



Transportation Impact Assessment – Step 4: Analysis

# Cowan's Grove Mid-Density Residential Block – 4791 Bank Street

---



Prepared for Urbandale Corporation  
by IBI Group  
November 20, 2019

## Document Control Page

---

<b>CLIENT:</b>	Urbandale Corporation
<b>PROJECT NAME:</b>	Cowan's Grove Mid-Density Residential Block – 4791 Bank Street
<b>REPORT TITLE:</b>	Transportation Impact Assessment
<b>IBI REFERENCE:</b>	121753
<b>VERSION:</b>	Final
<b>DIGITAL MASTER:</b>	J:\121753_CowansGrove\6.0_Technical\6.4_Traffic\6.4.3_Tech-Reports\TTR_CowansGrove_MASTER_2019-11-05.docx
<b>ORIGINATOR:</b>	Eric M°Laren
<b>REVIEWER:</b>	David Hook
<b>AUTHORIZATION:</b>	Justin Date
<b>CIRCULATION LIST:</b>	Josiane Gervais - City of Ottawa Transportation Project Manager Marcel Denomme – Urbandale Corporation
<b>HISTORY:</b>	TIA Step 1 & 2 Submitted for City Review – October 9, 2019 TIA Step 3 Submitted for City Review – October 22, 2019 TIA Step 4 Submitted for City Review – November 20, 2019

## **TIA Plan Reports - Certification**

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associate documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below:

### **CERTIFICATION**

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed<sup>1</sup> or registered<sup>1</sup> professional in good standing, whose field of expertise [check ☒ appropriate field(s)] is either transportation engineering ☐ or transportation planning ☐.

<sup>1</sup> License or registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

Dated at Ottawa this 20th day of November, 2019.

Name: David Hook

Professional Title: Project Engineer



Signature of Individual certifier that she/he meets the above four criteria

<b>Office Contact Information (Please Print)</b>
Address: 333 Preston Street – Suite 400
City / Postal Code: Ottawa, Ontario K1S 5N4
Telephone / Extension: (613) 225-1311 x524
E-Mail Address: dhook@ibigroup.com

Stamp



# Table of Contents

---

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
<b>2</b>	<b>TIA Screening.....</b>	<b>2</b>
<b>3</b>	<b>Project Scoping .....</b>	<b>2</b>
3.1	Description of Proposed Development .....	2
3.1.1	Site Location .....	2
3.1.2	Land Use Details.....	2
3.1.3	Development Phasing & Date of Occupancy.....	3
3.2	Existing Conditions .....	7
3.2.1	Existing Road Network.....	7
3.2.2	Existing Bicycle and Pedestrian Facilities.....	10
3.2.3	Existing Transit Facilities and Service .....	10
3.2.4	Collision History .....	11
3.3	Planned Conditions.....	12
3.3.1	Transportation Network.....	12
3.3.2	Future Adjacent Developments.....	15
3.3.3	Network Concept Screenline .....	16
3.4	Study Area .....	18
3.5	Time Periods.....	19
3.6	Study Horizon Year.....	19
3.7	Exemptions Review .....	19
<b>4</b>	<b>Forecasting.....</b>	<b>21</b>
4.1	Development Generated Traffic.....	21
4.1.1	Trip Generation Methodology .....	21
4.1.2	Trip Generation Results .....	21
4.1.3	Trip Distribution and Assignment.....	23
4.2	Background Network Traffic .....	27
4.2.1	Changes to the Background Transportation Network.....	27

# Table of Contents

---

4.2.2	General Background Growth Rates .....	27
4.2.3	Other Area Development .....	27
4.3	Demand Rationalization .....	27
4.3.1	Description of Capacity Issues .....	27
4.3.2	Adjustment to Development Generated Demands .....	28
4.3.3	Adjustment to Background Network Demands .....	28
4.4	Traffic Volume Summary .....	28
4.4.1	Future Total Traffic Volumes .....	28
<b>5</b>	<b>Analysis .....</b>	<b>34</b>
5.1	Development Design .....	34
5.1.1	Design for Sustainable Modes .....	34
5.1.2	Circulation and Access .....	34
5.1.3	New Street Networks .....	34
5.2	Parking .....	34
5.2.1	Parking Supply .....	34
5.2.2	Spillover Parking .....	34
5.3	Boundary Streets .....	34
5.4	Access Intersections .....	35
5.4.1	Location and Design of Access .....	35
5.4.2	Intersection Control .....	36
5.4.3	Intersection Design (MMLOS) .....	36
5.5	Transportation Demand Management (TDM) .....	36
5.5.1	Context for TDM .....	36
5.5.2	Need and Opportunity .....	36
5.5.3	TDM Program .....	37
5.6	Neighbourhood Traffic Management .....	37
5.6.1	Adjacent Neighbourhoods .....	37
5.7	Transit .....	37
5.7.1	Route Capacity .....	37

# Table of Contents

---

5.7.1	Transit Priority Measures .....	38
5.8	Review of Network Concept.....	38
5.9	Intersection Design .....	38
5.9.1	Intersection Control .....	38
5.9.2	Intersection Analysis Criteria (Automobile) .....	38
5.9.3	Intersection Capacity Analysis .....	40
5.9.4	Intersection Design (MMLOS).....	44
5.10	Geometric Review.....	44
5.10.1	Sight Distance and Corner Clearances .....	44
5.10.2	Auxiliary Lane Analysis .....	44
5.11	Summary of Recommendations .....	46
<b>6</b>	<b>Conclusion .....</b>	<b>48</b>

# Table of Contents

---

## List of Tables

Table 1 - Land Use Statistics .....	2
Table 2 – Reported Collisions within Vicinity of Proposed Development .....	11
Table 3 - Staging of Recommended Modifications in the Bank Street EA .....	13
Table 4 - Leitrim Master Transportation Study Developments .....	16
Table 5 - Exemptions Review .....	20
Table 6 - Base Vehicular Trip Generation Results.....	21
Table 7 - Person-Trip Results .....	22
Table 8 - 2011 OD Survey Mode Shares and Proposed Mode Share Targets .....	22
Table 9 – Peak Hour Person Trips by Mode .....	23
Table 10 – Proposed Development Distribution .....	23
Table 11 - Development Generated Transit Demand.....	37
Table 12 - LOS Criteria for Signalized Intersections.....	39
Table 13 - LOS Criteria for Unsignalized Intersections.....	40
Table 14 - Intersection Capacity Analysis: Future (2022) Total Traffic.....	41
Table 15 - Intersection Capacity Analysis: Future (2025) Total Traffic – Two-Lane Bank Street Design .....	42
Table 16 - Intersection Capacity Analysis: Future (2025) Total Traffic – Four-Lane Bank Street Design .....	43
Table 17 - Auxiliary Left-Turn Storage Analysis at Signalized Intersections .....	45
Table 18 – Auxiliary Right-Turn Lane Storage Analysis at Signalized Intersections .....	46



# Table of Contents

---

## List of Figures

Figure 1 - Bus Stops .....	11
Figure 2 - Future Road Network Projects .....	12
Figure 3 - Future 'Affordable RTTP Network Projects' .....	14
Figure 4 - Stage 2 LRT - Trillium Line Extension .....	15
Figure 5 - OPA Areas 9A & 9B.....	16
Figure 6 - Screenlines .....	18

## List of Exhibits

Exhibit 1 - Site Location .....	4
Exhibit 2 - Site Context.....	5
Exhibit 3 - Proposed Development .....	6
Exhibit 4 - Lane Configurations and Intersection Control .....	9
Exhibit 5 - 2022 Site Generated AM & PM Peak Hour Traffic Volumes .....	25
Exhibit 6 - 2025 Site Generated AM & PM Peak Hour Traffic Volumes .....	26
Exhibit 7 - Future (2022) Total Traffic - MTS .....	30
Exhibit 8 - Future (2025) Total Traffic - MTS .....	31
Exhibit 9 - Future (2022) Total Traffic - Adjusted Volumes.....	32
Exhibit 10 - Future (2025) Total Traffic - Adjusted Volumes .....	33

# Table of Contents

---

## List of Appendices

- Appendix A – City Circulation Comments
- Appendix B – Screening Form
- Appendix C – OC Transpo Routes
- Appendix D – Collision Data
- Appendix E – Trip Generation Data
- Appendix F – TDM Checklist
- Appendix G – Intersection Capacity Analysis

# 1 Introduction

IBI Group (IBI) was retained by Urbandale Corporation to undertake a Transportation Impact Assessment (TIA) in support of a Site Plan application for a proposed residential development to be located at 4791 Bank Street, Ottawa.

In accordance with the City of Ottawa's Transportation Impact Assessment Guidelines, published in June 2017, the following report is divided into four major components:

- **Screening** – Prior to the commencement of a TIA, an initial assessment of the proposed development is undertaken to establish the need for a comprehensive review of the site based on three triggers: Trip Generation, Location and Safety.
- **Scoping** – This component of the TIA report describes both the existing and planned conditions in the vicinity of the development and defines study parameters such as the study area, analysis periods and analysis years of the development. It also provides an opportunity to identify any scope exemptions that would eliminate elements of scope described in the TIA Guidelines that are not relevant to the development proposal, based on consultation with City staff.
- **Forecasting** – The Forecasting component of the TIA is intended to review both the development-generated travel demand and the background network travel demand, and provides an opportunity to rationalize this demand to ensure projections are within the capacity constraints of the transportation network.
- **Analysis** – This component documents the results of any analyses undertaken to ensure that the transportation related features of the proposed development are in conformance with prescribed technical standards and that its impacts on the transportation network are both sustainable and effectively managed. It also identifies a development strategy to ensure that what is being proposed is aligned with the City of Ottawa's city-building objectives, targets and policies.

Throughout the development of a TIA report, each of the four study components above are submitted in draft form to the City of Ottawa and undergo a review by a designated Transportation Project Manager. Any comments received are addressed to the satisfaction of the City's Transportation Project Manager before proceeding with subsequent components of the study. All technical comments and responses throughout this process are included in **Appendix A**.

Dependent on the findings of this report, the complete submission of this Transportation Impact Assessment may also require Functional Design Drawings of recommended roadway improvements to support a Roadway Modification Application (RMA). The submission may also require a post-development Monitoring Plan to track performance of the planned TIA Strategy. The need for these two elements will be confirmed through the analysis undertaken for this report.

## 2 TIA Screening

An initial screening was completed to confirm the need for a Transportation Impact Assessment by reviewing the following three triggers:

- **Trip Generation:** Based on the proposed number of stacked townhome units, the minimum development size threshold has been exceeded and therefore the Trip Generation trigger is satisfied.
- **Location:** The proposed development is located adjacent to Bank Street which is a spine bicycle route and, as such, the Location trigger is satisfied.
- **Safety:** Boundary street conditions were reviewed to determine if there is an elevated potential for safety concerns adjacent the site. Based on this review, there may be an elevated potential for safety concerns adjacent to the site due to the location of the proposed Bank Street access and therefore the Safety trigger is satisfied.

As the proposed development meets the Trip Generation, Location and Safety triggers, the need to undertake a Transportation Impact Assessment is confirmed.

A copy of the Screening Form is provided in **Appendix B**.

## 3 Project Scoping

### 3.1 Description of Proposed Development

#### 3.1.1 Site Location

The proposed development is within the Leirim Community and is approximately 1.4 hectares in size. It is bound by Bank Street to the west, the future 'Lilythorne' subdivision to the north (Claridge), Cowan's Grove subdivision to the east (Urbandale) and the Cowan's Grove Commercial Plaza to the south (Urbandale).

The site location and its surrounding context is illustrated in **Exhibit 1** and **Exhibit 2**.

#### 3.1.2 Land Use Details

**Table 1** summarizes the proposed land uses included in this development.

Table 1 - Land Use Statistics

LAND USE	SIZE
Stacked Townhomes	102 units

The site will provide 142 vehicle parking spaces, including 20 visitor parking spaces, and 54 bicycle parking spaces. The configuration of the proposed development is illustrated in **Exhibit 3**. Direct access to the site will be provided via a right-in/right-out (ri/ro) access on Bank Street, while a full-movement access on Longworth Avenue is also proposed. Longworth Avenue is classified as a local road and serves the adjacent Cowan's Grove subdivision, providing access to Bank Street via Shuttleworth Drive.

The subject site is currently an undeveloped greenfield site and is zoned GM - General Mixed Use, based on geoOttawa.

### **3.1.3 Development Phasing & Date of Occupancy**

It has been assumed that the proposed development will be fully built-out and occupied in a single phase by the end of 2021.









Cowan's Grove Mid-Density Residential Block

Site Access #1

Site Access #2

Bank Street

Longworth Avenue

Shuttleworth Drive



Cowan's Grove Mid-Density Residential  
Block - 4791 Bank Street  
Transportation Impact Assessment

Exhibit 2:  
Site Context

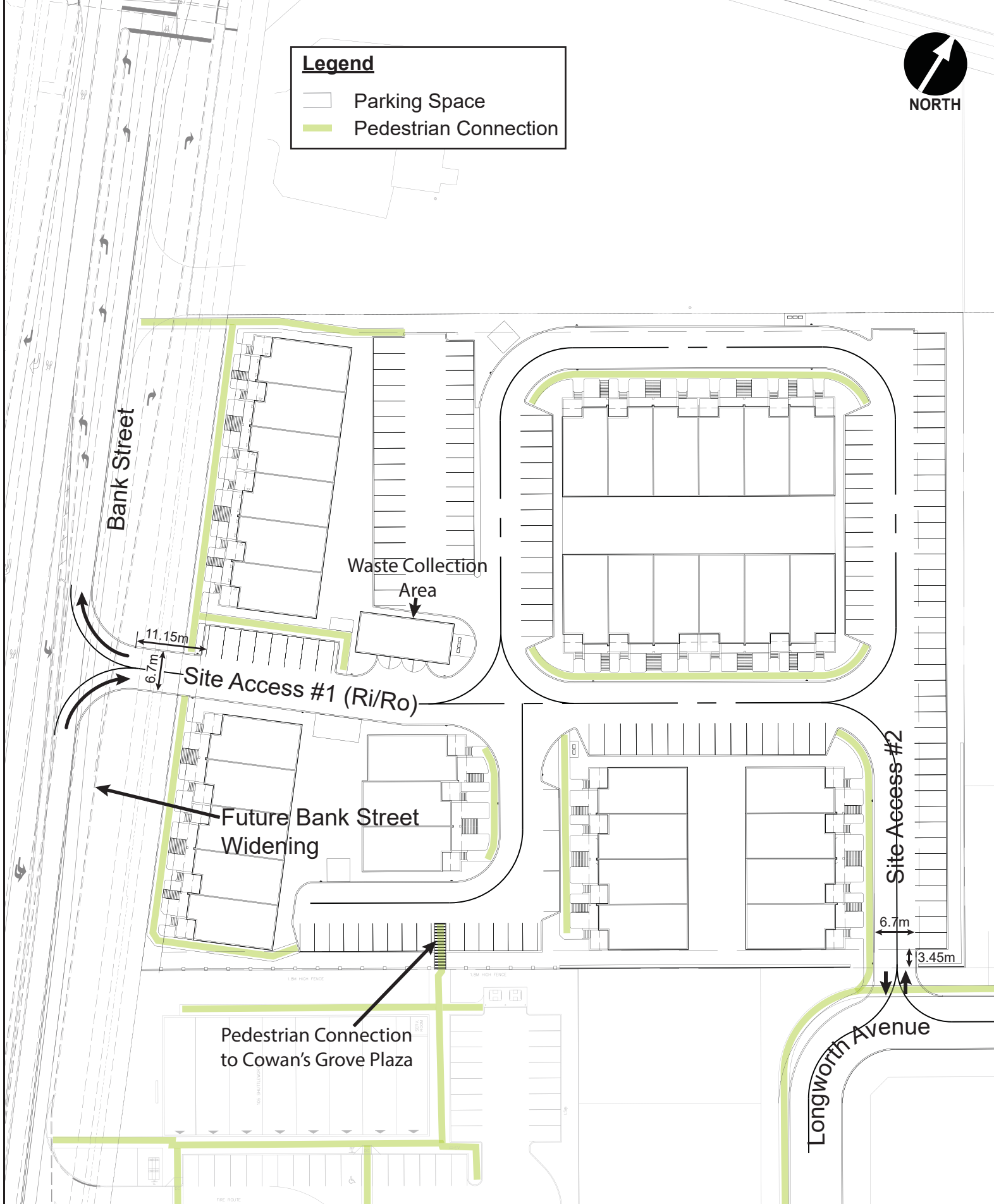
PROJECT No. 121753  
DATE: November 2019  
SCALE: 0m 15m 30m





### Legend

- Parking Space
- Pedestrian Connection





## 3.2 Existing Conditions

### 3.2.1 Existing Road Network

#### 3.2.1.1 Roadways

The proposed development is bound by the following street(s):

- **Bank Street** is an arterial road under the jurisdiction of the City of Ottawa that extends north-south through Ottawa from Wellington Street in the north to the urban boundary, where it becomes County Road 31. In the vicinity of the proposed development, Bank Street has a 2-lane rural cross-section with a posted speed limit of 70 km/h and a right-of-way protection of 44.5m with an additional 5.0m reserved on the rural side to accommodate a rural cross-section.
- **Longworth Avenue** is a future local road that will be under the jurisdiction of the City of Ottawa that will extend generally east-west through the Cowan's Grove subdivision. It will have an 18m right-of-way and it is assumed that the speed limit will be 50 km/h.

Other streets within the context area of the proposed development are as follows:

- **Rotary Way** is an urban collector road under the jurisdiction of the City of Ottawa that extends from Bank Street to Fernside Street. It has a 26m right-of-way and an unposted speed limit of 50 km/h.
- **Analdea Drive** is an urban collector road under the jurisdiction of the City of Ottawa that extends east from Bank Street to a dead-end at Fernside Street and has a right-of-way protection of 30m at Bank Street. Analdea Drive is currently configured as a two-lane rural road, however, and has a posted speed limit of 50 km/h.
- **White Alder Avenue** is an urban local road under the jurisdiction of the City of Ottawa that extends from Bank Street to Findlay Creek Drive. It has 24m right-of-way and an unposted speed limit of 50 km/h.
- **Findlay Creek Drive** is an urban collector road under the jurisdiction of the City of Ottawa that runs east-west from Albion Road to Bank Street. It has a 30m right-of-way and a posted speed limit of 50 km/h.
- **Shuttleworth Drive** is a local road under the jurisdiction of the City of Ottawa that extends east of Bank Street opposite the southern access to Findlay Creek Centre commercial plaza. It has a 18m right-of-way and a posted speed limit of 50 km/h.
- **Blais Road** is a rural collector road under the jurisdiction of the City of Ottawa that runs east-west from Bank Street to Hawthorne Road. It has a right-of-way protection of 30m and no posted speed limit.
- **Miikana Road** is an urban collector road under the jurisdiction of the City of Ottawa that will extend west from Bank Street to Kelly Farm Drive and is currently under construction. It has a 20m right-of-way and the speed limit is assumed to be posted at 50 km/h.

#### 3.2.1.2 Driveways Adjacent to Development Access

As discussed previously, two access intersections will connect the proposed development to the existing road network:

- A right-in/ right-out access off Bank Street (Site Access #1)
- A full-movement access with a connection to Longworth Avenue, an internal road within the Cowan's Grove subdivision (Site Access #2)

A concrete median currently exists along the section of Bank Street between Findlay Creek Centre and Shuttleworth Drive, therefore unsignalized access intersections such as Site Access #1 are restricted to right-in/right-out movements. The distance from the Findlay Creek Centre access to Site Access #1 is approximately 180 metres.

The full-movement access off of Longworth Avenue is proposed within proximity to residential driveways serving street townhomes.

### **3.2.1.3 Intersections**

The following intersections have the greatest potential to be impacted by the proposed development:

- **Bank Street & Findlay Creek Centre Access / Shuttleworth Drive** has recently been reconstructed to accommodate the Cowan's Grove subdivision and commercial plaza via Shuttleworth Drive on the east approach. Shuttleworth Drive is expected to be open to the public in fall 2019. Once open, this intersection will operate as a 4-legged signalized intersection with auxiliary left-turn lanes on all approaches and an auxiliary right-turn lane on the southbound approach.
- **Bank Street & Findlay Creek Drive** has recently been reconstructed to accommodate the Lilythorne subdivision via a future road on the east approach which will be open to the public in fall 2019. The intersection has auxiliary left-turn lanes on all approaches and an auxiliary right-turn lane on the southbound approach.

The intersection control and lane configurations for both intersections described above are shown in **Exhibit 4**.

Other intersections located within the context area of the proposed development are as follows:

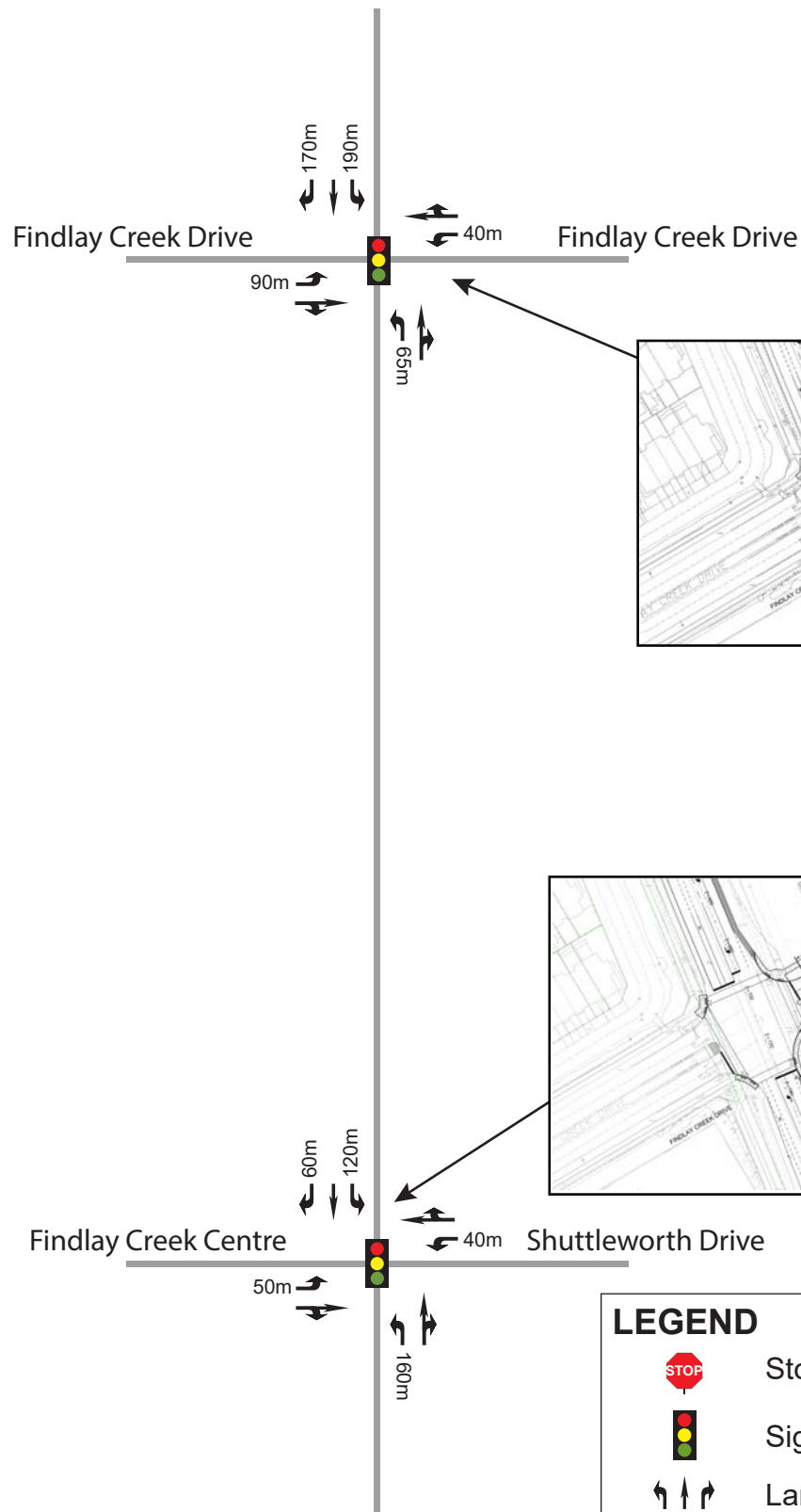
- **Bank Street & Rotary Way** is a 3-legged signalized intersection with auxiliary left-turn lanes on the southbound and westbound approaches, and an auxiliary right-turn lane on the northbound approach.
- **Bank Street & Analdea Drive / White Alder Avenue** is a 4-legged signalized intersection with auxiliary left-turn lanes on all approaches and an auxiliary right-turn lane on the southbound approach.
- **Bank Street & Blais Road / Miikana Road** has recently been reconstructed as a signalized fully-protected intersection which is slated to open in fall 2019.

### **3.2.1.4 Traffic Management Measures**

There are currently no existing traffic management or traffic calming measures on the boundary streets within the vicinity of the proposed development.

### **3.2.1.5 Existing Traffic Volumes**

As will be discussed later in Section 3.4, the intersection capacity analysis will be limited to a review of the relative impact from the change in the subject site's land use details using future total traffic volumes from the Leitrim Master Transportation Study (MTS). As such, existing (2019) traffic volumes are not necessary for completing this TIA.



### LEGEND



Stop Sign



Signalized Intersection



Lane Configurations



Storage Length



Existing Roads



### 3.2.2 Existing Bicycle and Pedestrian Facilities

At the time of this study, only small pockets of pedestrian infrastructure exist within the vicinity of the proposed development. A sidewalk is provided on the west side of Bank Street adjacent to the Findlay Creek Centre, while there are currently no formal pedestrian facilities along the east side of Bank Street.

Bank Street currently has on-road cycling facilities in the southbound direction and paved shoulders in the northbound direction.

### 3.2.3 Existing Transit Facilities and Service

The following transit routes, operated by OC Transpo, exist within the vicinity of the site:

- **Route #93** provides regular, all-day service between Leirtrim Station and Greenboro Station and operates on 15- to 30-minute headways during peak periods. On weekends service is reduced to 30-minute headways.
- **Route #294** provides weekday peak period service between Hurdman Station and the Findlay Creek community and operates on 30-minute headways.
- **Route #304** provides Thursday-only service between Metcalfe, Greely and Osgoode, and Billing's Bridge shopping centre.

Transit service maps for the individual routes above are provided in **Appendix C**. The bus stops located within the vicinity of the proposed development are shown below in **Figure 1**. The nearest bus stops are presently located at the Bank Street & Findlay Creek Drive intersection.

Figure 1 - Bus Stops



Source: OC Transpo

### 3.2.4 Collision History

A review of historical collision data has been undertaken for the boundary streets with the vicinity of the proposed development. The TIA Guidelines require a safety review if at least six collisions for any one movement or of a discernible pattern, over a five-year period have occurred. **Table 2** summarizes all reported collisions between January 1, 2014 and December 31, 2018.

Table 2 – Reported Collisions within Vicinity of Proposed Development

LOCATION	# OF REPORTED COLLISIONS
<b>INTERSECTIONS</b>	
Bank Street & Findlay Creek Drive	14
Bank Street & Findlay Creek Centre	5
<b>SEGMENTS</b>	
Bank Street – Findlay Creek Drive to Blais Road	5

Based on a preliminary review of the collision history noted above, only the Bank Street & Findlay Creek Drive intersection may warrant further analysis.

Detailed collision records are provided in **Appendix D**. Note that the detailed collision records contain collision data for intersections and road segments not discussed in **Table 2**.

### 3.3 Planned Conditions

#### 3.3.1 Transportation Network

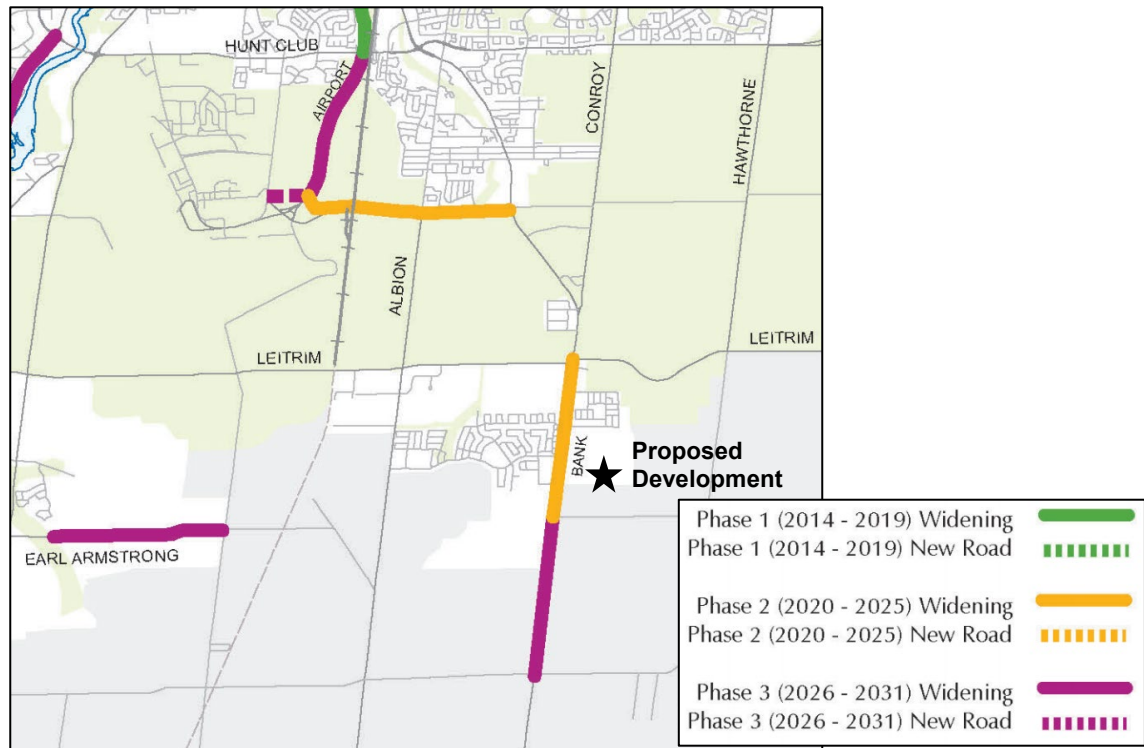
##### 3.3.1.1 Future Road Network Projects

The 2013 Transportation Master Plan (TMP) outlines future road network modifications required in the 2031 'Affordable Network'. The following project was noted that may have an impact on area traffic within the vicinity of the site:

- **Bank Street** – Planned widening from two to four lanes between Leitrim Road and Blais Road by 2025 (Phase 2: 2020-2025) and from two to four lanes between Blais Road and Rideau Road by 2031 (Phase 3: 2026-2031).

**Figure 2** illustrates the planned changes to the arterial road network in the broader area, as per the TMP Affordable Plan.

Figure 2 - Future Road Network Projects





The Bank Street Widening Class Environmental Assessment Study (Bank Street EA) triggered an update to the staging of recommended modifications in the TMP. These changes have been reflected in **Table 3**.

Table 3 - Staging of Recommended Modifications in the Bank Street EA

ROAD / PHASING	PROJECT DETAILS
<b>Phase 2: 2020-2025</b>	
Bank Street	Widen Bank Street from 2 to 4 lanes from Leitrim Road to Findlay Creek Drive including locally widening Leitrim Road to 4-lanes through the intersection with Bank Street.
<b>Phase 3: 2026-2031</b>	
Bank Street	Widen Bank Street from Findlay Creek Drive to south of Blais Road / the Urban Boundary from 2 to 4 lanes.
<b>Beyond 2031</b>	
Bank Street	Widen Bank Street from the Urban Boundary to Rideau Road from 2 to 4 lanes, including a two-way left turn lane within the rural area. Widen Bank Street to 6 lanes through the Leitrim Road intersection.

Various intersections along Bank Street within the context area have recently undergone modifications to accommodate the traffic demands of adjacent developments prior to the widening of the corridor.

The *2019 City-Wide Development Charges (DC) Background Study (March 15, 2019)* indicates that the timing for the Bank Street widening has since been revised. The DC study indicates that funding for widening between Leitrim Road and Findlay Creek Drive will be available by 2020-2024 and funding for widening between Findlay Creek Drive and Blais Road will be available by 2030-2031. Funding for widening south of Blais Road has not been allocated at this time.

IBI Group is currently undertaking the detailed design for the Bank Street Widening through the Leitrim Community. The Bank Street corridor is being redesigned with the complete streets philosophy to accommodate all travel modes within the vicinity of the proposed development.

Based on comments received by City staff, it is understood that the timing of the Bank Street widening to four lanes is as follows:

- Bank Street south of Leitrim to Dun Skipper Drive is tentatively scheduled for widening between 2026 and 2029, pending future budget deliberations.
- Bank Street widening from Dun Skipper Drive to Rideau Road is tentatively scheduled to occur beyond 2031.

### 3.3.1.2 Future Transit Facilities and Services

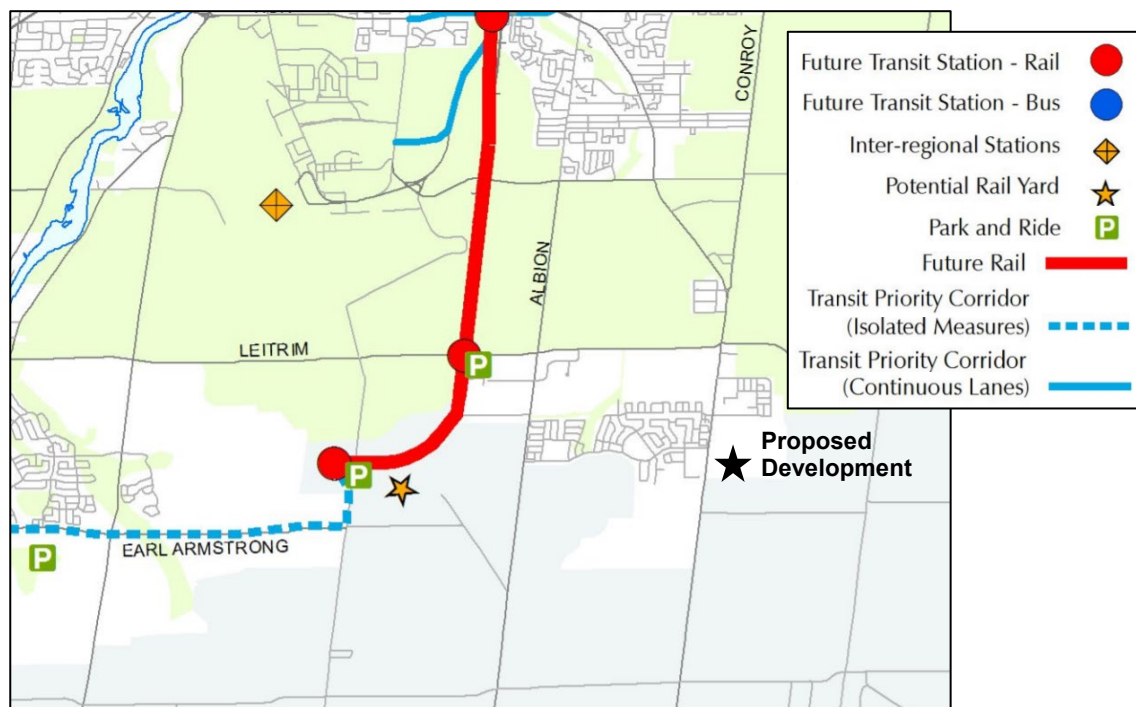
The 2013 TMP outlines the future rapid transit and transit priority (RTTP) network. The following projects were noted in the 'Affordable RTTP Network' that may have a future impact on study area traffic:

- **Trillium Line Extension** – Extension of the Trillium Line from its current terminus at Greenboro Station to Bowesville Station. The *Trillium Line Extension Planning and Environmental Assessment (EA) Study (January 2016)* and the *Trillium Line Light Rail Transit Extension Addendum (September 2018)* both expand upon the TMP. The Trillium Line will now extend to Limebank Road with a spur line to the Ottawa International Airport.

Based on the official Stage 2 LRT website, the Trillium Line extension is expected to be completed by the end of 2022.

**Figure 3** shows the transit infrastructure projects in the vicinity of the proposed development that are part of the TMP's 2031 Affordable Network. **Figure 4** below illustrates the proposed Trillium Line extension, including the recommendations from the EA study and the Addendum.

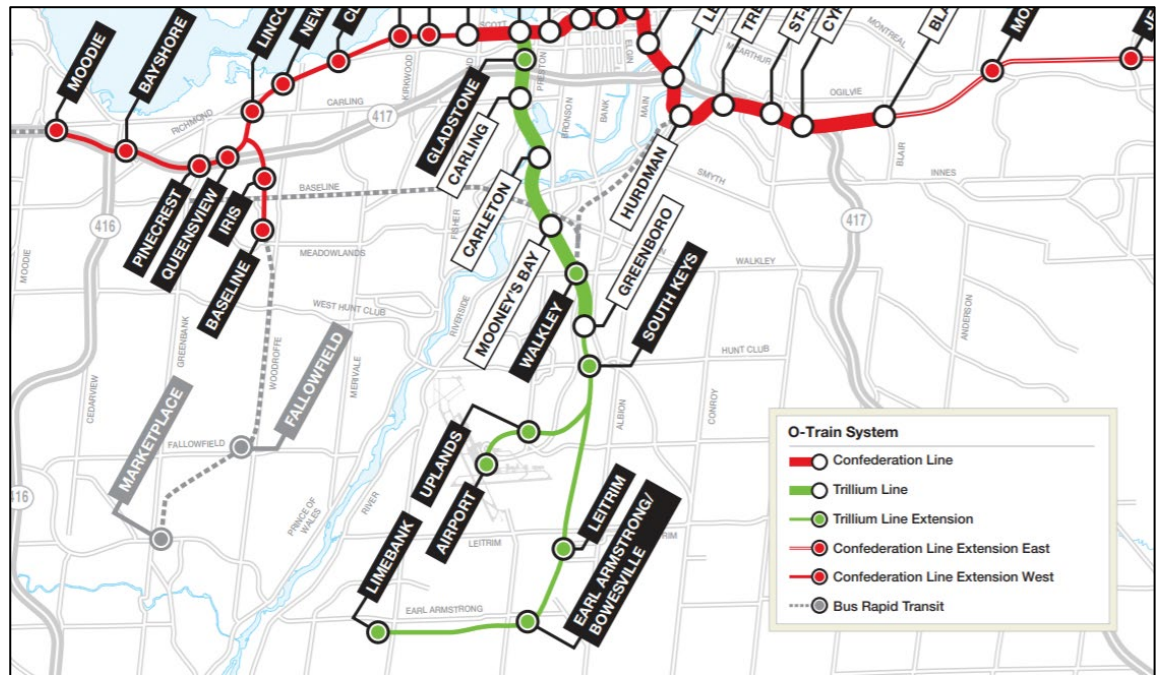
Figure 3 - Future 'Affordable RTTP Network Projects'



Source: 2013 Transportation Master Plan – Map 5 '2031 Affordable Network'



Figure 4 - Stage 2 LRT - Trillium Line Extension



Source: Stage 2 LRT Website – Trillium Line South Highlight Summary

### 3.3.1.3 Future Cycling and Pedestrian Facilities

The 2013 Ottawa Cycling Plan (OCP) designates Bank Street as a 'Spine Route', which forms part of a system linking the commercial, employment, institutional, residential and educational nodes throughout the City of Ottawa, and designates Findlay Creek Drive and Miikana Road as 'Local Routes'.

The Bank Street EA recommended the implementation of sidewalks and cycle tracks on both sides of Bank Street within the urban area, multi-use pathways (MUP) within the Greenbelt and paved shoulders separated from the travel lane by a rumble strip within the rural area. The detailed design for the four-lane widening of Bank Street currently being undertaken by IBI Group includes concrete sidewalks, cycle tracks and protected intersections.

### 3.3.2 Future Adjacent Developments

The City of Ottawa Transportation Impact Assessment (TIA) Guidelines specify that all significant developments proposed within the surrounding area which are likely to occur within the study's horizon year must be identified and taken into consideration in the development of future background traffic projections.

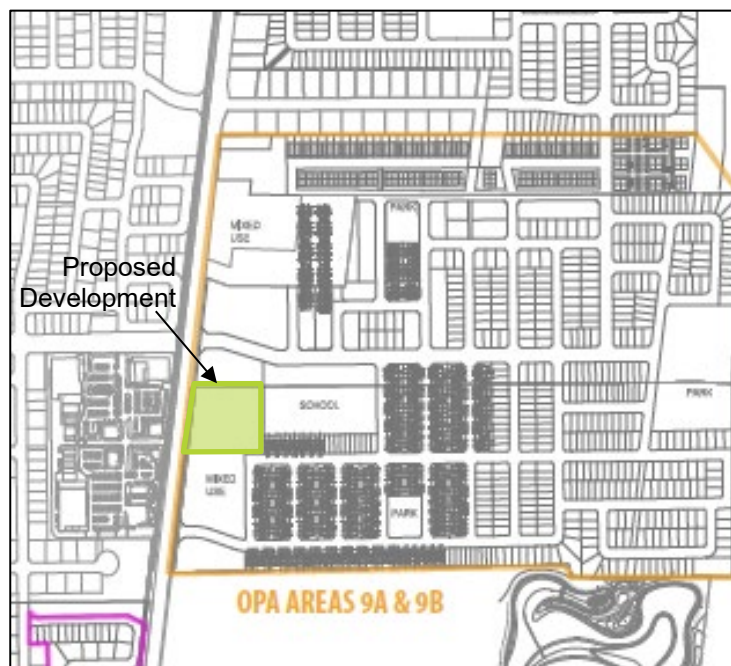
All current development applications within the context area of the proposed development have been identified. It has been reconfirmed that all of these developments were either accounted for explicitly in the Leitrim Master Transportation Study (MTS), undertaken by IBI Group in March 2017, or would contribute a negligible volume of traffic to the adjacent road network. **Table 4** summarizes all developments noted in the MTS.

Table 4 - Leitrim Master Transportation Study Developments

DEVELOPMENT	LAND USE	SIZE
Remaining Findlay Creek	Residential	152 units
Remaining Lemay and Sundance	Residential	158 units
Barrett Lands	Residential	797 units
Barrett Extension Lands	Residential	150 units
OPA Areas 9A & 9B	Residential	1,319 units
	Commercial	15,450 m <sup>2</sup>
Findlay Creek Stage 2 Phase 4C	Residential	240
Transport Canada Lands	Residential	231
Remer and Idone	Residential	1,155
	Commercial	24,187 m <sup>2</sup>

The proposed development site was previously accounted for in the OPA Areas 9A & 9B as shown in **Figure 5** below.

Figure 5 - OPA Areas 9A & 9B



Source: Leitrim MTS, IBI Group (March 2017)

### 3.3.3 Network Concept Screenline

A screenline is an artificial boundary between areas of major traffic generation that captures all significant points of entry from one area to another to compare crossing demand with the available roadway capacity. Screenlines are typically located along geographical barriers such as rivers, rail

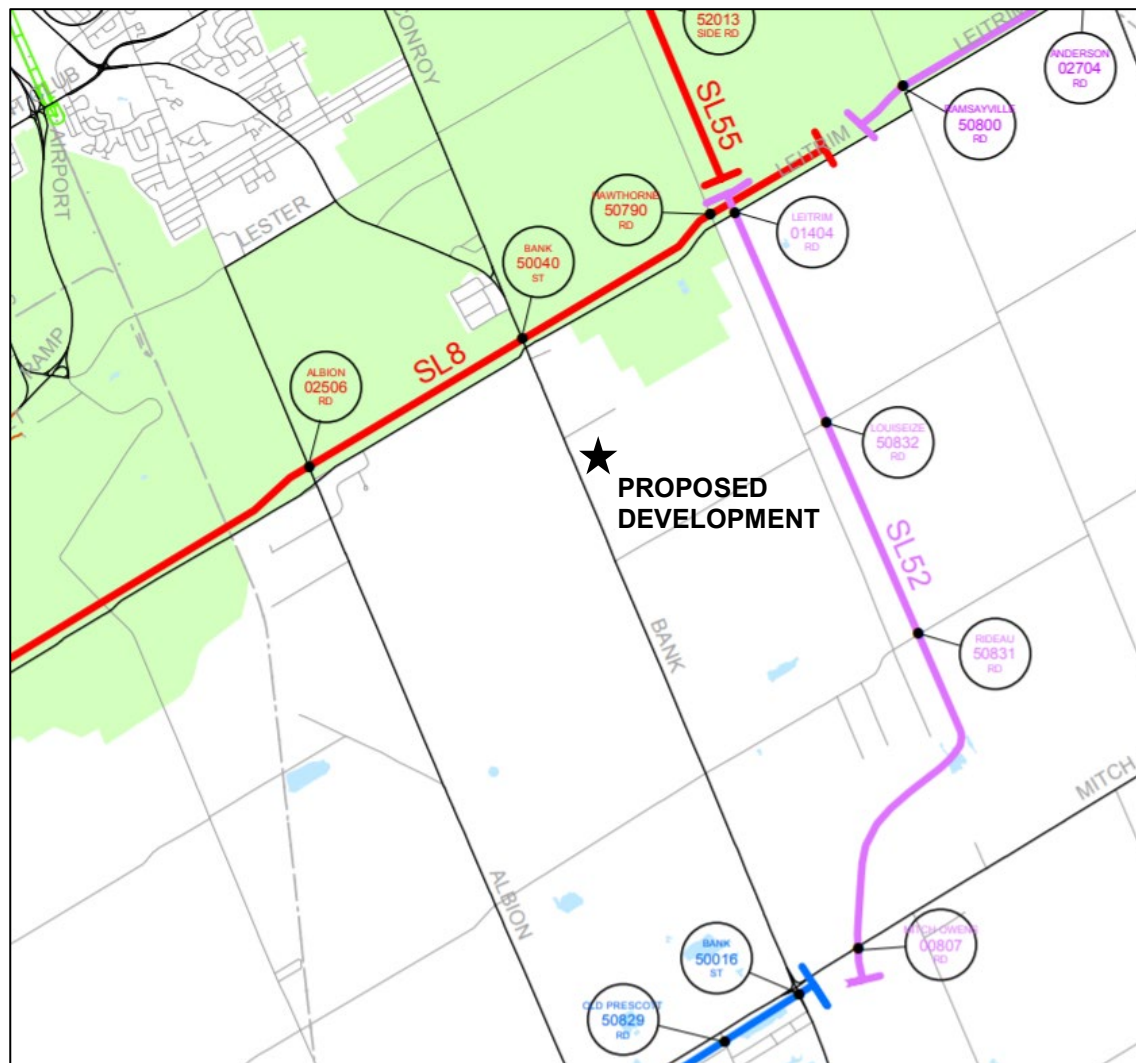
lines or within the greenbelt. To capture existing flow and model future demand, count stations are established by the City of Ottawa at each crossing point along the screenline.

The nearest strategic planning screenlines adjacent to the development have been identified:

- **SL8 – Leitrim** – This is the nearest east/west screenline to the proposed development, and it follows the northern side of Leitrim Road from east of Hawthorne Road to Limebank Road where it turns north till it crosses River Road and terminates at the Rideau River. This screenline has four crossing points: River Road, Albion Road, Bank Street and Hawthorne Road.
- **SL52 – Hawthorne - South** – This is the nearest north/south screenline to the proposed development, and it follows Hawthorne Road from north of Leitrim Road to the end of Hawthorne Road where it turns slightly westward to cross Mitch Owens Road between Bank Street and Sale Barn Road. The screenline has four crossing points: Leitrim Road, Louiseize Road, Rideau Road and Mitch Owens Road.

SL8 and SL52 are shown in **Figure 6**, as determined from the City of Ottawa's Road Network Development Report (2013), a supporting document to the 2013 Transportation Master Plan (TMP).

Figure 6 - Screenlines



Source: TRANS Screenline System (2010)

### 3.4 Study Area

The Leitrim Master Transportation Study (MTS) prepared by IBI Group in March 2017 analysed the impact of all developments along the Bank Street corridor within the Leitrim Community, including the proposed development which was considered as part of the OPA Areas 9A & 9B development. The MTS analysed all intersection between Leitrim Road and Blais Road under 2019, 2022, 2025 and 2031 future total conditions, and provided recommended configurations and phasing for each intersection.

Since the completion of the MTS, the land use details for the subject site have been refined. It was previously assumed that 70 apartment units would be built on the subject site, rather than the 102 stacked townhome units currently proposed. As a result of this change in land use, the volume of traffic generated by the subject site is expected to increase slightly. It should be noted however that with the proposed right-in/right-out access on Bank Street there may also be a reduction in traffic on certain intersection movements as this access was not considered in the MTS.

Given the above, the scope of the intersection capacity analysis in this TIA will be reduced to only an assessment of the relative impact from the change in the subject site's land use in order to validate the results of the MTS. The scope of the analysis will therefore be limited to the newly reconfigured Bank Street & Findlay Creek Centre / Shuttleworth Drive intersection, the right-in/right-out access off Bank Street and the intersection of Bank Street and Findlay Creek Drive under Future (2022) Total Traffic and Future (2025) Total Traffic conditions. The base traffic volumes will be taken directly from the MTS and adjusted to account for the change in land use of the subject site. Given the lack of significant newly-proposed developments within the context area of this study and that previous analyses considered a blanket development rate of 300 units per year for the Leitrim community, the traffic volumes projections indicated in the MTS can be assumed to remain representative of future conditions.

As per the TIA Guidelines, since a complete streets design has been prepared for Bank Street, it is not necessary to conduct Multi-Modal Level of Service (MMLOS) analysis for this study. In place of MMLOS, the Analysis component of the study will review the following: identify the design at the interface of the street, assess potential impacts of the proposed development on the design and, if necessary, develop an interim design concept for Bank Street to accommodate the proposed development.

### 3.5 Time Periods

The Leitrim MTS analysed both weekday morning and afternoon peak hours. Given that the proposed development comprises entirely residential land uses, the same time periods will be analysed in this TIA.

### 3.6 Study Horizon Year

As discussed in Section 3.4, the analysis will be limited to a review of the relative impacts from the change in the subject site's land use under **Future (2022) Total Traffic and Future (2025) Total Traffic** conditions in order to validate the results of the MTS. These analysis years have been selected as they align with the interim analysis years from the MTS and will illustrate the relative impacts of the change in land use density within Cowan's Grove.

### 3.7 Exemptions Review

The TIA Guidelines provide exemption considerations for elements of the Design Review and Network Impact components. **Table 5** summarizes the TIA modules that are not applicable to this study.

Table 5 - Exemptions Review

TIA MODULE	ELEMENT	EXEMPTION CONSIDERATIONS	REQUIRED
<b>DESIGN REVIEW COMPONENT</b>			
4.1 Development Design	4.1.2 Circulation and Access	<ul style="list-style-type: none"> <li>Only required for site plans</li> </ul>	✓
	4.1.3 New Street Networks	<ul style="list-style-type: none"> <li>Only required for plans of subdivision</li> </ul>	✗
4.2 Parking	4.2.1 Parking Supply	<ul style="list-style-type: none"> <li>Only required for site plans</li> </ul>	✓
	4.2.2 Spillover Parking	<ul style="list-style-type: none"> <li>Only required for site plans where parking supply is 15% below unconstrained demand</li> </ul>	✗
<b>NETWORK IMPACT COMPONENT</b>			
4.5 Transportation Demand Management	All Elements	<ul style="list-style-type: none"> <li>Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time</li> </ul>	✓
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	<ul style="list-style-type: none"> <li>Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds</li> </ul>	✓
4.8 Network Concept	n/a	<ul style="list-style-type: none"> <li>Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning</li> </ul>	✗

## 4 Forecasting

### 4.1 Development Generated Traffic

#### 4.1.1 Trip Generation Methodology

Peak hour site-generated traffic volumes were developed using the 2009 TRANS Trip Generation Residential Trip Rates Study Report. The TRANS trip generation rates are based on a blended rate derived from 17 trip generation studies undertaken in 2008, the ITE Trip Generation Manual and the 2005 TRANS OD Travel Survey. Separate trip generation rates exist for each of the four general geographic areas in Ottawa: Core, Urban (Inside the Greenbelt), Suburban (Outside the Greenbelt) and Rural. These trip generation rates reflect existing travel behavior by dwelling type and geographic area. The TIA Guidelines recommends that the TRANS trip generation rates be converted to person-trips based on the vehicular mode share proportions detailed in the TRANS Trip Generation study.

The person-trips were then subdivided based on representative mode share percentages applicable to the study area to determine the number of vehicle, transit, pedestrian, cycling and other trip types.

Target mode shares were developed based on the local mode shares from the OD Survey and the Leitrim Community Master Transportation Study (MTS).

#### 4.1.2 Trip Generation Results

##### 4.1.2.1 Vehicle Trip Generation

Peak hour vehicular traffic volumes associated with the Cowan's Grove Mid-Density Residential Block development were determined using the peak hour trip generation rates in the TRANS Trip Generation study.

The vehicular trip generation results for the proposed development have been summarized in **Table 6**.

Table 6 - Base Vehicular Trip Generation Results

LAND USE	SIZE	PERIOD	GENERATED TRIPS (VPH)		
			IN	OUT	TOTAL
Townhomes	102 units	AM	20	35	55
		PM	38	34	72

Notes: vph = Vehicles Per Hour

##### 4.1.2.2 Person Trip Generation

The person-trip to vehicle-trip conversion factors for TRANS trip generation rates vary depending on the peak hour, geographic location and land use considered. The vehicular trip generation results for the residential land uses from the previous section were divided by the vehicle mode shares to determine the number of person-trips generated.



The results after applying the appropriate conversion factors have been summarized in **Table 7**.

Table 7 - Person-Trip Results

LAND USE	VEH MODE SHARE	PERIOD	PERSON TRIPS (PPH)		
			IN	OUT	TOTAL
Townhomes	55%	AM	37	64	101
	61%	PM	63	56	119

Notes: pph = persons per hour

#### 4.1.2.3 Mode Share Proportions

The 2011 TRANS Origin-Destination (O-D) Survey provides approximations of the existing modal share within the South Gloucester / Leitrim Traffic Assessment Zone (TAZ). Relevant extracts from the 2011 O-D Survey are provided in **Appendix E**.

The AM Peak 'From District' and PM Peak 'To District' mode share distributions were averaged to estimate the weekday morning and afternoon commuter mode share distribution. The Leitrim MTS noted that the transit mode share from the Riverside South / Leitrim area was approximately 10% in 2016 and projected to increase to 16% by 2031. The MTS assumed that the transit mode share would not begin to increase until 2022 in conjunction with the Trillium Line extension and would increase linearly until 2031. The resulting 2025 target transit mode share would therefore be 13%. It has been assumed that any growth in transit mode share would result in a corresponding decrease in auto driver mode share and that all other mode shares would remain constant through to 2025. **Table 8** summarizes the 2011 OD Survey mode shares as well as the 2025 target mode shares.

A comment from City staff indicated that 'walking' mode share should be non-zero, as there is a high likelihood of some pedestrian activity occurring to/from a school proposed within close proximity to the site. In response to this, half of the 'other' mode share shown in the OD Survey was shifted over to the 'walking' mode share to achieve a more representative stratification of travel modes.

Table 8 - 2011 OD Survey Mode Shares and Proposed Mode Share Targets

TRAVEL MODE	2011 OD SURVEY MODE SHARES	2022 MODE SHARE TARGETS	2025 MODE SHARE TARGETS
Auto Driver	66%	66%	64%
Auto Passenger	16%	16%	16%
Transit	11%	11%	13%
Cycling	1%	1%	1%
Walking	0%	3%	3%
Other	6%	3%	3%

#### 4.1.2.4 Trip Reduction Factors

##### Deduction of Existing Development Trips

Not Applicable: The proposed development lands are currently undeveloped, and do not generate any traffic volumes.



#### Pass-by Traffic

Not Applicable: The proposed development will not generate pass-by traffic.

#### Synergy/ Internalization

Not Applicable: The proposed development will include only residential land uses, therefore internalization reduction factors are not required for this study.

#### **4.1.2.5 Trip Generation by Mode**

The 2022 and 2025 mode share targets (Table 8) were applied to the number of development-generated person-trips to determine the number of trips per travel mode, as summarized in **Table 9**.

Table 9 – Peak Hour Person Trips by Mode

MODE	2022				2025			
	AM		PM		AM		PM	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Auto Driver	25	42	42	37	24	41	40	36
Auto Passenger	6	10	10	9	6	10	10	9
Transit	4	7	7	6	5	8	8	7
Cycling	0	1	1	1	0	1	1	1
Walking	1	2	2	2	1	2	2	2
Other	1	2	2	2	1	2	2	1
<b>Total</b>	<b>101</b>		<b>119</b>		<b>101</b>		<b>119</b>	

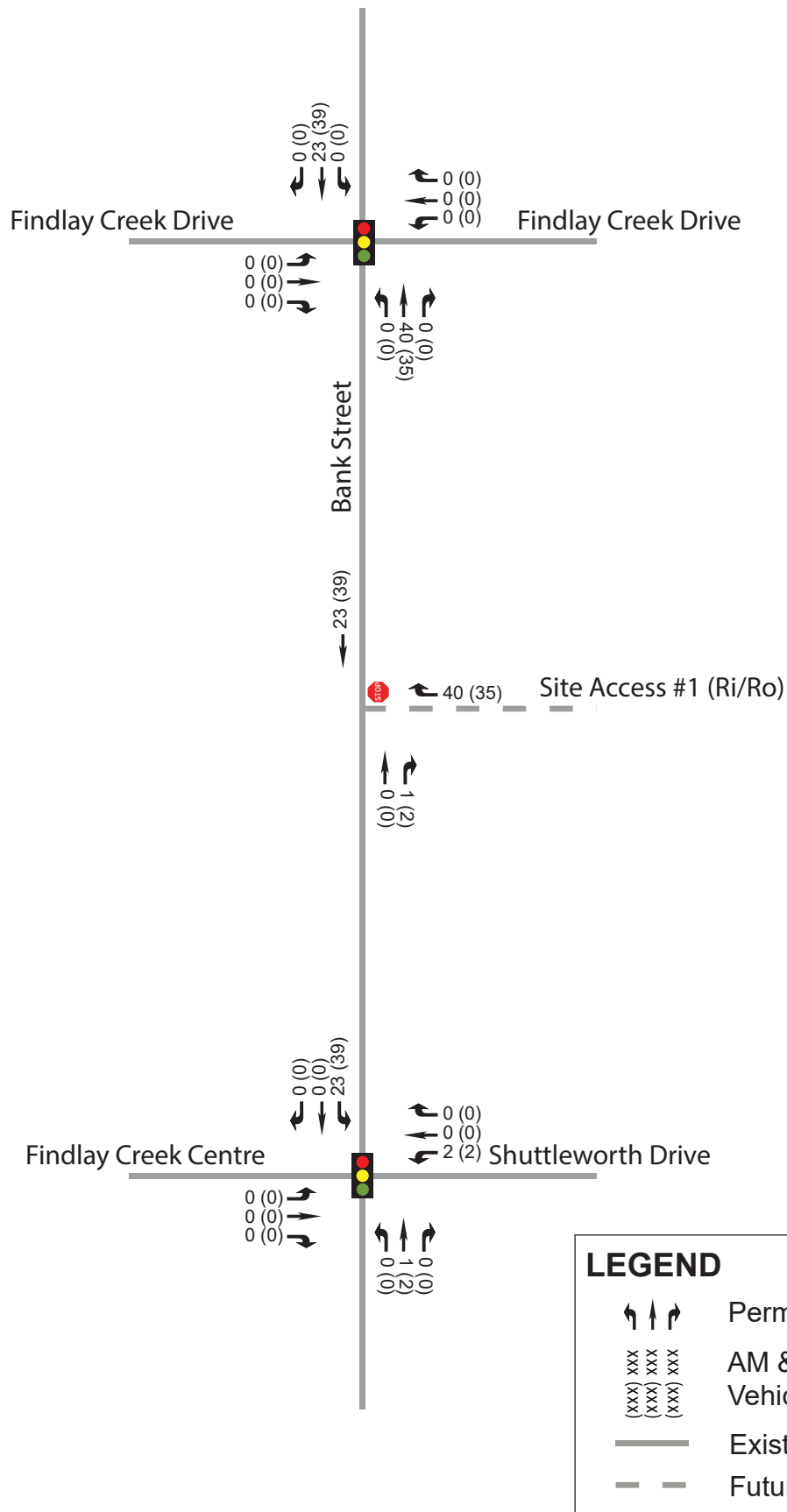
#### **4.1.3 Trip Distribution and Assignment**

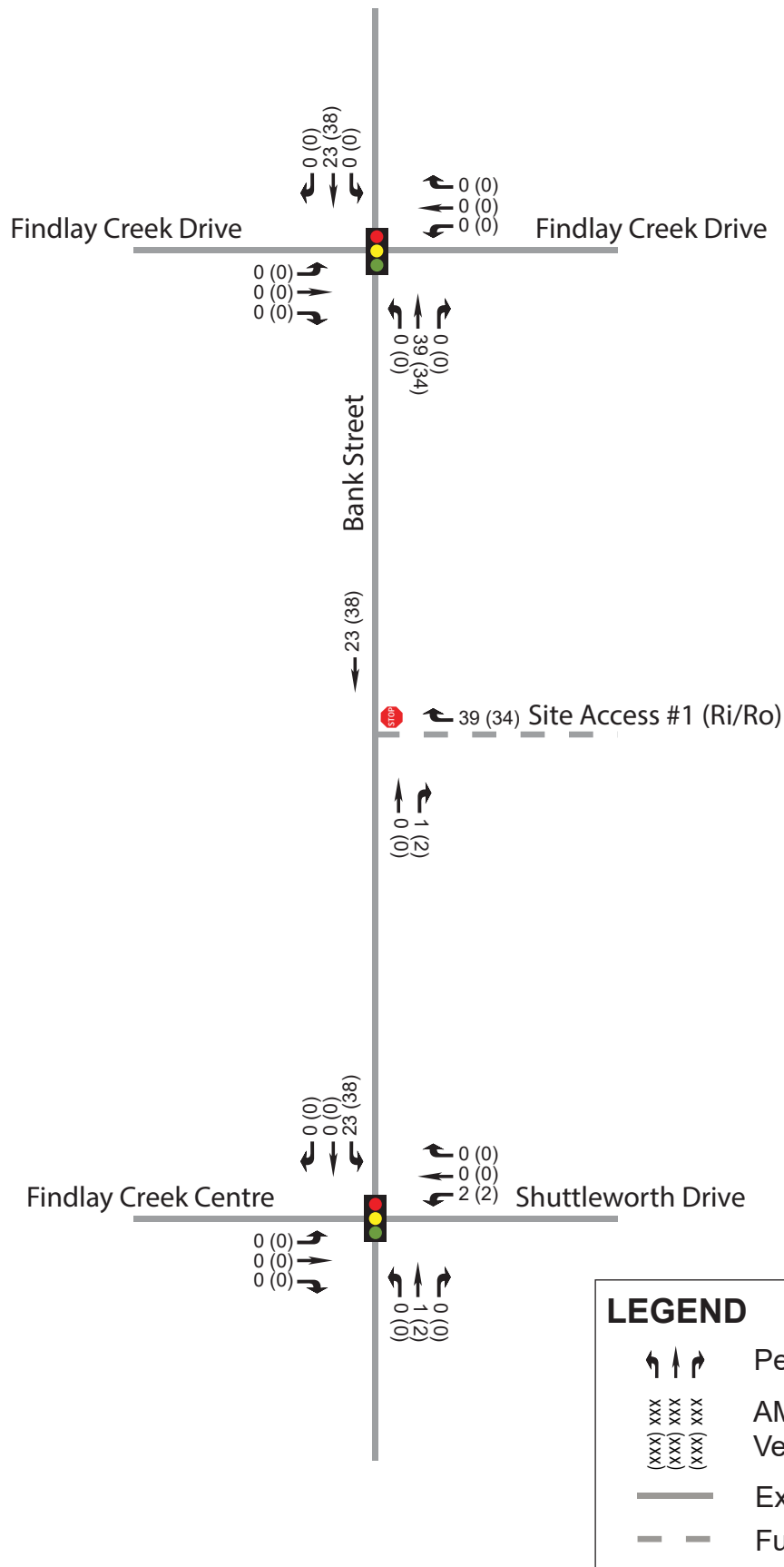
Consistent with the global distribution applied in the Leitrim MTS, trips generated by the proposed development were distributed to the adjacent road network, as shown in **Table 10**.

Table 10 – Proposed Development Distribution

FROM DEVELOPMENT	TO DEVELOPMENT
95% to North ➤ 100% via Ri/Ro off Bank Street	95% from North ➤ 100% via Longworth Avenue/ Shuttleworth Drive
5% to South ➤ 100% via Longworth Avenue/ Shuttleworth Drive	5% from South ➤ 100% via Ri/Ro off Bank Street

Utilizing the estimated number of new auto trips and applying the above distribution, future site-generated traffic volumes for the 2022 and 2025 analysis years are illustrated for each of the study area intersections in **Exhibit 5** and **Exhibit 6**, respectively.





## 4.2 Background Network Traffic

### 4.2.1 Changes to the Background Transportation Network

To properly assess future traffic conditions, planned modifications to the transportation network that may impact travel patterns or demand within the study area have been considered. The Scoping section of this report reviewed the anticipated changes to the study area transportation network based on the Transportation Master Plan (TMP), Capital Budget Forecasts and the *2019 City-Wide Development Charges (DC) Background Study*.

The *DC Background Study* indicates that funding for the widening of Bank Street to four lanes between Leitrim Road and Findlay Creek Drive will be available by 2020-2024 and funding for widening between Findlay Creek Drive and Blais Road will be available by 2030-2031, which is consistent with timing in the Leitrim MTS. Within the 2025 time horizon of this study, the MTS anticipated that the Bank Street widening to four lanes would be required to extend south through Findlay Creek Drive and transition to a two-lane cross-section prior to Shuttleworth Drive.

Based on a comment from City staff, it is understood that the timing of the Bank Street widening to four lanes is as follows:

- Bank Street south of Leitrim Road to Dun Skipper Drive is tentatively scheduled for widening between 2026 and 2029, pending future budget deliberations.
- Bank Street widening from Dun Skipper Drive to Rideau Road is tentatively scheduled to occur beyond 2031.

This study therefore assumes that Bank Street will remain as a two-lane road through the study area, and that widening will not occur within the 2025 horizon year.

### 4.2.2 General Background Growth Rates

The background growth rate is intended to represent regional growth from outside the study area that will travel along the adjacent road network. Consistent with the Leitrim Master Transportation Study (MTS), a 1.0% rate of linear growth per annum was applied to through movements on Bank Street within the study area for the calculation of future background traffic.

### 4.2.3 Other Area Development

As discussed previously, all current adjacent development applications within the study area that would potentially impact travel demand during the weekday morning and afternoon peak hours were previously accounted for in the development of background traffic volume projections for the Leitrim MTS. It is therefore not necessary to refine the background traffic volume projections from the MTS for use in this study.

## 4.3 Demand Rationalization

The purpose of this section is to rationalize future travel demands within the study area to account for potential capacity limitations in the transportation network and its ability to effectively accommodate the additional demand generated by a new development.

### 4.3.1 Description of Capacity Issues

#### 4.3.1.1 Findlay Creek Drive and Bank Street

The Leitrim Master Transportation Study (MTS) identified acceptable Levels of Service at the Findlay Creek Drive and Bank Street intersection during the weekday morning and afternoon peak hours with the four-lane widening of Bank Street in place through this intersection by 2025. As

noted previously, this timing is consistent with both the Leitrim MTS and funding from the *2019 DC Background Study*. However, based on comments received from City staff, it is understood that the widening of Bank Street to four lanes has been rescheduled to 2026-2029 for the segment adjacent to the subject site.

Based on logical road classification hierarchy, proposed development travel demand is expected to contribute to non-critical through volumes along Bank Street at Findlay Creek Drive, which were projected to operate well within capacity constraints under Future (2022) Total and Future (2025) Total traffic scenarios presented in the Leitrim MTS. The intersection capacity results will be verified in the Analysis component of this study, however, it is anticipated that additional trips from the proposed development will operate at similar levels of service with the modifications recommended in the Leitrim MTS.

#### **4.3.1.2 Shuttleworth Drive/ Findlay Creek Centre and Bank Street**

The Leitrim Master Transportation Study (MTS) identified acceptable Levels of Service at the Shuttleworth Drive/Findlay Creek Centre and Bank Street intersection during the weekday morning and afternoon peak hours with the existing two-lane cross-section of Bank Street beyond the 2025 study horizon of this study. The adjustments in travel demand associated with the proposed Cowan's Grove Mid-Density Residential Block are expected to contribute negligible traffic volumes to critical movements at this intersection such as the southbound left-turn. The intersection capacity results will be verified in the Analysis component of this study, however, it is anticipated that additional trips from the proposed development will result in similar levels of service with the modifications recommended in the Leitrim MTS.

#### **4.3.2 Adjustment to Development Generated Demands**

As discussed previously, consistent with the Leitrim MTS it was assumed that transit mode share targets would increase linearly from 11% to 13% between 2022 and 2025, which would result in a proportional decrease in the vehicular mode share of the proposed development. This expected gradual increase in transit usage coincides with the target completion of the Trillium Line extension in 2022.

The Leitrim MTS conservatively assumed that all site-generated traffic associated with the Cowan's Grove Subdivision (OPA Lands 9A and 9B) would access the site via Shuttleworth Drive. A redistribution of site-generated traffic was therefore necessary to reflect more realistic travel patterns given the inclusion of a right-in/right-out access connection directly off Bank Street, as indicated on the site plan.

#### **4.3.3 Adjustment to Background Network Demands**

Similar to the development-generated demands, adjustments to transit mode share were applied to the background network demands. These adjustments however were previously accounted for in the development of the traffic volumes projections for the Leitrim MTS, therefore no further adjustments were for this study.

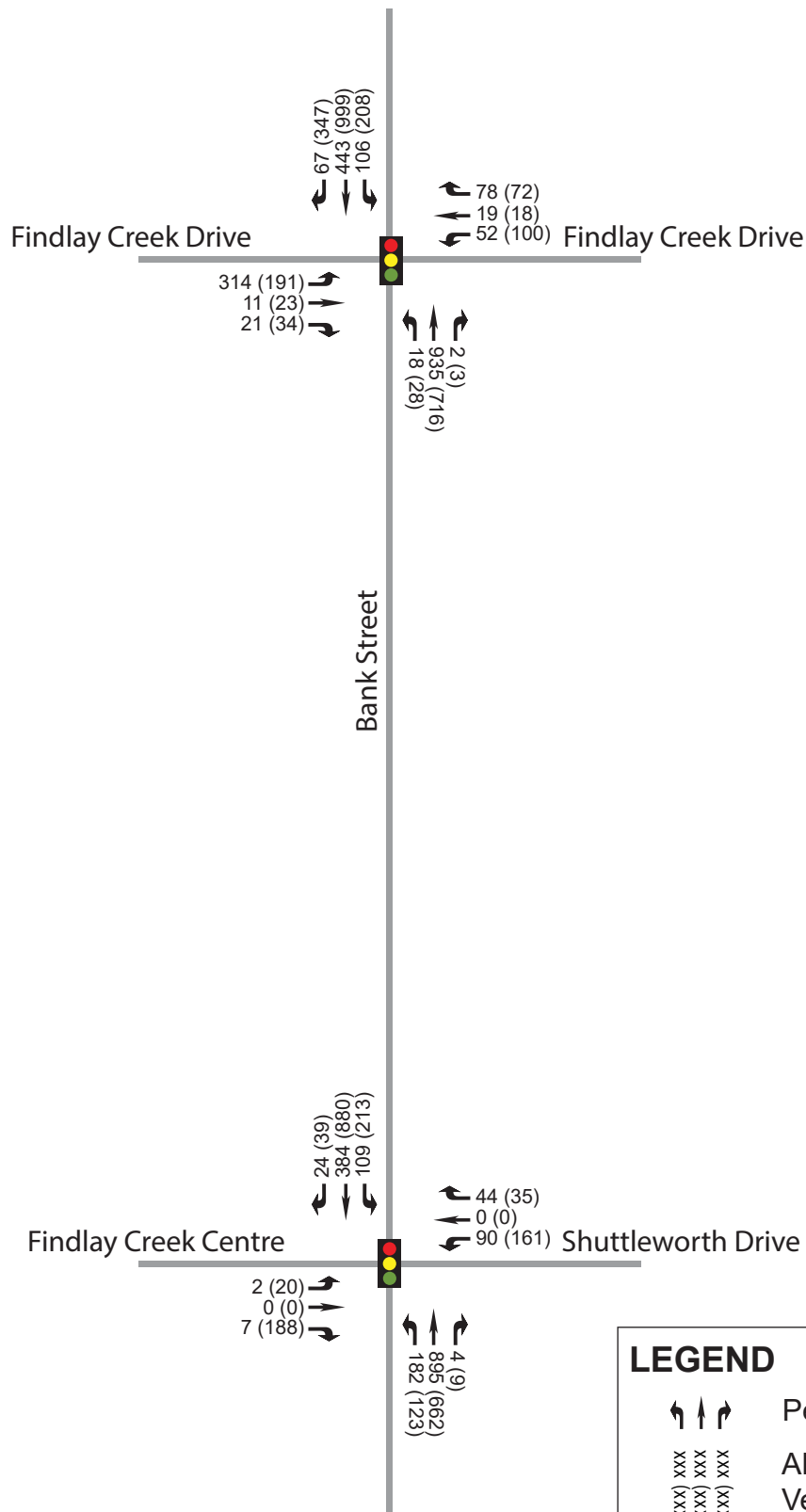
### **4.4 Traffic Volume Summary**

#### **4.4.1 Future Total Traffic Volumes**

As discussed previously, the 2022 and 2025 analysis years for this study were selected to align with the Leitrim MTS, allowing for a direct comparison of traffic volumes at the study area intersections.

**Exhibit 7** and **Exhibit 8** present the Future (2022) and Future (2025) Total Traffic, respectively, as extracted directly from the Leitrim MTS.

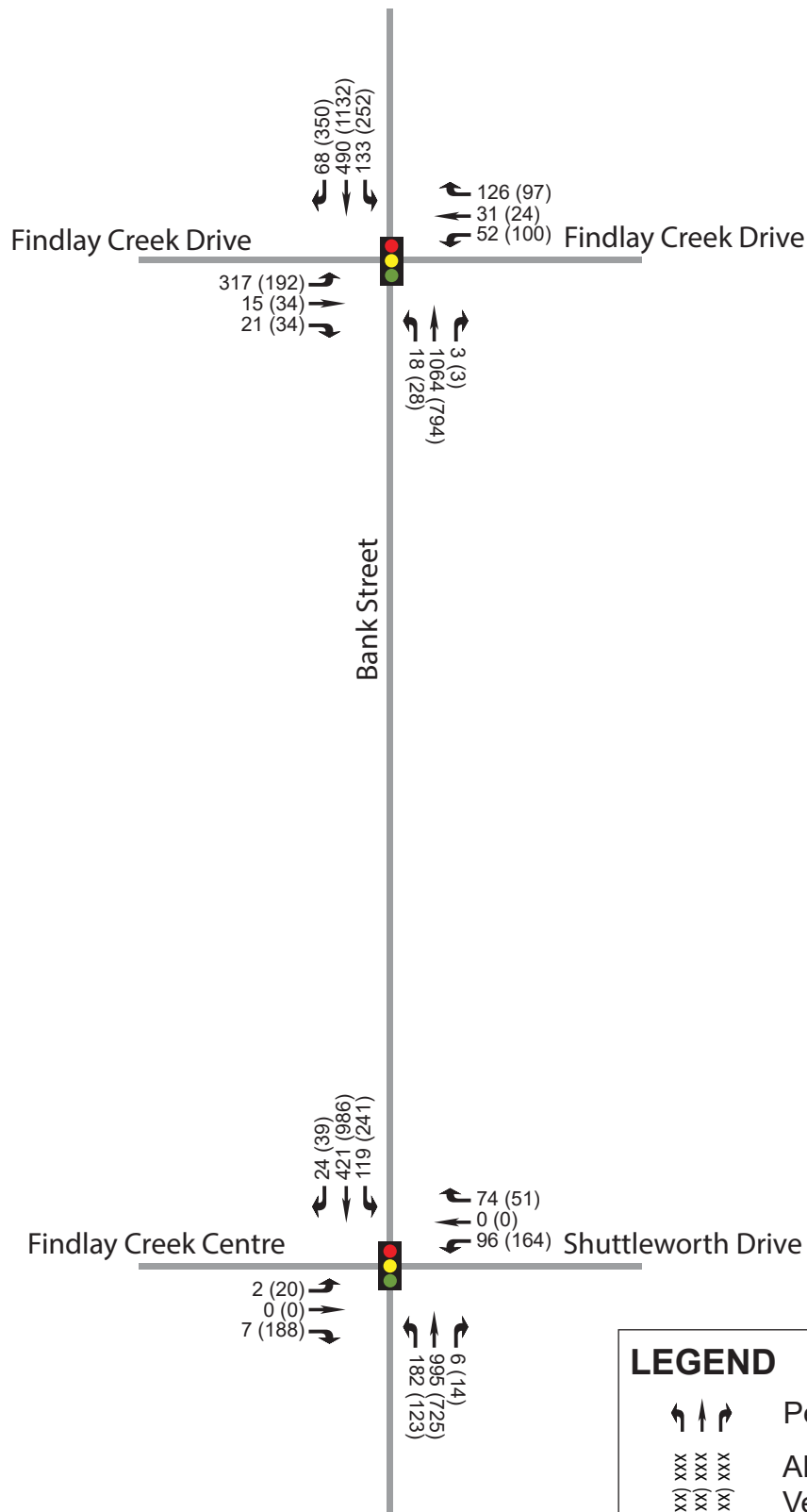
Future (2022) Total Traffic and Future (2025) Total Traffic volumes adjusted to account for the change in land use for the proposed development since the preparation of the MTS are presented in **Exhibit 9** and **Exhibit 10**, respectively.



Note: volumes extracted directly from Leitrim MTS (March 2017)

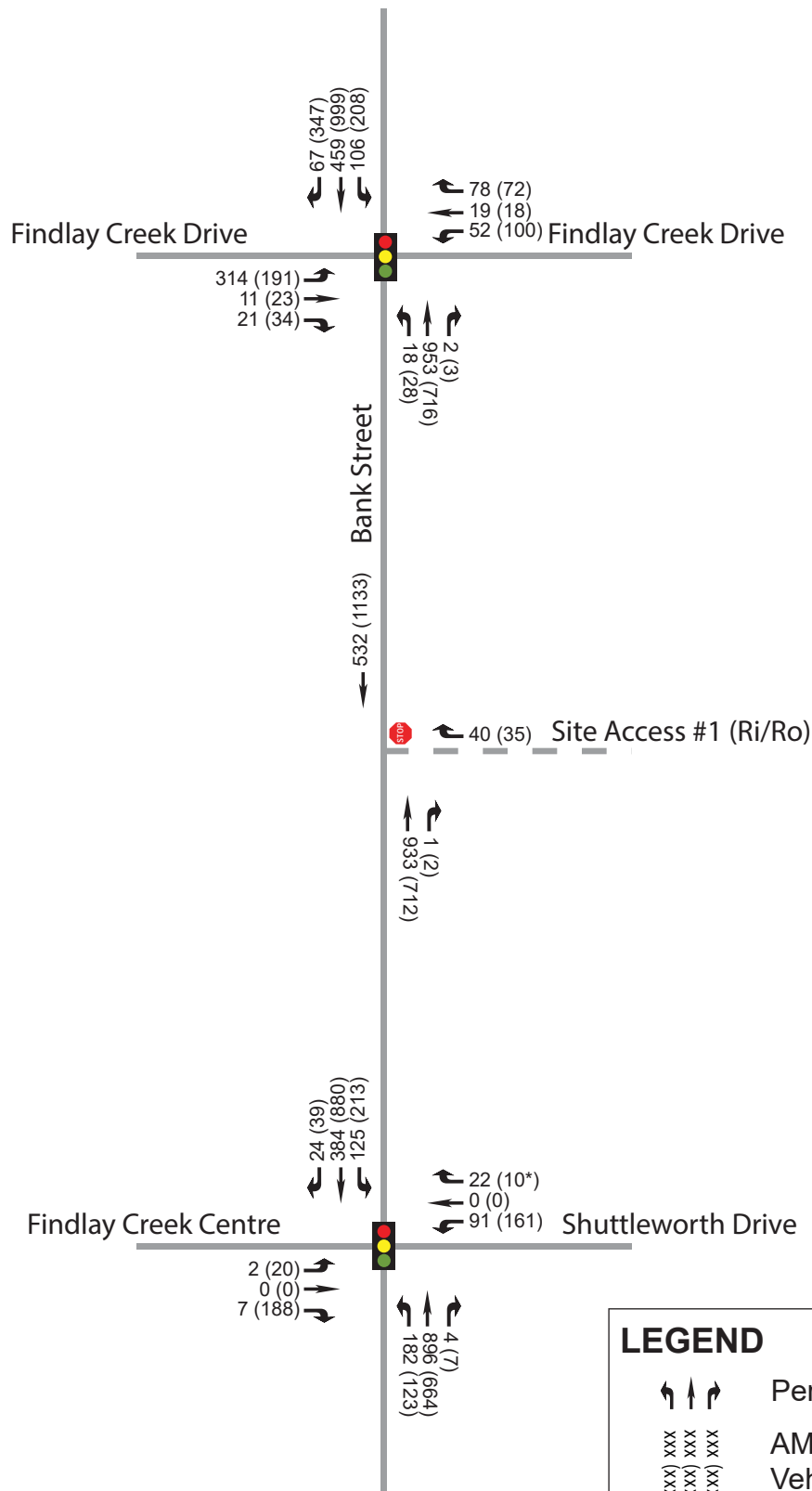






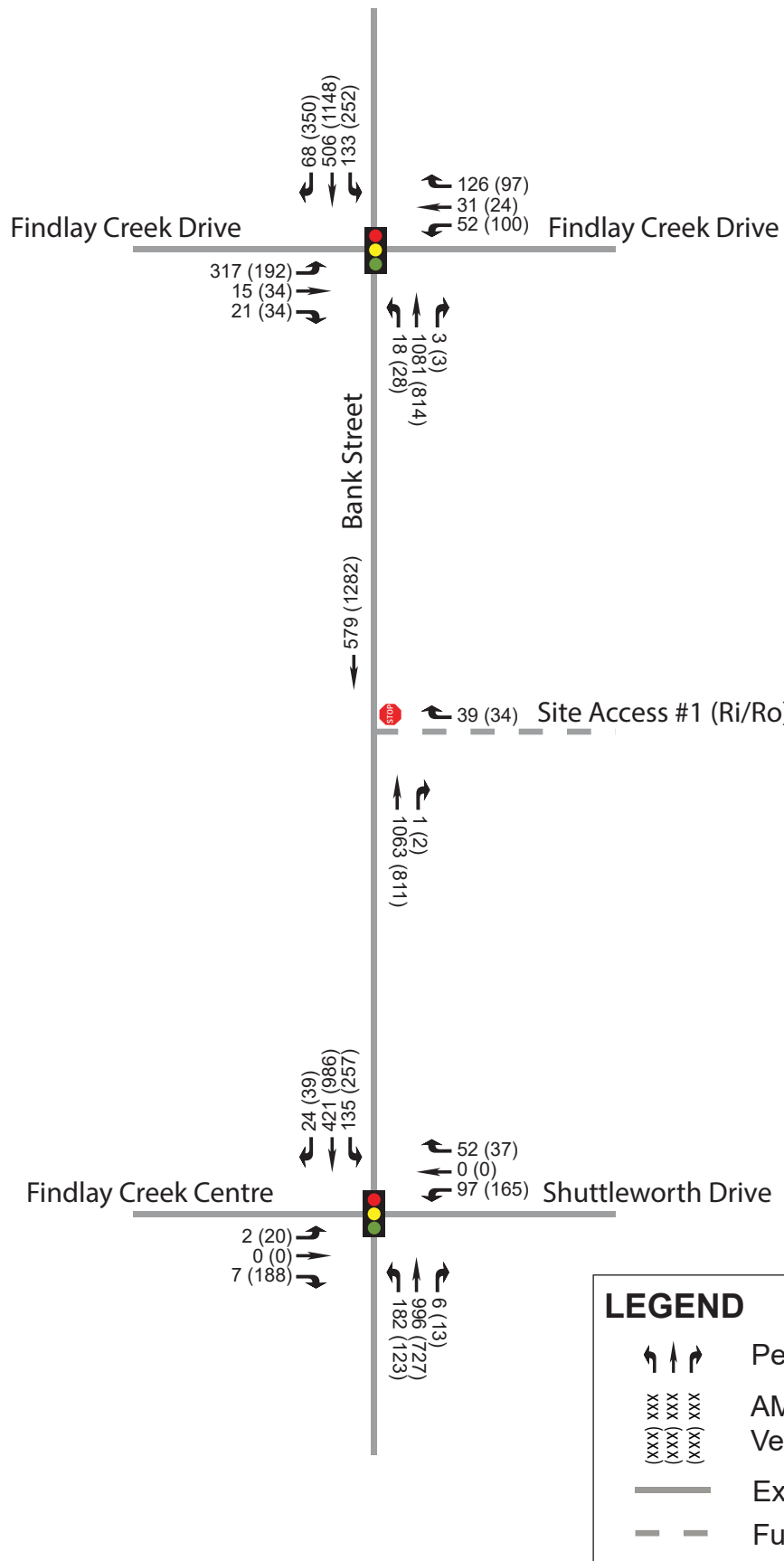
Note: volumes extracted directly from Leitrim MTS (March 2017)





\* Nominal traffic volume





## 5 Analysis

### 5.1 Development Design

#### 5.1.1 Design for Sustainable Modes

The proposed development aligns with the objectives of the Building Better and Smarter Suburbs (BBSS) policy document which promotes compact growth and sustainable development.

All of the proposed stacked townhome units are within 400m of the existing bus stops at the intersection of Bank Street & Findlay Creek Drive in accordance with OCTranspo design service guidelines.

As indicated in **Exhibit 3**, sidewalks are located throughout the proposed development with convenient connections to Bank Street, Longworth Avenue and the adjacent Cowan's Grove Commercial Plaza.

The TDM-Supportive Development Design and Infrastructure Checklist was completed and is provided in **Appendix F**. This checklist identifies measures that are being considered in association with the proposed development to offset the vehicular impact on the adjacent road network.

#### 5.1.2 Circulation and Access

Waste collection will occur on site at the location indicated in **Exhibit 3**. The waste collection area has been designed to accommodate a standard waste collection vehicle. The waste collection area is located sufficiently far from Bank Street to prevent any queue spillback onto Bank Street due to entering traffic being blocked by waste collection activities.

#### 5.1.3 New Street Networks

Not Applicable: The New Street Networks element is exempt from this TIA, as defined in the study scope. This element is not required for Site Plan applications.

### 5.2 Parking

#### 5.2.1 Parking Supply

Based on the size of the proposed development, a minimum of 122 resident parking spaces and 20 visitor parking spaces are required to meet the Zoning Bylaw requirements. The proposed site plan indicates that 142 vehicle parking spaces will be provided, including 20 visitor parking spaces, therefore the minimum parking supply requirement has been met.

According to the Zoning Bylaw, the proposed development must provide 51 bicycle parking spaces. A total of 51 bicycle parking spaces will be provided, therefore, the minimum bicycle parking requirement has been met.

#### 5.2.2 Spillover Parking

The minimum parking supply requirement has been met, therefore, no further review of parking will be necessary for the purposes of this study.

### 5.3 Boundary Streets

As discussed previously, since the City has prepared a Complete Street design concept for Bank Street through the study area and also that Longworth Avenue is a recently-constructed local road,

no segment Multi-Modal Level of Service (MMLOS) analysis is required for either of the proposed development's boundary streets.

Adjacent to the proposed development, Bank Street will be widened to four lanes with a boulevard and 2m wide cycle track and concrete sidewalk. The proposed right-in/right-out access off Bank Street will be constructed with a depressed curb and continuous sidewalk and cycle track to minimize the impacts of the development to the multi-modal facilities proposed as part of the Bank Street design.

Similarly, the private approach on Longworth Avenue will also be constructed with a depressed curb and continuous sidewalk.

## 5.4 Access Intersections

### 5.4.1 Location and Design of Access

The proposed development will provide two new private approaches: a right-in/right-out access on Bank Street and a full-movement access on Longworth Avenue. The proposed private approaches are in conformance with the City of Ottawa Private Approach By-law 2003-447, with particular confirmation of the following items:

- Width: A private approach will have a minimum width of 2.4m and a maximum width of 9.0m.
  - Both site private approaches will be 6.7m wide. ✓
- Distance from Intersecting Road: For a residential development with between 100 and 199 parking spaces, the proposed private approach must be at least 30 metres from the nearest intersecting street line.
  - The proposed access on Bank Street is approximately 115m from the nearest intersecting street line at Findlay Creek Drive and is therefore in conformance with the by-law. ✓
  - The proposed access on Longworth Avenue is approximately 50m from the nearest intersecting street line at Pisces Terrace (a future local road within the Cowan's Grove subdivision) and is therefore in conformance with the by-law. ✓
- Quantity and Spacing of Private Approaches: For sites with frontage between 46 and 150 metres, one (1) two-way and two (2) one-way, or two (2) two-way private approaches are permitted. For sites with frontage between 20 and 34 metres, one (1) two-way or two (2) one-way private approaches are permitted. On lots that abut more than one roadway, such as the proposed development these provisions apply to each frontage separately.
  - The frontage on Bank Street is 109m and therefore the single proposed two-way private approach is compliant with the by-law. ✓
  - The frontage on Longworth Avenue is 34m and therefore the single proposed two-way private approach is compliant with the by-law. ✓
- Distance from Property Line: Private approaches must be at least 3.0m from the abutting property line, however this requirement can be reduced to 0.3m provided that the access is a safe distance from the access serving the adjacent property, sight lines are adequate and that it does not create a traffic hazard.
  - Both proposed private approaches exceed the minimum distance required. ✓
- Grade of Private Approach: The grade of a private approach serving a parking area of more than 50 spaces must not exceed 2% within the private property for a distance of 9m from the highway/curb line.

- The grade of both private approaches will not exceed 2% within 9m of the curb line. ✓

Based on the Transportation Association of Canada's (TAC) Geometric Design Guide for Canadian Roads (June 2017), for a residential development of 100 to 200 units a minimum clear throat length of 25m is suggested for accesses on arterial roadways. The clear throat length is provided to ensure that any queues that form due to on-site circulation blockages do not spillback onto the arterial road.

A clear throat length of 11.15m is currently proposed for the Bank Street access which is below the suggested minimum clear throat length, however, it is expected that this substandard throat length will be adequate. The Bank Street access will be restricted to right-in/right-out movements only and only approximately 5% of site-generated traffic is expected to originate from the south which only equates to up to two vehicles entering the Bank Street access during the weekday morning and afternoon peak hours. It is therefore highly unlikely that any queue spillback issues will occur, even with consideration that the future Bank Street widening will reduce the clear throat length from 11.15m to 5.35m, as measured from the end of the curb radius, see **Exhibit 3**.

It should be noted that the Bank Street access will be south of the existing auxiliary left-turn lane taper for the Bank Street & Findlay Creek Drive intersection and may be located within the tail of the northbound left- and right-turn auxiliary lane tapers following the future Bank Street widening. No operational issues are expected with regards to the site access location on Bank Street.

#### **5.4.2 Intersection Control**

Not Applicable – Both proposed private approaches will be unsignalized, given the low site-generated traffic projections indicated in the Forecasting section of this report.

#### **5.4.3 Intersection Design (MMLOS)**

Not Applicable – As both proposed site access intersections will be unsignalized, MMLOS analysis is not required.

### **5.5 Transportation Demand Management (TDM)**

The City of Ottawa is committed to implementing Transportation Demand Management (TDM) measures on a City-wide basis in an effort to reduce automobile dependence, particularly during the weekday peak travel periods. TDM initiatives are aimed at encouraging individuals to use non-auto modes of travel during the peak periods.

#### **5.5.1 Context for TDM**

The proposed development is not located within Design Priority Area (DPA) or within a Transit-Oriented Development (TOD) zone.

As described in the Forecasting section of this report, mode shares used to estimate future development traffic were based on the 2011 TRANS Origin-Destination (OD) Survey for the South Gloucester/Leitrim Traffic Assessment Zone (TAZ) as well as the Leitrim Master Transportation Study (MTS). These mode share targets represent an average of the commuter peak period mode share distributions reported in the OD Survey and were adjusted to account for the expected increase in transit use in the area.

#### **5.5.2 Need and Opportunity**

The Leitrim community is mostly auto-oriented with limited transit access. It is expected, however, that as development in the surrounding community progresses that expanded transit service will be provided and gaps in the pedestrian and cyclist network will be filled in.

In order to effectively accommodate the expected future travel demand within the surrounding community, it is important that the City continues to expand the transit service network as the road network evolves in order to capture local trips and provide direct connections to major transit hubs such as the future Leirtrim Station. Providing high quality transit service within the community will help promote the use of transit as a convenient and efficient alternative mode of transportation, thereby reducing auto-dependency.

The implementation of the Complete Street concept in the future widening of Bank Street will facilitate travel by non-auto modes.

### 5.5.3 TDM Program

As previously mentioned, the site has been designed to provide an internal network of pedestrian facilities with direct connections to the Cowan's Grove Commercial Plaza as well as to the future Bank Street sidewalk and cycle track. Furthermore, bicycle racks will be provided throughout the site.

The proposed development conforms to the City's TDM principles by providing convenient and direct connections to adjacent pedestrian, cycling and transit facilities where available. The proposed on-site pedestrian facilities will provide direct and convenient connections to adjacent roadways and commercial developments.

The City of Ottawa's TDM Measures Checklist was completed for the proposed development, and the results are provided in **Appendix F**.

## 5.6 Neighbourhood Traffic Management

### 5.6.1 Adjacent Neighbourhoods

As discussed previously, the proposed development will have two private approaches: a right-in/right-out access on Bank Street, an arterial road, as well as a full-movement access on Longworth Avenue, a local road.

The TIA Guidelines indicate that the livability threshold for a local road is 120 vehicles per hour. During the weekday morning and afternoon peak hours, it is anticipated that the proposed development will generate up to 42 two-way vehicle-trips per hour. With consideration of the grid configuration of the adjacent Cowan's Grove subdivision, this additional vehicular traffic is not expected to increase volumes on Longworth Avenue in excess of its livability threshold.

## 5.7 Transit

### 5.7.1 Route Capacity

The estimated future total transit passenger demand of the proposed development was provided in Section 4.1.2.5. The results have been summarized in **Table 11**.

Table 11 - Development Generated Transit Demand

PERIOD	2022 PEAK PERIOD DEMAND		2025 PEAK PERIOD DEMAND	
	IN	OUT	IN	OUT
AM	4	7	5	8
PM	7	6	8	7

As the projected transit demand is minor, it is expected that the existing transit routes that operate in the vicinity of the proposed development will be able to accommodate the additional demand. The proposed development is expected to generate approximately 15 two-way transit trips during the weekday morning and afternoon peak hours, which represents a small fraction of the 104-person capacity indicated by OC Transpo for a regular bus.

### **5.7.1 Transit Priority Measures**

Given the minimal increase in demand the proposed development will have on the overall transit system, no transit priority measures are necessary.

## **5.8 Review of Network Concept**

Not Applicable: The Network Concept element is exempt from this TIA, as defined in the study scope. This element is not required for proposed developments expected to generate less than 200 person-trips during the weekday morning and afternoon peak hours.

## **5.9 Intersection Design**

In the MTS, it was assumed that 70 apartment units would be constructed on the subject site rather than the 102 stacked townhome units currently proposed. As discussed previously, the impact of the proposed development was assessed as part of the Leirtrim Master Transportation Study (MTS). The scope of the intersection capacity analysis in this TIA will be limited to an assessment of the relative impacts the change in subject site's land use will have on the study area intersections in order to validate the results of the MTS.

To evaluate the relative impact of the change in land use, intersection capacity analyses will be conducted under Future (2022 & 2025) Total Traffic conditions using the traffic volumes from the MTS and adjusted to account for the change in land use. The analysis will compare the impact of the adjusted traffic volumes to the recommended intersection configurations from the MTS to determine if further intersection modifications are required.

The following sections summarize the methodology and results of this analysis.

### **5.9.1 Intersection Control**

Traffic signal warrant analysis and roundabout analysis is not be required for this TIA. The scope of the analysis will be limited to an assessment of the relative impacts relating to the change in land use of the subject site based on the recommended road network configurations from the MTS. As such, revisions to traffic controls are not necessary.

#### **5.9.1.1 Traffic Signal Warrants**

Not Applicable. Traffic signal warrant analysis is not required for this TIA.

#### **5.9.1.2 Roundabout Analysis**

Not Applicable. Roundabout analysis is not required for this TIA.

### **5.9.2 Intersection Analysis Criteria (Automobile)**

The following section outlines the City of Ottawa's methodology for determining motor vehicle Level-of-Service (LOS) at signalized and unsignalized intersections.



### 5.9.2.1 *Signalized Intersections*

In qualitative terms, the Level-of-Service (LOS) defines operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of such factors as delay, speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. LOS can also be related to the ratio of the volume to capacity (v/c) which is simply the relationship of the traffic volume (either measured or forecast) to the capability of the intersection or road section to accommodate a given traffic volume. This capability varies depending on the factors described above. LOS are given letter designations from 'A' to 'F'. LOS 'A' represents the best operating conditions and LOS 'E' represents the level at which the intersection or an approach to the intersection is carrying the maximum traffic volume that can, practicably, be accommodated. LOS 'F' indicates that the intersection is operating beyond its theoretical capacity.

The City of Ottawa has developed criteria as part of the Transportation Impact Assessment Guidelines, which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a LOS designation. These criteria are as follows:

Table 12 - LOS Criteria for Signalized Intersections

LOS	VOLUME TO CAPACITY RATIO (v/c)
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	> 1.00

The intersection capacity analysis technique provides an indication of the LOS for each movement at the intersection under consideration and for the intersection as a whole. The overall v/c ratio for an intersection is defined as the sum of equivalent volumes for all critical movements at the intersection divided by the sum of capacities for all critical movements.

The Level of Service calculation is based on locally-specific parameters as described in the TIA Guidelines and incorporates existing signal timing plans obtained from the City of Ottawa. The analysis of future conditions considers optimized signal timing plans and the use of a Peak Hour Factor (PHF) of 1.0 to recognize peak spreading beyond a 15-minute period in congested conditions.

### 5.9.2.2 *Unsignalized Intersections*

The capacity of an unsignalized intersection can also be expressed in terms of the LOS it provides. For an unsignalized intersection, the Level of Service is described in terms of the average movement delays at the intersection. This is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. The average delay for any particular minor movement at the un-signalized intersection is a function of the capacity of the approach and the degree of saturation.

The Highway Capacity Manual 2010 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for un-signalized intersections, related to average movement delays at the intersection, as indicated in **Table 13**.

Table 13 - LOS Criteria for Unsignalized Intersections

LOS	DELAY (seconds)
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

The unsignalized intersection capacity analysis technique included in the HCM and used in the current study provides an indication of the Level of Service for each movement of the intersection under consideration. By this technique, the performance of the unsignalized intersection can be compared under varying traffic scenarios, using the Level of Service concept in a qualitative sense. One unsignalized intersection can be compared with another unsignalized intersection using this concept. Level of Service 'E' represents the capacity of the movement under consideration and generally, in large urban areas, Level of Service 'D' is considered to represent an acceptable operating condition. Level of Service 'E' is considered an acceptable operating condition for planning purposes for intersections located within Ottawa's Urban Core (the downtown and its vicinity). Level of Service 'F' indicates that the movement is operating beyond its design capacity.

### 5.9.3 Intersection Capacity Analysis

Following the established intersection capacity analysis criteria described above, the recommended road network configurations from the MTS under Future (2022 & 2025) Total Traffic conditions were evaluated using the adjusted traffic volumes from **Exhibit 9** and **Exhibit 10**.

The following section presents the results of the intersection capacity analysis. All tables summarize study area intersection LOS results during the weekday morning and afternoon peak hour periods.

The Synchro output files have been provided in **Appendix G**.

### 5.9.3.1 Future (2022) Total Traffic

An intersection capacity analysis has been undertaken using the adjusted Future (2022) Total Traffic volumes presented in **Exhibit 9**. The initial intersection configurations were taken from the recommended intersection configurations from the MTS for Future (2022) Total Traffic conditions:

- **Bank Street & Findlay Creek Drive:** Single through lane on the northbound, southbound and westbound approaches, shared through-right lane on the eastbound approach, right-turn lanes on Bank Street and the westbound approach, and left-turn lanes on all approaches.
- **Bank Street & Findlay Creek Centre / Shuttleworth Drive:** Shared through-right lanes on the northbound, eastbound and westbound approaches, right-turn lane and single through lane on the southbound approach and left-turn lanes on all approaches.

**Table 14** summarizes the results of the analysis as well as the previous results from the MTS.

Table 14 - Intersection Capacity Analysis: Future (2022) Total Traffic

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENT (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENT (V/C OR DELAY)
Leitrim Master Transportation Study Analysis Results					
Bank Street & Findlay Creek Drive	Signalized	E (0.92)	EBL (0.95)	D (0.82)	EBL (0.84)
Bank Street & Shuttleworth Drive	Signalized	B (0.67)	NBTR (0.68)	C (0.78)	WBL (0.89)
Cowan's Grove Mid-Density Residential Block Analysis Results					
Bank Street & Findlay Creek Drive	Signalized	E (0.95)	EBL (0.95)	D (0.82)	EBL (0.84)
Bank Street & Right-In/Right-Out Access	Unsignalized	C (18.8s)	WBR (18.8s)	B (14.6s)	WBR (14.6s)
Bank Street & Shuttleworth Drive	Signalized	B (0.67)	NBTR (0.68)	C (0.78)	WBL (0.89)

Based on the results of the intersection capacity analysis, the overall impact to the study area intersections as a result of the change in the subject site's land use is a slight increase in the overall v/c ratio of the Bank Street & Findlay Creek Drive intersection. The overall LOS however remains the same. As such, no changes are recommended to the MTS's recommended 2022 road network configuration.

The proposed right-in/right-out access on Bank Street will operate within capacity under Future (2022) Total Traffic conditions.

### 5.9.3.2 Future (2025) Total Traffic

An intersection capacity analysis has been undertaken using the adjusted Future (2025) Total Traffic volumes presented in **Exhibit 10**. Based on comments received by City staff, it is understood that the four-lane widening of Bank Street has been delayed to 2026-2029. Consequently, instead of using the recommended intersection configurations from the MTS for Future (2025) Total Traffic conditions as the initial intersection configurations, the intersection configuration used in the Future (2022) Total Traffic analysis has been assumed.

**Table 15** summarizes the results of the analysis as well as the previous results from the MTS.

Table 15 - Intersection Capacity Analysis: Future (2025) Total Traffic – Two-Lane Bank Street Design

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENT (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENT (V/C OR DELAY)
Leitrim Master Transportation Study Analysis Results					
Bank Street & Findlay Creek Drive	Signalized	E (0.99)	NBT (1.00)	E (0.92)	SBT (0.93)
Bank Street & Shuttleworth Drive	Signalized	C (0.75)	NBTR (0.76)	D (0.86)	WBL (0.92)
Cowan's Grove Mid-Density Residential Block Analysis Results					
Bank Street & Findlay Creek Drive	Signalized	E (1.00)	NBT (1.01)	E (0.93)	SBT (0.94)
Bank Street & Right-In/Right-Out Access	Unsignalized	C (22.1s)	WBR (22.1s)	C (16.2s)	WBR (16.2s)
Bank Street & Shuttleworth Drive	Signalized	C (0.75)	NBTR (0.76)	D (0.86)	WBL (0.92)

The results of the analysis confirm the findings of the MTS. By 2025, widening of Bank Street is required in order to accommodate traffic generated by all the developments in the Leitrim community. The change in the subject site's land use results in a negligible increase both to the overall and critical v/c ratios at the Bank Street & Findlay Creek Drive intersection.

With Bank Street widened to four lanes (as recommended by MTS), the Bank Street & Findlay Creek Drive is expected to operate under capacity during both the weekday morning and afternoon peak hours.

**Table 16** summarizes the results of the analysis using both the MTS and adjusted MTS traffic volumes with the recommended four-lane widening of Bank Street.

Table 16 - Intersection Capacity Analysis: Future (2025) Total Traffic – Four-Lane Bank Street Design

INTERSECTION	TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
		OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENT (V/C OR DELAY)	OVERALL LOS (V/C OR DELAY)	CRITICAL MOVEMENT (V/C OR DELAY)
Leitrim Master Transportation Study Analysis Results					
Bank Street & Findlay Creek Drive	Signalized	D (0.81)	EBL (0.89)	C (0.72)	EBL (0.83)
Bank Street & Shuttleworth Drive	Signalized	C (0.74)	NBTR (0.77)	D (0.87)	WBL (0.90)
Cowan's Grove Mid-Density Residential Block Analysis Results					
Bank Street & Findlay Creek Drive	Signalized	D (0.84)	EBL (0.89)	C (0.74)	EBL (0.83)
Bank Street & Right-In/Right-Out Access	Unsignalized	B (13.4s)	WBR (13.4s)	B (11.7s)	WBR (11.7s)
Bank Street & Shuttleworth Drive	Signalized	C (0.74)	NBTR (0.77)	D (0.87)	WBL (0.90)

#### 5.9.4 Intersection Design (MMLOS)

As discussed previously, since a Complete Street design has been completed for Bank Street Multi-Modal Level of Service (MMLOS) analysis is not required for this study. A review of the impact of the access intersection on the boundary street design was previously discussed in Section 5.4.3.

### 5.10 Geometric Review

The following section reviews all geometric requirements for the study area intersections.

#### 5.10.1 Sight Distance and Corner Clearances

Site Access #1 is proposed on Bank Street approximately 115m south of Findlay Creek Drive. Bank Street is relatively flat and straight at this location therefore sight distance and corner clearances are not expected to be a concern.

Site Access #2 is proposed immediately east of a right-angle bend in Longworth Avenue within close proximity to the outside curve. Its location on the outer edge of the roadway should afford drivers a favourable perspective upstream and downstream from the intersection. Furthermore, the location of the access allows for visibility in excess of the 85-metre distance required by TAC for a roadway with a design speed of 60km/h. Sight distance and corner clearances are therefore not expected to be a concern at this location.

#### 5.10.2 Auxiliary Lane Analysis

Auxiliary turning lane requirements for all intersections within the study area were reviewed using the adjusted Future (2025) Total Traffic volumes and compared to the existing storage lengths. Auxiliary turning lane requirements for all intersections within the study area are described as follows:

##### 5.10.2.1 Unsignalized Auxiliary Left-Turn Lane Requirements

Not Applicable: The provision of an auxiliary left-turn lane on a local roadway such as Longworth Avenue is not appropriate given the classification of the roadway. As such, an auxiliary left-turn lane will not be required at Site Access #2.

##### 5.10.2.2 Signalized Auxiliary Left-Turn Requirements

A review of auxiliary left-turn lane storage requirements was completed at all signalized intersections within the study area. The review compared the projected 95th percentile queue lengths from Synchro operational results, and the standard queue length calculation based on the following equation:

$$\text{Storage Length} = \frac{NL}{C} \times 1.5$$

Where:

$N$  = number of vehicles per hour

$L$  = Length occupied by a vehicle in the queue = 7 m

$C$  = number of traffic signal cycles per hour = 3600s / cycle length

The results of the auxiliary left-turn lane analysis are summarized below in **Table 17**.

Table 17 - Auxiliary Left-Turn Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	95TH %ILE QUEUE LENGTH (m)	CALCULATED QUEUE LENGTH (m)	EXISTING STORAGE LENGTH (m)	STORAGE DEFICIENCY (m)
Bank Street & Findlay Creek Drive	NB	m5	10	65	-
	SB	#50	90	190	-
	EB	#90	85	90	-
	WB	35	35	40	-
Bank Street & Findlay Creek Centre / Shuttleworth Drive	NB	m#55	50	160	-
	SB	#105	90	120	-
	EB	10	10	50	-
	WB	55	60	40	- <sup>1</sup>

<sup>1</sup> - The Leitrim MTS recommended 60m however Cowan's Grove Commercial Plaza TIA (July 2018) provided revised trip generation estimates which indicated that 40m of storage would be sufficient as the demand primarily relates to pass-by traffic.

#### 5.10.2.3 Unsignalized Auxiliary Right-Turn Lane Requirements

The Transportation Association of Canada (TAC) suggests that auxiliary right-turn lanes be considered “when the volume of decelerating or accelerating vehicles compared with through vehicles causes undue hazard.” Consideration for auxiliary right-turn lanes is typically given when the right-turning traffic exceeds 10% of the through volume and is at least 60 vehicles per hour.

The right-in/right-out access on Bank Street is expected to experience up to 2 vehicles turning right into the site during the weekday morning and afternoon peak hour. As such, an auxiliary right-turn lane is not required at this access.

Similarly to the provision of auxiliary left-turn lanes, the provision of auxiliary right-turn lanes on a local roadway such as Longworth Avenue is not appropriate given the classification of the roadway. As such, an auxiliary right-turn lane is not required at Site Access #2.

#### 5.10.2.4 Signalized Auxiliary Right-Turn Lane Requirements

For signalized intersections, TAC suggests that auxiliary right-turn lanes shall be considered when more than 10% of vehicles on an approach are turning right and when the peak hour demand exceeds 60 vehicles. The purpose of this guideline is to mitigate operational impacts to through-traffic, particularly on high-speed arterial roadways such as Bank Street through the study area, and may not be applicable in all circumstances.

The results of the auxiliary right-turn lane analysis are summarized below in **Table 18** below:

Table 18 – Auxiliary Right-Turn Lane Storage Analysis at Signalized Intersections

INTERSECTION	APPROACH	RIGHT TURN VOLUME	APPROACH VEHICLES TURNING RIGHT (%)	95TH %ILE QUEUE LENGTH (m)	EXISTING STORAGE LENGTH (m)	STORAGE DEFICIENCY (m)
Bank Street & Findlay Creek Drive	NB	3	0%	-	-	-
	SB	350	20%	10	170	-
	EB	34	13%	-	-	-
	WB	126	60%	20	-	20
Bank Street & Findlay Creek Centre / Shuttleworth Drive	NB	13	1%	-	-	-
	SB	39	3%	0	60	-
	EB	188	90%	-	-	Private Approach – Not Applicable
	WB	52	35%	-	-	-

Based on the above results, a westbound right-turn lane with 20m of storage is warranted at the Bank Street & Findlay Creek Drive intersection. Based on the ultimate design for the Bank Street widening, a right-turn lane will be added to this approach therefore this deficiency will be addressed when Bank Street is widened.

## 5.11 Summary of Recommendations

The results of the intersection capacity analysis confirm the findings of the Leitrim Master Transportation Study (MTS).

The results indicate that by 2022, the Bank Street & Findlay Creek Drive intersection will be approaching its theoretical capacity under weekday morning traffic conditions, however, as Bank Street is expected to be widened in the future and it is still expected to operate below its theoretical capacity no interim intersection modifications are recommended, consistent with the findings of the MTS.

By 2025, the Bank Street & Findlay Creek Drive intersection may approach capacity unless Bank Street is widened to four lanes as recommended by the MTS.

Overall, the change in the subject site's land use was found to have a negligible impact on the operational performance of the study area intersections. The road network modification recommendations from the MTS were found to provide sufficient excess capacity to accommodate the change in land use associated with the Cowan's Grove Mid-Density Residential Block.

The site access on Bank Street as well as the Bank Street & Findlay Creek Centre / Shuttleworth Drive intersection were found operate within acceptable standards under both Future (2022 & 2025) Total Traffic conditions.

The existing left- and right-turn storage lengths were found to be sufficient to accommodate the projected queue lengths for most intersection movements. The westbound approach at the Bank Street & Findlay Creek Drive intersection was found to warrant a westbound right-turn lane with



20m of storage as a result of background traffic. This configuration will be introduced when Bank Street is widened to four lanes. As such, no recommendations have been made with regards to storage lengths.

## 6 Conclusion

The proposed development at 4791 Bank Street has previously been assessed within the Leitrim Master Transportation Study (MTS). The MTS assumed that the subject site would accommodate 70 apartment units instead of the 102 stacked townhome units currently proposed. As the impact of the subject development has previously been assessed as part of the MTS, the scope of the intersection capacity analysis was limited to an assessment of the relative impact from the change in the subject site's land use in order to validate the results of the MTS. The key objective of this study was to determine if the change in the subject site's land use would require road network modifications that were not previously identified in the MTS.

Site-generated traffic volumes were calculated for the subject site using the same methodology used in the MTS. The Future (2022 & 2025) Total Traffic Volumes from the MTS were then adjusted to reflect the change in the subject site's land use.

The intersection capacity analysis was completed using the adjusted traffic volumes and the recommended road network identified in the MTS for each analysis year. The results of the analyses indicate that, as recommended by the MTS, the four-lane widening of Bank Street would be required by 2025.

The queueing analysis concluded that the current auxiliary lane storage lengths will be sufficient to accommodate the projected queues with consideration of site-generated traffic.

With regards to the site plan, the clear throat length at the right-in/right-out access on Bank Street was found to be substandard. Given the low volume of inbound traffic expected at this access, however, it is expected that the clear throat length proposed will be operationally sufficient under both existing and future configurations of Bank Street.

**Based on the findings of this study, it is the overall opinion of IBI Group that the proposed development will integrate well with and can be safely accommodated by the adjacent transportation network with the recommended actions and modifications in place. The impact of the change in land use is minimal and does not change the conclusions of the Leitrim Master Transportation Study.**

## Appendix A – City Circulation Comments

## **Step 1 & 2 Submission (Screening & Scoping) – Circulation Comments & Response**

Report Submitted: October 9, 2019

Comments Received: October 15, 2019

Transportation Project Manager: Josiane Gervais

### **Module 2.1 - Existing and Planned Conditions**

#### **Element 2.1.1 - Proposed Development**

- Existing land uses or permitted use provisions in the Official Plan, Zoning By-law, etc.;
  - Done. See Section 3.1.2.

#### **Element 2.1.2 - Existing Conditions**

- Existing driveways to adjacent developments (both sides of all roads bordering the site) within 200 m of proposed site driveway, indicating the land use associated with the driveway;
  - Section 3.2.1.2 has been added, describing existing access driveways within proximity to the proposed development.
- Existing peak hour travel demands by mode. Use figures to show existing networks and travel demands by mode as well as photographs to show transportation network elements near proposed access points.
  - A legend has been added to Exhibit 1 to distinguish between arterial and collector roads.
  - Exhibit 3 has been enhanced with the inclusion of design drawings to show the existing intersection configuration.

### **Module 2.2 - Study Area and Time Periods**

#### **Element 2.2.1 - Study Area**

- Findlay Creek Dr/Bank St
  - As discussed in Section 3.4, the intersection of Findlay Creek Drive and Bank Street has been added to the study area.
- Shuttleworth Dr/Longworth Ave
  - This is an internal intersection to the subdivision consisting of local-to-local roads. Furthermore, the level of service is not expected to be significant due to the distribution of site-generated traffic, of which a significant portion is expected to utilize the right-in/right-out access off Bank Street.

As an additional note, for Module 4.3 – Boundary Street Design, ensure the TIA includes justification of why MMLOS of the existing Bank St corridor is not relevant. The report should still assess MMLOS for future conditions.

- As per the TIA Guidelines, since a complete streets concept has been prepared for Bank Street through the study area, in place of Multi-Modal Level of Service (MMLOS) analysis, the Analysis section of the study will review the following:

- 1) Identify the design at the interface of the street
- 2) Assess the potential impact of the proposed development on the complete street design
- 3) If necessary, develop an interim design concept for Bank Street to accommodate the proposed development.

The above response regarding MMLOS has been incorporated in Section 3.4 as well.

## Step 3 Submission (Forecasting) – Circulation Comments & Response

Report Submitted: October 22, 2019

Comments Received: November 14, 2019

Transportation Project Manager: Josiane Gervais

### Transportation Engineering Services

- Provided the distance to the Cowan's Grove Plaza access from the Bank Street/Findlay Creek intersection in section 3.2.1.2.
  - Done. See Section 3.2.1.2.
- Apply a non-zero walking mode share since there will be a school nearby as well as the shopping across the street. This could be taken from the "other" mode share.
  - Noted. Half of the 'other' mode share provided in the 2011 OD Survey was shifted over to the 'walking' mode share to achieve a more representative stratification of travel modes. See Section 4.1.2.3.
- Review the sight lines at the Longworth access in the Strategy Report.
  - Done. See Section 5.10.1.
- The response to Module 3.3 (MMLOS) is accepted. Access Design (TIA Module 4.4) should be covered as described in Section 3.4 of the Forecasting Report.
  - Noted. The response however is provided in Section 5.3: Boundary Street Designs in accordance with the structure of the TIA Guidelines.

### Traffic Signal Operations

- No comments.

### TPM Comments:

- Element 2.1.2: To clarify, the information to be provided is simply a description of existing accesses/driveways within 200 m of the proposed area and their associated land uses. This section should not include a discussion of the proposed site accesses and/or operational issues related to the proposed accesses. Please revise section 3.2.1.2 of your report accordingly.
  - Noted. Section 3.2.1.2 has been revised to reflect the above comment.
- Appendix A: Element 2.2.1 Study Area, Findlay Creek/ Bank St: Response copied from the above line. Please revise.
  - The above response from the Scoping comments has been updated with the following response: As discussed in Section 3.4, the intersection of Findlay Creek Drive and Bank Street has been added to the study area.
- Bank Street south of Leitrim to Dun Skipper is tentatively scheduled for widening between 2026-2029 pending future budget deliberations.
  - Noted. The above has been incorporated into Section 3.3.1.1 & Section 4.2.1.
- Bank Street widening from Dun Skipper to Rideau Road is tentatively scheduled post 2031.

- Noted. The above has been incorporated into Section 3.3.1.1 & Section 4.2.1.

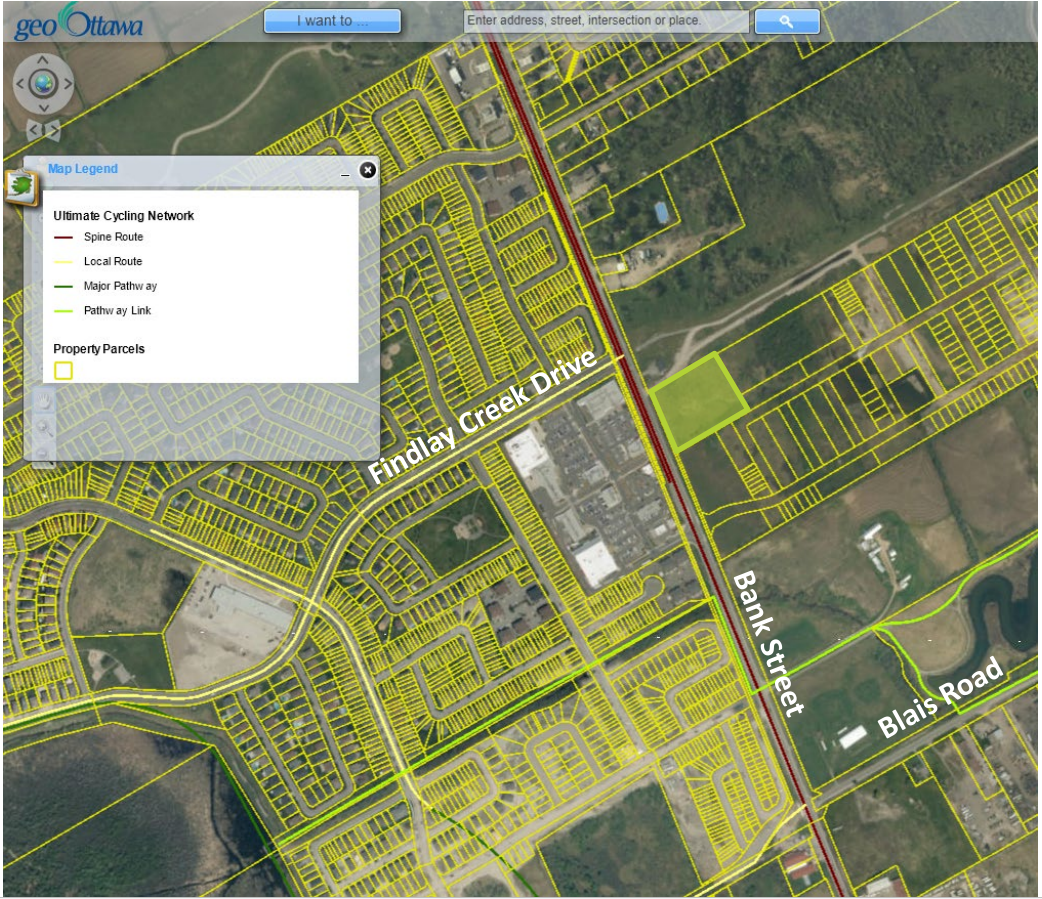
## Appendix B – Screening Form

---



## City of Ottawa 2017 TIA Guidelines Screening Form

### 1. Description of Proposed Development

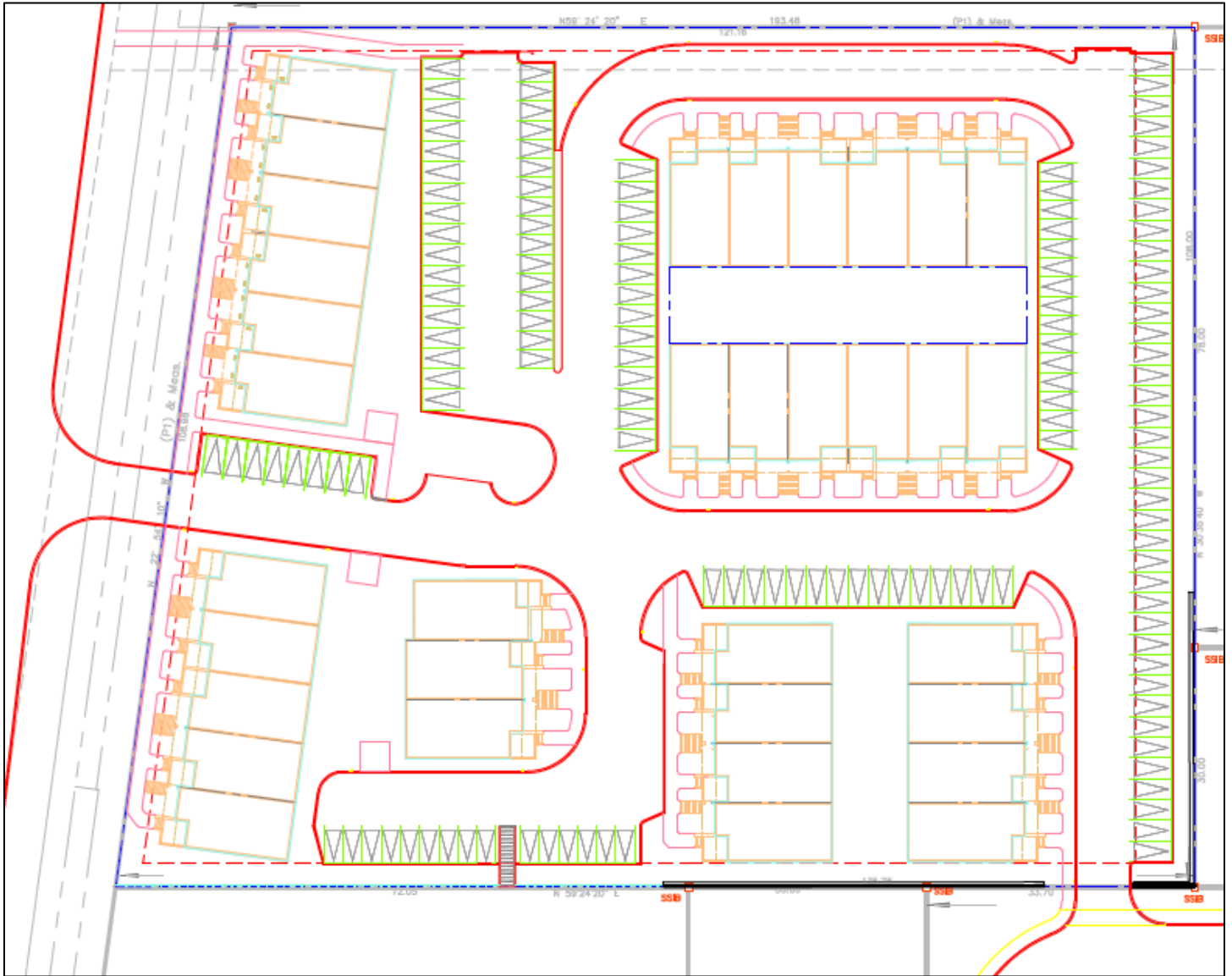
Municipal Address	4791 Bank Street
Description of Location	<p>Leitrim – East of Bank Street and south of Findlay Creek Drive, across Bank Street from Findlay Creek Centre.</p> 
Land Use Classification	Residential Subdivision
Development Size (units)	102 Stacked Townhouses
Development Size (m <sup>2</sup> )	N/A
Number of Accesses and Locations	<p>One (1) right-in/right-out access via Bank Street</p> <p>One (1) access via Longworth Avenue</p>
Phase of Development	Single Phase
Buildout Year	2021 (assumed)

If available, please attach a sketch of the development or site plan to this form.



## Transportation Impact Assessment Screening Form

Proposed Development:



## 2. Trip Generation Trigger



Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units 
Office	3,500 m <sup>2</sup>
Industrial	5,000 m <sup>2</sup>
Fast-food restaurant or coffee shop	100 m <sup>2</sup>
Destination retail	1,000 m <sup>2</sup>
Gas station or convenience market	75 m <sup>2</sup>

*\* If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

**Based on the results above, the Trip Generation Trigger is satisfied.**

## 3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks?		
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		

*\*DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

**Based on the results above, the Location Trigger is satisfied.**

#### 4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		<input checked="" type="checkbox"/>
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		<input checked="" type="checkbox"/>
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?	<input checked="" type="checkbox"/>	
Is the proposed driveway within auxiliary lanes of an intersection?	<input checked="" type="checkbox"/>	
Does the proposed driveway make use of an existing median break that serves an existing site?		<input checked="" type="checkbox"/>
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		<input checked="" type="checkbox"/>
Does the development include a drive-thru facility?		<input checked="" type="checkbox"/>

Based on the results above, the Safety Trigger is satisfied.

#### 5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	<input checked="" type="checkbox"/>	
Does the development satisfy the Location Trigger?	<input checked="" type="checkbox"/>	
Does the development satisfy the Safety Trigger?	<input checked="" type="checkbox"/>	

CONCLUSION: One or more of the above triggers was satisfied, therefore a TIA will be required.

## Appendix C – OC Transpo Routes

---

NEW / NOUVEAU

# 294

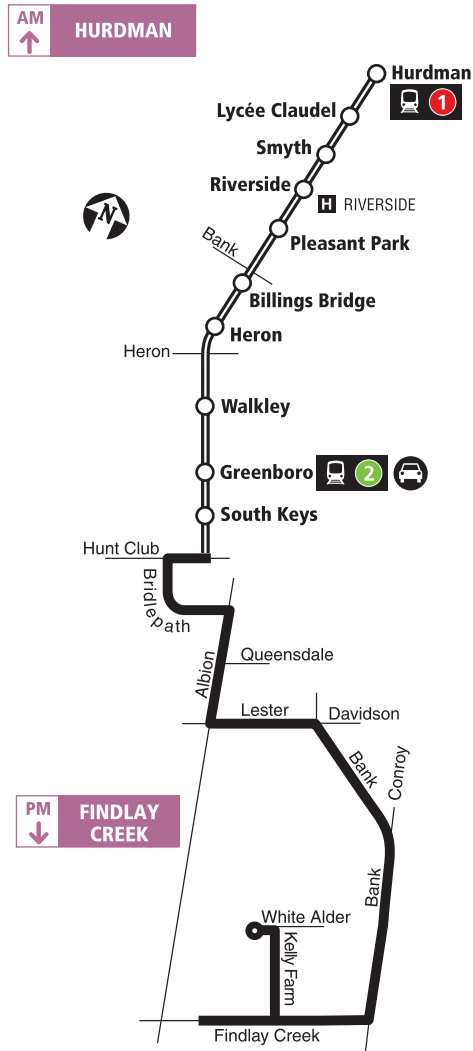
## HURDMAN FINDLAY CREEK

### Connexion

**Monday to Friday / Lundi au vendredi**

Peak periods only

Périodes de pointe seulement



Transitway & Station  
 Park & Ride / Parc-o-bus

2017.12



**Schedule / Horaire.....613-560-1000**

**Text / Texto .....560560**

*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres*

Customer Relations

Service à la clientèle ..... 613-842-3600

Lost and Found / Objets perdus..... 613-563-4011

Security / Sécurité..... 613-741-2478

**Effective December 24, 2017**

**En vigueur 24 décembre 2017**

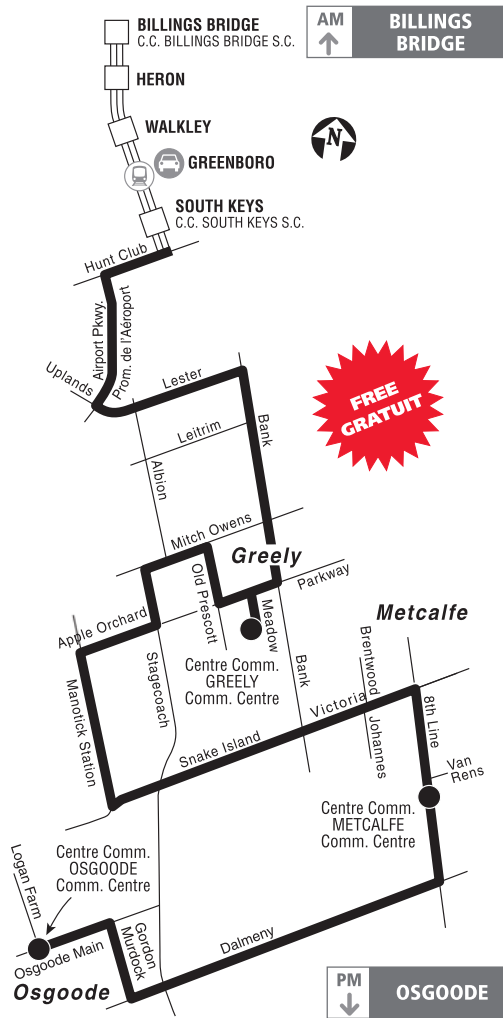


INFO 613-741-4390  
octranspo.com

**304****BILLINGS BRIDGE  
METCALFE, GREELY  
OSGOODE****Thursday only / Jeudi seulement**

Selected time periods

Périodes sélectionnées

**Legend • Légende**

- Transitway & Stations
- Line 2 - O-Train Trillium Line  
Ligne 2 - O-Train Ligne Trillium
- Park & Ride / Parc-o-bus

2016.12

Information / Renseignement ..... **613-741-4390**Customer Relations  
Service à la clientèle ..... **613-842-3600**Lost and Found / Objets perdus ..... **613-563-4011**Transecure ..... **613-741-2478**Schedule / Horaire ..... **613-560-1000**Text / Texto ..... **560560**  
*plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres***Effective December 25, 2016****En vigueur 25 décembre 2016****octranspo.com**

## Appendix D – Collision Data

---





# City Operations - Transportation Services

## Collision Details Report - Public Version

**From:** January 1, 2014 **To:** December 31, 2018

**Location:** ANALDEA DR/ WHITE ALDER AVE @ BANK ST

**Traffic Control:** Stop sign

**Total Collisions:** 23

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Feb-18, Tue,10:30	Clear	Angle	P.D. only	Ice	South	Turning right	Pick-up truck	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Apr-23, Wed,07:44	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	
2014-Sep-03, Wed,12:00	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Sep-15, Mon,17:46	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					South	Slowing or stopping	Pick-up truck	Other motor vehicle	
					South	Slowing or stopping	Passenger van	Other motor vehicle	

2014-Oct-04, Sat,16:04	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Pick-up truck	Other motor vehicle
2014-Oct-07, Tue,09:58	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Delivery van	Other motor vehicle
2014-Oct-25, Sat,18:43	Freezing Rain	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Skidding/sliding
					South	Slowing or stopping	Pick-up truck	Other motor vehicle
2014-Dec-01, Mon,16:20	Snow	Rear end	P.D. only	Wet	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2015-Jun-14, Sun,10:37	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Pick-up truck	Other motor vehicle
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2015-Dec-02, Wed,11:20	Unknown	Rear end	Non-fatal injury	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2016-Jan-08, Fri,18:04	Clear	Sideswipe	P.D. only	Loose snow	North	Unknown	Unknown	Other motor vehicle
					North	Turning right	Automobile, station wagon	Other motor vehicle

2016-Sep-27, Tue,15:30	Clear	Rear end	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2016-Oct-18, Tue,20:18	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-18, Sun,19:17	Clear	Rear end	Non-fatal injury	Ice	North	Slowing or stopping	Unknown	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2017-Mar-18, Sat,10:31	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Pick-up truck	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2017-Mar-18, Sat,16:13	Clear	SMV other	P.D. only	Dry	North	Going ahead	Unknown	Ran off road
2017-May-27, Sat,13:30	Clear	Rear end	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Jun-23, Fri,17:53	Rain	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2017-Aug-25, Fri,17:00	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle

					South	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Sep-01, Fri,08:24	Clear	Rear end	Non-fatal injury	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
2017-Sep-08, Fri,17:30	Rain	Rear end	P.D. only	Wet	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2017-Nov-08, Wed,10:48	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2017-Dec-12, Tue,18:34	Snow	Sideswipe	P.D. only	Loose snow	South	Changing lanes	Automobile, station wagon	Other motor vehicle
					South	Turning right	Automobile, station wagon	Other motor vehicle

**Location:** BANK ST @ FINDLAY CREEK SC/310 S OF FINDLAY CREEK DR

**Traffic Control:** Traffic signal

**Total Collisions:** 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Jul-05, Tue,06:35	Clear	Other	P.D. only	Dry	West	Reversing	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Pick-up truck	Other motor vehicle	

2016-Nov-21, Mon,08:43	Snow	Rear end	Non-fatal injury	Wet	North	Slowing or stopping	Pick-up truck	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2016-Nov-24, Thu,10:42	Snow	Angle	P.D. only	Loose snow	East	Turning right	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Skidding/sliding
2018-Mar-17, Sat,14:08	Clear	Turning movement	P.D. only	Dry	East	Turning right	Passenger van	Other motor vehicle
					East	Going ahead	Automobile, station wagon	Other motor vehicle
2018-Aug-05, Sun,09:30	Clear	Turning movement	Non-fatal injury	Dry	South	Making "U" turn	Passenger van	Other motor vehicle
					South	Going ahead	Passenger van	Other motor vehicle

**Location:** BANK ST @ ROTARY WAY

**Traffic Control:** Traffic signal

**Total Collisions:** 9

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-Jan-22, Thu,04:13	Clear	SMV other	P.D. only	Ice	South	Going ahead	Automobile, station wagon	Pole (sign, parking meter)	
2015-Apr-09, Thu,09:16	Clear	Angle	P.D. only	Dry	West	Turning right	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Municipal transit bus	Other motor vehicle	
2015-Jul-29, Wed,17:22	Clear	Rear end	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	

					South	Going ahead	Pick-up truck	Other motor vehicle
2016-Sep-14, Wed,07:25	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	School bus	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-09, Fri,08:43	Snow	Rear end	P.D. only	Ice	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	School bus	Other motor vehicle
2017-Nov-17, Fri,07:45	Clear	Rear end	P.D. only	Dry	South	Going ahead	Passenger van	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2017-Dec-11, Mon,16:40	Clear	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Unknown	Other motor vehicle
2018-May-16, Wed,15:23	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2018-Jul-05, Thu,00:18	Clear	SMV other	P.D. only	Dry	North	Turning left	Passenger van	Curb

**Location:** BANK ST btwn ANALDEA DR/ WHITE ALDER AVE & ROTARY WAY

**Traffic Control:** No control

**Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Feb-26, Thu,17:41	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	

**Location:** BANK ST btwn FINDLAY CREEK DR & BLAIS RD

**Traffic Control:** No control

**Total Collisions:** 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Jan-14, Wed,08:46	Clear	Approaching	Non-fatal injury	Ice	South	Going ahead	Pick-up truck	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2016-Apr-18, Mon,19:31	Rain	SMV other	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Animal - wild	
2016-Sep-30, Fri,06:55	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	
2017-Oct-19, Thu,08:01	Clear	SMV other	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Ran off road	
2018-Sep-26, Wed,15:54	Clear	Turning movement	Non-fatal injury	Dry	South	Making "U" turn	Automobile, station wagon	Other motor vehicle	

South      Going ahead      Automobile,  
station wagon      Other motor  
vehicle

**Location:** BANK ST btwn WHITE ALDER AVE & FINDLAY CREEK DR

**Traffic Control:** No control

**Total Collisions: 5**

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Feb-26, Wed,07:55	Clear	Rear end	P.D. only	Ice	North	Slowing or stopping	Pick-up truck	Skidding/sliding	
					North	Stopped	Passenger van	Other motor vehicle	
2014-Apr-02, Wed,11:10	Clear	Sideswipe	P.D. only	Dry	South	Going ahead	Truck - closed	Other motor vehicle	
					South	Stopped	Municipal transit bus	Other motor vehicle	
2015-Apr-10, Fri,18:43	Clear	Sideswipe	P.D. only	Dry	South	Overtaking	Passenger van	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Apr-20, Thu,07:40	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	
2017-Jul-05, Wed,16:10	Clear	Sideswipe	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	

**Location:** BLAIS RD @ BANK ST

**Traffic Control:** Stop sign

**Total Collisions: 7**

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
---------------	-------------	-------------	----------------	----------------	----------	-------------------	--------------	-------------	---------



2015-Feb-17, Tue,17:03	Clear	Rear end	P.D. only	Dry	South	Going ahead	Passenger van	Other motor vehicle
					South	Slowing or stopping	Pick-up truck	Other motor vehicle
					South	Stopped	Automobile, station wagon	Other motor vehicle
2016-Jan-07, Thu,06:35	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2016-Feb-09, Tue,09:00	Snow	Approaching	P.D. only	Ice	East	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Oct-02, Sun,15:56	Clear	Rear end	Non-fatal injury	Wet	South	Going ahead	Pick-up truck	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2017-May-14, Sun,21:45	Clear	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Slowing or stopping	Pick-up truck	Other motor vehicle
2018-Apr-12, Thu,12:53	Clear	Rear end	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2018-Jul-25, Wed,10:00	Rain	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Slowing or stopping	Pick-up truck	Other motor vehicle

**Location:** FINDLAY CREEK DR @ BANK ST

**Traffic Control:** Traffic signal

**Total Collisions:** 14

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jan-27, Mon,09:53	Drifting Snow	Angle	Non-fatal injury	Loose snow	South	Going ahead	Pick-up truck	Skidding/sliding	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Nov-07, Fri,19:36	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Passenger van	Other motor vehicle	
2015-Jan-06, Tue,13:43	Clear	Rear end	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Slowing or stopping	Pick-up truck	Other motor vehicle	
2015-Jan-22, Thu,08:29	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Automobile, station wagon	Other motor vehicle	
					North	Turning left	Pick-up truck	Other motor vehicle	
2015-Feb-05, Thu,20:27	Clear	Other	Non-fatal injury	Loose snow	South	Turning right	Automobile, station wagon	Other	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2015-Feb-06, Fri,06:50	Snow	Rear end	P.D. only	Loose snow	East	Turning left	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Pick-up truck	Other motor vehicle	

2015-Feb-21, Sat,10:00	Snow	Rear end	P.D. only	Packed snow	East	Slowing or stopping	Pick-up truck	Other motor vehicle
					East	Stopped	Pick-up truck	Other motor vehicle
2015-Feb-23, Mon,08:10	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle
					East	Stopped	Automobile, station wagon	Other motor vehicle
2015-Mar-20, Fri,07:01	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Passenger van	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2015-Jun-09, Tue,16:59	Clear	Rear end	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2015-Sep-12, Sat,14:49	Rain	Rear end	Non-fatal injury	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2017-May-06, Sat,15:32	Rain	Rear end	P.D. only	Wet	East	Turning left	Automobile, station wagon	Other motor vehicle
					East	Turning left	Pick-up truck	Other motor vehicle
2017-Aug-27, Sun,20:03	Clear	Angle	P.D. only	Dry	South	Turning right	Automobile, station wagon	Other motor vehicle

					East	Stopped	Automobile, station wagon	Other motor vehicle
2017-Dec-20, Wed,11:55	Snow	Rear end	Non-fatal injury	Slush	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle

## Appendix E – Trip Generation Data

---

Table 3.12: Person Trip Generation Rates – (all households with residents not older than 55 years of age)

Person Trip Generation Rates									
All Households with persons 55 years of age or less AM and PM Peak Hours									
<div>Geographic Areas</div> <div>Dwelling Unit Types</div>	Core Area		Urban Area (Inside the greenbelt)		Suburban (Outside the greenbelt)		Rural		All Areas
	Person Trip Rate	%▽	Person Trip Rate	%▽	Person Trip Rate	%▽	Person Trip Rate	%▽	Person Trip Rate
Single detached: AM PM	0.85 0.74	- 7% - 3%	0.99 0.75	+ 9% - 1%	0.94 0.79	+ 3% + 4%	0.78 0.71	- 14% - 7%	0.91 0.76
Semi-detached: AM PM	0.79 0.74	- 10% - 1%	0.97 0.68	10% - 9%	0.89 0.82	+ 1% + 9%	0.64 0.60	- 27% - 20%	0.88 0.75
Row Townhouse: AM PM	0.71 0.62	- 3% - 3%	0.78 0.60	+ 7% - 6%	0.67 0.69	- 8% + 8%	0.74 0.56	+ 1% - 13%	0.73 0.64
Apartment: AM PM	0.48 0.45	- 4% 0%	0.51 0.42	+ 2% - 7%	0.53 0.52	+ 6% + 16%	0.36 0.52	- 28% + 16%	0.50 0.45
All Types: AM PM	0.62 0.57	- 23% - 16%	0.82 0.63	+ 2% - 7%	0.86 0.75	+ 8% + 10%	0.76 0.69	- 5% + 1%	0.80 0.68
Note: 5% (+ or -) represents the percentage delta change in trip rate when compared against the average trip rate across all geographic areas									

Table 3.13: Mode Shares - (all households with residents not older than 55 years of age)

Reported Mode Shares																
All Households with persons 55 years of age or less																
AM and PM Peak Hours																
Geographic Areas Dwelling Unit Types		Core Area			Urban Area (Inside the greenbelt)			Suburban (Outside the greenbelt)			Rural *			All Areas		
		Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised	Vehicle Trips	Transit Share	Non-Motorised
Single - Detached:	AM PM	35% 45%	20% 11%	33% 32%	51% 58%	26% 19%	11% 13%	55% 64%	25% 19%	9% 6%	60% 73%	27% 13%	4% 2%	54% 63%	25% 17%	10% 8%
Semi-Detached:	AM PM	38% 36%	30% 20%	26% 34%	44% 51%	35% 27%	10% 13%	52% 62%	24% 17%	12% 7%	64% 77%	27% 12%	5% 1%	49% 58%	28% 20%	12% 10%
Row / Townhouse:	AM PM	33% 39%	22% 15%	40% 42%	45% 53%	34% 28%	10% 8%	55% 61%	27% 22%	8% 6%	73% 74%	15% 15%	3% 1%	49% 57%	30% 24%	11% 9%
Apartment:	AM PM	27% 23%	27% 29%	43% 42%	37% 40%	41% 37%	14% 14%	44% 44%	34% 33%	13% 9%	76% 48%	8% 4%	16% 17%	36% 35%	35% 33%	23% 23%
All Types:	AM PM	32% 34%	24% 21%	38% 38%	47% 53%	31% 24%	11% 12%	54% 62%	26% 20%	9% 6%	61% 73%	26% 13%	4% 2%	51% 59%	27% 20%	11% 10%
Note: Percentages do not necessarily sum to 100% as the proportion of automobile passengers have not been tabulated. Vehicle trips reflect the percentage of vehicle drivers.																
* - Rural area sample size is extremely low and mode shares are highly influenced by school types where public transportation levels are high during the AM versus the PM peaks.																

Table 6.1: Vehicle Trip Generation Rates

Vehicle Trip Generation Rates AM and PM Peak Hours						
ITE Land Use Code	Data Source Dwelling Unit Type		Vehicle Trip Generation Rate			
			2008 Count Data	ITE	OD Survey	Blended Rate
210	Single-detached dwellings	AM	0.66	0.75	0.56	0.66
		PM	0.89	1.01	0.53	0.81
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.40	0.70	0.46	0.52
		PM	0.64	0.72	0.46	0.61
231	Low-rise condominiums (1 or 2 floors)	AM	0.53	0.67	0.21	0.47
		PM	0.41	0.78	0.18	0.46
232	High-rise condominiums (3+ floors)	AM	0.53	0.34	0.21	0.36
		PM	0.41	0.38	0.18	0.32
233	Luxury condominiums	AM	0.53	0.56	0.21	0.43
		PM	0.41	0.55	0.18	0.38
221	Low-rise apartments (2 floors)	AM	0.19	0.46	0.21	0.29
		PM	0.21	0.58	0.18	0.32
223	Mid-rise apartments (3-10 floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.39	0.18	0.26
222	High-rise apartments (10+ floors)	AM	0.19	0.30	0.21	0.23
		PM	0.21	0.35	0.18	0.25

Table 6.2: Recommended Vehicle Trip Directional Splits

Comparison of Directional Splits (Inbound/Outbound) AM and PM Peak Hours								
ITE Land Use Code	Data Source Area Dwelling Unit Type		2008 Count Data		ITE		Blended Rate	
			Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
210	Single-detached dwellings	AM	33%	67%	25%	75%	29%	71%
		PM	60%	40%	63%	37%	62%	39%
224	Semi-detached dwellings, townhouses, rowhouses	AM	40%	60%	33%	67%	37%	64%
		PM	55%	45%	51%	49%	53%	47%
231	Low-rise condominiums (1 or 2 floors)	AM	36%	64%	25%	75%	31%	70%
		PM	54%	46%	58%	42%	56%	44%
232	High-rise condominiums (3+ floors)	AM	36%	64%	19%	81%	28%	73%
		PM	54%	46%	62%	38%	58%	42%
233	Luxury condominiums	AM	36%	64%	23%	77%	30%	71%
		PM	54%	46%	63%	37%	59%	42%
221	Low-rise apartments (2 floors)	AM	22%	78%	21%	79%	22%	79%
		PM	62%	38%	65%	35%	64%	37%
223	Mid-rise apartments (3-10 floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%
222	High-rise apartments (10+ floors)	AM	22%	78%	25%	75%	24%	77%
		PM	62%	38%	61%	39%	62%	39%

Table 6.3: Recommended Vehicle Trip Generation Rates for Residential Land Uses with Transit Bonus

Recommended Vehicle Trip Generation Rates with Transit Bonus AM and PM Peak Hours									
ITE Land Use Code	Geographic Area  Dwelling Unit Type		Vehicle Trip Rate						
			Core		Urban  (Inside the Greenbelt)		Suburban  (Outside the Greenbelt)		Rural
			Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate	< 600m to Rapid Transit	Base Rate
210	Single-detached dwellings	AM	0.40	0.31	0.67	0.50	0.70	0.49	0.62
		PM	0.60	0.33	0.76	0.57	0.90	0.63	0.92
224	Semi-detached dwellings, townhouses, rowhouses	AM	0.34	0.34	0.51	0.50	0.54	0.39	0.62
		PM	0.39	0.38	0.51	0.51	0.71	0.51	0.67
231	Low-rise condominiums (1 or 2 floors)	AM	0.34	0.34	0.50	0.50	0.60	0.60	0.71
		PM	0.29	0.29	0.49	0.49	0.66	0.66	0.72
232	High-rise condominiums (3+ floors)	AM	0.26	0.26	0.38	0.38	0.46	0.46	0.54
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
233	Luxury condominiums	AM	0.31	0.31	0.45	0.45	0.55	0.55	0.65
		PM	0.24	0.24	0.40	0.40	0.55	0.55	0.59
221	Low-rise apartments (2 floors)	AM	0.21	0.21	0.31	0.31	0.37	0.37	0.44
		PM	0.20	0.20	0.34	0.34	0.46	0.46	0.50
223	Mid-rise apartments (3-10 floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.28	0.28	0.37	0.37	0.41
222	High-rise apartments (10+ floors)	AM	0.17	0.17	0.24	0.24	0.29	0.29	0.35
		PM	0.16	0.16	0.27	0.27	0.36	0.36	0.39
Note: The transit bonus was only applied to geographic areas and dwelling unit types where the reported transit mode shares were less than the transit mode share reported for residential development located within the 600m proximity to a rapid transit station. It is noted that condominium and apartment housing categories reported similar levels of transit mode shares independent of location to rapid transit stations.									

## 6.5 Future Data Collection

While the rates presented in were prepared by blending the vehicle trip rates from ITE, the OD Survey and the 2008 local trip generation studies, it is important to stress the importance and need for ongoing local trip generation surveys to monitor changes in travel behaviour. The 2008 trip generation studies undertaken to support this study provide insight into local travel patterns and a well organized ongoing annual data collection program aimed at trip generation surveys of key land uses or requirement for data collection by local developers will continue to provide recent and accurate local trip generation rates. For example the high-rise apartment category of dwelling units reported the lowest peak hour vehicle trip rates.



## Orleans

### Demographic Characteristics

Population	117,440	Actively Travelled	95,100
Employed Population	57,400	Number of Vehicles	70,160
Households	42,950	Area (km <sup>2</sup> )	88.6

Occupation Status (age 5+)	Male	Female	Total
Full Time Employed	27,630	24,540	52,170
Part Time Employed	2,040	3,200	5,240
Student	14,100	14,710	28,800
Retiree	8,240	9,820	18,060
Unemployed	890	790	1,670
Homemaker	110	2,990	3,090
Other	630	1,030	1,660
<b>Total:</b>	<b>53,630</b>	<b>57,060</b>	<b>110,690</b>

Traveller Characteristics	Male	Female	Total
Transit Pass Holders	11,690	13,440	25,130

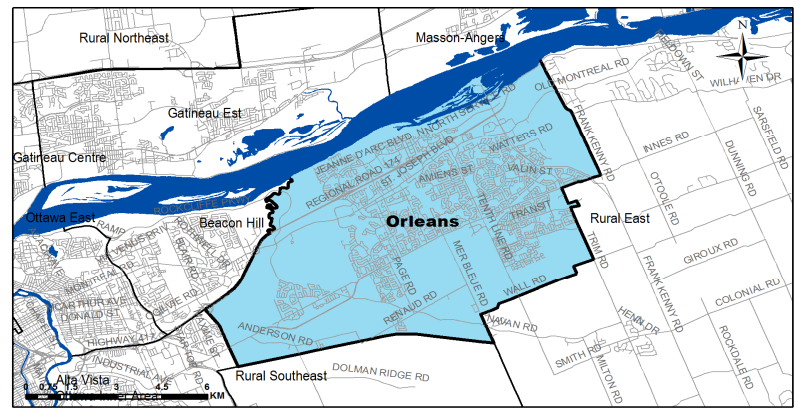
Licensed Drivers	41,780	42,490	84,270
------------------	--------	--------	--------

Telecommuters	270	260	530
---------------	-----	-----	-----

Trips made by residents	147,960	163,290	311,250
-------------------------	---------	---------	---------

#### Selected Indicators

Daily Trips per Person (age 5+)	2.81
Vehicles per Person	0.60
Number of Persons per Household	2.73
Daily Trips per Household	7.25
Vehicles per Household	1.63
Workers per Household	1.34
Population Density (Pop/km2)	1330



#### Household Size

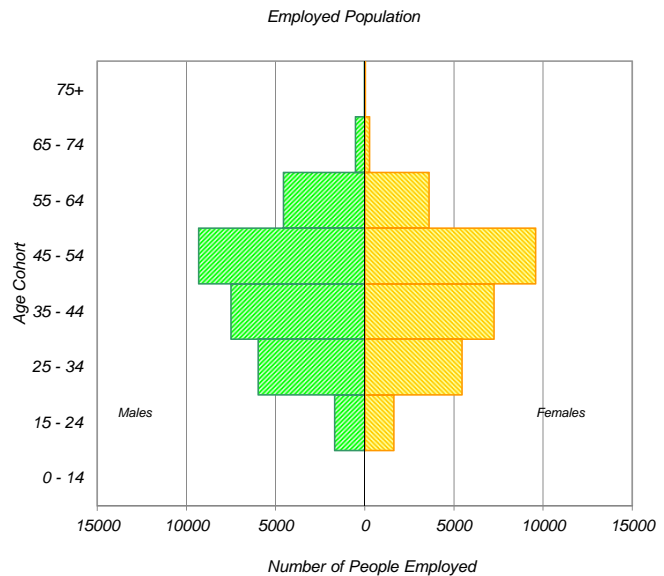
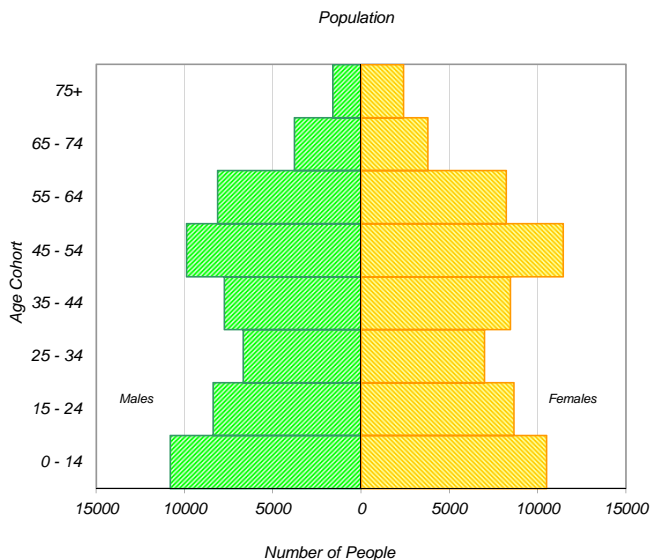
1 person	6,490	15%
2 persons	14,600	34%
3 persons	8,630	20%
4 persons	9,090	21%
5+ persons	4,130	10%
<b>Total:</b>	<b>42,950</b>	<b>100%</b>

#### Households by Vehicle Availability

0 vehicles	1,390	3%
1 vehicle	18,250	42%
2 vehicles	19,080	44%
3 vehicles	3,330	8%
4+ vehicles	890	2%
<b>Total:</b>	<b>42,950</b>	<b>100%</b>

#### Households by Dwelling Type

Single-detached	25,970	60%
Semi-detached	3,250	8%
Townhouse	10,730	25%
Apartment/Condo	3,010	7%
<b>Total:</b>	<b>42,950</b>	<b>100%</b>

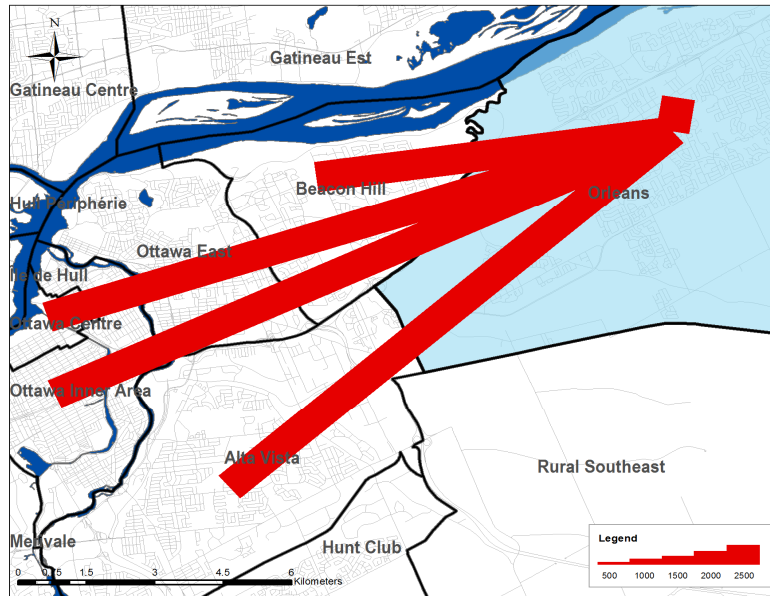


\* In 2005 data was only collected for household members aged 11+ therefore these results cannot be compared to the 2011 data.

## Travel Patterns

### Top Five Destinations of Trips from Orleans

#### AM Peak Period



### Summary of Trips to and from Orleans

Districts	Destinations of Trips From		Origins of Trips To	
	District	% Total	District	% Total
Ottawa Centre	7,330	11%	130	0%
Ottawa Inner Area	4,800	7%	630	2%
Ottawa East	2,840	4%	600	2%
Beacon Hill	4,180	6%	760	2%
Alta Vista	5,890	9%	1,050	3%
Hunt Club	950	1%	630	2%
Merivale	1,940	3%	460	1%
Ottawa West	1,460	2%	220	1%
Bayshore / Cedarview	1,210	2%	310	1%
Orléans	29,900	46%	29,900	78%
Rural East	1,000	2%	1,970	5%
Rural Southeast	70	0%	290	1%
South Gloucester / Leitrim	170	0%	50	0%
South Nepean	200	0%	330	1%
Rural Southwest	70	0%	70	0%
Kanata / Stittsville	500	1%	290	1%
Rural West	70	0%	0	0%
Île de Hull	1,530	2%	80	0%
Hull Périphérie	460	1%	200	1%
Plateau	10	0%	80	0%
Aylmer	60	0%	90	0%
Rural Northwest	50	0%	40	0%
Pointe Gatineau	200	0%	70	0%
Gatineau Est	40	0%	60	0%
Rural Northeast	10	0%	20	0%
Buckingham / Masson-Angers	0	0%	30	0%
Ontario Sub-Total:	62,580	96%	37,690	98%
Québec Sub-Total:	2,360	4%	670	2%
Total:	64,940	100%	38,360	100%

### Trips by Trip Purpose

24 Hours	From District		To District		Within District	
Work or related	38,220	40%	7,250	8%	9,470	6%
School	9,890	10%	2,120	2%	15,080	10%
Shopping	7,210	8%	7,770	8%	23,480	16%
Leisure	8,640	9%	6,050	6%	15,650	10%
Medical	2,450	3%	1,950	2%	2,610	2%
Pick-up / drive passenger	6,060	6%	5,730	6%	12,910	9%
Return Home	18,630	20%	60,820	64%	65,050	43%
Other	3,880	4%	2,890	3%	6,970	5%
Total:	94,980	100%	94,580	100%	151,220	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Work or related	25,310	72%	3,910	46%	4,740	16%
School	5,870	17%	1,940	23%	13,930	47%
Shopping	240	1%	240	3%	840	3%
Leisure	470	1%	400	5%	1,190	4%
Medical	560	2%	310	4%	230	1%
Pick-up / drive passenger	1,780	5%	550	7%	4,540	15%
Return Home	210	1%	710	8%	2,160	7%
Other	630	2%	400	5%	2,280	8%
Total:	35,070	100%	8,460	100%	29,910	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Work or related	970	8%	370	1%	660	2%
School	420	3%	10	0%	30	0%
Shopping	1,090	9%	1,910	5%	4,480	13%
Leisure	2,110	17%	1,300	4%	3,470	10%
Medical	250	2%	520	1%	470	1%
Pick-up / drive passenger	1,220	10%	2,850	8%	3,080	9%
Return Home	5,530	46%	26,920	77%	20,320	60%
Other	470	4%	870	3%	1,190	4%
Total:	12,060	100%	34,750	100%	33,700	100%

Peak Period (%)	Total:	% of 24 Hours	Within District (%)
24 Hours	340,780		44%
AM Peak Period	73,440	22%	41%
PM Peak Period	80,510	24%	42%

### Trips by Primary Travel Mode

24 Hours	From District		To District		Within District	
Auto Driver	57,110	60%	57,360	61%	82,890	55%
Auto Passenger	14,260	15%	13,790	15%	30,320	20%
Transit	21,040	22%	20,690	22%	6,650	4%
Bicycle	400	0%	400	0%	1,600	1%
Walk	70	0%	30	0%	18,160	12%
Other	2,110	2%	2,320	2%	11,590	8%
Total:	94,990	100%	94,590	100%	151,210	100%

AM Peak (06:30 - 08:59)	From District		To District		Within District	
Auto Driver	19,140	55%	5,160	61%	11,450	38%
Auto Passenger	2,970	8%	1,080	13%	5,840	20%
Transit	12,140	35%	870	10%	2,170	7%
Bicycle	230	1%	0	0%	490	2%
Walk	30	0%	10	0%	4,780	16%
Other	550	2%	1,340	16%	5,170	17%
Total:	35,060	100%	8,460	100%	29,900	100%

PM Peak (15:30 - 17:59)	From District		To District		Within District	
Auto Driver	7,680	64%	19,440	56%	18,250	54%
Auto Passenger	2,580	21%	3,680	11%	7,810	23%
Transit	1,420	12%	11,050	32%	1,130	3%
Bicycle	0	0%	230	1%	380	1%
Walk	0	0%	20	0%	3,660	11%
Other	380	3%	320	1%	2,460	7%
Total:	12,060	100%	34,740	100%	33,690	100%

Avg Vehicle Occupancy	From District		To District		Within District	
24 Hours	1.25		1.24		1.37	
AM Peak Period	1.16		1.21		1.51	
PM Peak Period	1.34		1.19		1.43	

Transit Modal Split	From District		To District		Within District	
24 Hours	23%		23%		6%	
AM Peak Period	35%		12%		11%	
PM Peak Period	12%		32%		4%	

## Appendix F – TDM Checklist

---

## TDM-Supportive Development Design and Infrastructure Checklist: *Residential Developments (multi-family or condominium)*

Legend	
<b>REQUIRED</b>	The Official Plan or Zoning By-law provides related guidance that must be followed
<b>BASIC</b>	The measure is generally feasible and effective, and in most cases would benefit the development and its users
<b>BETTER</b>	The measure could maximize support for users of sustainable modes, and optimize development performance

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>1. WALKING &amp; CYCLING: ROUTES</b>		
<b>1.1 Building location &amp; access points</b>		
<b>BASIC</b>	1.1.1 Locate building close to the street, and do not locate parking areas between the street and building entrances	<input checked="" type="checkbox"/>
<b>BASIC</b>	1.1.2 Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	<input checked="" type="checkbox"/> - DEEP SITE, FRONT HAS DIRECT ACCESS.
<b>BASIC</b>	1.1.3 Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	<input checked="" type="checkbox"/>
<b>1.2 Facilities for walking &amp; cycling</b>		
<b>REQUIRED</b>	1.2.1 Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations (see <i>Official Plan policy 4.3.3</i> )	<input type="checkbox"/>
<b>REQUIRED</b>	1.2.2 Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible (see <i>Official Plan policy 4.3.12</i> )	<input checked="" type="checkbox"/>

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3 Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks (see <i>Official Plan policy 4.3.10</i> )	<input checked="" type="checkbox"/>
REQUIRED	1.2.4 Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps (see <i>Official Plan policy 4.3.10</i> )	<input checked="" type="checkbox"/>
REQUIRED	1.2.5 Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians (see <i>Official Plan policy 4.3.11</i> )	<input type="checkbox"/>
BASIC	1.2.6 Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	<input checked="" type="checkbox"/>
BASIC	1.2.7 Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	<input type="checkbox"/>
BASIC	1.2.8 Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	<input type="checkbox"/>
<b>1.3 Amenities for walking &amp; cycling</b>		
BASIC	1.3.1 Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	<input type="checkbox"/>
BASIC	1.3.2 Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	<input type="checkbox"/>



TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>2. WALKING &amp; CYCLING: END-OF-TRIP FACILITIES</b>		
<b>2.1 Bicycle parking</b>		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see <i>Official Plan</i> policy 4.3.6)	<input checked="" type="checkbox"/> - PADS TO BE LIT, BUT NOT COVERED.
REQUIRED	2.1.2 Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see <i>Zoning By-law</i> Section 111)	<input checked="" type="checkbox"/>
REQUIRED	2.1.3 Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see <i>Zoning By-law</i> Section 111)	<input checked="" type="checkbox"/>
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	<input checked="" type="checkbox"/>
<b>2.2 Secure bicycle parking</b>		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see <i>Zoning By-law</i> Section 111)	<input type="checkbox"/>
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	<input type="checkbox"/>
<b>2.3 Bicycle repair station</b>		
BETTER	2.3.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input type="checkbox"/>
<b>3. TRANSIT</b>		
<b>3.1 Customer amenities</b>		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	<input type="checkbox"/>
BASIC	3.1.2 Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	<input type="checkbox"/>
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	<input type="checkbox"/>

TDM-supportive design & infrastructure measures: <i>Residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>4. RIDESHARING</b>		
<b>4.1 Pick-up &amp; drop-off facilities</b>		
<b>BASIC</b>	4.1.1 Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	<input type="checkbox"/>
<b>5. CARSHARING &amp; BIKESHARING</b>		
<b>5.1 Carshare parking spaces</b>		
<b>BETTER</b>	5.1.1 Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses ( <i>see Zoning By-law Section 94</i> )	<input type="checkbox"/>
<b>5.2 Bikeshare station location</b>		
<b>BETTER</b>	5.2.1 Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	<input type="checkbox"/>
<b>6. PARKING</b>		
<b>6.1 Number of parking spaces</b>		
<b>REQUIRED</b>	6.1.1 Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	<input type="checkbox"/>
<b>BASIC</b>	6.1.2 Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking	<input type="checkbox"/>
<b>BASIC</b>	6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly ( <i>see Zoning By-law Section 104</i> )	<input type="checkbox"/>
<b>BETTER</b>	6.1.4 Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/>
<b>6.2 Separate long-term &amp; short-term parking areas</b>		
<b>BETTER</b>	6.2.1 Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice versa)	<input type="checkbox"/>

TDM measures: <i>Residential developments</i>		Check if proposed & add descriptions
<b>3. TRANSIT</b>		
<b>3.1 Transit information</b>		
BASIC	3.1.1 Display relevant transit schedules and route maps at entrances ( <i>multi-family, condominium</i> )	<input type="checkbox"/>
BETTER	3.1.2 Provide real-time arrival information display at entrances ( <i>multi-family, condominium</i> )	<input type="checkbox"/>
<b>3.2 Transit fare incentives</b>		
BASIC	★ 3.2.1 Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	<input type="checkbox"/>
BETTER	3.2.2 Offer at least one year of free monthly transit passes on residence purchase/move-in	<input type="checkbox"/>
<b>3.3 Enhanced public transit service</b>		
BETTER	★ 3.3.1 Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels ( <i>subdivision</i> )	<input type="checkbox"/>
<b>3.4 Private transit service</b>		
BETTER	3.4.1 Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	<input type="checkbox"/>
<b>4. CARSHARING &amp; BIKESHARING</b>		
<b>4.1 Bikeshare stations &amp; memberships</b>		
BETTER	4.1.1 Contract with provider to install on-site bikeshare station ( <i>multi-family</i> )	<input type="checkbox"/>
BETTER	4.1.2 Provide residents with bikeshare memberships, either free or subsidized ( <i>multi-family</i> )	<input type="checkbox"/>
<b>4.2 Carshare vehicles &amp; memberships</b>		
BETTER	4.2.1 Contract with provider to install on-site carshare vehicles and promote their use by residents	<input type="checkbox"/>
BETTER	4.2.2 Provide residents with carshare memberships, either free or subsidized	<input type="checkbox"/>
<b>5. PARKING</b>		
<b>5.1 Priced parking</b>		
BASIC	★ 5.1.1 Unbundle parking cost from purchase price ( <i>condominium</i> )	<input type="checkbox"/>
BASIC	★ 5.1.2 Unbundle parking cost from monthly rent ( <i>multi-family</i> )	<input type="checkbox"/>



**TDM Measures Checklist:**  
*Residential Developments (multi-family, condominium or subdivision)*

<b>Legend</b>	
<b>BASIC</b>	The measure is generally feasible and effective, and in most cases would benefit the development and its users
<b>BETTER</b>	The measure could maximize support for users of sustainable modes, and optimize development performance
<b>★</b>	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

<b>TDM measures: Residential developments</b>		<b>Check if proposed &amp; add descriptions</b>
<b>1. TDM PROGRAM MANAGEMENT</b>		
<b>1.1 Program coordinator</b>		
<b>BASIC ★</b>	1.1.1 Designate an internal coordinator, or contract with an external coordinator	<input type="checkbox"/>
<b>1.2 Travel surveys</b>		
<b>BETTER</b>	1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	<input type="checkbox"/>
<b>2. WALKING AND CYCLING</b>		
<b>2.1 Information on walking/cycling routes &amp; destinations</b>		
<b>BASIC</b>	2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances <i>(multi-family, condominium)</i>	<input type="checkbox"/>
<b>2.2 Bicycle skills training</b>		
<b>BETTER</b>	2.2.1 Offer on-site cycling courses for residents, or subsidize off-site courses	<input type="checkbox"/>

TDM measures: <i>Residential developments</i>		Check if proposed & add descriptions
<b>6. TDM MARKETING &amp; COMMUNICATIONS</b>		
<b>6.1 Multimodal travel information</b>		
<b>BASIC</b>	★ 6.1.1 Provide a multimodal travel option information package to new residents	<input type="checkbox"/>
<b>6.2 Personalized trip planning</b>		
<b>BETTER</b>	★ 6.2.1 Offer personalized trip planning to new residents	<input type="checkbox"/>


























## Appendix G – Intersection Capacity Analysis

---













4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	317	15	21	52	31	126	18	1081	3	133	506	68
Future Volume (vph)	317	15	21	52	31	126	18	1081	3	133	506	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		165.0	60.0		60.0	200.0		0.0	60.0		170.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.913				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1629	0	1695	1784	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.736			0.732			0.389			0.053		
Satd. Flow (perm)	1313	1629	0	1306	1784	1517	694	1784	1517	95	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				97			31			72
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		375.9			397.5			119.0			390.9	
Travel Time (s)		27.1			28.6			6.1			20.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	334	16	22	55	33	133	19	1138	3	140	533	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	334	38	0	55	33	133	19	1138	3	140	533	72
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	4	4		8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.4	24.4		24.4	24.4	24.4	36.2	36.2	36.2	36.2	36.2	36.2
Total Split (s)	39.0	39.0		39.0	39.0	39.0	81.0	81.0	81.0	81.0	81.0	81.0
Total Split (%)	32.5%	32.5%		32.5%	32.5%	32.5%	67.5%	67.5%	67.5%	67.5%	67.5%	67.5%
Maximum Green (s)	32.6	32.6		32.6	32.6	32.6	74.8	74.8	74.8	74.8	74.8	74.8
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	3.1	3.1		3.1	3.1	3.1	1.6	1.6	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4		6.4	6.4	6.4	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0	0	0	0
Act Effect Green (s)	31.8	31.8		31.8	31.8	31.8	75.6	75.6	75.6	75.6	75.6	75.6
Actuated g/C Ratio	0.26	0.26		0.26	0.26	0.26	0.63	0.63	0.63	0.63	0.63	0.63
v/c Ratio	0.96	0.09		0.16	0.07	0.28	0.04	1.01	0.00	2.33	0.47	0.07
Control Delay	83.8	18.7		34.9	33.1	13.0	10.6	45.0	0.0	669.8	7.8	0.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.8	18.7		34.9	33.1	13.0	10.6	45.0	0.0	669.8	7.8	0.6

4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	B		C	C	B	B	D	A	F	A	A
Approach Delay		77.2			21.4			44.4			131.5	
Approach LOS		E			C			D			F	
Queue Length 50th (m)	71.0	2.6		9.1	5.3	5.8	0.7	~260.2	0.0	~50.7	20.3	0.0
Queue Length 95th (m)	#122.2	10.4		19.0	12.7	20.0	m3.0	#333.9	m0.0	#86.8	25.7	1.2
Internal Link Dist (m)		351.9			373.5			95.0			366.9	
Turn Bay Length (m)	60.0			60.0		60.0	200.0			60.0		170.0
Base Capacity (vph)	356	458		354	484	482	437	1124	967	60	1124	982
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.08		0.16	0.07	0.28	0.04	1.01	0.00	2.33	0.47	0.07

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 79 (66%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.33

Intersection Signal Delay: 73.2

Intersection LOS: E

Intersection Capacity Utilization 109.3%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 4: Bank Street & Findlay Creek Drive















5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	7	97	0	52	182	996	6	135	421	24
Future Volume (vph)	2	0	7	97	0	52	182	996	6	135	421	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		180.0	0.0		0.0	200.0		0.0	60.0		85.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1783	0	1695	1784	1517
Flt Permitted	0.721			0.753			0.492			0.190		
Satd. Flow (perm)	1286	1517	0	1344	1517	0	878	1783	0	339	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		509			172			1				30
Link Speed (k/h)		50			50			70				70
Link Distance (m)		378.7			410.7			490.5				191.8
Travel Time (s)		27.3			29.6			25.2				9.9
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	0	7	102	0	55	192	1048	6	142	443	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	7	0	102	55	0	192	1054	0	142	443	25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	24.3	24.3		24.3	24.3		24.2	24.2		24.2	24.2	24.2
Total Split (s)	24.3	24.3		24.3	24.3		95.7	95.7		95.7	95.7	95.7
Total Split (%)	20.3%	20.3%		20.3%	20.3%		79.8%	79.8%		79.8%	79.8%	79.8%
Maximum Green (s)	18.0	18.0		18.0	18.0		89.5	89.5		89.5	89.5	89.5
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	14.2	14.2		14.2	14.2		93.3	93.3		93.3	93.3	93.3
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.78	0.78		0.78	0.78	0.78
v/c Ratio	0.01	0.01		0.64	0.17		0.28	0.76		0.54	0.32	0.02
Control Delay	44.5	0.0		68.2	1.1		4.0	9.4		15.1	4.2	1.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	44.5	0.0		68.2	1.1		4.0	9.4		15.1	4.2	1.1

5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A		E	A		A	A		B	A	A
Approach Delay		9.9			44.7			8.6			6.6	
Approach LOS		A			D			A			A	
Queue Length 50th (m)	0.4	0.0		21.4	0.0		8.5	63.6		4.9	15.0	0.2
Queue Length 95th (m)	2.7	0.0		37.3	0.0		m13.9	182.7		45.2	64.0	m2.1
Internal Link Dist (m)		354.7			386.7			466.5			167.8	
Turn Bay Length (m)							200.0			60.0		85.0
Base Capacity (vph)	192	660		201	373		682	1386		263	1386	1185
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.01	0.01		0.51	0.15		0.28	0.76		0.54	0.32	0.02

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 112 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 10.8

Intersection LOS: B


Intersection Capacity Utilization 92.0%

ICU Level of Service F

Analysis Period (min) 15

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




Splits and Phases: 5: Bank Street & Findlay Creek Centre/Shuttleworth Drive

								
Ø2 (R)						Ø4		
95.7 s						24.3 s		
								
Ø6 (R)						Ø8		
95.7 s						24.3 s		

























8: Bank Street & Right-In/Right-Out Access  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
AM Peak Hour

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	39	1063	1	0	579
Future Vol, veh/h	0	39	1063	1	0	579
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	41	1119	1	0	609
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	1120	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	251	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	251	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	22.1	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt		NBT	NBRWBLn1	SBT		
Capacity (veh/h)		-	-	251	-	
HCM Lane V/C Ratio		-	-	0.164	-	
HCM Control Delay (s)		-	-	22.1	-	
HCM Lane LOS		-	-	C	-	
HCM 95th %tile Q(veh)		-	-	0.6	-	













4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	34	34	100	24	97	28	814	3	252	1148	350
Future Volume (vph)	192	34	34	100	24	97	28	814	3	252	1148	350
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		0.0	60.0		60.0	200.0		0.0	60.0		170.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925				0.850		0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1650	0	1695	1784	1517	1695	1783	0	1695	1784	1517
Flt Permitted	0.741			0.710			0.068			0.245		
Satd. Flow (perm)	1322	1650	0	1267	1784	1517	121	1783	0	437	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36				102						368
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		375.9			397.5			119.0			390.9	
Travel Time (s)		27.1			28.6			6.1			20.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	202	36	36	105	25	102	29	857	3	265	1208	368
Shared Lane Traffic (%)												
Lane Group Flow (vph)	202	72	0	105	25	102	29	860	0	265	1208	368
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	15.9	15.9		23.9	23.9	23.9	36.2	36.2		36.2	36.2	36.2
Total Split (s)	30.0	30.0		30.0	30.0	30.0	90.0	90.0		90.0	90.0	90.0
Total Split (%)	25.0%	25.0%		25.0%	25.0%	25.0%	75.0%	75.0%		75.0%	75.0%	75.0%
Maximum Green (s)	24.1	24.1		24.1	24.1	24.1	83.8	83.8		83.8	83.8	83.8
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.6	2.6		2.6	2.6	2.6	1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9		5.9	5.9	5.9	6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)				11.0	11.0	11.0	23.0	23.0		23.0	23.0	23.0
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	0
Act Effect Green (s)	21.6	21.6		21.6	21.6	21.6	86.3	86.3		86.3	86.3	86.3
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.18	0.72	0.72		0.72	0.72	0.72
v/c Ratio	0.85	0.22		0.46	0.08	0.29	0.33	0.67		0.84	0.94	0.31
Control Delay	77.4	24.3		50.2	40.0	9.8	11.7	5.0		16.3	13.6	0.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	77.4	24.3		50.2	40.0	9.8	11.7	5.0		16.3	13.6	0.3

4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	C		D	D	A	B	A		B	B	A
Approach Delay		63.4			31.3			5.2			11.3	
Approach LOS		E			C			A			B	
Queue Length 50th (m)	41.7	6.4		20.0	4.4	0.0	0.6	18.4		19.7	136.0	0.9
Queue Length 95th (m)	#74.1	18.0		35.9	11.4	13.2	m1.6	33.9		m8.0	m47.8	m0.0
Internal Link Dist (m)		351.9			373.5			95.0			366.9	
Turn Bay Length (m)	60.0			60.0		60.0	200.0			60.0		170.0
Base Capacity (vph)	265	360		254	358	386	87	1282		314	1282	1194
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.76	0.20		0.41	0.07	0.26	0.33	0.67		0.84	0.94	0.31

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 16 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 15.5

Intersection LOS: B

Intersection Capacity Utilization 105.3%

ICU Level of Service G

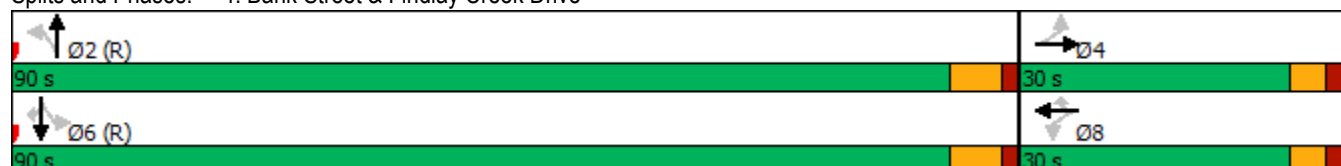
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 4: Bank Street & Findlay Creek Drive



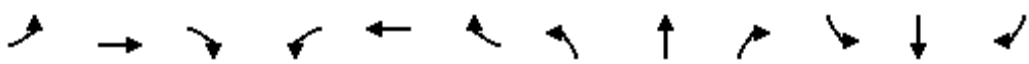
5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	188	165	0	37	123	727	13	257	986	39
Future Volume (vph)	20	0	188	165	0	37	123	727	13	257	986	39
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		180.0	0.0		0.0	200.0		0.0	60.0		85.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1779	0	1695	1784	1517
Flt Permitted	0.732			0.500			0.129			0.268		
Satd. Flow (perm)	1306	1517	0	892	1517	0	230	1779	0	478	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		132			234			2				41
Link Speed (k/h)		50			50			70				70
Link Distance (m)		378.7			410.7			490.5				191.8
Travel Time (s)		27.3			29.6			25.2				9.9
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	0	198	174	0	39	129	765	14	271	1038	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	198	0	174	39	0	129	779	0	271	1038	41
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.3	28.3		24.3	24.3		16.4	16.4		30.4	30.4	30.4
Total Split (s)	36.0	36.0		36.0	36.0		84.0	84.0		84.0	84.0	84.0
Total Split (%)	30.0%	30.0%		30.0%	30.0%		70.0%	70.0%		70.0%	70.0%	70.0%
Maximum Green (s)	29.7	29.7		29.7	29.7		77.8	77.8		77.8	77.8	77.8
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0					7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		11.0	11.0					17.0	17.0	17.0
Pedestrian Calls (#/hr)	0	0		0	0					0	0	0
Act Effect Green (s)	25.5	25.5		25.5	25.5		82.0	82.0		82.0	82.0	82.0
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.68	0.68		0.68	0.68	0.68
v/c Ratio	0.08	0.46		0.92	0.08		0.82	0.64		0.83	0.85	0.04
Control Delay	36.1	17.5		93.4	0.3		54.9	14.8		26.2	16.8	3.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	36.1	17.5		93.4	0.3		54.9	14.8		26.2	16.8	3.2

5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	B		F	A		D	B		C	B	A
Approach Delay		19.3			76.3			20.5			18.3	
Approach LOS		B			E			C			B	
Queue Length 50th (m)	3.6	11.5		36.1	0.0		26.2	115.6		21.1	81.2	0.3
Queue Length 95th (m)	9.6	30.8		#69.3	0.0		m#52.3	135.8		m34.6	m133.2	m0.7
Internal Link Dist (m)		354.7			386.7			466.5			167.8	
Turn Bay Length (m)							200.0			60.0		85.0
Base Capacity (vph)	323	474		220	551		157	1216		326	1218	1049
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.07	0.42		0.79	0.07		0.82	0.64		0.83	0.85	0.04

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 14 (12%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 23.7

Intersection LOS: C

Intersection Capacity Utilization 105.9%

ICU Level of Service G

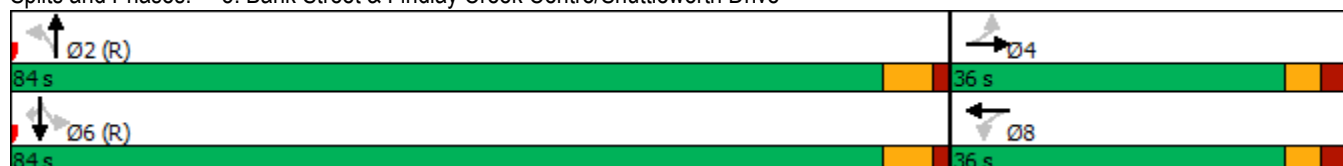
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.




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

Splits and Phases: 5: Bank Street & Findlay Creek Centre/Shuttleworth Drive



8: Bank Street & Right-In/Right-Out Access  
Cowan's Grove Mid-Density Residential Block

Future (2022) Total Traffic  
PM Peak Hour
























Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	34	811	2	0	1282
Future Vol, veh/h	0	34	811	2	0	1282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	36	854	2	0	1349
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	855	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	358	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	358	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	16.2	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	-		358	-	
HCM Lane V/C Ratio	-	-		0.1	-	
HCM Control Delay (s)	-	-		16.2	-	
HCM Lane LOS	-	-		C	-	
HCM 95th %tile Q(veh)	-	-		0.3	-	

#### 4: Bank Street & Findlay Creek Drive

#### Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)













Future (2025) Total Traffic

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	317	15	21	52	31	126	18	1081	3	133	506	68
Future Volume (vph)	317	15	21	52	31	126	18	1081	3	133	506	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		165.0	60.0		60.0	200.0		0.0	60.0		170.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.913				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1629	0	1695	1784	1517	1695	1784	1517	1695	1784	1517
Flt Permitted	0.736			0.732			0.389			0.053		
Satd. Flow (perm)	1313	1629	0	1306	1784	1517	694	1784	1517	95	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				97			31			72
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		375.9			397.5			120.0			390.9	
Travel Time (s)		27.1			28.6			6.2			20.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	334	16	22	55	33	133	19	1138	3	140	533	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	334	38	0	55	33	133	19	1138	3	140	533	72
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	4	4		8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	24.4	24.4		24.4	24.4	24.4	36.2	36.2	36.2	36.2	36.2	36.2
Total Split (s)	39.0	39.0		39.0	39.0	39.0	81.0	81.0	81.0	81.0	81.0	81.0
Total Split (%)	32.5%	32.5%		32.5%	32.5%	32.5%	67.5%	67.5%	67.5%	67.5%	67.5%	67.5%
Maximum Green (s)	32.6	32.6		32.6	32.6	32.6	74.8	74.8	74.8	74.8	74.8	74.8
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	3.1	3.1		3.1	3.1	3.1	1.6	1.6	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4		6.4	6.4	6.4	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0	0	0	0
Act Effect Green (s)	31.9	31.9		31.9	31.9	31.9	75.5	75.5	75.5	75.5	75.5	75.5
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.27	0.63	0.63	0.63	0.63	0.63	0.63
v/c Ratio	0.96	0.08		0.16	0.07	0.28	0.04	1.01	0.00	2.37	0.48	0.07
Control Delay	82.6	18.7		34.8	33.1	13.0	11.6	47.1	0.0	671.3	7.6	1.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.6	18.7		34.8	33.1	13.0	11.6	47.1	0.0	671.3	7.6	1.0

4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)

Future (2025) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	B		C	C	B	B	D	A	F	A	A
Approach Delay		76.1			21.4			46.4			131.7	
Approach LOS		E			C			D			F	
Queue Length 50th (m)	71.0	2.6		9.1	5.3	5.8	1.3	~260.0	0.0	~50.5	17.6	0.0
Queue Length 95th (m)	#122.2	10.4		19.0	12.7	20.0	m3.0	#333.6	m0.0	#86.6	28.1	2.4
Internal Link Dist (m)		351.9			373.5			96.0			366.9	
Turn Bay Length (m)	60.0			60.0		60.0	200.0			60.0		170.0
Base Capacity (vph)	356	458		354	484	482	436	1122	965	59	1122	980
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.08		0.16	0.07	0.28	0.04	1.01	0.00	2.37	0.48	0.07

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 79 (66%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.37

Intersection Signal Delay: 74.1

Intersection LOS: E

Intersection Capacity Utilization 109.3%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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






















Splits and Phases: 4: Bank Street & Findlay Creek Drive

















5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)

Future (2025) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	7	97	0	52	182	996	6	135	421	24
Future Volume (vph)	2	0	7	97	0	52	182	996	6	135	421	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		180.0	0.0		0.0	200.0		0.0	60.0		85.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1783	0	1695	1784	1517
Flt Permitted	0.721			0.753			0.492			0.190		
Satd. Flow (perm)	1286	1517	0	1344	1517	0	878	1783	0	339	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		509			172			1				30
Link Speed (k/h)		50			50			70				70
Link Distance (m)		378.7			410.7			490.5				190.8
Travel Time (s)		27.3			29.6			25.2				9.8
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	0	7	102	0	55	192	1048	6	142	443	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	7	0	102	55	0	192	1054	0	142	443	25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	24.3	24.3		24.3	24.3		24.2	24.2		24.2	24.2	24.2
Total Split (s)	24.3	24.3		24.3	24.3		95.7	95.7		95.7	95.7	95.7
Total Split (%)	20.3%	20.3%		20.3%	20.3%		79.8%	79.8%		79.8%	79.8%	79.8%
Maximum Green (s)	18.0	18.0		18.0	18.0		89.5	89.5		89.5	89.5	89.5
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	14.2	14.2		14.2	14.2		93.3	93.3		93.3	93.3	93.3
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.78	0.78		0.78	0.78	0.78
v/c Ratio	0.01	0.01		0.64	0.17		0.28	0.76		0.54	0.32	0.02
Control Delay	44.5	0.0		68.2	1.1		3.5	8.0		15.4	4.4	1.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	44.5	0.0		68.2	1.1		3.5	8.0		15.4	4.4	1.1

5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)

Future (2025) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	A		E	A		A	A		B	A	A
Approach Delay		9.9			44.7			7.3			6.8	
Approach LOS		A			D			A			A	
Queue Length 50th (m)	0.4	0.0		21.4	0.0		4.2	45.5		4.9	15.0	0.2
Queue Length 95th (m)	2.7	0.0		37.3	0.0		m13.3	175.9		44.2	67.2	m2.1
Internal Link Dist (m)		354.7			386.7			466.5			166.8	
Turn Bay Length (m)							200.0			60.0		85.0
Base Capacity (vph)	192	660		201	373		682	1386		263	1386	1185
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.01	0.01		0.51	0.15		0.28	0.76		0.54	0.32	0.02

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 112 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 10.1

Intersection LOS: B


Intersection Capacity Utilization 92.0%

ICU Level of Service F

Analysis Period (min) 15




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

Splits and Phases: 5: Bank Street & Findlay Creek Centre/Shuttleworth Drive

					
Ø2 (R)			Ø4		
95.7 s			24.3 s		
					
Ø6 (R)			Ø8		
95.7 s			24.3 s		

8: Bank Street & Right-In/Right-Out Access  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)























Future (2025) Total Traffic  
AM Peak Hour

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	39	1063	1	0	579
Future Vol, veh/h	0	39	1063	1	0	579
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	41	1119	1	0	609
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	-	1120	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	251	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	251	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	22.1	0	0			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT			
Capacity (veh/h)	-	-	251	-		
HCM Lane V/C Ratio	-	-	0.164	-		
HCM Control Delay (s)	-	-	22.1	-		
HCM Lane LOS	-	-	C	-		
HCM 95th %tile Q(veh)	-	-	0.6	-		

4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)













Future (2025) Total Traffic

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	34	34	100	24	97	28	814	3	252	1148	350
Future Volume (vph)	192	34	34	100	24	97	28	814	3	252	1148	350
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		0.0	60.0		60.0	200.0		0.0	60.0		170.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925				0.850		0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1650	0	1695	1784	1517	1695	1783	0	1695	1784	1517
Flt Permitted	0.741			0.710			0.067			0.245		
Satd. Flow (perm)	1322	1650	0	1267	1784	1517	120	1783	0	437	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36				102						368
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		375.9			397.5			121.0			390.9	
Travel Time (s)		27.1			28.6			6.2			20.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	202	36	36	105	25	102	29	857	3	265	1208	368
Shared Lane Traffic (%)												
Lane Group Flow (vph)	202	72	0	105	25	102	29	860	0	265	1208	368
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	15.9	15.9		23.9	23.9	23.9	36.2	36.2		36.2	36.2	36.2
Total Split (s)	30.0	30.0		30.0	30.0	30.0	90.0	90.0		90.0	90.0	90.0
Total Split (%)	25.0%	25.0%		25.0%	25.0%	25.0%	75.0%	75.0%		75.0%	75.0%	75.0%
Maximum Green (s)	24.1	24.1		24.1	24.1	24.1	83.8	83.8		83.8	83.8	83.8
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.6	2.6		2.6	2.6	2.6	1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.9	5.9		5.9	5.9	5.9	6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)				7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)				11.0	11.0	11.0	23.0	23.0		23.0	23.0	23.0
Pedestrian Calls (#/hr)				0	0	0	0	0		0	0	0
Act Effect Green (s)	21.7	21.7		21.7	21.7	21.7	86.2	86.2		86.2	86.2	86.2
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.18	0.72	0.72		0.72	0.72	0.72
v/c Ratio	0.85	0.22		0.46	0.08	0.29	0.34	0.67		0.84	0.94	0.31
Control Delay	77.1	24.3		50.1	40.0	9.8	12.4	5.6		9.9	9.0	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	77.1	24.3		50.1	40.0	9.8	12.4	5.6		9.9	9.0	0.2

4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)

Future (2025) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	C		D	D	A	B	A		A	A	A
Approach Delay		63.3			31.3			5.9			7.4	
Approach LOS		E			C			A			A	
Queue Length 50th (m)	41.7	6.4		20.0	4.4	0.0	0.6	17.8		15.8	115.4	1.0
Queue Length 95th (m)	#74.1	18.0		35.9	11.4	13.2	m1.6	33.0		m0.9	m5.6	m0.0
Internal Link Dist (m)		351.9			373.5			97.0			366.9	
Turn Bay Length (m)	60.0			60.0		60.0	200.0			60.0		170.0
Base Capacity (vph)	265	360		254	358	386	86	1281		314	1281	1193
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.76	0.20		0.41	0.07	0.26	0.34	0.67		0.84	0.94	0.31

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 16 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 13.4

Intersection LOS: B

Intersection Capacity Utilization 105.3%

ICU Level of Service G

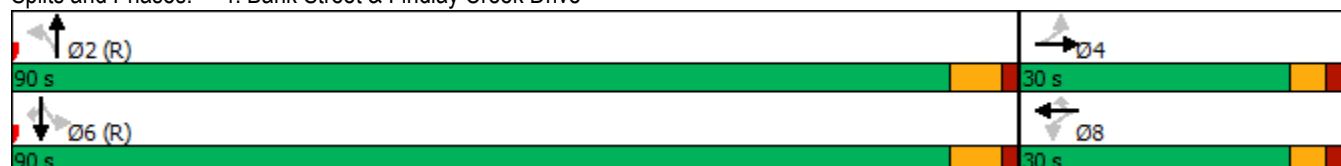
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 4: Bank Street & Findlay Creek Drive



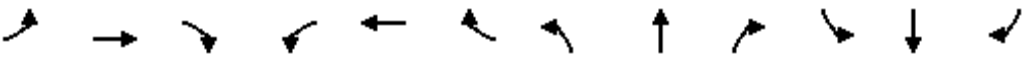
5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)

Future (2025) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	188	165	0	37	123	727	13	257	986	39
Future Volume (vph)	20	0	188	165	0	37	123	727	13	257	986	39
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		180.0	0.0		0.0	200.0		0.0	60.0		85.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1779	0	1695	1784	1517
Flt Permitted	0.732			0.500			0.129			0.268		
Satd. Flow (perm)	1306	1517	0	892	1517	0	230	1779	0	478	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		132			234			2				41
Link Speed (k/h)		50			50			70				70
Link Distance (m)		378.7			410.7			490.5				189.8
Travel Time (s)		27.3			29.6			25.2				9.8
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	0	198	174	0	39	129	765	14	271	1038	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	198	0	174	39	0	129	779	0	271	1038	41
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.3	28.3		24.3	24.3		16.4	16.4		30.4	30.4	30.4
Total Split (s)	36.0	36.0		36.0	36.0		84.0	84.0		84.0	84.0	84.0
Total Split (%)	30.0%	30.0%		30.0%	30.0%		70.0%	70.0%		70.0%	70.0%	70.0%
Maximum Green (s)	29.7	29.7		29.7	29.7		77.8	77.8		77.8	77.8	77.8
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0					7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		11.0	11.0					17.0	17.0	17.0
Pedestrian Calls (#/hr)	0	0		0	0					0	0	0
Act Effect Green (s)	25.5	25.5		25.5	25.5		82.0	82.0		82.0	82.0	82.0
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.68	0.68		0.68	0.68	0.68
v/c Ratio	0.08	0.46		0.92	0.08		0.82	0.64		0.83	0.85	0.04
Control Delay	36.1	17.5		93.4	0.3		49.9	12.2		25.8	16.3	3.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	36.1	17.5		93.4	0.3		49.9	12.2		25.8	16.3	3.1

5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)

Future (2025) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	B		F	A		D	B		C	B	A
Approach Delay		19.3			76.3			17.5			17.8	
Approach LOS		B			E			B			B	
Queue Length 50th (m)	3.6	11.5		36.1	0.0		21.6	101.9		21.2	81.2	0.3
Queue Length 95th (m)	9.6	30.8		#69.3	0.0		m#49.1	m134.3		m34.4	m132.8	m0.8
Internal Link Dist (m)		354.7			386.7			466.5			165.8	
Turn Bay Length (m)							200.0			60.0		85.0
Base Capacity (vph)	323	474		220	551		157	1216		326	1218	1049
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.07	0.42		0.79	0.07		0.82	0.64		0.83	0.85	0.04

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 14 (12%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 22.5

Intersection LOS: C

Intersection Capacity Utilization 105.9%

ICU Level of Service G

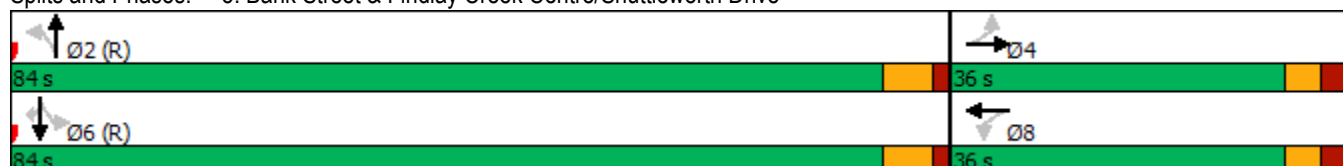
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.




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

Splits and Phases: 5: Bank Street & Findlay Creek Centre/Shuttleworth Drive



8: Bank Street & Right-In/Right-Out Access  
Cowan's Grove Mid-Density Residential Block (Two-Lane Bank Street)

Future (2025) Total Traffic  
PM Peak Hour

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	34	811	2	0	1282
Future Vol, veh/h	0	34	811	2	0	1282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	36	854	2	0	1349
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	855	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	358	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	358	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	16.2	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	- 358		-		
HCM Lane V/C Ratio	-	- 0.1		-		
HCM Control Delay (s)	-	- 16.2		-		
HCM Lane LOS	-	- C		-		
HCM 95th %tile Q(veh)	-	- 0.3		-		


























#### 4: Bank Street & Findlay Creek Drive

Future (2025) Total Traffic













#### Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	317	15	21	52	31	126	18	1081	3	133	506	68
Future Volume (vph)	317	15	21	52	31	126	18	1081	3	133	506	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		0.0	60.0		60.0	200.0		0.0	230.0		240.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.913				0.850						0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1629	0	1695	1784	1517	1695	3390	0	1695	3390	1517
Flt Permitted	0.736			0.732			0.446			0.186		
Satd. Flow (perm)	1313	1629	0	1306	1784	1517	796	3390	0	332	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22				68						72
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		375.9			397.5			119.0			390.9	
Travel Time (s)		27.1			28.6			6.1			20.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	334	16	22	55	33	133	19	1138	3	140	533	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	334	38	0	55	33	133	19	1141	0	140	533	72
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.4	28.4		28.4	28.4	28.4	36.2	36.2		36.6	36.6	36.6
Total Split (s)	34.6	34.6		34.6	34.6	34.6	55.4	55.4		55.4	55.4	55.4
Total Split (%)	38.4%	38.4%		38.4%	38.4%	38.4%	61.6%	61.6%		61.6%	61.6%	61.6%
Maximum Green (s)	28.2	28.2		28.2	28.2	28.2	49.2	49.2		49.2	49.2	49.2
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.1	3.1		3.1	3.1	3.1	1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4		6.4	6.4	6.4	6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0	15.0	23.0	23.0		23.0	23.0	23.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	0
Act Effect Green (s)	25.8	25.8		25.8	25.8	25.8	51.6	51.6		51.6	51.6	51.6
Actuated g/C Ratio	0.29	0.29		0.29	0.29	0.29	0.57	0.57		0.57	0.57	0.57
v/c Ratio	0.89	0.08		0.15	0.06	0.28	0.04	0.59		0.74	0.27	0.08
Control Delay	56.9	13.1		23.8	22.4	13.8	2.7	5.8		45.2	9.6	4.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	56.9	13.1		23.8	22.4	13.8	2.7	5.8		45.2	9.6	4.8

4: Bank Street & Findlay Creek Drive  
Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

Future (2025) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	B		C	C	B	A	A		D	A	A
Approach Delay		52.4			17.5			5.8			15.8	
Approach LOS		D			B			A			B	
Queue Length 50th (m)	48.6	1.8		6.2	3.7	7.4	0.8	47.4		9.9	19.6	1.0
Queue Length 95th (m)	#89.1	8.0		14.2	9.6	19.5	m0.5	33.4		#48.3	35.4	10.2
Internal Link Dist (m)		351.9			373.5			95.0			366.9	
Turn Bay Length (m)	60.0			60.0		60.0	200.0			230.0		240.0
Base Capacity (vph)	411	525		409	558	522	456	1944		190	1944	900
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.81	0.07		0.13	0.06	0.25	0.04	0.59		0.74	0.27	0.08

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 30 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 16.8

Intersection LOS: B

Intersection Capacity Utilization 80.8%

ICU Level of Service D

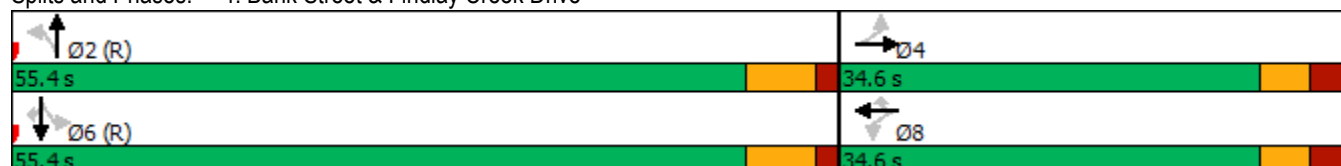
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 4: Bank Street & Findlay Creek Drive



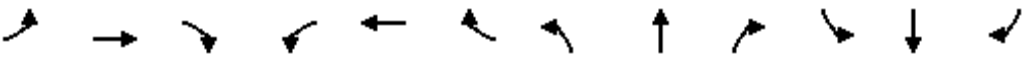
5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

Future (2025) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	7	97	0	52	182	996	6	135	421	24
Future Volume (vph)	2	0	7	97	0	52	182	996	6	135	421	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		0.0	60.0		0.0	165.0		0.0	60.0		85.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1783	0	1695	1784	1517
Flt Permitted	0.721			0.753			0.495			0.172		
Satd. Flow (perm)	1286	1517	0	1344	1517	0	883	1783	0	307	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		432			115			1				40
Link Speed (k/h)		50			50			70				70
Link Distance (m)		378.7			410.7			490.5				148.3
Travel Time (s)		27.3			29.6			25.2				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	0	7	102	0	55	192	1048	6	142	443	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	7	0	102	55	0	192	1054	0	142	443	25
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.3	28.3		28.3	28.3		24.2	24.2		24.2	24.2	24.2
Total Split (s)	28.3	28.3		28.3	28.3		61.7	61.7		61.7	61.7	61.7
Total Split (%)	31.4%	31.4%		31.4%	31.4%		68.6%	68.6%		68.6%	68.6%	68.6%
Maximum Green (s)	22.0	22.0		22.0	22.0		55.5	55.5		55.5	55.5	55.5
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.2	6.2		6.2	6.2	6.2
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	12.8	12.8		12.8	12.8		69.2	69.2		69.2	69.2	69.2
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.77	0.77		0.77	0.77	0.77
v/c Ratio	0.01	0.01		0.53	0.18		0.28	0.77		0.60	0.32	0.02
Control Delay	30.5	0.0		45.6	1.2		3.7	8.5		33.0	7.5	0.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	30.5	0.0		45.6	1.2		3.7	8.5		33.0	7.5	0.7

5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

Future (2025) Total Traffic  
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	A		D	A		A	A		C	A	A
Approach Delay		6.8			30.1			7.7			13.2	
Approach LOS		A			C			A			B	
Queue Length 50th (m)	0.3	0.0		15.4	0.0		6.6	49.0		18.1	38.3	0.3
Queue Length 95th (m)	2.0	0.0		27.9	0.5		m9.8 m#209.6			#38.2	58.0	0.0
Internal Link Dist (m)		354.7			386.7			466.5			124.3	
Turn Bay Length (m)	60.0			60.0			165.0			60.0		85.0
Base Capacity (vph)	314	697		328	457		679	1371		236	1371	1175
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.01	0.01		0.31	0.12		0.28	0.77		0.60	0.32	0.02

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 4 (4%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 11.1

Intersection LOS: B

Intersection Capacity Utilization 92.0%

ICU Level of Service F

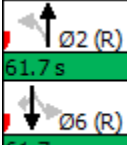
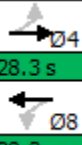
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.




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

Splits and Phases: 5: Bank Street & Findlay Creek Centre/Shuttleworth Drive

	
61.7 s	28.3 s
61.7 s	28.3 s

8: Bank Street & Right-In/Right-Out Access  
Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

Future (2025) Total Traffic  
AM Peak Hour
























Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	39	1063	1	0	579
Future Vol, veh/h	0	39	1063	1	0	579
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	41	1119	1	0	609
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	560	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	472	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	472	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	13.4	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	- 472		-		
HCM Lane V/C Ratio	-	- 0.087		-		
HCM Control Delay (s)	-	- 13.4		-		
HCM Lane LOS	-	- B		-		
HCM 95th %tile Q(veh)	-	- 0.3		-		

#### 4: Bank Street & Findlay Creek Drive

Future (2025) Total Traffic

#### Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

PM Peak Hour

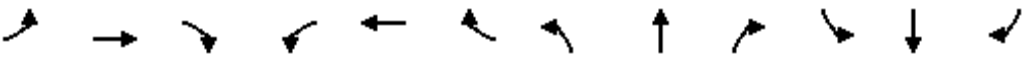
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	34	34	100	24	97	28	814	3	252	1148	350
Future Volume (vph)	192	34	34	100	24	97	28	814	3	252	1148	350
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		0.0	60.0		60.0	200.0		0.0	230.0		240.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.925				0.850		0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1650	0	1695	1784	1517	1695	3387	0	1695	3390	1517
Flt Permitted	0.741			0.710			0.198			0.309		
Satd. Flow (perm)	1322	1650	0	1267	1784	1517	353	3387	0	551	3390	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36				102		1				368
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		375.9			397.5			120.0			390.9	
Travel Time (s)		27.1			28.6			6.2			20.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	202	36	36	105	25	102	29	857	3	265	1208	368
Shared Lane Traffic (%)												
Lane Group Flow (vph)	202	72	0	105	25	102	29	860	0	265	1208	368
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	4	4		8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.4	28.4		28.4	28.4	28.4	36.6	36.6		36.6	36.6	36.6
Total Split (s)	32.0	32.0		32.0	32.0	32.0	88.0	88.0		88.0	88.0	88.0
Total Split (%)	26.7%	26.7%		26.7%	26.7%	26.7%	73.3%	73.3%		73.3%	73.3%	73.3%
Maximum Green (s)	25.6	25.6		25.6	25.6	25.6	81.4	81.4		81.4	81.4	81.4
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.1	3.1		3.1	3.1	3.1	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4		6.4	6.4	6.4	6.6	6.6		6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	C-Max	C-Max		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	15.0	15.0		15.0	15.0	15.0	23.0	23.0		23.0	23.0	23.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	0
Act Effect Green (s)	22.1	22.1		22.1	22.1	22.1	84.9	84.9		84.9	84.9	84.9
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.18	0.71	0.71		0.71	0.71	0.71
v/c Ratio	0.83	0.22		0.45	0.08	0.28	0.12	0.36		0.68	0.50	0.31
Control Delay	74.0	23.8		49.1	39.1	9.5	7.4	6.5		14.7	6.1	1.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	74.0	23.8		49.1	39.1	9.5	7.4	6.5		14.7	6.1	1.2

#### 4: Bank Street & Findlay Creek Drive

Future (2025) Total Traffic

#### Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	E	C		D	D	A	A	A		B	A	A
Approach Delay		60.8			30.6			6.5			6.4	
Approach LOS		E			C			A			A	
Queue Length 50th (m)	41.8	6.5		20.1	4.4	0.0	1.5	23.7		25.2	34.7	6.3
Queue Length 95th (m)	#70.4	17.7		35.4	11.2	13.0	m3.2	34.8		13.2	25.4	2.9
Internal Link Dist (m)		351.9			373.5			96.0			366.9	
Turn Bay Length (m)	60.0			60.0		60.0	200.0			230.0		240.0
Base Capacity (vph)	282	380		270	380	403	249	2397		390	2399	1181
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.72	0.19		0.39	0.07	0.25	0.12	0.36		0.68	0.50	0.31

#### Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 96 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 12.8

Intersection LOS: B

Intersection Capacity Utilization 76.1%

ICU Level of Service D

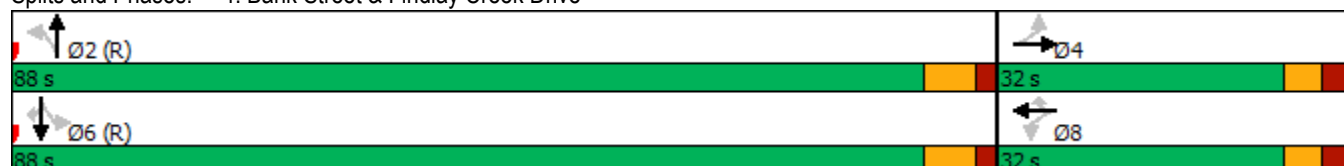
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

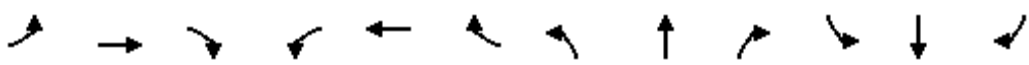









m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Bank Street & Findlay Creek Drive



5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

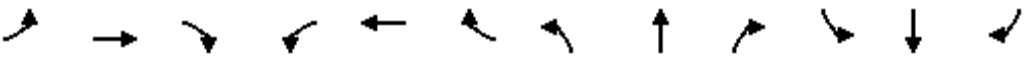
Future (2025) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	0	188	165	0	37	123	727	13	257	986	39
Future Volume (vph)	20	0	188	165	0	37	123	727	13	257	986	39
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	165.0		0.0	60.0		85.0
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.850			0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1695	1517	0	1695	1517	0	1695	1779	0	1695	1784	1517
Flt Permitted	0.732			0.503			0.126			0.266		
Satd. Flow (perm)	1306	1517	0	898	1517	0	225	1779	0	475	1784	1517
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109			204			1				39
Link Speed (k/h)		50			50			70				70
Link Distance (m)		378.7			410.7			490.5				148.3
Travel Time (s)		27.3			29.6			25.2				7.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	0	198	174	0	39	129	765	14	271	1038	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	198	0	174	39	0	129	779	0	271	1038	41
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	24.3	24.3		24.3	24.3		24.4	24.4		24.4	24.4	24.4
Total Split (s)	42.0	42.0		42.0	42.0		78.0	78.0		78.0	78.0	78.0
Total Split (%)	35.0%	35.0%		35.0%	35.0%		65.0%	65.0%		65.0%	65.0%	65.0%
Maximum Green (s)	35.7	35.7		35.7	35.7		71.6	71.6		71.6	71.6	71.6
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.4	6.4		6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	0
Act Effect Green (s)	25.9	25.9		25.9	25.9		81.4	81.4		81.4	81.4	81.4
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.68	0.68		0.68	0.68	0.68
v/c Ratio	0.07	0.48		0.90	0.08		0.85	0.65		0.84	0.86	0.04
Control Delay	34.1	20.8		87.7	0.3		54.0	11.4		34.1	18.4	1.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	34.1	20.8		87.7	0.3		54.0	11.4		34.1	18.4	1.5



5: Bank Street & Findlay Creek Centre/Shuttleworth Drive  
Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

Future (2025) Total Traffic  
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C		F	A		D	B		C	B	A
Approach Delay		22.1			71.7			17.4			21.0	
Approach LOS		C			E			B			C	
Queue Length 50th (m)	3.7	16.2		36.8	0.0		9.4	52.3		12.8	60.3	0.1
Queue Length 95th (m)	8.9	33.2		57.0	0.0		m#54.7	m138.3		#105.7	#298.2	m1.4
Internal Link Dist (m)		354.7			386.7			466.5			124.3	
Turn Bay Length (m)							165.0			60.0		85.0
Base Capacity (vph)	388	527		267	594		152	1207		322	1210	1041
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.05	0.38		0.65	0.07		0.85	0.65		0.84	0.86	0.04

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 109 (91%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 23.9

Intersection LOS: C

Intersection Capacity Utilization 106.2%

ICU Level of Service G

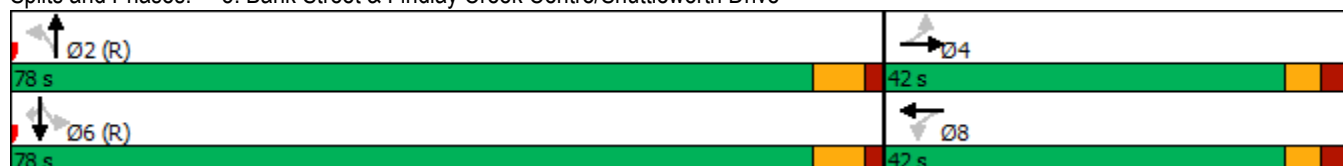
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.




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

Splits and Phases: 5: Bank Street & Findlay Creek Centre/Shuttleworth Drive



8: Bank Street & Right-In/Right-Out Access  
Cowan's Grove Mid-Density Residential Block (Four-Lane Bank Street)

Future (2025) Total Traffic  
PM Peak Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	34	811	2	0	1282
Future Vol, veh/h	0	34	811	2	0	1282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	36	854	2	0	1349
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	428	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	575	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	575	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	11.7	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	575		-		
HCM Lane V/C Ratio	-	0.062		-		
HCM Control Delay (s)	-	11.7		-		
HCM Lane LOS	-	B		-		
HCM 95th %tile Q(veh)	-	0.2		-		