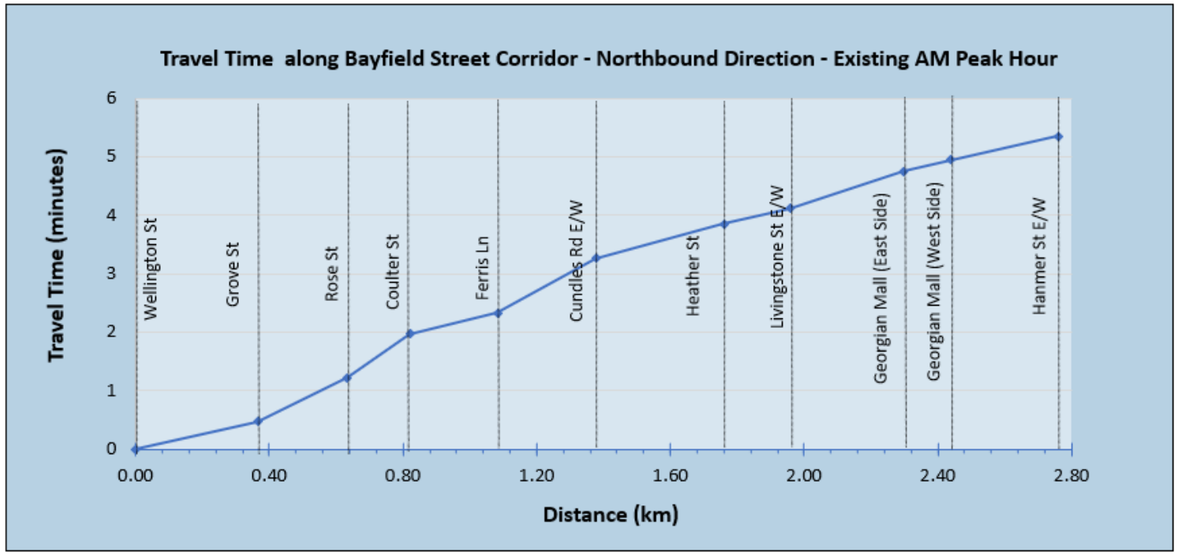
Bayfield Street Section		Southbound Direction		Northbound Direction	
From	To	Travel Time (min)	Average Speed (km/h)	Travel Time (min)	Average Speed (km/h)
Hanmer Street East/West	Georgian Mall (North Side)	0.6	37.1	0.4	40.3
Georgian Mall (North Side)	Georgian Mall (South Side)	0.6	31.2	0.2	49.2
Georgian Mall (South Side)	Livingstone Street East/West	1.5	15.2	0.6	39.2
Livingstone Street East/West	Heather Street/Springwater Marketplace	0.3	51.6	0.3	50.3
Heather Street/Springwater Marketplace	Cundles Road East/West	0.6	45.4	0.6	44.1
Cundles Road East/West	Ferris Lane	0.4	47.3	0.9	21.3
Ferris Lane	Coulter Street/Highway 400 SB off-ramp	0.5	32.8	0.4	46.8
Coulter Street/Highway 400 SB off-ramp	Rose Street/Highway 400 NB off-ramp	0.5	28.1	0.8	17.6
Rose Street/Highway 400 NB off-ramp	Grove Street	0.3	49.0	0.8	30.6
Grove Street	Wellington Street	0.6	40.1	0.5	49.4
Corridor Average - Hanmer Street East/West to Wellington Street		**5.9**	**31.2**	**5.4**	**34.2**

Table 2-4: Existing Travel Time and Speed Data – PM Peak Hour

Bayfield Street Section		Southbound Direction		Northbound Direction	
From	To	Travel Time (min)	Average Speed (km/h)	Travel Time (min)	Average Speed (km/h)
Hanmer Street East/West	Georgian Mall (North Side)	0.6	38.6	0.7	29.3
Georgian Mall (North Side)	Georgian Mall (South Side)	0.3	38.8	0.6	30.3
Georgian Mall (South Side)	Livingstone Street East/West	1.0	22.6	0.5	50.3
Livingstone Street East/West	Heather Street/Springwater Marketplace	0.3	46.1	0.3	51.1
Heather Street/Springwater Marketplace	Cundles Road East/West	1.0	25.4	0.5	50.1
Cundles Road East/West	Ferris Lane	1.0	30.6	0.5	30.3
Ferris Lane	Coulter Street/Highway 400 SB off-ramp	0.5	34.4	0.5	38.5
Coulter Street/Highway 400 SB off-ramp	Rose Street/Highway 400 NB off-ramp	0.6	22.8	0.9	14.5
Rose Street/Highway 400 NB off-ramp	Grove Street	0.4	41.2	1.0	16.5
Grove Street	Wellington Street	0.9	32.6	0.5	44.5
Corridor Average - Hanmer Street East/West to Wellington Street		**6.5**	**28.2**	**5.9**	**30.8**

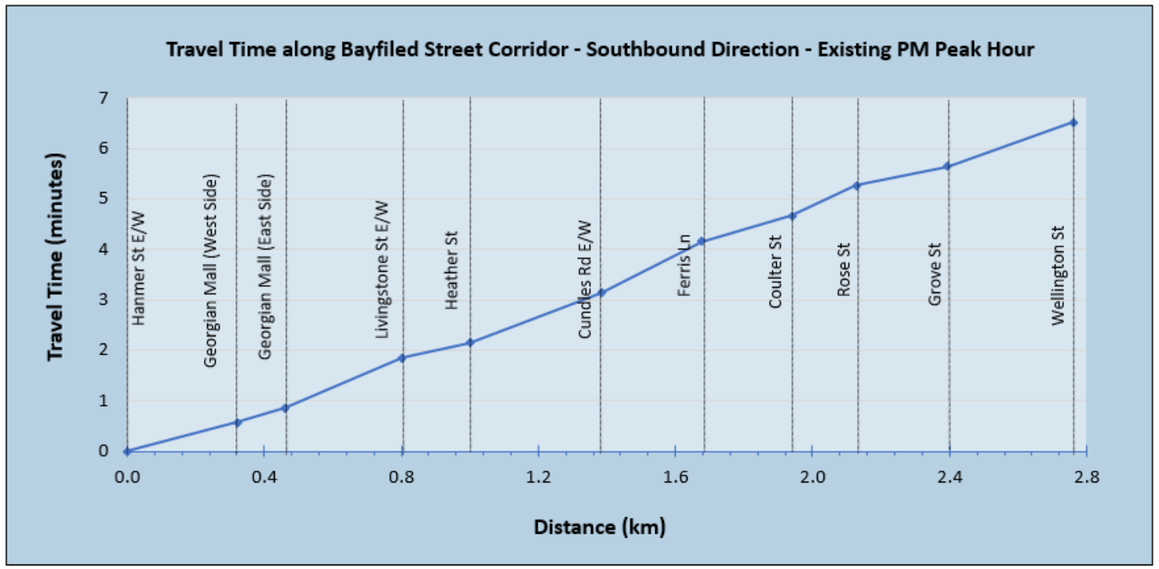
Figure 2-1: Travel Time – AM Peak Hour*

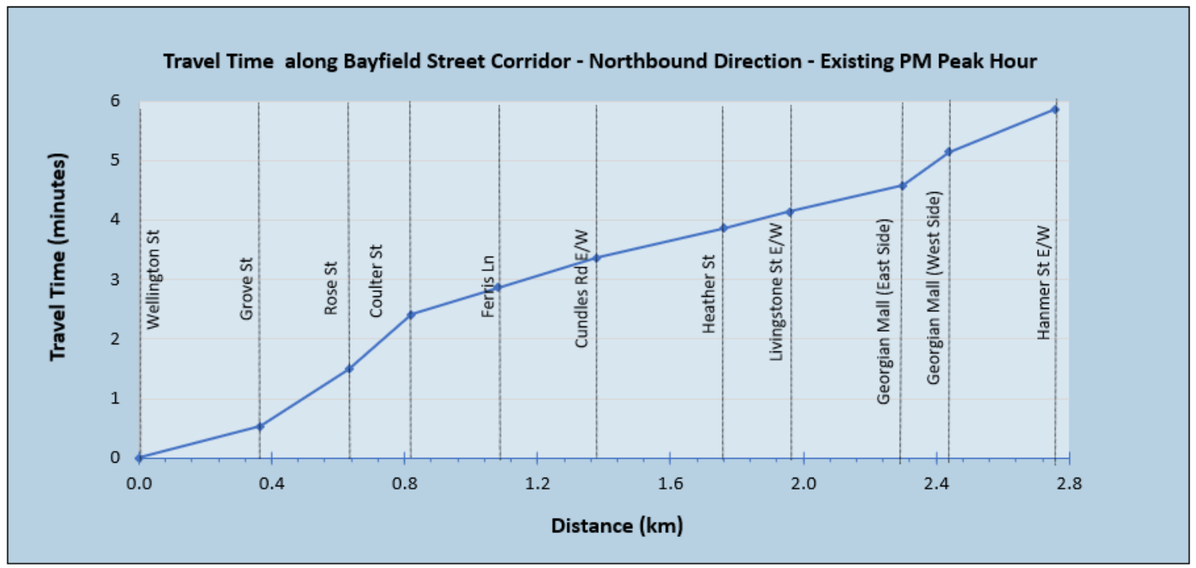




*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

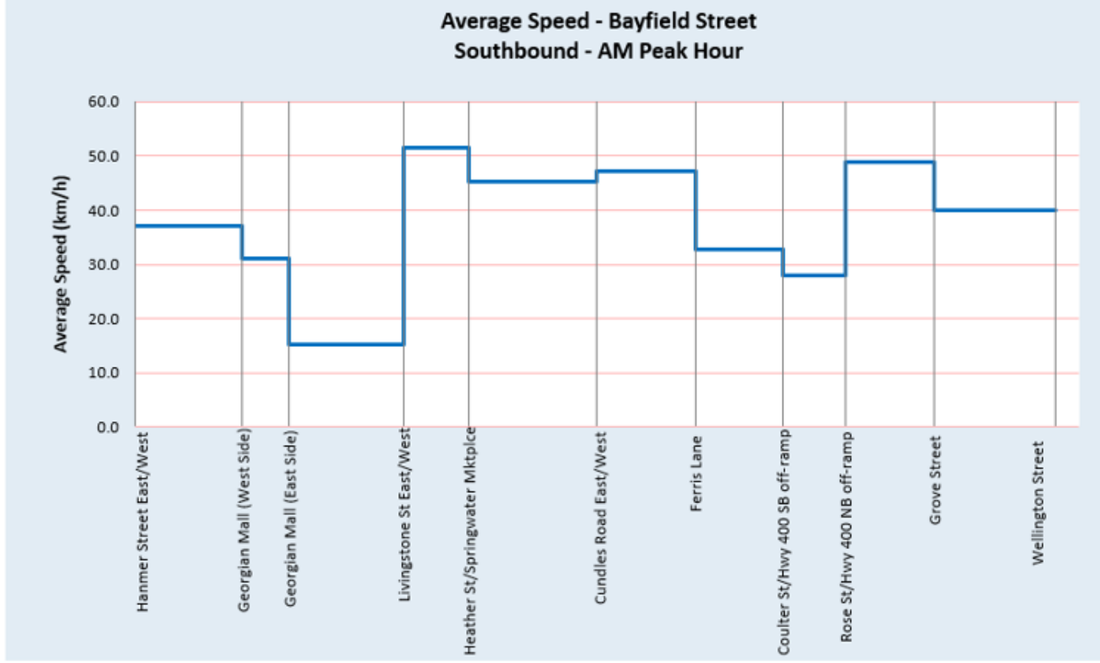
Figure 2-2 Travel Time – PM Peak Hour*

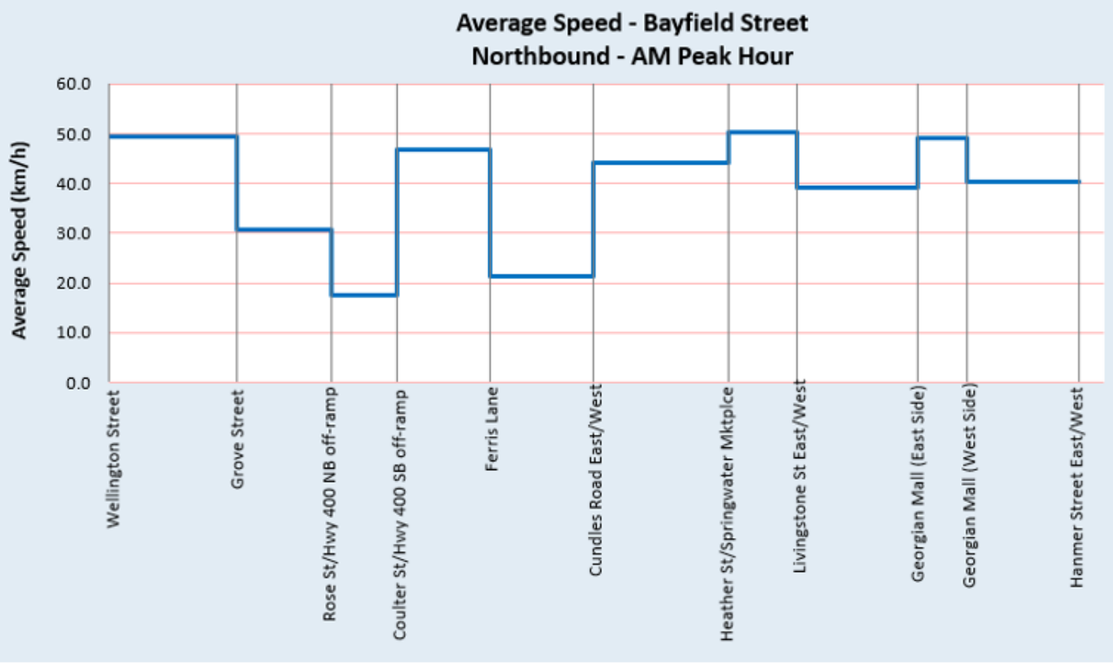




*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

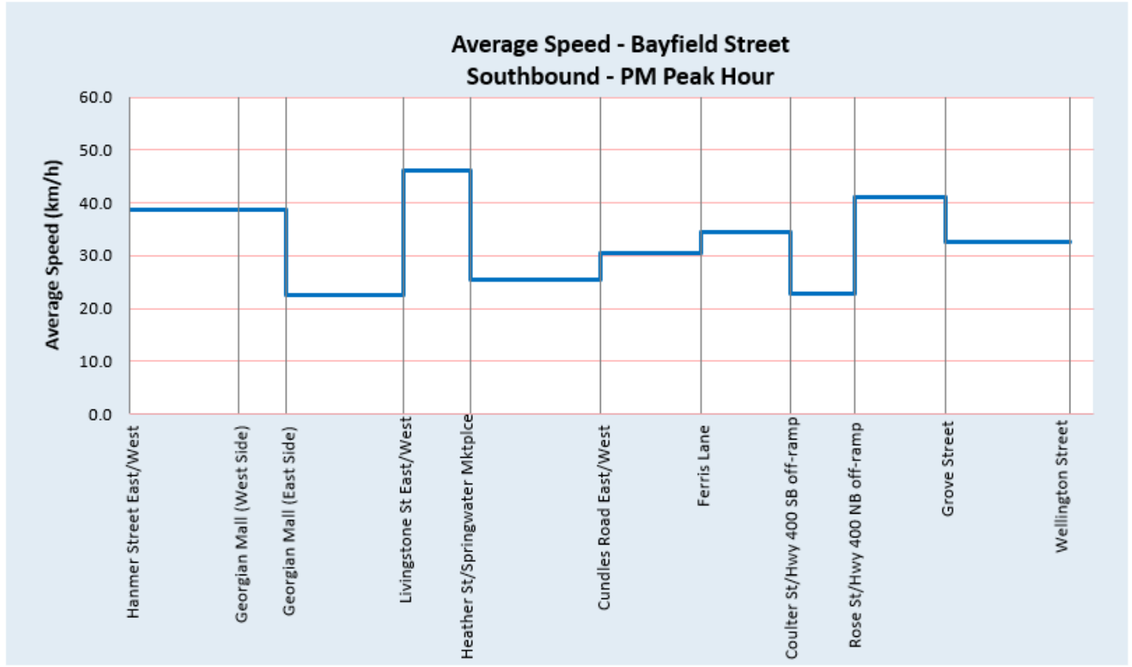
Figure 2-3: Average Speed – AM Peak Hour*

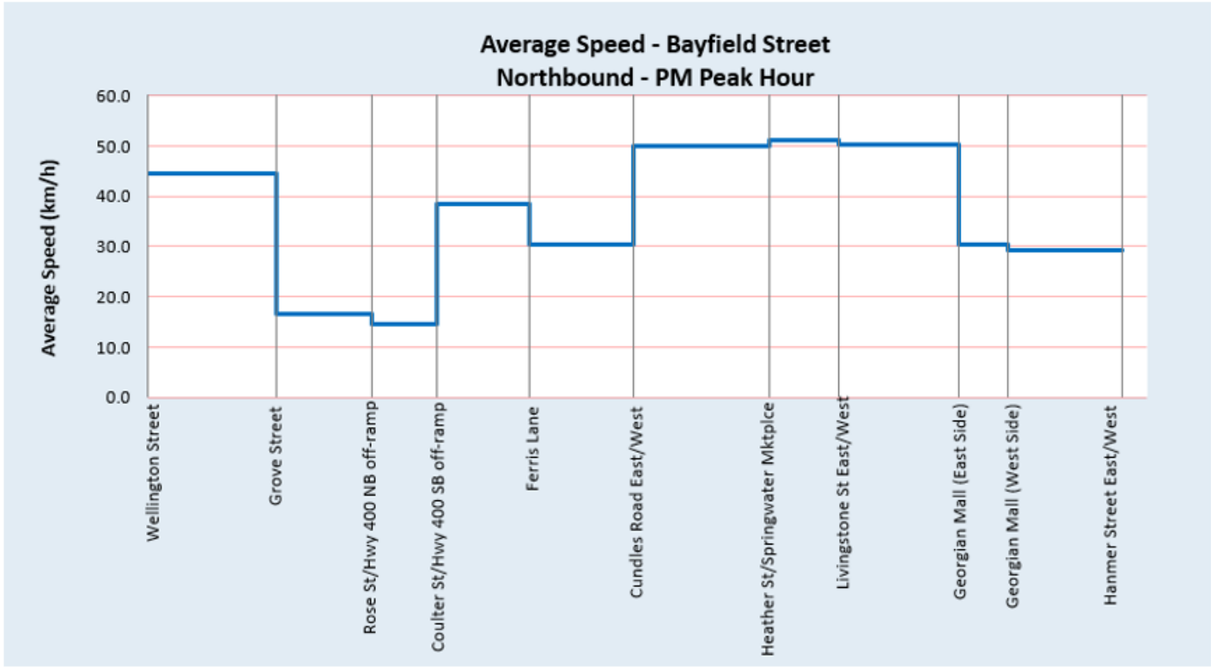




*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

Figure 2-4: Average Speed – PM Peak Hour*





*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

2.2 Existing Traffic Volumes

2.2.1 Turning Movement Count (TMC) volumes

The existing (2023) turning movement volumes for the weekday morning and afternoon peak hours are presented in Figure 2-6. The most recent TMC volumes were considered for establishing Existing Baseline conditions. The following is noted for the Existing Baseline intersection volumes along the Bayfield Street corridor:

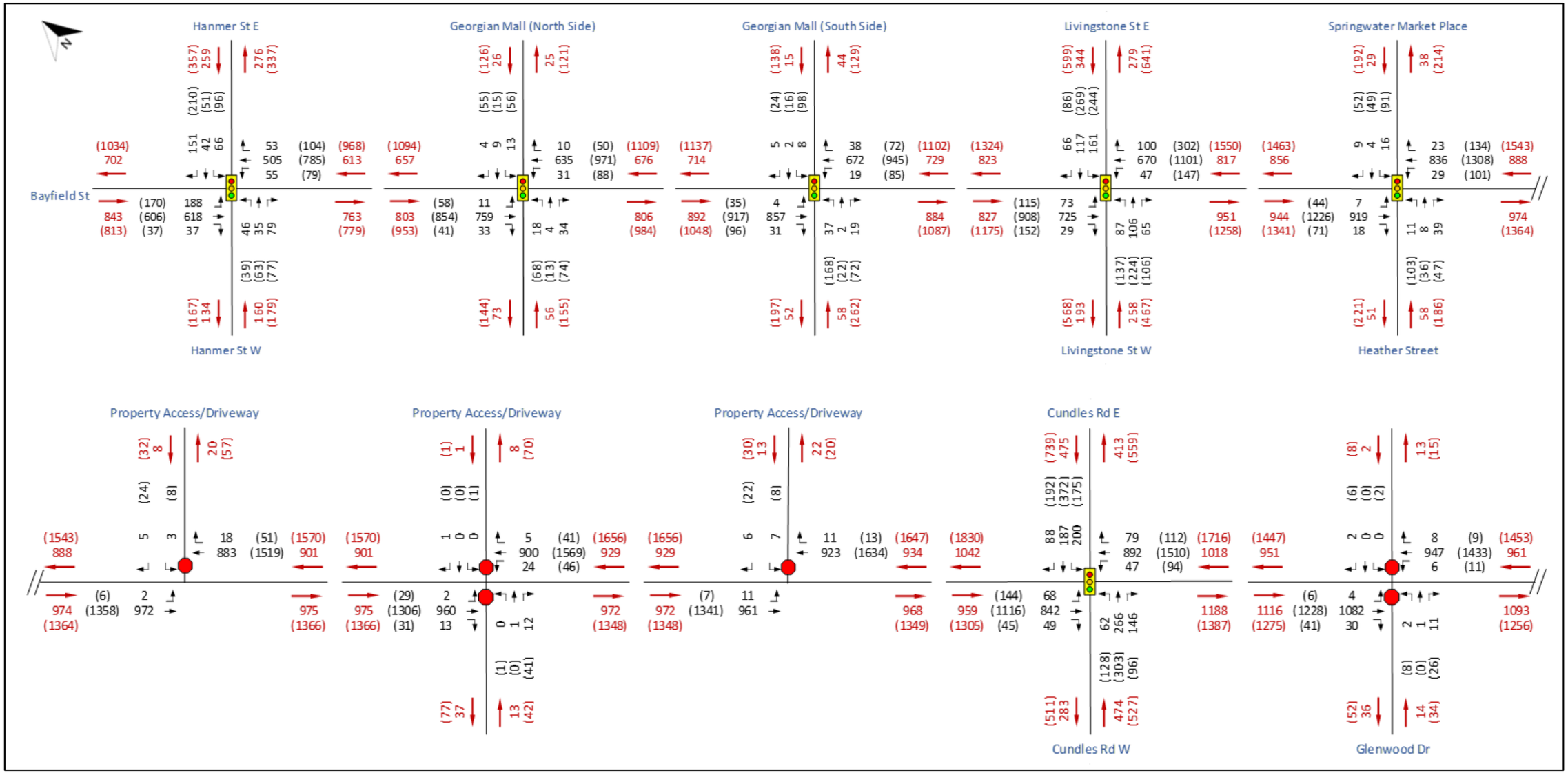
- Traffic volume balancing was not conducted except between the Highway 400 ramp terminal intersections as there are a number of entrances to shops and businesses in between the intersections.
- For the morning peak hour, southbound direction is critical and for the afternoon peak hour, northbound direction is critical.
- In both peak hours as well as in both directions, the highest volumes are on the stretch between the two Highway 400 ramp terminals because of the volumes to and from Highway 400 north and south.

As mentioned previously (Table 2-1), the TMCs were also obtained for the property accesses/driveways located on the Bayfield Street corridor between Heather Street and Cundles Road; and between Ferris Lane and Coulter Street, presented below in Figure 2-5.

Figure 2-5: Additional Location of Accesses/Driveways considered for Traffic Analysis

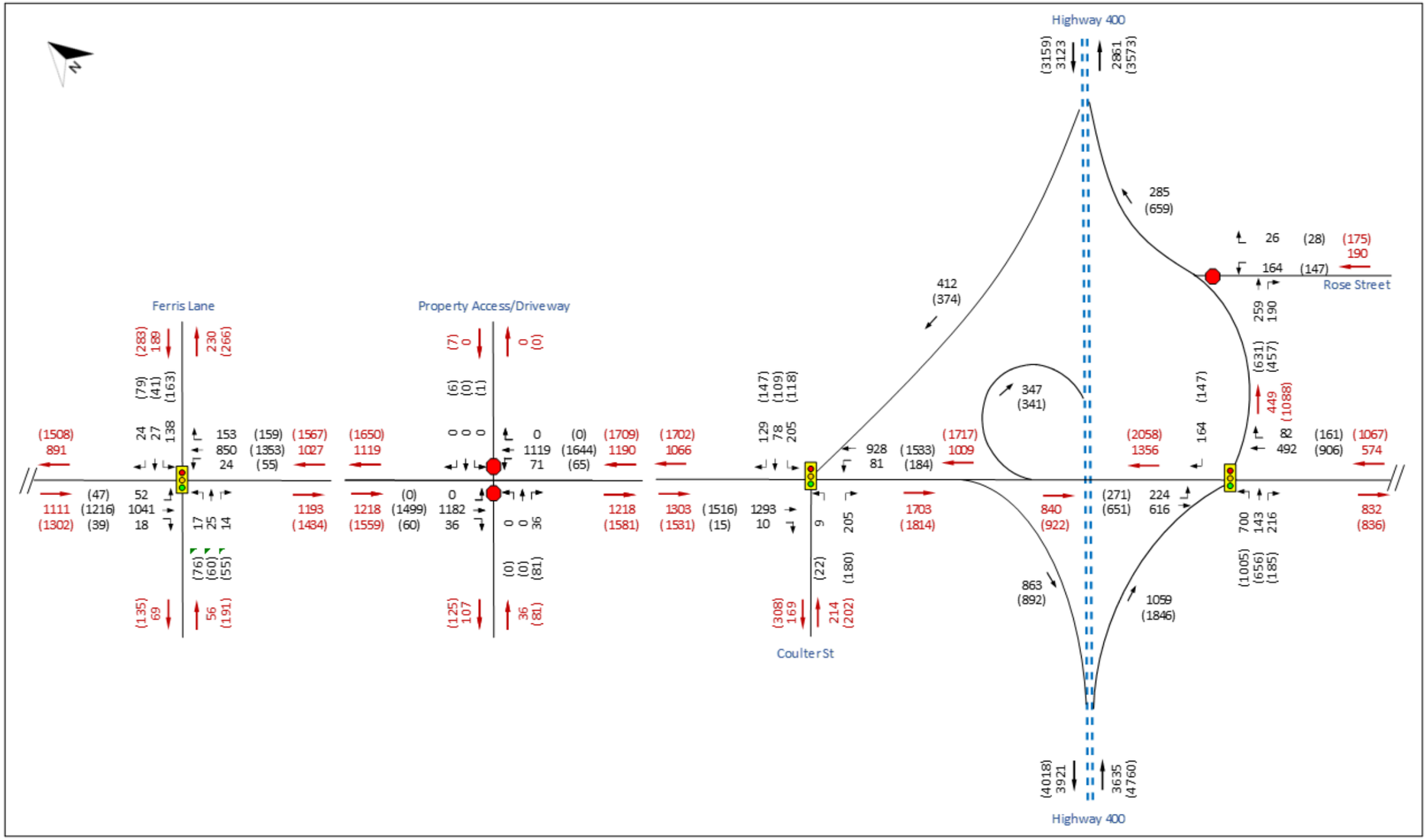


Figure 2-6: Existing Weekday AM and PM Peak Hour Turning Movement Volumes - Bayfield Street Corridor*



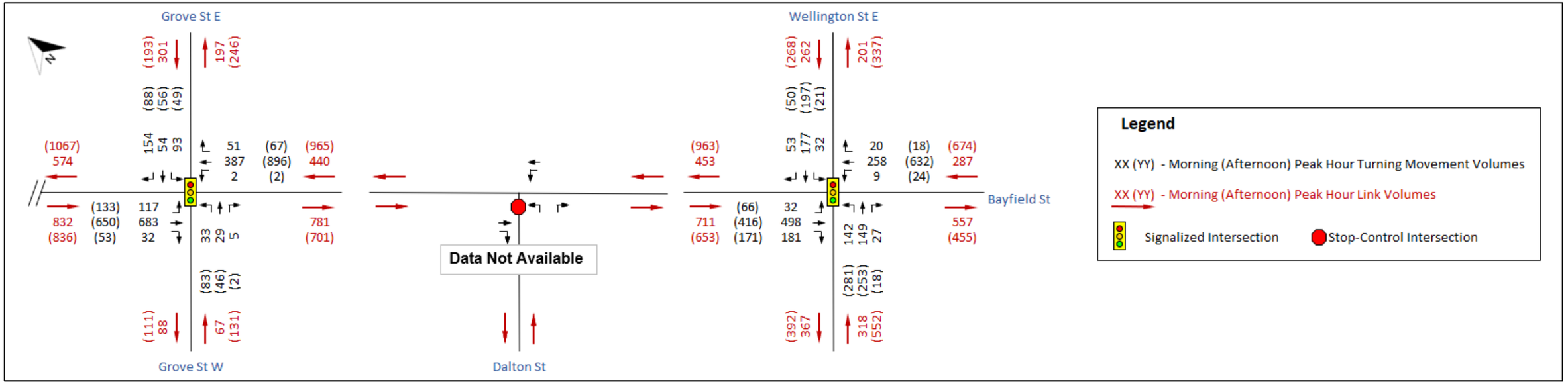
*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

Figure 2-7: Existing Weekday AM and PM Peak Hour Turning Movement Volumes - Bayfield Street Corridor (Continued)*



*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

Figure 2-8: Existing Weekday AM and PM Peak Hour Turning Movement Volumes - Bayfield Street Corridor (Continued)*



*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

2.2.2 Automatic Traffic Record (ATR) Counts

Table 2.5 provides 24-hour volume data from the ATR counts for sections on Bayfield Street at north of Hanmer Street as well as at the Highway 400 locations.

Table 2-5: 24-hour ATR volumes on Bayfield Street

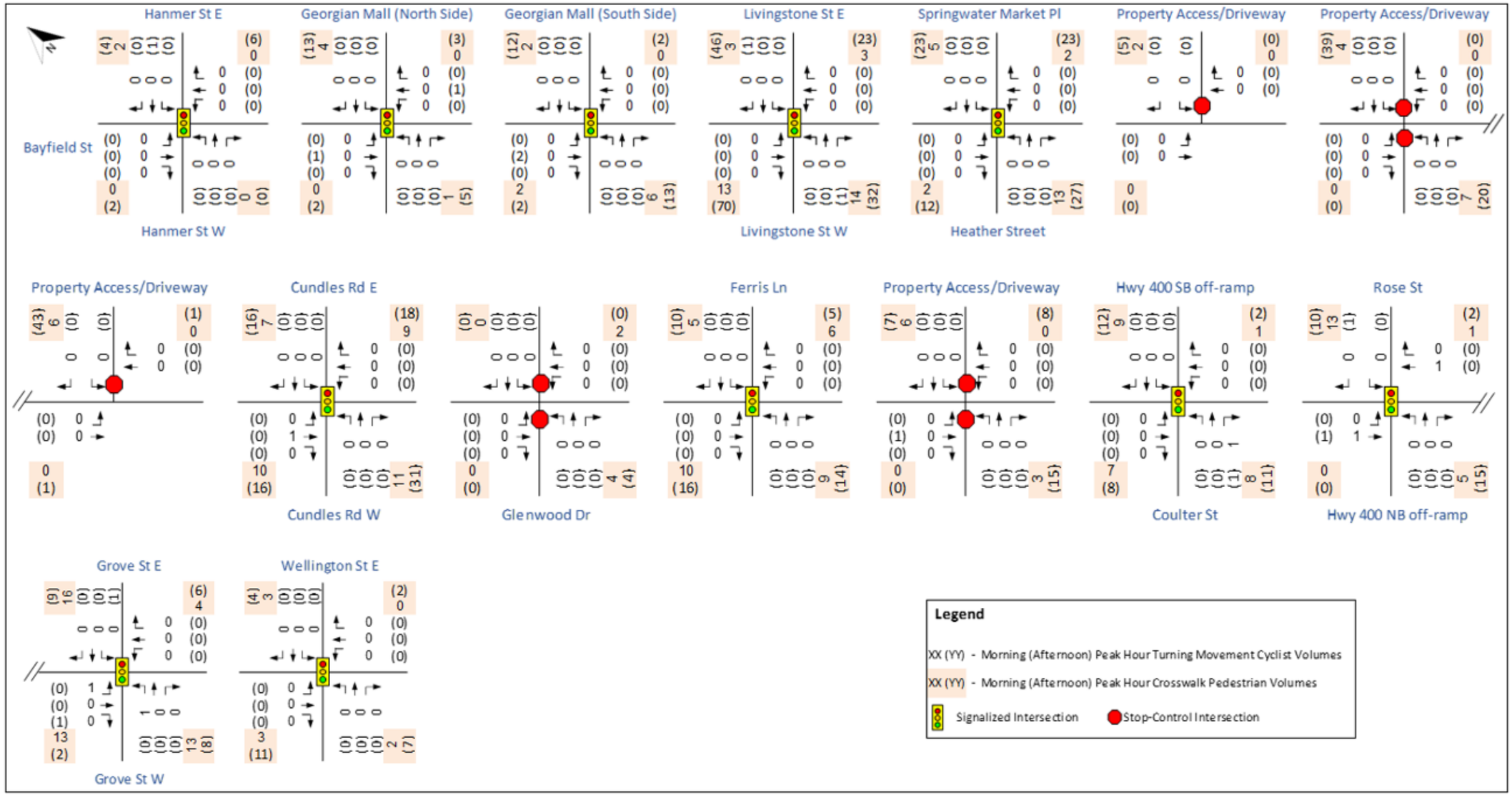
Location	Data year	Total	% Heavy Trucks	% Medium Trucks	% Light Trucks	% Buses	% Cars	% Bikes
Bayfield Street between Hanmer Street and the City Limits (SB&NB)	October 2018	22,211	2%	2%	25%	1%	70%	0%
Bayfield Street at Highway 400 (SB&NB)	May 2022	23,273	16%	4%	20%	0%	59%	1%

The ATR data, as presented in Table 2-5, suggests that buses and bikes constitute around 0-1% of total traffic volumes. The light trucks and medium trucks account for 20-25% and 2-4% of total traffic demand, respectively. Approximately 16% of 24-hour Bayfield Street volumes at Highway 400 were recorded as heavy trucks, whereas between Hanmer Street and the City Limits, the heavy trucks percentage was minimal, around 2%.

2.2.3 Pedestrian and Cyclists Volumes

The existing (2023) pedestrian and cyclist volumes for the weekday morning and afternoon peak hours are presented in Figure 2-7. The afternoon peak hour pedestrian volumes at the crosswalks are observed higher than the morning peak hour. The cyclist information at the crosswalks is not available. However, the cyclist volumes travelling along the mainstream of traffic on the roadways range from 0-2 per hour at the study area intersections.

Figure 2-9: Existing Weekday AM and PM Peak Hour Pedestrian and Cyclist Volumes - Bayfield Street Corridor*



*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

2.3 Evaluation of Existing Conditions

Existing traffic operations along Bayfield Street corridor intersections has been conducted using Synchro Software. Synchro is a macroscopic analysis tool which is a deterministic model that is best suited for evaluating traditional stop-controlled or signal-controlled intersections using HCM (Highway Capacity Manual) methodologies. However, this would not be able to capture the complex vehicle behaviour and interactions between autos, buses, trucks, and pedestrian as well as capturing sustained queue formation during the peak period. This is a case of highway sections with oversaturated and congested conditions and where accumulating queues and delay are possible. Therefore, the use of a microsimulation analysis such as Aimsun for the evaluation of existing and future alternate scenarios are recommended. Even though, for the existing conditions, Synchro models are used as a starting point to generate signal timing plans, for future baseline and alternative scenarios, only the microsimulation models would be used. Since these two categories of models are totally different – one is static and deterministic and other one dynamic with detailed vehicle interactions and behaviours, the results need not match, and comparison cannot be made between these two methodologies. Therefore, for all evaluations, comparison would be made with the modelling results from Aimsun microsimulation model which will be calibrated to existing field conditions.

The performance measures used to evaluate the operation of intersection configurations are summarized in Table 2-6 and delay thresholds for Level-of Service (LOS) is shown in Table 2-7.

Table 2-6: Description of analysis performance measures

Performance Measure	Description
V/C (Volume-to-Capacity Ratio)	• Represents the degree to which an intersection turning-movement can accommodate the traffic demand. • This measure was only produced by Synchro
Delay	• Increase in travel time through an intersection as a result of geometry, queuing, or control (stop, yield, or signal). • Geometric delay is negligible for standard stop or signal controlled intersection
LOS (Level of Service)	• Indicator of traffic performance based on total delay for a movement, approach, or intersection overall. Delay thresholds are shown in Table 2-5
95th Percentile Queue (Synchro	• Queue length which has only a 5% chance of being exceeded within the analysis period (AM or PM peak hour).

Table 2-7: Level-of-Service delay thresholds

LOS	Intersection Control Type	
	Signal-Control	**Stop-Control**
A	Under 10 seconds	Under 10 seconds
B	10-20 seconds	10-15 seconds
C	20-35 seconds	15-25 seconds
D	35-55 seconds	25-35 seconds
E	55-80 seconds	35-50 seconds
F	Over 80 seconds	Over 50 seconds

2.4 Existing (2023) Traffic Operations Using Synchro Model

Traffic analysis of all the intersections located within the study area were conducted using Synchro software for the existing weekday AM and PM peak hour traffic conditions. The turning movement volumes for the existing conditions shown in Figure 2-6 were used for

the AM and PM peak hour evaluations. The existing signal timing plans as described before, and existing intersection configurations were used for the analysis.

For the Synchro analysis of existing conditions, instead of using a default Peak Hour Factor (PHF) of 0.92, each approach was given a PHF consistent with the value based on the15 minutes count data. The higher PHF values were scaled down to 0.95.

Synchro results such as level-of-service (LOS), average delay, v/c ratio, and 95th percentile queues were used for the intersection evaluation.

Table 2-8 presents the results of Synchro for the existing weekday AM and PM peak hour conditions. The LOS are highlighted as per the legend shown in Table 2-7. Wherever the queue length exceeds the available storage length on turning lanes are also highlighted. The Synchro files and reports for the existing conditions are provided in Appendix 1.

Table 2-8: Synchro based Intersection Evaluation Results – Peak Hour Conditions – Existing Scenario*

Intersection	Direction/ Movement		Available Storage Length (m)	AM Peak Hour					PM Peak Hour				
				Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)	Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)
Bayfield Street at Hanmer St East/West (Signalized)	Southbound	SBL	64	188	0.34	7	A	23	170	0.42	8	A	22
		SBT	-	618	0.31	11	B	54	606	0.32	12	B	56
		SBR	63	37	0.04	0	A	0	37	0.04	0	A	0
		Approach	-	**843**	-	**10**	**A**	-	**813**	-	**11**	**B**	-
	Northbound	NBL	46	55	0.11	5	A	7	79	0.15	6	A	13
		NBT	-	505	0.23	9	A	18	785	0.33	11	B	49
		NBR	-	53					104				
		Approach	-	**613**	-	**8**	**A**	-	**968**	-	**11**	**B**	-
	Eastbound	EBL	45	46	0.21	37	D	20	39	0.18	36	D	16
		EBT	-	35	0.34	19	B	13	63	0.43	25	C	16
		EBR	-	79					77				
		Approach	-	**160**	-	**24**	**C**	-	**179**	-	**27**	**C**	-
	Westbound	WBL	182	66	0.31	39	D	26	96	0.43	42	D	35
		WBT	-	42	0.25	49	D	21	51	0.25	49	D	24
		WBR	177	151	0.56	15	B	20	210	0.59	13	B	23
		Approach	-	**259**	-	**27**	**C**	-	**357**	-	**26**	**C**	-
	Intersection Overall			**1875**	-	**13**	**B**	-	**2317**	-	**14**	**B**	-
Bayfield Street at Georgian Mall-North Side (Signalized)	Southbound	SBL	48	11	0.02	2	A	m1	58	0.15	4	A	7
		SBT	-	759	0.23	4	A	23	854	0.29	8	A	37
		SBR	-	33					41				
		Approach	-	**803**	-	**4**	**A**	-	**953**	-	**7**	**A**	-
	Northbound	NBL	48	31	0.06	2	A	2	88	0.20	4	A	8
		NBT	-	635	0.18	2	A	13	971	0.33	7	A	33
		NBR	-	10					50				
		Approach	-	**676**	-	**2**	**A**	-	**1109**	-	**6**	**A**	-
	Eastbound	EBL	-	18	0.38	29	C	17	68	0.78	54	D	47
		EBT	-	4					13				
		EBR	-	34					74				
		Approach	-	**56**	-	**29**	**C**	-	**155**	-	**54**	**D**	-
	Westbound	WBL	-	13	0.31	48	D	13	56	0.72	50	D	39
		WBT	-	9					15				
		WBR	-	4					55				
		Approach	-	**26**	-	**48**	**D**	-	**126**	-	**50**	**D**	-
	Intersection Overall			**1561**	-	**5**	**A**	-	**2343**	-	**13**	**B**	-
Bayfield Street at Georgian Mall-South Side (Signalized)	Southbound	SBL	49	4	0.01	2	A	m0	35	0.10	4	A	4
		SBT	-	857	0.25	3	A	15	917	0.35	7	A	23
		SBR	-	31					96				
		Approach	-	**892**	-	**3**	**A**	-	**1048**	-	**7**	**A**	-
	Northbound	NBL	51	19	0.05	3	A	2	85	0.23	8	A	14
		NBT	-	672	0.21	4	A	29	945	0.35	12	B	65
		NBR	-	38					72				
		Approach	-	**729**	-	**4**	**A**	-	**1102**	-	**12**	**B**	-
	Eastbound	EBL	72	37	0.35	54	D	20	168	0.76	57	E	56
		EBT	-	2	0.15	21	C	8	22	0.29	12	B	14
		EBR	-	19					72				
		Approach	-	**58**	-	**42**	**D**	-	**262**	-	**41**	**D**	-
	Westbound	WBL	50	8	0.07	46	D	7	98	0.50	44	D	34
		WBT	-	2	0.04	31	C	5	16	0.14	17	B	10
		WBR	-	5					24				
		Approach	-	**15**	-	**39**	**D**	-	**138**	-	**36**	**D**	-
	Intersection Overall			**1694**	-	**5**	**A**	-	**2550**	-	**15**	**B**	-
Bayfield Street at Livingstone Street East/West (Signalized)	Southbound	SBL	168	73	0.18	7	A	11	115	0.48	17	B	26
		SBT	-	725	0.29	13	B	43	908	0.41	21	C	101
		SBR	-	29					152				
		Approach	-	**827**	-	**12**	**B**	-	**1175**	-	**21**	**C**	-
	Northbound	NBL	65	47	0.13	2	A	2	147	0.46	14	B	20
		NBT	-	670	0.36	3	A	9	1101	0.56	8	A	48
		NBR	-	100					302				
		Approach	-	**817**	-	**3**	**A**	-	**1550**	-	**8**	**A**	-

Intersection	Direction/ Movement		Available Storage Length (m)	AM Peak Hour					PM Peak Hour				
				Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)	Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)
Bayfield Street at Livingstone Street East/West (Signalized)	Eastbound	EBL	97	87	0.41	35	C	27	137	0.55	48	D	50
		EBT	-	106	0.47	28	C	20	224	0.69	59	E	61
		EBR	-	65					106				
		Approach	**-**	**258**	**-**	**31**	**C**	**-**	**467**	**-**	**56**	**E**	**-**
	Westbound	WBL	92	161	0.77	54	D	47	244	0.94	85	F	#102
		WBT	-	117	0.54	31	C	21	269	0.74	65	E	76
		WBR	-	66					86				
		Approach	**-**	**344**	**-**	**42**	**D**	**-**	**599**	**-**	**73**	**E**	**-**
	Intersection Overall			**2246**	**-**	**16**	**B**	**-**	**3791**	**-**	**29**	**C**	**-**
Bayfield Street at Heather Street/Springwater Marketplace (Signalized)	Southbound	SBL	93	7	0.02	4	A	m1	44	0.18	6	A	m6
		SBT	-	919	0.30	7	A	37	1226	0.43	11	B	m58
		SBR	-	18					71				
		Approach	**-**	**944**	**-**	**7**	**A**	**-**	**1341**	**-**	**10**	**A**	**-**
	Northbound	NBL	65	29	0.08	2	A	m1	101	0.38	5	A	m6
		NBT	-	836	0.29	2	A	18	1308	0.44	10	A	111
		NBR	-	23					134				
		Approach	**-**	**888**	**-**	**2**	**A**	**-**	**1543**	**-**	**10**	**A**	**-**
	Eastbound	EBL	32	11	0.05	30	C	7	103	0.52	61	E	48
		EBT	-	8	0.26	20	B	13	36	0.50	45	D	32
		EBR	-	39					47				
		Approach	**-**	**58**	**-**	**22**	**C**	**-**	**186**	**-**	**54**	**D**	**-**
	Westbound	WBL	66	16	0.12	32	C	8	91	0.43	58	E	43
		WBT	-	4	0.09	22	C	5	49	0.60	59	E	42
		WBR	-	9					52				
		Approach	**-**	**29**	**-**	**28**	**C**	**-**	**192**	**-**	**58**	**E**	**-**
	Intersection Overall			**1919**	**-**	**5**	**A**	**-**	**3262**	**-**	**15**	**B**	**-**
Bayfield Street at Property Access south of Heather Street (Stop-controlled)	Southbound	SBL	-	2	0.01	14	B	0	6	0.03	25	C	1
		SBT	-	972	-	0	A	-	1358	-	1	A	-
		-	-	-	-	-	-	-	-	-	-	-	-
		Approach	**-**	**974**	**-**	**0**	**A**	**-**	**1364**	**-**	**1**	**A**	**-**
	Northbound	NBT	-	883	-	-	-	-	1519	-	-	-	-
		NBR	-	18	-	-	-	-	51	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
		Approach	**-**	**901**	**-**	**0**	**A**	**-**	**1570**	**-**	**0**	**A**	**-**
	Westbound	WBL	-	3	0.06	20	C	2	8	0.38	44	E	12
		WBR	-	5					24				
		-	-	-	-	-	-	-	-	-	-	-	-
		Approach	**-**	**8**	**-**	20	**C**	**-**	**32**	**-**	44	E	**-**
	Intersection Overall			**1883**	**-**	**0**	**A**	**-**	**2966**	**-**	**1**	**A**	**-**
Bayfield Street at Property Access between Heather Street and Cundles Rd E/W (Stop-controlled)	Southbound	SBL	-	2	0.01	14	B	0	29	0.18	31	D	4
		SBT	-	960	-	-	-	-	1306	-	-	-	-
		SBR	-	13					31				
		Approach	**-**	**975**	**-**	**0**	**A**	**-**	**1366**	**-**	**1**	**A**	**-**
	Northbound	NBL	25	24	0.07	16	C	2	46	0.20	24	C	5
		NBT	-	900	-	-	-	-	1569	-	-	-	-
		NBR	-	5					41				
		Approach	**-**	**929**	**-**	**0**	**A**	**-**	**1656**	**-**	**1**	**A**	**-**
	Eastbound	EBL	-	0	0.08	20	C	2	1	0.23	23	C	7
		EBT	-	1					0				
		EBR	-	12					41				
		Approach	**-**	**13**	**-**	20	C	**-**	**42**	**-**	23	C	**-**
	Westbound	WBL	-	0	0.01	13	B	0	1	0.20	226	F	4
		WBT	-	0					0				
		WBR	-	1					0				
		Approach	**-**	**1**	**-**	13	B	**-**	**1**	**-**	226	F	**-**
	Intersection Overall			**1918**	**-**	**0**	**A**	**-**	**3065**	**-**	**1**	**A**	**-**

Intersection	Direction/ Movement		Available Storage Length (m)	AM Peak Hour					PM Peak Hour				
				Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)	Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)
Bayfield Street at Property Access between Heather Street and north of Cundles Rd (Stop-controlled)	Southbound	SBL	25	11	0.03	16	C	1	7	0.05	28	D	1
		SBT	-	961	-	-	-	-	1341	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
		Approach	-	**972**	-	**0**	**A**	-	**1348**	-	**0**	**A**	-
	Northbound	NBT	-	923	-	-	-	-	1634	-	-	-	-
		NBR	-	11	-	-	-	-	13	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
		Approach	**-**	**934**	-	**0**	**A**	-	**1647**	-	**0**	**A**	-
	Westbound	WBL	-	7	0.08	21	C	2	8	0.29	46	E	8
		WBR	-	6					22				
		-	-	-	-	-	-	-	-	-	-	-	-
		Approach	**-**	**13**	-	**21**	**C**	-	**30**	-	**46**	**E**	-
	Intersection Overall			**1919**	-	**0**	**A**	-	**3025**	-	**1**	**A**	-
Bayfield Street at Cundles Road East/West (Signalized)	Southbound	SBL	64	68	0.29	11	B	13	144	0.76	44	D	54
		SBT	-	842	0.56	23	C	126	1116	0.60	42	D	219
		SBR	-	49	0.07	5	A	6	45	0.05	9	A	12
		Approach	-	**959**	**-**	**21**	**C**	**-**	**1305**	**-**	**41**	**D**	**-**
	Northbound	NBL	44	47	0.18	11	B	10	94	0.37	13	B	19
		NBT	-	892	0.71	25	C	129	1510	0.90	39	D	#334
		NBR	-	79					112				
		Approach	-	**1018**	**-**	**25**	**C**	**-**	**1716**	**-**	**37**	**D**	**-**
	Eastbound	EBL	46	62	0.21	24	C	19	128	0.62	56	E	51
		EBT	-	266	0.73	38	D	51	303	0.79	69	E	81
		EBR	-	146					96				
		Approach	-	**474**	**-**	**36**	**D**	**-**	**527**	**-**	**66**	**E**	**-**
	Westbound	WBL	42	200	0.91	66	E	#52	175	0.88	83	F	#73
		WBT	-	187	0.30	34	C	28	372	0.73	69	E	80
		WBR	42	88	0.25	6	A	8	192	0.54	16	B	33
		Approach	-	**475**	**-**	**43**	**D**	**-**	**739**	**-**	**59**	**E**	**-**
	Intersection Overall			**2926**	**-**	**28**	**C**	**-**	**4287**	**-**	**45**	**D**	**-**
Bayfield Street at Glenwood Dr (Stop-controlled)	Southbound	SBL	52	4	0.01	11	B	0	6	0.01	13	B	0
		SBT	-	1082	-	-	-	-	1228	-	-	-	-
		SBR	-	30					41				
		Approach	-	**1116**	-	**0**	**A**	-	**1275**	-	**0**	**A**	-
	Northbound	NBL	21	6	0.01	11	B	0	11	0.02	12	B	1
		NBT	-	947	-	-	-	-	1433	-	-	-	-
		NBR	-	8					9				
		Approach	**-**	**961**	-	**0**	**A**	-	**1453**	-	**0**	**A**	-
	Eastbound	EBL	-	2	0.15	32	D	4	8	0.43	69	F	14
		EBT	-	1					0				
		EBR	-	11					26				
		Approach	**-**	**14**	-	32	D	-	**34**	-	69	F	-
	Westbound	WBL	-	0	0.01	12	B	0	2	0.16	63	F	4
		WBT	-	0					0				
		WBR	-	2					6				
		Approach	**-**	**2**	-	**0**	**A**	-	**8**	-	**63**	**F**	-
	Intersection Overall			**2093**	-	**0**	**A**	-	**2770**	-	**1**	**A**	-
Bayfield Street and Ferris Lane (Signalized)	Southbound	SBL	40	52	0.18	7	A	7	47	0.25	9	A	9
		SBT	-	1041	0.52	13	B	96	1216	0.57	16	B	159
		SBR	-	18					39				
		Approach	-	**1111**	**-**	**13**	**B**	**-**	**1302**	**-**	**16**	**B**	**-**
	Northbound	NBL	50	24	0.08	3	A	m2	55	0.22	2	A	m2
		NBT	-	850	0.62	8	A	39	1353	0.70	4	A	m50
		NBR	-	153					159				
		Approach	**-**	**1027**	**-**	**8**	**A**	**-**	**1567**	**-**	**4**	**A**	**-**
	Eastbound	EBL	43	17	0.11	31	C	8	76	0.48	58	E	36
		EBT	-	25	0.33	34	C	12	60	0.70	70	E	51
		EBR	-	14					55				
		Approach	**-**	**56**	**-**	**33**	**C**	**-**	**191**	**-**	**65**	**E**	**-**

Intersection	Direction/ Movement		Available Storage Length (m)	AM Peak Hour					PM Peak Hour				
				Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)	Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)
Bayfield Street and Ferris Lane (Signalized)	Westbound	WBL	29	138	0.63	47	D	44	163	1.01	121	F	#78
		WBT	-	27	0.24	28	C	18	41	0.67	55	D	44
		WBR	-	24					79				
		Approach	**-**	**189**	**-**	**42**	**D**	**-**	**283**	**-**	**93**	**F**	**-**
	Intersection Overall			**2383**	**-**	**13**	**B**	**-**	**3343**	**-**	**21**	**C**	**-**
Bayfield Street at Property Access between Ferris Lane and Coulter St (Stop-controlled)	Southbound	SBL	45	0	-	-	-	-	0	-	0	A	0
		SBT	-	1182	-	-	-	-	1499	-	-	-	-
		SBR	50	36					60				
		Approach	**-**	**1218**	**-**	**0**	**A**	**-**	**1559**	**-**	**0**	**A**	**-**
	Northbound	NBL	45	71	0.15	13	B	4	65	0.18	16	C	4
		NBT	-	1119	-	-	-	-	1644	-	-	-	-
		NBR	-	0					0				
		Approach	**-**	**1190**	**-**	**1**	**A**	**-**	**1709**	**-**	**1**	**A**	**-**
	Eastbound	EBL	-	0	0.11	16	C	3	0	0.32	22	C	10
		EBT	-	0					0				
		EBR	-	36					81				
		Approach	**-**	**36**	**-**	**16**	**C**	**-**	**81**	**-**	**22**	**C**	**-**
	Westbound	WBL	-	0	-	-	-	-	1	0.42	156	F	11
		WBT	-	0					0				
		WBR	-	0					6				
		Approach	**-**	**0**	**-**	**0**	**A**	**-**	**7**	**-**	156	F	-
	Intersection Overall			**2444**	**-**	**1**	**A**	**-**	**3356**	**-**	**2**	**A**	**-**
Bayfield Street and Coulter Street/Highway 400 SB off-ramp (Signalized)	Southbound	-	-	-	-	-	-	-	-	-	-	-	-
		SBT	-	1293	0.78	16	B	163	1516	0.74	16	B	m89
		SBR	-	10					15				
		Approach	**-**	**1303**	**-**	**16**	**B**	**-**	**1531**	**-**	**16**	**B**	**-**
	Northbound	NBL	50	81	0.43	21	C	m12	184	0.73	37	D	m31
		NBT	-	928	0.48	9	A	50	1553	0.62	9	A	m64
		-	-	-	-	-	-	-	-	-	-	-	-
		Approach	**-**	**1009**	**-**	**10**	**A**	**-**	**1717**	**-**	**12**	**B**	**-**
	Eastbound	-	-	-	-	-	-	-	-	-	-	-	-
		EBL	-	9	0.60	16	B	18	22	0.87	40	D	#53
		EBR	-	205					180				
		Approach	**-**	**214**	**-**	**16**	**B**	**-**	**202**	**-**	**40**	**D**	**-**
	Westbound	WBL	410	205	1.65	352	F	#115	118	1.37	258	F	#89
		WBT	145	78	0.56	28	C	53	109	1.00	102	F	#119
		WBR	-	129					147				
		Approach	**-**	**412**	**-**	**189**	**F**	**-**	**374**	**-**	**151**	**F**	**-**
	Intersection Overall			**2938**	**-**	**37**	**D**	**-**	**3824**	**-**	**32**	**C**	**-**
Bayfield Street at Rose Street/Highway 400 NB off-ramp (Signalized)	Southbound	SBL	121	224	0.48	7	A	m13	271	0.97	57	E	m106
		SBT	-	616	0.31	7	A	m19	651	0.34	21	C	m84
		-	-	-									
		Approach	**-**	**840**	**-**	**7**	**A**	**-**	**922**	**-**	**31**	**C**	**-**
	Northbound	-	-	-	-	-	-	-	-	-	-	-	-
		NBT	-	492	0.43	18	B	52	906	0.75	39	D	179
		NBR	-	82					161				
		Approach	**-**	**574**	**-**	**18**	**B**	**-**	**1067**	**-**	**39**	**D**	**-**
	Eastbound	EBL (Dual)	613 (each)	700	0.86	45	D	#101	1005	1.38	216	F	#199
		EBT	-	143	0.75	36	D	95	656	2.16	551	F	#458
		EBR	-	216					185				
		Approach	**-**	**1059**	**-**	**42**	**D**	**-**	**1846**	**-**	**369**	**F**	**-**
	Westbound	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
		WBR	215	164	0.23	5	A	14	147	0.21	15	B	32
		Approach	**-**	**164**	**-**	**5**	**A**	**-**	**147**	**-**	**15**	**B**	**-**
	Intersection Overall			**2637**	**-**	**24**	**C**	**-**	**3982**	**-**	**225**	**F**	**-**

Intersection	Direction/ Movement		Available Storage Length (m)	AM Peak Hour					PM Peak Hour				
				Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)	Volume (veh/h)	V/C Ratio	Delay (sec)	LOS	95th %ile Queue (m)
Bayfield Street at Grove Street East/West (Signalized)	Southbound	SBL	47	117	0.22	7	A	m14	133	0.38	10	A	20
		SBT	-	683	0.34	7	A	42	650	0.32	9	**A**	50
		SBR	-	32					53				
		Approach	-	**832**	-	**7**	**A**	-	**836**	-	**9**	**A**	-
	Northbound	NBL	34	2	0.01	15	B	2	2	0.01	15	**B**	2
		NBT	-	387	0.27	14	B	45	896	0.54	18	**B**	106
		NBR	-	51					67				
		Approach	-	**440**	-	**14**	**B**	-	**965**	-	**18**	**B**	-
	Eastbound	EBL	23	**33**	0.38	49	D	15	83	0.55	53	**D**	32
		EBT	-	29	0.21	36	D	14	46	0.20	38	**D**	19
		EBR	-	5					2				
		Approach	-	**67**	-	**42**	**D**	-	**131**	-	**47**	**D**	-
	Westbound	WBL	28	93	0.59	41	D	26	49	0.20	29	**C**	17
		WBT	-	54	0.77	30	C	24	56	0.39	17	B	26
		WBR	-	154					88				
		Approach	-	**301**	-	**34**	**C**	-	**193**	-	**21**	**C**	-
	Intersection Overall			**1640**	-	**17**	**B**	-	**2125**	-	**16**	**B**	-
Bayfield Street at Wellington Street East/West (Signalized)	Southbound	SBL	26	32	0.06	11	B	8	66	0.19	13	B	15
		SBT	-	498	0.37	12	B	57	416	0.35	13	**B**	51
		SBR	-	181					171				
		Approach	-	**711**	-	**12**	**B**	-	**653**	-	**13**	**B**	-
	Northbound	NBL	28	9	0.03	19	B	5	24	0.08	21	**C**	10
		NBT	-	258	0.18	16	B	32	632	0.46	22	**C**	83
		NBR	-	20					18				
		Approach	-	**287**	-	**16**	**B**	-	**674**	-	**22**	**C**	-
	Eastbound	EBL	73	142	0.61	35	C	36	281	0.85	48	**D**	#74
		EBT	-	138	0.32	25	C	40	253	0.47	28	**C**	64
		EBR	-	27					18				
		Approach	-	**307**	-	29	**C**	-	**552**	-	**38**	**D**	-
	Westbound	WBL	32	32	0.16	32	C	13	21	0.12	34	**C**	10
		WBT	-	177	0.75	48	D	66	165	0.72	48	D	64
		WBR	-	53					50				
		Approach	-	**262**	-	**46**	**D**	-	**236**	-	**47**	**D**	-
	Intersection Overall			**1567**	-	**22**	**C**	-	**2115**	-	**26**	**C**	-

*Note *: Bayfield Street corridor is assumed to run a north-south corridor*
Note 1: m indicates that volume for 95th percentile queue is metred by upstream signal
Note 2: # indicates that 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. If the reported v/c<1 for this movement, the 95th percentile queue shown are acceptable for the storage bays.

As presented in Table 2-8, the existing intersection capacity analysis results for the Bayfield Street corridor indicate that afternoon peak hour traffic operations are more critical compared to the morning peak hour. The Bayfield Street study area intersections are operating at an overall LOS “D” or better with an average delay up to 45 seconds/vehicle during both the morning and afternoon peak hours, except for the Bayfield Street intersection at Rose Street/Highway 400 northbound off-ramp – which operates at LOS “F” with an average delay of 225 seconds during the afternoon peak hour.

The major north-south direction movements at all the intersections along Bayfield Street operate at acceptable LOS ‘D’ or better with the exception of southbound left turning movement at the Rose Street/ Highway 400 northbound off-ramp intersection, which is operating at LOS “E” during afternoon peak hour with an average delay of 57 seconds. Also, the movement operates at near capacity with v/c ratio 0.97.

The eastbound/westbound movements on Highway 404 off-ramp terminals that operate at LOS ‘E’ or ‘F’ include the following:

- At the intersection of Bayfield Street with Coulter Street/Highway 400 southbound off-ramp, the following movements are identified as critical movements:
    - The westbound left-turning movement from Highway 400 southbound off-ramp operate in congested conditions with LOS “F” and v/c ratio greater than 1.0 during both the peak hours.
    - The shared westbound through/right-turning movements operate at capacity (v/c ratio of 1.00) with a poor LOS “F” during the afternoon peak hour.
    - The queue lengths (with # sign) may exceed the value shown as the v/c ratio is greater than 1.0.
- At the intersection of Bayfield Street with Rose Street/Highway 400 northbound off-ramp, the following movements operate at LOS “F” during the afternoon peak hour:
    - The eastbound left-turning movement from Highway 400 northbound off-ramp, which operates with dual left turn lanes, experiences high delays

and operates at LOS “F”. The movement operate at above capacity with v/c ratio of 1.38.

- The shared eastbound through/right-turning movements operate in very congested conditions with a poor LOS “F” and the v/c ratio (2.16) far above the capacity.
- The queue lengths (with # sign) may exceed the value shown as the v/c ratio is greater than 1.0.

The northbound/southbound minor streets movements that operate at LOS ‘E’ or ‘F’ include the following:

- At the Bayfield Street intersection with the Georgian Mall Access that is located on the south side, the eastbound left turning movement experience an average delay of around 57 seconds during afternoon peak hour and operate with LOS “E”. However, the movement operates below capacity with v/c ratio of 0.76 and it is typical for left-turn movement to have LOS “E”.
- At the intersection of Bayfield Street with Livingstone Street East/West, the following movements during afternoon peak hour are identified as critical movements, i.e., operating at LOS “E/F”:
  - The shared eastbound and westbound through/right movements operate at LOS “E” with an average delay ranging between 59-65 seconds. The v/c ratios (0.69/0.74) indicate that the movements operate below capacity.
  - The westbound left turning movement experiences high delays and operates at LOS “F” with v/c ratio of 0.94. Also, the 95th percentile queue length for this movement exceeds the available storage length.
- At the intersection of Bayfield Street with Heather Street/Springwater Marketplace, the following movements operate as critical movements in the afternoon peak hour:
  - The westbound movements approaching from Springwater Marketplace experience an average delay of around 58-59 seconds and operate with LOS “E”. However, the movement operates below capacity with v/c ratios of 0.60 or below.

- The eastbound left turning movement to Bayfield Street operate at LOS “E” with an average delay of around 61 seconds. The 95th percentile queue length also exceeds the available left-turn storage length. However, the v/c ratio (0.52) indicate that the movement operate below capacity.

- At the intersection of Bayfield Street with Cundles Road East/West, the following movements operate with LOS “E/F”:
  - The eastbound movements on Cundles Road West during the afternoon peak hour operate below capacity at LOS “E” with an average delay of around 56-69 seconds. Also, the 95th percentile queue length for this movement exceeds the available left-turn storage length during afternoon peak hour. However, the movements operate below capacity with v/c ratios of 0.62-0.79.
  - The westbound left turning movement from Cundles Road East during the morning and afternoon peak hour operate at near capacity (v/c ratio of 0.88-0.91) with LOS “E/F”. The 95th percentile queue length for this movement surpasses the available left-turn storage length during both the peak hours.
  - The westbound through movement on Cundles Road East during afternoon peak hour operate below capacity (v/c ratio of 0.73) at LOS “E” with an average delay of around 69 seconds.
- At the intersection of Bayfield Street with Ferris Lane, the following movements operate as critical movements:
  - The westbound left-turning movement from Ferris Lane during the afternoon peak hour operates above capacity (v/c ratio of 1.01) with a poor LOS “F”. The 95th percentile queue length for this movement exceeds the available storage length during both the morning and afternoon peak hours.
  - The eastbound movements during an afternoon peak hour experience an average delay of around 58-70 seconds and operate at LOS “E”. However, the v/c ratios indicate that the eastbound movements operate below capacity.

At the stop-controlled property accesses/driveways (between Heather Street and Cundles Road; and between Ferris Lane and Coulter Street) and the intersection of Bayfield Street and Glenwood Drive, the eastbound/westbound movements experience very high delays and operate at poor LOS “E/F”. The eastbound/westbound traffic at these locations operates with a stop sign and may have to wait for a courtesy gap to turn or merge on Bayfield Street. However, volume levels for these movements are low (below 30 veh/hour) and queue lengths are also not significant (below 15 metres).

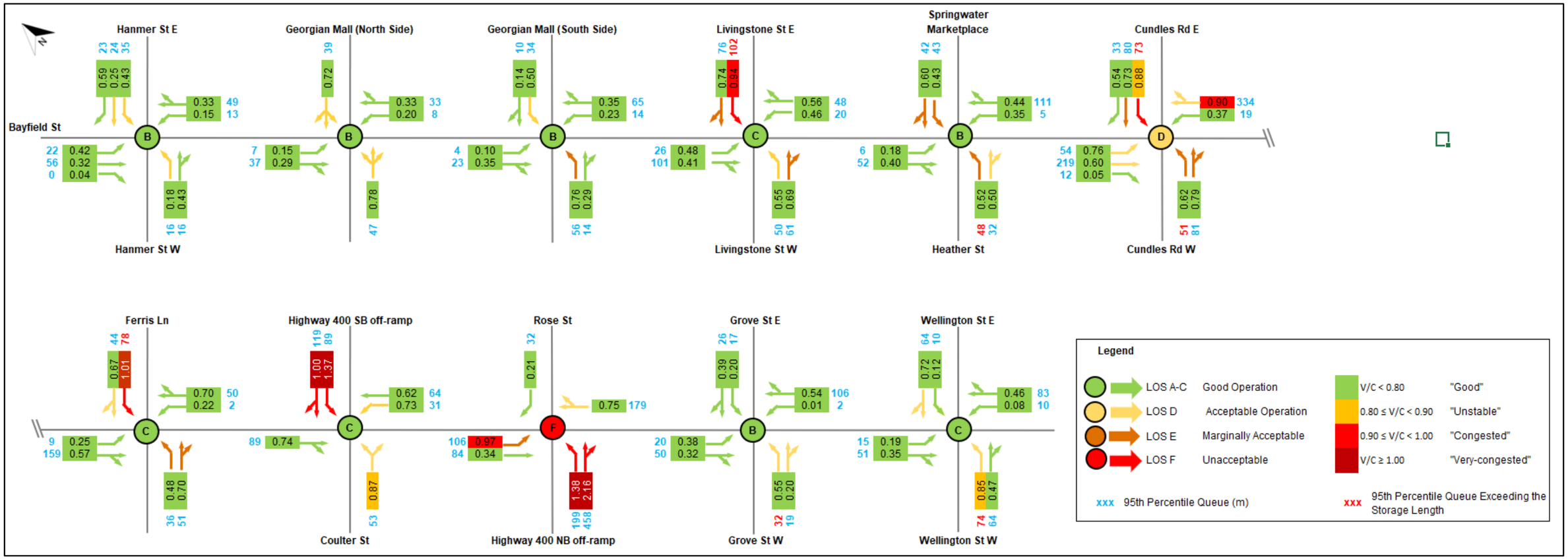
2.5 Summary of Existing (2023) Traffic Operations

Summary of the existing intersection traffic operations at the signalized intersections are shown in Figures 2-8 and 2-9 respectively, for the AM and PM peak hours. Overall, it may be shown that the Highway 400 interchange ramp terminal intersections operate with severe congested conditions at the off-ramps with LOS “F”, v/c ratios greater than 1.0 as well as with long queue lengths mainly for the PM peak hour conditions. Other intersections such as at Livingstone Street East/West, Cundles Road East/West, Ferris Line also operate with LOS “E/F” for turns from eastbound or westbound approaches mainly during afternoon peak hour.

It should be noted that the operational evaluation of intersections was based on the Synchro modelling. The results will be updated later with that from a detailed micro simulation models once the data pertaining traversal matrices from the EMME based macro models are available.

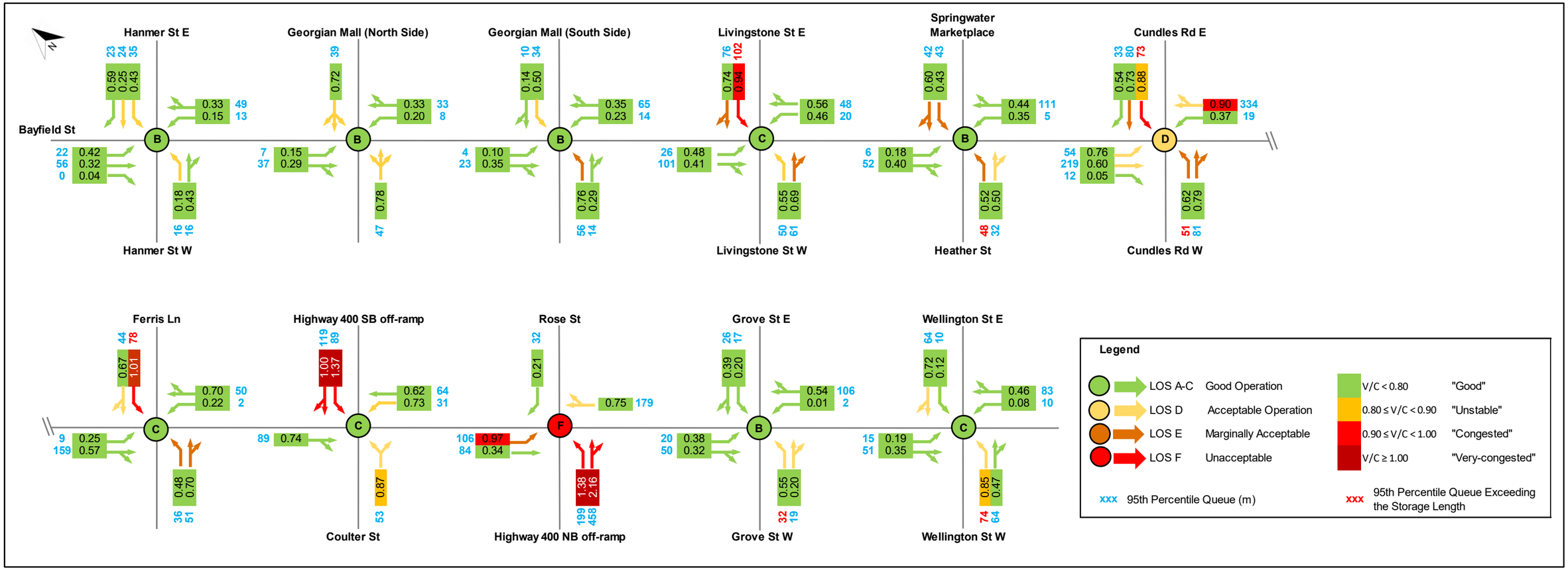
The average speed data between the intersections have indicated that excessive speed reductions happen between Georgian Mall (South Side) and Livingstone Street East/West, and between Coulter Street and Grove Street. The reduction of speed near the ramp terminals are due to the presence of on-ramps and off-ramps with high volumes. Based on the traffic volume information at Georgian Mall (South Side) and Livingstone Street East/West intersections, the modelling results have indicated good speed on this section. However, the speed data received from the city (based on just two runs during the peak hour) have shown very low speed on this section. If the travel time/speed survey data received is correct, the speed reduction at the above location should be due to vehicles turning in and out of properties causing obstruction on through vehicles.

Figure 2-10: Summary of Intersection Evaluation Results using Synchro – Existing (2023) AM Peak Hour*



*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*

Figure 2-11: Summary of Intersection Evaluation Results using Synchro – Existing (2023) PM Peak Hour*



*Note *: Bayfield Street corridor is assumed to run as a north-south corridor*