East Urban Community (EUC)
Phase 3 Area Community Design Plan (CDP)

Master Transportation Study (MTS)

Presented to:

Fairouz Wahab, P. Eng.
Manager - Land Development
Richcraft | Group of Companies
2280 St. Laurent Blvd. Suite 201,
Ottawa, Ontario, K1G 4K1

DRAFT

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Castleglenn Consultants
Engineers, Project Managers & Planners

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1.0 INTRODUCTION

The Study Area for the East Urban Community (EUC) Phase 3 Area Community Design Plan (CDP) covers 220 hectares and is located south of Innes Rd., on the east and west sides of Mer Bleue Rd., in the south end of the community of Orléans. The study area is illustrated with a red overlay in Exhibit 1.1.

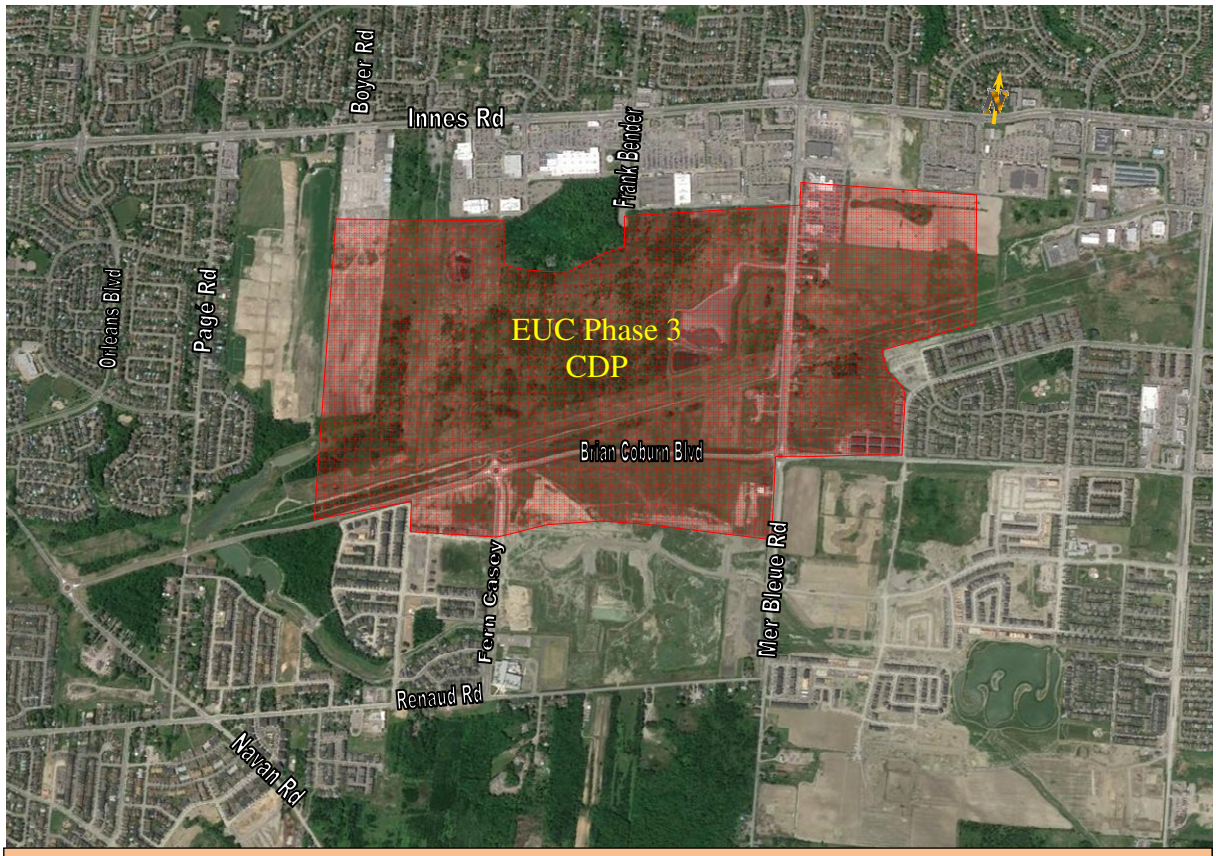


Exhibit 1.1: Community Design Plan – Study Area

To address appeals received by OPA 150, the City of Ottawa was ordered to undertake an Employment Lands Review (ELR) study, Land Evaluation and Area Review (LEAR) study and consider an extended development projection horizon to 2036. The ELR concluded that there was an oversupply of employment lands within the City and recommended the re-designation of some of the employment lands within the CDP from Employment Area to General Urban Area (west of Frank Bender St.) and Mixed-Use Centre to Urban Employment Area (north of the Hydro Corridor, largely west of Mer Bleue Rd.). The re-designation was implemented through OPA 180 and is reflected on Schedule B of the City's Official Plan.

A critical element in the CDP process was the integration of the planning process under the Official Plan with the Municipal Class Environmental Assessment (MCEA) process for proposed infrastructure projects. The integrated process provides an opportunity to coordinate the approval, review and public consultation of both the EA and the Planning Acts so the requirements of both are met.

The MCEA process recognizes the benefits of coordinating efforts under the Class EA and the Planning Act. Master Plans are defined in the Class EA as "long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles". Master Plans allow for an integrated process with other planning initiatives and provides streamlining opportunities for projects, which have some common elements such as geography or function. There are four (4) approaches that Master Plan can follow to accomplish the various phases of the Class EA process. The EUC Phase 3 Area Master Transportation Study (MTS) has followed Approach 4: Integrated under the Planning Act and was undertaken concurrently with the CDP to reflect interdependent decisions to benefit the overall community.

Two Class EA studies were initiated as part of this CDP: a Master Transportation Study (MTS) and a Master Servicing Study (MSS). These reports have been prepared in conjunction with the CDP for the lands within the study area.

The required Class EA environmental planning tasks generally include:

- Project need and opportunities;
- Existing conditions;
- Consultation with stakeholders;
- Evaluation of alternatives;
- Identification of effects and mitigation; and
- Documentation and completion of planning documents.

This report presents the methodology, findings and conclusions of the MTS for the EUC Phase 3 Area CDP.

2.0 POLICY AND REGULATORY FRAMEWORK

Several documents were referenced to provide direction and guidance on the transportation policy and framework to be applied to the development of the transportation network of the CDP.

2.1 TRANSPORTATION MASTER PLAN (TMP - 2013)

The City of Ottawa TMP is a guiding principle for planning and developing its transportation network over the next decade. The TMP emphasizes the integration of complete streets, updating modal share targets, advance strategies that improve and support non-auto mode means of transportation such as walking, cycling and transit.

The policies in the TMP will provide a basis for future projects that will remain flexible as priorities evolve over time. The TMP consists of infrastructure projects that are in the affordable network (i.e. projects prior to 2031) and concept network (i.e. post 2031 that are not within the City's budget). The various transportation projects outlined in the TMP relevant to the CDP study area were used as guidance to the study recommendations.

2.2 OTTAWA CYCLING PLAN (OCP - 2013)

The OCP provides guidance for planning, design, implementation and maintenance of cycling facilities within the City of Ottawa. The aim of the OCP is to create policies, facilities and programs that will make cycling an attractive mode of transportation within the City. The City of Ottawa implementation plan includes three phases of investment to 2031 in cycling related infrastructure.

The OCP encourages development of cycling facilities within new communities through the planning stages. Cycling facilities within the CDP area were incorporated as part of the collector roadway system, which provide connections to existing cycling facilities. The connected cycling network would encourage and support all skill level and ages of cyclists.

2.3 OTTAWA PEDESTRIAN PLAN (OPP - 2013)

The OPP is a planning document that provides guidance on how the City can become a vibrant and pedestrian friendly by creating an environment where walking is more attractive, safe and accessible. The desire of the OPP is to make new communities more walkable, connected and maximize opportunities for better walking facilities.

Sidewalks and Multi-use Pathways (MUPs) are planned within the CDP area to provide an environment that encourages walking between communities and employment areas. Grid pattern roads are planned for the CDP study area that encourages and reduces walking distances for pedestrians. The CDP pedestrian facilities also ensure that connectivity is provided to the existing pedestrian facilities.

2.4 BUILDING BETTER AND SMARTER SUBURBS (BBSS)

The City of Ottawa population is expected to increase by roughly 20% (from a 2013 population of 950,000 to approximately 1.15 million) by 2031 or roughly 11,100 persons annually. Aside from the intensification in existing communities, a significant portion of the population growth is expected to be in new suburban communities. As a result of this anticipated growth, the new communities are being designed to accommodate high quality transportation system supporting all modes of travel and a variety of housing types and sizes.

The City of Ottawa BBSS document aims to accomplish the following:

- Ensure that the new communities have a good subdivision design that consist of various land uses that are integrated with transportation planning;
- Accommodate complete streets that accommodate all users of transportation;
- Provide a variety of safe and reliable transportation options;
- Well designed and attractive suburbs that will create a sense of place and community; and
- Ensure infrastructure is designed, maintained and financially sustainable.

The design and planning of the CDP area aims to accomplish the BBSS objectives and goals.

2.5 COMPLETE STREETS

A complete street ensures that the right-of-way is designed to meet the needs of all users including pedestrians, cyclists, transit and motorists. Complete streets help create safe and livable communities by encouraging other modes of transportation such as walking, cycling and taking transit. The design of the transportation network within the CDP area ensured that it meets all modes of transportation by accommodating:

- Pedestrians through sidewalks and MUPs; with a grid pattern roadway design to reduce walking distances where possible;
- Cyclists through the provision of new MUPs and providing connections to existing cycling facilities;
- Transit routes and stops through the collector road system within the CDP area; and
- Motorists through developing local and collector roads and intersections that reduce travel speeds and encourage traffic flow (i.e. roundabouts).

2.6 TRANSIT-ORIENTED DEVELOPMENT (TOD) GUIDELINES (2007)

The TOD guidelines are applied to communities that are within 600m of a rapid transit stop or station. The Cumberland BRT (albeit beyond 2031) runs parallel to and north of the Brian Coburn

Blvd. within the CDP study area. Therefore, land uses north and south of the corridor would fall within the 600m radius of the rapid transit corridor. The TOD guidelines are as follows:

- Land uses – medium-to-high density residential, commercial, employment, institutional and mixed-use areas are planned in close proximity of the rapid transit corridor and stations (i.e. Fern Casey and Mer Bleue stations). The transit supportive land uses within the CDP area would encourage transit ridership in the future.
- Layout – providing a grid pattern roadway system within the CDP area would reduce the need to travel great distances to transit facilities and encourage more ridership.
- Built Form – creating "good design and places" around transit facilities will make for a more attractive public realm.
- Pedestrian and Cyclists – creating a safe and accessible walking and cycling experience would encourage the use of active modes to and from transit facilities. The CDP area incorporates sidewalks and MUP connections to future transit stations to encourage other modes of travel.
- Vehicles and Parking – reduce conflict between vehicle movements and pedestrians to encourage active modes of transportation. Initiatives such as shared parking arrangements can reduce parking requirements around transit stations.
- Streetscape and Environment – proper planning and design of the areas/path that lead to and from transit stations/facilities is an important element to create a positive experience for transit users.

2.7 BRIAN COBURN EXTENSION / CUMBERLAND TRANSITWAY WESTERLY ALTERNATE CORRIDOR ENVIRONMENTAL ASSESSMENT (EA) (2017 – UNDERWAY)

The EA for the Blackburn Hamlet Bypass Extension (BHBPE) / Cumberland Transitway was completed and approved in 1999. Part of the BHBPE segment (now called Brian Coburn Blvd.) has been built from Navan Road to east of Mer Bleue Road. However, the poor soil conditions in the vicinity and west of Navan Rd / Brian Coburn Blvd. increased the cost of construction significantly, making the previous approved project (1999) uneconomical. As a result, the City of Ottawa has initiated a new EA process to evaluate alternative alignments for Brian Coburn/Cumberland Transitway west of Navan Rd./Brian Coburn Blvd. Various alignments have been considered but a preferred alignment has not been selected. The EA study is also considering interim transit priority options.

3.0 CONSULTATION

Consultation is an integral part of both the Planning and Class Environmental Assessment (EA) processes. A Public Consultation Report (Morrison Hershfield, 2018) has been prepared outlining the process and meeting materials. Information is also available on the City of Ottawa

Website[1]. Consultation and the exchange of information was undertaken throughout the planning and assessment processes using a variety of methods, including meetings with the general public, regular meetings with the Core Project Team (CPT), consultation with approval agencies and the Ward Councilor. The project proceeded under the direction of the City of Ottawa and benefitted from the direct involvement and guidance of a Technical Advisory Committee (TAC) consisting of representatives from select government agencies, approval bodies and landowners. Table 3.1 lists key issues identified as part of the public consultation process.

Table 3.1: Key Project Issues

Topic	Comment
Transportation	• Concerned dead-ending both Renaud and Pagé Roads at Navan Rd. would eliminate direct access from Bradley Estates to the Mixed-Use Centre and existing retail along Innes Rd. • Would like the Brian Coburn extension to continue west of Navan Rd. and connect to Renaud Rd. rather than to the Blackburn Hamlet Bypass. • Would like safe and convenient pedestrian/bicycle access from the East Urban Community- Phase 1 to the commercial area. • Concerned with the existing condition of Mer Bleue Rd. and Renaud Rd. and the traffic associated with construction. Would like the Brian Coburn extension to Pagé /Navan Rd. to be completed sooner rather than later in order to alleviate traffic. • Would like a new park and ride in the area in order to alleviate the need to take express bus routes. • Concerned with cut through traffic along Renaud Rd. and connections to Innes[1]. • Upgrade Mer Bleue and Renaud Rd. • Extend Brian Coburn • Construct Belcourt from water tower to Renaud Rd.
Parks, Schools and Greenspace	• Residents requested some green space remain, citing it as the reason a lot of people chose to live in the area. • Ensuring the protection of Innes Park Woods • Provision of a community / recreation center for residents with safe access. • Timing for upgrades for Primary school, secondary French school on Renaud?
Commercial	• A farmer's market or more local store-type area (as opposed to big box stores), similar to Manotick/Merrickville or Lansdowne, was preferred to “add personality” and create a "town within a town".
Surface Water	• Implementation of appropriate flood mitigation and surface water management

1- Renaud Road is currently a 2-lane collector roadway. The ultimate solution to the concern would involve the development of the Brian Coburn West extension to the Innes/Walkley connection to divert traffic from Renaud Road. With the advent of this new infrastructure, the share of cut-through traffic on Renaud Road is anticipated to decline.

These issues were incorporated in the subsequent CDP, MSS and MTS. As part of the integrated CDP/EA process, Indigenous Groups were provided with information relating to the development of the CDP. More specifically, the Algonquins of Ontario were contacted with an

1 https://ottawa.ca/en/city-hall/public-engagement/projects/east-urban-community-mixed-use-centre-community-design-plan#overview

offer to receive comments. No comments have been received. The City of Ottawa's Development Applications process circulates to area residents with upcoming development applications and associated reports.

Throughout the project, the CPT met with key agency stakeholders and City staff with an interest in the project (TAC). Reports and Plans were circulated for comments and revisions made accordingly.

4.0 PROJECT NEEDS AND OPPORTUNITIES

4.1 PROJECT NEEDS

Schedule B- Urban Policy Plan of the Official Plan currently designates the CDP Study Area as follows:

- General Urban Area;
- Urban Employment Area; and
- Mixed Use Centre.

When the Official Plan for the amalgamated City of Ottawa was developed in 2003, a Mixed-Use Centre designation was established in South Orléans in the approximate location of the two planned BRT stations at Fern Casey Blvd. and Mer Bleue Rd. The boundary of the Mixed-Use Centre designation evolved over time as the lands to the south, southeast, and southwest were developed.

The South Orléans Mixed Use Centre was further modified in 2016 through Official Plan Amendment 180, which implemented recommendations from the City's ELR. More specifically, the ELR determined that there was an oversupply of employment land in the City of Ottawa and proposed re-designating land in certain areas. In recognition that the lands in South Orléans are challenged to attract employment uses seeking convenient access to highways and high visibility, the ELR recommended that the western half of the South Orléans Employment Area be re-designated to General Urban Area (now in effect). In order to reinforce the remaining Employment Area at the east end of South Orléans, the ELR recommended that the northeast portion of the Mixed-Use Centre designation be designated Urban Employment Area (now in effect).

Through the development of the CDP, it was proposed that the South Orléans Mixed Use Centre designation be removed completely and replaced with the General Urban Area designation. To support the land uses envisioned in the EUC Phase 3 Area the following transportation needs were identified:

- Transit provisions to support the growth;

- Pedestrian and cycling facilities to support growth;
- Local and collector roadways to support growth; and

The City of Ottawa requested that regional wide network improvements indirectly associated with this MTS that are needed to support the entire lands south of Innes Rd. and east of Navan Rd. be addressed.

4.2 PROJECT OPPORTUNITIES

EUC Phase 3 Area is located south of the Innes Rd. Arterial Mainstreet, north of the Trails Edge community and west/east of Mer Bleue. Its location provides for opportunities to connect to existing and planned transportation facilities that would address the project needs noted above.

Pedestrian Facilities

There are currently sidewalks along Mer Bleue Rd., Brian Coburn Blvd. and Innes Rd. adjacent to the CDP area. There will be opportunities to connect to these existing pedestrian facilities through the proposed intersections. The proposed east-west Multi-Use Pathway (MUP) within the Hydro corridor provides opportunities for connections through to collector roadways within EUC Phase 3 Area.

Cycling Facilities

There are currently cycling lanes along Mer Bleue Rd., Brian Coburn Blvd. and Innes Rd. adjacent to EUC Phase 3 Area. There will be opportunities to connect to the existing cycling lanes within the CDP area through collector roadways. The proposed collector roadways are envisioned to include cycling facilities within the community.

Transit Services

The new roads within EUC Phase 3 Area will accommodate transit services throughout the community and ensure reasonable walking distances to bus stops. There will be opportunities to modify existing transit services/routes or provide new routes as required to serve the CDP area.

Road Network

The collector roadway system will provide travel for all modes of transportation. The collector roads will connect to adjacent arterial roads (i.e. Innes Rd., Mer Bleue Rd. and Brian Coburn Blvd.) that will provide the primary routes to/from the community. The road network will allow road connection to Innes Rd. by extending Fern Casey Blvd. from Brian Coburn

Blvd. to the Frank Bender St. This will provide opportunities for the existing and proposed communities to the south to have another north-south connection.

5.0 EXISTING TRANSPORTATION CONDITIONS

5.1 ROADWAY NETWORK

The major transportation corridors within the planning area are as follows:

- ***Innes Rd.*** is an east-west arterial with 4-lanes of travel (two lanes per-direction). It is one of three access corridors in and out of Orléans from the inner core of the city (the others being HWY 174 and St. Joseph Blvd.). It is also a major commercial artery between Pagé Rd. and Tenth Line Rd. with big box stores and strip malls along the south side. The north side, in the stretch between Mer Bleue and Pagé, is mostly residential development with a few smaller commercial developments. The posted speed limit along Innes Rd. is 80 km/h as it travels through the Greenbelt (as the Blackburn Hamlet Bypass), but is reduced to 60 km/h east of Orléans Blvd.
- ***Brian Coburn Blvd.*** is an east-west arterial road characterized by 2-lanes of travel (one lane per-direction) from Navan Rd. to beyond Mer Bleue Rd. Residential subdivisions are currently being built or planned on both the north and south sides. It has a posted speed limit of 60 km/h.
- ***Renaud Rd.*** is an east-west collector road with 2-lanes of travel (one lane per-direction). Renaud Rd. east of Navan Rd. has the Trailsedge community on the north side, Crème and Eastboro on the south side. West of Navan Rd. are recent developments on the north and south sides (Spring Valley Trails and Bradley Estates). It has a posted speed limit of 50 km/h, which lowers to 40 km/h in the vicinity of Notre-Dame-des-Champs school.
- ***Navan Rd.*** is an arterial road with 2-lanes of travel (one lane per-direction) running in a north-west to south-east direction. It has a rural cross-section and forms a signalized T-intersection with the Blackburn Hamlet Bypass, a roundabout with Brian Coburn Blvd. within the Greenbelt south-east of Blackburn Hamlet. The posted speed limit is 70 km/h south of the Blackburn Hamlet Bypass and is reduced to 60 km/h near the intersection with Orléans Blvd. There are mostly rural residential and commercial properties along the corridor.
- ***Orléans Blvd.*** is a 2-lane (one lane per-direction) north-south arterial road that forms a T-intersection with Navan Rd. It becomes a 4-lane roadway (two lanes per-direction) north of the Longleaf Drive / Silverbirch Street intersection. The posted speed limit is 50 km/h north of this intersection and 60 km/h south of it. Orléans Blvd. has residential developments on both sides.
- ***Mer Bleue Rd.*** is a 4-lane (two lanes per-direction) north-south arterial road that starts south of Innes Rd. and tapers down to 2-lanes just north of Renaud Rd. There are commercial developments on the west and east side within the 4-lane cross-section. Where it tapers down to 2-lanes, Mer Bleue Rd. has a rural cross-section with uncultivated farmland, agricultural land and existing rural residences on both sides.

The section between Innes Rd. and Renaud Rd. has a posted speed limit of 60 km/h. The posted speed is reduced to 50km/hr. south of Renaud Rd.

The following points outline the infrastructure improvements that were envisioned within the City of Ottawa 2013 TMP:

- *Blackburn Hamlet By-Pass Extension*: New 4 lane arterial between Orléans Blvd. and Navan Rd. This was anticipated to occur sometime between 2014 and 2019 (Phase 1). This corridor is also planned to extend to Innes Rd. sometime between 2020 and 2025 (Phase 2). However, both extensions identified in the TMP have been determined to no longer be feasible due to costly geotechnical constraints and so alternative alignments are being considered west of Navan Rd. Presently, there is no defined alignment as the City of Ottawa is in the process of undertaking the EA.
- *Tenth Line Rd.*: This corridor is to be widened from 2 to 4 lanes between Harvest Valley Rd. and Wall Rd. sometime between 2020 and 2025.
- *Navan Rd.*: This corridor is to be widened from 2 to 4 lanes from Brian Coburn Blvd to Mer Bleue Rd. The Navan Rd. widening is classified as a Network Concept and there is no timeline for this improvement.
- *Mer Bleue New 4-lane Realignment*: The Concept Network outlines a new realigned 4-lane Mer Bleue from Renaud Rd. and Navan Rd. There is no timeline for this new section of road.

5.2 PEDESTRIAN FACILITIES

There are sidewalks on both sides of Innes Rd. and Mer Bleue Rd. with a MUP on the south side of Brian Coburn Blvd. to serve pedestrian activities. Also, a MUP is planned along the Hydro corridor that runs from Tenth Line Rd. to just east of Pagé Rd. Sidewalks or MUP would be planned along collector and arterial roads within the CDP.

5.3 BICYCLE FACILITIES

The City of Ottawa TMP (2013) indicates that Innes Rd., Mer Bleue Rd. and Navan Rd. are all defined as Spine Routes. Innes Rd. is also considered a cross town bikeway path. Brian Coburn Blvd is considered a Major Pathway. The City of Ottawa Cycling Network indicates that:

- *Innes Rd.* has on-road bike lanes that extend east from the Orléans Blvd. intersection.
- *Brian Coburn Blvd.* has an on-road westbound bike lane and MUP along the south side between Mer Bleue Rd. and Navan Rd.
- *Mer Bleue Rd.* has on-road bike lanes from Innes Rd. to just north of Renaud Rd.

Schedule C of the Official Plan also illustrates an off-route cycling route (i.e. MUP) along the Hydro Corridor. The OCP (2013) indicates that there will be segregated bike lanes along

Innes Rd. The implementation plan for such segregated bike lanes are to be implemented during Phase-3 (2026-to-2031).

5.4 TRANSIT

OC Transpo's current bus routes in the study area are shown in Exhibit 5.1. In this exhibit, route 94 is a Transitway Route, Route 225 (peak hour, peak direction) is a Connexion route and Route 34 is local route, all serving the west part of the study area. The east half of the study area is served by Route 30 (local) and 234 (Connexion).

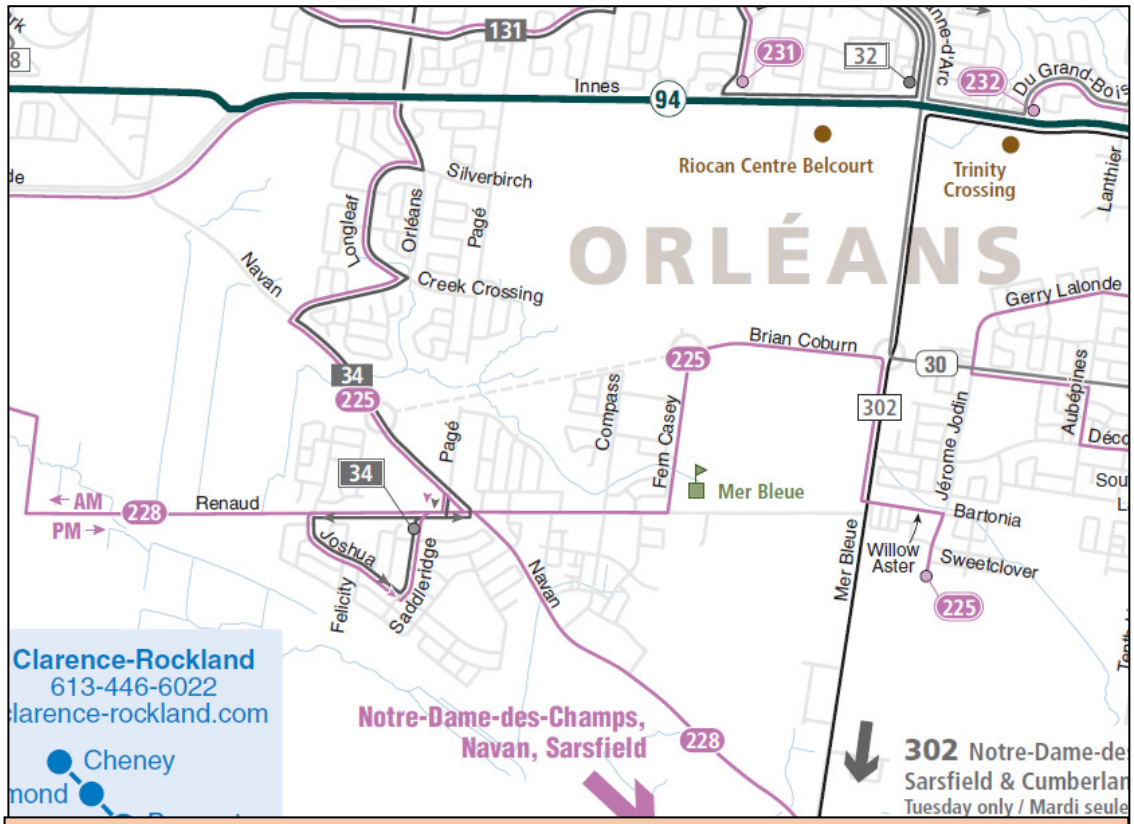


Exhibit 5.1: Existing OC Transpo Routes (Date: March 18th, 2019)

The Affordable Network in the City of Ottawa TMP (Map 5 Affordable Network) identifies:

- Innes Rd. and Brian Coburn as transit priority corridors with isolated measures;
- A new park and ride (Chapel Hill Park and Ride) is proposed (currently under construction with completion by 2019/2020) near the intersection of Brian Coburn Blvd and Navan Rd.;
- Future transit provisions also include extension of LRT to east of Jeanne d'Arc Blvd, north of the study area; and
- BHBPE as transit priority continues lanes from Navan Rd. to Innes Rd.

The Concept and Ultimate plans envision:

- the future LRT to be extended east to Trim Rd. (council approved extension to Trim Rd. with implementation planned for 2022);
- a grade separated Bus Rapid Transit (BRT) line is proposed through study area [from Tenth Line Rd. alongside Brian Coburn Blvd to the Blair Rd LRT (albeit post 2031)]. This BRT is envisioned to be at-grade at Fern Casey Blvd (former Belcourt Blvd);
- transit priority with isolated measures is planned along Mer Bleue Rd., from future Mer Bleue Rd. BRT station north to Innes Rd.

However, these projects are not included in the City's current affordable network and so the timing is unknown.

The "*East Urban Community Mixed-Use Centre CDP Project Modal Share*[2]" memorandum produced by Parsons (June 2014) indicated that the current peak direction transit share based on current travel patterns in the Orléans district (NCR 2011 Trans OD Survey – January 2013) for transit person trips:

- associated with the new community south of Innes Rd. and east of 10th Line Road is in the order of 10%; and
- associated with the established Orleans community is in the order of 30-to-35%.

5.5 EXISTING TRAFFIC VOLUMES

Existing traffic volumes for the study area were collected at the following intersections:

- Innes Rd. / Mer Bleue Rd.: May 3rd, 2017
- Innes Rd. / Belcourt Blvd: August 4th, 2015
- Innes Rd. / Viseneau Drive: January 25th, 2017
- Innes Rd. / Pagé Rd.: July 28th, 2015
- Innes Rd. / Orléans Blvd: May 3rd, 2017
- Blackburn Hamlet Bypass / Navan Rd.: May 3rd, 2017
- Navan Rd. / Renaud Rd.: January 28th, 2016.
- Mer Bleue Rd. / Renaud Rd.: January 27th, 2016
- Mer Bleue Rd. / Brian Coburn Blvd: June 1st, 2015

The following steps were undertaken to produce the existing balanced traffic volumes:

- The peak hour (a.m. and p.m.) traffic volumes from each of the intersections were entered into a spreadsheet and the differences between traffic entering one intersection and exiting another were compared to identify where imbalances were present (accounting for mid-block, accesses, etc.).

Exhibit 5.2 illustrates the balanced existing traffic volumes within the study area.

2 "*East Urban Community (EUC) Mixed-Use Centre CDP Projected Modal Share*" Parsons (June 2014)

6.0 ALTERNATIVE LAND USE AND INFRASTRUCTURE DESIGN

It is envisioned that the EUC Phase 3 Area will be a hub of activity for the residents of Orléans and surrounding communities. Its mix of housing, offices, shops and commercial services, combined with leisure and recreational opportunities will make it an attractive place to live, work, and play. Rapid transit will have successfully transitioned from bus priority measures on roadways shared with other traffic, to buses travelling on an exclusive BRT right-of-way. The BRT will provide excellent connections for commuters travelling to jobs in other areas or arriving to work in the CDP, which will offer a range of employment opportunities. An off-set grid pattern street network with regularly spaced intersections will allow for efficient transit, cycling, and vehicular travel and pedestrian movements. The Hydro corridor will provide a strong linear corridor for pedestrians and cyclists and will form part of a Greenspace network, which links features such as Innes Park Woods, watercourses, parks, and open spaces. With its compact form, mix of uses, and strong orientation towards walking, cycling and transit, the CDP area will be a model of sustainable design and development.

The following goals have been established to support the vision for the CDP:

- Establish a new, vibrant centre in Orléans, which accommodates a range of uses, such as office, low, medium and medium-high-density residential, retail, entertainment, and institutional uses, and acts as a central node of activity for the surrounding community and the City as a whole.
- Achieve compact growth which makes efficient use of land and existing infrastructure and is phased in step with required infrastructure improvements.
- In anticipation of the future BRT transitway, establish a Transit-Oriented Development pattern that incorporates “complete streets”, which provide safe, convenient and comfortable conditions for walking, cycling and public transit for all ages and abilities.

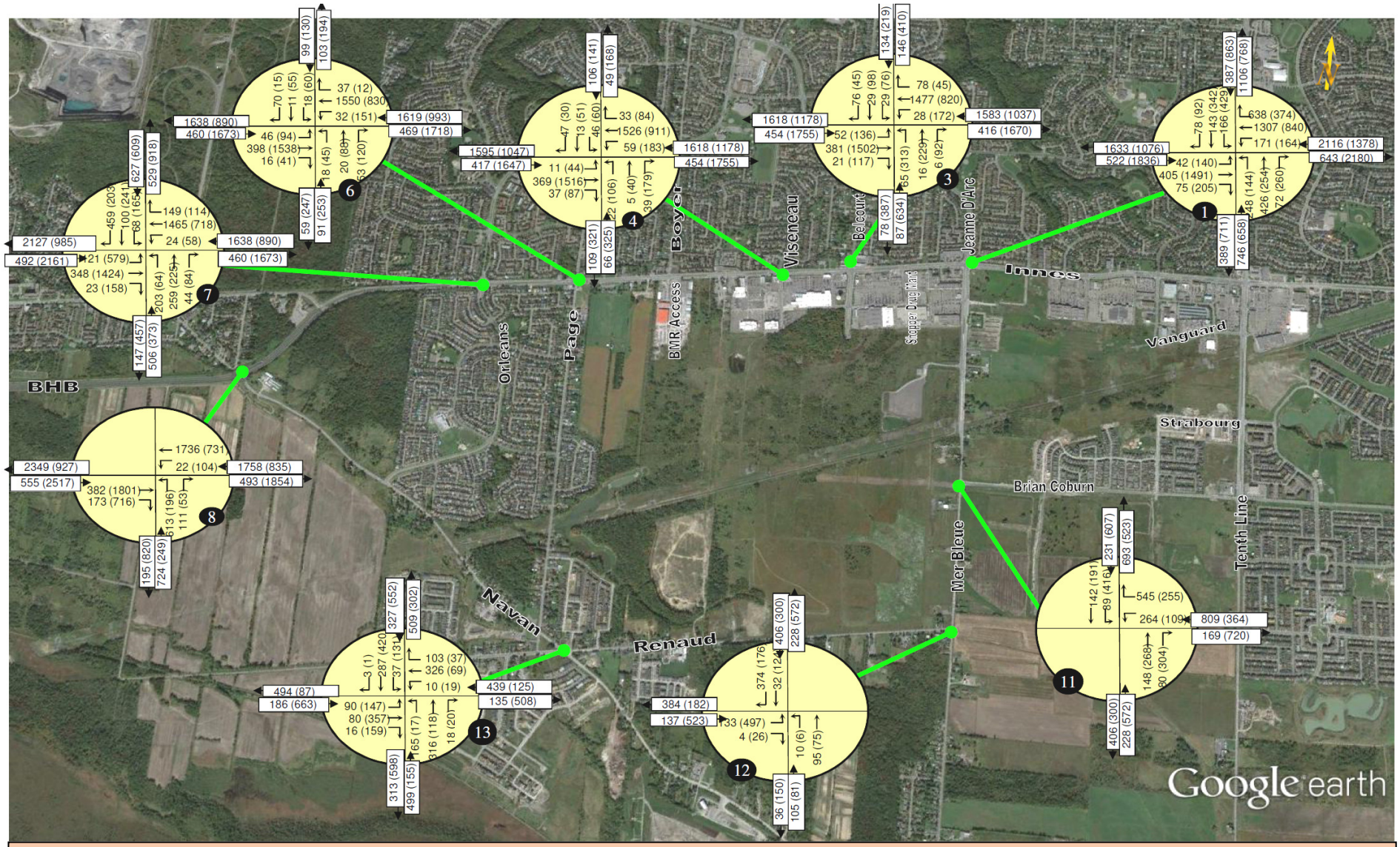


Exhibit 5.2: Existing Traffic Volumes

- Ensure that connections across the Hydro Corridor, the BRT Transitway, and Brian Coburn Blvd. are provided for the safe and efficient passage of pedestrians, cyclists, and motorists from one side of the CDP area to the other.
- Foster growth that complements the existing community of Orléans and facilitates connectivity between the Transit Stations and surrounding neighborhoods through such measures as MUPs, safe road crossings, and an efficient road network.
- Protect, improve and restore the Natural Heritage System within and adjacent to the CDP area and create a Greenspace Network that connects natural features, such as woodlands and stormwater ponds, and community features, such as public parks, and shopping areas.
- Encourage the establishment of a distinct identity for the currently undeveloped CDP area through the creation of area-specific design guidelines, which recognize and celebrate existing features and promote the creation of new public parks and civic spaces that contribute to a sense of place and foster a sense of community.
- Support the economic development potential of Orléans by creating opportunities within this CDP area for a range of employment uses that are well-served by transit.

The following sections presents three concept plans that were prepared as part of this MTS.

6.1 CONCEPT PLAN NO.1

The key features of Concept Plan No.1 include:

- Direct north-south collector route from Fern Casey to Vanguard extension;
- Extension of Frank Bender to future Vanguard extension (west of Mer Bleue);
- Extension of Vanguard from Mer Bleue west through to the neigbouring property and up to Innes Rd.;
- Five connections to arterial roadways;
- Preservation of Innes Park Woods;
- Neighbourhood park abutting storm water management;
- Mixed-use/employment located near future major Mer Bleue transit station;
- Mixed-use/high density residential located near future Fern Casey transit station;
- Opportunity for multiple transit routes; and
- MUPs

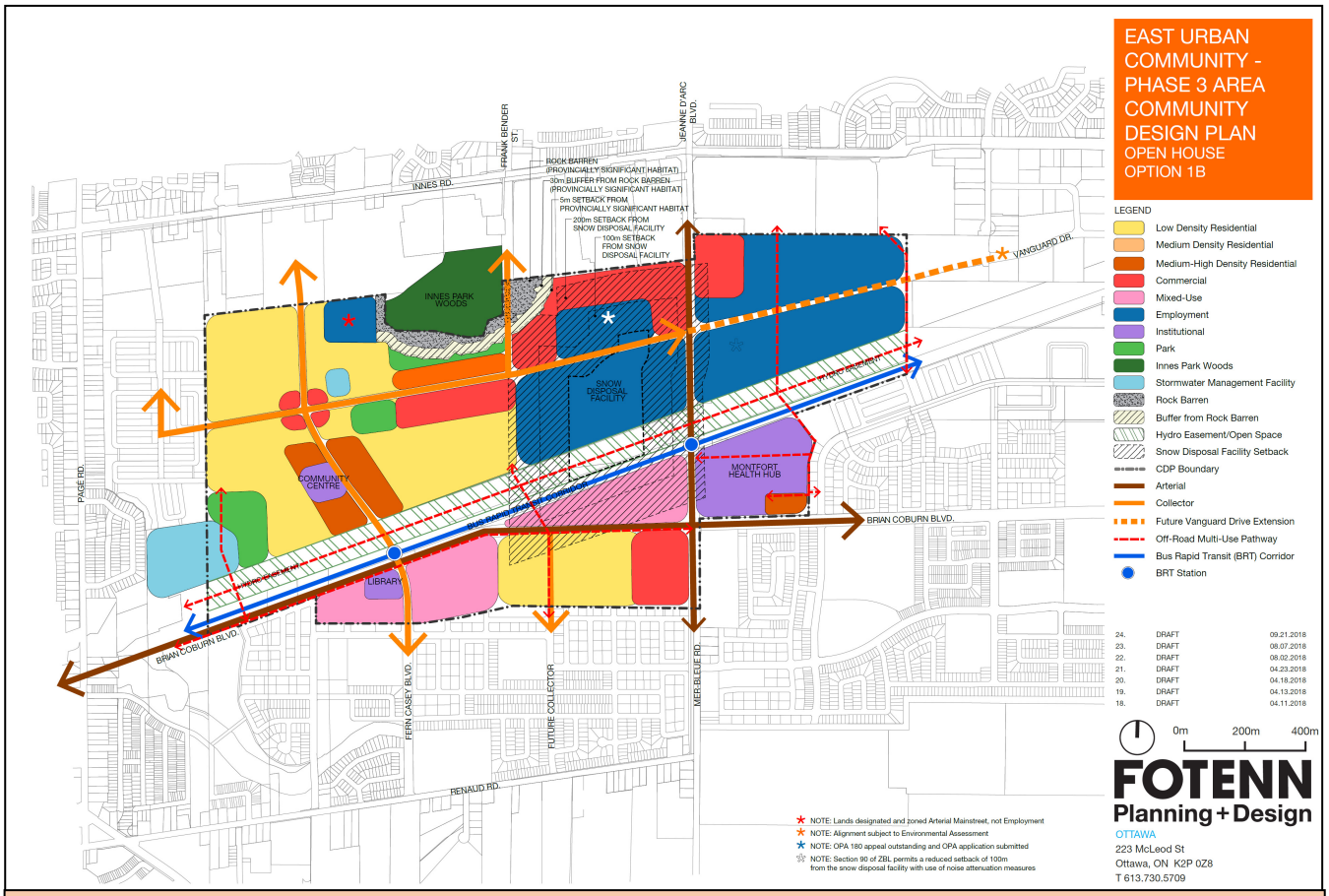


Exhibit 6.1: Concept Plan No.1

6.2 CONCEPT PLAN NO.2

The key features of Concept Plan No.2 include:

- Two direct north-south collectors connecting Fern Casey to Frank Bender;
- Extension of Vanguard west of Mer Bleue that loops south to connect to Fern Casey;
- Six connections to arterial roadways;
- Preservation of Innes Park Woods;
- Neighbourhood park abutting storm water management;
- Mixed-use/employment located near future major Mer Bleue transit station;
- Mixed-use/high density residential located near future Fern Casey transit station;
- Opportunity for multiple transit routes; and
- MUPs.

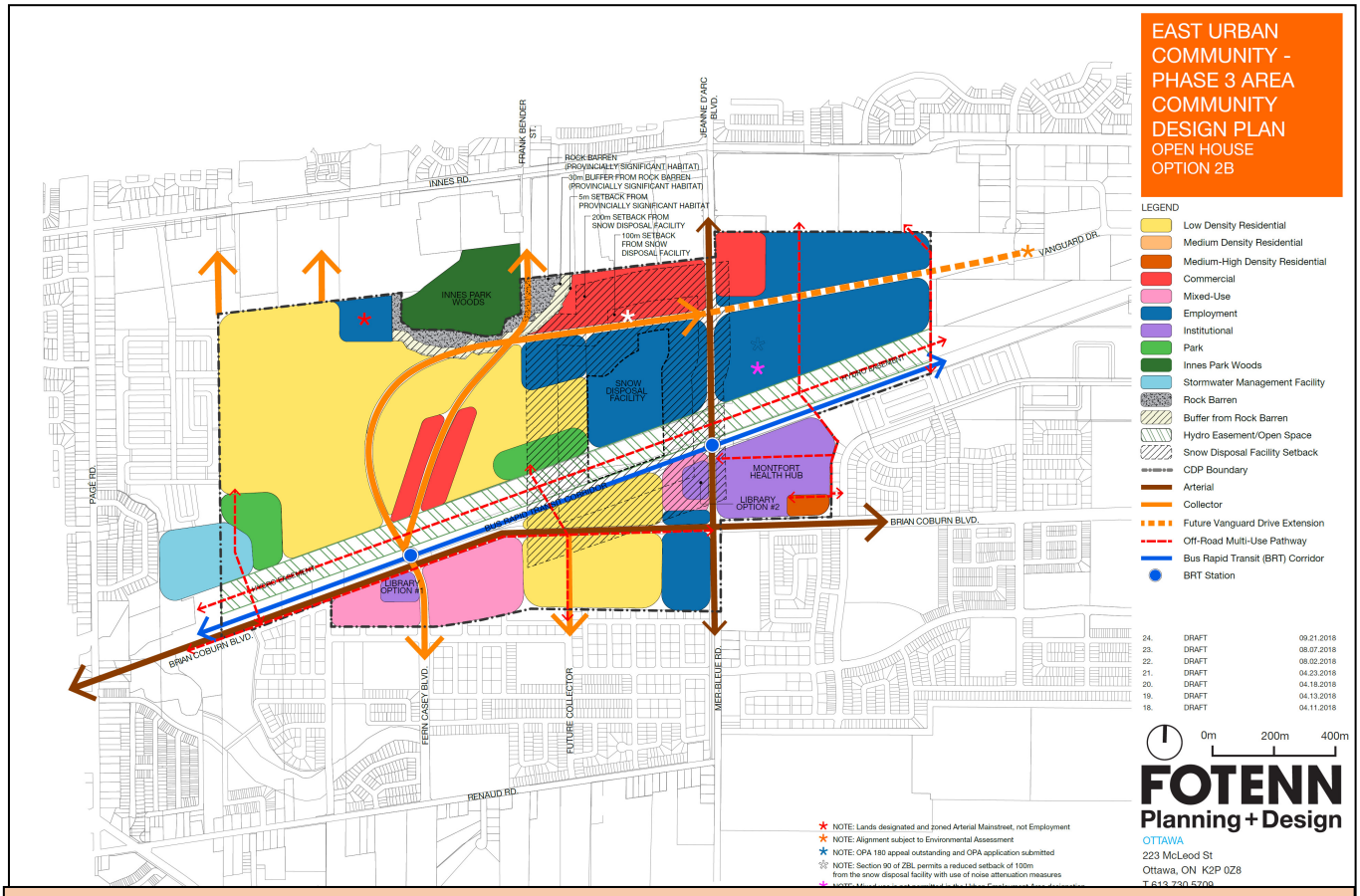


Exhibit 6.2: Concept Plan No.2

6.3 CONCEPT PLAN NO.3

The key features of Concept Plan No.3 include:

- Indirect north-south collector connecting Fern Casey to Frank Bender;
- Extension of Vanguard from Mer Bleue west through the neigbouring property up to Innes Rd.;
- Five connections to arterial roadways;
- Preservation of Innes Park Woods;
- Neighbourhood park abutting storm water management;
- Multiple parks and parkettes spaced throughout the CDP area;
- Mixed-use/employment located near future major Mer Bleue transit station;
- High density residential located near the future Fern Casey transit station;
- Better segregation of employment and residential lands;
- Opportunity for multiple transit routes; and
- MUPs.

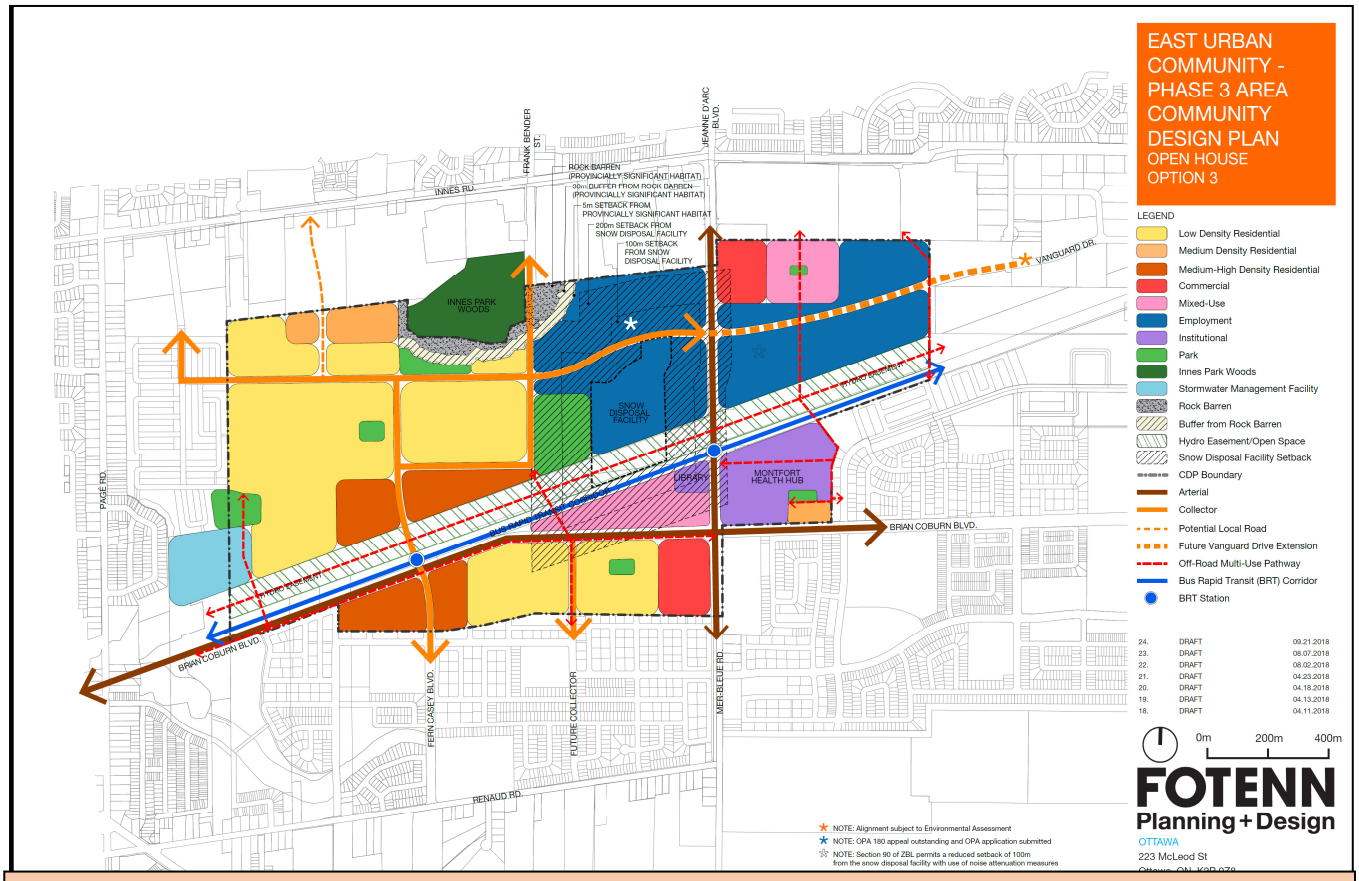


Exhibit 6.3: Concept Plan No.3

7.0 EVALUATION OF ALTERNATIVE LAND USE CONCEPTS

The three concepts were evaluated based on a list of criteria that considered the impacts of the natural and physical environmental, social environmental, transportation, servicing and economics. The impact (positive or negative) and the severity of the evaluation criteria was quantified according to the indicators in Table 7.1.

Table 7.1: Impact Description Table

	Terms describing:		**Definitions**
	Negative Impacts	**Positive Impacts (i.e., Benefits)**	
Most Preferred	Negligible/ Low	Greatest	The impact exists but is of a magnitude small enough that it has little effect or is of limited benefit; or has the least impact compared to all the alternatives. Greatest compliance, contribution or benefit.
	Slight	Good	The impact exists and is of relatively low magnitude. Provides a moderate effect or contribution or benefit.
	Some	Reasonable	The impact exists and has an effect that is of a moderate magnitude. Provides a measurable contribution or benefit.
Least Preferred	Greatest	Limited	The impact exists and has an effect that is relatively large or has the most impact when compared to other alternatives. Little to no contribution or benefit

Other factors were considered in the evaluation but did not results in a distinguishing difference between the alternatives. These included:

- Provision of Libraries
- Parks adjacent to SWMP
- Mix of uses adjacent to BRT station
- Loss of water courses
- Minimizing upgrades to existing water system requirements
- Compatibility with existing and future municipal infrastructure
- Impacts to existing downstream flood levels
- Disruptions of natural habitat (loss / fragmentation)

The transportation evaluation considered as criterion:

- Traffic infiltration through the community;
- Efficiency of road network;
- Efficiency of the transit system; and
- Active accessible neighbourhoods.

Table 7.2: Evaluation of Land Use Concepts

Category Catégorie	Criteria/Objective Critère/Objectif	Concept 1	Concept 2	Concept 3
Natural and Physical Environment Environnement naturel et physique	Connectivity within the natural heritage system Connectivité dans le système du patrimoine national	✓	~	✓
	Amount of greenspace (parkland) quantité d'espaces verts (parcs)	~	~	✓
	Hibernacula/ Hibernacula	✓	×	✓
	Species at Risk/Espèces en péril	✓	~	~
	Protection of recharge areas/ Protection des zones de recharge	~	×	✓
Social Environment Environnement social	Maximize access to community amenities/services Maximiser l'accès aux équipements communautaires et les services	✓	~	×
	Parks/Parcs	~	~	✓
	Provide appropriate mix of land uses considering ongoing snow disposal operations / Fournir un mélange approprié d'utilisation de terrains compte tenu des opérations d'élimination de la neige en cours	✓	×	~
Transportation Transport	Minimize traffic infiltration through the community Minimiser l'infiltration du trafic à travers la communauté	~	~	✓
	Efficiency of road network / Efficacité des réseaux routiers	✓	~	✓
	Create an efficient transit system / Créer un système de transport efficace	✓	~	✓
	Create active accessible neighbourhoods / Créer des quartiers actifs et accessibles	×	✓	~
Infrastructure / Infrastucture	Reduce construction, maintenance and operations requirements SWMF / Réduire les exigences de construction, d'entretien et d'opérations de l'installation de GEP	×	✓	✓
	Reduction of construction and operations requirements for sanitary servicing / Réduction de la construction et des exigences des opérations pour les services sanitaires	✓	×	✓
Economics Économique	Minimize front ending costs and allow for efficient area development / Minimiser les coûts initiaux et optimiser l'aménagement du territoire	✓	×	✓
	Preferred / Préféré			✓

Table 7.2 presents the results of the natural and physical environment, social environment, transportation, servicing and economics evaluation on the three land use concepts. The evaluation concluded that Concept No.3 was the preferred land use plan.

8.0 PREFERRED DEVELOPMENT PLAN

Subsequent to the completion of various public and TAC meetings, the CPT reviewed the feedback and refined the preferred concept plan. The preferred concept plan, which is illustrated in Exhibit 8.1 includes:

- North-south collector connecting Fern Casey to Frank Bender;
- Extension of Vanguard from Mer Bleue west, through the CDP area, to the neigbouring property and up to Innes Rd.;
- Five (5) connections to arterial roadways (two (2) connections to Innes Rd., two (2) connections to Brian Coburn Blvd, and one (1) to Mer Bleue Rd.);
- Preservation of Innes Park Woods;
- Multiple parks and parkettes spaced throughout the community;
- Mixed-use/employment located near future major Mer Bleue transit stations;
- High density development located near future Fern Casey transit station;
- Commercial located along arterial road;
- Better segregation of employment and residential lands;
- Opportunity for multiple transit routes; and
- MUPs.

8.1 PREFERRED LAND USE

The EUC Phase 3 Area CDP will consist primarily of residential dwellings of low, medium and high density. The proposed employment area will be along collector and arterial roadways (Vanguard Extension and Mer Bleue Rd.) as illustrated in Exhibit 8.1. The concept plan also consists of mixed-use, employment and institutional (Health Hub) land uses. Details of the concept plan include:

- Low density: 2,000 units
- Medium density: 330 units
- Medium-High density: 1,240 units
- Mixed use: 1,658 units and 420 jobs
- Commercial: 300 jobs
- Institutional: 1,500 jobs [1,500 jobs are associated with Montfort Health Hub. For the purpose of this MTS 350 jobs are anticipated to come on-board before interim year and the remaining are assumed to be ultimate build-out year]
- Employment: 2,545 jobs

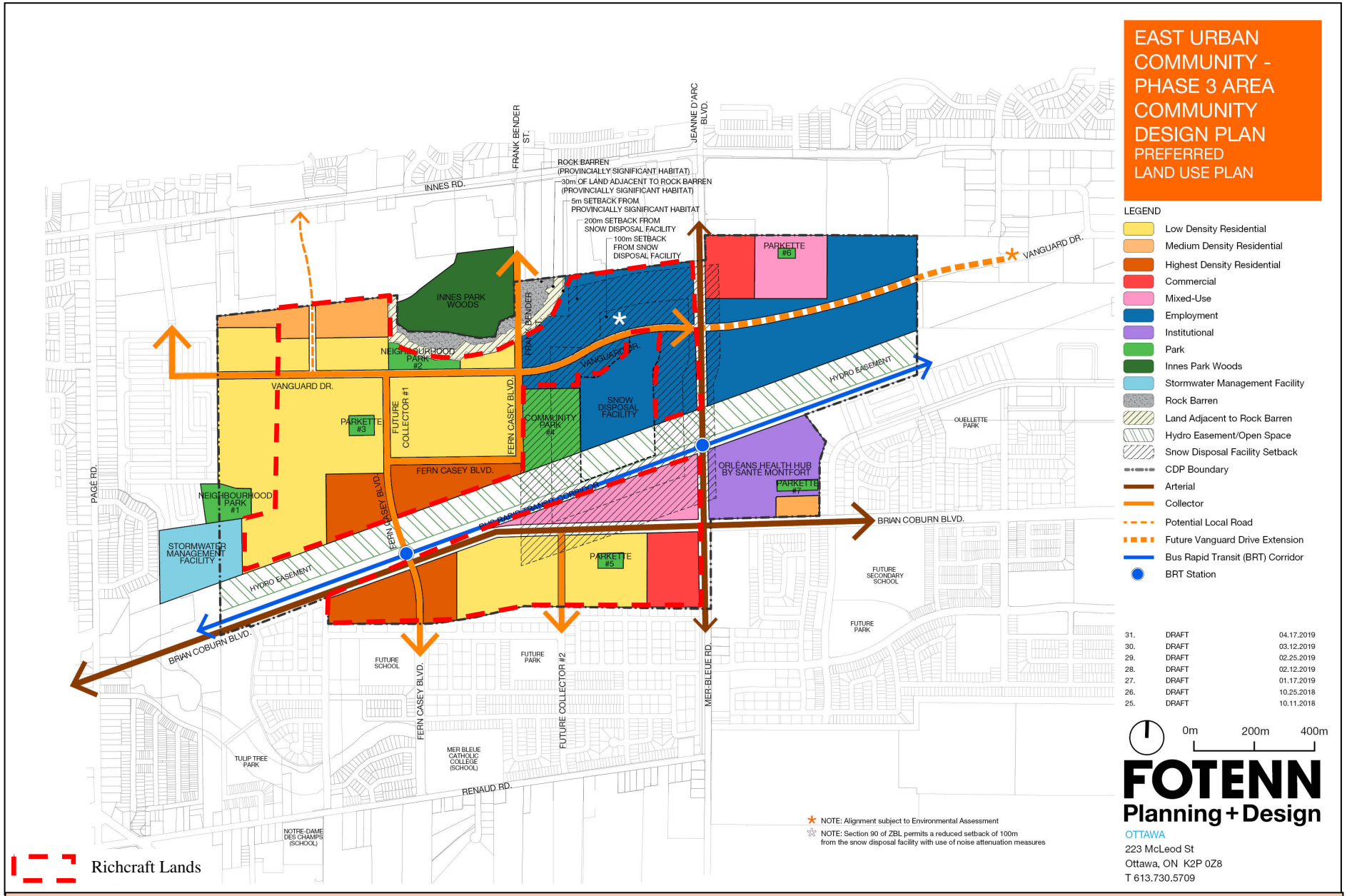


Exhibit 8.1: Preferred Concept Plan

8.2 PROPOSED INTERNAL ROAD NETWORK

The EUC Phase 3 Area CDP is proposing the following major collectors:

- **Fern Casey Blvd Extension**: This is a new collector roadway that extends from south of Brian Coburn Blvd. to the Frank Bender St. and provides a connection through to Innes Rd. The road is envisioned to accommodate 2-lanes of travel through the CDP area. The road is envisioned to be indirect with roundabouts planned at Fern Casey Blvd. and Future Collector #1 and at Vanguard Extension/Frank Bender St. to slow traffic within the low-density residential area. Fern Casey Blvd. is envisioned to have a right-of-way (ROW) of 24m that would accommodate a sidewalk on one side and a MUP on the other side.
- **Vanguard Dr. Extension**: This collector roadway is envisioned to extend west from Mer Bleue Rd. through the CDP lands and connect to Innes Rd. through the neighbouring property and will provide an east-west route. The road is envisioned to accommodate 2-travel lanes through the CDP area. Vanguard Extension is envisioned to have a ROW of 24m that would accommodate a sidewalk on one side and a MUP on the other side.
- **Future Collector #1 (between Fern Casey and Vanguard Extension)**: This new collector road is envisioned between Fern Casey Blvd. and Vanguard Extension. The road is envisioned to have a 24m ROW, accommodate 2 travel lanes, a sidewalk on one side and a MUP on the other side.
- **Future Collector #2 (south of Brian Coburn Blvd.)**: a new collector road is envisioned from Brian Coburn Blvd to Renaud Rd. that would go through the Trails Edge development. The road is envisioned to accommodate 2 travel lanes and have a ROW of 24m. The road is envisioned to accommodate a sidewalk on one side and a MUP on the other side.

8.3 PROPOSED PEDESTRIAN AND CYCLIST FACILITIES

Cycling facilities (i.e. MUPs) are proposed along all new collector Roads within the CDP area. Fern Casey and Vanguard Extension will serve as primary north-south and east-west route for cyclists to connect to major arterial roadways such as Innes Rd. and Mer Bleue Rd., which both accommodate cycling lanes. Future Collectors #1 and #2 would also accommodate MUPs. The MUP along Fern Casey Blvd. is envisioned to provide a connection to the east-west MUP within the Hydro easement.

A combination of a sidewalk and a MUP will be provided on both sides of all collector roads within the CDP area. Local roads that serve as direct routes to transit stops, schools, parks and commercial areas will have sidewalks on one side of the street.

There is an existing MUP along the Hydro corridor on the north side of Innes Rd. (which proposed to be extended through the study area) along with four north-south MUPs proposed within the CDP area. The MUP at the west end of the study area would provide a

connection from the Hydro Corridor MUP around the Stormwater Management Facility to the neighborhood park. The MUP from Future Collector #2 would cross the Hydro Corridor MUP and connect with Fern Casey Blvd. The two MUPs in the east end of the study area would traverse east of Montfort through the employment areas. Exhibit 8.2 illustrates the proposed pedestrian and cyclist facilities within the CDP area.

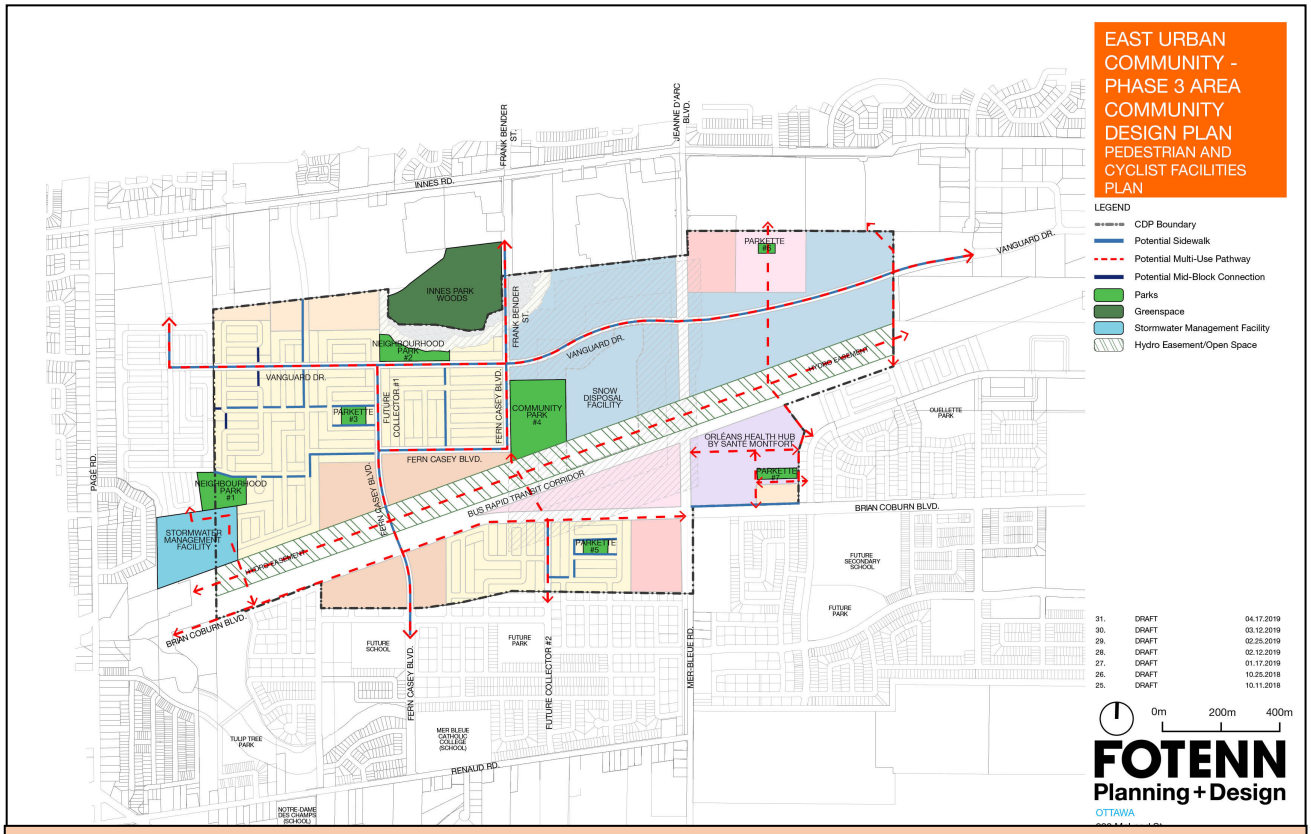


Exhibit 8.2: Pedestrian and Cyclist Facilities

8.4 Proposed Transit Facilities

The provision of transit services will be encouraged during the early plan of subdivision stage of the development through the creation of agreements between the developer and City of Ottawa /OC Transpo. The introduction of new transit services and modifications to existing transit routes will be required to serve the EUC Phase 3 Area CDP. The new collector roadways within the CDP area are envisioned to provide transit service. It is envisioned that transit service could operate along any of the new collector roadways, as determined by OC Transpo, in a manner that connects this new community with the existing south Orleans community and to future higher order transit.

The details of the implementation of transit service to the EUC Phase 3 Area will be developed by OC Transpo at the Plan of Subdivision stage for each phase of the

development. Transit amenities such as bus pads, shelters and benches will be incorporated into the plan during the detailed subdivision design process.

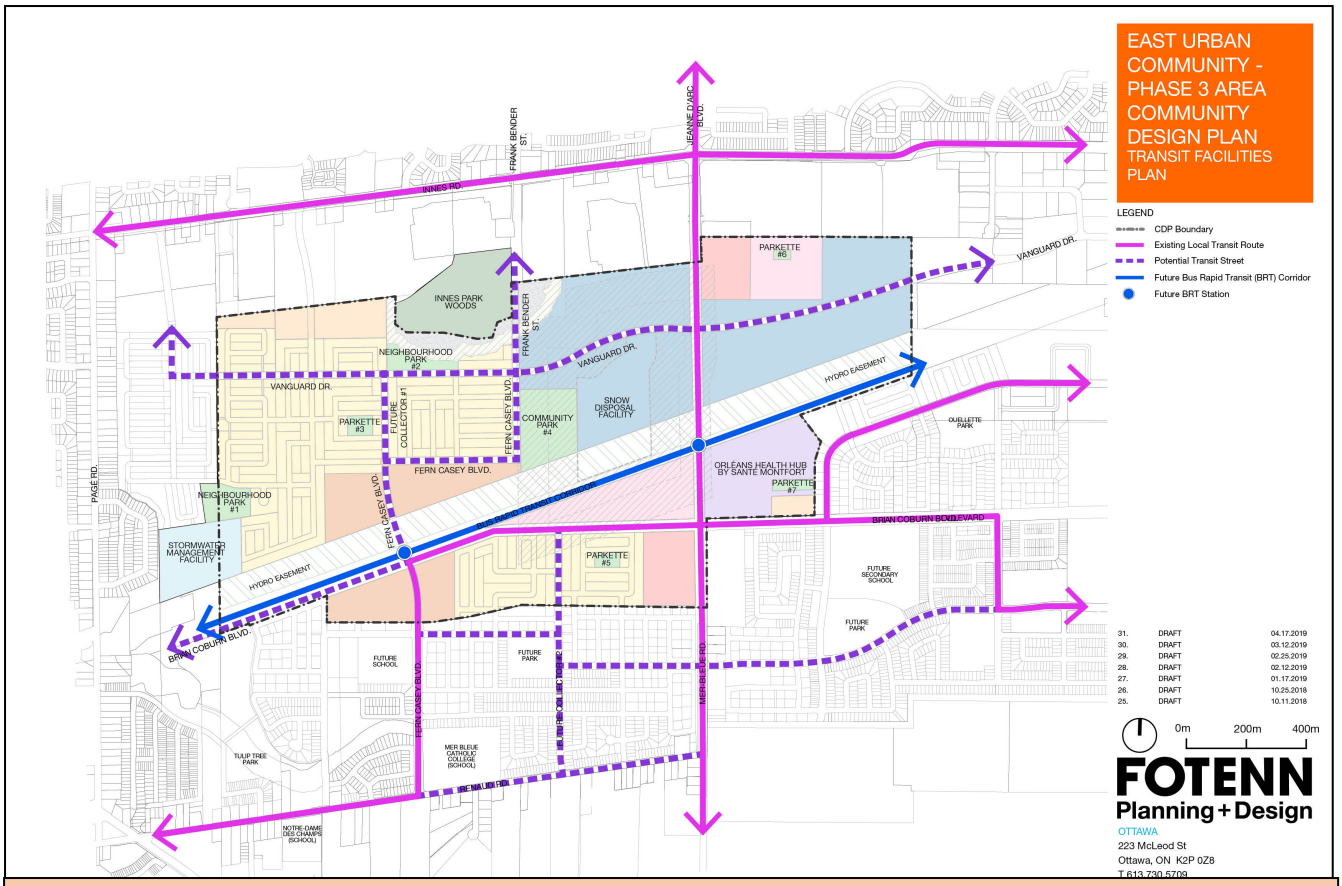


Exhibit 8.3: Transit Facilities

8.5 Proposed Right-Of-Way And Cross-Sections

The following ROW widths are proposed for the new roads in the EUC Phase 3 Area CDP:

- Collector Roads: 24m
- Local Roads: 18m

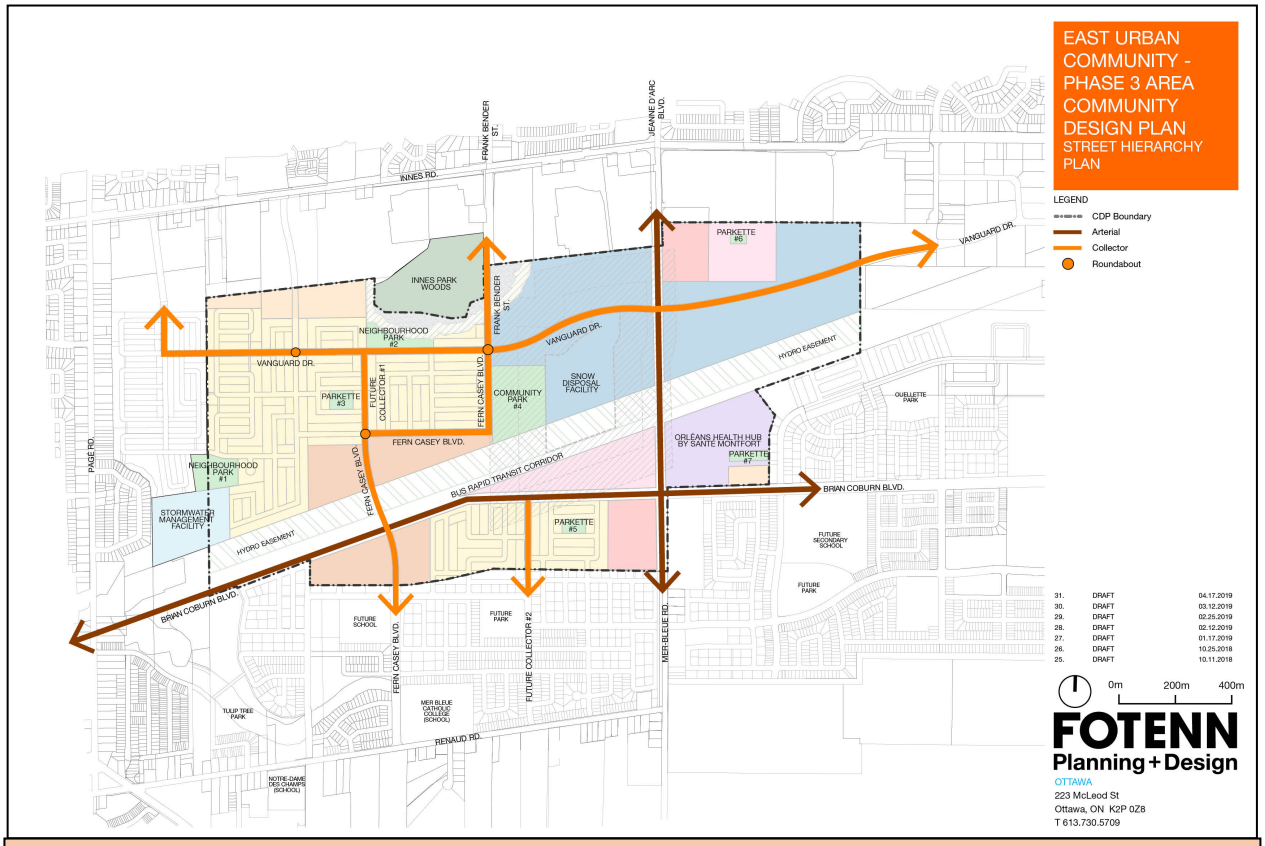


Exhibit 8.4: Street Hierarchy

Various cross-section options were evaluated for the new Collector roads. The 24m ROW roads include the Fern Casey Extension from Brian Coburn Blvd. to Frank Bender St., the Vanguard Extension west of Mer Bleue and the two north-south collector roads (Future Collector #1 and Collector #2) as outlined in Exhibit 8.4. The cross-section option that was considered for the collector roads within the CDP area is outlined in Exhibit 8.5 below. This option illustrates the flexibility of accommodating parking on one side and also a bus shelter/stop. This option allows for a sidewalk one side and a multi-use pathway on the other side to accommodate pedestrians and cyclists. Various other cross-section options were also considered but not put forward as they did not satisfy:

- foundation to tree setback (of 7.5m) required for sensitive clay soil;
- parking setback requirement of 6.2m from garage door to sidewalk; and
- required utility setbacks.

The options that were not recommended for the above reasons are illustrated in Appendix "F".

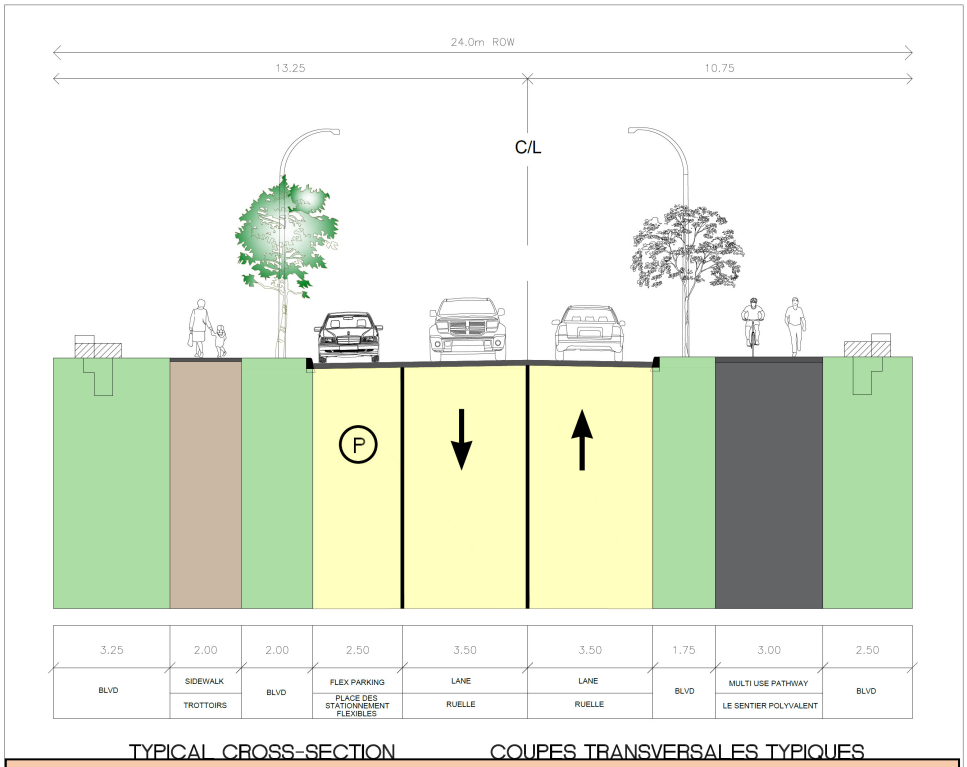


Exhibit 8.5a: Collector cross-section: Mid-block with Parking on One-Side

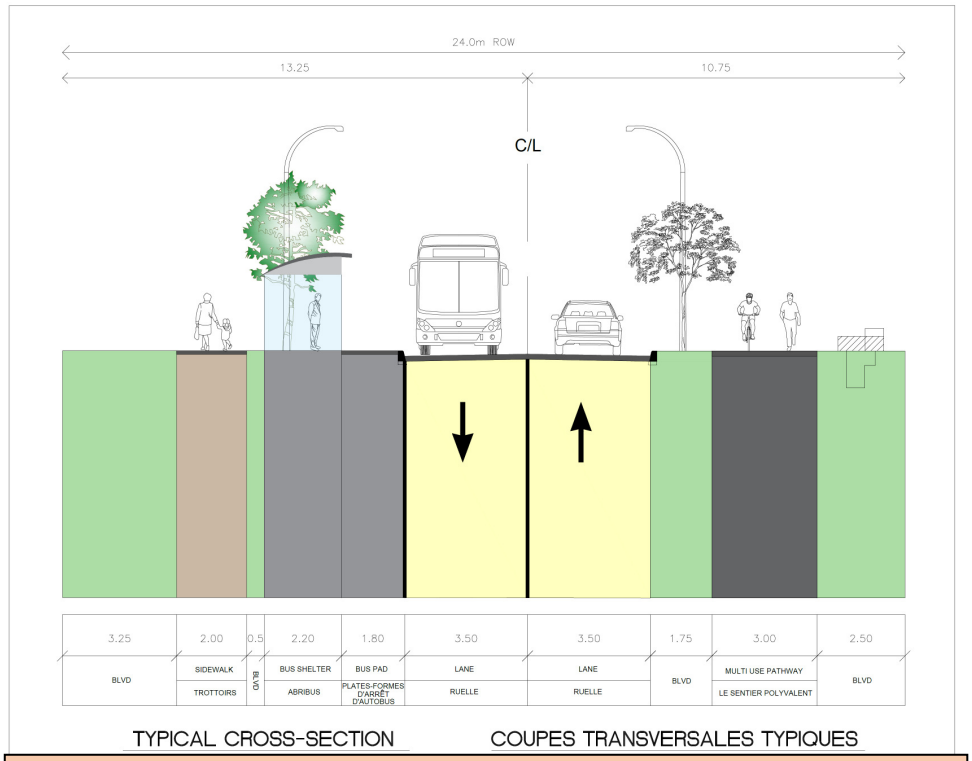


Exhibit 8.5b: Collector cross-section: at Bus Stops

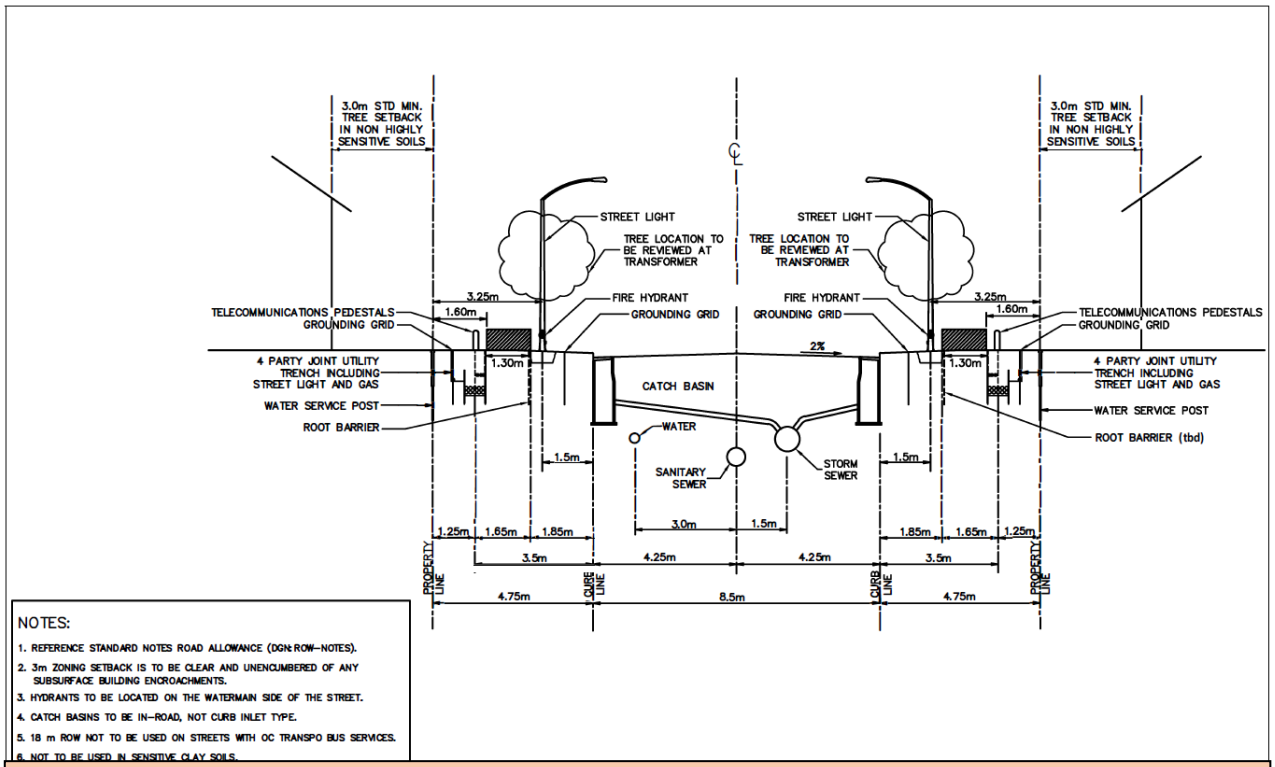


Exhibit 8.6a: Local Cross-section: No Sidewalk

RESIDENTIAL ROAD 18m ROAD ALLOWANCE
4 PARTY JOINT USE TRENCH

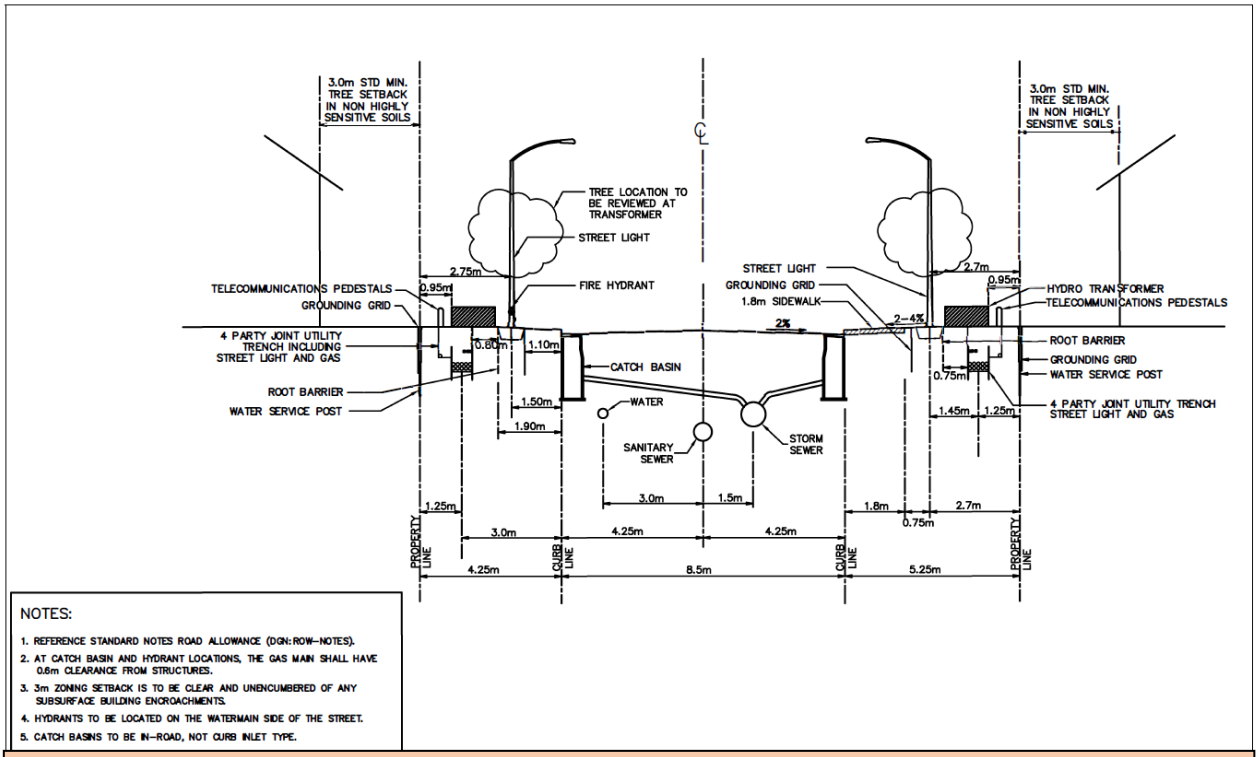


Exhibit 8.6b: Local Cross-section: With Sidewalk

RESIDENTIAL ROAD 18m ROAD ALLOWANCE
4 PARTY JOINT USE TRENCH

An alternate local road cross section was proposed to provide sufficient tree setback to address sensitive clay soils. The local road cross-sections are illustrated in Exhibits 8.6a and 8.6b. The local and collector road cross-sections are preliminary and the details of the road arrangement (i.e. sidewalks, cycling facilities, MUPs, on-street parking, transit, etc.), servicing, utilities, street lighting and landscaping will be worked through with the City of Ottawa staff as part of the detailed subdivision design process.

9.0 TRANSPORTATION IMPACT ANALYSIS

The MTS considers two (2) design horizons:

- An "interim" year where approximately 3,500 units would be completed and approximately 1,300 jobs created within the CDP lands (of which 3,200 are located within the Richcraft lands (as illustrated by the boundaries within Exhibit 8.1) along with the following additional adjacent development initiatives outlined in Table 9.1
- An "Ultimate Build-Out" where approximately 2,000 additional dwellings would be completed (of which 250 are located within the Richcraft lands (as illustrated by the boundaries within Exhibit 8.1) and an additional 3,500 jobs created within the CDP lands along with the following additional adjacent development initiatives outlined in Table 9.1

It is critical to appreciate that the current development strategy of the Richcraft lands within the EUC Phase 3 Area indicate that no development will be anticipated prior to the 2031-time horizon (which is only 12 years away from the time of this MTS study) of the City's Transportation Master Plan. (See Section 9.8)

Table 9.1: Adjacent Developments

No.	Development	Study Referenced	Interim Year	Ultimate Build-out Year (Additional Development)
1	SmartReit Orléans Commercial Development	Stantec TIS (July 2016)	Retail: 183,000ft^2 Restaurant: 30,000 ft^2 Banks: 10,000 ft^2	n/a
2	East Urban Community Phase II	Delcan CTS (August 2013)	Residential: 700 units Mixed-Use: 320,000 ft^2	Residential: 700 units Mixed-Use: 315,000 ft^2
3	Mer Bleue Expansion Study Area	IBI MTS (April 2017)	Residential: 1,800 units Institutional: 90,000 ft^2 Commercial: 2.0 ha	Residential: 1,800 units Institutional: 85,000 ft^2 Commercial: 1.9 ha
4	Trails Edge	Castleglenn CTS (November 2016)	Residential: 1,560 units Institutional: 5 ha Commercial block: 5.7 ha	n/a
5	Avalon West	Castleglenn TIA (August 2016)	Residential: 1,900 units Institutional: 56,500 ft^2 Commercial: 50,000 ft^2	n/a
6	3490 Innes Rd.	Parson TIS (Dec. 2016)	Residential: 684 units	n/a
7	Chaperal Retail Plaza	Delcan CTS (May 2014)	Retail: 98,000 ft^2	n/a

It is acknowledged that the Chaperal Retail Plaza is on-hold.
Development of the adjacent properties noted in Table 9.1 will also likely occur at a slower rate depending on market conditions.

Exhibit 9.1: Adjacent Development Locations

9.1 TRAVEL PATTERNS

The base traffic volumes used in the MTS assume the section of Brian Coburn Blvd through to Navan Road is not open. As per discussions with City of Ottawa staff[3], it was agreed to use the base traffic volumes and make assumptions as to how much traffic would shift to Brian Coburn Blvd. (currently open to Navan Rd.), as the extension of Brian Coburn Blvd. would have impacts on the travel patterns within the study area. The approved **Master Transportation Study for the *Mer Bleue Expansion Study Area [MESA] (January 18th, 2018)*** relies on traffic assumptions provided by the City's modelling group regarding the Brian Coburn extension. To remain consistent with the MESA, similar traffic diversion assumptions were applied, which would result in the redirection of 40% of the traffic on Renaud Rd. going to Brian Coburn Blvd. and 5% of traffic to/from north of Innes Rd. The

3 E-mail with City of Ottawa Project Manager dated Oct. 20th, 2017

existing traffic volumes were redistributed to account for the above anticipated traffic pattern changes.

9.2 FUTURE BACKGROUND TRAFFIC

9.2.1 Background Traffic Growth – *Orphan Movements*

"*Orphan Movements*" were defined as those turning movements within the study area intersections for which growth can be anticipated but remain unaffected by the known adjacent development initiatives. Growth at these turning movements are attributed to further development intensification within existing developed areas or growth in areas not accounted for within this study. An annual growth rate of 1 percent was applied at the identified turning movements. It should be noted that background growth was not applied to other movements given the level of adjacent development growth assumed in this study.

9.3 TRIP GENERATION

The trip generation associated with the CDP area were estimated using the ITE Trip Generation Manual. The morning and afternoon peak hour rates were used to estimate the CDP area traffic volumes. The ITE trip generation manual is based on data collected throughout North America for suburban areas with low non-auto mode share. It is considered good practice to adjust the trip generation volumes to better reflect local conditions. The vehicle trip generation derived from the ITE data was converted to person trips by using a factor of 1.3 passengers per vehicle.

9.3.1 Existing Mode Share

Once the person trips were determined, they were divided into each travel mode by referencing the "*East Urban Community Mixed-Use Centre CDP Project Modal Share*[4]" memorandum. The report outlines the current travel patterns in the Orléans district (NCR 2011 Trans OD Survey – January 2013) for auto driver, auto passenger, transit and non-auto person trips. Table 9.2 depicts the current modal share for the Orléans district.

Table 9.2: 2011 TRANS Origin-Destination OD Survey - Orléans

Mode	*AM Peak (to/from district)*	*PM Peak (to/from district)*
Auto Driver	61% / 55%	56% / 64%
Auto Passenger	13% / 8%	10% / 21%
Transit	10% / 35%	32% / 12%
Non-Auto (Bike, walk, taxi, etc.)	16% / 2%	2% / 3%

4 "*East Urban Community (EUC) Mixed-Use Centre CDP Projected Modal Share*" Parsons (June 2014)

The Parsons memorandum also outlined the modal shares for the adjacent community east of the CDP lands (using City's regional TRANS existing conditions model). Table below depicts the regional model for zones 3410 and 3421.

Table 9.3: Existing Regional Model for Zones 3410 & 3421

Mode	*AM Peak (to/from district)*	*PM Peak (to/from district)*
Auto Driver	50% / 55%	65% / 55%
Auto Passenger	25% / 20%	20% / 25%
Transit	10% / 15%	10% / 10%
Non-Auto (Bike, walk, taxi, etc.)	15% / 10%	5% / 10%

The derived modal shares summarized in Table 9.3 was assumed to best represent existing conditions for the CDP area given its similarity to the adjacent community (zones 3410 and 3421) in terms of proximity to transit, employment, shopping and other recreational opportunities.

9.3.2 Future Forecasted Mode Share

With the anticipated extension of LRT to Trim Rd. station by 2022, north-south transit bus service between the study area and the future LRT stations is anticipated to be encouraged. The advent of formalizing these north-south transit service enhancements could be used to potentially increase the transit share within the study area from its current 10 percent mode share. At this point it remains difficult to determine the impact that such enhancements would have upon the future transit share.

Given that the Cumberland Transitway is not currently planned until sometime beyond the 2031 horizon year, the City's ridership target rate is not expected to be reached by the 2031 timeline of the City's TMP.

Given the above, and for the purpose of this study, Table 9.4 serves to document a conservative modal share assumption that the Cumberland Transitway will not be in place by the Interim and Ultimate build-out year of the EUC Phase 3 area which is well beyond 2031.

Table 9.4: Future Mode Share

(Interim and Ultimate Build-Out Time Horizon)

Mode	*Peak Hour*	*Rationale*
Auto Driver	60%	Auto mode to remain similar to existing mode share
Auto Passenger	15%	
Transit	20%	Slight increase in Transit due to LRT north of the study area by 2023.
Non-Auto (Bike, walk, taxi, etc.)	5%	

9.3.3 Internal Trips

Internal trips between the employment areas and residential land uses are anticipated within the CDP area. For the purpose of this analysis, it was assumed that approximately 7% of the residential trips would be to/from the employment area (this was in order of 115 vph in the peak direction which were assumed to remain internal to the EUC Phase 3 lands). The residential traffic volumes (115 vph) were subtracted from the employment trips to avoid double counting.

9.3.4 Pass-By Trips

Pass-by trips are trips generated by land uses that are already en-route to their destination. Pass-by trips were assumed for the commercial/retail component of the development.

9.3.5 Trip Generation Summary

Table 9.5 below provides the net vehicular trip generation volumes within the EUC Phase 3 CDP area that were applied to the study area roadway network. Appendix "B" illustrates in details the trip generation rates and the site traffic volumes for all modes of transportation for the CDP area.

Table 9.5: Vehicular Net Trip Generation Summary

Land Use	***Morning Peak Hour***			***Afternoon Peak Hour***		
	IN	***OUT***	***Total***	***IN***	***OUT***	***Total***
Interim Time Horizon						
Residential Trips	290	1,140	1,430	1,151	615	1,766
Employment Trips	214	102	316	114	222	336
Total	**504**	**1,242**	**1,746**	**1,265**	**837**	**2102**
Ultimate Build-Out Time Horizon						
Residential Trips	407	1,445	1,852	1,450	820	2,270
Employment Trips	855	185	1,040	259	833	1,093
Total	**1,262**	**1,630**	**2,892**	**1,709**	**1,653**	**3,363**

9.4 TRIP DISTRIBUTION

The 2011 Origin-Destination (OD) Survey was reviewed to estimate the traffic distribution patterns likely to be in place during the time of ultimate build-out of the EUC Phase 3 Area. A different distribution pattern was adopted for both residential and employment land uses within the EUC Phase 3 area.

Residential Traffic Distribution: The distribution patterns applied to the residential land uses within the study area are provided below:

- 47% to/from the west;
- 27% to/from the north;

- 17% to/from the east;
- 2% to/from the south; and
- 7% remains within the CDP area (internal).

Employment Traffic Distribution The employment areas with the study area were distributed as follows:

- 25-to-30% to/from the west;
- 30-to-35% to/from the north;
- 35% to/from the east; and
- 5% to/from the south.

The route selection and assignment for each zone was based on a number of factors such as: shortest path, road classification and engineering judgment in favour of those routes most likely to be taken by motorists. The routing exercise resulted in detailed turning movement volumes at study area intersections.

9.5 Forecasted Traffic Volumes

Forecasted total traffic volumes anticipated during the time of interim and ultimate build-out were determined by adding the following layers of traffic:

- existing traffic volumes;
- traffic volumes generated by adjacent developments; and
- Site generated traffic volumes

Appendix "C" serves to illustrate forecast site generated and total traffic volumes.

9.6 Intersection Capacity Analysis

An intersection capacity analysis was undertaken for the study area intersections using Synchro 10™ (traffic control signals and stop controlled intersections) and Sidra (roundabouts) software. For the purpose of this study, a volume-to-capacity (v/c) ratio greater than 0.90 was considered critical. The results are summarized in Tables 9.6 thru 9.8.

9.6.1 Existing Traffic Analysis

An intersection capacity analysis was undertaken for the study intersections using the existing traffic volumes illustrated in Exhibit 5.2 (See Appendix "A" for detailed Synchro sheets).

Table 9.6: Existing Traffic Analysis

Intersection		Morning Peak Hour				Afternoon Peak Hour			
Intersections	*Traffic Control*	*Overall LOS*	*Critical Approach*			*Overall LOS*	*Critical Approach*		
			Movement	*LOS*	*V/C*		*Movement*	*LOS*	*V/C*
Innes / Mer Bleue	Signalized	D	WB-TH	D	**0.95**	E	**EB-TH SB-LT**	**F**	**1.06 0.96**
Innes / Frank Bender	Signalized	C	WB-TH	C	0.82	D	**NB-LT**	**F**	**1.07**
Innes / Viseneau	Signalized	C	WB-TH	C	0.82	C	EB-TH	C	0.90
Innes / Pagé	Signalized	C	WB-TH	C	0.82	C	WB-LT	**F**	**0.93**
Innes / Orléans	Signalized	**F**	**WB-TH**	**F**	**1.27**	D	**EB-TH**	**F**	**1.05**
BHP / Navan	Signalized	D	**WB-TH**	**F**	**1.03**	D	**EB-TH**	D	**0.99**
Brian Coburn / Mer Bleue	Roundabout	B	WB	C	0.97	A	WB	B	0.51
Renaud / Mer Bleue	Stop Control	B	SB	B	0.48	C	EB	D	0.83
Renaud / Navan	Signalized	C	WB-T/RT	C	0.77	B	EB-TH	B	0.51

The results of the existing intersection capacity analysis (Table 9.6) indicated that:

- Some intersections along the Innes Rd. corridor operate at a congested level of service during peak demand periods.
- The SB left-turn movement at Innes Rd. / Mer Bleue Rd. operates at a congested level of service with v/c ratio of 0.96. Although this movement is accommodated by a double left-turn lane, the failure level of service is due to several heavy movements competing for signal timing.
- The NB left-turn movement at Innes Rd. / Frank Bender operates at a congested level of service with a high v/c ratio during the afternoon peak hour. There is currently over 300 vph making the movement (motorists exiting the shopping plaza) that are competing with other movements for signal timing.

9.6.2 Forecast (Interim) Traffic Analysis

An intersection capacity analysis was undertaken for the study area intersections using the interim forecast total traffic volumes. The road network assumes the extension of Brian Coburn Blvd. to Navan Road (currently open).

Table 9.7 depicts the overall level of service and critical movements at the study area intersections (See Appendix "D" for detailed Synchro sheets).

Table 9.7: Forecast Intersection Capacity Analysis Results
Interim Time Horizon

Intersection		Morning Peak Hour				Afternoon Peak Hour			
Intersections	***Traffic Control***	***Overall LOS***	***Critical Approach***			***Overall LOS***	***Critical Approach***		
			Movement	***LOS***	***V/C***		***Movement***	***LOS***	***V/C***
Innes / Mer Bleue	Signalized	D	WB-TH	F	**1.01**	**F**	**EB-TH SB-LT WB-LT NB-LT**	**F**	**1.24 1.23 1.34 1.11**
Innes / Frank Bender	Signalized	C	WB-TH	C	0.85	E	**NB-LT WB-LT EB-TH**	**F**	**1.07 1.20 1.17**
Innes / Viseneau	Signalized	C	WB-TH	C	0.83	C	EB-TH	C	**0.97**
Innes / Pagé	Signalized	B	WB-TH	B	0.91	C	WB-LT	**F**	**1.41**
Innes / Orléans	Signalized	D	**WB-TH**	**F**	**1.03**	E	**EB-TH**	**F**	**1.14**
BHP / Navan	Signalized	E	**WB-TH NB-LT**	**F**	**1.08 1.05**	D	**EB-TH**	**F**	**1.05**
Brian Coburn / Mer Bleue	Roundabout	**F**	**WB**	**F**	**2.19**	**F**	**WB EB**	**F**	**1.26 1.74**
	4-lane Brian Coburn	C	WB	C	0.89	C	WB EB	A C	0.52 0.71
Renaud / Mer Bleue	Stop Control	C	SB	C	0.74	**F**	**EB SB**	**F**	**1.22 1.38**
	Roundabout	B	NB	B	0.58	C	EB	E	1.10
	Traffic Control Signal	A	NB	B	0.53	C	EB-LT	C	0.76
Renaud / Navan	Signalized	**F**	**WB-T/RT EB-LT NB-LT SB-T/RT**	**F F F D**	**1.25 1.02 1.81 0.94**	C	EB-LT	C	0.85
	Dedicated SB-RT Lane	D	WB-T/RT EB-LT NB-LT SB-RT	E C D E	0.93 0.72 0.82 0.95	C	EB-LT	C	0.84
Brian Coburn / Fern Casey	Roundabout	C	WB SB	C	0.76 0.74	**F**	**EB**	**F**	**1.01**
	4-lane Brian Coburn	B	WB SB	A B	0.33 0.63	A	EB	A	0.44
Brian Coburn / Navan	Roundabout	**F**	**WB**	**F**	**2.45**	**F**	**SB NB**	**F**	**1.62 1.22**
	4-lane Brian Coburn	A	WB-LT	C	0.73	A	SB-TH NB-TH	A B	0.80 0.68
Fern Casey / Frank Bender	Roundabout	A	EB	A	0.24	A	NB	A	0.33
Frank Bender / Vanguard Extension	Roundabout	A	NB	A	0.30	A	SB	A	0.42
Innes / Caivan Access	Signalized	C	NB-LT	E	0.79	B	NB-LT	D	0.60
Mer Bleue / Vanguard Extension	Signalized	A	EB-LT	D	0.64	A	EB-LT	D	0.57

- *Innes Rd. Corridor Intersections*: The Innes Rd. corridor continues to operate at a congested level of service during the peak demand periods. Improvements to the Innes Rd. intersections are not feasible due to the limited ROW width, especially from Mer Bleue Rd. to Orléans Blvd.

- *Innes Rd / Caivan Access*: The intersection operates at an overall satisfactory LOS "C" during the morning peak hour. The critical movement is the NB-LT, which operates LOS "E" with satisfactory v/c ratio of 0.79.
- *Renaud Rd. / Navan Rd.:* This intersection operates at a failure level of service during the morning peak hour. Several movements exhibit LOS "F" with v/c ratios above 0.90.
  - Given that widening of Navan Rd. is not within the 2031 TMP affordable plan and there is limited ROW along Renaud Rd., a potential feasible solution in the interim would be to implement a dedicated SB right-turn lane from Navan Rd. onto Renaud Rd. This would facilitate over 300 vph forecasted to make the movement during the morning peak hour. The improvement would alleviate pressure on other movements resulting in improved LOS.
- *Mer Bleue Rd. / Renaud Rd.*: The intersection operates at a congested LOS "F" during the afternoon peak hour assuming an All-Way Stop Control.
  - A roundabout was simulated at the intersection that results in an overall LOS improvement of "C" during the afternoon peak hour. The EB movement does operate at a high v/c ratio with a LOS "E" during the afternoon peak hour. However, it should be noted that the feasibility of the 3-leg roundabout depends on the right-of-way requirements and future plans for the realignment of Mer Bleue.
  - Given the above, the intersection was also simulated assuming a traffic signal with auxiliary lanes (NB-LT, SB-RT and EB-RT). The intersection was found to operate at an overall satisfactory LOS "C" during the afternoon peak hour with the EB-LT as a critical movement.

The EUC Phase 3 Area CDP study area intersection capacity results indicate that:

- *Brian Coburn Blvd. Intersections*:
  - The intersections at Mer Bleue Rd., Fern Casey Blvd. and Navan Rd. operate at a congested level of service during peak periods. This indicates that should development progress within the CDP area, Brian Coburn Blvd would require widening to 4-lanes by interim horizon year approaches.
  - The intersection at the Future Collector #2 (located in approximately mid-way between Mer Bleue and Fern Casey) can be assumed to be a roundabout or a right-in/right-out. The intersection configuration would also depend on the triangular lands[5] (located west of Mer Bleue, north of Brian Coburn and south of the Hydro corridor) and their access location. In either case (right-in/right-out or roundabout), the Future Collector #2 intersection (which initially would be configured as a T-intersection) is anticipated to operate at satisfactory level of service.
  - The widening of Brian Coburn results in satisfactory level of service at Mer Bleue, Fern Casey and Navan intersections. The Navan Rd. / Brian Coburn Blvd would also require auxiliary lanes along Navan Rd. to facilitate left-turn and right-turn movements onto Brian Coburn Blvd.

5 Triangular lands assumed to be build-out by ultimate build-out year for the purpose of this MTS

- *Mer Bleue Rd. / Vanguard Ext.*: The intersection is assumed to be configured as a traffic control signal once Vanguard is connected to Mer Bleue Rd. The intersection operates at a satisfactory level of service during both peak AM and PM periods.
- *Roundabouts within the CDP Area*: Roundabouts at Fern Casey / Future Collector #1 and Fern Casey/Frank Bender/Vanguard Extension are recommended. Both roundabouts operate at a satisfactory level of service during both peak hours.

9.6.3 Forecast (Ultimate Build-out) Traffic Analysis

An intersection capacity analysis was undertaken for the study intersections using the ultimate build-out forecast traffic volumes. The future road network assumes Brian Coburn Blvd. to be a 4-lane facility. Table 9.8 depicts the overall level of service and critical movements. (See Appendix "D"). The intersection capacity analysis results indicate:

- *Innes Rd. Corridor Intersections*: The Innes Rd. corridor would continue to operate at a congested level of service during AM & PM peak travel demand periods. The constrained movements result in increased v/c ratios as a result of further development within the study area. The study area would require additional transit and roadway infrastructure to accommodate the growth within the study area.
- *Innes Rd / Caivan Access*: The intersection continues to operate at an overall satisfactory LOS "C" during the morning peak hour. The critical movement remains to be the NB-LT, which continues to operate at a satisfactory v/c ratio.
- *Navan Rd. / Renaud Rd.*: This intersection operates at an overall LOS "E" during both peak hour travel demand periods. Several peak direction movements operate at a failure level of service with v/c ratios above 0.90.
  - The results indicate that widening of Navan Rd. should be considered at the ultimate full-build-out horizon year. By widening Navan Rd., the intersection operates at a satisfactory LOS.
- *Mer Bleue Rd. / Renaud Rd.*: With a single lane roundabout and 2-lanes on Mer Bleue Rd., the intersection experiences congested level of service during the AM & PM peak hour periods.
  - A 4-lane Mer Bleue with dedicated EB left-turn and right-turn lanes results in a satisfactory level of service. The City of Ottawa identifies a new realigned 4-lane Mer Bleue Rd. from Renaud Rd. to Navan Rd. as part of the Network Concept. As there is no timeline for this improvement the new section of road is dependent on development growth. Constructing a roundabout at this location depends on the ROW requirement and the realignment of Mer Bleue Rd.
  - A traffic signal assuming a 2-lane Mer Bleue Rd. results in a satisfactory overall LOS with v/c ratios above 0.90 in the EB direction and SB direction. This further indicates that realignment of the 4-lane Mer Bleue Rd. should be monitored approaching ultimate full build-out year depending on how development progresses within the study area.

Table 9.8: Forecast Intersection Capacity Analysis Results

Ultimate Build-out Time Horizon

Intersection		Morning Peak Hour				Afternoon Peak Hour			
Intersections	*Traffic Control*	*Overall LOS*	*Critical Approach*			*Overall LOS*	*Critical Approach*		
			Movement	*LOS*	*V/C*		*Movement*	*LOS*	*V/C*
Innes / Mer Bleue	Signalized	E	WB-TH NB-LT SB-LT	**F**	**1.08** **0.95** **0.94**	**F**	**EB-TH** **SB-LT** **WB-LT** **NB-LT** **SB-TH**	**F**	**1.39** **1.32** **1.53** **1.34** **1.05**
Innes / Frank Bender	Signalized	C	WB-TH	C	0.89	**F**	**NB-LT** **WB-LT** **EB-TH**	**F**	**1.05** **1.26** **1.27**
Innes / Viseneau	Signalized	C	WB-TH	C	0.85	D	**EB-TH** **WB-LT**	**F**	**1.01** **0.98**
Innes / Pagé	Signalized	B	WB-TH	B	0.91	D	**WB-LT**	**F**	**1.78**[3]
Innes / Orléans	Signalized	E	**WB-TH**	**F**	**1.10**	**F**	**EB-TH** **EB-LT** **WB-TH**	**F** **F** **E**	**1.30** **1.00** **1.00**
BHP / Navan	Signalized	**F**	**WB-TH** **NB-LT**	**F**	**1.24** **1.13**	D	**EB-TH** **NB-LT** **WB-LT**	**F**	**1.16** **1.11** **1.08**
Brian Coburn / Mer Bleue	4-lane Brian Coburn	**F**	**WB**	**F**	**1.21**	**F**	**NB** **SB** **EB**	**F**	**1.00** **1.24** **0.98**
	Channelized dedicated RT lanes on all approaches[2]	C	WB-RT	C	0.74	E	NB-T/LT SB-TH EB-T/LT	B E C	0.62 **0.95** 0.75
Renaud / Mer Bleue	Roundabout	C	**NB**	**F**	**1.00**	**F**	**EB** **SB**	**F**	**1.68** **1.16**
	4-lane Mer Bleue & dedicated EB LT/RT lanes	A	NB	A	0.41	B	EB-LT SB	D A	**0.96** 0.50
	Traffic Signal-2-lane Mer Bleue	B	NB	0.66	B	D	EB-LT SB-TH	E D	**0.96** **0.96**
Renaud / Navan	Dedicated SB-RT Lane	E	WB-T/RT EB-LT NB-LT SB-RT	**F** D E **F**	**1.07** 0.70 0.89 **0.98**	E	**EB-LT** **WB-T/RT** **SB-TH**	**F**	**1.00** **1.11** **0.96**
	4-lane Navan Channelized SB-RT lane[1]	D	WB-T/RT EB-LT NB-LT	D C D	0.90 0.71 0.79	C	EB-LT WB-T/RT SB-TH	C D C	0.84 0.83 0.69
Brian Coburn/Fern Casey	4-lane Brian Coburn	B	SB	B	0.68	A	EB	A	0.53
Brian Coburn / Navan	4-lane Brian Coburn	D	**WB-LT** **NB-TH**	**F**	**1.32** **1.03**	D	**SB-TH** **NB-TH**	**F**	**1.16** **1.11**
	4-lane Navan	A	WB-LT NB-TH	C A	0.81 0.59	B	SB NB	B C	0.89 0.94
Fern Casey / Frank B.	Roundabout	A	EB	A	0.23	A	NB	A	0.35
Frank B / Vanguard	Roundabout	A	NB	A	0.36	A	SB	A	0.45
Mer Bleue / Vanguard	Signalized	B	EB-LT	D	0.68	B	EB-LT	D	0.63
Innes / Caivan Access	Signalized	C	NB-LT	E	0.85	B	NB-LT	E	0.69
Brian Coburn/Triangle Land Access	Roundabout	A	WB	A	0.29	A	EB	A	0.69

1- Delay for channelized RT movements are excluded from intersection delay calculations. 2. If ROW is available to include dedicated RT lanes.

3- With Pagé Rd Cul-de-Saced, the WB left-turn movement is expected to be reduced. Base traffic volumes were undertaken at time when Pagé Rd was open. The high v/c ratio is due to high thru volumes where the left-turn is not afforded enough gaps. Changing the phasing from permitted to protected/permitted phase does improve the v/c to ~ 1.00. However, this would impact on the WB through movement.

The EUC Phase 3 area intersection results indicate that:

- *Brian Coburn Blvd. Intersections*: The intersections at Mer Bleue Rd. and Navan Rd. operate at a congested level of service during the AM & PM peak periods of travel demand. Further improvements would be required at the two intersections.
    - Navan Rd. would require widening to 4-lanes to accommodate additional growth within the study area. The Brian Coburn Blvd / Navan Rd. intersection would operate at a satisfactory level of service with 4-lanes on Navan Rd.
    - The Mer Bleue Rd. / Brian Coburn Blvd would require auxiliary right-turn lanes at all approaches to separate the right-turn movements from through/left-turn movements. This would result in satisfactory level of service.
    - For the purpose of this MTS, it was assumed that once the mixed-use block is developed, an access opposite Future Collector #2 would be provided. The intersection was assumed to be a roundabout, which results in satisfactory level of service. However, access to the mixed used block could also be configured as right-in/right-out if preferred.
- *Mer Bleue Rd. / Vanguard Extension*: The intersection continues to operate at a satisfactory level of service during both peak hour travel demand periods as a traffic control signal.
- *Roundabouts within CDP Area*: Roundabouts at Fern Casey / Future Collector #1 and Frank Bender/Fern Casey/Vanguard Extension continue to operate at a satisfactory level of service during both peak hour travel demand periods.

9.7 SUMMARY OF INFRASTRUCTURE IMPROVEMENTS

Table 9.9 summarizes the infrastructure improvements that fall within the EUC Phase 3 Area. The infrastructure improvements should be confirmed by subsequent traffic studies for each phase of the EUC Phase 3 development.

Table 9.9: EUC Phase 3 Area Proposed Improvements

Corridors	***Interim Year***	***Ultimate Build-out***
Brian Coburn Corridor (Mer Bleue to Navan)	Widening Brian Coburn to 4-lane facility was found to be required to provide more east-west capacity. This is dependent on how development progresses within the study area.	
Intersections	***Interim Year***	***Ultimate Build-out***
Mer Bleue / Brian Coburn		Dedicated RT lanes along all approaches
Mer Bleue / Vanguard	Traffic Control Signal	Traffic Control Signal

The forecast interim and ultimate build-out traffic conditions and infrastructure improvements outlined in this section (and Sections 9.6.2, 9.6.3 & 9.7) assume a significant portion of the EUC Phase 3 Area and adjacent development lands (Table 9.1) would be completed. This interim and ultimate build-out assumptions were developed to establish the traffic impacts and infrastructure requirements on the study area roads and intersections. However, the anticipated build-out of the EUC Phase 3 Area and Richcraft lands in particular are not anticipated to occur within the next decade. The Richcraft lands (See Exhibit 8.1) are anticipated to commence development well beyond the TMP horizon year of 2031.

Development and the Brian Coburn Corridor

A realistic high-level assumption was produced for the EUC Phase 3 Area to determine the impact within the City's TMP 2031 time-lines specifically to determine the impacts to the Brian Coburn Blvd corridor. Currently the widening of Brian Coburn Blvd. to a 4-lane cross-section from Mer Bleue Rd. to Navan Rd. is not in the "affordable projects" category of the City's Development Charge projects and is not funded. Table 9.10 illustrates the potential traffic impacts upon the Brian Coburn Blvd. corridor anticipated to occur during the 2026 horizon year. The forecasts are based upon a more realistic development growth scenario for the EUC Phase 3 Area. The table assumes:

- the Richcraft EUC Phase 3 Area is very unlikely to commence development within the next 7 years. Richcraft's development plans would only commence after the Trails Edge East community (bordered by Renaud Rd. to the south, Page Rd. to the west, Brian Coburn Blvd. to the north and Mer Bleue Rd. to the east) to the south have been built-out.
- The development potential of the entirety of the Trails Edge lands is approximately 2,000-to-2,500 units.

- Richcraft's development rate of Trails Edge has historically been in the area of roughly 72 units/year for the lands south of Brian Coburn Blvd. Extrapolating between 2019-and-2026 would see an addition 500 units within the Trails Edge community adding approximately 60 vph to the peak direction of travel along Brian Coburn Blvd.
- Richcraft had already completed (2019) approximately 400 dwellings within the Trails Edge lands. This translates to an existing estimate of approximately 50 vph that currently use the 2-lane Brain Coburn Blvd corridor and a future development capacity from 2019 on of approximately 1,600-to-2,100 units before Trails Edge is built-out.
- a 3% growth rate along Brian Coburn Blvd. corridor over the next 7-years as a result of surrounding adjacent development was taken into consideration. This impact would see an additional 180-to-190 vph in the peak direction of demand upon the Brian Coburn Blvd corridor.

Conclusion: The more realistic development scenario results in the conclusion that a 2-lane Brian Coburn Blvd. could suffice by the 2026 horizon year. The Mer Bleue Rd. / Vanguard Extension intersection is dependent on the timing of the westerly extension of Vanguard to Mer Bleue Rd.

Table 9.10 Brian Coburn (Navan to Mer Bleue)
2026 Forecast Traffic Impacts *(Two-Way Volumes)* - (vph = Vehicles per hour)

	Brian Coburn (Fern Casey to Navan) West Side		***Brian Coburn (Mer Bleue to Fern Casey) East Side***	
Contribution	***Morning Peak Hour***	***Afternoon Peak Hour***	***Morning Peak Hour***	***Afternoon Peak Hour***
Likely Richcraft Development in EUC Phase 3 CDP lands up to 2026 – Fern Cassey is not anticipated to be extended northward	0	0	0	0
Richcraft: New Trails Edge East Units Contribution (500 units over 7 years)	51	63	23	30
Richcraft: Completed 2019 Units Trails Edge Contribution (~400 units)	41	51	18	24
Richcraft Anticipated Contribution (2026)	92 (9%)	114 (12%)	41 (4%)	54 (5%)
Existing Traffic from All Other Lands (2019) – Excluding Trails Edge	780	700	829	879
All Other Lands (2019-to 2026) 3% growth/annum	172	158	178	190
Total Impact (2026)	**1,044-to-1,125[1]**	**972-to-1,310[1]**	**1,048**	**1,123**

1. Values noted in forecast volumes

Table 9.11 summarizes a similar approach that was undertaken depicting the impacts along the Brian Coburn Blvd. corridor assuming a 2031 horizon year.

***Table 9.11: Brian Coburn** (Navan to Mer Bleue)* ***2031 Forecast Traffic Impacts** (Two-Way Volumes)* - (vph = Vehicles per hour)				
	Brian Coburn (Fern Casey to Navan) West Side		***Brian Coburn (Mer Bleue to Fern Casey) East Side***	
Contribution	***Morning Peak Hour***	***Afternoon Peak Hour***	***Morning Peak Hour***	***Afternoon Peak Hour***
Likely Richcraft Development in CDP lands up to 2031:	0	0	0	0
Richcraft: New Trails Edge East Units Contribution (+360 units for a total 860 units)	87	107	39	51
Richcraft: Completed 2019 Units Trails Edge Contribution (~400 units)	41	51	18	24
Richcraft Anticipated Contribution (2031)	128 (11%)	158 (14%)	57 (5%)	75 (6%)
Existing Traffic from All Other Lands (2019) – Excluding Trails Edge	780	700	829	879
All Other Lands (2019-to 2031) - 12 years 3% growth/annum	281	252	298	316
Total Impact (2031)	**1,189-to-1,400[1]**	**1,110-to-1,600[1]**	**1,184**	**1,270**

Once again, the Richcraft lands within the CDP area are not anticipated to commence by 2031 as development would continue within the Trails Edge area over the next 12 years. Table 9.11 indicates that:

- An additional 360 units would be anticipated to be constructed over the following 5-years (from 2026 to 2031) beyond 2026 within the Trails Edge community. This is anticipated to result in an additional 40 vph in the peak direction along Brian Coburn Blvd.
- The study assumes a 3% growth along Brian Coburn Blvd. over this additional 5-year (from 2026 to 2031) period resulting in an additional 120-to-130 vph in the peak direction along Brian Coburn Blvd. that can be attributed to adjacent developments in the area.

Conclusion: The timing of Brian Coburn Blvd. widening to a 4-lane cross-section may not be warranted by the 2031-time horizon of the City's TMP. Despite this finding, the next TMP should ideally review the timing of the need for widening of the corridor. Once again, the Mer Bleue Rd. / Vanguard Extension is dependent on the timing of the westerly extension of Vanguard to Mer Bleue Rd.

9.8 SUMMARY OF SUPPORTING ADJACENT REGION-WIDE INFRASTRUCTURE IMPROVEMENTS

Table 9.12 summarizes the adjacent region-wide infrastructure improvements that are needed to support the entire lands south of Innes Rd. and east of Navan Rd. be addressed.

Table 9.12: Supporting Adjacent Region-Wide Proposed Improvements

Corridors	***Interim Year***	***Ultimate Build-out***
Navan Rd (Renaud to Brian Coburn)		Widen from 2-lane to 4-lane. This is dependent on how development progresses within the study area.
Intersections	***Interim Year***	***Ultimate Build-out***
Navan / Brian Coburn	Widen Navan at the intersection to provide a separate SB left-turn lane and NB Right-turn lane along Navan to separate the heavy through movements from turning movements. This would require widening to a 2-lane roundabout.	
Navan / Renaud	Dedicated SB right-turn lane from Navan onto Renaud Rd. The storage length was assumed to be 70m[1].	Channelized SB right-turn movement
Mer Bleue / Renaud	Convert the All-Way Stop control to a single lane roundabout or traffic control signal. If traffic control signal[3], storage length calculated from Ultimate build-out requirements. - EB-RT = 50m storage - NB-LT = 45m storage - SB-RT = 80m storage	Roundabout: Expansion to a 2-lane roundabout would be required with Dedicated EB LT and RT lane along Renaud Rd[2] If traffic control signal: - EB-RT = 50m storage - NB-LT = 45m storage - SB-RT = 80m storage
Innes / Caivan Access	Traffic Control Signal	Traffic Control Signal

1- Assuming a cycle length of 120 sec, a storage length of 115m is required. However, RT lane is constrained by Pagé Rd intersection with Navan, therefore a 70m storage length to allow for taper length.
2- The City of Ottawa identifies a new realigned 4-lane Mer Bleue Rd. from Renaud Rd. to Navan part of the Network Concept. Therefore, there is no timeline for this improvement. The new section of Rd. is dependent on the development growth within the study area (especially south Renaud Rd.).
3- The storage lanes were calculated based on a cycle length of 100 sec.

9.9 MULTI-MODAL LEVEL OF SERVICE (MMLOS)

A Multi-Modal Level of Service (MMLOS) evaluates the convenience and comfort level of all roadway users at intersections and roadway segments. The MMLOS was undertaken to evaluate the:

- *Pedestrian Level of Service (PLOS)*: The PLOS evaluates and quantifies the pedestrian comfort, safety and convenience. The segment analysis evaluates the quality of the pedestrian facility, while the intersection analysis evaluates pedestrian delay and exposure to traffic at signalized intersections.
- *Bicycle Level of Service (BLOS)*: The BLOS evaluates the level of stress cyclists experience using the roadway segment and traffic control signal intersections.
- *Transit Level of Service (TLOS)*: The TLOS evaluates the transit travel time and priority afforded to the buses based on different facilities and conditions. The level of service for

transit in the MMLOS Guidelines is intended to be determined along roadways with rapid transit or transit priority measures.

- *Truck Level of Service (TkLOS)*: The TkLOS accounts for the physical space provided for trucks to negotiate corners and operate safely within the travelled lanes. Given that the study area corridors are not anticipated to be designated as truck routes, the TkLOS was not assessed as part of this MTS. However, corridor with regular bus routes would need to ensure that transit vehicle movements can be accommodated (i.e. curb radii, width, etc.).

The intersection MMLOS is only applied at signalized locations. A traffic control signal is assumed at the Mer Bleue Rd. / Vanguard Extension intersection. However, given several factors are unknown at this point (such as crosswalk treatment, corner radius, exact crossing distances, cycling facility configuration at the intersection, etc.) at this early stage, intersection MMLOS was not undertaken as part of this MTS.

The roadway segments that were included in the MMLOS analysis include the collector roads within the CDP area: Fern Casey Blvd, Vanguard Extension, Frank Bender St., Future Collector #1 and Future Collector #2. Given all were assumed to have a 24m ROW and a similar cross-section (as illustrated in Exhibit 8.5), the MMLOS applies to all four collector roads.

Table 9.13: Segment MMLOS

Road Segment	PLOS		BLOS		TLOS	
	Actual[1]	Target[4]	Actual[2]	Target[4]	Actual[3]	Target[4]
Collector Roads	B	C	A	C	D	NA

1- Assumes a 2m sidewalk, 0.5-to-2m Blvd, on-street parking, >3,000 AADT
2- Assumes a physical separated bikeway (MUP)
3- Assumes mixed traffic transit type facility (no dedicated bus routes along collector roads) and limited friction (driveways/parking frictions)
4- Assumes General Urban Area as per Exhibit 22 of MMLOS Guidelines

10.0 REGIONAL IMPACTS

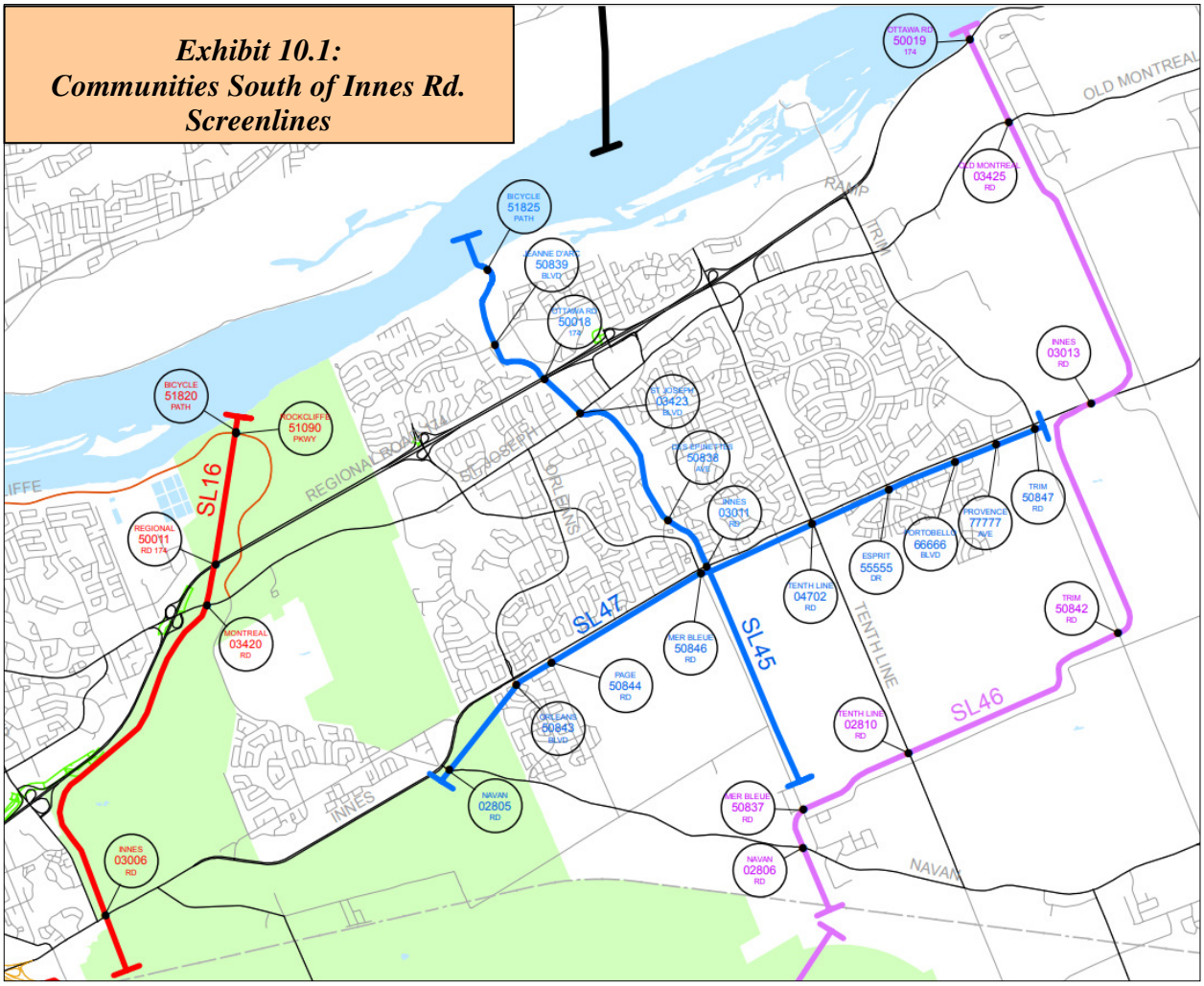
The development of all lands to the east of the Greens Creek screenline (SL-16 – See Exhibit 10.1) will result in continued increasing transportation demand for additional east-west travel. The transportation infrastructure, which currently comprise this screenline include:

- Rockcliffe Parkway (2-lane Urban Parkway Undivided);
- Highway 174 (4-lane Urban Freeway Divided with dedicated Transit lanes in each direction);
- St. Joseph Blvd. (4-lane Urban Arterial Divided); and
- Innes Rd. (6-lane Urban Arterial Divided).

Currently, the east-west peak period travel demands crossing this screenline can best be described as congested. Analysis of the Blair Rd./Innes Rd. intersection station, in particular, during the peak hours of travel demand represent critical traffic operational conditions.

An evaluation of current transit demand in the study area indicated that the Orléans district (NCR 2011 Trans OD Survey – January 2013) transit characteristics:

- associated with the new community south of Innes Rd. and east of 10th Line Rd. is in the order of 10%; and
- associated with the established Orleans community is in the order of 30-to-35%.



10.1 Screen-line Evaluation and Analyses

a) The Transportation Master Plan Evaluation

The City's TMP[6] provided analyses along several screenline corridors which highlights forecast travel demand compared to future available capacity for several regional screenline corridors.

Table 10.1 highlight extracts from an evaluation that was carried out as part of the TMP initiative and indicated existing and forecast volume-to-capacity results for the various screenlines within the

6 *"Transportation Master Plan Update – Road Network Development Report" (Sept. 2013),* Exhibits 3-4 and 4.8

regional area surrounding the proposed CDP lands. The report presents v/c ratios for the following time horizons:

- a 2011 Base Scenario (Do-Nothing);
- a 2031 Base Scenario (includes existing roads and projects under construction or committed for implementation); and
- a 2031 Network Concept (includes additional projects arising from new CDPs, EAs and other studies).

The report presents v/c ratios for the following screenlines within the study area:

- *Billberry Creek Screenline (No.45)* runs north-south along Billberry Creek and Mer Bleue Rd. between Navan Rd. and the Ottawa River;
- *Frank Kenny Road Screenline (No.46)* runs north-south along Frank Kenny from Ottawa River down along Trim Rd. and ends south of Navan Rd. / Tenth Line Rd.;
- *Innes Rd. Screenline (No.47)* runs east-west along Innes Rd. from Trim Rd. to Navan Rd.; and
- *Greens Creek Screenline (No.16)* runs north south between the Blackburn Hamlet and Beacon Hill communities on the south side of the Hwy 174 corridor and east of Blair Rd.

Table 10.1 provides a summary of this TMP information and clearly indicates that the Greens Creek Screenline (SL-16) is characterized by deficient residual capacity during the morning peak hour of travel demand.

Table 10.1: Screenline Analysis (TMP Update)

Scenario	***Screenline***	***Inbound (Morning Peak Hour)***		
		Vehicles	***Capacity***	***V/C Ratio***
2011 Base Network[1]	Billberry Creek (SL 45)	6,179	8,000	0.77
	Frank Kenny (SL 46)	2,224	7,800	0.29
	Innes Rd (SL 47)	2,277	7,600	0.30
	Greens Creek (SL-16)	9,512	8,800	**1.08**
2031 Base Network[1]	Billberry Creek (SL 45)	7,871	8,400	**0.94**
	Frank Kenny (SL 46)	3,678	10,200	0.36
	Innes Rd (SL 47)	4,172	7,200	0.58
	Greens Creek (SL-16)	10,739	8,800	**1.22**
2031 Network Concept[2]	Billberry Creek (SL 45)	7,681	11,600	0.66
	Frank Kenny (SL 46)	3,880	9,800	0.40
	Innes Rd (SL 47)	4,278	12,200	0.35
	Greens Creek (SL-16)	10,897	10,600	**1.03**

* Source: "*Transportation Master Plan Update – Road Network Development Report (Sept. 2013)*
1- Exhibit 3-4: Screenline and Cordon Travel Volumes (Motorized Travel Modes) – Inbound 2011 and 2031 Base (Do-Nothing) Scenario
2- Exhibit 4-8: Screenline and Cordon Travel Volumes (Motorized Travel Modes) – Inbound 2031 Base Scenario and 2031 Network Concept

As part of the Regional traffic assessment, an analysis was conducted to estimate the impact of development upon the Greens Creek Screenline and its more critical intersections such as the Innes Rd./Blair Rd. intersection.

b) The Impact of East Urban Community Phase 3 Area on the Greens Creek Screenline

The development of the EUC Phase 3 Area represents a component in the overall development potential of the community south of Innes Rd. and as such a Region-wide perspective is required to assess the ultimate pressures that are anticipated to be exerted upon the Greens Creek Screenline.

The traffic analysis and assumptions adopted for the EUC Phase 3 Area concluded the following:

- The buildout of the entire community was assumed to be comprised of a maximum of approximately 5,500 dwellings and 4,800 employees, (of which ~ 3,200 units represent Richcraft lands);
- The anticipated vehicle traffic generated by this development was determined to be an additional 3,460 two-way vehicle trips during the peak hour of travel demand assuming a peak direction 20% transit service level. Keeping in mind that the population/employment ratio at build-out is roughly 52% population-to-48% employment, the peak directional traffic volume was found to be 1,760 vehicles per hour during the peak hour of travel demand.
- The study assumptions included a 7% internalization assumption. This resulted in a reduction of 115 vehicle trips from the directional peak hour trips generated by the East Urban Community Phase 3 Area.
- Approximately 71% of the external trips could potentially be assigned to destinations west of the East Urban Community Phase 3 Area. This translates into an additional demand of 1,165 vehicle trips in the peak direction of travel crossing the Greens Creek Screenline west of the community.
- This 71% (1,165 vph) would be shared along the Innes (39%), St. Joseph (5%), Hwy 174 (15%) and Renaud Rd. (12%) corridors.
- The impact of the "ultimate" development of the East Urban Community Phase 3 Area upon the Innes Rd. corridor would therefore see an additional 640 vph added to the future traffic demands.

c) Traffic Impact of Remaining Community South of Innes

The development of the entire Community south of Innes Rd. includes several lands adjacent to the EUC Phase 3 Area. The following initiatives were identified as part of this study which include:

- East Urban Community Phase II
- Mer Bleue Expansion Study Area
- Trails Edge
- Avalon West
- 3490 Innes Rd. (Caivan Development)
- SmartReit Orléans Commercial Development

The combined development potential of the above was estimated at build-out to result in an additional 9,000-to-10,000 dwellings excluding additional retail, institutional and commercial land uses internal to these developments.

The anticipated impact in terms of traffic demand (assuming a 15-to-20% transit service level) was found to result in an additional:

- 3,000-to-3,500 new peak direction vehicle trips across the Greens Creek Screenline; and
- 1,500-to-2,000 new peak direction vehicle trips along the Innes Rd. corridor.

In addition to these traffic volumes

- traffic generated by the development of all lands east of the Tenth Line Rd. corridor must also be considered; and
- external traffic demands generated by outlying sub-urban development outside of the City of Ottawa, (such as the Community of Clarence-Rockland) will continue to add demand across the Greens Creek Screenline.

d) Total Traffic Demand and Impact

The above analysis highlights that in total:

- The anticipated impact in terms of traffic demand of the approximate 15,000 new dwellings (assuming a 15-to-20% transit service level) associated with new growth within the planned approved urban development area of the Communities south of Innes can contribute as much as:
  - an additional 4,200-to-4,700 vph (peak direction) vehicle trips crossing the Greens Creek Screenline; and
  - an additional 2,150-to-2,650 vph (peak direction) vehicle trips crossing the Innes Rd./Blair Rd. station of the Screenline.
- A comparison of forecast and existing demand at the Greens Creek Screenline (outlined in Table 10.1) indicates that demand is expected to increase by only 1,400 vph along the entire Greens Creek screenline. (10,897 vph less 9,512vph). This represents
  - an annual increase of less than 1% growth in the peak direction of auto-vehicle travel demand.
  - roughly only a 3rd of the anticipated growth in demand forecast by the 4,200-to-4,700 vph (peak direction) vehicle trips noted above.
- In addition, it should be noted that the 2031 horizon adopted for the TMP does not reflect the buildout year of the entire communities south of Innes Rd.

Conclusion: Continued development of the entirety of the lands east of the Greens Creek Screenline inclusive of external traffic destined to Greater Ottawa is expected to exert considerable demand for additional capacity across the Greens Creek Screenline and its critical stations such as the Innes Rd./Blair Rd. corridor.

10.2 Infrastructure Solutions to Address Regional Constraints

The solution to the Regional constraints identified above are two-fold in that both expanded transit and additional roadway network infrastructure form the necessary components to assist is partially addressing the above noted capacity constraints.

10.2.1 Regional Transit Solutions

The following future East-West transit infrastructure initiatives would provide for additional east-west transit capacity from a Regional perspective include:

- The Stage 2 Light Rail (Confederation East) Initiative;
- The Cumberland Transitway (Bus Rapid Transit); and
- Incorporation of transit priority measures on existing roadways and future roadways (i.e. additional/expanded transit services such as transit routes to/from LRT Stage 2 stations, Park and Ride facilities).

The above transit infrastructure would be critical to serve and provide east-west transit capacity to the communities south of Innes Rd.

It is acknowledged that the City of Ottawa has recently initiated the Brian Coburn Extension/Cumberland Transitway Westerly Alternative Corridor EA. Although the westerly extension of Brian Coburn Blvd. is considered a roadway (and not transit initiative), an interim transit option may potentially consist of accommodating dedicated either bus lanes or transit priority along the Brian Coburn Blvd. Westerly Extension until such time as the Cumberland Transitway can be developed.

Clearly, the ultimate demand upon the Greens Creek Screenline necessitates the full development of the Cumberland Transitway (Bus Rapid Transit) solution.

10.2.2 Regional Roadway Infrastructure Improvements

In addition, roadway concepts and plans have been, and continue to be, evaluated which include:

- The Innes / Walkley / Hunt Club connection;
- Widening of the Blackburn Hamlet Bypass; and
- Options with regard to the Brian Coburn West Extension (alignment to be determined).

The City of Ottawa 2013 TMP indicates that the Blackburn Hamlet Bypass Extension is planned to connect Navan/Brian Coburn to the Bypass and will run parallel to Navan Rd. However, the soil conditions within the corridor increased the cost of construction significantly, making the project uneconomical. The City of Ottawa has initiated the

environmental assessment of the Brian Coburn Blvd. Extension west of Navan Rd. To the best of Castleglenn's knowledge, the EA process is at the initial stages and no preferred alignment has been identified.

The above roadway infrastructures especially the Brian Coburn Blvd. extension and Innes/Walkley/Hunt Club connection would be critical in providing additional east-west capacity that would alleviate traffic pressure at the Innes/Blair Rd. screenline.

10.2.3 Lessons Learned

The above analysis underscores the necessity to assure transit initiatives are accelerated in the developing communities to the south of Innes Road where the current transit share is currently in the order of 10%. These initiatives include:

- The development of alternative expanded east-west transit infrastructure to serve the developing community (which has been estimated to reach approximately 15,000 dwellings at build-out) located south of Innes Road corridor;
- consideration given to widening the Brian Coburn Blvd. corridor to provide dedicated transit priority lanes prior to any expansion that would accommodate motor-vehicle traffic;
- The development of north-south transit corridors through the East Urban Community Phase 3 Area (as well as existing corridors outside of the Phase 3 Area) that would connect with the Stage 2 Light Rail transit stations. This would include incorporation of transit priority measures on existing and future roadways inclusive of motor-vehicle turning prohibitions and the potential removal of existing traffic calming measures to facilitate bus maneuvers; and
- The development of a Park and Ride at Navan Rd and Brian Coburn Blvd.

To serve the communities south of Innes Rd., it is imperative that projects oriented at increasing vehicle capacity of the Regional Road network be accelerated as well such as:

- The Innes / Walkley / Hunt Club connection;
- Widening of the Blackburn Hamlet Bypass; and
- Options with regard to the Brian Coburn Blvd. Westerly Extension.

11.0 ROADWAY INFRASTRUCTURE

Exhibit 11.1 illustrates the collector roadways required to support the EUC Phase 3 Area development and identifies the EA Schedule for each collector roadway:

- All the collector roadways within EUC Phase 3 are identified as 24m ROWs;
- Vanguard Drive Extension west of Mer Bleue Rd. and the Fern Casey Extension north to Frank Bender are Schedule "C" projects; and
- Future Collector #1 (Fern Casey to Vanguard Drive Extension) and Future Collector #2 (south of Brian Coburn) are Schedule "B" projects.

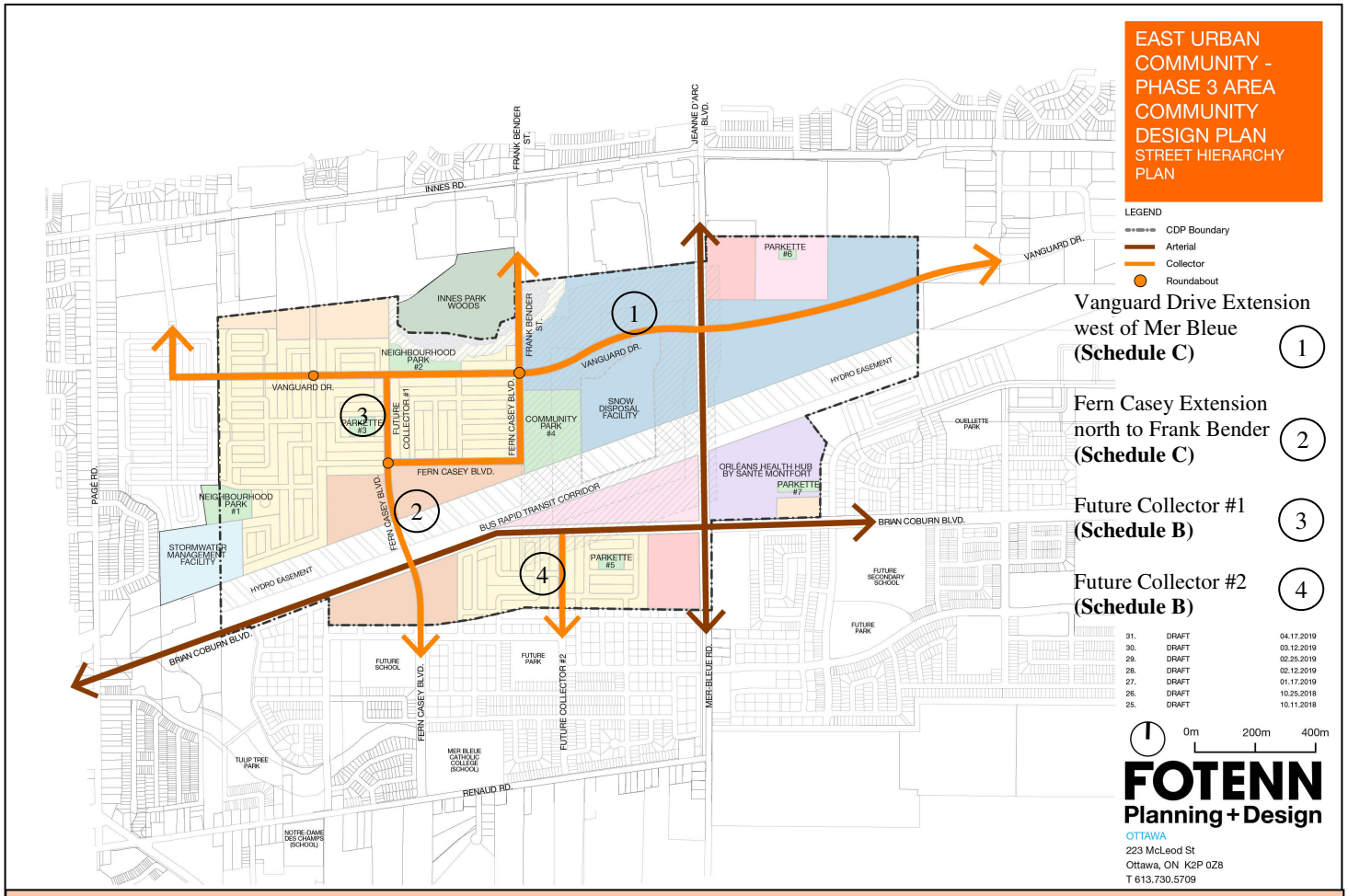


Exhibit 11.1: Roadway Infrastructure

12.0 Development Charge (DC) Projects

The MTS also identified eligible DC projects within the CDP study area. Exhibit 12.1 illustrates the intersections within the CDP area that are envisioned to be DC projects.

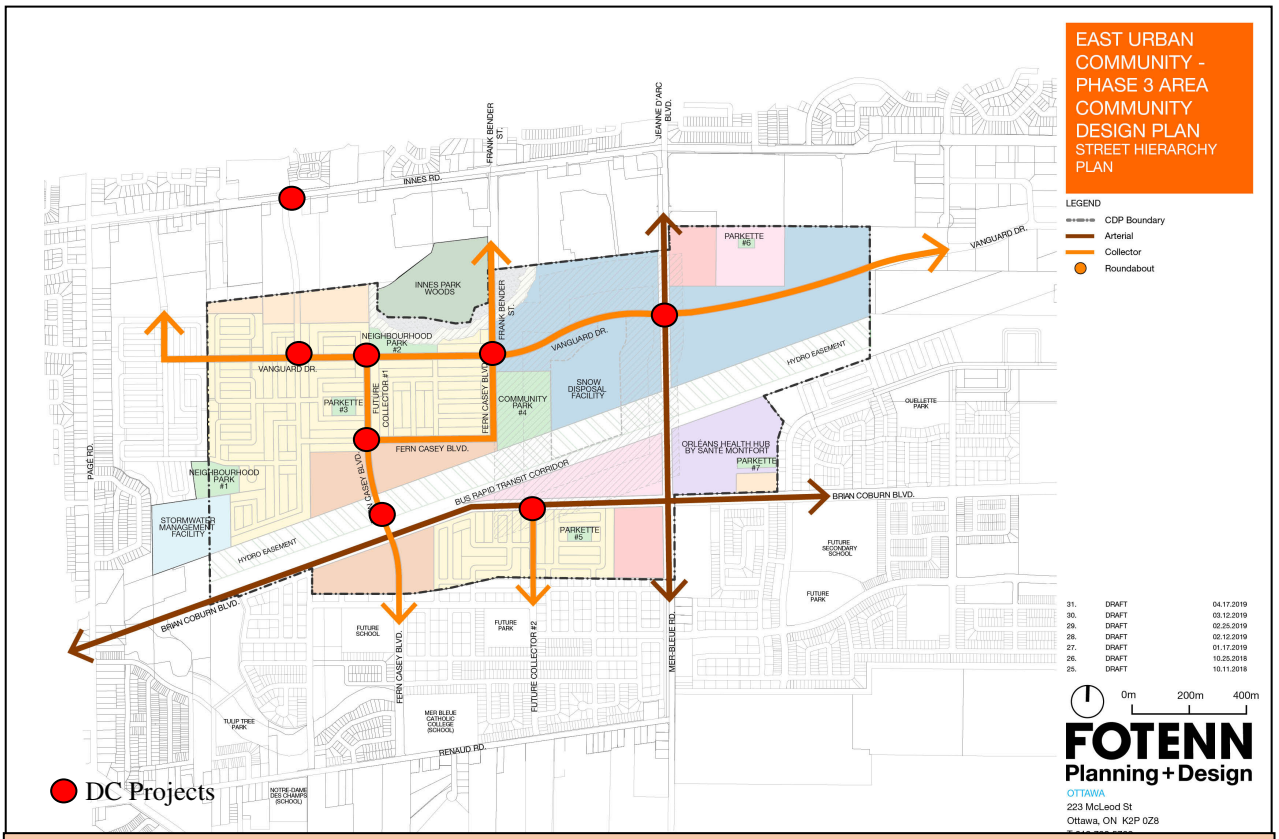


Exhibit 12.1: Eligible DC Projects

The DC charge intersections include:

- Future north-south road at Innes Rd;
- Vanguard Extension at future north-south road;
- Vanguard Extension at Fern Casey Blvd.;
- Vanguard Extension at Frank Bender St.;
- Vanguard Extension at Mer Bleue Rd.;
- Fern Casey Blvd. at BRT;
- Fern Casey Blvd. at Future Collector #1; and
- Brian Coburn Blvd. at Future Collector #2.

13.0 IMPACTS, MITIGATION AND MONITORING

13.1 TRANSPORTATION IMPACTS AND MITIGATION

Table 13.1 provides a summary of the potential transportation activities during the construction period for the various EA projects within the CDP area. For each activity identified, potential mitigation and monitoring measures, along with the significance of the impact are provided. The list provided in Table 11.1 is high-level and should be further refined in detail for each phase of the development during the site plan / plan of subdivision process.

The developer would need to work with City of Ottawa staff prior to construction start-up to provide proper traffic management plans, as well as mitigation and monitoring measures where required. The purpose of the plan will be to maintain safe and clear pedestrian routes, cycling paths (where required), maintain traffic flow as close as possible to current conditions and outline road and detour signage where required.

The project impact/activities were assessed in terms of their significance and are categorized according to the following:

- *Negligible* – means nearly zero or hardly noticeable effect. This could affect a specific group of individuals within a localized area and/or over a short period;
- *Insignificant* - could mean one of the followings:
  - Not widespread;
  - Temporary or short-term duration;
  - Affecting a specific group of individuals or community within a localized area; and
  - Not permanent and after project activity is complete, the integrity of the system would resume.
- *Significant* - could mean one of the followings:
  - Widespread;
  - Permanent or breach of standards, policies or guidelines, etc.; and
  - Permanent impact on environmental, underground services, archaeological/heritage resources, community character, land use patterns, etc.

Table 13.1: Transportation EA Projects – Impacts, Mitigation and Monitoring

Criteria	***Project Activity/Impact***	***Mitigation Measures***	***Monitoring***	***Impact***
Level of Service/Delay	• Construction activities could impact traffic LOS/delay and capacity of roads specifically at the major corridors such as Vanguard at Mer Bleue and Fern Casey at Brian Coburn. Delays can result at those major intersections with existing arterial roads as a result of construction	• Contractor to prepare traffic management plan that complies with City of Ottawa standards and policies. • Ensure delay to emergency responders is minimized. • Police assistance at major roads/intersections when required • Off-peak hour constructions during construction especially at major arterials/collectors and critical intersections. • Temporary detour routes may be required. • Impacted stakeholders to be consulted/notified of the construction activities	• Construction monitoring • Coordination with City of Ottawa staff • TIS/TIA in support of the plan of subdivision to review and identify interim roadway capacity requirements and construction accesses	Insignificant
Transit Services	• Construction activities could impact transit activities at the major road such as Mer Bleue, Brian Coburn and Navan	• Construction phasing to allow for good connectivity to interim transit routes/stations • Allow road network to maximize transit service and provide flexibility for routing	• Coordination with City of Ottawa and OC Transpo	Insignificant
Infiltration to adjacent local community	• Construction activities of the new roads within CDP could cause intrusions to adjacent new/existing communities	• Consultation/communication strategy • Traffic management strategy to minimize impact on adjacent local roads • Truck access on major roads rather than local (where possible)	• Construction monitoring • Liaison with City of Ottawa / local communities	Insignificant

13.2 Environmental Impacts and Mitigation

Mitigation measures including planning decisions, design features, construction requirements and construction constraints, will be employed to reduce potential project impacts on the environment. The following mitigation measures and Best Management Practices will be brought forward as part of the project implementation. Best Management Practices (BMP):

- Completion of an Environmental Impact Statement (EIS) prior to construction
- Air Quality and Noise Complaints Protocol
- Tree Planting Compensation for EUC Pond 1 Expansion Tree Removals
- Erosion and Sediment Control Plan
- Construction and Traffic Management Plan
- Cultural Heritage Resource Management Plan
- Emergency Response Plan
- Environmental Protection Plan
- Landscape Plan
- Slope Stability Management Plan
- Waste and Contaminated Materials Management Plan
- Well Decommissioning Plan

Based on the results of the field investigations, the following Species at Risk (SAR) have been identified: Bobolink, Least Bittern, Barn Swallow, Eastern Wood Pewee, Bank Swallow, Wood Thrush and Eastern Meadowlark. The Recommendations in Table 13.2, identify the recommended mitigation measures as well as potential permitting requirements.

Table 13.2: Species at Risk Mitigation Measures and Permitting Requirements

Constraint (Feature or Species)	**Guiding Policies**	**Significance/ Rationale**	**Recommendations**
Bobolink	Provincially and Federally Threatened Species (COSSARO,2017; COSEWIC, 2017) Protected under the Ontario Endangered Species Act (2007) and Migratory Birds Convention Act (Gov. Canada, 1994). Habitat protected under the City of Ottawa Official Plan (2003) Sections 2.4.2 and 4.7.4	Identified in Community 1 south of Community 9	Prior to development at the Environmental Impact Statement (EIS) stage a qualified biologist should reassess the property for bobolink habitat. If habitat exists discussions with the Ministry of Natural Resources and Forestry (MNRF) should occur to decide the best course of action and requirements under the Endangered Species Act. A SAR permit may be required from Ministry of the Environment, Conservation, and Parks (MECP) if bobolink still exists within the field meadows. Possible compensation required on-site or off-site if removal of habitat is needed and detailed mitigation measures to be developed. Site preparation activities, no clearing to occur within the peak breeding bird period (April 15th to August 15th) as per Environment Canada

Constraint (Feature or Species)	Guiding Policies	Significance/ Rationale	Recommendations
Least Bittern	Provincially and Federally Threatened Species (COSSARO, 2017; COSEWIC, 2017) Protected under the Ontario Endangered Species Act (2007), Species at Risk Act and Migratory Birds Convention Act (Gov. Canada, 1994). Habitat protected under the City of Ottawa Official Plan (2003) Sections 2.4.2 and 4.7.4	One individual identified in Community 9	Prior to development at the EIS stage a qualified biologist should reassess the property for least bittern habitat. If habitat exists discussions with MNRF should occur to decide the best course of action and requirements under the Endangered Species Act. Endangered Species Act permit may be required from MECP if least bittern still exists within the storm water pond prior to construction. Possible compensation required if removal of habitat is needed and detailed mitigation measures to be developed. No clearing to occur within the peak breeding bird period (Mid-April to end of August) as per Environment Canada. If dredging or other works are proposed in this pond, MNRF and MECP should be contacted regarding the need for permits under the Endangered Species Act.
Barn Swallow	Provincially and Federally Threatened Species (COSSARO, 2017; COSEWIC, 2017) Protected under the Ontario Endangered Species Act (2007) and Migratory Birds Convention Act (Gov. Canada, 1994). Habitat Protected under the City of Ottawa Official Plan (2003) Sections 2.4.2 and 4.7.4	Several individuals identified foraging over a snow dump pile in Community 1 on the northwest limits of the study property.	No further action is required. Only nests on structures are protected. Currently no structures with active barn swallow nests in Study Area. The presence/absence barn swallow nests should be conducted prior to removal of any potential barn swallow nesting structures.
Eastern Wood-peewee	Federally and provincially a special concern species (COSEWIC, 2017; COSSARO, 2017) Protected under Migratory Birds Convention Act (Gov. Canada,1994) and the Significant Wildlife Habitat Technical Guide (MNR, 2000) Habitat protected under the City of Ottawa Official Plan (2003) Sections 2.4.2 and 4.7.8	Identified in Community 8	Prior to development at the EIS stage a qualified biologist should reassess the property for eastern wood-pewee habitat. Protect the entire UNF (Innes Park Woods UNA). Special concern species covered under Significant Wildlife Habitat policies in PPS and City of Ottawa Official Plan. Forest to be preserved, no tree cutting.

Constraint (Feature or Species)	Guiding Policies	Significance/ Rationale	Recommendations
Bank Swallow	Federally and provincially threatened species (COSEWIC, 2017; COSSARO, 2017) Protected under the Migratory Birds Convention Act (Gov. Canada, 1994) Habitat Protected under the City of Ottawa Official Plan (2003) Sections 2.4.2 and 4.7.4	Birds identified foraging over the property (north-west corner of Community 1 over a snow dump), no nesting habitat identified.	Currently no nesting colonies present, therefore no action under the ESA is required. Prior to development at the EIS stage a qualified biologist should reassess the property for bank swallow habitat. As these birds are opportunistic and can use temporary storage piles as nesting sites, the presence of suitable habitat and colonies should be assessed at the EIS stage. City of Ottawa Recommendation: site specific mitigation measures are needed regarding storage of topsoil/fill/etc. on-site, to avoid potential issues.
Wood Thrush	Federally threatened species (COSEWIC, 2017) and a special concern species provincially (COSSARO, 2017) Protected under the Migratory Birds Convention Act (Gov. Canada,1994) and the Significant Wildlife Habitat Technical Guide (MNR, 2000) Habitat protected under the City of Ottawa Official Plan (2003) Sections 2.4.2 and 4.7.8	Identified in Community 8	Protect the entire Urban Natural Feature (UNF) (Innes Park Woods). Special concern species covered under Significant Wildlife Habitat policies in PPS and City of Ottawa Official Plan. Prior to development at the EIS stage a qualified biologist should reassess the property for wood thrush habitat. No cutting of forest permitted until this is completed.
Eastern Meadowlark	Federally and provincially threatened species (COSEWIC, 2017; COSSARO, 2017) Protected under the Ontario Endangered Species Act (2007) and Migratory Birds Convention Act. Habitat protected under the City of Ottawa Official Plan (2003) Sections 2.4.2 and 4.7.4	Identified in Community 14	Prior to development at the EIS stage a qualified biologist should reassess the property for eastern meadowlark habitat. Permit required from MECP under the Endangered Species Act if eastern meadowlark still exists within the field meadows. Discussions with the MNRF may be required. Possible compensation required if removal of habitat is needed. No clearing to occur within the breeding bird period (April 15th to August 15th) as per Environment Canada.

Community Design Policies and Guidelines provide a framework for the overall identity and structure of the CDP area, as well as for the characteristics of new buildings, streetscapes, and parks within the community. Their purpose is to ensure a consistently high-quality design standard throughout the community. These policies and guidelines have been developed within an environmental context and contain guidance related to: noise control, visual conformity and

design aesthetics, transit infrastructure, multi-modal transportation, streetscaping, vegetation planting, use of existing natural elements and greenspace planning, and stormwater management policies and guidelines. Environmental Responsibilities and Approvals anticipated in the next steps of the area development, including the responsible authority are outlined in Table 13.3 below.

Table 13.3: Environmental Approvals

Action	Responsibility	Timing/Process/Permits and Approvals
Woodlands and Forests • Review opportunities for retention of woodlots / trees and incorporation into Parkland.	City	Area Parks Plan (APP)
Tree Conservation Report (TCR) and Landscape Plan • Address opportunities for tree retention. Consider transplanting where appropriate. • Provide tree planting recommendations to achieve 30% tree canopy in new parks and to enhance urban forest and canopy cover throughout the community, using native species (Appendix C).	Developers	Plan of Subdivision Endangered Species Act if butternut is found to be present Urban Tree Conservation By-law
Environmental Impact Statement • Complete EIS for development applications within 30 meters of designated Urban Natural Features (Innes Park Woods and the rock barren) to identify necessary mitigation measures for protection of the features and their functions. These 30 meters of land is already identified on the CDP Land Use and Demonstration Plans and will be designated Major Open Space (and therefore be undevelopable). • Complete the EIS to confirm presence of known or potential SAR, extent of any SAR habitat, and associated mitigation / compensation requirements, as well as other potential natural heritage features • If necessary, obtain SAR permit or other authorization from the Ministry of Environment, Conservation and Parks (MECP) for bobolink, least bittern, eastern meadowlark, bank swallow and/or barn swallow.	Developers	Plan of Subdivision *Endangered Species Act if protected SAR or SAR habitat are present* *Environment Impact Statement*
Wildlife Protection • Develop site specific Protocol for Wildlife Protection.	Developers	Plan of Subdivision City of Ottawa Protocol for Wildlife Protection
Water and Sewer • Apply for Environmental Compliance Approval (ECA) from the MECP	Developers	Plan of Subdivision Environmental Protection Act ECA MECP
Permit to Take Water (PTTW) • Permit to Take Water if more than 4000,000 l/day or registration on the Environmental Activity and Sector Registry (EASR) if between 50,000 to 400,000 l/day.	Developers	MECP Ontario Water Resources Act (OWRA) Water Taking Regulation (O. Reg. 387/04)
Previous Land Uses • Decommission wells. • Remove agricultural tile drains. • Remove septic systems.	Developers	Environmental Protection Act Ontario Water Resources Act

Headwater Drainage Features • Implement the recommendations of the Headwater Drainage Features Summary report prepared by Niblett (March 28, 2018)	Developers	Permit from appropriate Conservation Authority under Conservation Authorities Act

14.0 AMENDMENT PROCESS

Master Plans, by MCEA definition, are long range plans, which integrate infrastructure requirements and future land uses. Over time, due to unforeseen circumstances, it may not be feasible to implement the projects as described in the CDP or Master Plans/EAs. Significant or major changes to the project, or change in the environmental setting, will need to be reviewed and a determination made as to whether an addendum to the Master Plan Projects is required.

Major Changes would be considered to be those which change the intent of the EAs or appreciably change the expected net impacts or outcomes associated with the project. An example of a major change would result from a proposed major shift in a preferred design alignment or configuration which would warrant changes in mitigation as described in the EA. If the proposed modification is major, an addendum to the Master Plans may be required to: document the change; identify the associated impacts and mitigation measures; and allow related concerns to be addressed and reviewed by the appropriate stakeholders and public.

Minor design changes are considered to be changes which do not appreciably change the expected net impacts or outcomes associated with the project. The majority of such changes could be dealt with during the detailed design and development approvals phase and would remain the responsibility of the proponent to ensure that all relevant issues are taken into account. For example, a design change in lighting treatment, landscaping, noise attenuation, median width, pathway connections, underground infrastructure sizes, increases in sanitary/stormwater outflows, and increases in water demands would be considered minor. A change would also be considered as minor if it is required to comply with another Act, a regulation made under another Act, an order, permit, approval or other instrument issued under another Act, or if required to comply with the requirements of approval authorities such as the City of Ottawa or Conservation Authorities. Changes in infrastructure alignment or facility footprints or tributary areas would also be considered as minor if they do not affect non-consenting landowners and do not warrant changes in mitigation as described in the EA.

15.0 FINDING AND CONCLUSIONS

The findings and conclusions of the Master Transportation Study (MTS) are based on the land use assumptions and analysis outlined above.

15.1 FINDINGS

- The full build-out of the EUC Phase 3 Area is anticipated to generate a total of over 2,700 vehicular trips during the morning peak hour and 3,400 during the afternoon peak hour of travel demand.
- The Richcraft portion of the EUC Phase 3 Area is not anticipated to commence before the 2031-time horizon of the City's TMP.
- The current transit share of the growing community south of Innes Rd. is currently in the order of 10%. This compares to the 30%-to-35% peak hour mode share for communities north of Innes Road.
- Continued development of the EUC Phase 3 Area and all lands south of Innes Rd. is expected to exert considerable demand for additional capacity across the Greens Creek Screenline and its critical stations such as the Innes Rd./Blair Rd. corridor.
- Several movements along the *Innes Rd.* corridor intersections currently operate at congested levels of services during the peak periods. The v/c ratios and delays are anticipated to increase during peak periods as development progresses within the study area. Improvements along Innes Rd. corridor are not feasible due to the limited ROW width along the corridor.
- There is a necessity to assure transit initiatives are accelerated to serve the developing communities to the south of Innes Rd., which in the immediate time frame would involve establishing north-south linkages to the immanent Stage 2 LRT stations.

15.2 CONCLUSIONS

The following conclusions involving required infrastructure initiatives were identified within this MTS and involve infrastructure local to the EUC Phase 3 Area, supporting major arterial infrastructure and region-wide initiatives necessary to sustain the entirety of the development of all lands east of the Greens Creek Screenline.

15.2.1 EUC Phase 3 Area Local Initiatives

- **Roadway Initiatives Internal to the EUC Phase 3 Area:** New collector roads and intersections will be required as part of the development of the EUC Phase 3 Area:
    - Fern Casey Extension to Frank Bender St.
    - Vanguard Dr. Extension west of Mer Bleue Rd.
    - Future Collector #1 between Fern Casey Blvd. and Vanguard Extension;
    - Future Collector #2 south of Brian Coburn to Renaud Rd.
    - Roundabouts are recommended within EUC Phase 3 Area:
        - Fern Casey Blvd. at Frank Bender St. and the Vanguard Extension;
        - Future Collector #1 and Fern Casey Blvd.; and
        - Vanguard Dr. Extension at Future North-South Rd.
    - Future Collector #2 intersection at Brian Coburn Blvd.
    - Vanguard Extension at Mer Bleue is assumed to be a traffic control signal.

- **Local Cycling Infrastructure:** The proposed EUC Phase 3 Area network includes cycling facilities along the collector roads by way of a MUP on one side of the collector roads. The cycling provisions would provide connections to the existing cycling facilities along the arterial roadway system such Innes Rd. and Mer Bleue Rd.
- **Local Pedestrian Infrastructure:** MUPs are proposed on one side of all collector roads, with a sidewalk proposed on the opposite side. Sidewalks are also proposed on one side of some of the local roads.
- **Local Transit Infrastructure:** Transit service is expected to be provided along the collector roadway system within EUC Phase 3 Area. The details of the transit routes and transit support services will dependent highly upon the phasing/staging of the EUC Phase 3 Area and are best addressed at development at the plan of subdivision stage. Such infrastructure such as the location of bus routes, bus stops, shelters and related infrastructure must be coordinated with OC Transpo/City of Ottawa at of each phase of development.

15.2.2 Supporting Major Arterial Infrastructure

- **Adjacent Arterial Roadway Initiatives:** The following roadway infrastructure improvements were identified to be required to sustain the development the growing urban community east of Navan Road inclusive of the adjacent lands identified within Table 9.1.
  - *Brian Coburn Blvd.* was determined to require widening to 4-lanes (Mer Bleue to Navan) by interim year to provide east-west capacity and support the projected development within the study area, but is contingent on the pace of development within the study area. The City's 2013 TMP acknowledges that Brian Coburn Blvd will ultimately be a 4-lane corridor, but does not provide a timeline for this improvement. It is recommended that the timing of the widening of Brian Coburn Blvd to 4-lanes be further reviewed when the next TMP update is undertaken.
  - *Navan Rd.* was determined to require widening to 4-lanes by ultimate full-build-out to address development growth within the study area. The City's 2013 TMP acknowledges that Navan Rd. will ultimately be a 4-lane corridor as part of the Network Concept, but does not provide a timeline for this improvement. It is recommended that the timing of the widening of Navan Rd. to 4-lanes be further reviewed when the next TMP update is undertaken.
  - *Mer Bleue Rd. / Brian Coburn Blvd.* was determined to require additional capacity along Brian Coburn. As indicated above, a 4-lane Brian Coburn from Mer Bleue Rd. to Navan Rd. is anticipated to be required should development progress within the study area. The intersection was also found to require additional dedicated right-turn lanes on all approaches ultimate build-out year. The right-turn lanes are dependent on the right-of-way availability at the intersection.
  - *Navan Rd. / Brian Coburn Blvd.* was determined to require a dedicated SB left-turn lane and NB Right-turn lane along Navan to separate the heavy through movements from turning movements by the interim scenario. This would require a 2-lane roundabout. As indicated above, by ultimate build-out year Navan Rd. was determined to require widening.

- *Navan Rd. / Renaud Rd.* was found to operate at a congested level of service as development progressed within the study area. Improvements might not be feasible along Renaud Rd. due to lack of right-of-way availability. Improvements in the interim year were proposed by providing a dedicated SB right-turn lane along Navan Rd. By ultimate build-out year, Navan Rd. was found to require widening to 4-lanes.
- *Mer Bleue Rd. / Renaud Rd.* was determined to require improvements to either a roundabout or traffic control signal. The feasibility of the 3-leg roundabout is dependent on the right-of-way requirement at the intersection.

15.2.3 Region-wide Initiatives

- **Regional Infrastructure Initiatives:** In addition to arterial investments within close proximity to the EUC Phase 3 Area, it is imperative that projects oriented at increasing vehicle capacity of Region-wide infrastructure be accelerated to include such additional roadway facilities as:
  - The Innes / Walkley / Hunt Club connection;
  - Widening of the Blackburn Hamlet Bypass; and
  - options with regard to the Brian Coburn Blvd. Westerly Extension.
- **Region-Wide Transit Initiatives:** The following transit infrastructure improvements were identified to be required to sustain the development of the lands east of the Navan Road corridor inclusive of the adjacent lands identified within Table 9.1. Transit initiatives include:
  - The development of alternative expanded east-west transit infrastructure to serve the developing community (which has been estimated to reach approximately 15,000 dwellings at build-out) located south of Innes Road corridor;
  - consideration given to widening the Brian Coburn Blvd. corridor to provide dedicated transit priority lanes prior to any expansion that would accommodate motor-vehicle traffic;
  - The development of north-south transit corridors through the East Urban Community Phase 3 Area (as well as existing corridors outside of the Phase 3 Area) that would connect with the Stage 2 Light Rail transit stations are encouraged to improve the transit share of developments south of Innes Rd. This would include incorporation of transit priority measures on existing and future roadways; and
  - The development of a Park and Ride at Navan Rd and Brian Coburn Blvd.

It is recognized that the infrastructure conclusions are dependent on how development progresses within the areas east of Navan Road.

16.0 RECOMMENDATIONS

Based on the above findings and conclusions it is recommended that for:

<u>EUC Phase 3 Area Initiative</u>:

- local Initiatives (as outlined in section 15.2.1) be undertaken to support the EUC Phase 3 Area development;
- the EUC Phase 3 Area be recognized as a single component of the entire development potential of all of the lands east of Navan Road;
- subsequent transportation impact studies be initiated for each phase of development of the EUC Phase 3 Area as development proceeds; and
- this MTS receive approval as a component of the overall community design plan.

Region-Wide Initiative:

- the need for several region-wide roadway and transit infrastructure initiatives (section 15.2.3) as identified within this MTS remain imperative to accommodate the ultimate development forecasts of all lands east of Navan Road; and
- the upcoming City of Ottawa TMP address the timing, phasing and multi-modal alternatives for the Brian Coburn Blvd. corridor inclusive of its potential western extension.

Arman Matti

Arman Matti, P. Eng.
May 2019

Appendix A

Existing Traffic Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	405	75	171	1307	638	248	426	72	166	143	78
Future Volume (veh/h)	42	405	75	171	1307	638	248	426	72	166	143	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1491	1688	1688	1758	1758	1772	1786	1744	1744	1744	1688	1688
Adj Flow Rate, veh/h	46	440	0	186	1421	0	270	463	0	180	155	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	22	8	8	3	3	2	1	4	4	4	8	8
Cap, veh/h	130	1215		478	1489		398	1080		303	959	
Arrive On Green	0.05	0.38	0.00	0.10	0.45	0.00	0.12	0.33	0.00	0.09	0.30	0.00
Sat Flow, veh/h	1420	3207	1430	1674	3340	1502	3300	3400	0	3222	3291	0
Grp Volume(v), veh/h	46	440	0	186	1421	0	270	463	0	180	155	0
Grp Sat Flow(s),veh/h/ln	1420	1603	1430	1674	1670	1502	1650	1657	0	1611	1603	0
Q Serve(g_s), s	2.5	12.8	0.0	8.3	53.3	0.0	10.2	14.2	0.0	7.0	4.6	0.0
Cycle Q Clear(g_c), s	2.5	12.8	0.0	8.3	53.3	0.0	10.2	14.2	0.0	7.0	4.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	130	1215		478	1489		398	1080		303	959	
V/C Ratio(X)	0.35	0.36		0.39	0.95		0.68	0.43		0.59	0.16	
Avail Cap(c_a), veh/h	231	1431		484	1490		541	1080		528	959	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.2	29.1	0.0	20.2	34.7	0.0	54.7	34.3	0.0	56.5	33.5	0.0
Incr Delay (d2), s/veh	1.6	0.2	0.0	0.5	13.9	0.0	2.0	1.2	0.0	1.9	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	2.9	0.0	1.6	13.7	0.0	3.1	3.7	0.0	2.1	1.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.8	29.3	0.0	20.8	48.6	0.0	56.8	35.6	0.0	58.4	33.9	0.0
LnGrp LOS	C	C		C	D		E	D		E	C	
Approach Vol, veh/h		486	A		1607	A		733	A		335	A
Approach Delay, s/veh		29.6			45.4			43.4			47.1	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.5	53.2	17.4	42.9	7.8	62.0	13.9	46.4
Change Period (Y+Rc), s	* 6.1	6.4	4.0	* 6.2	4.0	6.4	4.0	* 6.2
Max Green Setting (Gmax), s	* 11	55.6	19.0	* 22	13.0	55.6	19.0	* 22
Max Q Clear Time (g_c+I1), s	10.3	14.8	12.2	6.6	4.5	55.3	9.0	16.2
Green Ext Time (p_c), s	0.1	4.9	1.2	1.0	0.1	0.2	1.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	42.7
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	381	21	28	1477	78	65	16	6	29	29	76
Future Volume (veh/h)	52	381	21	28	1477	78	65	16	6	29	29	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1688	1575	1800	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	57	414	23	30	1605	85	71	17	7	32	32	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	8	16	0	2	2	0	0	0	0	0	0
Cap, veh/h	197	1917	798	614	1952	103	344	502	426	439	124	321
Arrive On Green	0.05	0.60	0.60	0.03	0.60	0.58	0.28	0.28	0.28	0.28	0.28	0.26
Sat Flow, veh/h	1714	3207	1335	1714	3253	171	1298	1800	1525	1409	443	1150
Grp Volume(v), veh/h	57	414	23	30	827	863	71	17	7	32	0	115
Grp Sat Flow(s),veh/h/ln	1714	1603	1335	1714	1683	1741	1298	1800	1525	1409	0	1593
Q Serve(g_s), s	1.6	7.8	0.9	0.9	50.2	51.2	5.9	0.9	0.4	2.2	0.0	7.4
Cycle Q Clear(g_c), s	1.6	7.8	0.9	0.9	50.2	51.2	13.3	0.9	0.4	3.1	0.0	7.4
Prop In Lane	1.00		1.00	1.00		0.10	1.00		1.00	1.00		0.72
Lane Grp Cap(c), veh/h	197	1917	798	614	1010	1045	344	502	426	439	0	445
V/C Ratio(X)	0.29	0.22	0.03	0.05	0.82	0.83	0.21	0.03	0.02	0.07	0.00	0.26
Avail Cap(c_a), veh/h	204	2040	849	667	1123	1161	344	502	426	439	0	445
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.7	12.1	10.7	10.1	20.4	20.7	41.6	34.1	33.9	35.2	0.0	37.2
Incr Delay (d2), s/veh	0.8	0.1	0.0	0.0	4.5	4.6	1.4	0.1	0.1	0.3	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.8	0.1	0.1	6.4	6.8	1.4	0.3	0.1	0.6	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.5	12.1	10.7	10.1	24.9	25.3	43.0	34.2	34.0	35.5	0.0	38.6
LnGrp LOS	C	B	B	B	C	C	D	C	C	D	A	D
Approach Vol, veh/h		494			1720			95			147	
Approach Delay, s/veh		13.2			24.9			40.7			38.0	
Approach LOS		B			C			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	81.7		40.3	7.5	82.2		40.3
Change Period (Y+Rc), s	* 4.7	* 6.6		* 6.8	4.0	* 6.6		* 6.8
Max Green Setting (Gmax), s	* 7.3	* 80		* 25	4.0	* 84		* 25
Max Q Clear Time (g_c+I1), s	2.9	9.8		9.4	3.6	53.2		15.3
Green Ext Time (p_c), s	0.0	5.1		0.9	0.0	22.4		0.4

Intersection Summary	
HCM 6th Ctrl Delay	23.9
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	369	37	59	1526	33	22	5	39	46	13	47
Future Volume (veh/h)	11	369	37	59	1526	33	22	5	39	46	13	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1463	1674	1674	1800	1758	1758	1744	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	12	401	40	64	1659	36	24	5	42	50	14	51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	24	9	9	0	3	3	4	0	0	0	0	0
Cap, veh/h	115	1609	718	587	2013	44	489	585	496	241	76	216
Arrive On Green	0.51	0.51	0.51	0.06	0.60	0.58	0.32	0.32	0.32	0.32	0.32	0.30
Sat Flow, veh/h	239	3180	1418	1714	3342	72	1315	1800	1525	599	235	664
Grp Volume(v), veh/h	12	401	40	64	827	868	24	5	42	115	0	0
Grp Sat Flow(s),veh/h/ln	239	1590	1418	1714	1670	1745	1315	1800	1525	1498	0	0
Q Serve(g_s), s	4.6	7.8	1.6	1.8	42.9	43.3	0.0	0.2	2.1	3.4	0.0	0.0
Cycle Q Clear(g_c), s	37.3	7.8	1.6	1.8	42.9	43.3	1.5	0.2	2.1	6.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	0.43		0.44
Lane Grp Cap(c), veh/h	115	1609	718	587	1006	1051	489	585	496	534	0	0
V/C Ratio(X)	0.10	0.25	0.06	0.11	0.82	0.83	0.05	0.01	0.08	0.22	0.00	0.00
Avail Cap(c_a), veh/h	125	1734	774	609	1093	1142	489	585	496	534	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	36.3	15.4	13.8	10.4	17.2	17.3	25.6	25.1	25.8	27.5	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.1	0.0	0.1	4.8	4.8	0.2	0.0	0.3	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.9	0.2	0.1	2.8	2.9	0.3	0.1	0.5	1.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.7	15.4	13.8	10.4	22.1	22.1	25.8	25.2	26.1	28.4	0.0	0.0
LnGrp LOS	D	B	B	B	C	C	C	C	C	C	A	A
Approach Vol, veh/h		453			1759			71			115	
Approach Delay, s/veh		15.9			21.7			25.9			28.4	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	10.6	59.7		39.7		70.3		39.7
Change Period (Y+Rc), s	* 6.3	* 6.3		* 6.7		* 6.3		* 6.7
Max Green Setting (Gmax), s	* 5.7	* 58		* 27		* 70		* 27
Max Q Clear Time (g_c+I1), s	3.8	39.3		8.0		45.3		4.1
Green Ext Time (p_c), s	0.0	4.3		0.8		18.6		0.5

Intersection Summary	
HCM 6th Ctrl Delay	21.0
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	398	16	32	1550	37	18	20	53	18	11	70
Future Volume (veh/h)	46	398	16	32	1550	37	18	20	53	18	11	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1632	1632	1730	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	50	433	17	35	1685	40	20	22	58	20	12	76
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	12	12	5	2	2	0	0	0	0	0	0
Cap, veh/h	129	1867	73	570	2063	49	113	130	283	105	76	338
Arrive On Green	0.61	0.61	0.59	0.61	0.61	0.59	0.31	0.31	0.29	0.31	0.31	0.29
Sat Flow, veh/h	286	3041	119	918	3361	80	237	416	901	211	244	1079
Grp Volume(v), veh/h	50	220	230	35	842	883	100	0	0	108	0	0
Grp Sat Flow(s),veh/h/ln	286	1550	1610	918	1683	1758	1554	0	0	1533	0	0
Q Serve(g_s), s	18.1	7.0	7.1	2.0	42.5	42.9	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	61.0	7.0	7.1	9.1	42.5	42.9	5.0	0.0	0.0	5.6	0.0	0.0
Prop In Lane	1.00		0.07	1.00		0.05	0.20		0.58	0.19		0.70
Lane Grp Cap(c), veh/h	129	951	988	570	1033	1079	526	0	0	519	0	0
V/C Ratio(X)	0.39	0.23	0.23	0.06	0.81	0.82	0.19	0.00	0.00	0.21	0.00	0.00
Avail Cap(c_a), veh/h	138	1000	1039	599	1087	1134	526	0	0	519	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	40.2	9.6	9.6	11.6	16.4	16.5	28.1	0.0	0.0	28.4	0.0	0.0
Incr Delay (d2), s/veh	1.9	0.1	0.1	0.0	4.7	4.7	0.8	0.0	0.0	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.2	0.2	0.1	2.2	2.3	1.2	0.0	0.0	1.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.1	9.7	9.7	11.7	21.1	21.2	28.9	0.0	0.0	29.3	0.0	0.0
LnGrp LOS	D	A	A	B	C	C	C	A	A	C	A	A
Approach Vol, veh/h		500			1760			100			108	
Approach Delay, s/veh		12.9			21.0			28.9			29.3	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	71.5	38.5	71.5	38.5
Change Period (Y+Rc), s	* 6.1	* 6.2	* 6.1	* 6.2
Max Green Setting (Gmax), s	* 69	* 29	* 69	* 29
Max Q Clear Time (g_c+I1), s	63.0	7.6	44.9	7.0
Green Ext Time (p_c), s	2.4	0.8	18.9	0.7

Intersection Summary	
HCM 6th Ctrl Delay	20.0
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	348	23	24	1465	149	203	259	44	68	100	459
Future Volume (veh/h)	121	348	23	24	1465	149	203	259	44	68	100	459
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1617	1589	1730	1800	1772	1674	1786	1730	1758	1688	1603	1786
Adj Flow Rate, veh/h	132	378	0	26	1592	0	221	282	0	74	109	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	13	15	5	0	2	9	1	5	3	8	14	1
Cap, veh/h	238	1231		77	1255		604	1441		349	828	
Arrive On Green	0.08	0.41	0.00	0.04	0.37	0.00	0.13	0.44	0.00	0.27	0.27	0.00
Sat Flow, veh/h	2988	3020	1466	1714	3367	1418	1701	3287	1490	1045	3047	1514
Grp Volume(v), veh/h	132	378	0	26	1592	0	221	282	0	74	109	0
Grp Sat Flow(s),veh/h/ln	1494	1510	1466	1714	1683	1418	1701	1643	1490	1045	1523	1514
Q Serve(g_s), s	4.7	9.3	0.0	1.6	41.0	0.0	9.5	5.8	0.0	6.1	3.0	0.0
Cycle Q Clear(g_c), s	4.7	9.3	0.0	1.6	41.0	0.0	9.5	5.8	0.0	6.1	3.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	238	1231		77	1255		604	1441		349	828	
V/C Ratio(X)	0.55	0.31		0.34	1.27		0.37	0.20		0.21	0.13	
Avail Cap(c_a), veh/h	245	1231		140	1255		614	1441		349	828	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	48.7	22.1	0.0	50.9	34.5	0.0	21.4	19.0	0.0	31.4	30.3	0.0
Incr Delay (d2), s/veh	2.6	0.1	0.0	2.6	127.3	0.0	0.4	0.3	0.0	1.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	1.5	0.0	0.5	30.1	0.0	1.9	1.1	0.0	1.1	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.3	22.2	0.0	53.5	161.8	0.0	21.8	19.3	0.0	32.8	30.6	0.0
LnGrp LOS	D	C		D	F		C	B		C	C	
Approach Vol, veh/h		510	A		1618	A		503	A		183	A
Approach Delay, s/veh		29.7			160.1			20.4			31.5	
Approach LOS		C			F			C			C	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	8.9	48.8	18.3	33.9	12.8	45.0		52.2
Change Period (Y+Rc), s	* 6.2	* 6.2	* 6.7	* 6.7	* 6.2	* 6.2		* 6.7
Max Green Setting (Gmax), s	* 6.8	* 39	* 12	* 26	* 6.8	* 39		* 45
Max Q Clear Time (g_c+I1), s	3.6	11.3	11.5	8.1	6.7	43.0		7.8
Green Ext Time (p_c), s	0.0	3.9	0.1	1.6	0.0	0.0		3.1

Intersection Summary	
HCM 6th Ctrl Delay	103.1
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	613	111	382	173	22	1736
Future Volume (veh/h)	613	111	382	173	22	1736
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1702	1744	1547	1477	1786	1786
Adj Flow Rate, veh/h	666	0	415	0	24	1887
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	4	18	23	1	1
Cap, veh/h	1231		1371		72	1838
Arrive On Green	0.39	0.00	0.47	0.00	0.04	0.54
Sat Flow, veh/h	3144	1478	3017	1252	1701	3483
Grp Volume(v), veh/h	666	0	415	0	24	1887
Grp Sat Flow(s),veh/h/ln	1572	1478	1470	1252	1701	1697
Q Serve(g_s), s	19.6	0.0	10.5	0.0	1.6	65.0
Cycle Q Clear(g_c), s	19.6	0.0	10.5	0.0	1.6	65.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	1231		1371		72	1838
V/C Ratio(X)	0.54		0.30		0.34	1.03
Avail Cap(c_a), veh/h	1231		1371		132	1838
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	0.0	19.9	0.0	55.8	27.5
Incr Delay (d2), s/veh	1.7	0.0	0.1	0.0	2.7	28.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	0.0	1.6	0.0	0.6	15.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	29.9	0.0	20.0	0.0	58.6	55.6
LnGrp LOS	C		C		E	F
Approach Vol, veh/h	666	A	415	A		1911
Approach Delay, s/veh	29.9		20.0			55.6
Approach LOS	C		C			E

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	9.1	59.9			69.0	51.0
Change Period (Y+Rc), s	* 6.3	* 5.9			* 5.9	5.8
Max Green Setting (Gmax), s	* 7	* 50			* 63	45.2
Max Q Clear Time (g_c+I1), s	3.6	12.5			67.0	21.6
Green Ext Time (p_c), s	0.0	4.7			0.0	7.0

Intersection Summary	
HCM 6th Ctrl Delay	45.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NER, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	133	4	10	95	32	374
Future Vol, veh/h	133	4	10	95	32	374
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	145	4	11	103	35	407
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.8	8.7	10.5
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	10%	97%	0%
Vol Thru, %	90%	0%	8%
Vol Right, %	0%	3%	92%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	105	137	406
LT Vol	10	133	0
Through Vol	95	0	32
RT Vol	0	4	374
Lane Flow Rate	114	149	441
Geometry Grp	1	1	1
Degree of Util (X)	0.152	0.217	0.481
Departure Headway (Hd)	4.787	5.243	3.924
Convergence, Y/N	Yes	Yes	Yes
Cap	748	682	918
Service Time	2.826	3.299	1.947
HCM Lane V/C Ratio	0.152	0.218	0.48
HCM Control Delay	8.7	9.8	10.5
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.5	0.8	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	37	287	3	165	316	18	90	80	16	10	326	103
Future Volume (veh/h)	37	287	3	165	316	18	90	80	16	10	326	103
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1519	1519	1730	1758	1758	1632	1744	1716	1800	1786	1786
Adj Flow Rate, veh/h	40	312	3	179	343	0	98	87	17	11	354	112
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	20	20	5	3	3	12	4	6	0	1	1
Cap, veh/h	395	644	6	379	753		322	824	687	553	460	146
Arrive On Green	0.43	0.43	0.40	0.43	0.43	0.00	0.09	0.47	0.47	0.35	0.35	0.32
Sat Flow, veh/h	1054	1502	14	1039	1758	0	1554	1744	1454	1311	1300	411
Grp Volume(v), veh/h	40	0	315	179	343	0	98	87	17	11	0	466
Grp Sat Flow(s),veh/h/ln	1054	0	1517	1039	1758	0	1554	1744	1454	1311	0	1712
Q Serve(g_s), s	2.3	0.0	12.1	12.1	11.2	0.0	2.9	2.2	0.5	0.4	0.0	19.6
Cycle Q Clear(g_c), s	13.4	0.0	12.1	24.2	11.2	0.0	2.9	2.2	0.5	0.4	0.0	19.6
Prop In Lane	1.00		0.01	1.00		0.00	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	395	0	650	379	753		322	824	687	553	0	606
V/C Ratio(X)	0.10	0.00	0.48	0.47	0.46		0.30	0.11	0.02	0.02	0.00	0.77
Avail Cap(c_a), veh/h	760	0	1175	739	1362		427	1244	1037	780	0	903
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.2	0.0	16.7	25.4	16.4	0.0	15.5	11.8	11.4	17.0	0.0	23.5
Incr Delay (d2), s/veh	0.1	0.0	0.6	0.9	0.4	0.0	0.5	0.1	0.0	0.0	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.7	1.2	0.7	0.0	0.2	0.1	0.0	0.0	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.3	0.0	17.2	26.3	16.8	0.0	16.0	11.9	11.4	17.0	0.0	25.8
LnGrp LOS	C	A	B	C	B		B	B	B	B	A	C
Approach Vol, veh/h		355			522	A		202			477	
Approach Delay, s/veh		17.7			20.1			13.9			25.6	
Approach LOS		B			C			B			C	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		38.7		42.0		38.7	9.6	32.5				
Change Period (Y+Rc), s		* 6.7		6.5		* 6.7	5.0	6.5				
Max Green Setting (Gmax), s		* 60		55.0		* 60	10.0	40.0				
Max Q Clear Time (g_c+I1), s		26.2		4.2		15.4	4.9	21.6				
Green Ext Time (p_c), s		5.8		1.0		3.9	0.2	4.4				

Intersection Summary	
HCM 6th Ctrl Delay	20.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

MOVEMENT SUMMARY

Site: Existing AM - BCB/Mer Bleue

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
8	T1	161	3.0	0.111	4.7	LOS A	0.5	3.9	0.25	0.42	60.4
18	R2	87	3.0	0.111	4.6	LOS A	0.5	3.9	0.25	0.45	58.6
Approach		248	3.0	0.111	4.6	LOS A	0.5	3.9	0.25	0.43	59.8
East: Brian Coburn											
1	L2	287	3.0	0.971	27.0	LOS C	29.1	226.5	1.00	1.04	47.4
16	R2	592	3.0	0.971	21.0	LOS C	29.1	226.5	1.00	1.04	46.1
Approach		879	3.0	0.971	22.9	LOS C	29.1	226.5	1.00	1.04	46.5
North: Mer Bleue											
7	L2	97	3.0	0.137	11.3	LOS B	0.7	5.6	0.48	0.66	56.1
4	T1	154	3.0	0.137	5.6	LOS A	0.7	5.6	0.48	0.54	58.3
Approach		251	3.0	0.137	7.8	LOS A	0.7	5.6	0.48	0.59	57.5
All Vehicles		1378	3.0	0.971	16.9	LOS B	29.1	226.5	0.77	0.85	50.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	1491	205	164	840	374	144	254	260	429	342	92
Future Volume (veh/h)	140	1491	205	164	840	374	144	254	260	429	342	92
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1800	1800	1800	1758	1758	1758	1772	1772	1800	1772	1772
Adj Flow Rate, veh/h	152	1621	0	178	913	0	157	276	0	466	372	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	3	3	3	2	2	0	2	2
Cap, veh/h	355	1526		226	1557		276	623		486	829	
Arrive On Green	0.08	0.45	0.00	0.10	0.47	0.00	0.08	0.18	0.00	0.15	0.25	0.00
Sat Flow, veh/h	1714	3420	1525	1714	3340	1490	3248	3455	0	3326	3455	0
Grp Volume(v), veh/h	152	1621	0	178	913	0	157	276	0	466	372	0
Grp Sat Flow(s),veh/h/ln	1714	1710	1525	1714	1670	1490	1624	1683	0	1663	1683	0
Q Serve(g_s), s	6.0	58.0	0.0	8.9	26.1	0.0	6.0	9.5	0.0	18.1	12.2	0.0
Cycle Q Clear(g_c), s	6.0	58.0	0.0	8.9	26.1	0.0	6.0	9.5	0.0	18.1	12.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	355	1526		226	1557		276	623		486	829	
V/C Ratio(X)	0.43	1.06		0.79	0.59		0.57	0.44		0.96	0.45	
Avail Cap(c_a), veh/h	390	1526		227	1557		475	623		486	829	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.0	36.0	0.0	37.0	25.5	0.0	57.2	47.0	0.0	55.1	41.5	0.0
Incr Delay (d2), s/veh	0.8	41.6	0.0	16.6	0.6	0.0	1.8	2.3	0.0	30.5	1.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	20.8	0.0	3.0	5.1	0.0	1.9	2.9	0.0	7.3	3.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.8	77.6	0.0	53.6	26.1	0.0	59.0	49.3	0.0	85.6	43.3	0.0
LnGrp LOS	B	F		D	C		E	D		F	D	
Approach Vol, veh/h		1773	A		1091	A		433	A		838	A
Approach Delay, s/veh		72.7			30.6			52.8			66.8	
Approach LOS		E			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.0	62.0	15.0	36.0	14.3	64.6	23.0	28.0
Change Period (Y+Rc), s	* 6.1	6.4	* 6.3	* 6.2	* 6.1	6.4	* 6.3	* 6.2
Max Green Setting (Gmax), s	* 11	55.6	* 17	* 22	* 11	55.6	* 17	* 22
Max Q Clear Time (g_c+I1), s	10.9	60.0	8.0	14.2	8.0	28.1	20.1	11.5
Green Ext Time (p_c), s	0.0	0.0	0.7	1.9	0.3	10.5	0.0	1.6

Intersection Summary	
HCM 6th Ctrl Delay	58.3
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	136	1502	117	172	820	45	313	229	92	76	98	45
Future Volume (veh/h)	136	1502	117	172	820	45	313	229	92	76	98	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1786	1730	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	148	1633	127	187	891	49	340	249	100	83	107	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	5	2	2	0	0	0	0	0	0
Cap, veh/h	371	1827	815	224	2128	117	318	508	431	231	330	151
Arrive On Green	0.54	0.54	0.54	0.09	0.66	0.64	0.28	0.28	0.28	0.28	0.28	0.26
Sat Flow, veh/h	601	3393	1514	1647	3245	178	1250	1800	1525	1048	1169	535
Grp Volume(v), veh/h	148	1633	127	187	462	478	340	249	100	83	0	156
Grp Sat Flow(s),veh/h/ln	601	1697	1514	1647	1683	1740	1250	1800	1525	1048	0	1704
Q Serve(g_s), s	20.2	55.7	5.5	8.0	16.9	17.0	27.3	15.0	6.5	9.3	0.0	9.5
Cycle Q Clear(g_c), s	21.9	55.7	5.5	8.0	16.9	17.0	36.7	15.0	6.5	24.3	0.0	9.5
Prop In Lane	1.00		1.00	1.00		0.10	1.00		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	371	1827	815	224	1104	1141	318	508	431	231	0	481
V/C Ratio(X)	0.40	0.89	0.16	0.84	0.42	0.42	1.07	0.49	0.23	0.36	0.00	0.32
Avail Cap(c_a), veh/h	376	1853	827	284	1178	1218	318	508	431	231	0	481
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.5	26.7	15.1	34.3	10.6	10.7	53.7	38.8	35.8	48.9	0.0	37.2
Incr Delay (d2), s/veh	0.7	6.0	0.1	15.7	0.3	0.2	70.6	3.3	1.3	4.3	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.0	0.8	2.5	0.8	0.8	13.9	4.9	1.8	2.0	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.1	32.7	15.2	50.0	10.9	10.9	124.3	42.2	37.1	53.3	0.0	39.0
LnGrp LOS	C	C	B	D	B	B	F	D	D	D	A	D
Approach Vol, veh/h		1908			1127			689			239	
Approach Delay, s/veh		30.6			17.4			82.0			43.9	
Approach LOS		C			B			F			D	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	15.3	74.0		40.7		89.3		40.7
Change Period (Y+Rc), s	* 4.7	* 6.6		* 6.8		* 6.6		* 6.8
Max Green Setting (Gmax), s	* 15	* 68		* 28		* 88		* 28
Max Q Clear Time (g_c+I1), s	10.0	57.7		26.3		19.0		38.7
Green Ext Time (p_c), s	0.6	9.7		0.4		12.7		0.0

Intersection Summary	
HCM 6th Ctrl Delay	36.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	1516	87	183	911	84	106	40	179	60	51	30
Future Volume (veh/h)	44	1516	87	183	911	84	106	40	179	60	51	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1772	1772	1800	1744	1744	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	48	1648	95	199	990	91	115	43	195	65	55	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	2	2	0	4	4	0	0	0	0	0	0
Cap, veh/h	327	1832	817	254	2066	190	371	472	400	186	152	82
Arrive On Green	0.54	0.54	0.54	0.10	0.67	0.66	0.26	0.26	0.26	0.27	0.27	0.24
Sat Flow, veh/h	526	3367	1502	1714	3068	282	1330	1800	1525	553	575	310
Grp Volume(v), veh/h	48	1648	95	199	535	546	115	43	195	153	0	0
Grp Sat Flow(s),veh/h/ln	526	1683	1502	1714	1657	1693	1330	1800	1525	1439	0	0
Q Serve(g_s), s	6.3	56.8	4.0	8.1	20.2	20.4	1.6	2.3	14.1	8.3	0.0	0.0
Cycle Q Clear(g_c), s	9.9	56.8	4.0	8.1	20.2	20.4	12.6	2.3	14.1	11.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.17	1.00		1.00	0.42		0.22
Lane Grp Cap(c), veh/h	327	1832	817	254	1115	1140	371	472	400	421	0	0
V/C Ratio(X)	0.15	0.90	0.12	0.78	0.48	0.48	0.31	0.09	0.49	0.36	0.00	0.00
Avail Cap(c_a), veh/h	332	1865	832	296	1172	1198	371	472	400	421	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.7	26.5	14.4	34.6	10.2	10.4	40.3	36.3	40.6	39.2	0.0	0.0
Incr Delay (d2), s/veh	0.2	6.3	0.1	11.1	0.3	0.3	2.2	0.4	4.2	2.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	10.0	0.5	2.6	0.5	0.5	2.3	0.8	4.1	3.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.9	32.8	14.5	45.7	10.6	10.7	42.5	36.6	44.8	41.6	0.0	0.0
LnGrp LOS	B	C	B	D	B	B	D	D	D	D	A	A
Approach Vol, veh/h		1791			1280			353			153	
Approach Delay, s/veh		31.4			16.1			43.0			41.6	
Approach LOS		C			B			D			D	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	16.8	74.7		38.5		91.5		38.5
Change Period (Y+Rc), s	* 6.3	* 6.3		7.1		* 6.3		* 7.1
Max Green Setting (Gmax), s	* 14	* 70		27.0		* 90		* 27
Max Q Clear Time (g_c+I1), s	10.1	58.8		13.0		22.4		16.1
Green Ext Time (p_c), s	0.5	9.6		1.0		16.2		2.3

Intersection Summary	
HCM 6th Ctrl Delay	27.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	1538	41	151	830	12	45	88	120	60	55	15
Future Volume (veh/h)	94	1538	41	151	830	12	45	88	120	60	55	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1786	1800	1758	1758	1772	1772	1772	1800	1800	1800
Adj Flow Rate, veh/h	102	1672	45	164	902	13	49	96	130	65	60	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	1	0	3	3	2	2	2	0	0	0
Cap, veh/h	424	2332	63	177	2329	34	90	146	177	156	133	31
Arrive On Green	0.69	0.69	0.67	0.69	0.69	0.67	0.24	0.24	0.22	0.24	0.24	0.22
Sat Flow, veh/h	620	3376	91	288	3371	49	217	619	750	458	563	131
Grp Volume(v), veh/h	102	838	879	164	447	468	275	0	0	141	0	0
Grp Sat Flow(s),veh/h/ln	620	1697	1770	288	1670	1749	1586	0	0	1152	0	0
Q Serve(g_s), s	9.1	33.2	33.6	42.4	12.4	12.4	4.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	21.6	33.2	33.6	76.0	12.4	12.4	17.4	0.0	0.0	12.9	0.0	0.0
Prop In Lane	1.00		0.05	1.00		0.03	0.18		0.47	0.46		0.11
Lane Grp Cap(c), veh/h	424	1172	1223	177	1154	1208	414	0	0	320	0	0
V/C Ratio(X)	0.24	0.71	0.72	0.93	0.39	0.39	0.67	0.00	0.00	0.44	0.00	0.00
Avail Cap(c_a), veh/h	424	1172	1223	177	1154	1208	414	0	0	320	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.7	10.4	10.5	40.6	7.2	7.2	39.1	0.0	0.0	36.4	0.0	0.0
Incr Delay (d2), s/veh	1.3	3.7	3.7	51.2	1.0	0.9	8.2	0.0	0.0	4.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.2	1.2	5.4	0.3	0.3	5.2	0.0	0.0	2.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.1	14.1	14.1	91.9	8.2	8.1	47.3	0.0	0.0	40.8	0.0	0.0
LnGrp LOS	B	B	B	F	A	A	D	A	A	D	A	A
Approach Vol, veh/h		1819			1079			275			141	
Approach Delay, s/veh		14.1			20.9			47.3			40.8	
Approach LOS		B			C			D			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	80.0	30.0	80.0	30.0
Change Period (Y+Rc), s	* 6.1	* 6.2	* 6.1	* 6.2
Max Green Setting (Gmax), s	* 74	* 24	* 74	* 24
Max Q Clear Time (g_c+I1), s	35.6	14.9	78.0	19.4
Green Ext Time (p_c), s	28.5	0.7	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	20.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	579	1424	158	58	718	114	64	225	84	165	241	203
Future Volume (veh/h)	579	1424	158	58	718	114	64	225	84	165	241	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1800	1800	1758	1772	1800	1772	1800	1800	1772	1786
Adj Flow Rate, veh/h	629	1548	0	63	780	0	70	245	0	179	262	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	1	0	0	3	2	0	2	0	0	2	1
Cap, veh/h	770	1470		114	896		437	1316		400	976	
Arrive On Green	0.23	0.43	0.00	0.07	0.27	0.00	0.06	0.39	0.00	0.29	0.29	0.00
Sat Flow, veh/h	3326	3393	1525	1714	3340	1502	1714	3367	1525	1153	3367	1514
Grp Volume(v), veh/h	629	1548	0	63	780	0	70	245	0	179	262	0
Grp Sat Flow(s),veh/h/ln	1663	1697	1525	1714	1670	1502	1714	1683	1525	1153	1683	1514
Q Serve(g_s), s	19.7	47.7	0.0	3.9	24.5	0.0	2.9	5.3	0.0	14.4	6.6	0.0
Cycle Q Clear(g_c), s	19.7	47.7	0.0	3.9	24.5	0.0	2.9	5.3	0.0	14.4	6.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	770	1470		114	896		437	1316		400	976	
V/C Ratio(X)	0.82	1.05		0.55	0.87		0.16	0.19		0.45	0.27	
Avail Cap(c_a), veh/h	816	1470		187	911		451	1316		400	976	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.1	31.2	0.0	49.7	38.4	0.0	22.9	22.0	0.0	32.8	30.1	0.0
Incr Delay (d2), s/veh	6.2	38.8	0.0	4.1	9.0	0.0	0.2	0.3	0.0	3.6	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	15.7	0.0	1.3	6.8	0.0	0.6	1.1	0.0	2.8	1.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.3	70.0	0.0	53.8	47.4	0.0	23.1	22.3	0.0	36.4	30.7	0.0
LnGrp LOS	D	F		D	D		C	C		D	C	
Approach Vol, veh/h		2177	A		843	A		315	A		441	A
Approach Delay, s/veh		63.1			47.9			22.5			33.0	
Approach LOS		E			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	11.3	51.7	11.1	35.9	29.5	33.5		47.0
Change Period (Y+Rc), s	* 6.2	* 6.2	* 6.7	* 6.7	* 6.2	* 6.2		* 6.7
Max Green Setting (Gmax), s	* 9.8	* 43	* 5.3	* 26	* 25	* 28		* 38
Max Q Clear Time (g_c+I1), s	5.9	49.7	4.9	16.4	21.7	26.5		7.3
Green Ext Time (p_c), s	0.1	0.0	0.0	2.8	1.5	0.8		2.5

Intersection Summary	
HCM 6th Ctrl Delay	52.8
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	196	53	1801	716	104	731
Future Volume (veh/h)	196	53	1801	716	104	731
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1617	1800	1786	1744	1800	1744
Adj Flow Rate, veh/h	213	58	1958	0	113	795
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	13	0	1	4	0	4
Cap, veh/h	732	374	1968		127	2278
Arrive On Green	0.24	0.24	0.58	0.00	0.07	0.69
Sat Flow, veh/h	2988	1525	3483	1478	1714	3400
Grp Volume(v), veh/h	213	58	1958	0	113	795
Grp Sat Flow(s),veh/h/ln	1494	1525	1697	1478	1714	1657
Q Serve(g_s), s	7.0	3.6	68.8	0.0	7.8	11.8
Cycle Q Clear(g_c), s	7.0	3.6	68.8	0.0	7.8	11.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	732	374	1968		127	2278
V/C Ratio(X)	0.29	0.16	0.99		0.89	0.35
Avail Cap(c_a), veh/h	732	374	1968		127	2278
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	36.8	35.6	25.0	0.0	55.1	7.7
Incr Delay (d2), s/veh	1.0	0.9	19.0	0.0	47.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.9	11.5	0.0	4.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	37.8	36.4	44.1	0.0	102.8	7.8
LnGrp LOS	D	D	D		F	A
Approach Vol, veh/h	271		1958	A		908
Approach Delay, s/veh	37.5		44.1			19.6
Approach LOS	D		D			B

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	12.9	74.0			86.9	33.5
Change Period (Y+Rc), s	* 6.3	* 6.3			* 6.3	5.9
Max Green Setting (Gmax), s	* 6.6	* 68			* 80	27.6
Max Q Clear Time (g_c+I1), s	9.8	70.8			13.8	9.0
Green Ext Time (p_c), s	0.0	0.0			10.9	2.3

Intersection Summary	
HCM 6th Ctrl Delay	36.4
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NER] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	21.8
Intersection LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	497	26	6	75	124	176
Future Vol, veh/h	497	26	6	75	124	176
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	1	10	11	0	1	2
Mvmt Flow	540	28	7	82	135	191
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	28.4	10.4	13.3
HCM LOS	D	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	7%	95%	0%
Vol Thru, %	93%	0%	41%
Vol Right, %	0%	5%	59%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	81	523	300
LT Vol	6	497	0
Through Vol	75	0	124
RT Vol	0	26	176
Lane Flow Rate	88	568	326
Geometry Grp	1	1	1
Degree of Util (X)	0.153	0.828	0.483
Departure Headway (Hd)	6.254	5.242	5.328
Convergence, Y/N	Yes	Yes	Yes
Cap	571	694	675
Service Time	4.312	3.271	3.373
HCM Lane V/C Ratio	0.154	0.818	0.483
HCM Control Delay	10.4	28.4	13.3
HCM Lane LOS	B	D	B
HCM 95th-tile Q	0.5	9	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	131	420	1	17	118	20	147	357	159	19	69	37
Future Volume (veh/h)	131	420	1	17	118	20	147	357	159	19	69	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1744	1744	1393	1660	1660	1617	1786	1674	1800	1730	1730
Adj Flow Rate, veh/h	142	457	1	18	128	0	160	388	173	21	75	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	4	4	29	10	10	13	1	9	0	5	5
Cap, veh/h	609	733	2	292	699		570	768	610	337	249	133
Arrive On Green	0.42	0.42	0.37	0.42	0.42	0.00	0.15	0.43	0.43	0.23	0.23	0.19
Sat Flow, veh/h	1272	1739	4	734	1660	0	1540	1786	1418	862	1062	566
Grp Volume(v), veh/h	142	0	458	18	128	0	160	388	173	21	0	115
Grp Sat Flow(s),veh/h/ln	1272	0	1743	734	1660	0	1540	1786	1418	862	0	1628
Q Serve(g_s), s	4.2	0.0	11.1	1.1	2.6	0.0	3.6	8.5	4.3	1.0	0.0	3.2
Cycle Q Clear(g_c), s	6.8	0.0	11.1	12.1	2.6	0.0	3.6	8.5	4.3	1.0	0.0	3.2
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	609	0	734	292	699		570	768	610	337	0	382
V/C Ratio(X)	0.23	0.00	0.62	0.06	0.18		0.28	0.51	0.28	0.06	0.00	0.30
Avail Cap(c_a), veh/h	1557	0	2033	839	1936		701	1917	1522	819	0	1292
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.9	0.0	12.2	17.0	9.7	0.0	10.3	11.1	9.9	16.1	0.0	17.3
Incr Delay (d2), s/veh	0.2	0.0	0.9	0.1	0.1	0.0	0.3	0.5	0.3	0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.1	0.0	13.1	17.0	9.9	0.0	10.5	11.7	10.2	16.2	0.0	17.7
LnGrp LOS	B	A	B	B	A		B	B	B	B	A	B
Approach Vol, veh/h		600			146	A		721			136	
Approach Delay, s/veh		12.8			10.8			11.1			17.5	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		26.7		27.0		26.7	10.5	16.5				
Change Period (Y+Rc), s		* 6.7		6.5		* 6.7	5.0	6.5				
Max Green Setting (Gmax), s		* 60		55.0		* 60	10.0	40.0				
Max Q Clear Time (g_c+I1), s		14.1		10.5		13.1	5.6	5.2				
Green Ext Time (p_c), s		1.5		6.6		6.9	0.4	1.4				

Intersection Summary	
HCM 6th Ctrl Delay	12.2
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

MOVEMENT SUMMARY

Site: Existing PM - BCB/Mer Bleue

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
8	T1	291	3.0	0.352	7.1	LOS A	1.9	15.2	0.61	0.65	58.1
18	R2	330	3.0	0.391	7.1	LOS A	2.2	17.5	0.63	0.73	57.0
Approach		622	3.0	0.391	7.1	LOS A	2.2	17.5	0.62	0.69	57.5
East: Brian Coburn											
1	L2	118	3.0	0.505	12.9	LOS B	3.3	26.0	0.63	0.75	57.8
16	R2	277	3.0	0.505	6.9	LOS A	3.3	26.0	0.63	0.75	55.9
Approach		396	3.0	0.505	8.7	LOS A	3.3	26.0	0.63	0.75	56.5
North: Mer Bleue											
7	L2	452	3.0	0.414	10.8	LOS B	2.7	20.8	0.38	0.64	55.4
4	T1	208	3.0	0.234	5.1	LOS A	1.2	9.3	0.34	0.46	59.8
Approach		660	3.0	0.414	9.0	LOS A	2.7	20.8	0.37	0.58	56.7
All Vehicles		1677	3.0	0.505	8.2	LOS A	3.3	26.0	0.53	0.66	56.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix B

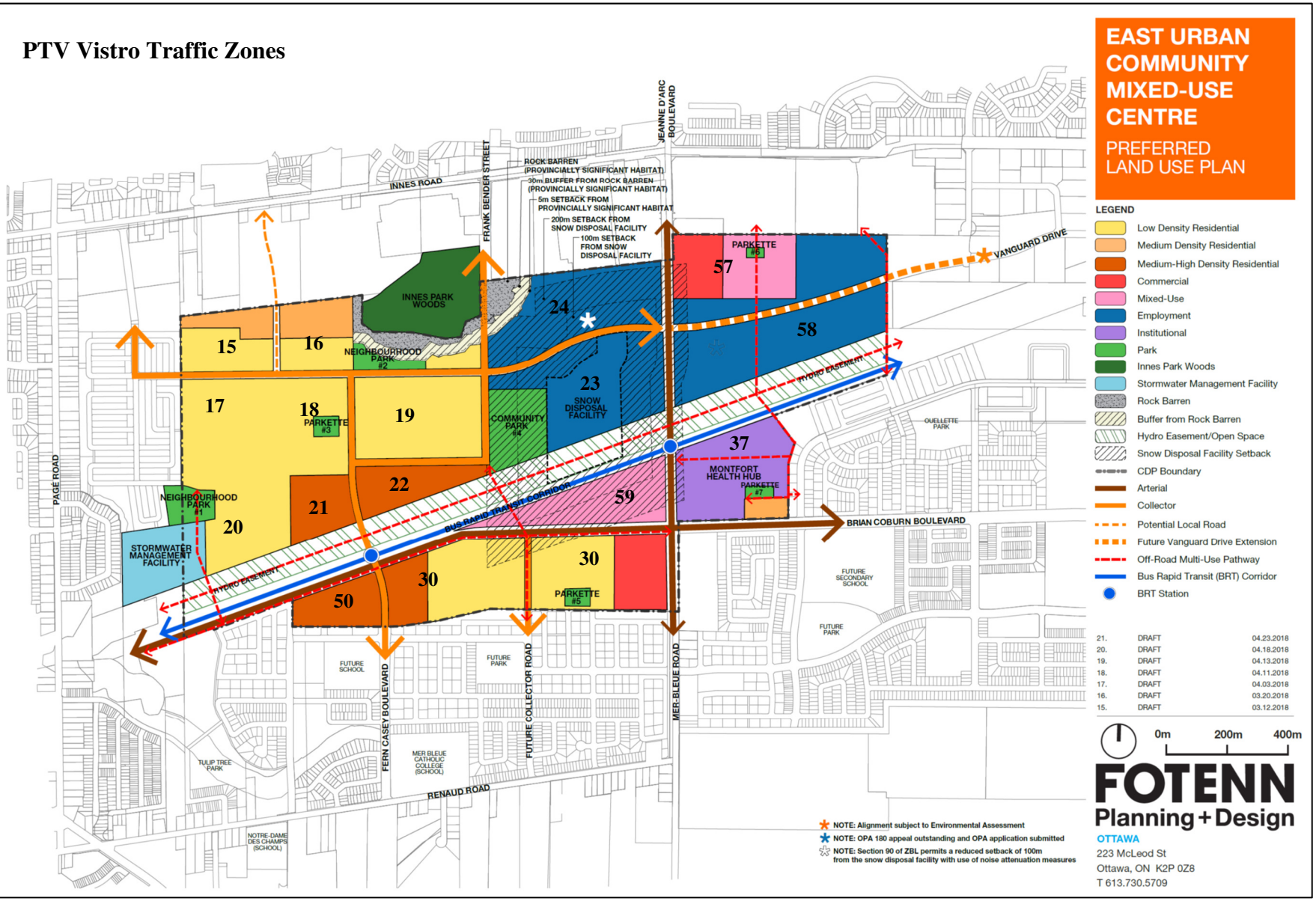
Site Traffic Mode Split

Trip Generation Rates - CDP Study Area

ITE Trip Rates					Modified Person Trips Rate	x 1.3			
Rate per unit	Pk Period	Rate	Split		Rate per unit	Pk Period	Rate	Split	
			IN	OUT				IN	OUT
Single Family Homes - 210	AM	0.75	25%	75%	Single Family Homes - 210	AM	0.98	25%	75%
	PM	1.01	63%	37%		PM	1.31	63%	37%
Rate per unit	Pk Period	Rate	Split		Rate per unit	Pk Period	Rate	Split	
			IN	OUT				IN	OUT
Townhomes - 230	AM	0.44	17%	83%	Townhomes - 230	AM	0.57	17%	83%
	PM	0.52	67%	33%		PM	0.68	67%	33%
Rate per unit	Pk Period	Rate	Split		Rate per unit	Pk Period	Rate	Split	
			IN	OUT				IN	OUT
Apartment - 220	AM	0.51	20%	80%	Apartment - 220	AM	0.66	20%	80%
	PM	0.62	65%	35%		PM	0.81	65%	35%

ITE Trip Rates					Modified Person Trips Rate				
Rate per unit	Pk Period	Rate	Split		Rate per unit	Pk Period	Rate	Split	
			IN	OUT				IN	OUT
Office	AM	0.48	88%	12%	Office	AM	0.62	88%	12%
	PM	0.46	17%	83%		PM	0.60	17%	83%
Rate per unit	Pk Period	Rate	Split		Rate per unit	Pk Period	Rate	Split	
			IN	OUT				IN	OUT
Industrial	AM	0.47	86%	14%	Industrial	AM	0.61	86%	14%
	PM	0.46	20%	80%		PM	0.60	20%	80%

PTV Vistro Traffic Zones



Residential Mode Share Split - Zone 15

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	20	79	99	80	43	123
Auto Passenger	15%	5	20	25	20	11	31
Transit	20%	7	26	33	27	14	41
Non-Auto	5%	2	7	8	7	4	10
Total Person Trips	100%	33	131	165	133	71	205
Total "Residential" Auto Trips		**20**	**79**	**99**	**80**	**43**	**123**

Residential Mode Share Split - Zone 16

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	24	96	119	95	51	146
Auto Passenger	15%	6	24	30	24	13	37
Transit	20%	8	32	40	32	17	49
Non-Auto	5%	2	8	10	8	4	12
Total Person Trips	100%	39	159	199	159	85	243
Total "Residential" Auto Trips		**24**	**96**	**119**	**95**	**51**	**146**

Residential Mode Share Split - Zone 17

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	33	114	148	123	68	191
Auto Passenger	15%	8	29	37	31	17	48
Transit	20%	11	38	49	41	23	64
Non-Auto	5%	3	10	12	10	6	16
Total Person Trips	100%	55	191	246	204	114	318
Total "Residential" Auto Trips		**33**	**114**	**148**	**123**	**68**	**191**

Residential Mode Share Split - Zone 18

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	17	75	92	74	38	112
Auto Passenger	15%	4	19	23	18	9	28
Transit	20%	6	25	31	25	13	37
Non-Auto	5%	1	6	8	6	3	9
Total Person Trips	100%	28	125	153	123	63	186
Total "Residential" Auto Trips		**17**	**75**	**92**	**74**	**38**	**112**

Residential Mode Share Split - Zone 19

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	33	128	161	131	70	201
Auto Passenger	15%	8	32	40	33	18	50
Transit	20%	11	43	54	44	23	67
Non-Auto	5%	3	11	13	11	6	17
Total Person Trips	100%	55	213	268	219	117	336
Total "Residential" Auto Trips		**33**	**128**	**161**	**131**	**70**	**201**

Residential Mode Share Split - Zone 20

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	14	55	69	56	29	85
Auto Passenger	15%	3	14	17	14	7	21
Transit	20%	5	18	23	19	10	28
Non-Auto	5%	1	5	6	5	2	7
Total Person Trips	100%	23	92	115	93	49	142
Total "Residential" Auto Trips		**14**	**55**	**69**	**56**	**29**	**85**

Residential Mode Share Split - Zone 21

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	34	138	172	136	72	209
Auto Passenger	15%	8	35	43	34	18	52
Transit	20%	11	46	57	45	24	70
Non-Auto	5%	3	12	14	11	6	17
Total Person Trips	100%	56	231	286	227	120	348
Total "Residential" Auto Trips		**34**	**138**	**172**	**136**	**72**	**209**

Residential Mode Share Split - Zone 22

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	29	115	144	114	61	175
Auto Passenger	15%	7	29	36	28	15	44
Transit	20%	10	38	48	38	20	58
Non-Auto	5%	2	10	12	9	5	15
Total Person Trips	100%	48	192	240	190	102	292
Total "Residential" Auto Trips		**29**	**115**	**144**	**114**	**61**	**175**

Residential Mode Share Split - Zone 30

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	58	229	288	232	124	357
Auto Passenger	15%	15	57	72	58	31	89
Transit	20%	19	76	96	77	41	119
Non-Auto	5%	5	19	24	19	10	30
Total Person Trips	100%	97	382	479	387	207	595
Total "Residential" Auto Trips		**58**	**229**	**288**	**232**	**124**	**357**

Residential Mode Share Split - Zone 50

Travel Mode	Mode Share	AM			PM		
		In	Out	Total	In	Out	Total
Auto Driver	60%	28	111	139	110	59	169
Auto Passenger	15%	7	28	35	28	15	42
Transit	20%	9	37	46	37	20	56
Non-Auto	5%	2	9	12	9	5	14
Total Person Trips	100%	46	186	232	183	99	282
Total "Residential" Auto Trips		**28**	**111**	**139**	**110**	**59**	**169**

Residential Mode Share Split -Zone 59							
Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	60%	20	80	100	79	43	122
Auto Passenger	15%	5	20	25	20	11	30
Transit	20%	7	27	33	26	14	41
Non-Auto	5%	2	7	8	7	4	10
Total Person Trips	100%	33	134	167	132	71	203
Total "Residential" Auto Trips		**20**	**80**	**100**	**79**	**43**	**122**

Office/Comm Mode Share Split - Zone 59							
Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	60%	87	12	99	16	79	95
Auto Passenger	15%	22	3	25	4	20	24
Transit	20%	29	4	33	5	26	32
Non-Auto	5%	7	1	8	1	7	8
Total Person Trips	100%	146	20	165	27	132	158
Total "Office/Comm" Auto Trips		**87**	**12**	**99**	**16**	**79**	**95**
Internal - 20%		17	2	20	3	16	19
Pass-by - 30%		26	4	30	5	24	29
Total Office/Commercial NEW Trips after deduction		**44**	**6**	**50**	**8**	**39**	**48**

70% Office - Zone 58							
Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	60%	187	26	213	35	169	204
Auto Passenger	15%	47	6	53	9	42	51
Transit	20%	62	9	71	12	56	68
Non-Auto	5%	16	2	18	3	14	17
Total Person Trips	100%	312	43	355	58	282	340
Total Auto Trips		**187**	**26**	**213**	**35**	**169**	**204**
Internal - 10%		19	3	21	3	17	20
Pass-By - 15%		28	4	32	5	25	31
Trips After Reduction		**140**	**19**	**160**	**26**	**127**	**153**

30% Industrial - Zone 58							
Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	60%	77	13	89	17	70	87
Auto Passenger	15%	19	3	22	4	17	22
Transit	20%	26	4	30	6	23	29
Non-Auto	5%	6	1	7	1	6	7
Total Person Trips	100%	128	21	149	29	117	146
Total Auto Trips		**77**	**13**	**89**	**17**	**70**	**87**

Mode Share Split - Zone 23							
Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	60%	356	49	405	66	324	390
Auto Passenger	15%	89	12	101	17	81	98
Transit	20%	119	16	135	22	108	130
Non-Auto	5%	30	4	34	6	27	33
Total Person Trips	100%	594	81	675	111	540	651
Total Auto Trips		**356**	**49**	**405**	**66**	**324**	**390**
Pass-by - 15%		53	7	61	10	49	59
Total Auto Trips After Deduction		**303**	**41**	**344**	**56**	**275**	**332**

Mode Share Split - Zone 24							
Travel Mode	*Mode Share*	*AM*			*PM*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	60%	112	15	128	21	102	123
Auto Passenger	15%	28	4	32	5	26	31
Transit	20%	37	5	43	7	34	41
Non-Auto	5%	9	1	11	2	9	10
Total Person Trips	100%	187	26	213	35	170	205
Total Auto Trips		**112**	**15**	**128**	**21**	**102**	**123**
Pass-by - 20%		22	3	26	4	20	25
Total Auto Trips After Deduction		**90**	**12**	**102**	**17**	**82**	**98**

Zones 23 and 24 are the main employment areas of the CDP area. It is assumed that those employment areas would attract internal trips from the CDP residential land uses. The above trips noted in Zones 23 and 24 do not reflect internal trips but for analysis purposes it was assumed that a 10% of the CDP residential land uses would work and be destined to/from the employment areas.

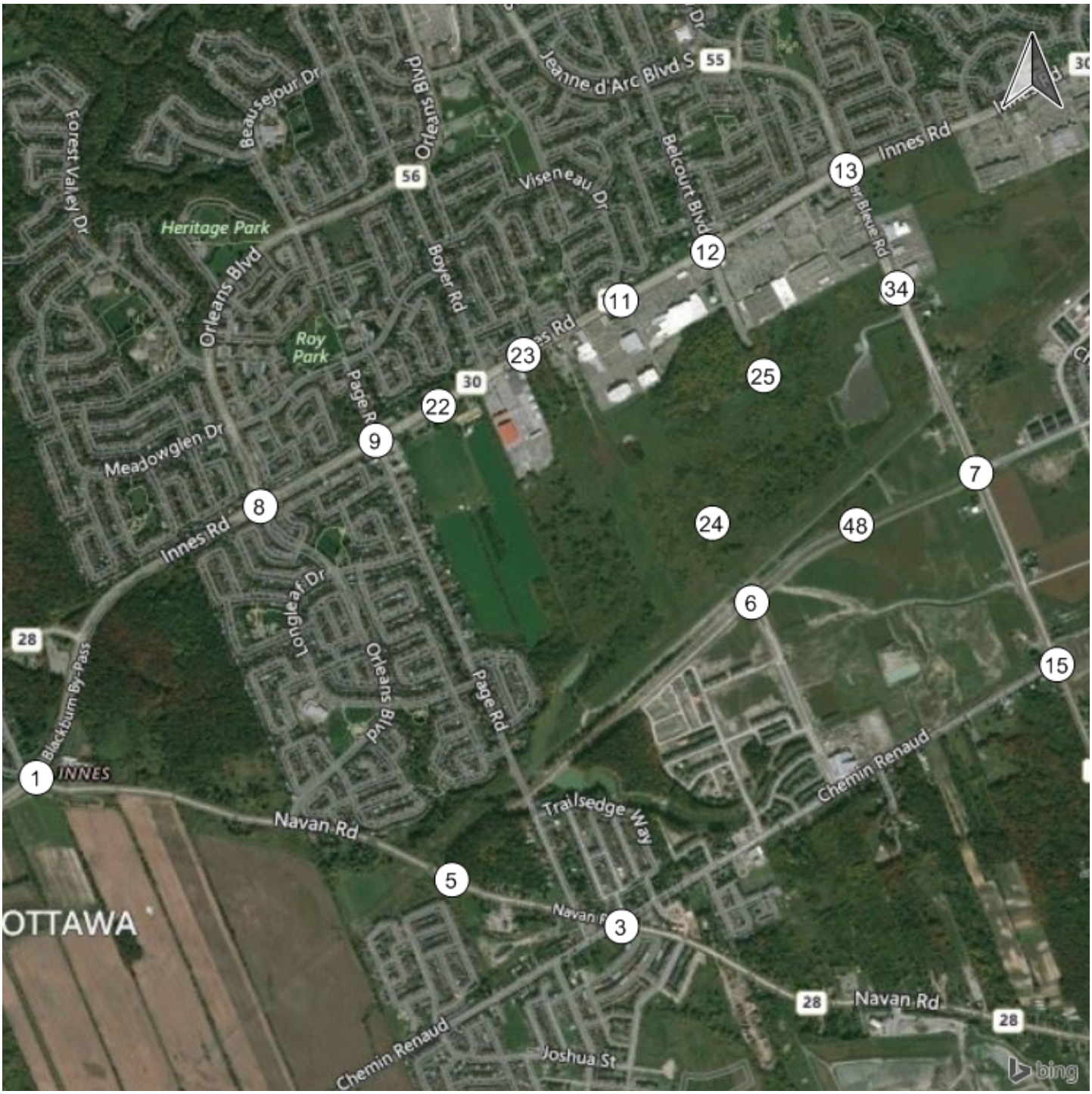
Zone 37 interim trip generations were referenced from "*2225 Mer Bleue Road – Orleans Health Hub Transportation Impact Study"* (March 2018). The ultimate build-out traffic volumes were referenced from "*Orleans Family Health Hub – Community Transportation Study / Transportation Impact Study*" (Oct. 2010).

Zone 57 trip generations were referenced from "*2025 Mer Bleue Road – Community Transportation Study*" (Jan. 2017).

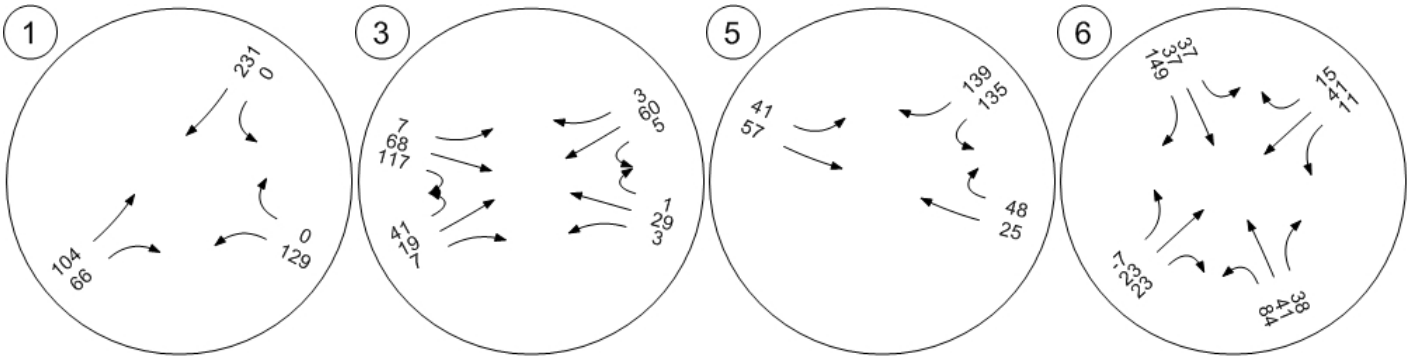
Appendix C

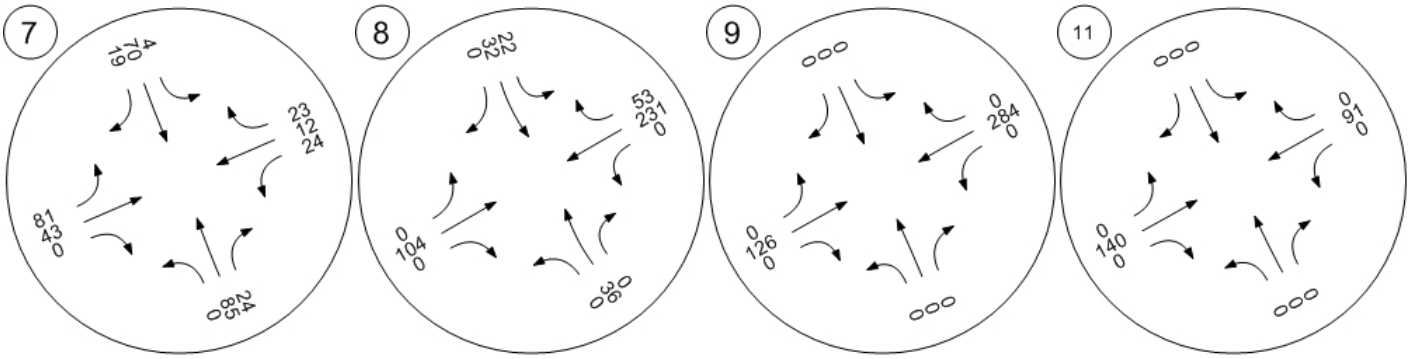
Site and Forecast Traffic Volumes

Study Intersections



Traffic Volume - Net New Site Trips





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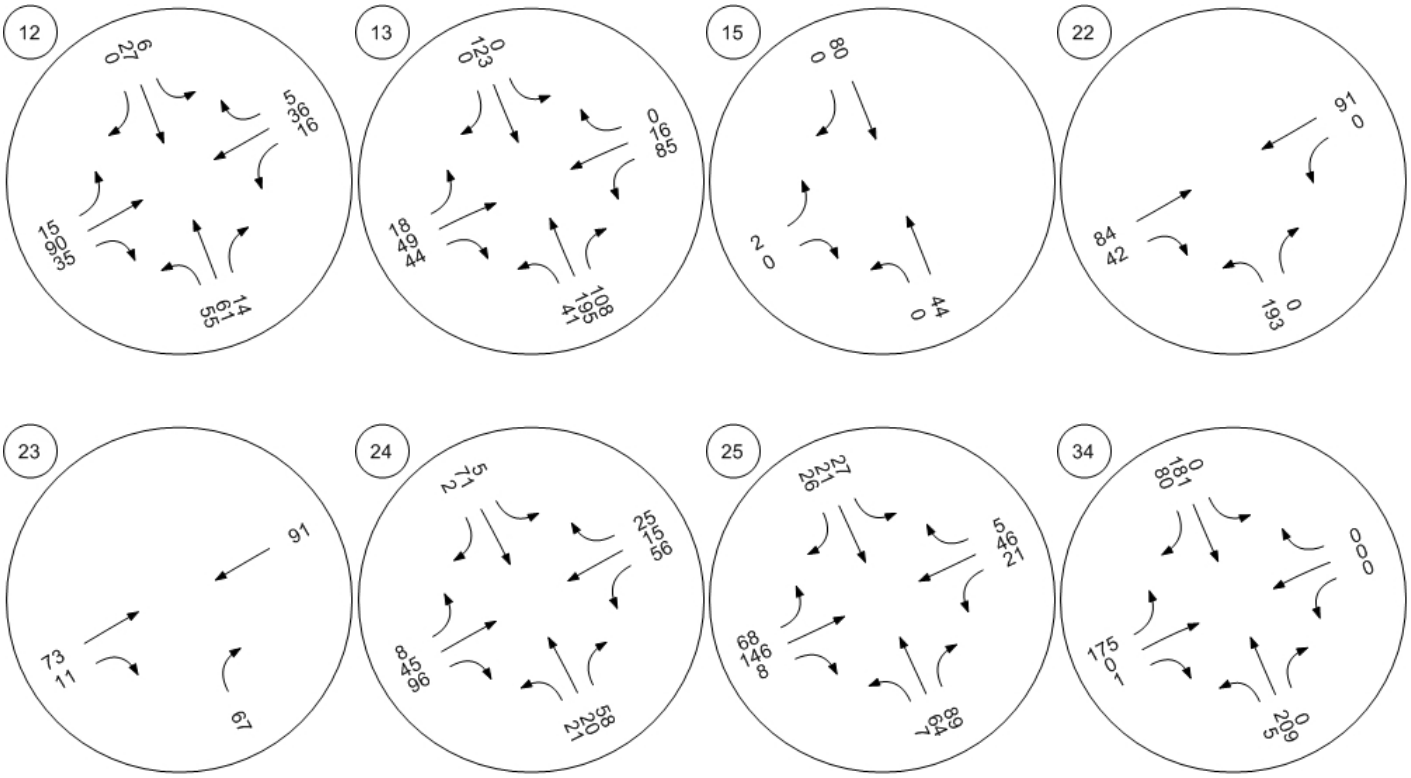

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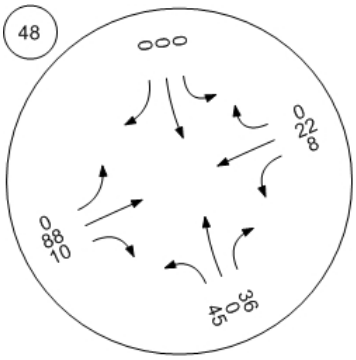
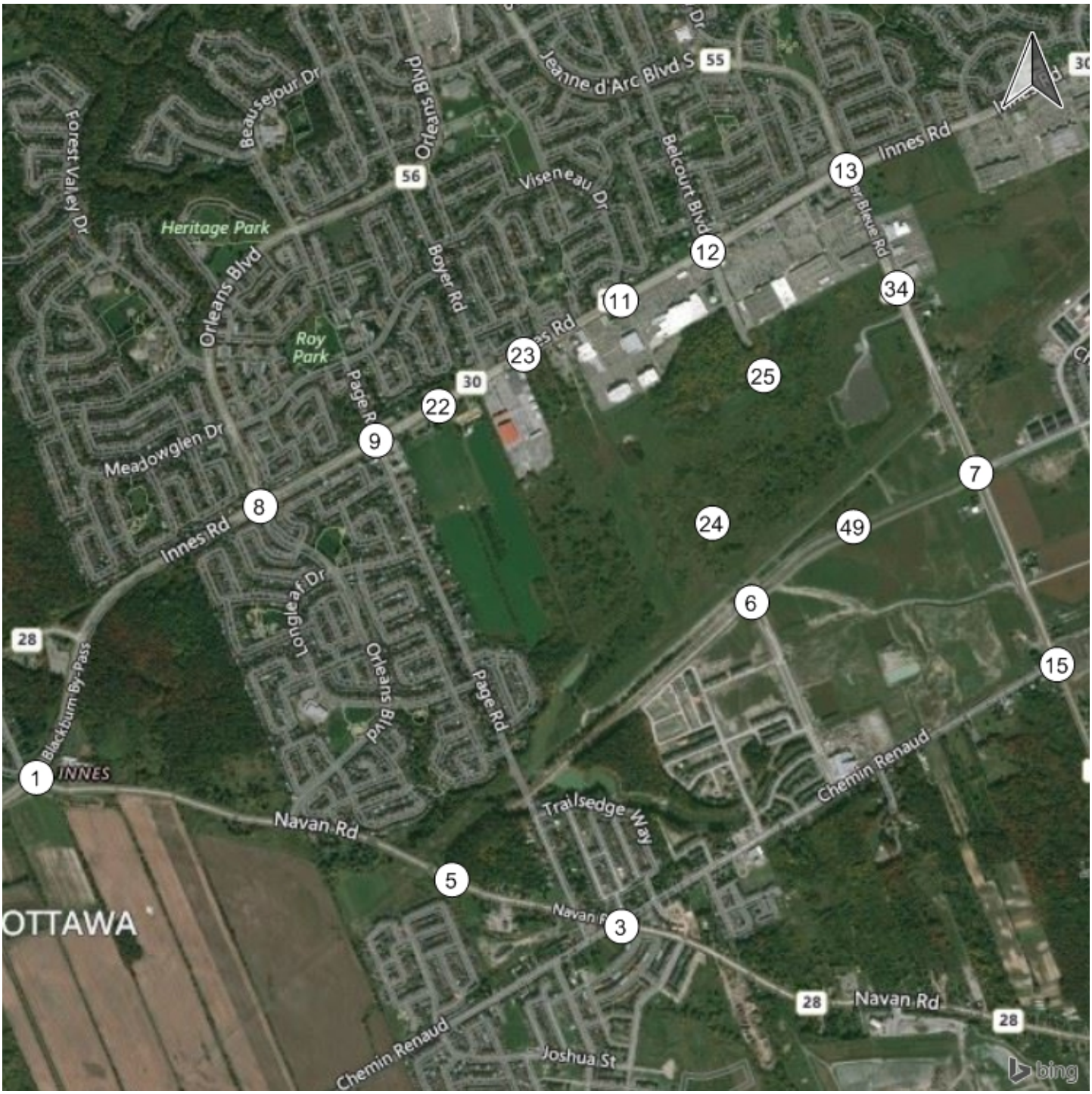


Study Intersections



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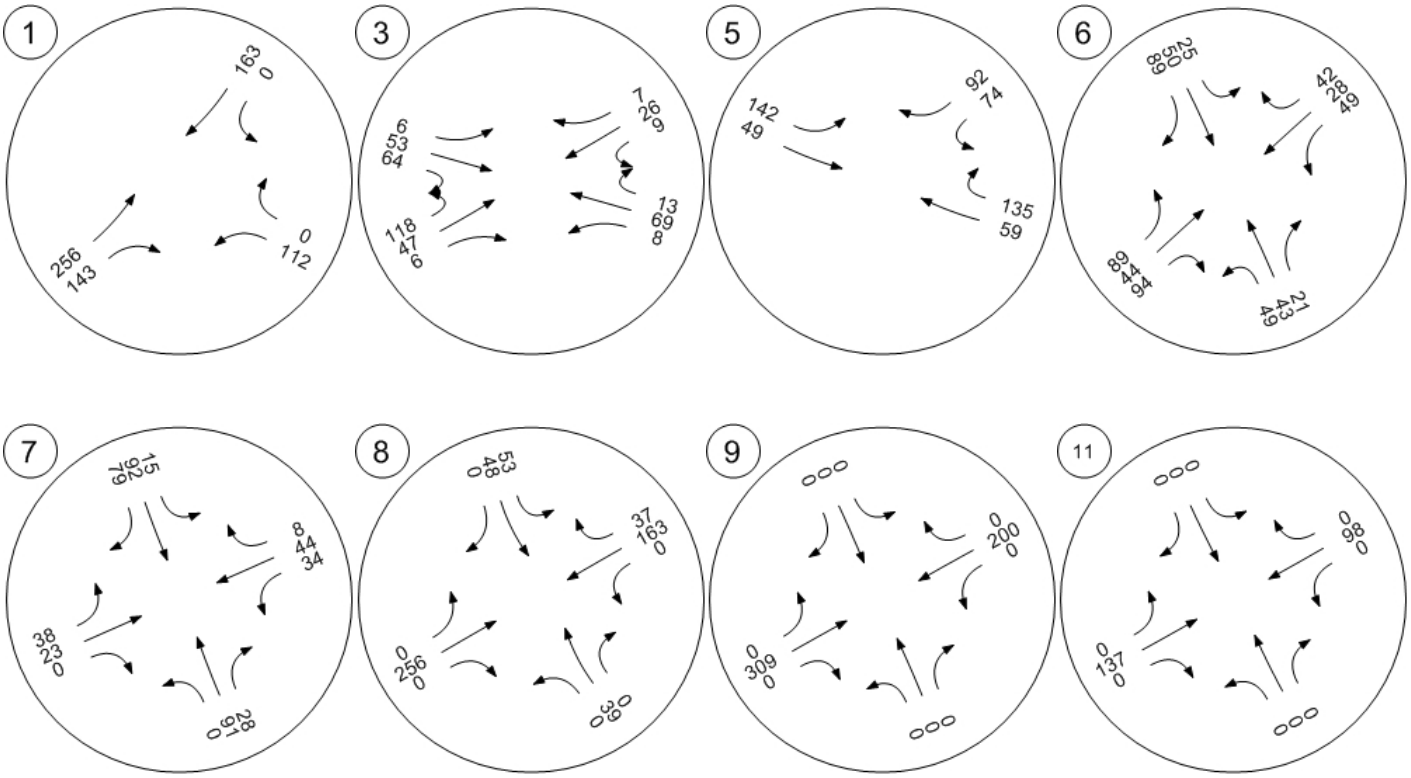
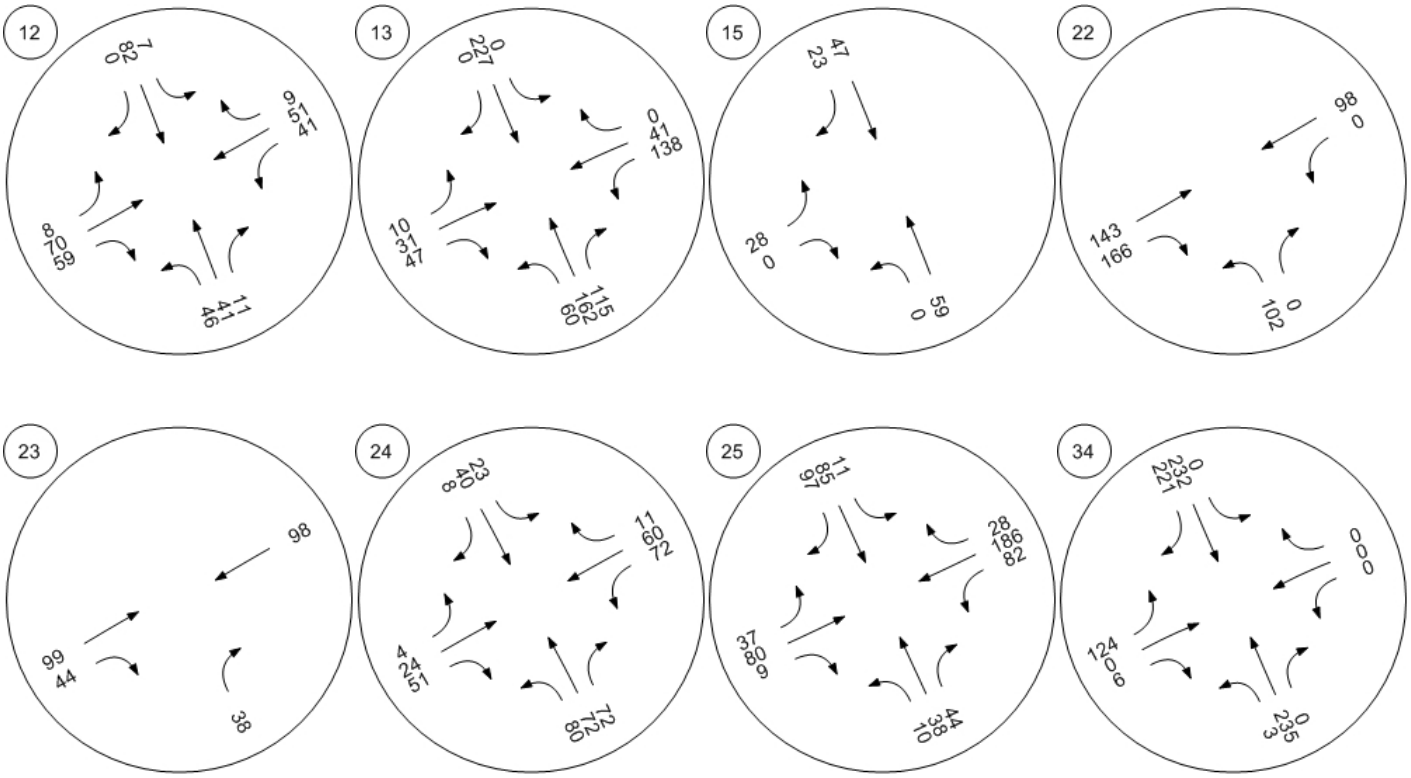
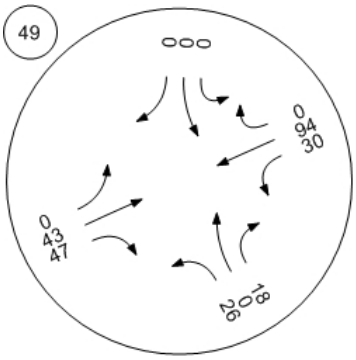


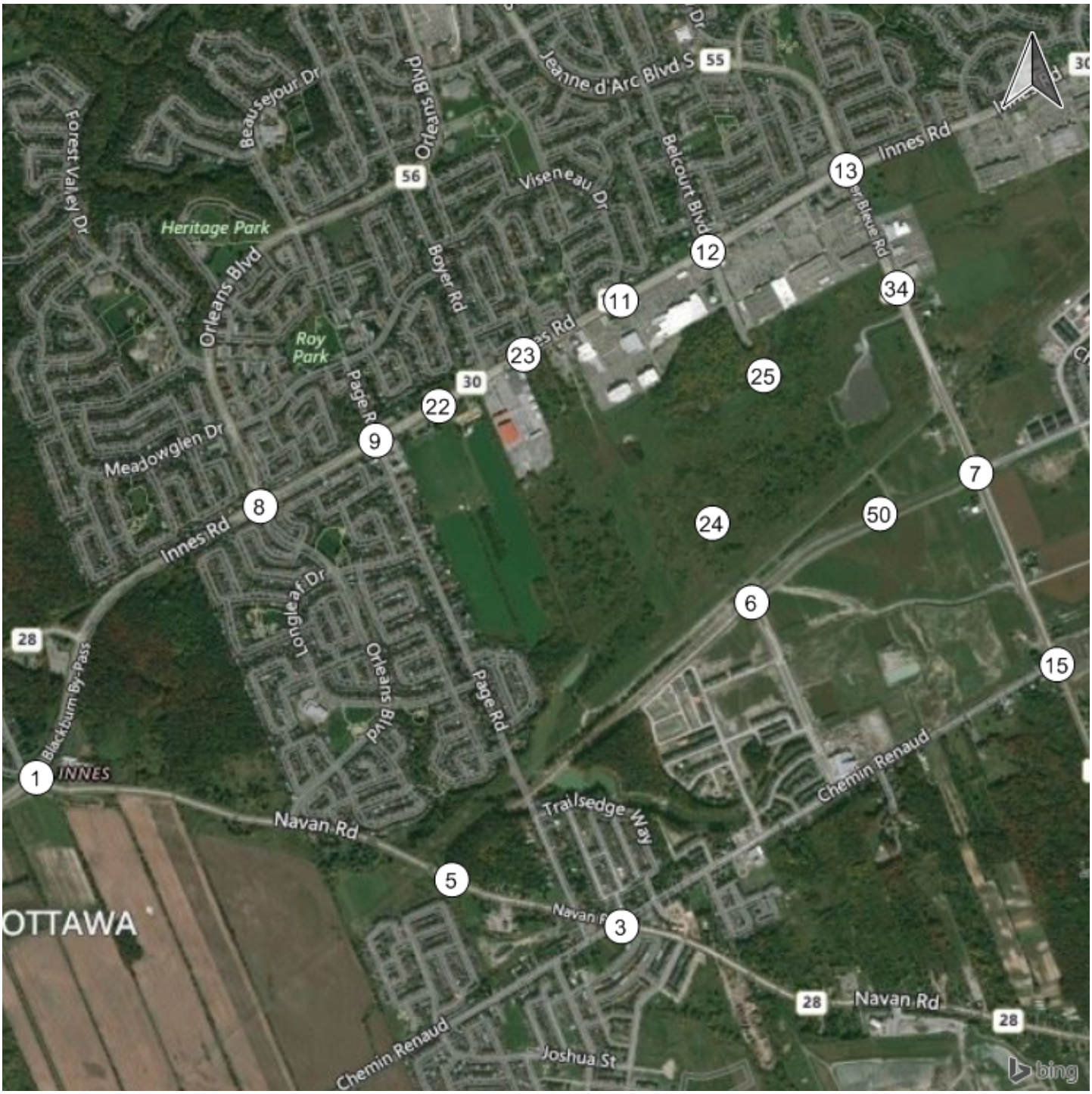
Traffic Volume - Net New Site Trips



Traffic Volume - Net New Site Trips



Study Intersections



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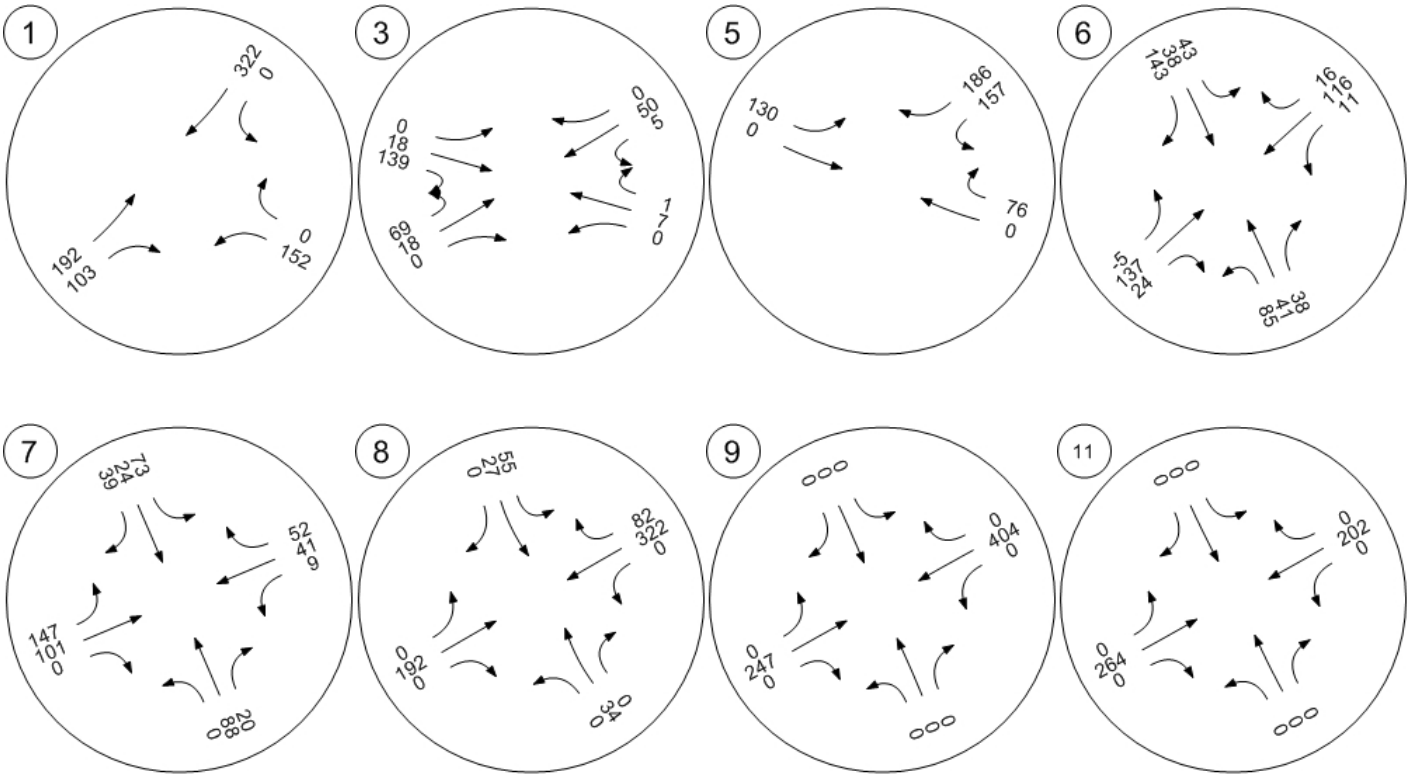

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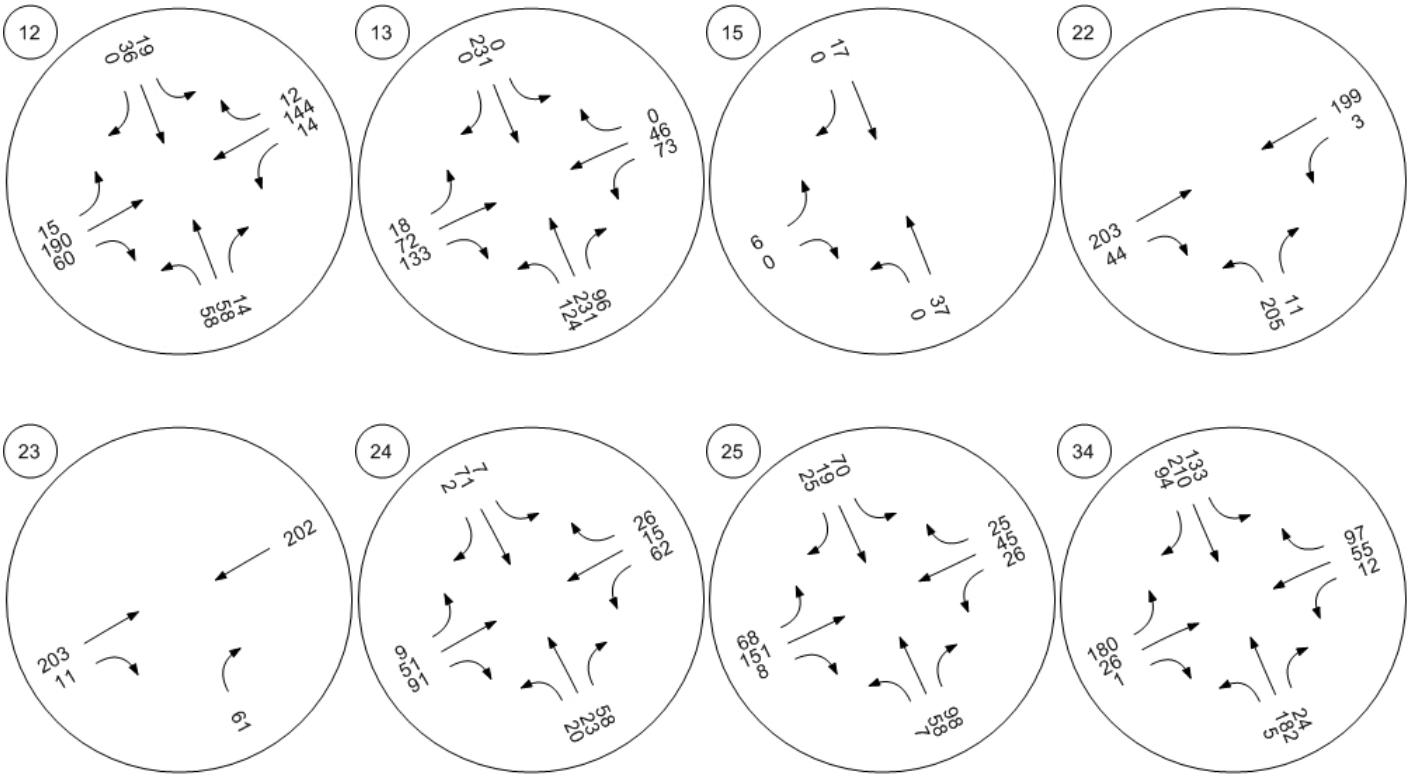
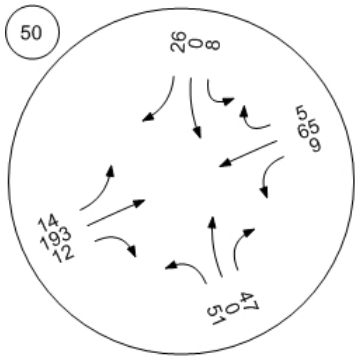
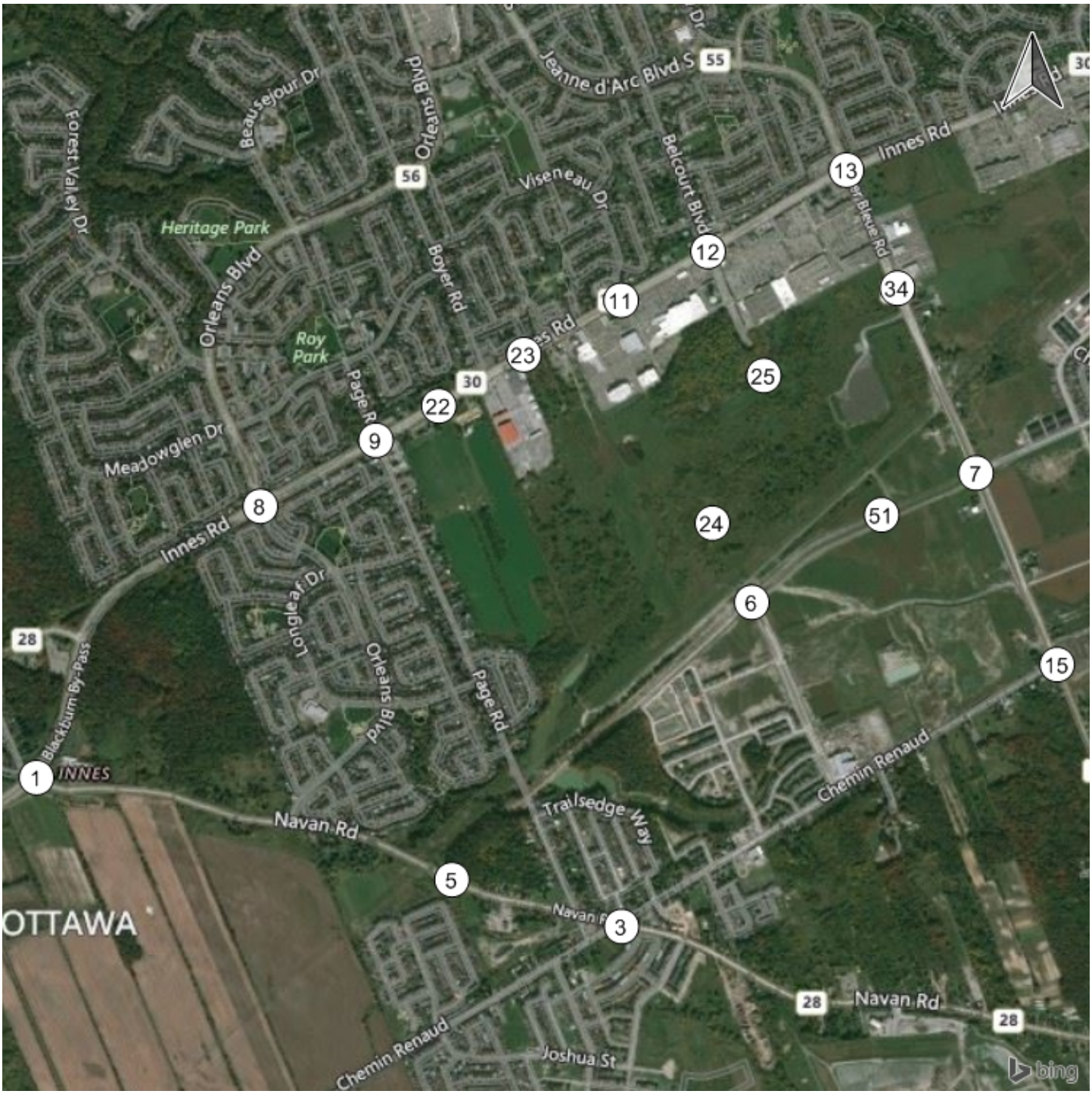


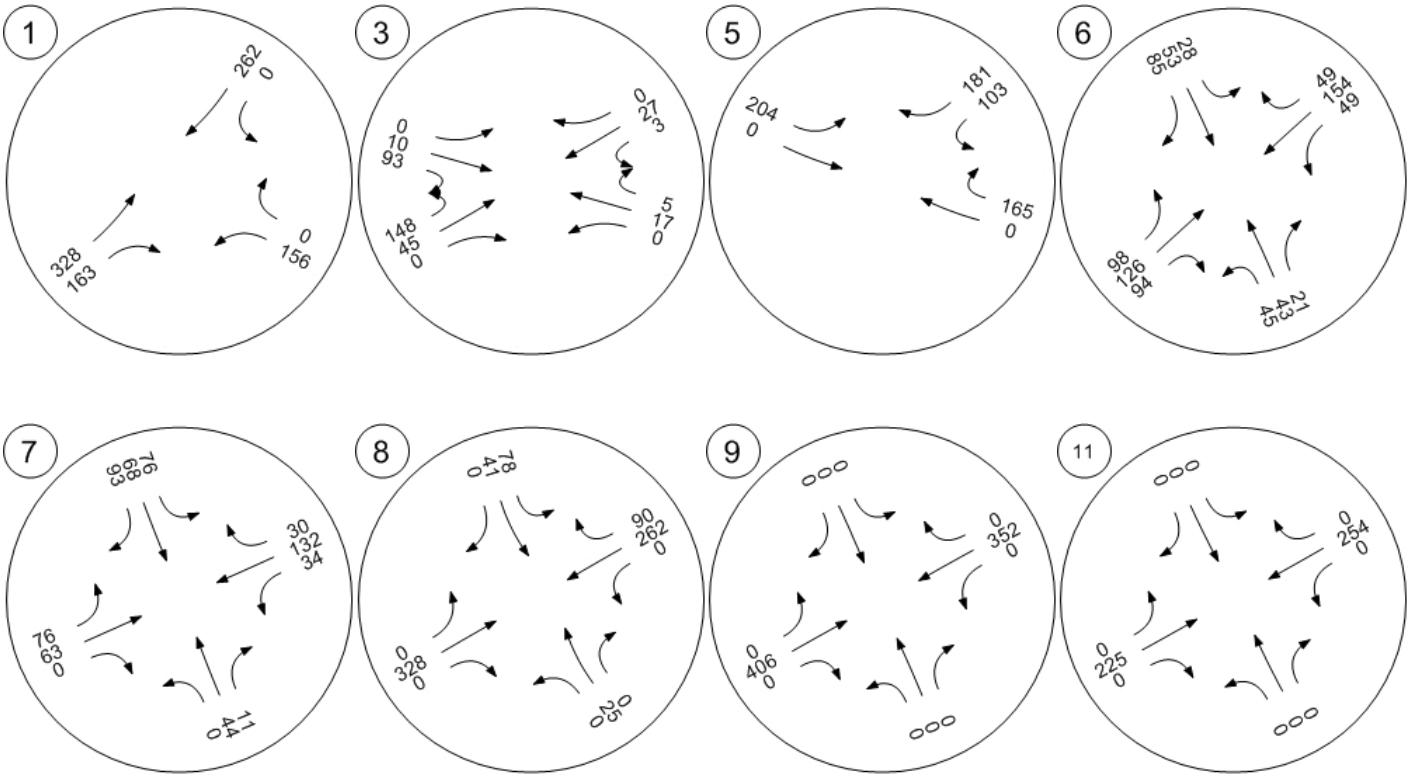
Traffic Volume - Net New Site Trips



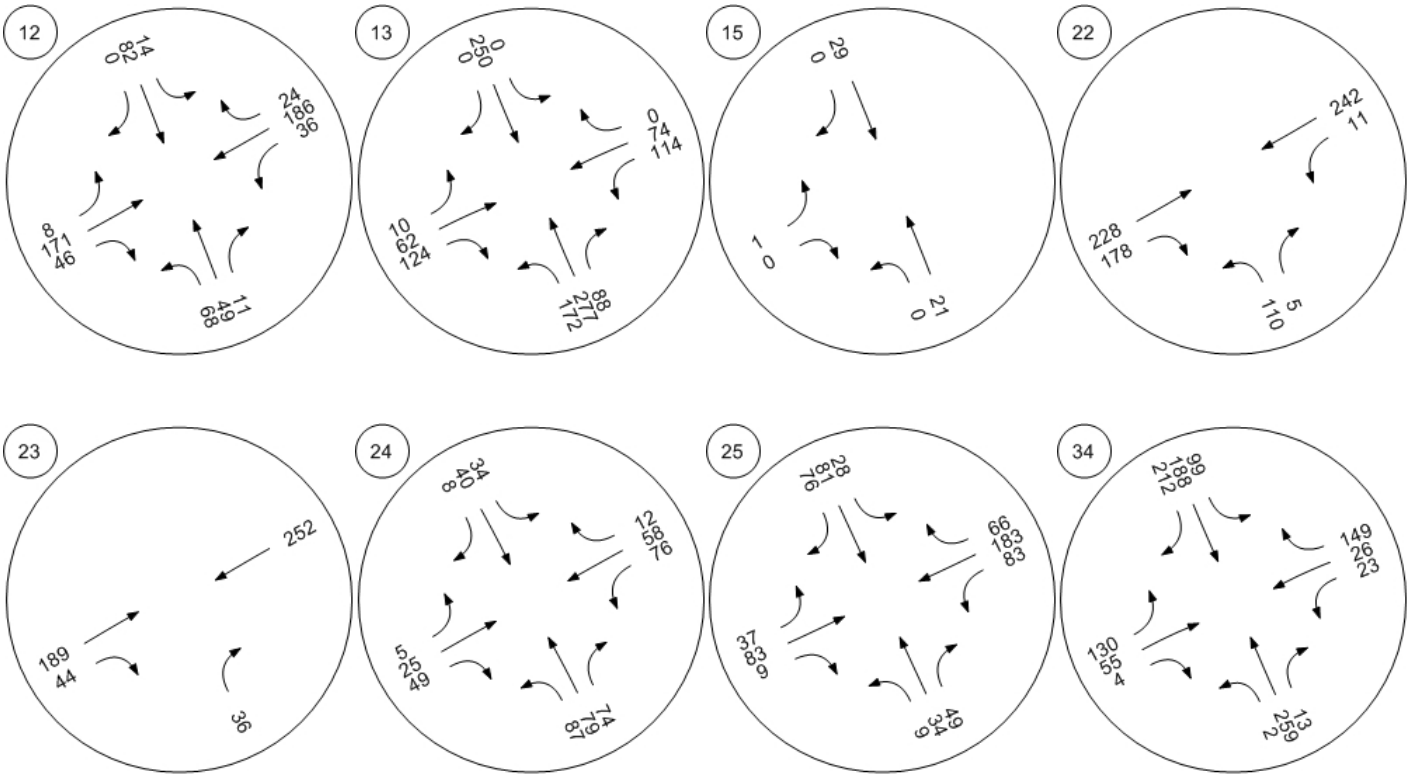
Study Intersections



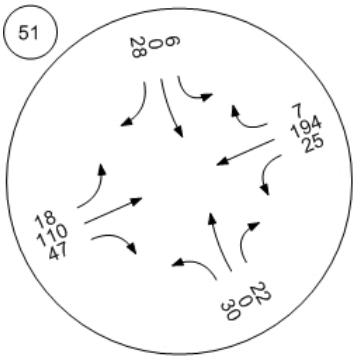
Traffic Volume - Net New Site Trips



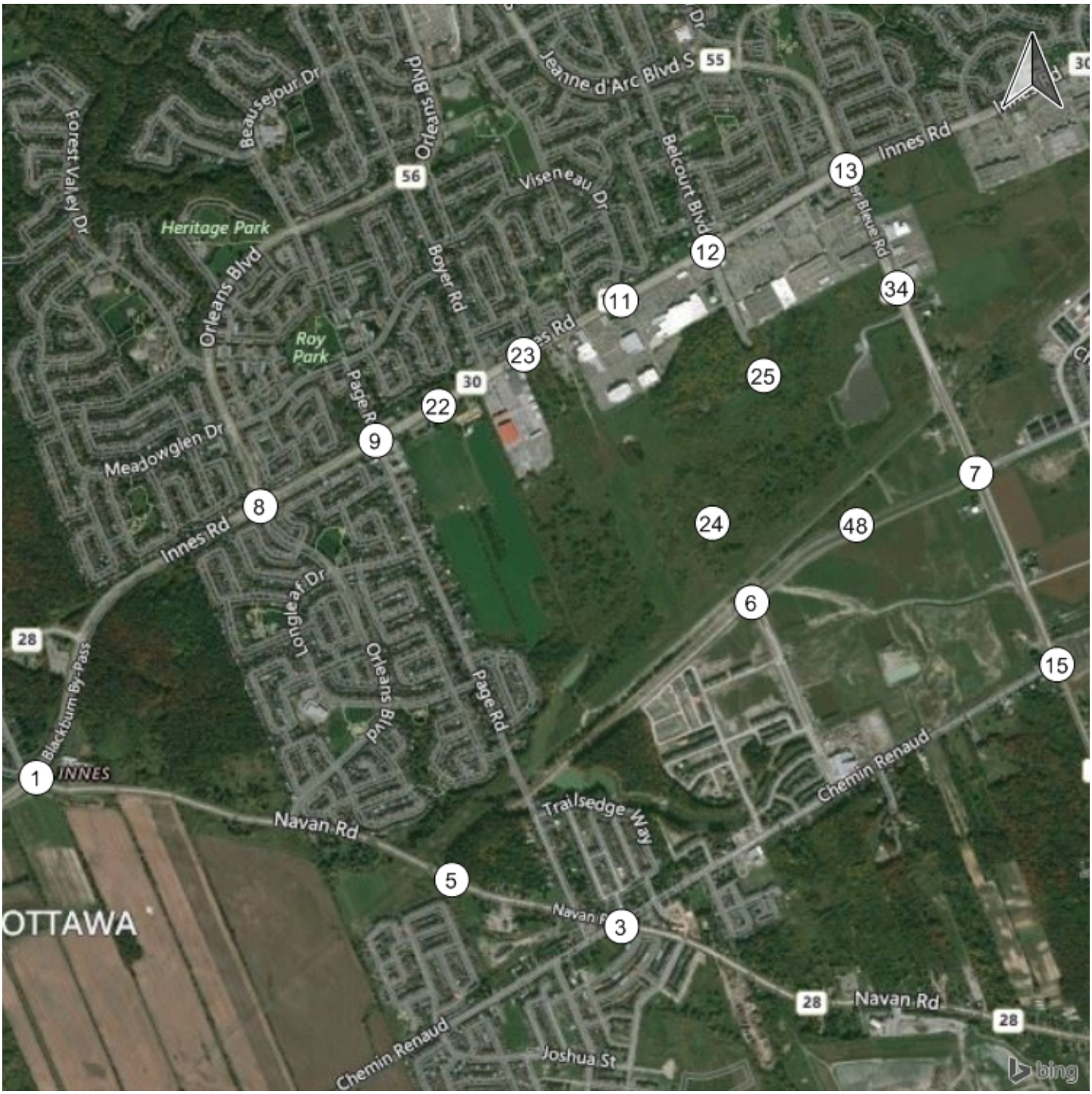
Traffic Volume - Net New Site Trips



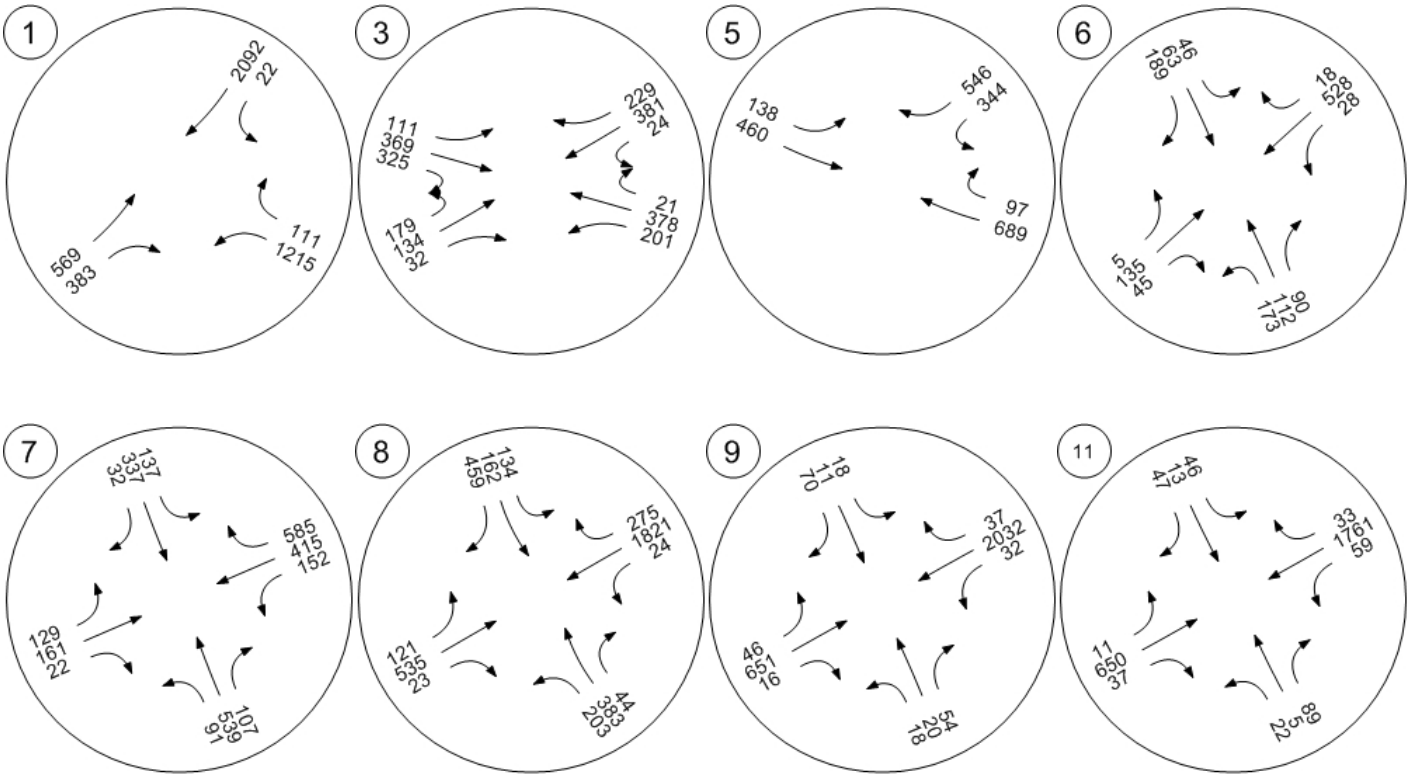
Traffic Volume - Net New Site Trips



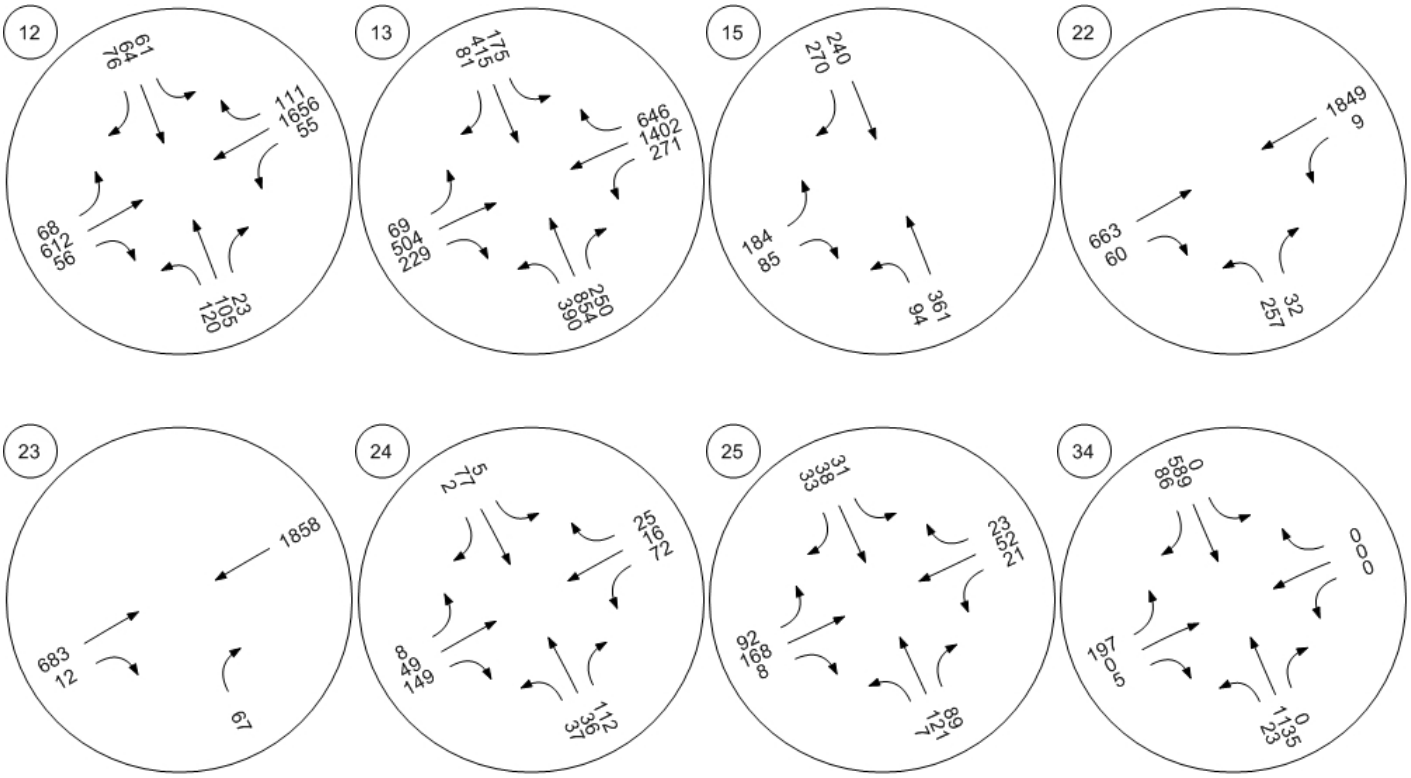
Study Intersections



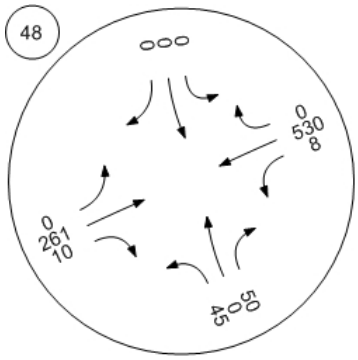
Traffic Volume - Future Total Volume



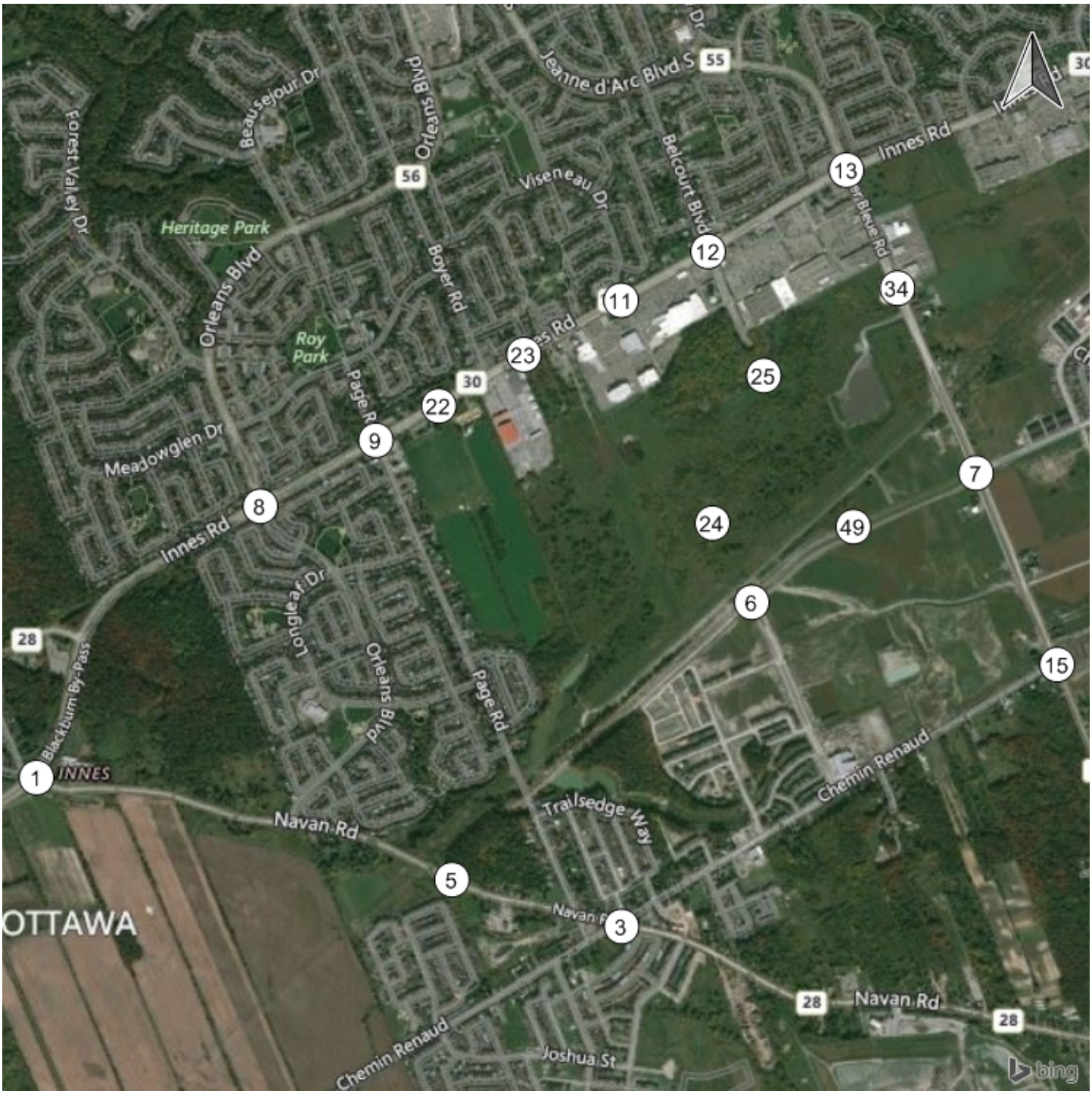
Traffic Volume - Future Total Volume



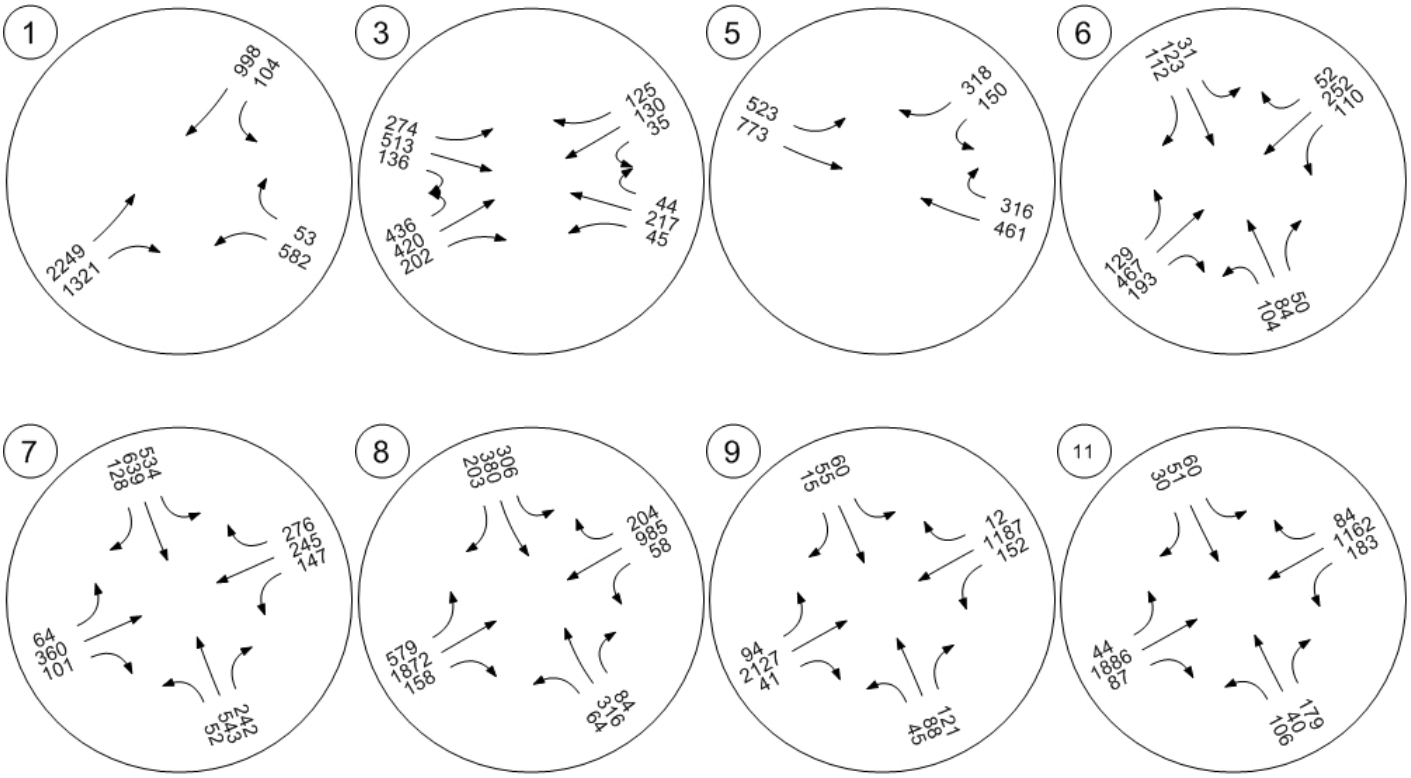
Traffic Volume - Future Total Volume



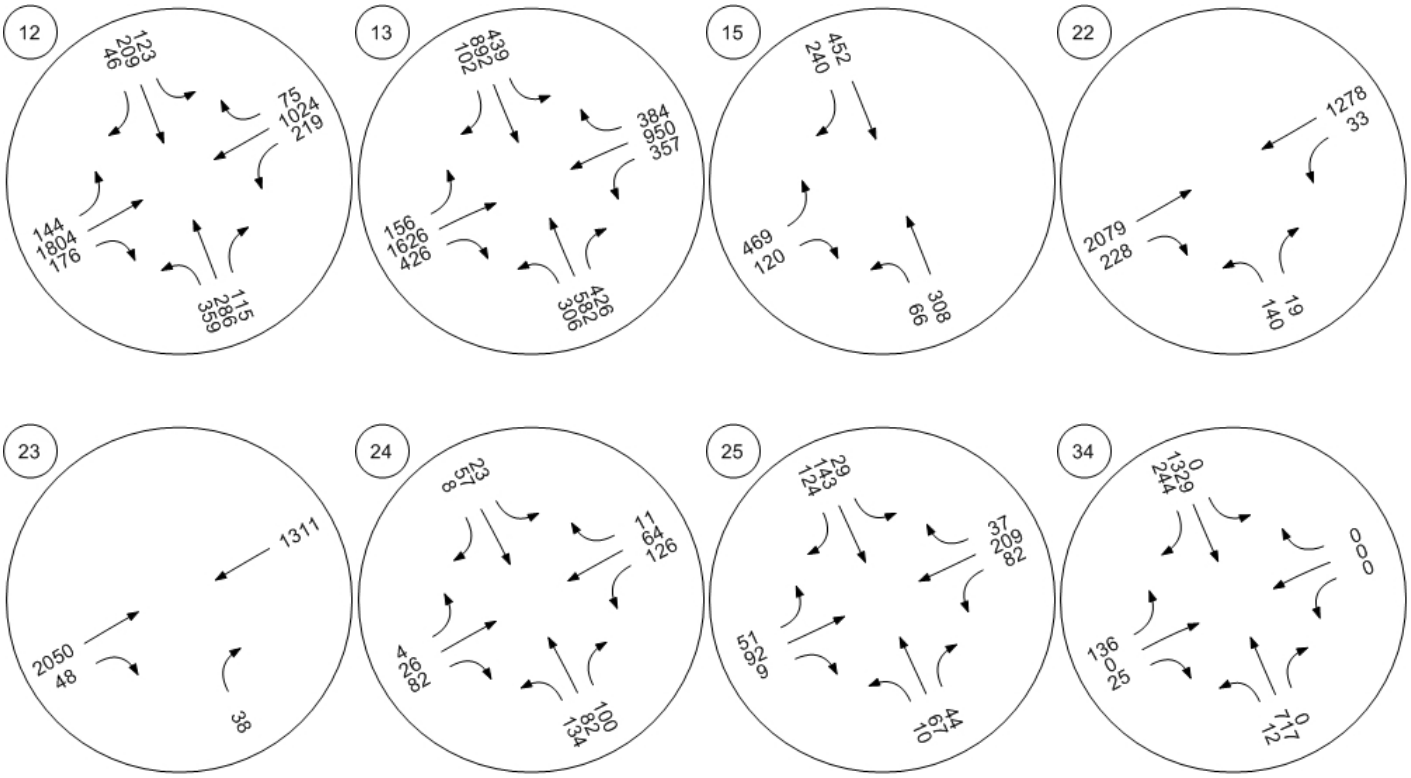
Study Intersections



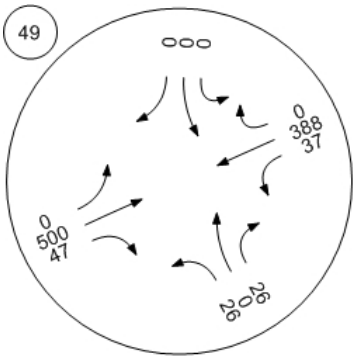
Traffic Volume - Future Total Volume



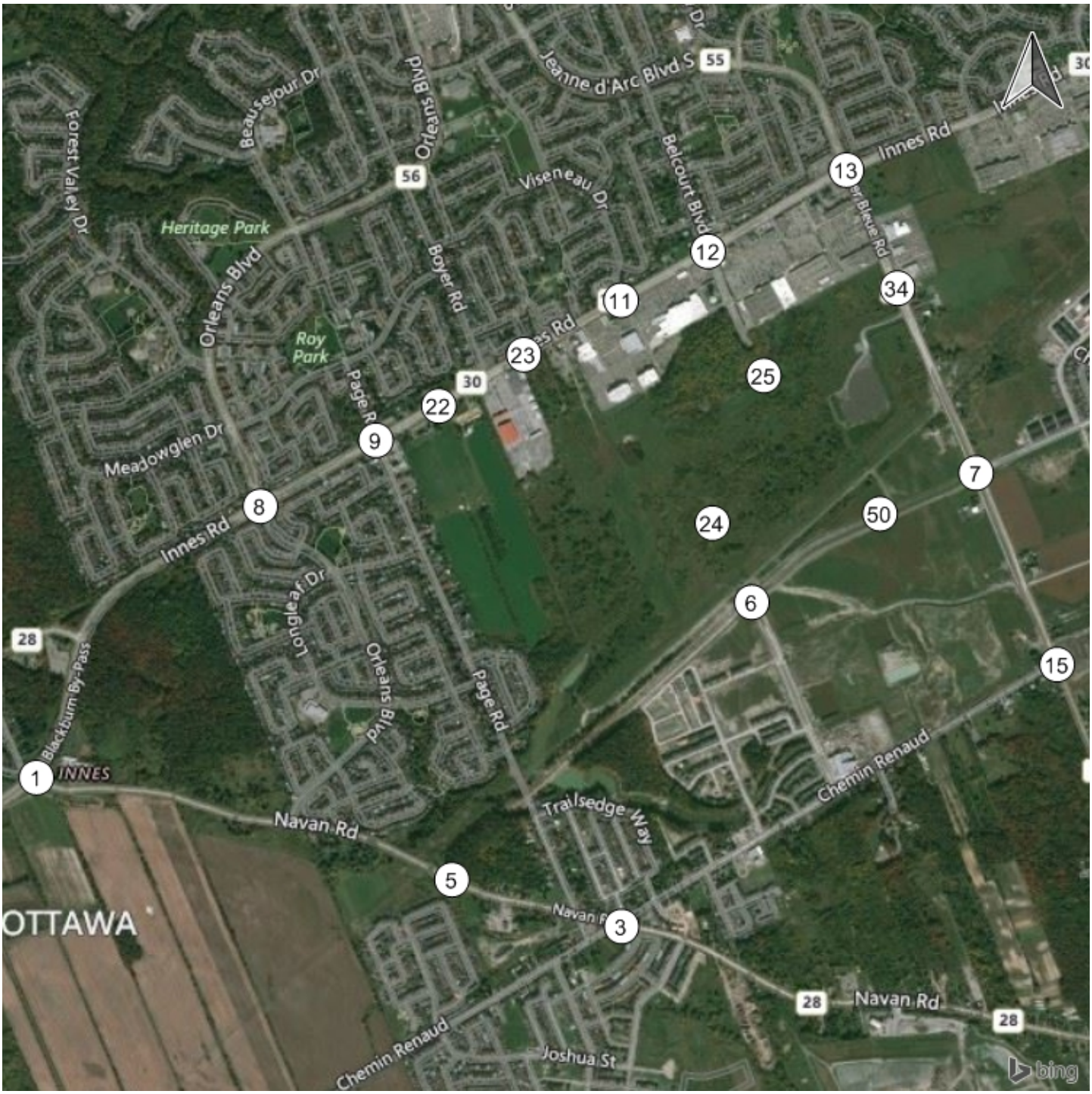
Traffic Volume - Future Total Volume



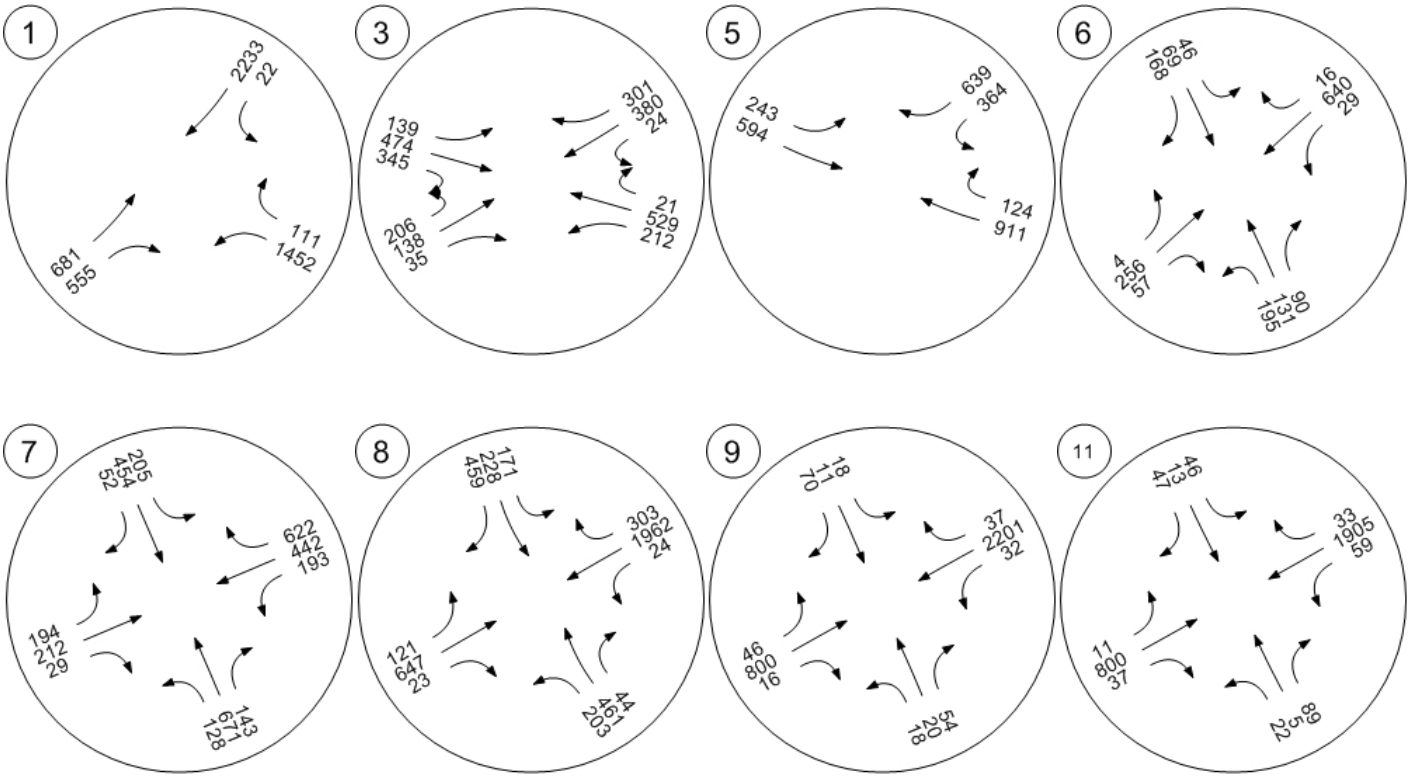
Traffic Volume - Future Total Volume



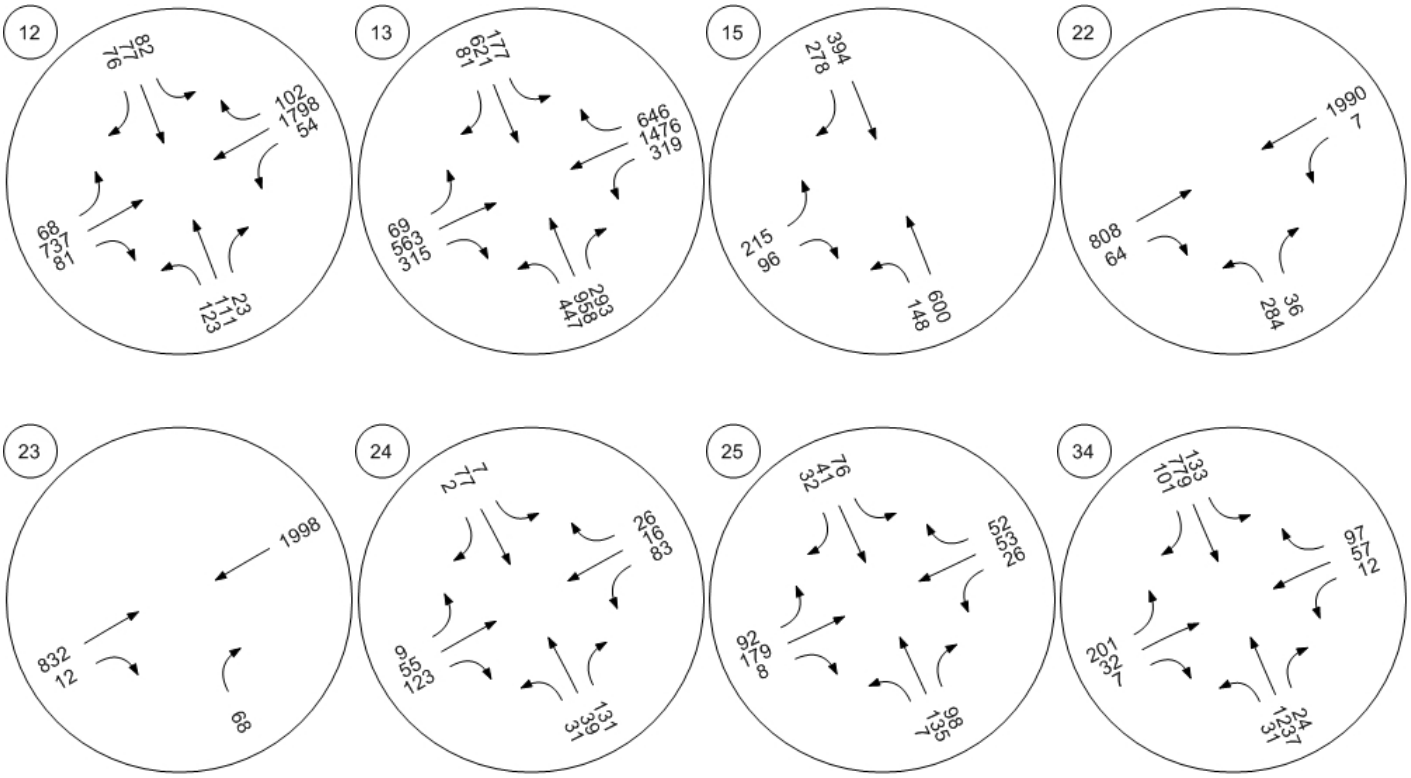
Study Intersections



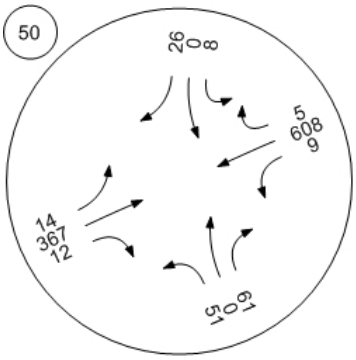
Traffic Volume - Future Total Volume



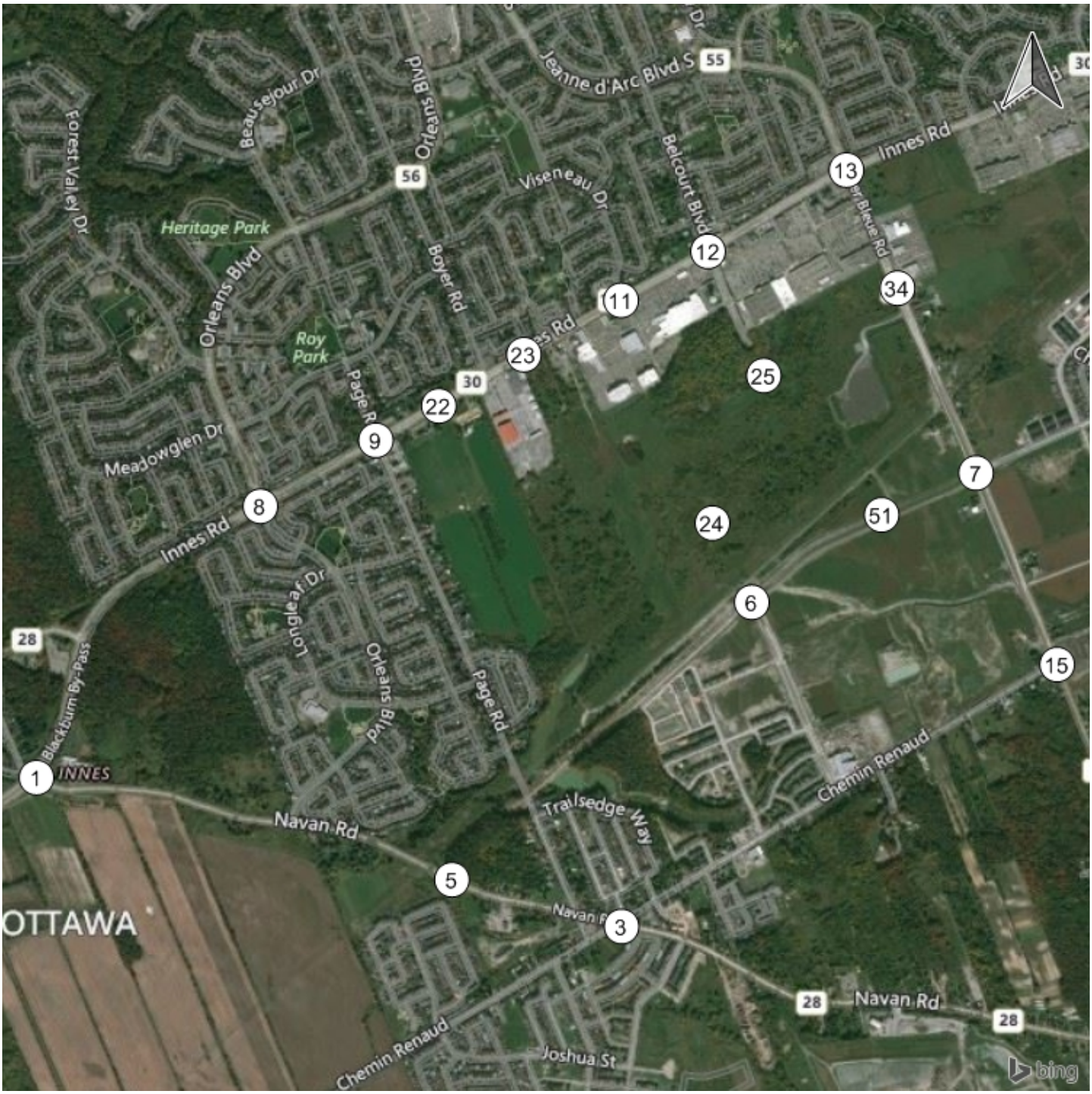
Traffic Volume - Future Total Volume



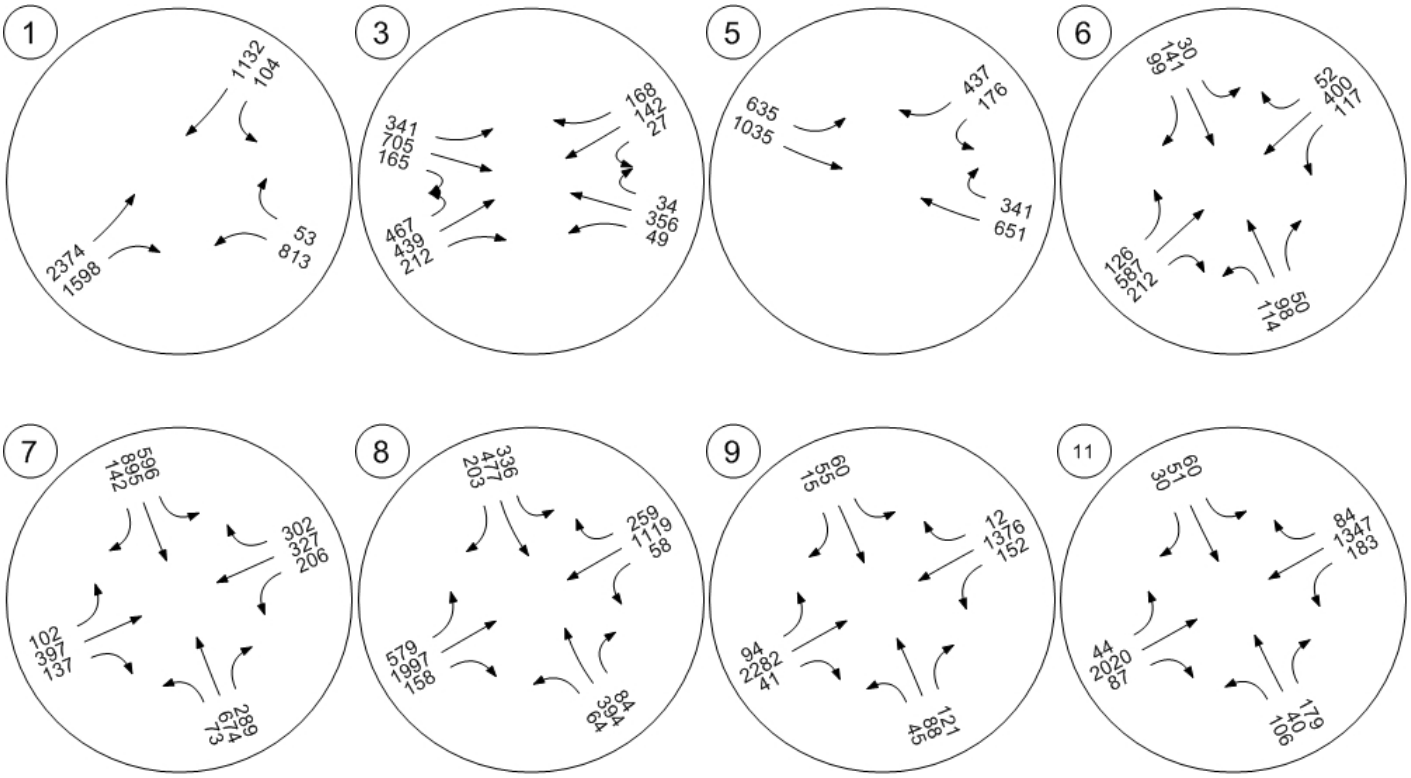
Traffic Volume - Future Total Volume



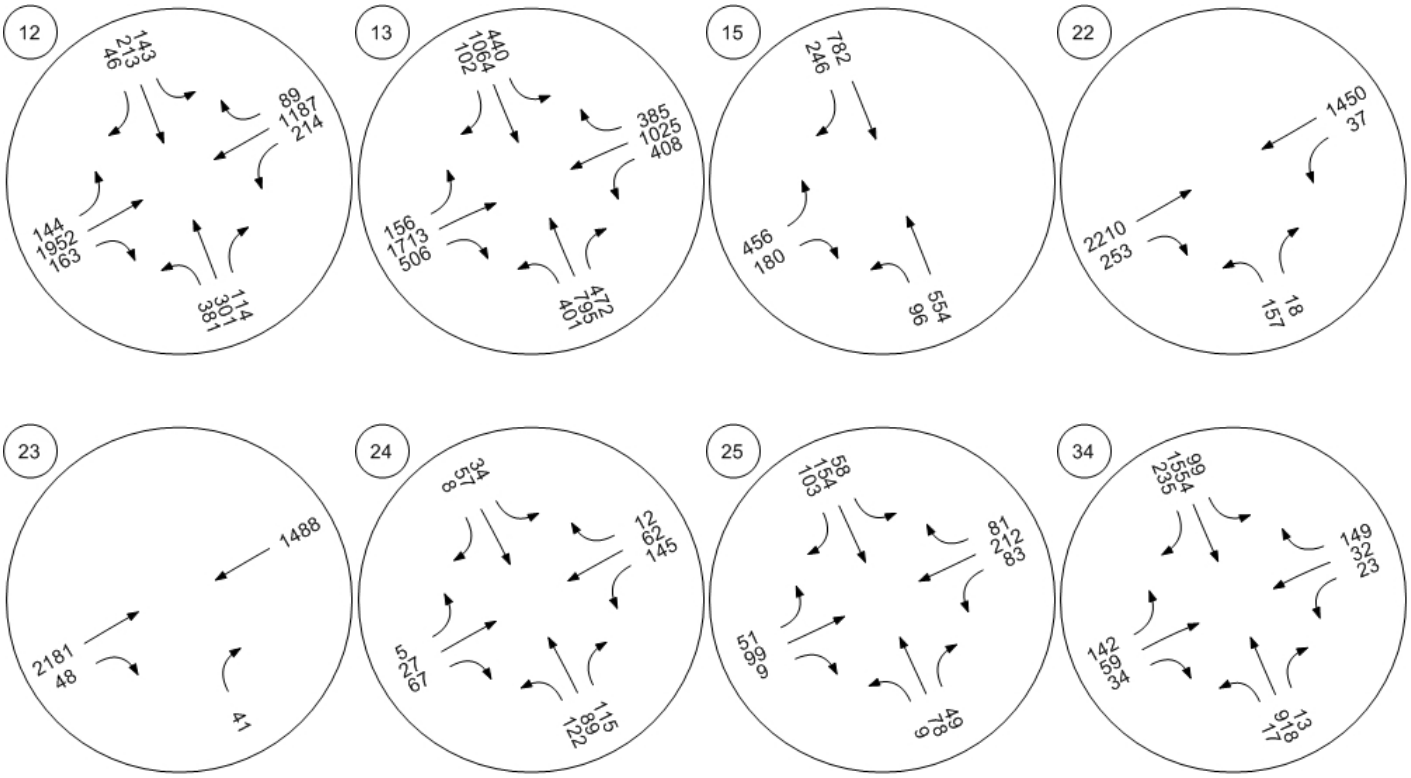
Study Intersections



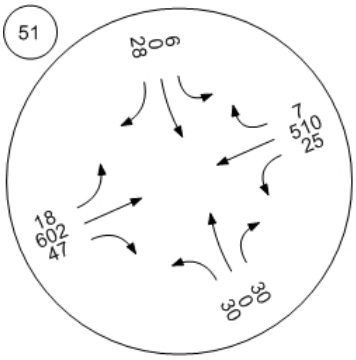
Traffic Volume - Future Total Volume



Traffic Volume - Future Total Volume



Traffic Volume - Future Total Volume



Appendix D

Forecast Traffic Analysis

Appendix D-1

Forecast 2026 Traffic Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	504	229	270	1402	646	390	854	248	175	415	81
Future Volume (veh/h)	69	504	229	270	1402	646	390	854	248	175	415	81
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1491	1688	1688	1758	1758	1772	1786	1744	1744	1744	1688	1688
Adj Flow Rate, veh/h	69	504	0	270	1402	0	390	854	0	175	415	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	22	8	8	3	3	2	1	4	4	4	8	8
Cap, veh/h	133	1068		468	1387		480	1149		193	839	
Arrive On Green	0.05	0.33	0.00	0.14	0.42	0.00	0.15	0.35	0.00	0.06	0.26	0.00
Sat Flow, veh/h	1420	3207	1430	1674	3340	1502	3300	3400	0	3222	3291	0
Grp Volume(v), veh/h	69	504	0	270	1402	0	390	854	0	175	415	0
Grp Sat Flow(s),veh/h/ln	1420	1603	1430	1674	1670	1502	1650	1657	0	1611	1603	0
Q Serve(g_s), s	4.1	16.2	0.0	12.9	54.0	0.0	14.9	29.5	0.0	7.0	14.3	0.0
Cycle Q Clear(g_c), s	4.1	16.2	0.0	12.9	54.0	0.0	14.9	29.5	0.0	7.0	14.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	133	1068		468	1387		480	1149		193	839	
V/C Ratio(X)	0.52	0.47		0.58	1.01		0.81	0.74		0.91	0.49	
Avail Cap(c_a), veh/h	133	1068		512	1387		480	1149		193	839	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.99	0.99	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.9	34.3	0.0	22.5	38.0	0.0	53.8	37.4	0.0	60.7	40.7	0.0
Incr Delay (d2), s/veh	3.5	0.3	0.0	1.4	26.8	0.0	10.2	4.3	0.0	39.4	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	4.7	0.0	3.4	20.0	0.0	5.6	9.3	0.0	3.4	4.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.4	34.6	0.0	23.9	64.8	0.0	64.0	41.7	0.0	100.1	42.8	0.0
LnGrp LOS	D	C		C	F		E	D		F	D	
Approach Vol, veh/h		573	A		1672	A		1244	A		590	A
Approach Delay, s/veh		34.8			58.2			48.7			59.8	
Approach LOS		C			E			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.8	47.3	22.9	38.0	11.1	58.0	11.8	49.1
Change Period (Y+Rc), s	* 6.1	6.4	* 6.3	* 6.2	* 6.1	6.4	* 6.3	* 6.2
Max Green Setting (Gmax), s	* 19	37.5	* 17	* 32	* 5	51.6	* 5.5	* 43
Max Q Clear Time (g_c+I1), s	14.9	18.2	16.9	16.3	6.1	56.0	9.0	31.5
Green Ext Time (p_c), s	0.8	4.6	0.0	3.3	0.0	0.0	0.0	5.8

Intersection Summary	
HCM 6th Ctrl Delay	52.2
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	612	56	55	1656	111	118	105	23	61	64	76
Future Volume (veh/h)	68	612	56	55	1656	111	118	105	23	61	64	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1688	1575	1800	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	68	612	56	55	1656	111	118	105	23	61	64	76
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	8	16	0	2	2	0	0	0	0	0	0
Cap, veh/h	186	1910	795	501	1937	129	315	492	417	349	205	244
Arrive On Green	0.05	0.60	0.60	0.04	0.60	0.59	0.27	0.27	0.27	0.27	0.27	0.25
Sat Flow, veh/h	1714	3207	1335	1714	3204	213	1269	1800	1525	1282	750	890
Grp Volume(v), veh/h	68	612	56	55	864	903	118	105	23	61	0	140
Grp Sat Flow(s),veh/h/ln	1714	1603	1335	1714	1683	1734	1269	1800	1525	1282	0	1640
Q Serve(g_s), s	1.9	12.4	2.3	1.6	54.2	56.0	10.6	5.9	1.4	5.0	0.0	8.9
Cycle Q Clear(g_c), s	1.9	12.4	2.3	1.6	54.2	56.0	19.5	5.9	1.4	10.9	0.0	8.9
Prop In Lane	1.00		1.00	1.00		0.12	1.00		1.00	1.00		0.54
Lane Grp Cap(c), veh/h	186	1910	795	501	1017	1048	315	492	417	349	0	449
V/C Ratio(X)	0.37	0.32	0.07	0.11	0.85	0.86	0.37	0.21	0.06	0.18	0.00	0.31
Avail Cap(c_a), veh/h	217	1998	832	540	1075	1107	315	492	417	349	0	449
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.40	0.40	0.40	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.8	13.1	11.1	10.4	20.9	21.4	45.3	36.4	34.8	40.6	0.0	38.1
Incr Delay (d2), s/veh	1.2	0.1	0.0	0.0	2.7	2.9	3.4	1.0	0.3	1.1	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	2.3	0.4	0.3	10.8	11.7	3.0	2.2	0.5	1.4	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.0	13.2	11.1	10.4	23.6	24.3	48.7	37.4	35.1	41.7	0.0	40.0
LnGrp LOS	C	B	B	B	C	C	D	D	D	D	A	D
Approach Vol, veh/h		736			1822			246			201	
Approach Delay, s/veh		14.2			23.5			42.6			40.5	
Approach LOS		B			C			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.0	81.4		39.6	7.7	82.8		39.6
Change Period (Y+Rc), s	* 4.7	* 6.6		* 6.8	4.0	* 6.6		* 6.8
Max Green Setting (Gmax), s	* 7.3	* 78		* 26	6.0	* 81		* 26
Max Q Clear Time (g_c+I1), s	3.9	14.4		12.9	3.9	58.0		21.5
Green Ext Time (p_c), s	0.1	8.5		1.3	0.1	18.2		0.8

Intersection Summary	
HCM 6th Ctrl Delay	23.9
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	650	37	59	1759	33	22	5	89	46	13	47
Future Volume (veh/h)	11	650	37	59	1759	33	22	5	89	46	13	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1463	1674	1674	1800	1758	1758	1744	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	11	650	37	59	1759	33	22	5	89	46	13	47
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	24	9	9	0	3	3	4	0	0	0	0	0
Cap, veh/h	103	1737	775	473	2108	39	456	558	473	223	70	202
Arrive On Green	0.55	0.55	0.55	0.05	0.63	0.61	0.31	0.31	0.31	0.31	0.31	0.29
Sat Flow, veh/h	218	3180	1418	1714	3354	63	1321	1800	1525	591	227	652
Grp Volume(v), veh/h	11	650	37	59	874	918	22	5	89	106	0	0
Grp Sat Flow(s),veh/h/ln	218	1590	1418	1714	1670	1747	1321	1800	1525	1469	0	0
Q Serve(g_s), s	5.4	15.2	1.6	1.8	53.0	53.5	0.0	0.2	5.6	4.1	0.0	0.0
Cycle Q Clear(g_c), s	48.2	15.2	1.6	1.8	53.0	53.5	1.7	0.2	5.6	6.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	0.43		0.44
Lane Grp Cap(c), veh/h	103	1737	775	473	1050	1098	456	558	473	495	0	0
V/C Ratio(X)	0.11	0.37	0.05	0.12	0.83	0.84	0.05	0.01	0.19	0.21	0.00	0.00
Avail Cap(c_a), veh/h	113	1883	840	491	1143	1196	456	558	473	495	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	42.0	16.8	13.7	11.3	18.8	18.9	31.6	31.0	32.9	33.6	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.1	0.0	0.1	5.0	5.0	0.2	0.0	0.9	1.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.2	0.3	0.3	10.3	10.8	0.4	0.1	1.7	2.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.4	17.0	13.8	11.4	23.8	23.9	31.8	31.1	33.8	34.6	0.0	0.0
LnGrp LOS	D	B	B	B	C	C	C	C	C	C	A	A
Approach Vol, veh/h		698			1851			116			106	
Approach Delay, s/veh		17.2			23.5			33.3			34.6	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	10.7	75.0		44.3		85.7		44.3
Change Period (Y+Rc), s	* 6.3	* 6.3		* 6.7		* 6.3		* 6.7
Max Green Setting (Gmax), s	* 5.7	* 75		* 30		* 87		* 30
Max Q Clear Time (g_c+I1), s	3.8	50.2		8.7		55.5		7.6
Green Ext Time (p_c), s	0.0	7.7		0.8		23.9		0.9

Intersection Summary	
HCM 6th Ctrl Delay	22.7
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	651	16	32	2032	37	18	20	54	18	11	70
Future Volume (veh/h)	46	651	16	32	2032	37	18	20	54	18	11	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1632	1632	1730	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	46	651	16	32	2032	37	18	20	54	18	11	70
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	12	12	5	2	2	0	0	0	0	0	0
Cap, veh/h	118	2042	50	487	2234	41	98	114	250	91	68	297
Arrive On Green	0.66	0.66	0.64	0.88	0.88	0.85	0.27	0.27	0.25	0.27	0.27	0.25
Sat Flow, veh/h	204	3092	76	751	3383	61	227	416	914	203	247	1086
Grp Volume(v), veh/h	46	326	341	32	1008	1061	92	0	0	99	0	0
Grp Sat Flow(s),veh/h/ln	204	1550	1618	751	1683	1761	1557	0	0	1536	0	0
Q Serve(g_s), s	24.9	10.9	10.9	1.3	43.0	44.5	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	70.0	10.9	10.9	12.3	43.0	44.5	5.3	0.0	0.0	5.9	0.0	0.0
Prop In Lane	1.00		0.05	1.00		0.03	0.20		0.59	0.18		0.71
Lane Grp Cap(c), veh/h	118	1024	1068	487	1112	1163	461	0	0	455	0	0
V/C Ratio(X)	0.39	0.32	0.32	0.07	0.91	0.91	0.20	0.00	0.00	0.22	0.00	0.00
Avail Cap(c_a), veh/h	125	1072	1119	511	1164	1218	461	0	0	455	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.53	0.53	0.53	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	39.6	8.8	8.8	4.7	5.1	5.2	34.1	0.0	0.0	34.4	0.0	0.0
Incr Delay (d2), s/veh	2.1	0.2	0.2	0.0	5.8	5.9	1.0	0.0	0.0	1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	1.2	1.2	0.1	3.0	3.2	1.8	0.0	0.0	2.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.7	8.9	9.0	4.7	10.9	11.2	35.1	0.0	0.0	35.5	0.0	0.0
LnGrp LOS	D	A	A	A	B	B	D	A	A	D	A	A
Approach Vol, veh/h		713			2101			92			99	
Approach Delay, s/veh		11.1			10.9			35.1			35.5	
Approach LOS		B			B			D			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	83.0	37.0	83.0	37.0
Change Period (Y+Rc), s	* 6.1	* 6.2	* 6.1	* 6.2
Max Green Setting (Gmax), s	* 81	* 27	* 81	* 27
Max Q Clear Time (g_c+I1), s	72.0	7.9	46.5	7.3
Green Ext Time (p_c), s	4.6	0.7	29.8	0.6

Intersection Summary	
HCM 6th Ctrl Delay	12.5
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	535	23	24	1821	275	203	383	44	134	162	459
Future Volume (veh/h)	121	535	23	24	1821	275	203	383	44	134	162	459
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1617	1589	1730	1800	1772	1674	1786	1730	1758	1688	1603	1786
Adj Flow Rate, veh/h	121	535	0	24	1821	0	203	383	0	134	162	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	13	15	5	0	2	9	1	5	3	8	14	1
Cap, veh/h	175	1638		67	1761		395	1072		280	717	
Arrive On Green	0.06	0.54	0.00	0.04	0.52	0.00	0.06	0.33	0.00	0.24	0.24	0.00
Sat Flow, veh/h	2988	3020	1466	1714	3367	1418	1701	3287	1490	953	3047	1514
Grp Volume(v), veh/h	121	535	0	24	1821	0	203	383	0	134	162	0
Grp Sat Flow(s),veh/h/ln	1494	1510	1466	1714	1683	1418	1701	1643	1490	953	1523	1514
Q Serve(g_s), s	5.2	12.8	0.0	1.8	68.0	0.0	7.8	11.6	0.0	16.3	5.6	0.0
Cycle Q Clear(g_c), s	5.2	12.8	0.0	1.8	68.0	0.0	7.8	11.6	0.0	16.3	5.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	175	1638		67	1761		395	1072		280	717	
V/C Ratio(X)	0.69	0.33		0.36	1.03		0.51	0.36		0.48	0.23	
Avail Cap(c_a), veh/h	175	1638		95	1761		395	1072		280	717	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.1	16.5	0.0	60.9	31.0	0.0	37.8	33.4	0.0	44.2	40.1	0.0
Incr Delay (d2), s/veh	11.1	0.1	0.0	3.2	30.8	0.0	1.1	0.9	0.0	5.8	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.6	0.0	0.7	23.4	0.0	4.5	3.7	0.0	3.5	1.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.2	16.7	0.0	64.0	61.8	0.0	38.9	34.3	0.0	50.0	40.9	0.0
LnGrp LOS	E	B		E	F		D	C		D	D	
Approach Vol, veh/h		656	A		1845	A		586	A		296	A
Approach Delay, s/veh		26.7			61.8			35.9			45.0	
Approach LOS		C			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	9.1	74.5	11.8	34.6	11.6	72.0		46.4
Change Period (Y+Rc), s	* 6.2	* 6.2	* 6.7	* 6.7	* 6.2	* 6.2		* 6.7
Max Green Setting (Gmax), s	* 5	* 66	* 5.1	* 28	* 5.4	* 66		* 40
Max Q Clear Time (g_c+I1), s	3.8	14.8	9.8	18.3	7.2	70.0		13.6
Green Ext Time (p_c), s	0.0	6.5	0.0	1.9	0.0	0.0		3.9

Intersection Summary	
HCM 6th Ctrl Delay	49.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	1215	111	569	383	22	2092
Future Volume (veh/h)	1215	111	569	383	22	2092
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1702	1744	1547	1477	1786	1786
Adj Flow Rate, veh/h	1215	0	569	0	22	2092
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	7	4	18	23	1	1
Cap, veh/h	1161		1469		66	1932
Arrive On Green	0.37	0.00	0.50	0.00	0.04	0.57
Sat Flow, veh/h	3144	1478	3017	1252	1701	3483
Grp Volume(v), veh/h	1215	0	569	0	22	2092
Grp Sat Flow(s),veh/h/ln	1572	1478	1470	1252	1701	1697
Q Serve(g_s), s	48.0	0.0	15.6	0.0	1.6	74.0
Cycle Q Clear(g_c), s	48.0	0.0	15.6	0.0	1.6	74.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	1161		1469		66	1932
V/C Ratio(X)	1.05		0.39		0.33	1.08
Avail Cap(c_a), veh/h	1161		1469		96	1932
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	41.0	0.0	20.2	0.0	60.8	28.0
Incr Delay (d2), s/veh	39.5	0.0	0.2	0.0	2.9	47.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.4	0.0	3.4	0.0	0.6	28.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	80.5	0.0	20.3	0.0	63.8	75.0
LnGrp LOS	F		C		E	F
Approach Vol, veh/h	1215	A	569	A		2114
Approach Delay, s/veh	80.5		20.3			74.9
Approach LOS	F		C			E

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	9.0	69.0			78.0	52.0
Change Period (Y+Rc), s	* 6.3	* 5.9			* 5.9	5.8
Max Green Setting (Gmax), s	* 5	* 61			* 72	46.2
Max Q Clear Time (g_c+I1), s	3.6	17.6			76.0	50.0
Green Ext Time (p_c), s	0.0	6.9			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	68.7
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NER, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	19.9
Intersection LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	184	85	94	361	240	270
Future Vol, veh/h	184	85	94	361	240	270
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	184	85	94	361	240	270
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	14.8	21.2	21.5
HCM LOS	B	C	C

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	21%	68%	0%
Vol Thru, %	79%	0%	47%
Vol Right, %	0%	32%	53%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	455	269	510
LT Vol	94	184	0
Through Vol	361	0	240
RT Vol	0	85	270
Lane Flow Rate	455	269	510
Geometry Grp	1	1	1
Degree of Util (X)	0.708	0.469	0.737
Departure Headway (Hd)	5.599	6.276	5.205
Convergence, Y/N	Yes	Yes	Yes
Cap	642	570	689
Service Time	3.663	4.346	3.268
HCM Lane V/C Ratio	0.709	0.472	0.74
HCM Control Delay	21.2	14.8	21.5
HCM Lane LOS	C	B	C
HCM 95th-tile Q	5.8	2.5	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	111	369	325	201	378	21	179	134	32	24	381	229
Future Volume (veh/h)	111	369	325	201	378	21	179	134	32	24	381	229
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1519	1519	1730	1758	1758	1632	1744	1716	1800	1786	1786
Adj Flow Rate, veh/h	111	369	325	201	378	0	179	134	32	24	381	229
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	20	20	5	3	3	12	4	6	0	1	1
Cap, veh/h	471	393	346	111	927		176	698	582	426	304	183
Arrive On Green	0.53	0.53	0.50	0.53	0.53	0.00	0.07	0.40	0.40	0.29	0.29	0.27
Sat Flow, veh/h	1021	745	656	732	1758	0	1554	1744	1454	1239	1045	628
Grp Volume(v), veh/h	111	0	694	201	378	0	179	134	32	24	0	610
Grp Sat Flow(s),veh/h/ln	1021	0	1401	732	1758	0	1554	1744	1454	1239	0	1673
Q Serve(g_s), s	8.1	0.0	51.2	6.8	14.2	0.0	7.8	5.5	1.5	1.5	0.0	32.0
Cycle Q Clear(g_c), s	22.3	0.0	51.2	58.0	14.2	0.0	7.8	5.5	1.5	1.5	0.0	32.0
Prop In Lane	1.00		0.47	1.00		0.00	1.00		1.00	1.00		0.38
Lane Grp Cap(c), veh/h	471	0	739	111	927		176	698	582	426	0	487
V/C Ratio(X)	0.24	0.00	0.94	1.81	0.41		1.02	0.19	0.06	0.06	0.00	1.25
Avail Cap(c_a), veh/h	471	0	739	111	927		176	698	582	426	0	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.4	0.0	25.0	53.6	15.7	0.0	31.2	21.4	20.2	28.2	0.0	39.5
Incr Delay (d2), s/veh	0.3	0.0	19.8	398.9	0.3	0.0	73.0	0.1	0.0	0.1	0.0	130.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	12.4	14.7	2.9	0.0	5.7	1.5	0.3	0.3	0.0	27.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.6	0.0	44.8	452.5	15.9	0.0	104.2	21.6	20.3	28.3	0.0	169.6
LnGrp LOS	C	A	D	F	B		F	C	C	C	A	F
Approach Vol, veh/h		805			579	A		345			634	
Approach Delay, s/veh		41.7			167.5			64.3			164.2	
Approach LOS		D			F			E			F	

Timer - Assigned Phs	2	3	4	6	8
Phs Duration (G+Y+Rc), s	62.0	12.0	36.0	62.0	48.0
Change Period (Y+Rc), s	6.6	* 6.8	6.6	6.6	6.6
Max Green Setting (Gmax), s	55.4	* 5.2	29.4	55.4	41.4
Max Q Clear Time (g_c+I1), s	53.2	9.8	34.0	60.0	7.5
Green Ext Time (p_c), s	1.5	0.0	0.0	0.0	1.5

Intersection Summary	
HCM 6th Ctrl Delay	108.7
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	197	0	5	0	0	0	23	1135	0	0	589	86
Future Volume (veh/h)	197	0	5	0	0	0	23	1135	0	0	589	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	197	0	5	0	0	0	23	1135	0	0	589	86
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	309	0	211	72	249	0	632	2624	0	72	2624	1171
Arrive On Green	0.14	0.00	0.14	0.00	0.00	0.00	0.78	0.78	0.00	0.00	0.78	0.78
Sat Flow, veh/h	1688	0	1502	1411	1772	0	764	3455	0	496	3367	1502
Grp Volume(v), veh/h	197	0	5	0	0	0	23	1135	0	0	589	86
Grp Sat Flow(s),veh/h/ln	1688	0	1502	1411	1772	0	764	1683	0	496	1683	1502
Q Serve(g_s), s	11.4	0.0	0.3	0.0	0.0	0.0	0.8	11.2	0.0	0.0	4.7	1.3
Cycle Q Clear(g_c), s	11.4	0.0	0.3	0.0	0.0	0.0	5.5	11.2	0.0	0.0	4.7	1.3
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	309	0	211	72	249	0	632	2624	0	72	2624	1171
V/C Ratio(X)	0.64	0.00	0.02	0.00	0.00	0.00	0.04	0.43	0.00	0.00	0.22	0.07
Avail Cap(c_a), veh/h	595	0	466	311	549	0	632	2624	0	72	2624	1171
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	41.8	0.0	37.1	0.0	0.0	0.0	3.7	3.7	0.0	0.0	2.9	2.6
Incr Delay (d2), s/veh	2.2	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.0	0.0	37.1	0.0	0.0	0.0	3.8	4.2	0.0	0.0	3.1	2.7
LnGrp LOS	D	A	D	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		202			0			1158			675	
Approach Delay, s/veh		43.8			0.0			4.2			3.1	
Approach LOS		D						A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	82.0	18.0	82.0	18.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	61.0	31.0	61.0	31.0
Max Q Clear Time (g_c+I1), s	13.2	13.4	6.7	0.0
Green Ext Time (p_c), s	13.6	0.7	6.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	7.8
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	683	11	0	1856	0	67
Future Vol, veh/h	683	11	0	1856	0	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	683	11	0	1856	0	67

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	347
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	-	0	649
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	649
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	649	-	-	-
HCM Lane V/C Ratio	0.103	-	-	-
HCM Control Delay (s)	11.2	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	663	59	9	1847	247	32
Future Volume (vph)	663	59	9	1847	247	32
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)		50.0	35.1		85.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.6		7.6	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3390	1517	1695	3390	1695	1517
Flt Permitted			0.353		0.950	
Satd. Flow (perm)	3390	1517	630	3390	1695	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		59				32
Link Speed (k/h)	60			60	50	
Link Distance (m)	236.0			246.2	531.0	
Travel Time (s)	14.2			14.8	38.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	663	59	9	1847	247	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	663	59	9	1847	247	32
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)		14	26		26	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	10.0	2.1	2.1	10.0	2.1	2.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6	2.1	2.1	0.6	2.1	2.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	10.0	22.0	22.0	22.0
Total Split (s)	76.0	76.0	10.0	86.0	34.0	34.0
Total Split (%)	63.3%	63.3%	8.3%	71.7%	28.3%	28.3%
Maximum Green (s)	70.0	70.0	4.0	80.0	28.0	28.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	83.8	83.8	85.8	85.8	22.2	22.2
Actuated g/C Ratio	0.70	0.70	0.72	0.72	0.18	0.18
v/c Ratio	0.28	0.05	0.02	0.76	0.79	0.10
Control Delay	7.6	2.1	6.3	14.3	64.1	12.9
Queue Delay	0.0	0.0	0.0	7.8	0.0	0.0
Total Delay	7.6	2.1	6.3	22.1	64.1	12.9
LOS	A	A	A	C	E	B
Approach Delay	7.1			22.0	58.3	
Approach LOS	A			C	E	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 21.8	Intersection LOS: C
Intersection Capacity Utilization 78.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 45: Ciavan Access & Innes Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	111	369	325	201	378	21	179	134	32	24	381	229
Future Volume (veh/h)	111	369	325	201	378	21	179	134	32	24	381	229
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1519	1337	1730	1758	1758	1632	1744	1716	1800	1786	1786
Adj Flow Rate, veh/h	111	369	325	201	378	0	179	134	32	24	381	229
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	20	33	5	3	3	12	4	6	0	1	1
Cap, veh/h	310	488	341	246	579		248	907	757	542	409	246
Arrive On Green	0.06	0.32	0.30	0.07	0.33	0.00	0.10	0.52	0.52	0.39	0.39	0.37
Sat Flow, veh/h	1714	1519	1133	1647	1758	0	1554	1744	1454	1239	1045	628
Grp Volume(v), veh/h	111	369	325	201	378	0	179	134	32	24	0	610
Grp Sat Flow(s),veh/h/ln	1714	1519	1133	1647	1758	0	1554	1744	1454	1239	0	1673
Q Serve(g_s), s	5.4	27.5	35.6	8.7	23.2	0.0	8.1	5.0	1.4	1.5	0.0	44.2
Cycle Q Clear(g_c), s	5.4	27.5	35.6	8.7	23.2	0.0	8.1	5.0	1.4	1.5	0.0	44.2
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.38
Lane Grp Cap(c), veh/h	310	488	341	246	579		248	907	757	542	0	655
V/C Ratio(X)	0.36	0.76	0.95	0.82	0.65		0.72	0.15	0.04	0.04	0.00	0.93
Avail Cap(c_a), veh/h	310	493	344	246	584		281	952	794	547	0	662
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.0	38.4	43.3	35.4	36.2	0.0	27.2	15.8	14.9	23.9	0.0	37.3
Incr Delay (d2), s/veh	0.7	6.5	36.2	18.8	2.6	0.0	7.7	0.1	0.0	0.0	0.0	20.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	8.3	11.0	4.2	7.6	0.0	2.4	1.3	0.3	0.3	0.0	16.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.7	45.0	79.5	54.1	38.8	0.0	34.9	15.8	14.9	23.9	0.0	57.3
LnGrp LOS	C	D	E	D	D		C	B	B	C	A	E
Approach Vol, veh/h		805			579	A		345			634	
Approach Delay, s/veh		56.6			44.1			25.6			56.0	
Approach LOS		E			D			C			E	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	44.7	16.3	53.5	11.0	45.7		69.8
Change Period (Y+Rc), s	5.9	6.6	5.9	6.6	5.9	6.6		6.6
Max Green Setting (Gmax), s	6.1	38.4	13.1	47.4	5.1	39.4		66.4
Max Q Clear Time (g_c+I1), s	10.7	37.6	10.1	46.2	7.4	25.2		7.0
Green Ext Time (p_c), s	0.0	0.5	0.4	0.7	0.0	2.7		1.7

Intersection Summary	
HCM 6th Ctrl Delay	48.9
HCM 6th LOS	D

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	184	85	94	361	240	270
Future Volume (vph)	184	85	94	361	240	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	50.0	45.0			80.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.6		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1517	1654	1749	1734	1511
Flt Permitted	0.950		0.610			
Satd. Flow (perm)	1668	1517	1062	1749	1734	1511
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		85				270
Link Speed (k/h)	50			60	60	
Link Distance (m)	951.6			937.0	170.0	
Travel Time (s)	68.5			56.2	10.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Bus Blockages (#/hr)	4	0	6	5	7	1
Adj. Flow (vph)	184	85	94	361	240	270
Shared Lane Traffic (%)						
Lane Group Flow (vph)	184	85	94	361	240	270
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	1.08	1.06	1.09	1.08	1.10	1.06
Turning Speed (k/h)	26	14	26			14
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	14.9	14.9	14.9	14.9	14.9	14.9
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.9	14.9	14.9	14.9	14.9	14.9
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Total Split (s)	40.0	40.0	60.0	60.0	60.0	60.0
Total Split (%)	40.0%	40.0%	60.0%	60.0%	60.0%	60.0%
Maximum Green (s)	33.5	33.5	53.5	53.5	53.5	53.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	11.1	11.1	15.7	15.7	15.7	15.7
Actuated g/C Ratio	0.28	0.28	0.39	0.39	0.39	0.39
v/c Ratio	0.40	0.18	0.23	0.53	0.35	0.36
Control Delay	15.0	4.9	10.0	12.8	10.5	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	4.9	10.0	12.8	10.5	3.0
LOS	B	A	B	B	B	A
Approach Delay	11.8			12.2	6.6	
Approach LOS	B			B	A	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 40	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 9.8	Intersection LOS: A
Intersection Capacity Utilization 48.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 12: Mer Bleue Rd & Renaud Rd

MOVEMENT SUMMARY

Site: 2026 AM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	188	2.0	0.438	11.5	LOS A	3.0	23.2	0.55	0.66	54.0
8	T1	122	3.0	0.438	6.5	LOS A	3.0	23.2	0.55	0.66	54.3
18	R2	98	2.0	0.438	6.2	LOS A	3.0	23.2	0.55	0.66	56.2
Approach		408	2.3	0.438	8.7	LOS A	3.0	23.2	0.55	0.66	54.8
East: Brian Coburn											
1	L2	30	2.0	0.760	17.7	LOS C	10.1	78.2	0.92	0.96	54.4
6	T1	574	2.0	0.760	12.8	LOS C	10.1	78.2	0.92	0.96	56.1
16	R2	20	3.0	0.760	12.5	LOS C	10.1	78.2	0.92	0.96	55.2
Approach		624	2.0	0.760	13.0	LOS C	10.1	78.2	0.92	0.96	56.0
North: Fern Casey											
7	L2	50	3.0	0.738	29.6	LOS C	7.9	61.3	1.00	1.21	49.4
4	T1	68	3.0	0.738	24.6	LOS C	7.9	61.3	1.00	1.21	41.0
14	R2	205	3.0	0.738	24.4	LOS C	7.9	61.3	1.00	1.21	44.2
Approach		324	3.0	0.738	25.3	LOS C	7.9	61.3	1.00	1.21	44.6
West: Brian Coburn											
5	L2	5	3.0	0.208	10.8	LOS A	1.3	9.8	0.42	0.51	58.4
2	T1	147	2.0	0.208	5.6	LOS A	1.3	9.8	0.42	0.51	60.2
12	R2	49	2.0	0.208	5.3	LOS A	1.3	9.8	0.42	0.51	54.7
Approach		201	2.0	0.208	5.7	LOS A	1.3	9.8	0.42	0.51	59.3
All Vehicles		1557	2.3	0.760	13.5	LOS C	10.1	78.2	0.77	0.87	53.7

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 AM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	749	3.0	0.959	22.5	LOS C	31.0	241.8	1.00	0.97	46.3
18	R2	105	3.0	0.959	22.1	LOS C	31.0	241.8	1.00	0.97	45.5
Approach		854	3.0	0.959	22.4	LOS C	31.0	241.8	1.00	0.97	46.2
East: Brian Coburn											
1	L2	374	3.0	2.457	681.0	LOS F	201.4	1569.4	1.00	4.64	5.0
16	R2	593	3.0	2.457	676.7	LOS F	201.4	1569.4	1.00	4.64	5.0
Approach		967	3.0	2.457	678.4	LOS F	201.4	1569.4	1.00	4.64	5.0
North: Navan											
7	L2	150	3.0	0.737	12.8	LOS B	9.7	75.6	0.84	0.71	54.2
4	T1	500	3.0	0.737	9.0	LOS A	9.7	75.6	0.84	0.71	54.5
Approach		650	3.0	0.737	9.9	LOS A	9.7	75.6	0.84	0.71	54.4
All Vehicles		2472	3.0	2.457	275.8	LOS F	201.4	1569.4	0.96	2.34	11.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 AM - Fern Casey/Frank Bender

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
3	L2	40	3.0	0.198	9.7	LOS A	1.1	8.8	0.27	0.54	57.5
8	T1	39	3.0	0.198	5.5	LOS A	1.1	8.8	0.27	0.54	57.9
18	R2	122	3.0	0.198	5.2	LOS A	1.1	8.8	0.27	0.54	56.6
Approach		201	3.0	0.198	6.1	LOS A	1.1	8.8	0.27	0.54	57.0
East: Frank Bender											
1	L2	78	3.0	0.123	9.8	LOS A	0.6	4.9	0.28	0.60	55.9
6	T1	17	3.0	0.123	5.6	LOS A	0.6	4.9	0.28	0.60	56.2
16	R2	27	3.0	0.123	5.3	LOS A	0.6	4.9	0.28	0.60	55.0
Approach		123	3.0	0.123	8.2	LOS A	0.6	4.9	0.28	0.60	55.8
North: Frank Bender											
7	L2	5	3.0	0.097	10.1	LOS B	0.5	3.7	0.34	0.51	57.3
4	T1	84	3.0	0.097	6.0	LOS A	0.5	3.7	0.34	0.51	57.6
14	R2	2	3.0	0.097	5.6	LOS A	0.5	3.7	0.34	0.51	56.3
Approach		91	3.0	0.097	6.2	LOS A	0.5	3.7	0.34	0.51	57.5
West: RoadName											
5	L2	9	3.0	0.245	10.6	LOS B	1.4	10.6	0.42	0.58	57.5
2	T1	53	3.0	0.245	6.4	LOS A	1.4	10.6	0.42	0.58	57.8
12	R2	162	3.0	0.245	6.1	LOS A	1.4	10.6	0.42	0.58	56.5
Approach		224	3.0	0.245	6.3	LOS A	1.4	10.6	0.42	0.58	56.9
All Vehicles		639	3.0	0.245	6.6	LOS A	1.4	10.6	0.33	0.56	56.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 AM - Frank Bender/Vanguard

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Frank Bender											
3	L2	8	3.0	0.305	12.0	LOS B	1.8	13.7	0.58	0.68	56.3
8	T1	133	3.0	0.305	7.9	LOS A	1.8	13.7	0.58	0.68	56.6
18	R2	97	3.0	0.305	7.5	LOS A	1.8	13.7	0.58	0.68	55.4
Approach		237	3.0	0.305	7.8	LOS A	1.8	13.7	0.58	0.68	56.1
East: Vanguard											
1	L2	23	3.0	0.125	11.0	LOS B	0.6	5.0	0.46	0.61	56.4
6	T1	57	3.0	0.125	6.8	LOS A	0.6	5.0	0.46	0.61	56.7
16	R2	25	3.0	0.125	6.4	LOS A	0.6	5.0	0.46	0.61	55.4
Approach		104	3.0	0.125	7.6	LOS A	0.6	5.0	0.46	0.61	56.3
North: Frank Bender											
7	L2	34	3.0	0.112	9.8	LOS A	0.6	4.6	0.28	0.55	57.0
4	T1	41	3.0	0.112	5.6	LOS A	0.6	4.6	0.28	0.55	57.3
14	R2	36	3.0	0.112	5.2	LOS A	0.6	4.6	0.28	0.55	56.0
Approach		111	3.0	0.112	6.8	LOS A	0.6	4.6	0.28	0.55	56.8
West: Vanguard											
5	L2	100	3.0	0.296	10.1	LOS B	1.8	13.9	0.35	0.56	56.4
2	T1	183	3.0	0.296	5.9	LOS A	1.8	13.9	0.35	0.56	56.8
12	R2	9	3.0	0.296	5.5	LOS A	1.8	13.9	0.35	0.56	55.5
Approach		291	3.0	0.296	7.3	LOS A	1.8	13.9	0.35	0.56	56.6
All Vehicles		743	3.0	0.305	7.4	LOS A	1.8	13.9	0.43	0.61	56.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 AM - Mer Bleue / Brian Coburn

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	99	2.0	0.466	13.3	LOS A	3.0	23.5	0.68	0.74	59.0
8	T1	586	2.0	0.466	7.3	LOS A	3.0	23.5	0.68	0.73	57.2
18	R2	116	2.0	0.466	7.3	LOS A	3.0	23.5	0.68	0.71	56.0
Approach		801	2.0	0.466	8.0	LOS A	3.0	23.5	0.68	0.72	57.3
East: Brian Coburn											
1	L2	165	2.0	2.192	555.7	LOS F	228.6	1766.7	1.00	6.24	5.9
6	T1	451	2.0	2.192	549.7	LOS F	228.6	1766.7	1.00	6.24	8.2
16	R2	636	2.0	2.192	549.7	LOS F	228.6	1766.7	1.00	6.24	6.1
Approach		1252	2.0	2.192	550.5	LOS F	228.6	1766.7	1.00	6.24	6.9
North: Mer Bleue											
7	L2	149	2.0	0.307	12.1	LOS A	1.8	13.7	0.58	0.69	56.9
4	T1	366	2.0	0.307	6.1	LOS A	1.8	13.7	0.58	0.62	57.6
14	R2	35	2.0	0.307	6.1	LOS A	1.8	13.7	0.58	0.58	58.8
Approach		550	2.0	0.307	7.7	LOS A	1.8	13.7	0.58	0.63	57.5
West: Brian Coburn											
5	L2	140	2.0	0.508	14.7	LOS A	2.9	22.6	0.69	0.90	58.2
2	T1	175	2.0	0.508	8.8	LOS A	2.9	22.6	0.69	0.90	58.0
12	R2	24	2.0	0.508	8.7	LOS A	2.9	22.6	0.69	0.90	56.4
Approach		339	2.0	0.508	11.2	LOS A	2.9	22.6	0.69	0.90	58.0
All Vehicles		2942	2.0	2.192	239.2	LOS F	228.6	1766.7	0.80	3.08	13.7

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 AM - Mer Bleue / Renaud Rd

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	102	2.0	0.579	11.7	LOS B	5.1	40.2	0.71	0.69	60.4
8	T1	392	5.0	0.579	8.2	LOS A	5.1	40.2	0.71	0.69	52.6
Approach		495	4.4	0.579	8.9	LOS A	5.1	40.2	0.71	0.69	55.8
North: Mer Bleue											
4	T1	261	2.0	0.568	6.8	LOS A	5.6	43.6	0.57	0.56	55.1
14	R2	293	2.0	0.568	6.4	LOS A	5.6	43.6	0.57	0.56	60.5
Approach		554	2.0	0.568	6.6	LOS A	5.6	43.6	0.57	0.56	59.1
West: Renaud Rd											
5	L2	200	2.0	0.361	11.6	LOS B	2.4	18.8	0.62	0.73	59.7
12	R2	92	2.0	0.361	7.5	LOS A	2.4	18.8	0.62	0.73	59.8
Approach		292	2.0	0.361	10.3	LOS B	2.4	18.8	0.62	0.73	59.7
All Vehicles		1341	2.9	0.579	8.3	LOS A	5.6	43.6	0.63	0.65	58.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	188	2.0	0.462	11.6	LOS A	2.6	20.0	0.48	0.65	55.5
8	T1	122	3.0	0.462	5.6	LOS A	2.6	20.0	0.48	0.65	55.8
18	R2	98	2.0	0.462	5.5	LOS A	2.6	20.0	0.48	0.65	57.0
Approach		408	2.3	0.462	8.3	LOS A	2.6	20.0	0.48	0.65	56.0
East: Brian Coburn											
1	L2	30	2.0	0.329	11.7	LOS A	1.8	14.0	0.52	0.59	58.9
6	T1	574	2.0	0.329	6.1	LOS A	1.8	14.0	0.52	0.58	59.9
16	R2	20	3.0	0.329	5.8	LOS A	1.8	14.0	0.52	0.58	58.9
Approach		624	2.0	0.329	6.4	LOS A	1.8	14.0	0.52	0.58	59.8
North: Fern Casey											
7	L2	50	3.0	0.633	19.0	LOS B	4.0	31.2	0.79	1.00	55.8
4	T1	68	3.0	0.633	13.4	LOS B	4.0	31.2	0.79	1.00	49.4
14	R2	205	3.0	0.633	13.5	LOS B	4.0	31.2	0.79	1.00	50.9
Approach		324	3.0	0.633	14.3	LOS B	4.0	31.2	0.79	1.00	51.6
West: Brian Coburn											
5	L2	5	3.0	0.093	10.7	LOS A	0.4	3.4	0.31	0.44	60.5
2	T1	147	2.0	0.093	4.5	LOS A	0.4	3.4	0.31	0.44	61.6
12	R2	49	2.0	0.093	4.6	LOS A	0.4	3.4	0.31	0.45	56.6
Approach		201	2.0	0.093	4.7	LOS A	0.4	3.4	0.31	0.45	60.8
All Vehicles		1557	2.3	0.633	8.3	LOS B	4.0	31.2	0.54	0.67	57.5

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	749	3.0	0.705	5.6	LOS A	7.0	54.5	0.65	0.53	58.4
18	R2	105	3.0	0.168	5.7	LOS A	0.8	5.9	0.39	0.55	58.3
Approach		854	3.0	0.705	5.6	LOS A	7.0	54.5	0.62	0.53	58.4
East: Brian Coburn											
1	L2	374	3.0	0.730	24.6	LOS C	7.3	56.8	0.96	1.16	47.1
16	R2	593	3.0	0.365	4.0	LOS A	0.0	0.0	0.00	0.46	60.0
Approach		967	3.0	0.730	12.0	LOS B	7.3	56.8	0.37	0.73	54.1
North: Navan											
7	L2	150	3.0	0.283	13.9	LOS B	1.4	11.2	0.63	0.83	54.1
4	T1	500	3.0	0.590	7.6	LOS A	5.0	39.3	0.77	0.76	57.7
Approach		650	3.0	0.590	9.1	LOS A	5.0	39.3	0.73	0.78	56.8
All Vehicles		2472	3.0	0.730	9.0	LOS A	7.3	56.8	0.55	0.67	56.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Mer Bleue / Brian Coburn

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	99	2.0	0.444	12.5	LOS A	2.4	18.7	0.60	0.68	59.4
8	T1	586	2.0	0.444	6.5	LOS A	2.4	18.7	0.60	0.67	57.7
18	R2	116	2.0	0.444	6.5	LOS A	2.4	18.7	0.60	0.65	56.4
Approach		801	2.0	0.444	7.3	LOS A	2.4	18.7	0.60	0.67	57.8
East: Brian Coburn											
1	L2	165	2.0	0.885	24.6	LOS C	10.9	84.3	0.96	1.28	48.5
6	T1	451	2.0	0.885	18.7	LOS C	11.1	86.2	0.96	1.28	52.7
16	R2	636	2.0	0.885	18.1	LOS C	11.1	86.2	0.96	1.28	48.7
Approach		1252	2.0	0.885	19.2	LOS C	11.1	86.2	0.96	1.28	50.4
North: Mer Bleue											
7	L2	149	2.0	0.436	15.1	LOS A	2.9	22.7	0.82	0.93	55.0
4	T1	366	2.0	0.436	9.0	LOS A	3.0	23.0	0.82	0.89	55.9
14	R2	35	2.0	0.436	8.9	LOS A	3.0	23.0	0.82	0.86	57.7
Approach		550	2.0	0.436	10.7	LOS A	3.0	23.0	0.82	0.90	55.8
West: Brian Coburn											
5	L2	140	2.0	0.224	12.6	LOS A	1.0	7.9	0.61	0.82	57.8
2	T1	175	2.0	0.224	6.6	LOS A	1.0	7.9	0.61	0.66	59.7
12	R2	24	2.0	0.224	6.7	LOS A	1.0	7.9	0.61	0.63	58.4
Approach		339	2.0	0.224	9.1	LOS A	1.0	7.9	0.61	0.72	58.8
All Vehicles		2942	2.0	0.885	13.2	LOS C	11.1	86.2	0.80	0.98	54.2

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	1626	426	357	950	384	306	582	425	439	892	102
Future Volume (veh/h)	156	1626	426	357	950	384	306	582	425	439	892	102
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1800	1800	1800	1758	1758	1758	1772	1772	1800	1772	1772
Adj Flow Rate, veh/h	156	1626	0	357	950	0	306	582	0	439	892	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	0	0	0	3	3	3	2	2	0	2	2
Cap, veh/h	317	1315		266	1408		275	881		358	958	
Arrive On Green	0.09	0.38	0.00	0.12	0.42	0.00	0.08	0.26	0.00	0.11	0.28	0.00
Sat Flow, veh/h	1714	3420	1525	1714	3340	1490	3248	3455	0	3326	3455	0
Grp Volume(v), veh/h	156	1626	0	357	950	0	306	582	0	439	892	0
Grp Sat Flow(s),veh/h/ln	1714	1710	1525	1714	1670	1490	1624	1683	0	1663	1683	0
Q Serve(g_s), s	6.9	50.0	0.0	16.0	29.9	0.0	11.0	20.1	0.0	14.0	33.5	0.0
Cycle Q Clear(g_c), s	6.9	50.0	0.0	16.0	29.9	0.0	11.0	20.1	0.0	14.0	33.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	317	1315		266	1408		275	881		358	958	
V/C Ratio(X)	0.49	1.24		1.34	0.67		1.11	0.66		1.23	0.93	
Avail Cap(c_a), veh/h	347	1315		266	1408		275	881		358	958	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.95	0.95	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	23.5	40.0	0.0	42.4	30.4	0.0	59.5	42.9	0.0	58.0	45.3	0.0
Incr Delay (d2), s/veh	1.2	113.0	0.0	176.2	1.3	0.0	86.9	3.7	0.0	123.9	16.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	35.2	0.0	15.8	8.4	0.0	7.0	6.8	0.0	10.9	12.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.7	153.0	0.0	218.6	31.7	0.0	146.4	46.6	0.0	181.9	61.8	0.0
LnGrp LOS	C	F		F	C		F	D		F	E	
Approach Vol, veh/h		1782	A		1307	A		888	A		1331	A
Approach Delay, s/veh		141.8			82.8			81.0			101.4	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	54.0	15.0	41.0	15.2	58.8	18.0	38.0
Change Period (Y+Rc), s	* 6.1	6.4	* 6.3	* 6.2	* 6.1	6.4	* 6.3	* 6.2
Max Green Setting (Gmax), s	* 14	47.6	* 8.7	* 35	* 11	50.1	* 12	* 32
Max Q Clear Time (g_c+I1), s	18.0	52.0	13.0	35.5	8.9	31.9	16.0	22.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.2	8.9	0.0	3.6

Intersection Summary	
HCM 6th Ctrl Delay	106.9
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	1804	176	219	1024	75	358	286	115	123	209	46
Future Volume (veh/h)	144	1804	176	219	1024	75	358	286	115	123	209	46
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1786	1730	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	144	1804	176	219	1024	75	358	286	115	123	209	46
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	1	1	5	2	2	0	0	0	0	0	0
Cap, veh/h	290	1540	687	182	1786	131	363	678	575	314	539	119
Arrive On Green	0.45	0.45	0.45	0.15	1.00	1.00	0.38	0.38	0.38	0.38	0.38	0.36
Sat Flow, veh/h	517	3393	1514	1647	3180	233	1142	1800	1525	999	1429	314
Grp Volume(v), veh/h	144	1804	176	219	542	557	358	286	115	123	0	255
Grp Sat Flow(s),veh/h/ln	517	1697	1514	1647	1683	1730	1142	1800	1525	999	0	1743
Q Serve(g_s), s	27.4	59.0	9.3	10.0	0.0	0.0	35.1	15.3	6.6	13.5	0.0	13.9
Cycle Q Clear(g_c), s	27.4	59.0	9.3	10.0	0.0	0.0	49.0	15.3	6.6	28.8	0.0	13.9
Prop In Lane	1.00		1.00	1.00		0.13	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	290	1540	687	182	945	971	363	678	575	314	0	657
V/C Ratio(X)	0.50	1.17	0.26	1.20	0.57	0.57	0.98	0.42	0.20	0.39	0.00	0.39
Avail Cap(c_a), veh/h	290	1540	687	182	945	971	363	678	575	314	0	657
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.81	0.81	0.81	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.9	35.5	21.9	35.0	0.0	0.0	49.9	30.0	27.3	40.7	0.0	29.8
Incr Delay (d2), s/veh	1.3	84.4	0.2	125.6	0.7	0.7	43.6	1.9	0.8	3.6	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	33.7	2.2	8.7	0.2	0.2	14.0	5.3	1.9	3.0	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.2	119.9	22.1	160.6	0.7	0.7	93.5	31.9	28.1	44.3	0.0	31.5
LnGrp LOS	C	F	C	F	A	A	F	C	C	D	A	C
Approach Vol, veh/h		2124			1318			759			378	
Approach Delay, s/veh		105.6			27.2			60.4			35.7	
Approach LOS		F			C			E			D	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	14.0	63.0		53.0		77.0		53.0
Change Period (Y+Rc), s	* 4.7	* 6.6		* 6.8		* 6.6		* 6.8
Max Green Setting (Gmax), s	* 9.3	* 56		* 46		* 70		* 46
Max Q Clear Time (g_c+I1), s	12.0	61.0		30.8		2.0		51.0
Green Ext Time (p_c), s	0.0	0.0		3.2		16.5		0.0

Intersection Summary	
HCM 6th Ctrl Delay	69.8
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	1885	87	183	1162	84	106	40	179	60	51	30
Future Volume (veh/h)	44	1885	87	183	1162	84	106	40	179	60	51	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1772	1772	1800	1744	1744	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	44	1885	87	183	1162	84	106	40	179	60	51	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	2	2	0	4	4	0	0	0	0	0	0
Cap, veh/h	284	1942	866	209	2169	157	491	617	523	237	196	106
Arrive On Green	0.58	0.58	0.58	0.08	0.69	0.67	0.34	0.34	0.34	0.35	0.35	0.32
Sat Flow, veh/h	450	3367	1502	1714	3133	226	1338	1800	1525	571	567	307
Grp Volume(v), veh/h	44	1885	87	183	614	632	106	40	179	141	0	0
Grp Sat Flow(s),veh/h/ln	450	1683	1502	1714	1657	1703	1338	1800	1525	1445	0	0
Q Serve(g_s), s	6.9	70.0	3.4	8.8	23.6	23.8	0.6	1.9	11.4	6.0	0.0	0.0
Cycle Q Clear(g_c), s	15.7	70.0	3.4	8.8	23.6	23.8	9.8	1.9	11.4	8.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.13	1.00		1.00	0.43		0.21
Lane Grp Cap(c), veh/h	284	1942	866	209	1147	1179	491	617	523	539	0	0
V/C Ratio(X)	0.15	0.97	0.10	0.88	0.54	0.54	0.22	0.06	0.34	0.26	0.00	0.00
Avail Cap(c_a), veh/h	285	1942	866	209	1147	1179	491	617	523	539	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.3	26.5	12.4	42.1	9.8	9.9	31.4	28.7	31.8	30.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	14.1	0.1	31.2	0.5	0.5	1.0	0.2	1.8	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	18.1	0.6	6.5	2.6	2.7	2.0	0.7	3.5	2.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.6	40.6	12.4	73.4	10.3	10.4	32.4	28.9	33.6	32.0	0.0	0.0
LnGrp LOS	B	D	B	E	B	B	C	C	C	C	A	A
Approach Vol, veh/h		2016			1429			325			141	
Approach Delay, s/veh		38.9			18.4			32.6			32.0	
Approach LOS		D			B			C			C	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	15.0	79.0		49.3		94.0		49.3
Change Period (Y+Rc), s	* 6.3	* 6.3		7.1		* 6.3		* 7.1
Max Green Setting (Gmax), s	* 8.7	* 73		28.9		* 88		* 29
Max Q Clear Time (g_c+I1), s	10.8	72.0		10.7		25.8		13.4
Green Ext Time (p_c), s	0.0	0.7		1.0		20.5		2.6

Intersection Summary	
HCM 6th Ctrl Delay	30.6
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	2127	41	152	1187	12	45	88	121	60	55	15
Future Volume (veh/h)	94	2127	41	152	1187	12	45	88	121	60	55	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1786	1800	1758	1758	1772	1772	1772	1800	1800	1800
Adj Flow Rate, veh/h	94	2127	41	152	1187	12	45	88	121	60	55	15
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	1	0	3	3	2	2	2	0	0	0
Cap, veh/h	332	2463	47	108	2450	25	81	129	158	137	116	27
Arrive On Green	0.72	0.72	0.71	0.72	0.72	0.71	0.21	0.21	0.19	0.21	0.21	0.19
Sat Flow, veh/h	474	3405	65	185	3387	34	216	612	754	443	551	130
Grp Volume(v), veh/h	94	1056	1112	152	585	614	254	0	0	130	0	0
Grp Sat Flow(s),veh/h/ln	474	1697	1774	185	1670	1752	1582	0	0	1124	0	0
Q Serve(g_s), s	12.6	54.8	55.8	31.0	17.9	17.9	4.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	30.6	54.8	55.8	86.8	17.9	17.9	18.0	0.0	0.0	13.6	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.02	0.18		0.48	0.46		0.12
Lane Grp Cap(c), veh/h	332	1227	1283	108	1208	1267	368	0	0	280	0	0
V/C Ratio(X)	0.28	0.86	0.87	1.41	0.48	0.48	0.69	0.00	0.00	0.46	0.00	0.00
Avail Cap(c_a), veh/h	332	1227	1283	108	1208	1267	368	0	0	280	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.85	0.85	0.85	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.6	12.2	12.3	53.1	7.1	7.1	45.0	0.0	0.0	42.2	0.0	0.0
Incr Delay (d2), s/veh	2.1	8.0	8.0	223.8	1.2	1.1	10.2	0.0	0.0	5.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	4.5	4.7	9.4	0.9	1.0	6.9	0.0	0.0	3.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.7	20.2	20.4	276.9	8.3	8.2	55.2	0.0	0.0	47.6	0.0	0.0
LnGrp LOS	B	C	C	F	A	A	E	A	A	D	A	A
Approach Vol, veh/h		2262			1351			254			130	
Approach Delay, s/veh		20.1			38.5			55.2			47.6	
Approach LOS		C			D			E			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	90.8	29.2	90.8	29.2
Change Period (Y+Rc), s	* 6.1	* 6.2	* 6.1	* 6.2
Max Green Setting (Gmax), s	* 85	* 23	* 85	* 23
Max Q Clear Time (g_c+I1), s	57.8	15.6	88.8	20.0
Green Ext Time (p_c), s	25.0	0.5	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	29.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	579	1872	158	58	985	204	64	316	84	306	380	203
Future Volume (veh/h)	579	1872	158	58	985	204	64	316	84	306	380	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1800	1800	1758	1772	1800	1772	1800	1800	1772	1786
Adj Flow Rate, veh/h	579	1872	0	58	985	0	64	316	0	306	380	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	0	0	3	2	0	2	0	0	2	1
Cap, veh/h	671	1644		95	1129		345	1238		358	942	
Arrive On Green	0.20	0.48	0.00	0.06	0.34	0.00	0.06	0.37	0.00	0.28	0.28	0.00
Sat Flow, veh/h	3326	3393	1525	1714	3340	1502	1714	3367	1525	1080	3367	1514
Grp Volume(v), veh/h	579	1872	0	58	985	0	64	316	0	306	380	0
Grp Sat Flow(s),veh/h/ln	1663	1697	1525	1714	1670	1502	1714	1683	1525	1080	1683	1514
Q Serve(g_s), s	21.9	63.0	0.0	4.3	36.0	0.0	3.3	8.5	0.0	36.4	11.9	0.0
Cycle Q Clear(g_c), s	21.9	63.0	0.0	4.3	36.0	0.0	3.3	8.5	0.0	36.4	11.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	671	1644		95	1129		345	1238		358	942	
V/C Ratio(X)	0.86	1.14		0.61	0.87		0.19	0.26		0.86	0.40	
Avail Cap(c_a), veh/h	675	1644		95	1129		348	1238		358	942	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.1	33.5	0.0	60.0	40.4	0.0	29.1	28.7	0.0	47.0	38.0	0.0
Incr Delay (d2), s/veh	11.1	70.2	0.0	10.9	7.7	0.0	0.3	0.5	0.0	22.3	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	32.0	0.0	1.8	11.9	0.0	1.0	2.7	0.0	9.9	4.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.2	103.7	0.0	71.0	48.0	0.0	29.4	29.2	0.0	69.3	39.3	0.0
LnGrp LOS	E	F		E	D		C	C		E	D	
Approach Vol, veh/h		2451	A		1043	A		380	A		686	A
Approach Delay, s/veh		93.7			49.3			29.2			52.7	
Approach LOS		F			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	11.2	67.0	11.4	40.4	30.2	48.0		51.8
Change Period (Y+Rc), s	* 6.2	* 6.2	* 6.7	* 6.7	* 6.2	* 6.2		* 6.7
Max Green Setting (Gmax), s	* 5	* 61	* 5	* 33	* 24	* 42		* 45
Max Q Clear Time (g_c+I1), s	6.3	65.0	5.3	38.4	23.9	38.0		10.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.2	2.5		3.4

Intersection Summary	
HCM 6th Ctrl Delay	72.0
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	582	53	2249	1321	104	998
Future Volume (veh/h)	582	53	2249	1321	104	998
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1617	1800	1786	1744	1800	1744
Adj Flow Rate, veh/h	582	0	2249	0	104	998
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	13	0	1	4	0	4
Cap, veh/h	639		2143		107	2401
Arrive On Green	0.21	0.00	0.63	0.00	0.06	0.72
Sat Flow, veh/h	2988	1525	3483	1478	1714	3400
Grp Volume(v), veh/h	582	0	2249	0	104	998
Grp Sat Flow(s),veh/h/ln	1494	1525	1697	1478	1714	1657
Q Serve(g_s), s	24.7	0.0	82.1	0.0	7.9	15.4
Cycle Q Clear(g_c), s	24.7	0.0	82.1	0.0	7.9	15.4
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	639		2143		107	2401
V/C Ratio(X)	0.91		1.05		0.97	0.42
Avail Cap(c_a), veh/h	639		2143		107	2401
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	49.9	0.0	23.9	0.0	60.8	7.1
Incr Delay (d2), s/veh	19.4	0.0	33.9	0.0	78.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	23.7	0.0	5.1	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	69.3	0.0	57.9	0.0	139.3	7.6
LnGrp LOS	E		F		F	A
Approach Vol, veh/h	582	A	2249	A		1102
Approach Delay, s/veh	69.3		57.9			20.0
Approach LOS	E		E			C

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		31.8	12.1	86.1		98.2
Change Period (Y+Rc), s		* 5.8	* 6.3	* 5.9		* 5.9
Max Green Setting (Gmax), s		* 26	* 5.8	* 80		* 92
Max Q Clear Time (g_c+I1), s		26.7	9.9	84.1		17.4
Green Ext Time (p_c), s		0.0	0.0	0.0		15.6

Intersection Summary	
HCM 6th Ctrl Delay	49.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NER, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	143
Intersection LOS	F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	469	120	66	308	452	240
Future Vol, veh/h	469	120	66	308	452	240
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	1	10	11	0	1	2
Mvmt Flow	510	130	72	335	491	261
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	139	39.1	202.6
HCM LOS	F	E	F

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	18%	80%	0%
Vol Thru, %	82%	0%	65%
Vol Right, %	0%	20%	35%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	374	589	692
LT Vol	66	469	0
Through Vol	308	0	452
RT Vol	0	120	240
Lane Flow Rate	407	640	752
Geometry Grp	1	1	1
Degree of Util (X)	0.815	1.215	1.376
Departure Headway (Hd)	8.388	7.468	7.2
Convergence, Y/N	Yes	Yes	Yes
Cap	435	493	511
Service Time	6.388	5.468	5.2
HCM Lane V/C Ratio	0.936	1.298	1.472
HCM Control Delay	39.1	139	202.6
HCM Lane LOS	E	F	F
HCM 95th-tile Q	7.5	22.7	31.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	274	513	136	45	217	44	436	420	202	35	130	125
Future Volume (veh/h)	274	513	136	45	217	44	436	420	202	35	130	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1744	1744	1393	1660	1660	1617	1786	1674	1800	1730	1730
Adj Flow Rate, veh/h	274	513	136	45	217	0	436	420	202	35	130	125
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	4	4	29	10	10	13	1	9	0	5	5
Cap, veh/h	503	590	157	138	738		515	833	662	243	162	156
Arrive On Green	0.44	0.44	0.42	0.44	0.44	0.00	0.25	0.47	0.47	0.20	0.20	0.17
Sat Flow, veh/h	1173	1328	352	615	1660	0	1540	1786	1418	815	810	779
Grp Volume(v), veh/h	274	0	649	45	217	0	436	420	202	35	0	255
Grp Sat Flow(s),veh/h/ln	1173	0	1680	615	1660	0	1540	1786	1418	815	0	1590
Q Serve(g_s), s	17.5	0.0	31.5	6.4	7.5	0.0	18.7	14.8	8.0	3.2	0.0	13.8
Cycle Q Clear(g_c), s	25.0	0.0	31.5	38.0	7.5	0.0	18.7	14.8	8.0	3.2	0.0	13.8
Prop In Lane	1.00		0.21	1.00		0.00	1.00		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	503	0	747	138	738		515	833	662	243	0	318
V/C Ratio(X)	0.54	0.00	0.87	0.33	0.29		0.85	0.50	0.31	0.14	0.00	0.80
Avail Cap(c_a), veh/h	503	0	747	138	738		515	833	662	243	0	318
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.0	0.0	22.9	39.8	16.0	0.0	19.4	16.7	14.9	30.1	0.0	34.9
Incr Delay (d2), s/veh	1.2	0.0	10.7	1.4	0.2	0.0	12.5	0.5	0.3	0.3	0.0	13.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	7.9	0.7	1.4	0.0	4.9	3.1	1.3	0.5	0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.2	0.0	33.6	41.2	16.2	0.0	31.9	17.2	15.2	30.4	0.0	48.7
LnGrp LOS	C	A	C	D	B		C	B	B	C	A	D
Approach Vol, veh/h		923			262	A		1058			290	
Approach Delay, s/veh		31.1			20.5			22.9			46.4	
Approach LOS		C			C			C			D	

Timer - Assigned Phs		2	3	4		6		8
Phs Duration (G+Y+Rc), s		44.0	24.0	22.0		44.0		46.0
Change Period (Y+Rc), s		6.6	4.0	6.6		6.6		6.6
Max Green Setting (Gmax), s		37.4	20.0	15.4		37.4		39.4
Max Q Clear Time (g_c+I1), s		33.5	20.7	15.8		40.0		16.8
Green Ext Time (p_c), s		2.6	0.0	0.0		0.0		6.3

Intersection Summary	
HCM 6th Ctrl Delay	28.3
HCM 6th LOS	C

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	0	25	0	0	0	12	717	0	0	1329	244
Future Volume (veh/h)	135	0	25	0	0	0	12	717	0	0	1329	244
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	147	0	27	0	0	0	13	779	0	0	1445	265
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	257	0	165	72	195	0	248	2627	0	72	2627	1172
Arrive On Green	0.11	0.00	0.11	0.00	0.00	0.00	0.78	0.78	0.00	0.00	0.78	0.78
Sat Flow, veh/h	1688	0	1502	1383	1772	0	286	3455	0	693	3367	1502
Grp Volume(v), veh/h	147	0	27	0	0	0	13	779	0	0	1445	265
Grp Sat Flow(s),veh/h/ln	1688	0	1502	1383	1772	0	286	1683	0	693	1683	1502
Q Serve(g_s), s	8.5	0.0	1.6	0.0	0.0	0.0	1.8	6.6	0.0	0.0	16.5	4.7
Cycle Q Clear(g_c), s	8.5	0.0	1.6	0.0	0.0	0.0	18.4	6.6	0.0	0.0	16.5	4.7
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	257	0	165	72	195	0	248	2627	0	72	2627	1172
V/C Ratio(X)	0.57	0.00	0.16	0.00	0.00	0.00	0.05	0.30	0.00	0.00	0.55	0.23
Avail Cap(c_a), veh/h	469	0	353	245	416	0	248	2627	0	72	2627	1172
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	43.4	0.0	40.4	0.0	0.0	0.0	7.8	3.1	0.0	0.0	4.2	2.9
Incr Delay (d2), s/veh	2.0	0.0	0.5	0.0	0.0	0.0	0.4	0.3	0.0	0.0	0.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	0.5	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.4	0.0	40.8	0.0	0.0	0.0	8.2	3.4	0.0	0.0	5.1	3.4
LnGrp LOS	D	A	D	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		174			0			792			1710	
Approach Delay, s/veh		44.7			0.0			3.5			4.8	
Approach LOS		D						A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	83.5	16.5	83.5	16.5
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	65.5	23.5	65.5	23.5
Max Q Clear Time (g_c+I1), s	20.4	10.5	18.5	0.0
Green Ext Time (p_c), s	8.2	0.6	22.3	0.0

Intersection Summary	
HCM 6th Ctrl Delay	7.0
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	2049	45	0	1310	0	38
Future Vol, veh/h	2049	45	0	1310	0	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2049	45	0	1310	0	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	1047
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	-	0	225
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	225
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	24.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	225	-	-	-
HCM Lane V/C Ratio	0.169	-	-	-
HCM Control Delay (s)	24.2	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.6	-	-	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	2075	222	33	1277	136	19
Future Volume (vph)	2075	222	33	1277	136	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)		50.0	35.0		85.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3353	1500	1676	3353	1676	1500
Flt Permitted			0.061		0.950	
Satd. Flow (perm)	3353	1500	108	3353	1676	1500
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		158				19
Link Speed (k/h)	60			60	50	
Link Distance (m)	219.8			255.1	539.8	
Travel Time (s)	13.2			15.3	38.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2075	222	33	1277	136	19
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2075	222	33	1277	136	19
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	10.0	2.0	2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6	2.0	2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	8.5	20.5	20.5	20.5
Total Split (s)	61.0	61.0	8.5	69.5	20.5	20.5
Total Split (%)	67.8%	67.8%	9.4%	77.2%	22.8%	22.8%
Maximum Green (s)	56.5	56.5	4.0	65.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	63.0	63.0	68.8	68.8	12.2	12.2
Actuated g/C Ratio	0.70	0.70	0.76	0.76	0.14	0.14
v/c Ratio	0.88	0.20	0.19	0.50	0.60	0.09
Control Delay	19.2	2.7	5.6	5.2	47.1	14.6
Queue Delay	0.7	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	2.7	5.6	5.2	47.1	14.6
LOS	B	A	A	A	D	B
Approach Delay	18.2			5.2	43.1	
Approach LOS	B			A	D	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 76.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 48: Ciavan Access & Innes Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	274	513	136	45	217	44	436	420	202	35	130	125
Future Volume (veh/h)	274	513	136	45	217	44	436	420	202	35	130	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1744	1800	1393	1660	1660	1617	1786	1674	1800	1730	1730
Adj Flow Rate, veh/h	274	513	136	45	217	0	436	420	202	35	130	125
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	4	0	29	10	10	13	1	9	0	5	5
Cap, veh/h	468	607	497	181	481		521	893	709	222	158	152
Arrive On Green	0.11	0.35	0.33	0.05	0.29	0.00	0.27	0.50	0.50	0.20	0.20	0.17
Sat Flow, veh/h	1701	1744	1525	1327	1660	0	1540	1786	1418	815	810	779
Grp Volume(v), veh/h	274	513	136	45	217	0	436	420	202	35	0	255
Grp Sat Flow(s),veh/h/ln	1701	1744	1525	1327	1660	0	1540	1786	1418	815	0	1590
Q Serve(g_s), s	12.8	31.3	7.6	2.7	12.3	0.0	23.5	17.7	9.6	4.2	0.0	17.7
Cycle Q Clear(g_c), s	12.8	31.3	7.6	2.7	12.3	0.0	23.5	17.7	9.6	4.2	0.0	17.7
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	468	607	497	181	481		521	893	709	222	0	311
V/C Ratio(X)	0.59	0.84	0.27	0.25	0.45		0.84	0.47	0.28	0.16	0.00	0.82
Avail Cap(c_a), veh/h	468	706	583	187	582		619	1015	806	225	0	318
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.3	34.6	28.7	28.5	33.4	0.0	23.9	18.8	16.8	38.9	0.0	45.0
Incr Delay (d2), s/veh	1.9	8.2	0.3	0.7	0.7	0.0	8.6	0.4	0.2	0.3	0.0	15.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	10.3	2.1	0.6	3.6	0.0	6.4	4.5	1.9	0.7	0.0	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.2	42.9	29.0	29.2	34.1	0.0	32.4	19.2	17.0	39.2	0.0	60.4
LnGrp LOS	C	D	C	C	C		C	B	B	D	A	E
Approach Vol, veh/h		923			262	A		1058			290	
Approach Delay, s/veh		35.9			33.2			24.2			57.8	
Approach LOS		D			C			C			E	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	9.5	44.1	35.1	26.5	16.2	37.3		61.6
Change Period (Y+Rc), s	5.9	6.6	6.6	6.6	5.9	6.6		6.6
Max Green Setting (Gmax), s	4.1	44.0	35.8	20.4	10.3	37.8		62.8
Max Q Clear Time (g_c+I1), s	4.7	33.3	25.5	19.7	14.8	14.3		19.7
Green Ext Time (p_c), s	0.0	4.2	2.9	0.2	0.0	1.8		7.5

Intersection Summary	
HCM 6th Ctrl Delay	33.2
HCM 6th LOS	C

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

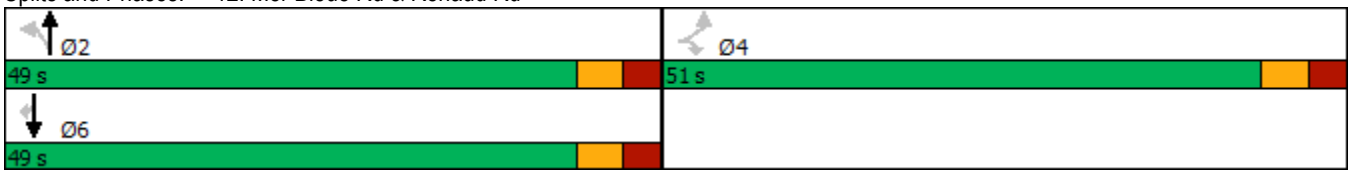
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	469	120	66	308	452	240
Future Volume (vph)	469	120	66	308	452	240
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	50.0	45.0			80.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1666	1391	1504	1764	1732	1494
Flt Permitted	0.950		0.323			
Satd. Flow (perm)	1666	1391	511	1764	1732	1494
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		120				261
Link Speed (k/h)	50			60	60	
Link Distance (m)	937.5			936.0	201.6	
Travel Time (s)	67.5			56.2	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	10%	11%	0%	1%	2%
Bus Blockages (#/hr)	4	0	6	5	7	1
Adj. Flow (vph)	510	130	72	335	491	261
Shared Lane Traffic (%)						
Lane Group Flow (vph)	510	130	72	335	491	261
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.09	1.07	1.11	1.10	1.11	1.08
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0	15.0	15.0	15.0	15.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	51.0	51.0	49.0	49.0	49.0	49.0
Total Split (%)	51.0%	51.0%	49.0%	49.0%	49.0%	49.0%
Maximum Green (s)	44.5	44.5	42.5	42.5	42.5	42.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	27.1	27.1	25.7	25.7	25.7	25.7
Actuated g/C Ratio	0.40	0.40	0.38	0.38	0.38	0.38
v/c Ratio	0.76	0.21	0.37	0.50	0.74	0.36
Control Delay	26.6	4.8	23.4	19.8	26.7	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	4.8	23.4	19.8	26.7	3.9
LOS	C	A	C	B	C	A
Approach Delay	22.2			20.4	18.8	
Approach LOS	C			C	B	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 67.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 20.3 — Intersection LOS: C
Intersection Capacity Utilization 77.1% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 12: Mer Bleue Rd & Renaud Rd



MOVEMENT SUMMARY

Site: 2026 PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	113	2.0	0.518	18.3	LOS A	4.2	32.2	0.92	1.03	48.3
8	T1	91	3.0	0.518	13.4	LOS A	4.2	32.2	0.92	1.03	48.5
18	R2	54	2.0	0.518	13.0	LOS A	4.2	32.2	0.92	1.03	51.9
Approach		259	2.4	0.518	15.5	LOS A	4.2	32.2	0.92	1.03	49.4
East: Brian Coburn											
1	L2	120	2.0	0.565	14.2	LOS A	4.8	37.2	0.76	0.82	56.2
6	T1	274	2.0	0.565	9.2	LOS A	4.8	37.2	0.76	0.82	57.7
16	R2	57	3.0	0.565	8.9	LOS A	4.8	37.2	0.76	0.82	56.7
Approach		450	2.1	0.565	10.5	LOS A	4.8	37.2	0.76	0.82	57.2
North: Fern Casey											
7	L2	34	3.0	0.450	15.1	LOS A	3.1	24.5	0.78	0.87	57.5
4	T1	134	3.0	0.450	10.1	LOS A	3.1	24.5	0.78	0.87	52.3
14	R2	122	3.0	0.450	9.9	LOS A	3.1	24.5	0.78	0.87	53.6
Approach		289	3.0	0.450	10.6	LOS A	3.1	24.5	0.78	0.87	53.7
West: Brian Coburn											
5	L2	140	3.0	1.010	44.0	LOS F	35.9	278.0	1.00	1.51	38.7
2	T1	508	2.0	1.010	38.7	LOS F	35.9	278.0	1.00	1.51	43.6
12	R2	210	2.0	1.010	38.5	LOS F	35.9	278.0	1.00	1.51	33.5
Approach		858	2.2	1.010	39.5	LOS F	35.9	278.0	1.00	1.51	41.0
All Vehicles		1855	2.3	1.010	24.6	LOS F	35.9	278.0	0.90	1.18	47.1

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	501	3.0	1.223	121.9	LOS F	70.5	549.4	1.00	2.67	20.6
18	R2	343	3.0	1.223	121.5	LOS F	70.5	549.4	1.00	2.67	20.4
Approach		845	3.0	1.223	121.7	LOS F	70.5	549.4	1.00	2.67	20.5
East: Brian Coburn											
1	L2	163	3.0	0.791	21.6	LOS C	10.7	83.2	1.00	1.15	48.2
16	R2	346	3.0	0.791	17.3	LOS B	10.7	83.2	1.00	1.15	47.6
Approach		509	3.0	0.791	18.7	LOS B	10.7	83.2	1.00	1.15	47.8
North: Navan											
7	L2	568	3.0	1.619	296.0	LOS F	206.3	1607.7	1.00	3.34	10.6
4	T1	840	3.0	1.619	292.2	LOS F	206.3	1607.7	1.00	3.34	10.6
Approach		1409	3.0	1.619	293.7	LOS F	206.3	1607.7	1.00	3.34	10.6
All Vehicles		2762	3.0	1.619	190.5	LOS F	206.3	1607.7	1.00	2.73	14.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM - Fern Casey/Frank Bender

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
3	L2	146	3.0	0.333	9.7	LOS A	2.2	16.8	0.28	0.56	56.6
8	T1	89	3.0	0.333	5.5	LOS A	2.2	16.8	0.28	0.56	57.0
18	R2	109	3.0	0.333	5.2	LOS A	2.2	16.8	0.28	0.56	55.7
Approach		343	3.0	0.333	7.2	LOS A	2.2	16.8	0.28	0.56	56.4
East: Frank Bender											
1	L2	137	3.0	0.259	11.2	LOS B	1.5	11.3	0.50	0.68	54.9
6	T1	70	3.0	0.259	7.1	LOS A	1.5	11.3	0.50	0.68	55.2
16	R2	12	3.0	0.259	6.7	LOS A	1.5	11.3	0.50	0.68	54.0
Approach		218	3.0	0.259	9.7	LOS A	1.5	11.3	0.50	0.68	54.9
North: Frank Bender											
7	L2	25	3.0	0.127	11.9	LOS B	0.6	5.0	0.54	0.67	55.6
4	T1	62	3.0	0.127	7.7	LOS A	0.6	5.0	0.54	0.67	55.9
14	R2	9	3.0	0.127	7.3	LOS A	0.6	5.0	0.54	0.67	54.7
Approach		96	3.0	0.127	8.7	LOS A	0.6	5.0	0.54	0.67	55.7
West: RoadName											
5	L2	4	3.0	0.143	10.9	LOS B	0.7	5.7	0.45	0.60	57.4
2	T1	28	3.0	0.143	6.7	LOS A	0.7	5.7	0.45	0.60	57.7
12	R2	89	3.0	0.143	6.3	LOS A	0.7	5.7	0.45	0.60	56.4
Approach		122	3.0	0.143	6.6	LOS A	0.7	5.7	0.45	0.60	56.7
All Vehicles		779	3.0	0.333	8.0	LOS A	2.2	16.8	0.40	0.61	56.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM - Frank Bender/Vanguard

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Frank Bender											
3	L2	11	3.0	0.149	10.6	LOS B	0.8	6.2	0.43	0.57	57.0
8	T1	73	3.0	0.149	6.4	LOS A	0.8	6.2	0.43	0.57	57.4
18	R2	48	3.0	0.149	6.1	LOS A	0.8	6.2	0.43	0.57	56.1
Approach		132	3.0	0.149	6.6	LOS A	0.8	6.2	0.43	0.57	56.9
East: Vanguard											
1	L2	89	3.0	0.380	10.6	LOS B	2.5	19.3	0.45	0.59	56.3
6	T1	227	3.0	0.380	6.4	LOS A	2.5	19.3	0.45	0.59	56.6
16	R2	40	3.0	0.380	6.0	LOS A	2.5	19.3	0.45	0.59	55.4
Approach		357	3.0	0.380	7.4	LOS A	2.5	19.3	0.45	0.59	56.4
North: Frank Bender											
7	L2	32	3.0	0.423	12.5	LOS B	2.7	21.2	0.66	0.74	55.7
4	T1	155	3.0	0.423	8.3	LOS A	2.7	21.2	0.66	0.74	56.0
14	R2	135	3.0	0.423	7.9	LOS A	2.7	21.2	0.66	0.74	54.8
Approach		322	3.0	0.423	8.6	LOS A	2.7	21.2	0.66	0.74	55.5
West: Vanguard											
5	L2	55	3.0	0.206	11.4	LOS B	1.1	8.8	0.53	0.66	55.5
2	T1	100	3.0	0.206	7.3	LOS A	1.1	8.8	0.53	0.66	55.9
12	R2	10	3.0	0.206	6.9	LOS A	1.1	8.8	0.53	0.66	54.7
Approach		165	3.0	0.206	8.6	LOS A	1.1	8.8	0.53	0.66	55.7
All Vehicles		975	3.0	0.423	7.9	LOS A	2.7	21.2	0.53	0.65	56.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM - Mer Bleue / Brian Coburn

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	57	2.0	0.840	32.6	LOS C	11.4	87.8	1.00	1.32	48.9
8	T1	590	2.0	0.840	26.4	LOS C	11.7	90.6	1.00	1.32	44.5
18	R2	263	2.0	0.840	25.9	LOS C	11.7	90.6	1.00	1.32	43.7
Approach		910	2.0	0.840	26.6	LOS C	11.7	90.6	1.00	1.32	44.6
East: Brian Coburn											
1	L2	160	2.0	1.264	142.1	LOS F	60.7	469.2	1.00	3.05	18.7
6	T1	266	2.0	1.264	136.1	LOS F	60.7	469.2	1.00	3.05	24.1
16	R2	300	2.0	1.264	136.0	LOS F	60.7	469.2	1.00	3.05	19.2
Approach		726	2.0	1.264	137.4	LOS F	60.7	469.2	1.00	3.05	21.0
North: Mer Bleue											
7	L2	580	2.0	0.792	17.4	LOS C	10.6	81.7	0.94	1.01	52.2
4	T1	695	2.0	0.792	11.4	LOS C	10.6	81.9	0.94	1.00	54.4
14	R2	139	2.0	0.792	11.3	LOS C	10.6	81.9	0.94	1.00	56.5
Approach		1414	2.0	0.792	13.8	LOS C	10.6	81.9	0.94	1.00	53.8
West: Brian Coburn											
5	L2	70	2.0	1.742	358.7	LOS F	86.7	669.8	1.00	3.76	12.1
2	T1	391	2.0	1.742	352.7	LOS F	86.7	669.8	1.00	3.76	12.0
12	R2	110	2.0	1.742	352.6	LOS F	86.7	669.8	1.00	3.76	11.6
Approach		571	2.0	1.742	353.4	LOS F	86.7	669.8	1.00	3.76	12.0
All Vehicles		3621	2.0	1.742	95.4	LOS F	86.7	669.8	0.98	1.93	26.0

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM- Mer Bleue / Renaud Rd

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	66	2.0	0.647	18.9	LOS B	6.6	51.9	0.94	1.06	58.0
8	T1	308	5.0	0.647	15.4	LOS B	6.6	51.9	0.94	1.06	47.3
Approach		374	4.5	0.647	16.1	LOS B	6.6	51.9	0.94	1.06	51.0
North: Mer Bleue											
4	T1	491	2.0	0.737	6.8	LOS A	11.4	87.9	0.69	0.52	54.3
14	R2	261	2.0	0.737	6.4	LOS A	11.4	87.9	0.69	0.52	60.1
Approach		752	2.0	0.737	6.6	LOS A	11.4	87.9	0.69	0.52	57.7
West: Renaud Rd											
5	L2	510	2.0	1.039	63.0	LOS F	32.6	252.2	1.00	1.87	43.6
12	R2	130	2.0	1.039	58.9	LOS F	32.6	252.2	1.00	1.87	44.6
Approach		640	2.0	1.039	62.1	LOS E	32.6	252.2	1.00	1.87	43.8
All Vehicles		1766	2.5	1.039	28.7	LOS C	32.6	252.2	0.85	1.12	48.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	113	2.0	0.427	14.9	LOS A	2.2	17.1	0.69	0.89	53.7
8	T1	91	3.0	0.427	8.7	LOS A	2.2	17.1	0.69	0.89	53.3
18	R2	54	2.0	0.427	8.6	LOS A	2.2	17.1	0.69	0.89	55.2
Approach		259	2.4	0.427	11.4	LOS A	2.2	17.1	0.69	0.89	54.0
East: Brian Coburn											
1	L2	120	2.0	0.242	11.9	LOS A	1.2	9.5	0.50	0.66	58.2
6	T1	274	2.0	0.242	5.7	LOS A	1.2	9.5	0.50	0.60	60.2
16	R2	57	3.0	0.242	5.9	LOS A	1.2	9.5	0.50	0.56	59.3
Approach		450	2.1	0.242	7.3	LOS A	1.2	9.5	0.50	0.61	59.6
North: Fern Casey											
7	L2	34	3.0	0.420	13.8	LOS A	2.1	16.6	0.63	0.79	60.0
4	T1	134	3.0	0.420	7.6	LOS A	2.1	16.6	0.63	0.79	55.8
14	R2	122	3.0	0.420	7.5	LOS A	2.1	16.6	0.63	0.79	56.2
Approach		289	3.0	0.420	8.3	LOS A	2.1	16.6	0.63	0.79	56.7
West: Brian Coburn											
5	L2	140	3.0	0.440	12.0	LOS A	2.6	20.4	0.54	0.62	58.0
2	T1	508	2.0	0.440	5.7	LOS A	2.6	20.4	0.54	0.61	60.1
12	R2	210	2.0	0.440	5.9	LOS A	2.6	20.4	0.54	0.59	55.1
Approach		858	2.2	0.440	6.8	LOS A	2.6	20.4	0.54	0.61	59.0
All Vehicles		1855	2.3	0.440	7.8	LOS A	2.6	20.4	0.57	0.67	58.3

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	501	3.0	0.676	11.7	LOS B	6.6	51.6	0.87	1.02	55.4
18	R2	343	3.0	0.516	9.8	LOS A	3.7	28.8	0.78	0.92	54.8
Approach		845	3.0	0.676	10.9	LOS B	6.6	51.6	0.84	0.98	55.2
East: Brian Coburn											
1	L2	163	3.0	0.277	13.9	LOS B	1.5	11.6	0.68	0.85	54.1
16	R2	346	3.0	0.213	4.0	LOS A	0.0	0.0	0.00	0.46	60.0
Approach		509	3.0	0.277	7.2	LOS A	1.5	11.6	0.22	0.58	57.9
North: Navan											
7	L2	568	3.0	0.584	11.6	LOS B	4.6	35.6	0.57	0.68	54.9
4	T1	840	3.0	0.802	7.4	LOS A	11.2	87.5	0.82	0.68	57.4
Approach		1409	3.0	0.802	9.1	LOS A	11.2	87.5	0.71	0.68	56.3
All Vehicles		2762	3.0	0.802	9.3	LOS A	11.2	87.5	0.66	0.75	56.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2026 PM - Mer Bleue / Brian Coburn

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	57	2.0	0.809	25.7	LOS C	8.0	61.8	0.95	1.21	52.4
8	T1	590	2.0	0.809	19.4	LOS C	8.3	64.3	0.95	1.21	48.7
18	R2	263	2.0	0.809	18.7	LOS C	8.3	64.3	0.95	1.21	47.9
Approach		910	2.0	0.809	19.6	LOS C	8.3	64.3	0.95	1.21	48.8
East: Brian Coburn											
1	L2	160	2.0	0.515	14.5	LOS A	3.3	25.5	0.77	0.91	54.9
6	T1	266	2.0	0.515	8.5	LOS A	3.3	25.7	0.77	0.91	58.3
16	R2	300	2.0	0.515	8.5	LOS A	3.3	25.7	0.77	0.90	55.8
Approach		726	2.0	0.515	9.8	LOS A	3.3	25.7	0.77	0.90	56.7
North: Mer Bleue											
7	L2	580	2.0	0.817	18.2	LOS C	10.1	78.2	0.92	1.11	51.6
4	T1	695	2.0	0.817	12.2	LOS C	10.1	78.4	0.92	1.09	53.8
14	R2	139	2.0	0.817	12.1	LOS C	10.1	78.4	0.92	1.09	56.0
Approach		1414	2.0	0.817	14.7	LOS C	10.1	78.4	0.92	1.10	53.2
West: Brian Coburn											
5	L2	70	2.0	0.711	23.6	LOS C	4.7	36.7	0.91	1.08	53.4
2	T1	391	2.0	0.711	16.8	LOS C	5.1	39.2	0.92	1.09	54.1
12	R2	110	2.0	0.711	16.1	LOS C	5.1	39.2	0.93	1.09	53.3
Approach		571	2.0	0.711	17.5	LOS C	5.1	39.2	0.92	1.09	53.9
All Vehicles		3621	2.0	0.817	15.4	LOS C	10.1	78.4	0.90	1.09	52.9

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D-2

Forecast 2031 Traffic Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	563	315	319	1476	646	447	958	293	177	621	81
Future Volume (veh/h)	69	563	315	319	1476	646	447	958	293	177	621	81
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1491	1688	1688	1758	1758	1772	1786	1744	1744	1744	1688	1688
Adj Flow Rate, veh/h	69	563	0	319	1476	0	447	958	0	177	621	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	22	8	8	3	3	2	1	4	4	4	8	8
Cap, veh/h	133	962		452	1362		472	1180		188	871	
Arrive On Green	0.05	0.30	0.00	0.16	0.41	0.00	0.14	0.36	0.00	0.06	0.27	0.00
Sat Flow, veh/h	1420	3207	1430	1674	3340	1502	3300	3400	0	3222	3291	0
Grp Volume(v), veh/h	69	563	0	319	1476	0	447	958	0	177	621	0
Grp Sat Flow(s),veh/h/ln	1420	1603	1430	1674	1670	1502	1650	1657	0	1611	1603	0
Q Serve(g_s), s	4.3	19.4	0.0	16.1	53.0	0.0	17.5	34.0	0.0	7.1	22.7	0.0
Cycle Q Clear(g_c), s	4.3	19.4	0.0	16.1	53.0	0.0	17.5	34.0	0.0	7.1	22.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	133	962		452	1362		472	1180		188	871	
V/C Ratio(X)	0.52	0.59		0.71	1.08		0.95	0.81		0.94	0.71	
Avail Cap(c_a), veh/h	133	962		493	1362		472	1180		188	871	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.99	0.99	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.4	38.6	0.0	24.9	38.5	0.0	55.2	37.9	0.0	61.0	42.8	0.0
Incr Delay (d2), s/veh	3.5	0.9	0.0	4.1	50.5	0.0	28.2	6.1	0.0	48.4	5.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	5.8	0.0	4.6	24.2	0.0	7.6	10.9	0.0	3.6	7.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	39.5	0.0	29.1	89.0	0.0	83.5	44.0	0.0	109.4	47.7	0.0
LnGrp LOS	D	D		C	F		F	D		F	D	
Approach Vol, veh/h		632	A		1795	A		1405	A		798	A
Approach Delay, s/veh		39.4			78.4			56.5			61.4	
Approach LOS		D			E			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.1	43.0	22.6	39.3	11.1	57.0	11.6	50.3
Change Period (Y+Rc), s	* 6.1	6.4	* 6.3	* 6.2	* 6.1	6.4	* 6.3	* 6.2
Max Green Setting (Gmax), s	* 22	33.4	* 16	* 33	* 5	50.6	* 5.3	* 44
Max Q Clear Time (g_c+I1), s	18.1	21.4	19.5	24.7	6.3	55.0	9.1	36.0
Green Ext Time (p_c), s	0.9	4.0	0.0	3.5	0.0	0.0	0.0	5.0

Intersection Summary	
HCM 6th Ctrl Delay	63.5
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	737	81	55	1798	102	123	111	23	82	77	76
Future Volume (veh/h)	68	737	81	55	1798	102	123	111	23	82	77	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1688	1575	1800	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	68	737	81	55	1798	102	123	111	23	82	77	76
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	8	16	0	2	2	0	0	0	0	0	0
Cap, veh/h	176	1986	827	455	2036	114	271	449	381	311	208	205
Arrive On Green	0.05	0.62	0.62	0.04	0.63	0.61	0.25	0.25	0.25	0.25	0.25	0.23
Sat Flow, veh/h	1714	3207	1335	1714	3240	182	1254	1800	1525	1275	832	821
Grp Volume(v), veh/h	68	737	81	55	926	974	123	111	23	82	0	153
Grp Sat Flow(s),veh/h/ln	1714	1603	1335	1714	1683	1739	1254	1800	1525	1275	0	1652
Q Serve(g_s), s	1.8	14.8	3.2	1.5	59.1	61.5	11.7	6.4	1.5	7.1	0.0	10.1
Cycle Q Clear(g_c), s	1.8	14.8	3.2	1.5	59.1	61.5	21.8	6.4	1.5	13.6	0.0	10.1
Prop In Lane	1.00		1.00	1.00		0.10	1.00		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	176	1986	827	455	1058	1093	271	449	381	311	0	412
V/C Ratio(X)	0.39	0.37	0.10	0.12	0.88	0.89	0.45	0.25	0.06	0.26	0.00	0.37
Avail Cap(c_a), veh/h	180	1986	827	494	1088	1124	271	449	381	311	0	412
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.40	0.40	0.40	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.8	12.2	10.0	9.5	20.0	20.5	49.4	39.0	37.2	44.4	0.0	40.9
Incr Delay (d2), s/veh	1.4	0.1	0.1	0.0	3.5	3.9	5.4	1.3	0.3	2.1	0.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	2.5	0.5	0.2	11.0	12.0	3.4	2.4	0.5	2.0	0.0	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.1	12.3	10.1	9.5	23.4	24.4	54.8	40.3	37.5	46.5	0.0	43.5
LnGrp LOS	C	B	B	A	C	C	D	D	D	D	A	D
Approach Vol, veh/h		886			1955			257			235	
Approach Delay, s/veh		13.3			23.5			47.0			44.5	
Approach LOS		B			C			D			D	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.0	84.5		36.5	7.7	85.9		36.5
Change Period (Y+Rc), s	* 4.7	* 6.6		* 6.8	4.0	* 6.6		* 6.8
Max Green Setting (Gmax), s	* 7.3	* 77		* 27	4.0	* 82		* 27
Max Q Clear Time (g_c+I1), s	3.5	16.8		15.6	3.8	63.5		23.8
Green Ext Time (p_c), s	0.1	11.0		1.5	0.0	15.8		0.6

Intersection Summary	
HCM 6th Ctrl Delay	24.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	800	37	59	1905	33	22	5	89	46	13	47
Future Volume (veh/h)	11	800	37	59	1905	33	22	5	89	46	13	47
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1463	1674	1674	1800	1758	1758	1744	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	11	800	37	59	1905	33	22	5	89	46	13	47
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	24	9	9	0	3	3	4	0	0	0	0	0
Cap, veh/h	97	1847	824	437	2228	38	408	495	420	201	64	180
Arrive On Green	0.58	0.58	0.58	0.05	0.66	0.65	0.28	0.28	0.28	0.28	0.28	0.25
Sat Flow, veh/h	189	3180	1418	1714	3359	58	1321	1800	1525	586	233	652
Grp Volume(v), veh/h	11	800	37	59	944	994	22	5	89	106	0	0
Grp Sat Flow(s),veh/h/ln	189	1590	1418	1714	1670	1747	1321	1800	1525	1471	0	0
Q Serve(g_s), s	6.3	18.3	1.5	1.6	57.0	57.8	0.0	0.3	5.8	4.5	0.0	0.0
Cycle Q Clear(g_c), s	53.3	18.3	1.5	1.6	57.0	57.8	1.9	0.3	5.8	7.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	0.43		0.44
Lane Grp Cap(c), veh/h	97	1847	824	437	1108	1159	408	495	420	445	0	0
V/C Ratio(X)	0.11	0.43	0.04	0.13	0.85	0.86	0.05	0.01	0.21	0.24	0.00	0.00
Avail Cap(c_a), veh/h	102	1942	866	449	1169	1223	408	495	420	445	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	42.1	15.3	11.7	10.1	17.0	17.1	34.8	34.2	36.3	37.1	0.0	0.0
Incr Delay (d2), s/veh	0.5	0.2	0.0	0.1	6.0	6.0	0.3	0.0	1.1	1.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.5	0.3	0.3	9.5	10.1	0.4	0.1	1.9	2.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.6	15.4	11.7	10.2	23.0	23.2	35.1	34.3	37.4	38.3	0.0	0.0
LnGrp LOS	D	B	B	B	C	C	D	C	D	D	A	A
Approach Vol, veh/h		848			1997			116			106	
Approach Delay, s/veh		15.6			22.7			36.8			38.3	
Approach LOS		B			C			D			D	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	10.7	79.5		39.8		90.2		39.8
Change Period (Y+Rc), s	* 6.3	* 6.3		* 6.7		* 6.3		* 6.7
Max Green Setting (Gmax), s	* 5.3	* 77		* 28		* 89		* 28
Max Q Clear Time (g_c+I1), s	3.6	55.3		9.1		59.8		7.8
Green Ext Time (p_c), s	0.0	9.0		0.7		24.1		0.9

Intersection Summary	
HCM 6th Ctrl Delay	21.8
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	800	16	32	2202	37	18	20	54	18	11	70
Future Volume (veh/h)	46	800	16	32	2202	37	18	20	54	18	11	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1632	1632	1730	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	46	800	16	32	2202	37	18	20	54	18	11	70
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	12	12	5	2	2	0	0	0	0	0	0
Cap, veh/h	87	2224	44	458	2424	41	82	95	204	76	57	243
Arrive On Green	0.72	0.72	0.70	0.72	0.72	0.70	0.22	0.22	0.21	0.22	0.22	0.21
Sat Flow, veh/h	173	3108	62	654	3388	57	219	426	916	195	256	1088
Grp Volume(v), veh/h	46	399	417	32	1091	1148	92	0	0	99	0	0
Grp Sat Flow(s),veh/h/ln	173	1550	1620	654	1683	1762	1560	0	0	1539	0	0
Q Serve(g_s), s	23.7	12.8	12.8	2.6	68.1	69.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	93.0	12.8	12.8	15.4	68.1	69.3	6.1	0.0	0.0	6.8	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.20		0.59	0.18		0.71
Lane Grp Cap(c), veh/h	87	1109	1159	458	1204	1260	381	0	0	376	0	0
V/C Ratio(X)	0.53	0.36	0.36	0.07	0.91	0.91	0.24	0.00	0.00	0.26	0.00	0.00
Avail Cap(c_a), veh/h	87	1109	1159	458	1204	1260	381	0	0	376	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.39	0.39	0.39	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	56.9	7.1	7.1	10.0	15.0	15.2	42.1	0.0	0.0	42.5	0.0	0.0
Incr Delay (d2), s/veh	5.9	0.2	0.2	0.0	4.3	4.4	1.5	0.0	0.0	1.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.9	1.0	0.2	6.6	7.0	2.2	0.0	0.0	2.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.8	7.3	7.3	10.1	19.3	19.6	43.6	0.0	0.0	44.2	0.0	0.0
LnGrp LOS	E	A	A	B	B	B	D	A	A	D	A	A
Approach Vol, veh/h		862			2271			92			99	
Approach Delay, s/veh		10.3			19.3			43.6			44.2	
Approach LOS		B			B			D			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	97.0	33.0	97.0	33.0
Change Period (Y+Rc), s	* 6.1	* 6.2	* 6.1	* 6.2
Max Green Setting (Gmax), s	* 91	* 27	* 91	* 27
Max Q Clear Time (g_c+I1), s	95.0	8.8	71.3	8.1
Green Ext Time (p_c), s	0.0	0.7	18.5	0.6

Intersection Summary	
HCM 6th Ctrl Delay	18.4
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	647	23	24	1962	303	203	461	44	171	228	459
Future Volume (veh/h)	121	647	23	24	1962	303	203	461	44	171	228	459
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1617	1589	1730	1800	1772	1674	1786	1730	1758	1688	1603	1786
Adj Flow Rate, veh/h	121	647	0	24	1962	0	203	461	0	171	228	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	13	15	5	0	2	9	1	5	3	8	14	1
Cap, veh/h	175	1661		67	1787		349	1047		239	694	
Arrive On Green	0.06	0.55	0.00	0.04	0.53	0.00	0.06	0.32	0.00	0.23	0.23	0.00
Sat Flow, veh/h	2988	3020	1466	1714	3367	1418	1701	3287	1490	887	3047	1514
Grp Volume(v), veh/h	121	647	0	24	1962	0	203	461	0	171	228	0
Grp Sat Flow(s),veh/h/ln	1494	1510	1466	1714	1683	1418	1701	1643	1490	887	1523	1514
Q Serve(g_s), s	5.2	16.0	0.0	1.8	69.0	0.0	7.8	14.5	0.0	24.6	8.1	0.0
Cycle Q Clear(g_c), s	5.2	16.0	0.0	1.8	69.0	0.0	7.8	14.5	0.0	27.3	8.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	175	1661		67	1787		349	1047		239	694	
V/C Ratio(X)	0.69	0.39		0.36	1.10		0.58	0.44		0.71	0.33	
Avail Cap(c_a), veh/h	175	1661		95	1787		349	1047		239	694	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.1	16.8	0.0	60.9	30.5	0.0	39.8	35.1	0.0	50.6	41.9	0.0
Incr Delay (d2), s/veh	11.1	0.1	0.0	3.2	53.4	0.0	2.4	1.3	0.0	16.7	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	3.2	0.0	0.7	29.1	0.0	4.9	4.7	0.0	5.5	2.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.2	16.9	0.0	64.0	83.9	0.0	42.2	36.5	0.0	67.3	43.2	0.0
LnGrp LOS	E	B		E	F		D	D		E	D	
Approach Vol, veh/h		768	A		1986	A		664	A		399	A
Approach Delay, s/veh		25.5			83.7			38.2			53.5	
Approach LOS		C			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	9.1	75.5	11.8	33.6	11.6	73.0		45.4
Change Period (Y+Rc), s	* 6.2	* 6.2	* 6.7	* 6.7	* 6.2	* 6.2		* 6.7
Max Green Setting (Gmax), s	* 5	* 67	* 5.1	* 27	* 5.4	* 67		* 39
Max Q Clear Time (g_c+I1), s	3.8	18.0	9.8	29.3	7.2	71.0		16.5
Green Ext Time (p_c), s	0.0	8.2	0.0	0.0	0.0	0.0		4.6

Intersection Summary	
HCM 6th Ctrl Delay	60.9
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	1452	111	681	555	22	2233
Future Volume (veh/h)	1452	111	681	555	22	2233
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1702	1744	1547	1477	1786	1786
Adj Flow Rate, veh/h	1452	0	681	0	22	2233
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	7	4	18	23	1	1
Cap, veh/h	1282		1356		66	1801
Arrive On Green	0.41	0.00	0.46	0.00	0.04	0.53
Sat Flow, veh/h	3144	1478	3017	1252	1701	3483
Grp Volume(v), veh/h	1452	0	681	0	22	2233
Grp Sat Flow(s),veh/h/ln	1572	1478	1470	1252	1701	1697
Q Serve(g_s), s	53.0	0.0	21.1	0.0	1.6	69.0
Cycle Q Clear(g_c), s	53.0	0.0	21.1	0.0	1.6	69.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	1282		1356		66	1801
V/C Ratio(X)	1.13		0.50		0.33	1.24
Avail Cap(c_a), veh/h	1282		1356		97	1801
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	38.5	0.0	24.6	0.0	60.8	30.5
Incr Delay (d2), s/veh	70.0	0.0	0.3	0.0	2.9	112.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	26.3	0.0	4.9	0.0	0.6	44.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	108.5	0.0	24.9	0.0	63.8	143.4
LnGrp LOS	F		C		E	F
Approach Vol, veh/h	1452	A	681	A		2255
Approach Delay, s/veh	108.5		24.9			142.6
Approach LOS	F		C			F

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	9.0	64.0			73.0	57.0
Change Period (Y+Rc), s	* 6.3	* 5.9			* 5.9	5.8
Max Green Setting (Gmax), s	* 5.1	* 56			* 67	51.2
Max Q Clear Time (g_c+I1), s	3.6	23.1			71.0	55.0
Green Ext Time (p_c), s	0.0	8.1			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	113.0
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NER, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	139	474	345	212	529	21	206	138	35	24	380	301
Future Volume (veh/h)	139	474	345	212	529	21	206	138	35	24	380	301
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1519	1337	1730	1758	1758	1632	1744	1716	1800	1786	1786
Adj Flow Rate, veh/h	139	474	345	212	529	0	206	138	35	24	380	301
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	20	33	5	3	3	12	4	6	0	1	1
Cap, veh/h	200	503	352	182	608		232	926	772	529	355	281
Arrive On Green	0.05	0.33	0.31	0.07	0.35	0.00	0.11	0.53	0.53	0.38	0.38	0.36
Sat Flow, veh/h	1714	1519	1133	1647	1758	0	1554	1744	1454	1231	923	731
Grp Volume(v), veh/h	139	474	345	212	529	0	206	138	35	24	0	681
Grp Sat Flow(s),veh/h/ln	1714	1519	1133	1647	1758	0	1554	1744	1454	1231	0	1654
Q Serve(g_s), s	6.6	39.5	39.2	8.6	36.6	0.0	12.3	5.2	1.5	1.6	0.0	50.0
Cycle Q Clear(g_c), s	6.6	39.5	39.2	8.6	36.6	0.0	12.3	5.2	1.5	1.6	0.0	50.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.44
Lane Grp Cap(c), veh/h	200	503	352	182	608		232	926	772	529	0	636
V/C Ratio(X)	0.70	0.94	0.98	1.16	0.87		0.89	0.15	0.05	0.05	0.00	1.07
Avail Cap(c_a), veh/h	200	503	352	182	608		232	926	772	529	0	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.3	42.3	44.4	35.3	39.8	0.0	37.8	15.5	14.7	25.1	0.0	40.6
Incr Delay (d2), s/veh	10.0	26.6	42.5	117.7	12.8	0.0	31.0	0.1	0.0	0.0	0.0	56.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	14.4	12.6	8.5	13.5	0.0	4.3	1.4	0.3	0.4	0.0	24.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.3	68.9	86.9	153.1	52.6	0.0	68.9	15.6	14.7	25.1	0.0	96.5
LnGrp LOS	D	E	F	F	D		E	B	B	C	A	F
Approach Vol, veh/h		958			741	A		379			705	
Approach Delay, s/veh		71.8			81.3			44.5			94.1	
Approach LOS		E			F			D			F	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	47.0	19.0	54.0	8.0	49.0		73.0
Change Period (Y+Rc), s	4.0	6.6	* 6.8	6.6	4.0	6.6		6.6
Max Green Setting (Gmax), s	6.0	40.4	* 12	47.4	4.0	42.4		66.4
Max Q Clear Time (g_c+I1), s	10.6	41.5	14.3	52.0	8.6	38.6		7.2
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.6		1.8

Intersection Summary	
HCM 6th Ctrl Delay	76.3
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	201	32	7	12	57	97	31	1237	24	133	779	101
Future Volume (veh/h)	201	32	7	12	57	97	31	1237	24	133	779	101
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	201	32	7	12	57	97	31	1237	24	133	779	101
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	294	365	80	403	153	260	424	2232	43	276	2225	992
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.66	0.66	0.66	0.66	0.66	0.66
Sat Flow, veh/h	1233	1408	308	1368	589	1002	631	3378	66	440	3367	1502
Grp Volume(v), veh/h	201	0	39	12	0	154	31	616	645	133	779	101
Grp Sat Flow(s),veh/h/ln	1233	0	1716	1368	0	1591	631	1683	1760	440	1683	1502
Q Serve(g_s), s	16.0	0.0	1.7	0.7	0.0	7.9	2.3	19.6	19.6	23.2	10.2	2.4
Cycle Q Clear(g_c), s	23.9	0.0	1.7	2.4	0.0	7.9	12.5	19.6	19.6	42.8	10.2	2.4
Prop In Lane	1.00		0.18	1.00		0.63	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	294	0	445	403	0	413	424	1112	1163	276	2225	992
V/C Ratio(X)	0.68	0.00	0.09	0.03	0.00	0.37	0.07	0.55	0.55	0.48	0.35	0.10
Avail Cap(c_a), veh/h	295	0	446	404	0	414	424	1112	1163	276	2225	992
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	0.0	28.1	29.0	0.0	30.4	10.2	9.1	9.1	20.5	7.5	6.2
Incr Delay (d2), s/veh	6.4	0.0	0.1	0.0	0.0	0.6	0.3	2.0	1.9	5.9	0.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	0.0	0.5	0.2	0.0	2.2	0.2	1.4	1.5	1.6	0.5	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.6	0.0	28.2	29.0	0.0	30.9	10.6	11.1	11.0	26.4	7.9	6.4
LnGrp LOS	D	A	C	C	A	C	B	B	B	C	A	A
Approach Vol, veh/h		240			166			1292			1013	
Approach Delay, s/veh		43.6			30.8			11.0			10.2	
Approach LOS		D			C			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		70.1		29.9		70.1		29.9				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		66.0		26.0		66.0		26.0				
Max Q Clear Time (g_c+I1), s		21.6		25.9		44.8		9.9				
Green Ext Time (p_c), s		14.6		0.0		9.2		0.9				

Intersection Summary												
HCM 6th Ctrl Delay			14.8									
HCM 6th LOS			B									

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	808	64	7	1990	284	36
Future Volume (vph)	808	64	7	1990	284	36
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)		50.0	35.1		85.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.6		7.6	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3390	1517	1695	3390	1695	1517
Flt Permitted			0.292		0.950	
Satd. Flow (perm)	3390	1517	521	3390	1695	1517
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		64				36
Link Speed (k/h)	60			60	50	
Link Distance (m)	236.0			246.2	531.0	
Travel Time (s)	14.2			14.8	38.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	808	64	7	1990	284	36
Shared Lane Traffic (%)						
Lane Group Flow (vph)	808	64	7	1990	284	36
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)		14	26		26	14
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	10.0	2.1	2.1	10.0	2.1	2.1
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6	2.1	2.1	0.6	2.1	2.1
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	10.0	22.0	22.0	22.0
Total Split (s)	77.0	77.0	10.0	87.0	33.0	33.0
Total Split (%)	64.2%	64.2%	8.3%	72.5%	27.5%	27.5%
Maximum Green (s)	71.0	71.0	4.0	81.0	27.0	27.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	82.2	82.2	84.2	84.2	23.8	23.8
Actuated g/C Ratio	0.68	0.68	0.70	0.70	0.20	0.20
v/c Ratio	0.35	0.06	0.02	0.84	0.85	0.11
Control Delay	9.2	2.4	6.4	17.9	68.2	12.4
Queue Delay	0.0	0.0	0.0	2.0	0.0	0.0
Total Delay	9.2	2.4	6.4	20.0	68.2	12.4
LOS	A	A	A	B	E	B
Approach Delay	8.7			19.9	62.0	
Approach LOS	A			B	E	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 21.1	Intersection LOS: C
Intersection Capacity Utilization 84.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 45: Ciavan Access & Innes Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	139	474	345	212	529	21	206	138	35	24	380	301
Future Volume (veh/h)	139	474	345	212	529	21	206	138	35	24	380	301
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1519	1337	1730	1758	1758	1632	1744	1716	1800	1786	1786
Adj Flow Rate, veh/h	139	474	0	212	529	0	206	138	35	24	380	301
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	20	33	5	3	3	12	4	6	0	1	1
Cap, veh/h	279	645		268	746		292	1059	883	630	424	336
Arrive On Green	0.09	0.22	0.00	0.09	0.22	0.00	0.11	0.61	0.61	0.46	0.46	0.44
Sat Flow, veh/h	1714	2886	1133	1647	3428	0	1554	1744	1454	1231	923	731
Grp Volume(v), veh/h	139	474	0	212	529	0	206	138	35	24	0	681
Grp Sat Flow(s),veh/h/ln	1714	1443	1133	1647	1670	0	1554	1744	1454	1231	0	1654
Q Serve(g_s), s	6.8	17.1	0.0	9.6	16.4	0.0	7.1	3.8	1.1	1.2	0.0	42.6
Cycle Q Clear(g_c), s	6.8	17.1	0.0	9.6	16.4	0.0	7.1	3.8	1.1	1.2	0.0	42.6
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.44
Lane Grp Cap(c), veh/h	279	645		268	746		292	1059	883	630	0	760
V/C Ratio(X)	0.50	0.74		0.79	0.71		0.71	0.13	0.04	0.04	0.00	0.90
Avail Cap(c_a), veh/h	279	856		268	990		362	1207	1006	678	0	825
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.3	40.5	0.0	34.7	40.2	0.0	22.6	9.4	8.9	16.7	0.0	28.4
Incr Delay (d2), s/veh	1.4	2.3	0.0	14.6	1.6	0.0	4.6	0.1	0.0	0.0	0.0	11.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	4.6	0.0	4.2	5.1	0.0	1.7	0.7	0.2	0.2	0.0	13.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.6	42.8	0.0	49.3	41.8	0.0	27.2	9.5	8.9	16.8	0.0	40.3
LnGrp LOS	C	D		D	D		C	A	A	B	A	D
Approach Vol, veh/h		613	A		741	A		379			705	
Approach Delay, s/veh		40.3			44.0			19.0			39.5	
Approach LOS		D			D			B			D	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	11.0	29.1	16.6	55.6	11.0	29.1		72.2
Change Period (Y+Rc), s	4.0	6.6	* 6.8	6.6	4.0	6.6		6.6
Max Green Setting (Gmax), s	7.0	30.7	* 15	53.4	7.0	30.7		75.1
Max Q Clear Time (g_c+I1), s	11.6	19.1	9.1	44.6	8.8	18.4		5.8
Green Ext Time (p_c), s	0.0	3.3	0.8	4.4	0.0	3.8		1.8

Intersection Summary	
HCM 6th Ctrl Delay	37.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	456	180	96	554	782	246
Future Volume (vph)	456	180	96	554	782	246
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	50.0	45.0			80.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.5		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1666	1391	1504	1764	1732	1494
Flt Permitted	0.950		0.083			
Satd. Flow (perm)	1666	1391	131	1764	1732	1494
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		124				216
Link Speed (k/h)	50			60	60	
Link Distance (m)	937.5			936.0	201.6	
Travel Time (s)	67.5			56.2	12.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	10%	11%	0%	1%	2%
Bus Blockages (#/hr)	4	0	6	5	7	1
Adj. Flow (vph)	496	196	104	602	850	267
Shared Lane Traffic (%)						
Lane Group Flow (vph)	496	196	104	602	850	267
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.09	1.07	1.11	1.10	1.11	1.08
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0	15.0	15.0	15.0	15.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	4.0	10.0	10.0	10.0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Split (s)	22.5	22.5	8.0	22.5	22.5	22.5
Total Split (s)	43.2	43.2	8.0	76.8	68.8	68.8
Total Split (%)	36.0%	36.0%	6.7%	64.0%	57.3%	57.3%
Maximum Green (s)	36.7	36.7	4.0	70.3	62.3	62.3
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	3.0	3.0	0.5	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	4.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Min	Min	Min
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	36.1	36.1	70.2	67.7	59.7	59.7
Actuated g/C Ratio	0.31	0.31	0.60	0.58	0.51	0.51
v/c Ratio	0.96	0.38	0.83	0.59	0.96	0.31
Control Delay	72.7	14.9	60.1	18.6	50.4	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	14.9	60.1	18.6	50.4	4.6
LOS	E	B	E	B	D	A
Approach Delay	56.3			24.7	39.4	
Approach LOS	E			C	D	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 116.9	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 40.0	Intersection LOS: D
Intersection Capacity Utilization 89.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 12: Mer Bleue Rd & Renaud Rd

MOVEMENT SUMMARY

Site: 2031 AM - Brian Coburn / Access Triangle Lands

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	55	2.0	0.167	12.1	LOS A	0.6	4.9	0.46	0.71	55.6
8	T1	5	3.0	0.167	6.1	LOS A	0.6	4.9	0.46	0.71	55.9
18	R2	66	2.0	0.167	6.0	LOS A	0.6	4.9	0.46	0.71	57.0
Approach		127	2.0	0.167	8.7	LOS A	0.6	4.9	0.46	0.71	56.5
East: Brian Coburn											
1	L2	10	2.0	0.292	10.3	LOS A	1.6	12.1	0.25	0.43	60.5
6	T1	661	2.0	0.292	4.7	LOS A	1.6	12.1	0.25	0.43	61.2
16	R2	5	3.0	0.292	4.4	LOS A	1.6	12.1	0.25	0.42	60.1
Approach		676	2.0	0.292	4.8	LOS A	1.6	12.1	0.25	0.43	61.2
North: Fern Casey											
7	L2	9	3.0	0.074	13.7	LOS A	0.3	2.0	0.55	0.76	59.0
4	T1	5	3.0	0.074	8.1	LOS A	0.3	2.0	0.55	0.76	54.1
14	R2	27	3.0	0.074	8.2	LOS A	0.3	2.0	0.55	0.76	54.7
Approach		41	3.0	0.074	9.3	LOS A	0.3	2.0	0.55	0.76	55.8
West: Brian Coburn											
5	L2	15	3.0	0.176	10.2	LOS A	0.8	6.4	0.11	0.38	61.7
2	T1	399	2.0	0.176	4.0	LOS A	0.8	6.4	0.11	0.37	62.5
12	R2	13	2.0	0.176	4.1	LOS A	0.8	6.4	0.11	0.36	57.9
Approach		427	2.0	0.176	4.2	LOS A	0.8	6.4	0.11	0.37	62.4
All Vehicles		1272	2.1	0.292	5.1	LOS A	1.6	12.1	0.24	0.45	61.1

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	212	2.0	0.570	13.6	LOS A	3.8	29.6	0.63	0.82	53.8
8	T1	142	3.0	0.570	7.6	LOS A	3.8	29.6	0.63	0.82	54.1
18	R2	98	2.0	0.570	7.5	LOS A	3.8	29.6	0.63	0.82	55.8
Approach		452	2.3	0.570	10.4	LOS A	3.8	29.6	0.63	0.82	54.4
East: Brian Coburn											
1	L2	32	2.0	0.413	12.1	LOS A	2.5	19.5	0.61	0.63	58.5
6	T1	696	2.0	0.413	6.5	LOS A	2.5	19.5	0.61	0.62	59.5
16	R2	17	3.0	0.413	6.3	LOS A	2.5	19.5	0.61	0.62	58.6
Approach		745	2.0	0.413	6.8	LOS A	2.5	19.5	0.61	0.62	59.4
North: Fern Casey											
7	L2	50	3.0	0.677	21.1	LOS B	4.4	34.1	0.83	1.04	54.5
4	T1	75	3.0	0.677	15.5	LOS B	4.4	34.1	0.83	1.04	47.6
14	R2	183	3.0	0.677	15.6	LOS B	4.4	34.1	0.83	1.04	49.5
Approach		308	3.0	0.677	16.5	LOS B	4.4	34.1	0.83	1.04	50.2
West: Brian Coburn											
5	L2	5	3.0	0.162	10.8	LOS A	0.8	6.2	0.34	0.44	60.4
2	T1	278	2.0	0.162	4.6	LOS A	0.8	6.2	0.34	0.45	61.5
12	R2	62	2.0	0.162	4.7	LOS A	0.8	6.2	0.34	0.46	56.3
Approach		346	2.0	0.162	4.7	LOS A	0.8	6.2	0.34	0.45	60.9
All Vehicles		1850	2.3	0.677	8.9	LOS B	4.4	34.1	0.60	0.71	57.3

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	990	3.0	1.027	36.1	LOS F	39.5	307.4	1.00	1.48	40.8
18	R2	135	3.0	0.245	7.2	LOS A	1.1	8.9	0.53	0.67	57.1
Approach		1125	3.0	1.027	32.7	LOS C	39.5	307.4	0.94	1.38	42.2
East: Brian Coburn											
1	L2	396	3.0	1.316	183.6	LOS F	43.0	334.7	1.00	2.37	16.1
16	R2	695	3.0	0.427	4.0	LOS A	0.0	0.0	0.00	0.46	60.0
Approach		1090	3.0	1.316	69.2	LOS E	43.0	334.7	0.36	1.15	29.6
North: Navan											
7	L2	264	3.0	0.389	12.8	LOS B	2.3	17.7	0.62	0.79	54.7
4	T1	646	3.0	0.712	8.4	LOS A	7.9	61.6	0.83	0.82	57.3
Approach		910	3.0	0.712	9.7	LOS A	7.9	61.6	0.77	0.81	56.5
All Vehicles		3125	3.0	1.316	38.7	LOS D	43.0	334.7	0.69	1.14	39.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Fern Casey/Frank Bender

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
3	L2	34	3.0	0.218	10.0	LOS A	1.3	9.8	0.29	0.53	58.1
8	T1	42	3.0	0.218	5.3	LOS A	1.3	9.8	0.29	0.53	58.4
18	R2	142	3.0	0.218	5.0	LOS A	1.3	9.8	0.29	0.53	57.0
Approach		218	3.0	0.218	5.8	LOS A	1.3	9.8	0.29	0.53	57.4
East: Frank Bender											
1	L2	90	3.0	0.136	10.0	LOS A	0.7	5.5	0.28	0.60	56.1
6	T1	17	3.0	0.136	5.3	LOS A	0.7	5.5	0.28	0.60	56.4
16	R2	28	3.0	0.136	5.0	LOS A	0.7	5.5	0.28	0.60	55.1
Approach		136	3.0	0.136	8.3	LOS A	0.7	5.5	0.28	0.60	55.9
North: Frank Bender											
7	L2	8	3.0	0.100	10.3	LOS B	0.5	3.8	0.34	0.51	57.8
4	T1	84	3.0	0.100	5.6	LOS A	0.5	3.8	0.34	0.51	58.0
14	R2	2	3.0	0.100	5.4	LOS A	0.5	3.8	0.34	0.51	56.6
Approach		93	3.0	0.100	6.0	LOS A	0.5	3.8	0.34	0.51	58.0
West: RoadName											
5	L2	10	3.0	0.226	10.8	LOS B	1.2	9.6	0.43	0.58	57.9
2	T1	60	3.0	0.226	6.1	LOS A	1.2	9.6	0.43	0.58	58.2
12	R2	134	3.0	0.226	5.9	LOS A	1.2	9.6	0.43	0.58	56.8
Approach		203	3.0	0.226	6.2	LOS A	1.2	9.6	0.43	0.58	57.2
All Vehicles		651	3.0	0.226	6.5	LOS A	1.3	9.8	0.34	0.55	57.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Frank Bender/Vanguard

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Frank Bender											
3	L2	8	3.0	0.358	12.9	LOS B	2.1	16.7	0.65	0.73	56.4
8	T1	147	3.0	0.358	8.2	LOS A	2.1	16.7	0.65	0.73	56.7
18	R2	107	3.0	0.358	8.0	LOS A	2.1	16.7	0.65	0.73	55.3
Approach		261	3.0	0.358	8.2	LOS A	2.1	16.7	0.65	0.73	56.1
East: Vanguard											
1	L2	28	3.0	0.173	11.3	LOS B	0.9	7.2	0.49	0.63	56.9
6	T1	58	3.0	0.173	6.6	LOS A	0.9	7.2	0.49	0.63	57.1
16	R2	57	3.0	0.173	6.4	LOS A	0.9	7.2	0.49	0.63	55.8
Approach		142	3.0	0.173	7.5	LOS A	0.9	7.2	0.49	0.63	56.5
North: Frank Bender											
7	L2	83	3.0	0.165	10.0	LOS B	0.9	7.1	0.31	0.58	56.6
4	T1	45	3.0	0.165	5.3	LOS A	0.9	7.1	0.31	0.58	56.8
14	R2	35	3.0	0.165	5.1	LOS A	0.9	7.1	0.31	0.58	55.5
Approach		162	3.0	0.165	7.7	LOS A	0.9	7.1	0.31	0.58	56.4
West: Vanguard											
5	L2	100	3.0	0.329	10.8	LOS B	2.0	15.7	0.45	0.60	56.5
2	T1	195	3.0	0.329	6.1	LOS A	2.0	15.7	0.45	0.60	56.7
12	R2	9	3.0	0.329	5.9	LOS A	2.0	15.7	0.45	0.60	55.4
Approach		303	3.0	0.329	7.6	LOS A	2.0	15.7	0.45	0.60	56.6
All Vehicles		868	3.0	0.358	7.8	LOS A	2.1	16.7	0.49	0.64	56.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Mer Bleue / Brian Coburn

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	139	2.0	0.654	15.8	LOS B	5.0	38.6	0.79	0.98	57.8
8	T1	729	2.0	0.654	9.7	LOS B	5.0	38.9	0.79	0.97	55.9
18	R2	155	2.0	0.654	9.6	LOS B	5.0	38.9	0.79	0.96	54.8
Approach		1024	2.0	0.654	10.5	LOS B	5.0	38.9	0.79	0.97	56.0
East: Brian Coburn											
1	L2	210	2.0	1.214	123.0	LOS F	47.9	370.4	1.00	2.84	20.9
6	T1	480	2.0	1.214	116.9	LOS F	51.9	401.3	1.00	2.85	26.5
16	R2	676	2.0	1.214	115.9	LOS F	51.9	401.3	1.00	2.95	21.2
Approach		1366	2.0	1.214	117.4	LOS F	51.9	401.3	1.00	2.90	23.2
North: Mer Bleue											
7	L2	223	2.0	0.568	16.3	LOS A	4.3	33.3	0.83	1.00	54.0
4	T1	493	2.0	0.568	10.2	LOS A	4.4	33.7	0.83	0.98	55.3
14	R2	57	2.0	0.568	10.0	LOS A	4.4	33.7	0.83	0.97	57.3
Approach		773	2.0	0.568	11.9	LOS A	4.4	33.7	0.83	0.98	55.1
West: Brian Coburn											
5	L2	211	2.0	0.366	14.0	LOS A	1.8	14.3	0.72	0.91	56.8
2	T1	230	2.0	0.366	7.7	LOS A	1.9	14.5	0.72	0.76	59.4
12	R2	32	2.0	0.366	7.8	LOS A	1.9	14.5	0.72	0.75	57.9
Approach		473	2.0	0.366	10.5	LOS A	1.9	14.5	0.72	0.83	58.1
All Vehicles		3636	2.0	1.214	51.0	LOS F	51.9	401.3	0.87	1.68	36.4

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Mer Bleue / Renaud Rd

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	161	2.0	1.005	43.1	LOS F	37.0	291.8	1.00	1.39	50.6
8	T1	652	5.0	1.005	38.6	LOS F	37.0	291.8	1.00	1.39	34.7
Approach		813	4.4	1.005	39.5	LOS D	37.0	291.8	1.00	1.39	40.1
North: Mer Bleue											
4	T1	428	2.0	0.817	11.2	LOS B	14.7	113.9	1.00	0.79	52.3
14	R2	302	2.0	0.817	10.9	LOS B	14.7	113.9	1.00	0.79	59.2
Approach		730	2.0	0.817	11.1	LOS B	14.7	113.9	1.00	0.79	56.7
West: Renaud Rd											
5	L2	234	2.0	0.530	15.5	LOS B	4.5	34.9	0.85	0.93	58.5
12	R2	104	2.0	0.530	10.6	LOS B	4.5	34.9	0.85	0.93	58.5
Approach		338	2.0	0.530	14.0	LOS B	4.5	34.9	0.85	0.93	58.5
All Vehicles		1882	3.0	1.005	23.9	LOS C	37.0	291.8	0.97	1.08	50.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Brian Coburn / Navan - Improv

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	990	3.0	0.588	6.3	LOS A	4.8	37.1	0.66	0.62	58.4
18	R2	135	3.0	0.588	6.5	LOS A	4.8	37.1	0.66	0.63	56.5
Approach		1125	3.0	0.588	6.4	LOS A	4.8	37.1	0.66	0.63	58.1
East: Brian Coburn											
1	L2	396	3.0	0.805	23.5	LOS C	6.5	50.9	0.90	1.16	47.7
16	R2	695	3.0	0.427	4.0	LOS A	0.0	0.0	0.00	0.46	60.0
Approach		1090	3.0	0.805	11.1	LOS B	6.5	50.9	0.33	0.71	54.7
North: Navan											
7	L2	264	3.0	0.544	13.6	LOS B	4.3	33.2	0.74	0.81	55.8
4	T1	646	3.0	0.544	7.4	LOS A	4.3	33.2	0.74	0.75	57.1
Approach		910	3.0	0.544	9.2	LOS A	4.3	33.2	0.74	0.77	56.7
All Vehicles		3125	3.0	0.805	8.8	LOS A	6.5	50.9	0.57	0.70	56.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Mer Bleue / Brian Coburn - Improv

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	139	2.0	0.456	13.2	LOS A	2.6	20.0	0.67	0.78	58.7
8	T1	729	2.0	0.456	6.8	LOS A	2.7	20.6	0.66	0.68	57.2
18	R2	155	2.0	0.134	5.1	LOS A	0.6	4.3	0.44	0.59	57.9
Approach		1024	2.0	0.456	7.4	LOS A	2.7	20.6	0.63	0.68	57.6
East: Brian Coburn											
1	L2	210	2.0	0.457	14.8	LOS A	2.5	19.5	0.76	0.94	53.8
6	T1	480	2.0	0.457	7.8	LOS A	2.7	21.0	0.76	0.78	58.9
16	R2	676	2.0	0.735	9.8	LOS C	6.2	48.1	0.84	1.04	54.9
Approach		1366	2.0	0.735	9.9	LOS C	6.2	48.1	0.80	0.93	56.4
North: Mer Bleue											
7	L2	223	2.0	0.422	13.4	LOS A	2.3	17.5	0.71	0.87	55.5
4	T1	493	2.0	0.422	6.8	LOS A	2.4	18.4	0.70	0.68	56.9
14	R2	57	2.0	0.054	5.4	LOS A	0.2	1.8	0.51	0.61	59.7
Approach		773	2.0	0.422	8.6	LOS A	2.4	18.4	0.69	0.73	56.8
West: Brian Coburn											
5	L2	211	2.0	0.287	13.0	LOS A	1.3	10.4	0.68	0.87	56.9
2	T1	230	2.0	0.255	6.3	LOS A	1.3	9.7	0.66	0.59	59.8
12	R2	32	2.0	0.031	5.6	LOS A	0.1	1.0	0.52	0.61	59.4
Approach		473	2.0	0.287	9.3	LOS A	1.3	10.4	0.66	0.72	58.4
All Vehicles		3636	2.0	0.735	8.8	LOS C	6.2	48.1	0.71	0.79	57.1

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 AM - Mer Bleue / Renaud Rd - Improv

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	161	2.0	0.413	11.7	LOS B	2.7	21.2	0.54	0.61	61.9
8	T1	652	5.0	0.413	5.6	LOS A	2.7	21.2	0.54	0.56	56.4
Approach		813	4.4	0.413	6.8	LOS A	2.7	21.3	0.54	0.57	58.6
North: Mer Bleue											
4	T1	428	2.0	0.342	4.9	LOS A	2.1	16.4	0.42	0.47	58.8
14	R2	302	2.0	0.342	5.0	LOS A	2.1	16.4	0.42	0.52	61.8
Approach		730	2.0	0.342	5.0	LOS A	2.1	16.4	0.42	0.49	60.7
West: Renaud Rd											
5	L2	234	2.0	0.266	12.3	LOS B	1.4	10.5	0.56	0.77	60.0
12	R2	104	2.0	0.156	6.9	LOS A	0.7	5.4	0.55	0.68	61.7
Approach		338	2.0	0.266	10.7	LOS B	1.4	10.5	0.55	0.74	60.5
All Vehicles		1882	3.0	0.413	6.8	LOS A	2.7	21.3	0.50	0.57	59.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	1713	506	408	1025	385	401	795	472	440	1064	102
Future Volume (veh/h)	156	1713	506	408	1025	385	401	795	472	440	1064	102
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1800	1800	1800	1758	1758	1758	1772	1772	1800	1772	1772
Adj Flow Rate, veh/h	156	1713	0	408	1025	0	401	795	0	440	1064	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	0	0	0	3	3	3	2	2	0	2	2
Cap, veh/h	269	1236		266	1354		300	984		333	1010	
Arrive On Green	0.08	0.36	0.00	0.12	0.41	0.00	0.09	0.29	0.00	0.10	0.30	0.00
Sat Flow, veh/h	1714	3420	1525	1714	3340	1490	3248	3455	0	3326	3455	0
Grp Volume(v), veh/h	156	1713	0	408	1025	0	401	795	0	440	1064	0
Grp Sat Flow(s),veh/h/ln	1714	1710	1525	1714	1670	1490	1624	1683	0	1663	1683	0
Q Serve(g_s), s	7.3	47.0	0.0	16.0	34.2	0.0	12.0	28.4	0.0	13.0	39.0	0.0
Cycle Q Clear(g_c), s	7.3	47.0	0.0	16.0	34.2	0.0	12.0	28.4	0.0	13.0	39.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	269	1236		266	1354		300	984		333	1010	
V/C Ratio(X)	0.58	1.39		1.53	0.76		1.34	0.81		1.32	1.05	
Avail Cap(c_a), veh/h	269	1236		266	1354		300	984		333	1010	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.95	0.95	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.9	41.5	0.0	41.8	33.2	0.0	59.0	42.6	0.0	58.5	45.5	0.0
Incr Delay (d2), s/veh	3.1	178.5	0.0	257.4	2.5	0.0	171.9	6.8	0.0	164.9	43.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	44.6	0.0	22.0	10.0	0.0	11.1	9.7	0.0	12.0	18.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.0	220.0	0.0	299.1	35.7	0.0	230.9	49.4	0.0	223.4	89.0	0.0
LnGrp LOS	C	F		F	D		F	D		F	F	
Approach Vol, veh/h		1869	A		1433	A		1196	A		1504	A
Approach Delay, s/veh		204.2			110.7			110.2			128.3	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	51.0	16.0	43.0	14.3	56.7	17.0	42.0
Change Period (Y+Rc), s	* 6.1	6.4	* 6.3	* 6.2	* 6.1	6.4	* 6.3	* 6.2
Max Green Setting (Gmax), s	* 14	44.6	* 9.7	* 37	* 8.2	50.3	* 11	* 36
Max Q Clear Time (g_c+I1), s	18.0	49.0	14.0	41.0	9.3	36.2	15.0	30.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	8.1	0.0	3.0

Intersection Summary	
HCM 6th Ctrl Delay	144.1
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	1952	163	214	1187	89	381	301	114	143	213	46
Future Volume (veh/h)	144	1952	163	214	1187	89	381	301	114	143	213	46
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1786	1786	1730	1772	1772	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	144	1952	163	214	1187	89	381	301	114	143	213	46
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	1	1	5	2	2	0	0	0	0	0	0
Cap, veh/h	191	1542	688	170	1761	132	365	671	569	309	535	115
Arrive On Green	0.45	0.45	0.45	0.06	0.55	0.53	0.37	0.37	0.37	0.37	0.37	0.35
Sat Flow, veh/h	437	3393	1514	1647	3175	238	1138	1800	1525	987	1434	310
Grp Volume(v), veh/h	144	1952	163	214	629	647	381	301	114	143	0	259
Grp Sat Flow(s),veh/h/ln	437	1697	1514	1647	1683	1729	1138	1800	1525	987	0	1744
Q Serve(g_s), s	31.6	50.0	7.2	7.0	29.2	29.4	28.9	13.9	5.6	14.0	0.0	12.1
Cycle Q Clear(g_c), s	50.0	50.0	7.2	7.0	29.2	29.4	41.0	13.9	5.6	27.9	0.0	12.1
Prop In Lane	1.00		1.00	1.00		0.14	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	191	1542	688	170	933	959	365	671	569	309	0	650
V/C Ratio(X)	0.75	1.27	0.24	1.26	0.67	0.68	1.05	0.45	0.20	0.46	0.00	0.40
Avail Cap(c_a), veh/h	191	1542	688	170	933	959	365	671	569	309	0	650
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.81	0.81	0.81	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.2	30.0	18.3	29.8	17.4	17.6	43.1	26.0	23.4	36.5	0.0	25.6
Incr Delay (d2), s/veh	15.6	124.8	0.2	148.2	1.6	1.5	59.4	2.2	0.8	4.9	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	38.1	1.5	8.6	5.4	5.6	13.8	4.5	1.5	2.9	0.0	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.8	154.8	18.5	178.0	19.0	19.1	102.5	28.2	24.2	41.4	0.0	27.4
LnGrp LOS	E	F	B	F	B	B	F	C	C	D	A	C
Approach Vol, veh/h		2259			1490			796			402	
Approach Delay, s/veh		138.7			41.9			63.2			32.4	
Approach LOS		F			D			E			C	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	11.0	54.0		45.0		65.0		45.0
Change Period (Y+Rc), s	* 4.7	* 6.6		* 6.8		* 6.6		* 6.8
Max Green Setting (Gmax), s	* 6.3	* 47		* 38		* 58		* 38
Max Q Clear Time (g_c+I1), s	9.0	52.0		29.9		31.4		43.0
Green Ext Time (p_c), s	0.0	0.0		2.3		14.8		0.0

Intersection Summary	
HCM 6th Ctrl Delay	88.8
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	2020	87	183	1347	84	106	40	179	60	51	30
Future Volume (veh/h)	44	2020	87	183	1347	84	106	40	179	60	51	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1772	1772	1800	1744	1744	1800	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	44	2020	87	183	1347	84	106	40	179	60	51	30
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	2	2	0	4	4	0	0	0	0	0	0
Cap, veh/h	235	1994	889	187	2218	138	487	612	519	235	195	106
Arrive On Green	0.59	0.59	0.59	0.08	0.70	0.68	0.34	0.34	0.34	0.34	0.34	0.32
Sat Flow, veh/h	377	3367	1502	1714	3168	197	1338	1800	1525	570	567	308
Grp Volume(v), veh/h	44	2020	87	183	703	728	106	40	179	141	0	0
Grp Sat Flow(s),veh/h/ln	377	1683	1502	1714	1657	1708	1338	1800	1525	1445	0	0
Q Serve(g_s), s	9.0	77.0	3.3	9.6	28.7	29.1	0.6	2.0	11.4	6.1	0.0	0.0
Cycle Q Clear(g_c), s	24.1	77.0	3.3	9.6	28.7	29.1	9.9	2.0	11.4	8.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.12	1.00		1.00	0.43		0.21
Lane Grp Cap(c), veh/h	235	1994	889	187	1160	1196	487	612	519	535	0	0
V/C Ratio(X)	0.19	1.01	0.10	0.98	0.61	0.61	0.22	0.07	0.35	0.26	0.00	0.00
Avail Cap(c_a), veh/h	235	1994	889	187	1160	1196	487	612	519	535	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.2	26.5	11.5	46.0	10.2	10.3	31.6	29.0	32.1	31.0	0.0	0.0
Incr Delay (d2), s/veh	0.4	23.4	0.0	58.9	0.9	0.9	1.0	0.2	1.8	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	21.4	0.6	5.5	3.0	3.2	2.0	0.7	3.5	2.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.6	49.9	11.5	104.9	11.1	11.2	32.7	29.2	33.9	32.2	0.0	0.0
LnGrp LOS	C	F	B	F	B	B	C	C	C	C	A	A
Approach Vol, veh/h		2151			1614			325			141	
Approach Delay, s/veh		47.8			21.8			32.9			32.2	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	14.0	81.0		49.0		95.0		49.0
Change Period (Y+Rc), s	* 6.3	* 6.3		7.1		* 6.3		* 7.1
Max Green Setting (Gmax), s	* 7.7	* 75		27.9		* 89		* 28
Max Q Clear Time (g_c+I1), s	11.6	79.0		10.8		31.1		13.4
Green Ext Time (p_c), s	0.0	0.0		1.0		25.6		2.5

Intersection Summary	
HCM 6th Ctrl Delay	36.2
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	2282	41	152	1376	12	45	88	121	60	55	15
Future Volume (veh/h)	94	2282	41	152	1376	12	45	88	121	60	55	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1786	1800	1758	1758	1772	1772	1772	1800	1800	1800
Adj Flow Rate, veh/h	94	2282	41	152	1376	12	45	88	121	60	55	15
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	1	0	3	3	2	2	2	0	0	0
Cap, veh/h	272	2467	44	85	2454	21	81	129	158	137	116	27
Arrive On Green	0.72	0.72	0.71	0.72	0.72	0.71	0.21	0.21	0.19	0.21	0.21	0.19
Sat Flow, veh/h	396	3411	61	159	3393	30	216	612	754	443	551	130
Grp Volume(v), veh/h	94	1132	1191	152	677	711	254	0	0	130	0	0
Grp Sat Flow(s),veh/h/ln	396	1697	1775	159	1670	1753	1582	0	0	1124	0	0
Q Serve(g_s), s	17.4	66.5	67.8	19.0	22.6	22.7	4.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	40.1	66.5	67.8	86.8	22.6	22.7	18.0	0.0	0.0	13.6	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.02	0.18		0.48	0.46		0.12
Lane Grp Cap(c), veh/h	272	1227	1284	85	1208	1268	368	0	0	280	0	0
V/C Ratio(X)	0.35	0.92	0.93	1.78	0.56	0.56	0.69	0.00	0.00	0.46	0.00	0.00
Avail Cap(c_a), veh/h	272	1227	1284	85	1208	1268	368	0	0	280	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.79	0.79	0.79	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.1	13.8	14.0	57.2	7.7	7.7	45.0	0.0	0.0	42.2	0.0	0.0
Incr Delay (d2), s/veh	3.5	12.7	12.9	387.5	1.5	1.4	10.2	0.0	0.0	5.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	6.5	6.9	11.3	1.2	1.2	6.9	0.0	0.0	3.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.5	26.5	26.9	444.7	9.2	9.2	55.2	0.0	0.0	47.6	0.0	0.0
LnGrp LOS	C	C	C	F	A	A	E	A	A	D	A	A
Approach Vol, veh/h		2417			1540			254			130	
Approach Delay, s/veh		26.5			52.2			55.2			47.6	
Approach LOS		C			D			E			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	90.8	29.2	90.8	29.2
Change Period (Y+Rc), s	* 6.1	* 6.2	* 6.1	* 6.2
Max Green Setting (Gmax), s	* 85	* 23	* 85	* 23
Max Q Clear Time (g_c+I1), s	69.8	15.6	88.8	20.0
Green Ext Time (p_c), s	14.5	0.5	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	37.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	579	1997	158	58	1119	259	64	394	84	336	477	203
Future Volume (veh/h)	579	1997	158	58	1119	259	64	394	84	336	477	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1800	1786	1800	1800	1758	1772	1800	1772	1800	1800	1772	1786
Adj Flow Rate, veh/h	579	1997	0	58	1119	0	64	394	0	336	477	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	1	0	0	3	2	0	2	0	0	2	1
Cap, veh/h	578	1540		95	1120		336	1341		369	1049	
Arrive On Green	0.17	0.45	0.00	0.06	0.34	0.00	0.06	0.40	0.00	0.31	0.31	0.00
Sat Flow, veh/h	3326	3393	1525	1714	3340	1502	1714	3367	1525	1006	3367	1514
Grp Volume(v), veh/h	579	1997	0	58	1119	0	64	394	0	336	477	0
Grp Sat Flow(s),veh/h/ln	1663	1697	1525	1714	1670	1502	1714	1683	1525	1006	1683	1514
Q Serve(g_s), s	22.6	59.0	0.0	4.3	43.5	0.0	3.1	10.4	0.0	40.5	14.8	0.0
Cycle Q Clear(g_c), s	22.6	59.0	0.0	4.3	43.5	0.0	3.1	10.4	0.0	40.5	14.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	578	1540		95	1120		336	1341		369	1049	
V/C Ratio(X)	1.00	1.30		0.61	1.00		0.19	0.29		0.91	0.45	
Avail Cap(c_a), veh/h	578	1540		95	1120		341	1341		369	1049	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	53.7	35.5	0.0	60.0	43.2	0.0	26.9	26.6	0.0	46.1	35.9	0.0
Incr Delay (d2), s/veh	37.8	138.4	0.0	10.9	26.6	0.0	0.3	0.6	0.0	29.0	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.4	45.2	0.0	1.8	17.1	0.0	1.0	3.2	0.0	11.5	4.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	91.5	173.9	0.0	71.0	69.8	0.0	27.1	27.2	0.0	75.1	37.3	0.0
LnGrp LOS	F	F		E	E		C	C		E	D	
Approach Vol, veh/h		2576	A		1177	A		458	A		813	A
Approach Delay, s/veh		155.4			69.9			27.2			53.0	
Approach LOS		F			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	11.2	63.0	11.3	44.5	26.6	47.6		55.8
Change Period (Y+Rc), s	* 6.2	* 6.2	* 6.7	* 6.7	* 6.2	* 6.2		* 6.7
Max Green Setting (Gmax), s	* 5	* 57	* 5	* 37	* 20	* 41		* 49
Max Q Clear Time (g_c+I1), s	6.3	61.0	5.1	42.5	24.6	45.5		12.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0		4.4

Intersection Summary	
HCM 6th Ctrl Delay	107.1
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	813	53	2374	1598	104	1132
Future Volume (veh/h)	813	53	2374	1598	104	1132
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1617	1800	1786	1744	1800	1744
Adj Flow Rate, veh/h	813	0	2374	0	104	1132
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	13	0	1	4	0	4
Cap, veh/h	736		2054		96	2294
Arrive On Green	0.25	0.00	0.61	0.00	0.06	0.69
Sat Flow, veh/h	2988	1525	3483	1478	1714	3400
Grp Volume(v), veh/h	813	0	2374	0	104	1132
Grp Sat Flow(s),veh/h/ln	1494	1525	1697	1478	1714	1657
Q Serve(g_s), s	32.0	0.0	78.7	0.0	7.3	20.8
Cycle Q Clear(g_c), s	32.0	0.0	78.7	0.0	7.3	20.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	736		2054		96	2294
V/C Ratio(X)	1.11		1.16		1.08	0.49
Avail Cap(c_a), veh/h	736		2054		96	2294
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	49.0	0.0	25.6	0.0	61.4	9.3
Incr Delay (d2), s/veh	65.8	0.0	76.0	0.0	115.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.8	0.0	36.3	0.0	5.7	2.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	114.8	0.0	101.7	0.0	176.5	10.1
LnGrp LOS	F		F		F	B
Approach Vol, veh/h	813	A	2374	A		1236
Approach Delay, s/veh	114.8		101.7			24.1
Approach LOS	F		F			C

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		36.0	11.3	82.7		94.0
Change Period (Y+Rc), s		* 5.8	* 6.3	* 5.9		* 5.9
Max Green Setting (Gmax), s		* 30	* 5	* 77		* 88
Max Q Clear Time (g_c+I1), s		34.0	9.3	80.7		22.8
Green Ext Time (p_c), s		0.0	0.0	0.0		18.8

Intersection Summary	
HCM 6th Ctrl Delay	82.4
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NER, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	341	705	165	49	356	34	467	439	212	27	142	168
Future Volume (veh/h)	341	705	165	49	356	34	467	439	212	27	142	168
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1744	1800	1393	1660	1660	1617	1786	1674	1800	1730	1730
Adj Flow Rate, veh/h	341	705	165	49	356	0	467	439	212	27	142	168
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	4	0	29	10	10	13	1	9	0	5	5
Cap, veh/h	449	738	615	139	562		465	811	644	196	128	151
Arrive On Green	0.14	0.42	0.40	0.05	0.34	0.00	0.27	0.45	0.45	0.18	0.18	0.16
Sat Flow, veh/h	1701	1744	1525	1327	1660	0	1540	1786	1418	793	722	854
Grp Volume(v), veh/h	341	705	165	49	356	0	467	439	212	27	0	310
Grp Sat Flow(s),veh/h/ln	1701	1744	1525	1327	1660	0	1540	1786	1418	793	0	1576
Q Serve(g_s), s	16.6	50.9	9.4	3.0	23.5	0.0	34.6	23.1	12.5	3.8	0.0	23.0
Cycle Q Clear(g_c), s	16.6	50.9	9.4	3.0	23.5	0.0	34.6	23.1	12.5	3.8	0.0	23.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.54
Lane Grp Cap(c), veh/h	449	738	615	139	562		465	811	644	196	0	279
V/C Ratio(X)	0.76	0.96	0.27	0.35	0.63		1.00	0.54	0.33	0.14	0.00	1.11
Avail Cap(c_a), veh/h	449	738	615	139	562		465	811	644	196	0	279
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.9	36.3	26.0	32.0	36.2	0.0	37.3	25.7	22.8	45.6	0.0	54.2
Incr Delay (d2), s/veh	7.4	22.8	0.2	1.5	2.3	0.0	42.6	0.7	0.3	0.3	0.0	87.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	19.1	2.6	0.7	7.3	0.0	15.0	7.0	3.0	0.6	0.0	14.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.3	59.1	26.2	33.5	38.5	0.0	79.8	26.4	23.1	45.9	0.0	141.5
LnGrp LOS	C	E	C	C	D		F	C	C	D	A	F
Approach Vol, veh/h		1211			405	A		1118			337	
Approach Delay, s/veh		47.1			37.9			48.1			133.8	
Approach LOS		D			D			D			F	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	59.0	36.0	27.0	19.0	48.0		63.0
Change Period (Y+Rc), s	4.0	6.6	4.0	6.6	4.0	6.6		6.6
Max Green Setting (Gmax), s	4.0	52.4	32.0	20.4	15.0	41.4		56.4
Max Q Clear Time (g_c+I1), s	5.0	52.9	36.6	25.0	18.6	25.5		25.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.8		7.4

Intersection Summary	
HCM 6th Ctrl Delay	55.8
HCM 6th LOS	E

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	142	59	34	23	32	149	17	918	13	99	1554	235
Future Volume (veh/h)	142	59	34	23	32	149	17	918	13	99	1554	235
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	154	64	37	25	35	162	18	998	14	108	1689	255
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	245	269	155	340	70	324	133	2158	30	341	2138	954
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.63	0.63	0.63	0.63	0.63	0.63
Sat Flow, veh/h	1186	1053	609	1294	274	1269	227	3399	48	557	3367	1502
Grp Volume(v), veh/h	154	0	101	25	0	197	18	494	518	108	1689	255
Grp Sat Flow(s),veh/h/ln	1186	0	1662	1294	0	1543	227	1683	1763	557	1683	1502
Q Serve(g_s), s	12.7	0.0	4.8	1.6	0.0	10.9	6.3	15.2	15.2	12.4	36.7	7.5
Cycle Q Clear(g_c), s	23.6	0.0	4.8	6.4	0.0	10.9	43.0	15.2	15.2	27.6	36.7	7.5
Prop In Lane	1.00		0.37	1.00		0.82	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	245	0	424	340	0	394	133	1069	1120	341	2138	954
V/C Ratio(X)	0.63	0.00	0.24	0.07	0.00	0.50	0.14	0.46	0.46	0.32	0.79	0.27
Avail Cap(c_a), veh/h	245	0	424	340	0	394	133	1069	1120	341	2138	954
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	0.0	29.5	32.1	0.0	31.8	29.1	9.4	9.4	16.6	13.4	8.0
Incr Delay (d2), s/veh	5.0	0.0	0.3	0.1	0.0	1.0	2.1	1.4	1.4	2.4	3.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	1.4	0.4	0.0	3.0	0.3	1.5	1.5	1.0	3.5	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.9	0.0	29.8	32.2	0.0	32.8	31.2	10.9	10.8	19.0	16.4	8.7
LnGrp LOS	D	A	C	C	A	C	C	B	B	B	B	A
Approach Vol, veh/h		255			222			1030			2052	
Approach Delay, s/veh		40.2			32.7			11.2			15.6	
Approach LOS		D			C			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	69.0	31.0	69.0	31.0
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	63.5	25.5	63.5	25.5
Max Q Clear Time (g_c+I1), s	45.0	25.6	38.7	12.9
Green Ext Time (p_c), s	7.9	0.0	19.0	1.2

Intersection Summary	
HCM 6th Ctrl Delay	17.2
HCM 6th LOS	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	2210	253	37	1451	157	18
Future Volume (vph)	2210	253	37	1451	157	18
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)		50.0	35.0		85.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3353	1500	1676	3353	1676	1500
Flt Permitted			0.054		0.950	
Satd. Flow (perm)	3353	1500	95	3353	1676	1500
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		169				18
Link Speed (k/h)	60			60	50	
Link Distance (m)	219.8			255.1	539.8	
Travel Time (s)	13.2			15.3	38.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2210	253	37	1451	157	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2210	253	37	1451	157	18
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (m)	10.0	2.0	2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6	2.0	2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	8.5	20.5	20.5	20.5
Total Split (s)	71.0	71.0	8.5	79.5	20.5	20.5
Total Split (%)	71.0%	71.0%	8.5%	79.5%	20.5%	20.5%
Maximum Green (s)	66.5	66.5	4.0	75.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	72.0	72.0	77.4	77.4	13.6	13.6
Actuated g/C Ratio	0.72	0.72	0.77	0.77	0.14	0.14
v/c Ratio	0.92	0.22	0.25	0.56	0.69	0.08
Control Delay	21.1	2.7	6.9	5.8	56.9	16.5
Queue Delay	4.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	2.7	6.9	5.8	56.9	16.5
LOS	C	A	A	A	E	B
Approach Delay	22.8			5.8	52.7	
Approach LOS	C			A	D	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 81.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 48: Ciavan Access & Innes Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	341	705	165	49	356	34	467	439	212	27	142	168
Future Volume (veh/h)	341	705	165	49	356	34	467	439	212	27	142	168
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1786	1744	1800	1393	1660	1660	1617	1786	1674	1800	1730	1730
Adj Flow Rate, veh/h	341	705	0	49	356	0	467	439	212	27	142	168
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	4	0	29	10	10	13	1	9	0	5	5
Cap, veh/h	438	1022		227	788		556	951	756	262	171	202
Arrive On Green	0.12	0.31	0.00	0.06	0.25	0.00	0.28	0.53	0.53	0.24	0.24	0.21
Sat Flow, veh/h	1701	3313	1525	1327	3236	0	1540	1786	1418	793	722	854
Grp Volume(v), veh/h	341	705	0	49	356	0	467	439	212	27	0	310
Grp Sat Flow(s),veh/h/ln	1701	1657	1525	1327	1577	0	1540	1786	1418	793	0	1576
Q Serve(g_s), s	11.6	18.0	0.0	2.6	9.2	0.0	19.4	14.7	7.9	2.6	0.0	18.1
Cycle Q Clear(g_c), s	11.6	18.0	0.0	2.6	9.2	0.0	19.4	14.7	7.9	2.6	0.0	18.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.54
Lane Grp Cap(c), veh/h	438	1022		227	788		556	951	756	262	0	372
V/C Ratio(X)	0.78	0.69		0.22	0.45		0.84	0.46	0.28	0.10	0.00	0.83
Avail Cap(c_a), veh/h	438	1544		236	1306		674	1091	867	263	0	375
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.8	29.3	0.0	24.7	30.6	0.0	17.7	14.0	12.4	29.2	0.0	35.8
Incr Delay (d2), s/veh	8.6	0.8	0.0	0.5	0.4	0.0	7.9	0.3	0.2	0.2	0.0	14.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	4.6	0.0	0.5	2.3	0.0	4.2	2.8	1.2	0.4	0.0	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.4	30.2	0.0	25.1	31.0	0.0	25.6	14.3	12.6	29.3	0.0	50.4
LnGrp LOS	C	C		C	C		C	B	B	C	A	D
Approach Vol, veh/h		1046	A		405	A		1118			337	
Approach Delay, s/veh		31.5			30.3			18.7			48.7	
Approach LOS		C			C			B			D	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	7.3	33.8	28.6	26.8	13.0	28.1		55.4
Change Period (Y+Rc), s	4.0	6.6	4.0	6.6	4.0	6.6		6.6
Max Green Setting (Gmax), s	4.0	42.4	32.0	20.4	9.0	37.4		56.4
Max Q Clear Time (g_c+I1), s	4.6	20.0	21.4	20.1	13.6	11.2		16.7
Green Ext Time (p_c), s	0.0	7.1	3.3	0.1	0.0	3.5		7.9

Intersection Summary	
HCM 6th Ctrl Delay	28.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	215	96	148	600	394	278
Future Volume (vph)	215	96	148	600	394	278
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	50.0	45.0			80.0
Storage Lanes	1	1	1			1
Taper Length (m)	7.6		20.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1668	1517	1654	1749	1734	1511
Flt Permitted	0.950		0.356			
Satd. Flow (perm)	1668	1517	620	1749	1734	1511
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		96				278
Link Speed (k/h)	50			60	60	
Link Distance (m)	951.6			937.0	170.0	
Travel Time (s)	68.5			56.2	10.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Bus Blockages (#/hr)	4	0	6	5	7	1
Adj. Flow (vph)	215	96	148	600	394	278
Shared Lane Traffic (%)						
Lane Group Flow (vph)	215	96	148	600	394	278
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.7			3.7	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	1.08	1.06	1.09	1.08	1.10	1.06
Turning Speed (k/h)	26	14	26			14
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (m)	14.9	14.9	14.9	14.9	14.9	14.9
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.9	14.9	14.9	14.9	14.9	14.9
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	4.0	10.0	10.0	10.0
Minimum Split (s)	22.5	22.5	8.0	22.5	22.5	22.5

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Total Split (s)	34.0	34.0	13.0	66.0	53.0	53.0
Total Split (%)	34.0%	34.0%	13.0%	66.0%	53.0%	53.0%
Maximum Green (s)	27.5	27.5	9.0	59.5	46.5	46.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	3.0	3.0	0.5	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	4.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Min	Min	Min
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	14.0	14.0	32.7	30.1	20.5	20.5
Actuated g/C Ratio	0.24	0.24	0.56	0.52	0.35	0.35
v/c Ratio	0.53	0.22	0.29	0.66	0.64	0.39
Control Delay	27.2	6.9	7.6	14.1	22.5	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	6.9	7.6	14.1	22.5	4.0
LOS	C	A	A	B	C	A
Approach Delay	20.9			12.8	14.8	
Approach LOS	C			B	B	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 58	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 15.1	Intersection LOS: B
Intersection Capacity Utilization 57.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 12: Mer Bleue Rd & Renaud Rd

MOVEMENT SUMMARY

Site: 2031 PM - Brian Coburn - Triangle Land Access

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Frank Bender											
3	L2	33	3.0	0.134	15.2	LOS B	0.7	5.7	0.73	0.82	53.0
8	T1	5	3.0	0.134	10.5	LOS B	0.7	5.7	0.73	0.82	53.2
18	R2	33	3.0	0.134	10.3	LOS B	0.7	5.7	0.73	0.82	52.1
Approach		71	3.0	0.134	12.6	LOS B	0.7	5.7	0.73	0.82	52.6
East: Vanguard											
1	L2	27	3.0	0.574	10.2	LOS B	5.6	43.3	0.41	0.47	57.5
6	T1	554	3.0	0.574	5.5	LOS A	5.6	43.3	0.41	0.47	57.8
16	R2	8	3.0	0.574	5.2	LOS A	5.6	43.3	0.41	0.47	56.4
Approach		589	3.0	0.574	5.7	LOS A	5.6	43.3	0.41	0.47	57.8
North: Frank Bender											
7	L2	7	3.0	0.075	14.2	LOS B	0.4	3.0	0.67	0.74	54.9
4	T1	5	3.0	0.075	9.5	LOS A	0.4	3.0	0.67	0.74	55.1
14	R2	30	3.0	0.075	9.3	LOS A	0.4	3.0	0.67	0.74	53.9
Approach		42	3.0	0.075	10.1	LOS B	0.4	3.0	0.67	0.74	54.2
West: Vanguard											
5	L2	20	3.0	0.688	10.1	LOS B	8.4	65.8	0.42	0.45	57.6
2	T1	654	3.0	0.688	5.4	LOS A	8.4	65.8	0.42	0.45	57.9
12	R2	51	3.0	0.688	5.2	LOS A	8.4	65.8	0.42	0.45	56.5
Approach		725	3.0	0.688	5.5	LOS A	8.4	65.8	0.42	0.45	57.8
All Vehicles		1427	3.0	0.688	6.1	LOS A	8.4	65.8	0.44	0.48	57.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	124	2.0	0.521	16.4	LOS A	3.0	23.2	0.76	0.95	51.4
8	T1	107	3.0	0.521	10.5	LOS A	3.0	23.2	0.76	0.95	51.7
18	R2	54	2.0	0.521	10.3	LOS A	3.0	23.2	0.76	0.95	54.0
Approach		285	2.4	0.521	13.0	LOS A	3.0	23.2	0.76	0.95	52.2
East: Brian Coburn											
1	L2	127	2.0	0.341	12.0	LOS A	1.9	14.7	0.56	0.68	57.7
6	T1	435	2.0	0.341	6.4	LOS A	1.9	14.7	0.56	0.64	59.4
16	R2	57	3.0	0.341	6.2	LOS A	1.9	14.7	0.56	0.62	58.9
Approach		618	2.1	0.341	7.6	LOS A	1.9	14.7	0.56	0.65	59.0
North: Fern Casey											
7	L2	33	3.0	0.539	16.7	LOS A	3.1	24.1	0.74	0.93	57.4
4	T1	153	3.0	0.539	11.1	LOS A	3.1	24.1	0.74	0.93	51.8
14	R2	108	3.0	0.539	11.2	LOS A	3.1	24.1	0.74	0.93	52.8
Approach		293	3.0	0.539	11.7	LOS A	3.1	24.1	0.74	0.93	53.1
West: Brian Coburn											
5	L2	137	3.0	0.529	12.6	LOS A	3.7	28.3	0.62	0.67	57.7
2	T1	638	2.0	0.529	6.3	LOS A	3.7	28.3	0.62	0.66	59.9
12	R2	230	2.0	0.529	6.5	LOS A	3.7	28.3	0.62	0.65	54.6
Approach		1005	2.1	0.529	7.2	LOS A	3.7	28.3	0.62	0.66	58.8
All Vehicles		2202	2.3	0.539	8.7	LOS A	3.7	28.3	0.64	0.73	57.5

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	708	3.0	1.158	96.8	LOS F	48.6	378.4	1.00	2.48	24.6
18	R2	371	3.0	0.753	18.7	LOS B	7.6	59.4	0.97	1.16	48.4
Approach		1078	3.0	1.158	70.0	LOS E	48.6	378.4	0.99	2.03	29.5
East: Brian Coburn											
1	L2	191	3.0	0.413	16.4	LOS B	2.5	19.8	0.80	0.96	52.3
16	R2	475	3.0	0.292	4.0	LOS A	0.0	0.0	0.00	0.46	60.0
Approach		666	3.0	0.413	7.6	LOS A	2.5	19.8	0.23	0.60	57.5
North: Navan											
7	L2	690	3.0	0.759	14.3	LOS B	9.4	72.9	0.80	0.79	53.9
4	T1	1125	3.0	1.108	63.6	LOS F	65.3	509.0	1.00	1.78	31.4
Approach		1815	3.0	1.108	44.8	LOS D	65.3	509.0	0.93	1.40	37.5
All Vehicles		3560	3.0	1.158	45.5	LOS D	65.3	509.0	0.81	1.44	36.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Fern Casey/Frank Bender

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
3	L2	133	3.0	0.350	10.0	LOS B	2.3	18.0	0.32	0.56	57.1
8	T1	97	3.0	0.350	5.3	LOS A	2.3	18.0	0.32	0.56	57.3
18	R2	125	3.0	0.350	5.1	LOS A	2.3	18.0	0.32	0.56	56.0
Approach		354	3.0	0.350	7.0	LOS A	2.3	18.0	0.32	0.56	56.8
East: Frank Bender											
1	L2	158	3.0	0.282	11.4	LOS B	1.6	12.7	0.51	0.69	55.1
6	T1	67	3.0	0.282	6.7	LOS A	1.6	12.7	0.51	0.69	55.3
16	R2	13	3.0	0.282	6.5	LOS A	1.6	12.7	0.51	0.69	54.1
Approach		238	3.0	0.282	9.8	LOS A	1.6	12.7	0.51	0.69	55.1
North: Frank Bender											
7	L2	37	3.0	0.144	12.1	LOS B	0.7	5.8	0.55	0.68	55.8
4	T1	62	3.0	0.144	7.4	LOS A	0.7	5.8	0.55	0.68	56.0
14	R2	9	3.0	0.144	7.2	LOS A	0.7	5.8	0.55	0.68	54.7
Approach		108	3.0	0.144	9.0	LOS A	0.7	5.8	0.55	0.68	55.8
West: RoadName											
5	L2	5	3.0	0.130	11.3	LOS B	0.7	5.2	0.47	0.60	57.7
2	T1	29	3.0	0.130	6.6	LOS A	0.7	5.2	0.47	0.60	57.9
12	R2	73	3.0	0.130	6.3	LOS A	0.7	5.2	0.47	0.60	56.5
Approach		108	3.0	0.130	6.6	LOS A	0.7	5.2	0.47	0.60	57.0
All Vehicles		808	3.0	0.350	8.1	LOS A	2.3	18.0	0.43	0.62	56.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Frank Bender/Vanguard

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Frank Bender											
3	L2	10	3.0	0.175	11.1	LOS B	0.9	7.3	0.47	0.59	57.4
8	T1	85	3.0	0.175	6.4	LOS A	0.9	7.3	0.47	0.59	57.7
18	R2	53	3.0	0.175	6.2	LOS A	0.9	7.3	0.47	0.59	56.3
Approach		148	3.0	0.175	6.6	LOS A	0.9	7.3	0.47	0.59	57.2
East: Vanguard											
1	L2	90	3.0	0.442	11.0	LOS B	3.1	24.1	0.50	0.60	56.7
6	T1	230	3.0	0.442	6.3	LOS A	3.1	24.1	0.50	0.60	57.0
16	R2	88	3.0	0.442	6.1	LOS A	3.1	24.1	0.50	0.60	55.7
Approach		409	3.0	0.442	7.3	LOS A	3.1	24.1	0.50	0.60	56.6
North: Frank Bender											
7	L2	63	3.0	0.454	12.8	LOS B	3.0	23.5	0.68	0.75	55.8
4	T1	167	3.0	0.454	8.1	LOS A	3.0	23.5	0.68	0.75	56.0
14	R2	112	3.0	0.454	7.8	LOS A	3.0	23.5	0.68	0.75	54.7
Approach		342	3.0	0.454	8.9	LOS A	3.0	23.5	0.68	0.75	55.6
West: Vanguard											
5	L2	55	3.0	0.227	12.0	LOS B	1.3	9.9	0.57	0.69	55.8
2	T1	108	3.0	0.227	7.3	LOS A	1.3	9.9	0.57	0.69	56.0
12	R2	10	3.0	0.227	7.1	LOS A	1.3	9.9	0.57	0.69	54.8
Approach		173	3.0	0.227	8.8	LOS A	1.3	9.9	0.57	0.69	55.9
All Vehicles		1072	3.0	0.454	7.9	LOS A	3.1	24.1	0.57	0.66	56.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Mer Bleue / Brian Coburn

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	79	2.0	1.005	51.2	LOS F	19.4	149.8	1.00	1.73	41.4
8	T1	733	2.0	1.005	44.7	LOS F	20.6	159.1	1.00	1.74	36.3
18	R2	314	2.0	1.005	43.6	LOS F	20.6	159.1	1.00	1.75	35.8
Approach		1126	2.0	1.005	44.8	LOS F	20.6	159.1	1.00	1.74	36.6
East: Brian Coburn											
1	L2	224	2.0	0.775	20.7	LOS C	6.8	52.6	0.93	1.13	50.2
6	T1	355	2.0	0.775	14.5	LOS C	7.0	54.1	0.93	1.13	54.8
16	R2	328	2.0	0.775	14.3	LOS C	7.0	54.1	0.93	1.12	51.5
Approach		908	2.0	0.775	16.0	LOS C	7.0	54.1	0.93	1.13	52.7
North: Mer Bleue											
7	L2	648	2.0	1.244	131.4	LOS F	70.8	547.2	1.00	3.23	20.6
4	T1	973	2.0	1.244	125.1	LOS F	72.9	563.3	1.00	3.26	20.0
14	R2	221	2.0	1.244	125.0	LOS F	72.9	563.3	1.00	3.27	25.2
Approach		1841	2.0	1.244	127.3	LOS F	72.9	563.3	1.00	3.25	20.9
West: Brian Coburn											
5	L2	111	2.0	0.977	52.8	LOS E	11.4	88.3	0.99	1.47	41.0
2	T1	432	2.0	0.977	45.1	LOS E	12.8	98.5	1.00	1.49	41.7
12	R2	149	2.0	0.977	43.7	LOS E	12.8	98.5	1.00	1.51	41.2
Approach		691	2.0	0.977	46.0	LOS E	12.8	98.5	1.00	1.49	41.5
All Vehicles		4566	2.0	1.244	72.5	LOS F	72.9	563.3	0.99	2.19	30.5

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Mer Bleue / Renaud Rd

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	104	2.0	0.952	34.3	LOS C	25.6	201.9	1.00	1.31	53.3
8	T1	602	5.0	0.952	29.8	LOS C	25.6	201.9	1.00	1.31	38.8
Approach		707	4.6	0.952	30.5	LOS C	25.6	201.9	1.00	1.31	42.8
North: Mer Bleue											
4	T1	850	2.0	1.159	87.0	LOS F	92.7	716.6	1.00	1.50	22.4
14	R2	267	2.0	1.159	86.7	LOS F	92.7	716.6	1.00	1.50	38.5
Approach		1117	2.0	1.159	86.9	LOS F	92.7	716.6	1.00	1.50	27.9
West: Renaud Rd											
5	L2	496	2.0	1.681	336.5	LOS F	105.5	815.1	1.00	3.60	18.1
12	R2	196	2.0	1.681	331.5	LOS F	105.5	815.1	1.00	3.60	19.1
Approach		691	2.0	1.681	335.1	LOS F	105.5	815.1	1.00	3.60	18.4
All Vehicles		2515	2.7	1.681	139.3	LOS F	105.5	815.1	1.00	2.02	24.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Brian Coburn / Navan - Improv

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	708	3.0	0.941	32.2	LOS C	17.5	136.3	1.00	1.46	42.5
18	R2	371	3.0	0.941	32.2	LOS C	17.5	136.3	1.00	1.46	41.2
Approach		1078	3.0	0.941	32.2	LOS C	17.5	136.3	1.00	1.46	42.0
East: Brian Coburn											
1	L2	191	3.0	0.405	15.8	LOS B	2.1	16.5	0.75	0.94	52.7
16	R2	475	3.0	0.292	4.0	LOS A	0.0	0.0	0.00	0.46	60.0
Approach		666	3.0	0.405	7.4	LOS A	2.1	16.5	0.21	0.60	57.6
North: Navan											
7	L2	690	3.0	0.891	17.6	LOS B	18.0	140.2	1.00	0.87	52.5
4	T1	1125	3.0	0.891	11.3	LOS B	18.0	140.2	1.00	0.87	54.9
Approach		1815	3.0	0.891	13.7	LOS B	18.0	140.2	1.00	0.87	54.0
All Vehicles		3560	3.0	0.941	18.1	LOS B	18.0	140.2	0.85	1.00	50.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Mer Bleue / Brian Coburn - Improv

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	79	2.0	0.619	19.4	LOS B	4.5	34.9	0.88	1.05	55.7
8	T1	733	2.0	0.619	12.3	LOS B	5.1	39.2	0.89	1.05	54.0
18	R2	314	2.0	0.403	7.9	LOS A	2.5	19.2	0.80	0.91	56.2
Approach		1126	2.0	0.619	11.6	LOS B	5.1	39.2	0.86	1.01	54.7
East: Brian Coburn											
1	L2	224	2.0	0.374	13.3	LOS A	1.9	14.9	0.73	0.90	54.1
6	T1	355	2.0	0.374	6.5	LOS A	2.0	15.8	0.72	0.64	59.3
16	R2	328	2.0	0.367	6.4	LOS A	2.0	15.4	0.71	0.73	56.8
Approach		908	2.0	0.374	8.1	LOS A	2.0	15.8	0.72	0.73	57.4
North: Mer Bleue											
7	L2	648	2.0	0.785	17.1	LOS C	7.5	58.2	0.87	1.10	51.8
4	T1	973	2.0	0.951	17.8	LOS E	17.7	137.1	1.00	1.41	50.2
14	R2	154	2.0	0.136	5.1	LOS A	0.6	4.9	0.47	0.59	59.9
Approach		1775	2.0	0.951	16.4	LOS E	17.7	137.1	0.91	1.22	51.8
West: Brian Coburn											
5	L2	111	2.0	0.746	27.1	LOS C	5.1	39.1	0.94	1.12	51.1
2	T1	432	2.0	0.746	19.0	LOS C	5.1	39.1	0.94	1.13	52.9
12	R2	149	2.0	0.271	9.2	LOS A	1.8	13.7	0.90	0.93	57.5
Approach		691	2.0	0.746	18.2	LOS C	5.1	39.1	0.93	1.09	53.5
All Vehicles		4500	2.0	0.951	13.8	LOS E	17.7	137.1	0.86	1.05	53.9

Level of Service (LOS) Method: Degree of Saturation (SIDRA METHOD).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on degree of saturation per movement
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2031 PM - Mer Bleue / Renaud Rd - Improv

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	104	2.0	0.476	14.2	LOS B	3.5	27.7	0.78	0.82	61.2
8	T1	602	5.0	0.476	8.1	LOS A	3.5	27.7	0.78	0.80	54.8
Approach		707	4.6	0.476	9.0	LOS A	3.5	27.9	0.78	0.80	56.8
North: Mer Bleue											
4	T1	850	2.0	0.501	4.7	LOS A	4.1	31.7	0.45	0.46	58.6
14	R2	267	2.0	0.501	4.8	LOS A	4.1	31.7	0.45	0.48	61.7
Approach		1117	2.0	0.501	4.8	LOS A	4.1	31.7	0.45	0.46	60.0
West: Renaud Rd											
5	L2	496	2.0	0.955	35.7	LOS D	11.5	89.2	0.87	1.51	51.7
12	R2	196	2.0	0.423	11.6	LOS B	2.2	16.7	0.75	0.90	59.8
Approach		691	2.0	0.955	28.9	LOS C	11.5	89.2	0.84	1.34	53.8
All Vehicles		2515	2.7	0.955	12.6	LOS B	11.5	89.2	0.65	0.80	56.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

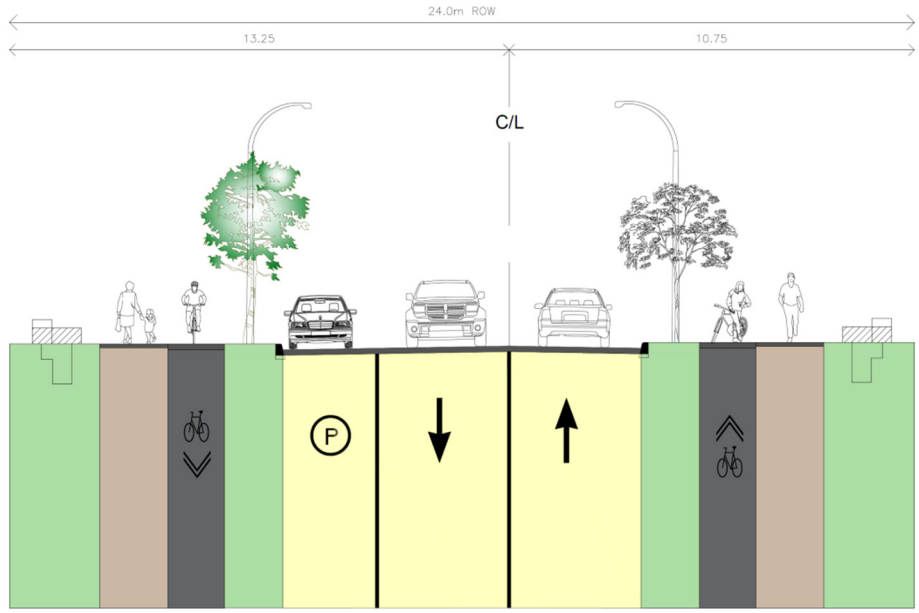
Appendix E

Adjacent Development Locations

Exhibit E-1: Adjacent Development Locations

Appendix F

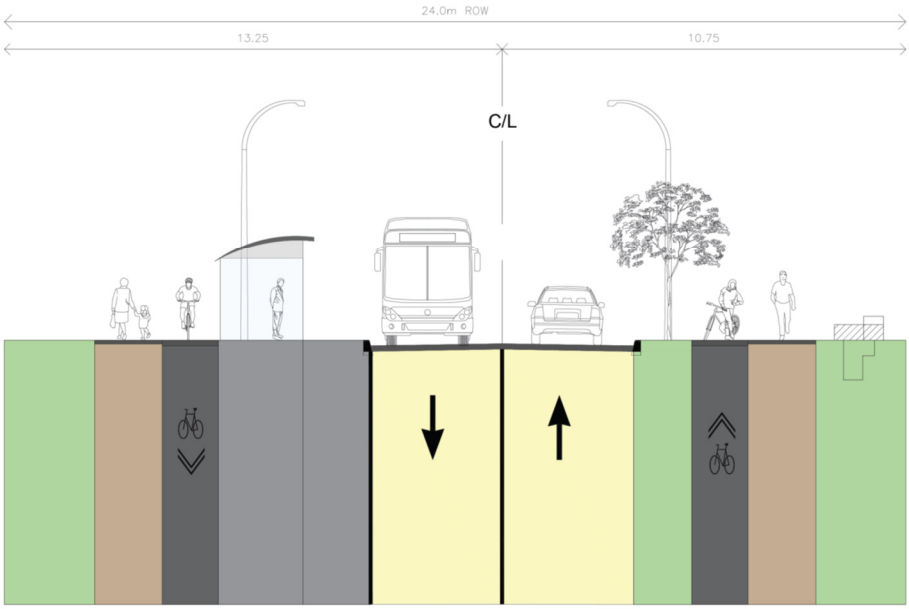
Cross-Sections – Not Recommended



2.40	1.80	1.50	1.55	2.50	3.50	3.50	1.55	1.50	1.80	2.40
BLVD	SIDEWALK	CYCLE TRACK	BLVD	FLEX PARKING	LANE	LANE	BLVD	CYCLE TRACK	SIDEWALK	BLVD
	TROTTOIRS	PISTES CYCLABLES		PLACE DES STATIONNEMENT FLEXIBLES	RUELLE	RUELLE		PISTES CYCLABLES	TROTTOIRS	

TYPICAL CROSS-SECTION
24m ROW - OPTION 1-A

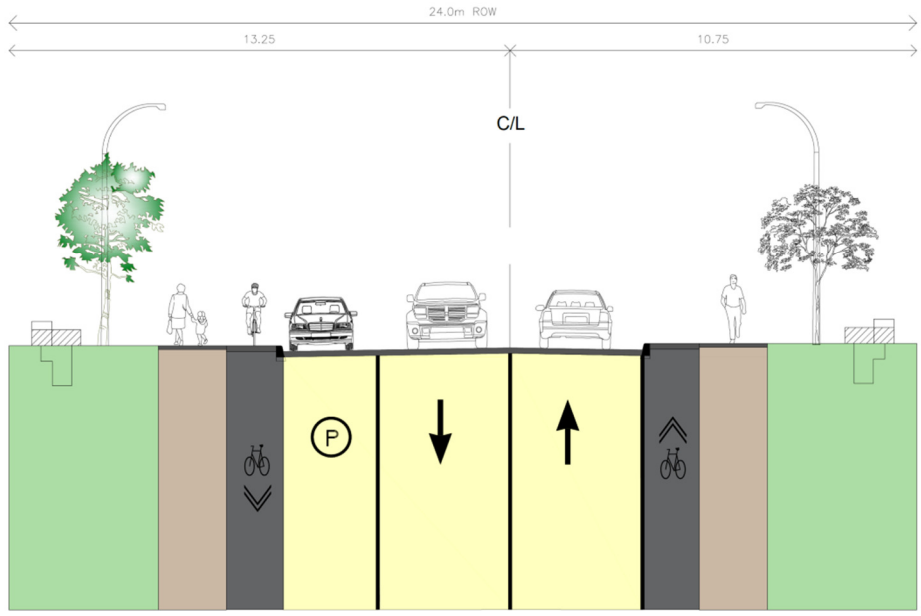
COUPES TRANSVERSALES TYPIQUES
24m ROW - OPTION 1-A



2.40	1.80	1.55	2.20	1.80	3.50	3.50	1.55	1.50	1.80	2.40
BLVD	SIDEWALK	CYCLE TRACK	BUS SHELTER	BUS PAD	LANE	LANE	BLVD	CYCLE TRACK	SIDEWALK	BLVD
	TROTTOIRS	PISTES CYCLABLES	ABRIBUS	PLATES-FORMES D'ARRÊT D'AUTOBUS	RUELLE	RUELLE		PISTES CYCLABLES	TROTTOIRS	

TYPICAL CROSS-SECTION
24m ROW - OPTION 1-B

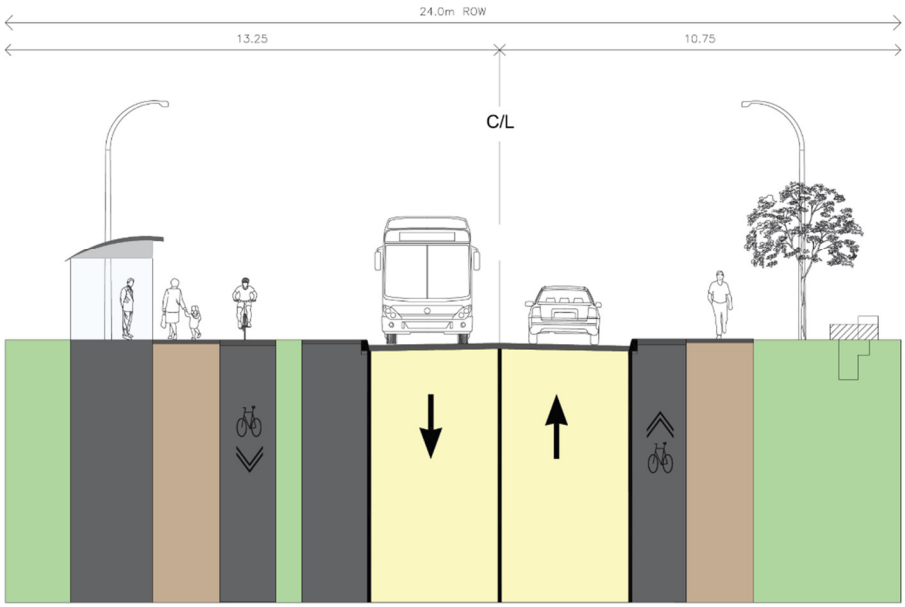
COUPES TRANSVERSALES TYPIQUES
24m ROW - OPTION 1-B



3.95	1.80	1.50	2.50	3.50	3.50	1.50	1.80	3.95
BLVD	SIDEWALK	CYCLE TRACK	FLEX PARKING	LANE	LANE	CYCLE TRACK	SIDEWALK	BLVD
	TROTTOIRS	PISTES CYCLABLES	PLACE DES STATIONNEMENT FLEXIBLES	RUELLE	RUELLE	PISTES CYCLABLES	TROTTOIRS	

TYPICAL CROSS-SECTION
24m ROW - OPTION 2-A

COUPES TRANSVERSALES TYPIQUES
24m ROW - OPTION 2-A



1.75	2.20	1.80	1.50	0.70	1.80	3.50	3.50	1.50	1.80	3.95
BLVD	BUS SHELTER	SIDEWALK	CYCLE TRACK	BLVD	BUS PAD	LANE	LANE	CYCLE TRACK	SIDEWALK	BLVD
	ABRIBUS	TROTTOIRS	PISTES CYCLABLES		PLATES-FORMES D'ARRÊT D'AUTOBUS	RUELLE	RUELLE	PISTES CYCLABLES	TROTTOIRS	

TYPICAL CROSS-SECTION
24m ROW - OPTION 2-B

COUPES TRANSVERSALES TYPIQUES
24m ROW - OPTION 2-B