PROPOSED TRAILSEDGE NORTH (EUC PHASE 3)
ORLEANS, OTTAWA
RICHCRAFT HOMES

TRAFFIC IMPACT ASSESMENT

Presented to:

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Project 7255

CASTLEGLENN CONSULTANTS LTD.

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1.0 EXISTING AND PLANNED CONDITIONS

1.1 PROPOSED DEVELOPMENT

Exhibit 1-1 illustrates the location of the proposed subdivision located in Orleans, Ontario. The site is located within the future East Urban Community (EUC) Phase 3 lands and is part of Richcraft's Trailsedge development initiative. Appendix "J" provides for the current draft of subdivision for the proposed development.

Exhibit 1-2 illustrates the proposed plan of subdivision (August, 2020) and access arrangement. The proposed development is anticipated to provide for approximately:

- 2,040 dwellings (340 singles, 529 townhouses, 114 back-to-back townhomes, and 1,060 apartment units) would be located north of Brian Coburn Boulevard; and
- 830 jobs which would be located in the employment area in the general vicinity of the existing Innes Snow Disposal Facility (2170 Mer Bleue Road).

The proposed development is located within the General Urban Area. A review of the current Zoning By-law indicates a "IL – Light Industrial Zone" designation. The site is currently greenfield.

This Traffic Impact Study is in support of a Major Zoning By-Law Amendment application and an application for Plan of Subdivision Application (Draft Plan Approval) in accordance with the "*East Urban Community (EUC) Phase 3 Area Community Design Plan's (CDP) Master Transportation Study (MTS)*".

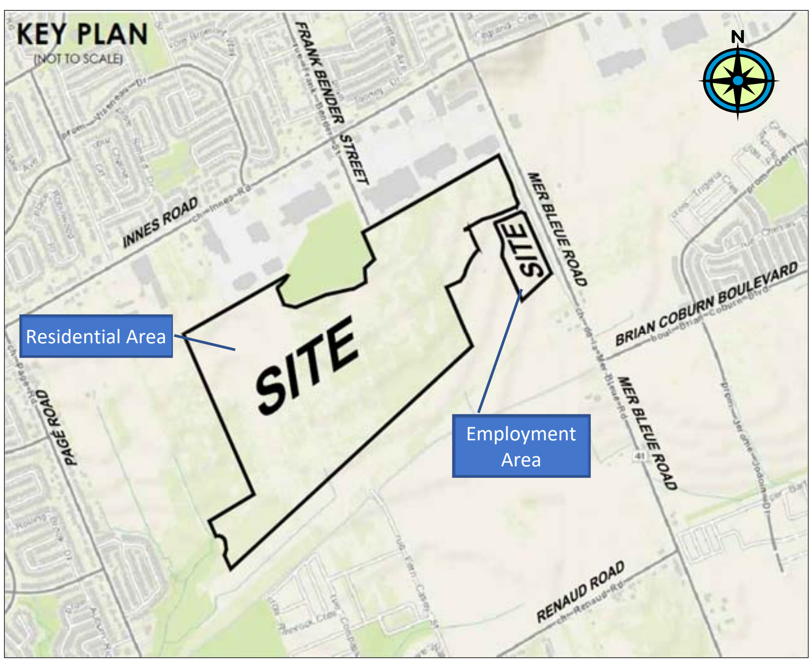


Exhibit 1-1: Approximate Area of Proposed Development

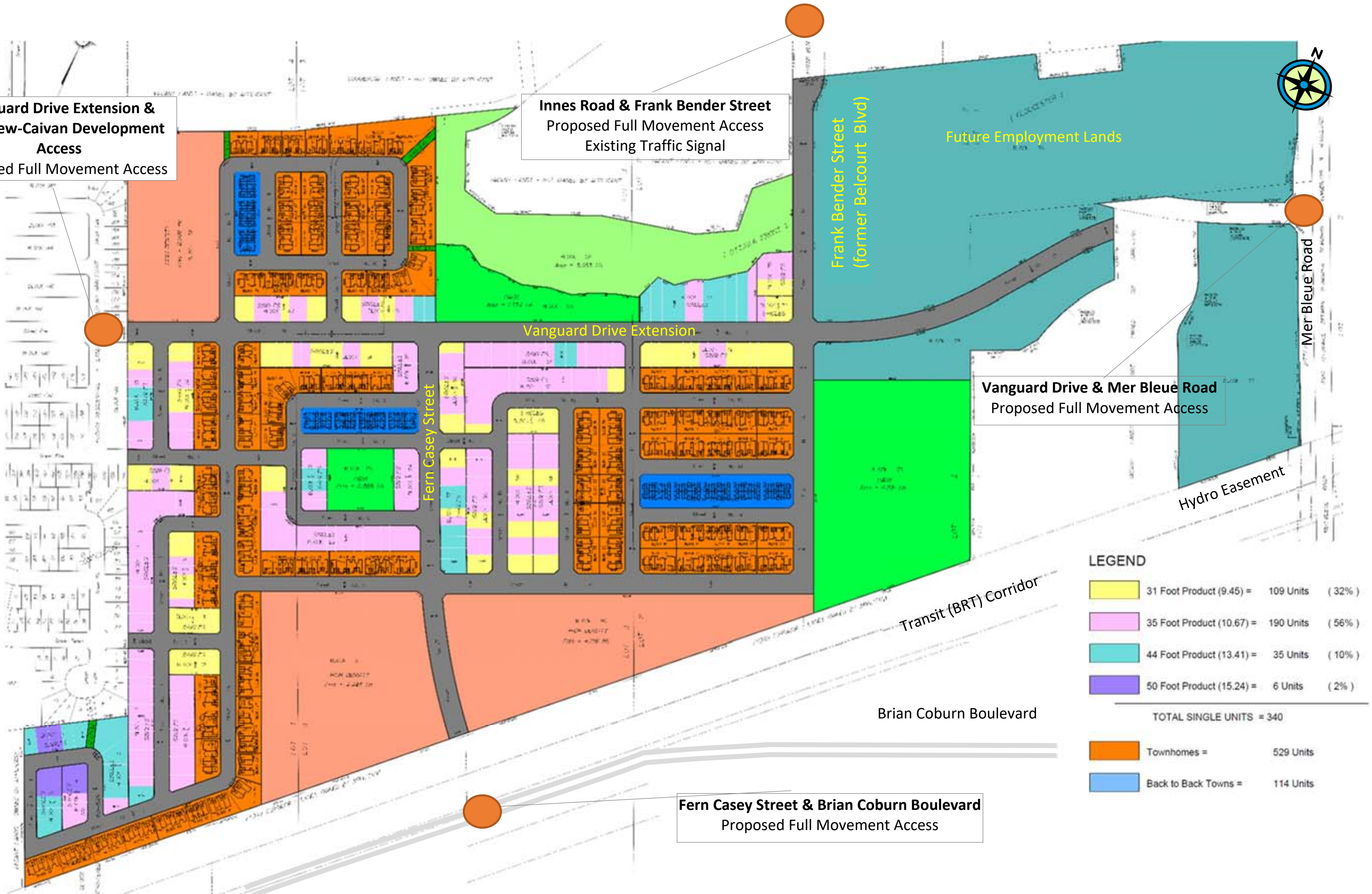


Exhibit 1-2: Trailsedge North Site Plan: Phases 1-thru-4

Exhibit 1-2 illustrates that the proposed development would be accessed by way of four locations:

1. *Vanguard Drive / Mer Bleue Road intersection*: This new intersection is dependent on the status of the Vanguard Drive Extension (between Mer Bleue and Lanthier Drive) located east of the site. The configuration of the future intersection is assumed to provide for all turning movements;
2. *Vanguard Drive / Glenview-Caivan Access intersection*: A connection to the west of the proposed site is envisioned through the proposed Glenview and Caivan developments which would connect to a Inness Road at both the Innes Road / Caivan Access and Innes Road / Glenview Access intersections. This access is also dependent on the timing of the Vanguard Drive Extension through the site;
3. *Fern Casey Street / Brian Coburn Boulevard intersection*: The northly extension of Fern Casey would be used to access the southern boundary of the proposed development. This intersection currently exists as a 3-leg roundabout with single lane approaches;
4. *Innes Road / Frank Bender Street (former Belcourt Blvd) intersection:* The existing 4-leg Innes Road intersection is traffic signal controlled and provides for all turning movements. The south leg of Frank Bender currently terminates as a cul-de-sac just south of the Smart Centres (3900 Innes Road) Orleans II retail shopping area. The southerly extension of Frank Bender would be used to access the proposed development.

The proposed Trailsedge North development is currently envisioned to proceed from the south-west toward the north-east, and is anticipated to be staged as follows:

- *Phase 1*: 95 single units, 155 townhouse units and 444 apartment units;
- *Phase 2*: 119 single units, 188 townhouse units, 64 back-to-back townhouse units, and 200 apartment units.
- *Phase 3*: would see the remainder of the development being developed, which would involve 126 single units, 186 townhouse units, 50 back-to-back townhouse units, and 415 apartment units.
- *Phase 4*: would see the development of the Urban Employment Area as envisioned within the EUC Phase 3 Area CDP lands (between the existing Innes Snow Disposal Facility and Mer Bleue Road). Development of this employment area is expected to generate approximately 830 jobs. The timing of this phase remains uncertain.

A phasing plan will be submitted with both ZBLA and SBDA (DPA).

1.2 Existing Conditions

Study Area Roadways

The City of Ottawa TMP (Map 6) was referenced along with a desktop review of aerial photography to document the existing roadways that would serve the proposed development and surrounding area:

- *Fern Casey Street:* is an existing major collector roadway that currently connects Brian Coburn Boulevard to Renaud Road. It is characterized by 2-lanes of travel, sidewalks with a boulevard arrangement on either side of the corridor, a 50 km/hr posted speed limit, a concrete median and a 24m right-of-way north of Brian Coburn Boulevard. Fern Casey Street currently terminates at Brian Coburn Boulevard at a roundabout T-intersection south of the proposed development;
- *Vanguard Drive:* is an existing undivided two-lane collector roadway running east-west from Lanthier Drive in the west to Tenth Line Road in the east. Paved sidewalks with boulevards are provided on the north and south sides of Vanguard Drive. Plans are in place to extend Vanguard Drive westward to Mer Bleue and into the proposed development area;
- *Frank Bender Street (former Belcourt Boulevard):* is an existing major collector roadway running north-south from Jeanne D'Arc in the north to south of Innes Road. Frank Bender terminates at a cul-de-sac immediately south of the SmartCentres Orleans II Shopping area. South of Innes Road, this road is characterized by a 4-lane divided cross section with sidewalks on both sides in a predominately boulevard arrangement;
- *Innes Road:* is an existing east-west arterial roadway running from Saint Laurent Boulevard in the west to Dunning Road in the east. Innes Road transitions onto the Blackburn Hamlet Bypass in the vicinity of Blackburn Hamlet. Within the study area, Innes Road is a divided four-lane cross section with single-directional cycling lanes and paved sidewalk provided on the north and south sides. Innes Road is part of the City of Ottawa's cycling spine route in the vicinity of the development.;
- *Brian Coburn Boulevard:* is an existing 2-lane east-west undivided two-lane arterial roadway (posted speed 60 km/hr) located south of the proposed development and running from Navan Road in the west to Trim Road in the east. The surrounding land use is characterized by planned and existing residential dwellings. A MUP is provided along the south side of the roadway while an on-street cycling lane is available along the north side of the boulevard;
- *Mer Bleue Road:* is a 4-lane (two lanes per-direction) north-south arterial that extends from the Jeanne d'Arc/Innes Road intersection southward and tapers to a 2-lanes roadway cross-section just north of Renaud Road. The 4-lane section is posted at 60 km/h and provides an urban cross-section with on-street cycling lanes, sidewalks with boulevards on both sides. The existing 2-lane section of Mer Bleue Road is posted at 50km/hr south of Renaud Road and is characterized by a rural cross-section with un-cultivated farmland, agricultural land uses and existing rural residences on both sides of the corridor.

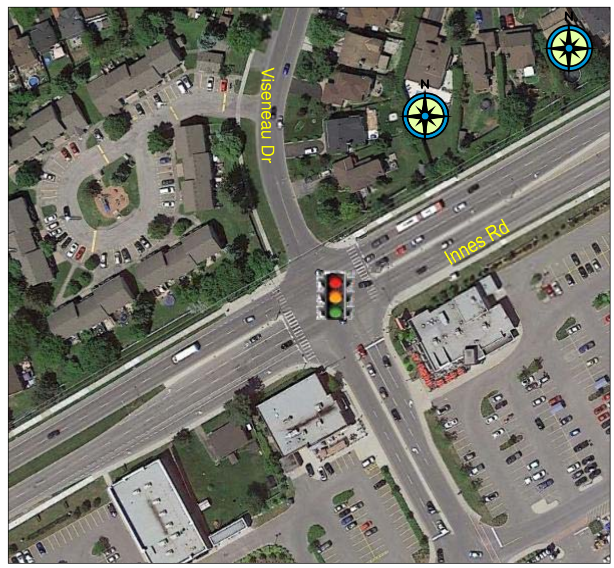
Area Traffic Management

No Area Traffic Management strategies have been identified for the boundary roads within the study area.

Study Area Intersections

Innes Road/Frank Bender Street: This intersection is a 4-leg traffic signal-controlled intersection. The eastbound approach provides for two thru lanes, an auxiliary left turn bay and an EB-RT auxiliary lane. The westbound approach provides for one thru lane, one shared WB-Th/RT lane and an auxiliary left turn bay. The northbound approach provides for one auxiliary NB-LT bay, one thru lane, and one NB-RT lane. The southbound approach provides for one auxiliary left turn bay, and one shared SB-Th/RT lane. A bike lane is provided on both sides of Innes Road.

Innes Road/Viseneau Drive: This intersection is a 4-leg traffic signal-controlled intersection. The eastbound approach provides for two thru lanes, an auxiliary left turn bay and EB-RT auxiliary bay. The westbound approach provides for one thru lane, one shared WB-Th/RT lane and an auxiliary left turn bay. The northbound approach provides for one auxiliary NB-LT lane, one thru lane, and one NB-RT bay. The southbound approach provides for one shared SB-LT/Th/RT lane. Bike lanes are provided on both sides of Innes Road.



Innes Road/Avenue de Lamarche (Caivan Access): This "T" intersection is currently STOP-controlled on the south leg. A two-way left-turn lane is provided along Innes Road as well as two thru lanes on the eastbound and westbound approaches of the intersection. Bike lanes are provided on both sides of Innes Road.

Innes Road/473 E of Page-Builders' Warehouse (Future Street No.9): This 4-leg signal control intersection currently serves the 3619-21 Innes Road commercial plaza on the north leg and a U-Haul storage on the south leg. Both of the westbound and eastbound approaches provide for a single dedicated left-turn lane, a dedicated thru lane, and a shared thru/right turn lane. The north south approaches offer a shared approach without auxiliary lane. Bike lanes are provided on the east-west along Innes Road approaches.

Brian Coburn Boulevard/Mer Bleue Road: This 4-leg roundabout intersection is characterized by 2 NB and 2 SB approach lanes along the Mer Bleue corridor and single EB and WB approach lanes along the Brian Coburn Boulevard corridor in the east-west direction. Bike lanes are provided along Brian Coburn Boulevard and Mer Bleue Road leading to the roundabout, with provision for access to the MUP through the roundabout.

Brian Coburn Boulevard/Fern Casey Street: This intersection is a 3-leg roundabout with single lane approaches. In the future, Fern Casey Street is to be extended northward and form a fourth leg to the intersection;

Existing Cycling Facilities

The City of Ottawa's Transportation Master Plan "*Map 1: Cycling Network – Primary Urban"* indicates that:

- Brian Coburn Boulevard accommodates a "Major Pathway" in the form of an east-west multi-use pathway (MUP) along the south side of the corridor; and
- Both Mer Bleue Road and Innes Road are designated as cycling "Spine Routes" that are to provide on-street cycling lanes.

The following peak period traffic counts (AM, Mid-day, PM peaks) were reviewed and indicated the following current cyclist volumes on the area intersections:

- A traffic count performed on Tuesday August 4th, 2015 at the Frank Bender Street/Innes Road intersection indicated:
- 2 north-south cyclists along Frank Bender Street in the AM peak hour and 3 north-south cyclists in the PM peak hour; and
- 14 east-west cyclists travelled along Innes Road in the AM peak hour, 22 in the PM peak hour.
- A traffic count performed on Wednesday January 15th, 2017 (winter) at the Innes Road/Viseneau Drive intersection indicated no east-west cyclists along Innes Road or Viseneau Drive.

Existing Pedestrian Facilities

A review of the study area found that pedestrian provisions were afforded on each of the boundary streets to the proposed development. A sidewalk and boulevard arrangement exists along the full length of both sides of Fern Casey Street while an MUP is provided on the south side of Brian Coburn Boulevard. A signalized pedestrian crossover connects Page Road across Brian Coburn Boulevard east of Navan Road.

A review of the August 2015 Innes Road/Frank Bender Street intersection traffic counts indicated:

- 12 pedestrians crossed north-south on Innes Road in the AM peak hour;
- 52 pedestrians crossed north-south on Innes Road in the PM peak hour;
- 10 pedestrians crossed east-west on Frank Bender Street in the AM peak hour; and
- 35 pedestrians crossed east-west on Frank Bender Street in the PM peak hour;

A review of the January 2017 Innes Road/Viseneau Drive intersection traffic count indicated:

- 3 pedestrians crossed north-south on Innes Road in the AM peak hour;
- 21 pedestrians crossed north-south on Innes Road in the PM peak hour;
- 4 pedestrians crossed east-west on Viseneau Drive in the AM peak hour; and
- 20 pedestrians crossed east-west on Viseneau Drive in the PM peak hour.

Existing Transit Provisions

Exhibit 1-3 illustrates the transit routes within the study area and the location of the Chapel Hill Park-and-Ride facility nearest the Brian Coburn Boulevard/Navan Road intersection, southwest of the proposed site. The Chapel Hill Park and Ride is access from an all-movement signalized intersection along Navan Road and a right-in right-out access along Brian Coburn Boulevard.

Exhibit 1-3: Existing Transit Routes

The following transit routes are anticipated to serve residents of the development:

- *Route 225:* connects the proposed development to the existing LRT at Blair Station via the Blackburn Hamlet By-Pass-Innes Road corridor. It connects Willow Aster in the east, the Chapel Hill Park-and-Ride, and the Blair Road Line 1 Station in the west. A review of the schedule for Tuesday, June 30th indicated that this route runs only in the peak period with 20-minute headways between buses.
- *Route 30:* to Millennium Park & Ride in the east to Blair Station via Brian Coburn Boulevard and Mer Bleue Road. A review of the schedule for Thursday July 30th indicated that runs 10-minute headways in the peak direction during the peak period, and 15-30 minute headways outside of the peak period.
- *Route 25:* travels along Innes Road to the north of the proposed development. The route connects Millennium Park & Ride to the existing Blair Station and is scheduled with 10-minute headways in the peak direction during the peak period, and 15-30 minute headways outside of the peak period.
- *Route 131:* circles through the Fallingbrook and Chapel Hill neighbourhood and travels into the study area along Innes Road from Viseneau Road to Mer Bleue Road. The route is scheduled with 30-minute headways during the day.
- *Route 138:* connects Place d'Orleans to Innes Road and Tenth Line and travels into the study area along Innes Road from Viseneau Road to Mer Bleue Road. The route is scheduled with 30-minute headways during the peak period, and 1-hour headways outside of the peak period.
- *Route 302:* connects St-Laurent and Blair Station to the Cumberland neighbourhood, which runs once on Tuesdays at around 9:00AM northwards from Cameron Street/Sparkle Street to St-Laurent Station, 2:30PM southwards from St-Laurent Station to Cameron Street/Regional Road 174 in Cumberland. The route passes Mer Bleue between Innes Road to south of the proposed development.

Existing (2020) Traffic Volumes

Exhibit 1-4 illustrates the existing morning and afternoon peak hour traffic volumes within the study area intersections. The following recent traffic counts were obtained for the study area intersections (Appendix "D"):

- Innes Road/Viseneau Drive (City Count: January 2017)
- Belcourt Boulevard/Innes Road (City Count: August 2015)
- Brian Coburn Boulevard/Fern Casey Street (Castleglenn Count: December, 2018);
- Mer Bleue Road/Brian Coburn Boulevard (TIS 2225 Mer Bleue Rd – Orleans Health Hub: Dec. 2017);

Existing Road Safety Information

Five (5) year (January 1st, 2013 to December 31st, 2017) historical collision information was reviewed for the study area intersections (Appendix "D"). The collision information provides:

- the date and time of each collision;
- the type of collision (i.e. angle collision, rear-end);
- the level of damage involved;
- vehicle details (truck, passenger vehicle, etc.);
- vehicle path/maneuver characteristics; and
- the number of pedestrians involved (in the collision).

For each intersection within the study area a standard collision rate based on the number of collisions-per-million-entering-vehicles (MEV) was calculated. A collision rate greater than 1.0 collisions/MEV was considered to pose a potential safety concern.

The following provides a summary of the collision information collected and evaluated:

- *Brian Coburn Boulevard/Mer Bleue Road:* A total of 9 collisions occurred at this intersection in the past 5 years with 44% (4) of the collisions being rear-end collisions. All of the collisions were found to result in property damage only. A collision rate of 0.25 collisions/MEV was calculated;
- *Brian Coburn Boulevard/Fern Casey Street:* This intersection has only recently been constructed and as such there is no historical collision information covering a full five-year period.
- *Innes Road/Viseneau Drive:* A total of 37 collisions occurred at this intersection over the past 5 years with 51% (19) of the collisions being rear-end collisions. 78% (29) of the collisions resulted in property damage only, and 22% (8) of the collisions resulted in non-fatal injury. A collision rate of 0.61/MEV was determined for this location; and;
- *Innes Road/Frank Bender Street (Belcourt Boulevard):* A total of 34 collisions occurred at this intersection over the past 5 years with 53% (18) of the collisions being rear-end collisions. (24) of the

collisions resulted in property damage only, and (10) of the collisions resulted in non-fatal injury. A collision rate of 0.56/MEV was determined for this location.;

A review of the available collision information indicated that there appears to be no discernable pattern given the incidence of collisions over the 5-year period.

1.3 PLANNED CONDITIONS

The planned development roadway network, pedestrian linkages and cycling elements are described within Section 7.1.2. The following sections pertain to the transportation network surrounding the proposed development.

Planned Transportation Network Modifications

A review of the City of Ottawa's documents[1] indicated that:

- The Blackburn Hamlet Bypass Extension between Navan Road and Orleans Boulevard is scheduled to occur before 2024;
- Brian Coburn Boulevard would be upgraded with transit signal priority ("Isolated Measures") between Blackburn Hamlet Bypass and Tenth Line Road; and
- Innes Road would receive transit priority measures (queue jumps and transit signal priority) between the Blackburn Hamlet Bypass and Trim Road. Some improvements have already taken place.

The "*Rapid Transit and Transit Priority Map*" for the 2031 Affordable Network (Map 5) within the City of Ottawa Transportation Master Plan indicated that Brian Coburn Boulevard is a designated "*Transit Priority Corridor (Isolated Measures)*" corridor.

A review of the City of Ottawa's Transportation Master Plan Map 4 (Rapid Transit and Transit Priority Network – 2031 Conceptual Network) indicated that the Cumberland Transitway / Blackburn Hamlet By-Pass Extension would be located south of the proposed development, within the Hydro corridor. It is believed that the extension of the Transitway is anticipated to be driven by the Trailsedge North development. However, the exact timing of the Transitway remains unknown at this time given the long-term planning horizons assumed within this traffic impact study. The Cumberland Transitway has been assumed to occur well beyond the current Transportation Master Plan horizon of 2031.

Finally, Map 10 "*Road Network – 2031 Network Concept*" was reviewed which indicated future widening of Brian Coburn Boulevard and Mer Bleue Road. These potential widenings will be considered when the build-out analysis is undertaken.

1. City of Ottawa *Transportation Master Plan* (Nov. 2013) Map 11 (Road Network Affordable Transportation Network), Map 5 (Rapid Transit and Transit Priority Network – 2031 Affordable Network), Appendix "E" of the 2019 DC Background Study and other planning documents.

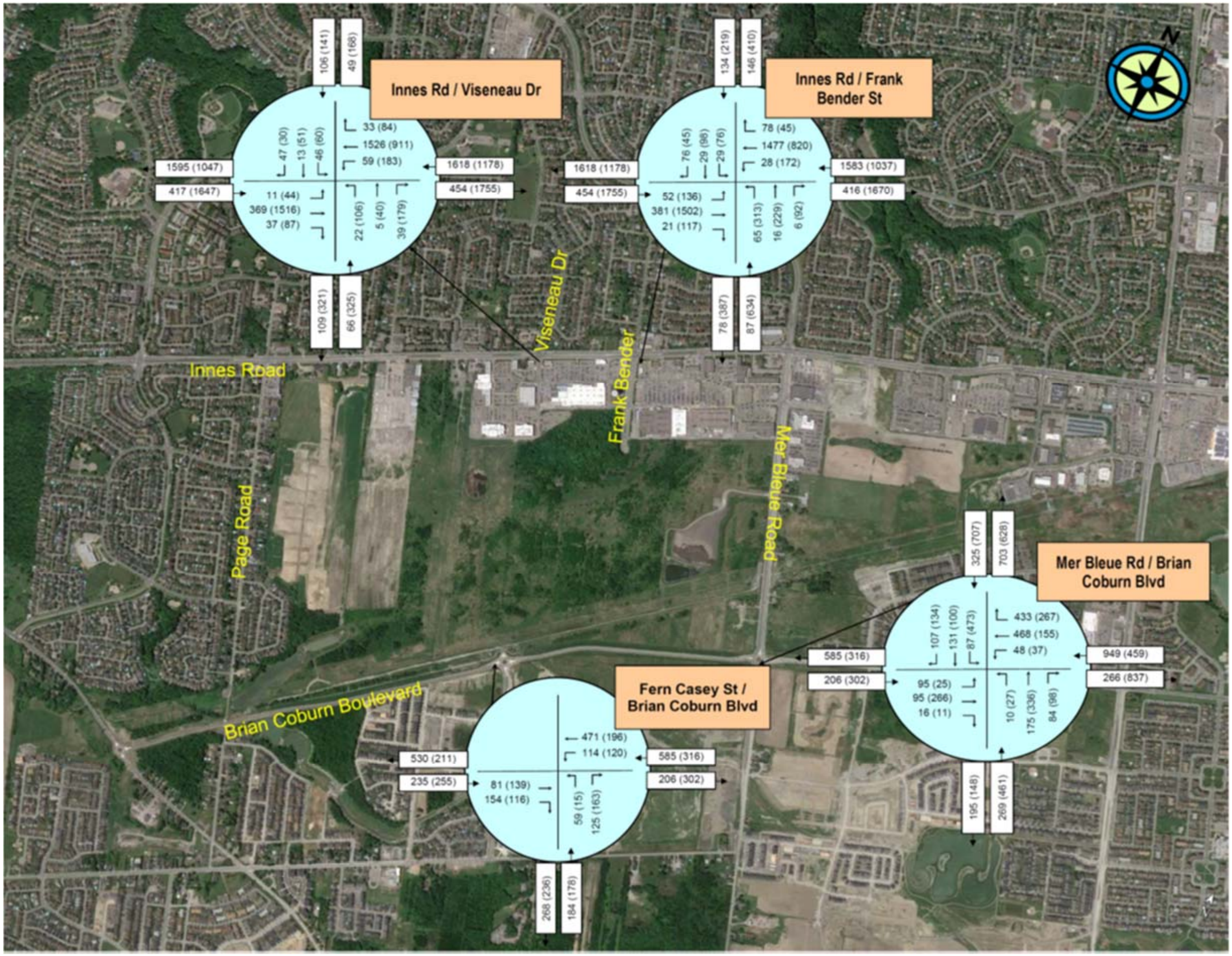


Exhibit 1-4: Existing (2020) – AM (PM) Peak Hour Traffic Volumes

A Review of the East Urban Community Phase III Master Transportation Study

The East Urban Community Phase III Master Transportation study indicated the following infrastructure recommendations within this TIA study area to support the Trailsedge North community as well as the surrounding developments to the south and to the west:

- Widening of the Brian Coburn Boulevard by the Interim Horizon year to a 4-lane facility;
- Traffic Signal Control at the intersection of Innes Road / Caivan Development; and
- Traffic Signal Control at the Mer Bleue Road / Vanguard Drive intersection by the interim horizon year.

The above improvements were considered baseline for this traffic impact assessment.

Other Adjacent Development Initiatives

A review of adjacent developments planned within the immediate study area was undertaken as part of this report. The following adjacent development initiatives have been identified (Appendix "E"):

- *Richcraft Trailsedge East: Stage 3 & 4:* The Trailsedge Stage 3 and 4 development is located immediately south of the proposed Trailsedge North Development. Stage 3 and 4 are bounded by the Hydro corridor in the north, Mer Bleue Road in the east, Fern Casey Street in the west and Renaud Road to the south. The residential portion of Stage 3 and 4 is anticipated to be built-out before the advent of significant development north of the hydro corridor. Collectively, these areas would involve 485 single homes, 767 townhomes, and 228 back-to-back townhouses;
- *Richcraft Blocks 193 and 194 (6429 Renaud Road):* This residential development is located in the southeast quadrant of the Brian Coburn Boulevard / Fern Casey Street roundabout and would provide for 90 back-to-back townhouse units and 96 mid-rise terrace dwellings. It is anticipated that this development would be complete by 2024;
- *Stage 6 - Minto Avalon West & 2336 Tenth Line Road (Mer Bleue Road/Decoeur Drive):* The Minto Avalon West residential development located east of the study area, as of Fall 2019, proposed an additional 256 townhomes and 180 single homes. The existing Mer Bleue Road/Decoeur Drive "T" intersection will be modified to provide for a fourth (west) leg that would provide access the future Trailsedge East (Phases 2/3) development;
- *Orleans Family Health Hub – EUC Phase 3 (TIS, HDR, March 2018)* envisions a medical facility at the north-east corner of the Mer Bleue Road/Brian Coburn Boulevard roundabout. The development holds the promise of potential longer-term on-site expansion. The initial phase of the development would provide 350 jobs and was originally anticipated to be constructed in 2016. It is anticipated (as a result of community demand for health services) that the medical facility will be expanded in the next 20-to-30 years to provide for approximately 1,500 jobs;
- *Mer Bleue Expansion Area (IBI MTS, April 2017):* This area is located to the south and east of the proposed site. It proposes approximately 3,600 residential units, 175,000 SF of institutional development and approximately 4 hectares of commercial development by the time of ultimate build-out. This development will largely affect background traffic growth along existing corridors such as

Navan Road, Mer Bleue Drive and Renaud Road corridors. The Summerside West Phase 4-6 TIA (Parsons, 2018) was referenced for the adjacent background traffic;

- *East Urban Community, Phase 2 (Delcan CTS, August 2013):* The EUC Phase 2 lands are located south of Renaud Road to south of Navan Road. It is anticipated that the full buildout would include approximately 1,400 residential units and approximately 635,000 SF of mixed-use development. It is anticipated that the Phase 2 lands will build-out from south-to-north, and therefore largely impact Navan Road and the Mer Bleue Road corridors over the next decade.
- *3604 Innes Road - Glenview Residential Development (EUC Phase III Lands) (Proposed Subdivision, 0 Innes Road TIA, Novatech, October 2019):* The Glenview development is located on the west side of the EUC Phase 3 lands adjacent to the Caivan development. Glenview proposes 457 dwellings which would consist of 180 singles, 109 townhouses and 168 stacked townhouses. It is assumed that this development will be bult-out by 2028;
- *Smartreit Development - 4200 Innes Road / 2025 Mer Bleue Road (Stantec January 2017)* - This site is located in the southeast quadrant of the Innes Road / Mer Bleue Road intersection and would be provided access to the future Vanguard Drive Extension corridor. The full site build-out would be composed of approximately 42,000 ft^2 GFA of retail spac, 14,000 ft^2 of restaurant space, 118,000 ft^2 industrial space, 1200 apartment units, 350 senior housing units and an assisted living building containing 256 beds. The site is anticipated to be built-out by 2026;
- *Caivan Subdivision and Lepine Mixed-Use High-Rise Development – 3490 Innes Road* – The Caivan subdivision is currently in development of 534 residential units west of the proposed Trailsedge North site. Additionally, the mixed-used Lepine High Rise Development anticipates 1,320 apartment dwellings and 28,000 ft2 of commercial retail. The full build-out of these developments is anticipated to occur by 2031.

2.0 Study Area and Time Periods

2.1 Study Area

The proposed Trailsedge North development meets the trip generation triggers requiring both a Design Review and Network.

The study area is proposed to include Brian Coburn Blvd, Innes Road and Mer Bleue Road as Boundary Streets for analysis.

The traffic study would address the following intersections:

- Brian Coburn Boulevard/Mer Bleue Road (Roundabout);
- Brian Coburn Boulevard / Fern Casey Street (Roundabout);
- Innes Road & Frank Bender Street (Signalized)
- Innes Road & Viseneau Drive (Signalized);
- Innes Road & Caivan Access (Un-signalized);
- Innes Road & Glenview Access (Signalized);
- Mer Bleue Road & Vanguard Drive (Signalized);
- Vanguard Drive & Fern Casey Street (Un-signalized);
- Frank Bender Street & Vanguard Drive (Un-signalized);
- Frank Bender & Fern Casey (Un-signalized);

2.2 Time Periods

The study will analyze the morning and afternoon peak hours of travel demand as they were envisioned to represent the "worst-case" scenario in terms of traffic volumes.

2.3 Horizon Years

For analysis purposes, the traffic study proposes to analyze three horizon years:

- A 2037 horizon that corresponds with the "Opening Day" or build-out of Phase 1;
- A 2042 horizon that corresponds with build-out of Phase 2; and
- A 2047 horizon that corresponds with build-out of Phase 3 residential;

3.0 EXEMPTION REVIEW

Table 3.1 is an extract from the TIA Guidelines (2017) in regard to possible reduction in scope of work of the traffic study.

Castleglenn would request the City of Ottawa to provide exemptions for Elements 4.2, 4.6.1 and 4.8 as indicated within the table.

In regards to Module 4.6, the NTM thresholds were reviewed for the adjacent Lamarche Avenue (Street No .1, Caivan Access) corridor and Glenview Access (Street No.7). The review indicated:

- The Caivan Development is anticipated to generate 176-to-182 vehicles-per-hour in the peak direction along Lamarche Avenue south of the Lepine Corp proposal at 3490 Innes Road. The future Trailsedge North community is forecast to increase the peak direction by less than 60 vehicles, remaining below the "Major Collector" threshold; and
- The Glenview Development is anticipated to generate 137-to-145 vehicles-per-hour in the peak direction along Street No. 9, indicated of a function of a "Collector Roadway". The proposed Trailsedge North community is forecast to increase traffic by less than 100 vehicles-per-hour in the peak direction, which remains below the threshold of "Major Collector" roadways.

The Lamarche Avenue and Glenview Access (Street No. 9) roadways will continue to function as Collector Roadways following the Trailsedge North development, therefore the Neighborhood Traffic Management module will not be reviewed.

Table 3-1: Exemptions as per TIA Guidelines

Module	Element	Exemption Considerations	Include Module in TIA
Design Review Component			
4.1 Development Design	**4.1.2 Circulation and Access**	Required for site plan.	No
	4.1.3 New Street Networks	Only required for plans of subdivision	**Yes**
4.2 Parking	**4.2.1 Parking Supply**	Required for site plan.	No
	4.2.2 Spillover Parking	Parking supply not anticipated to exceed minimum	No
Network Impact Component			
4.5 Transportation Demand Management	**All elements**		**Yes**
4.6 Neighbourhood Traffic Management	**4.6.1 Adjacent Neighbourhoods**	The development trips are not anticipated to exceed ATM thresholds for Fern Casey Street (Major Collector) Frank Bender Street (Collector), Vanguard Drive (Collector), Lamarche Avenue (Collector) and the Glenview Access (Collector) within the study area.	No
4.8 Network Concept		The proposed development is not anticipated to generate 200-person-trips more than the permitted zoning	No

4.0 Forecasting

4.1 Development-Generated Travel Demand

The proposed development is located within a suburban area outside the Greenbelt. The surrounding area is characterized by low-to-medium density residential development with commercial area south of Innes Road.

The development of the Trailsedge North community is anticipated to occur from the southwest toward the northeast.

The planning horizon for the East Urban Community Phase 3 lands north of the Hydro Corridor (Trailsedge North) is such that the future transportation network could vary greatly. The traffic forecasting methodology presents two cases for the future trips generated by the subject development:

- A traffic forecast consistent with the EUC Phase 3 Community Design Plan and Master Transportation Study that assumed the timing of the Cumberland Transitway remains beyond the 2031 planning horizon and could occur after the build-out of the Trailsedge North residential community; and
- A traffic forecast that assumes the Cumberland Transitway is in place before the full build-out of the Trailsedge North residential development.

4.1.1 Auto Trip Generation Rates

Table 4-1 summarizes the auto trip generation rates used for each land use. The vehicle trip generation rates and directional splits for the residential portions of all phases were referenced from Table 6.3 of the TRANS "*Trip Generation Residential Trip Rates Study*" (2009). The table indicates both the base trip generation rate and the "<600m to Rapid Transit" rate for comparison purposes.

Table 4-1: Trailsedge North Development: Adopted Traffic Generation Rates

Land Use	*Source*	*Independent Variable*	*Rapid Transit / Base Rate*	*Morning Peak Hour*			*Afternoon Peak Hour*		
				Rate	*In*	*Out*	*Rate*	*In*	*Out*
Single-Detached Dwellings	TRANS (Table 6.2, 6.3)	Dwelling Units	Rapid Transit	0.49	29%	71%	0.63	62%	38%
			Base Rate	0.70	29%	71%	0.90	62%	38%
Semi-Detached Dwellings, Townhouses, Rowhouses	TRANS (Table 6.2, 6.3)	Dwelling Units	Rapid Transit	0.39	37%	63%	0.51	53%	47%
			Base Rate	0.54	37%	63%	0.71	53%	47%
Mid-Rise Apartment	TRANS (Table 6.2, 6.3)	Dwelling Units	No Rate Difference	0.29	24%	76%	0.37	62%	38%

4.1.2 Auto Trip Generation

Table 4-2 and Table 4-3 detail the non-cumulative auto trip generation for each phase of the proposed Trailsedge North with and without the future Cumberland Transitway, respectively.

Altogether, the entire residential component of the Trailsedge North development would produce an additional 168 auto trips in the morning peak hour and 221 auto trips during the afternoon peak hour without the Cumberland Transitway in place assuming the inherent mode shares within each auto rate.

4.1.3 Estimate of Total Development Generated Person Trips

Table 4-4 and Table 4-5 summarize conversion of base auto trips generated by the development phases to an equivalent number of person-trips with, and without, the Cumberland Transitway in place. The adopted mode shares for "without the Cumberland Transitway" were referenced from Table 3.13 of the TRANS Trip Generation Study for single-detached dwellings, townhouses and apartment residential units.

The inherit trip mode shares presented in Table 3.13 do not distinguish between areas nearest a rapid transit station and areas that are served by standard bus routes.

To determine base mode shares for a rapid transit scenario, it was assumed that each phase off the development would generate an equivalent number of person trips during the peak hour regardless if the Cumberland Transitway is in place or not. Therefore, the base mode shares assigned to the "With Cumberland Transitway" scenario were determined from the based on the mode shares presented within Table 3.13 of the TRANS Trip Generation Study and the number of person trips generated by the proposed development.

In comparison, the "With Rapid Transit" mode shares:

- Provide a reduced share of auto drivers from 55%-to-64% without rapid transit to approximately 38%-to-40% with rapid transit;
- Result in a substantial increase in transit share from 25%-to-27% without rapid transit to 38%-to-40% with rapid transit; and
- Have similar auto passenger and active mode shares to the base case.

Table 4-2: Trailsedge North (EUC Phase 3) Development: Auto Traffic Generation With Cumberland Transitway

Land Use	*Source*	*Size*	*Morning Peak Hour (vehicles/hour)*			*Afternoon Peak Hour (vehicles/hour)*		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Phase 1: 2037 Time Horizon								
Single-Detached Dwellings	TRANS	95 Dwelling Units	13	34	47	37	23	60
Townhouses	TRANS	155 Dwelling Units	22	38	60	42	37	79
Mid-Rise Apartment	TRANS	444 Dwelling Units	31	98	129	102	62	164
Phase 1 Total Auto Trips/Hour			**66**	**170**	**236**	**181**	**122**	**303**
Phase 2: 2042 Time Horizon								
Single-Detached Dwellings	TRANS	119 Dwelling Units	17	41	58	46	29	75
Townhouses	TRANS	252 Dwelling Units	36	62	98	68	61	129
Mid-Rise Apartment	TRANS	200 Dwelling Units	14	44	58	46	28	74
Phase 2 Total Auto Trips/Hour			**67**	**147**	**214**	**160**	**118**	**278**
Phase 3: 2047 Time Horizon								
Single-Detached Dwellings	TRANS	126 Dwelling Units	18	44	62	49	30	79
Townhouses	TRANS	236 Dwelling Units	34	58	92	64	56	120
Mid-Rise Apartment	TRANS	415 Dwelling Units	29	91	120	95	59	154
Phase 3 Total Auto Trips/Hour			**81**	**193**	**274**	**208**	**145**	**353**
Total Auto Trips/Hour			**214**	**510**	**724**	**549**	**385**	**934**

Table 4-3: Trailsedge North (EUC Phase 3) Development: Auto Traffic Generation Without Cumberland Transitway

Land Use	*Source*	*Size*	*Morning Peak Hour (veh/hr)*			*Afternoon Peak Hour (veh/hr)*		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Phase 1: 2037 Time Horizon								
Single-Detached Dwellings	TRANS	95 Dwelling Units	19	48	67	53	33	86
Townhouses	TRANS	155 Dwelling Units	31	53	84	58	52	110
Mid-Rise Apartment	TRANS	444 Dwelling Units	31	98	129	102	62	164
Phase 1 Total Auto Trips/Hour			**81**	**199**	**280**	**213**	**147**	**360**
Phase 2: 2042 Time Horizon								
Single-Detached Dwellings	TRANS	119 Dwelling Units	24	59	83	66	41	107
Townhouses	TRANS	252 Dwelling Units	50	86	136	95	84	179
Mid-Rise Apartment	TRANS	200 Dwelling Units	14	44	58	46	28	74
Phase 2 Total Auto Trips/Hour			**88**	**189**	**277**	**207**	**153**	**360**
Phase 3: 2047 Time Horizon								
Single-Detached Dwellings	TRANS	126 Dwelling Units	26	62	88	70	43	113
Townhouses	TRANS	236 Dwelling Units	47	80	127	89	79	168
Mid-Rise Apartment	TRANS	415 Dwelling Units	29	91	120	95	59	154
Phase 3 Total Auto Trips/Hour			**102**	**233**	**335**	**254**	**181**	**435**
Total Auto Trips/Hour			**271**	**621**	**892**	**674**	**481**	**1,155**

Table 4-4: Mode Share and Person-Trips-Per-Hour by Dwelling Type (TRANS Trip Table 3.13)

Assumes Cumberland Transitway in Place

Travel Mode	Single Detached Dwellings								Townhouses								Mid-Rise Apartments							
	Mode Share	*Morning Peak Hour (person trips/hr)*			Mode Share	*Afternoon Peak Hour (person trips/hr)*			Mode Share	*Morning Peak Hour (person trips/hr)*			Mode Share	*Afternoon Peak Hour (person trips/hr)*			Mode Share	*Morning Peak Hour (person trips/hr)*			Mode Share	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*
Phase 1: 2037 Time Horizon																								
Auto Driver	39%	13	34	47	45%	37	23	60	39%	22	38	60	44%	42	37	79	44%	31	98	129	44%	102	62	164
Auto Passenger	10%	4	9	13	10%	8	5	13	10%	6	10	15	11%	11	9	20	9%	6	20	26	14%	32	20	52
Transit	40%	13	35	48	30%	25	15	40	40%	22	38	61	30%	30	26	56	34%	24	76	100	33%	77	46	123
Non-Motorized	11%	4	10	14	15%	13	8	21	11%	6	11	17	15%	14	13	27	13%	9	29	38	9%	21	13	34
Total (Phase 1)	**100%**	**34**	**88**	**122**	**100%**	**83**	**51**	**134**	**100%**	**56**	**97**	**152**	**100%**	**97**	**85**	**182**	**100%**	**70**	**223**	**293**	**100%**	**232**	**141**	**373**
Phase 2: 2042 Time Horizon																								
Auto Driver	38%	17	41	58	45%	46	29	75	40%	36	62	98	44%	68	61	129	44%	14	44	58	44%	46	28	74
Auto Passenger	10%	4	11	15	11%	11	7	18	10%	9	16	25	11%	17	15	32	9%	3	9	12	14%	15	9	24
Transit	39%	17	42	59	29%	30	18	48	42%	38	67	105	37%	58	50	108	34%	11	34	45	33%	35	20	55
Non-Motorized	13%	6	14	20	15%	16	10	26	8%	7	13	20	8%	12	11	23	13%	4	13	17	9%	9	6	15
Total (Phase 2)	**100%**	**44**	**108**	**152**	**100%**	**103**	**64**	**167**	**100%**	**90**	**158**	**248**	**100%**	**155**	**137**	**292**	**100%**	**32**	**100**	**132**	**100%**	**105**	**63**	**168**
Phase 3: 2047 Time Horizon																								
Auto Driver	39%	18	44	62	45%	49	30	79	40%	34	58	92	44%	64	56	120	44%	29	91	120	44%	95	59	154
Auto Passenger	11%	6	12	18	12%	13	8	21	10%	9	15	23	11%	16	14	30	9%	6	19	25	14%	30	19	49
Transit	39%	18	44	62	29%	32	19	51	42%	36	61	97	37%	54	50	104	34%	22	70	93	33%	72	44	116
Non-Motorized	11%	6	12	18	14%	16	10	25	8%	7	12	18	8%	12	10	22	13%	9	27	35	9%	20	12	32
Total (Phase 3)	**100%**	**48**	**112**	**160**	**100%**	**110**	**67**	**177**	**100%**	**86**	**146**	**230**	**100%**	**146**	**130**	**276**	**100%**	**66**	**207**	**273**	**100%**	**217**	**134**	**351**
Total Generated Trips																								
Auto Driver		48	119	167		132	82	214		92	158	250		174	154	328		74	233	307		243	149	392
Auto Passenger		14	32	46		32	20	52		17	29	46		44	38	82		15	48	63		77	48	125
Transit		48	121	169		87	52	139		45	77	122		141	126	267		57	180	238		184	110	294
Non-Motorized		16	36	52		45	28	72		13	23	36		38	34	72		22	69	90		50	31	81
Total (Build-Out)		**126**	**308**	**434**		**296**	**182**	**478**		**167**	**287**	**454**		**397**	**352**	**749**		**168**	**530**	**698**		**554**	**338**	**892**

Table 4-5: Mode Share and Person-Trips-Per-Hour by Dwelling Type (TRANS Trip Table 3.13)

Without Cumberland Transitway in Place

Single Detached Dwellings

Travel Mode	**Mode Share**	*Morning Peak Hour (person trips/hr)*			**Mode Share**	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Phase 1 – Single Units								
Auto Driver	55%	19	48	67	64%	53	33	86
Auto Passenger	11%	4	10	14	11%	9	6	15
Transit	25%	9	22	30	19%	16	10	25
Non-Motorized	9%	3	8	11	6%	5	3	8
Total (Phase 1)	**100%**	**34**	**88**	**122**	**100%**	**83**	**52**	**134**
Phase 2: 2042 Time Horizon								
Auto Driver	55%	24	59	83	64%	66	41	107
Auto Passenger	11%	5	12	16	11%	11	7	18
Transit	25%	11	27	38	19%	20	12	32
Non-Motorized	9%	4	10	14	6%	6	4	10
Total (Phase 2)	**100%**	**44**	**108**	**152**	**100%**	**103**	**64**	**167**
Phase 3: 2047 Time Horizon								
Auto Driver	55%	26	62	88	64%	70	43	113
Auto Passenger	11%	5	12	18	11%	12	7	19
Transit	25%	12	28	40	19%	21	13	34
Non-Motorized	9%	4	10	14	6%	7	4	11
Total (Phase 3)	**100%**	**47**	**112**	**160**	**100%**	**110**	**67**	**177**
Total Generated Trips								
Auto Driver		69	169	238		189	117	306
Auto Passenger		14	34	48		32	20	52
Transit		32	77	109		57	34	91
Non-Motorized		11	28	39		18	11	29
Total (Build-Out)		**126**	**308**	**434**		**296**	**182**	**478**

Townhouses

Travel Mode	**Mode Share**	*Morning Peak Hour (person trips/hr)*			**Mode Share**	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Phase 1 – Single Units								
Auto Driver	55%	31	53	84	61%	59	52	111
Auto Passenger	10%	6	10	15	11%	11	9	20
Transit	27%	15	26	41	22%	21	19	40
Non-Motorized	8%	4	8	12	6%	6	5	11
Total (Phase 1)	**100%**	**56**	**97**	**152**	**100%**	**97**	**85**	**182**
Phase 2: 2042 Time Horizon								
Auto Driver	55%	50	86	136	61%	95	84	179
Auto Passenger	10%	9	16	25	11%	17	15	32
Transit	27%	24	43	67	22%	34	30	64
Non-Motorized	8%	7	13	20	6%	9	8	17
Total (Phase 2)	**100%**	**90**	**158**	**248**	**100%**	**155**	**137**	**292**
Phase 3: 2047 Time Horizon								
Auto Driver	55%	47	80	127	61%	89	79	168
Auto Passenger	10%	9	15	23	11%	16	14	30
Transit	27%	23	39	62	22%	32	29	61
Non-Motorized	8%	7	12	18	6%	9	8	17
Total (Phase 3)	**100%**	**86**	**146**	**230**	**100%**	**146**	**130**	**276**
Total Generated Trips								
Auto Driver		128	219	347		242	215	457
Auto Passenger		24	41	63		44	38	82
Transit		62	108	170		87	78	164
Non-Motorized		18	33	50		24	21	46
Total (Build-Out)		**232**	**401**	**630**		**397**	**352**	**749**

Mid-Rise Apartments

Travel Mode	**Mode Share**	*Morning Peak Hour (person trips/hr)*			**Mode Share**	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Phase 1 – Single Units								
Auto Driver	44%	31	98	129	44%	102	62	164
Auto Passenger	9%	6	20	26	14%	32	20	52
Transit	34%	24	76	100	33%	77	46	123
Non-Motorized	13%	9	29	38	9%	21	13	34
Total (Phase 1)	**100%**	**70**	**223**	**293**	**100%**	**232**	**141**	**373**
Phase 2: 2042 Time Horizon								
Auto Driver	44%	14	44	58	44%	46	28	74
Auto Passenger	9%	3	9	12	14%	15	9	24
Transit	34%	11	34	45	33%	35	20	55
Non-Motorized	13%	4	13	17	9%	9	6	15
Total (Phase 2)	**100%**	**32**	**100**	**132**	**100%**	**105**	**63**	**168**
Phase 3: 2047 Time Horizon								
Auto Driver	44%	29	91	120	44%	95	59	154
Auto Passenger	9%	6	19	25	14%	30	19	49
Transit	34%	22	70	93	33%	72	44	116
Non-Motorized	13%	9	27	35	9%	20	12	32
Total (Phase 3)	**100%**	**66**	**207**	**273**	**100%**	**217**	**134**	**351**
Total Generated Trips								
Auto Driver		74	233	307		243	149	392
Auto Passenger		15	48	63		77	48	125
Transit		57	180	238		184	110	294
Non-Motorized		22	69	90		50	31	81
Total (Build-Out)		**168**	**530**	**698**		**554**	**338**	**892**

4.1.4 Existing and Future Mode Shares

Table 4-6 summarizes the existing and future mode shares adopted for the proposed development with the Cumberland Transitway in place, as well as a rationale for the future mode shares.

The existing and future mode shares for the proposed development were based on the mode shares as developed and rationalized in the East Urban Community (EUC) Phase 3 Area Community Design Plan – Master Transportation Study (CastleGlenn, May 2020)[2].

The implementation of the Cumberland Transitway to support the development was associated with a 5% decrease in travel demand for the auto-drivers and auto-passenger mode, while the transit mode share was assumed to increase by 15%-to-20%.

Table 4-6: Existing and Future Mode Shares – With the Cumberland Transitway

Travel Mode	*Peak Existing Mode Shares*		*Forecast*	*Rationale*
	AM	*PM*	*AM & PM*	
Auto Driver	55%	65%	55%	Auto mode assumed to be similar to existing mode share, reduced by 2037 due to Cumberland Transitway
Auto Passenger	20%	20%	10%	Auto passenger mode reduced in 2037 due to Cumberland Transitway. Less drivers would result in less auto passengers
Transit	15%	10%	30%	Increase in Transit due to Trim Rd. Extension, isolated transit improvements, Cumberland Transitway would have a significant benefit to transit
Non-Motorized	10%	5%	5%	Active modes would likely be consistent across scenarios

The future mode shares would likely involve an increase in transit mode share due to the:

- Planned isolated transit improvements along Innes Road and Brian Coburn Boulevard,
- Extension of the LRT to east of Jeanne d'Arc Blvd, and;
- the assumption that the Cumberland Transitway would be in place by 2037. The Cumberland Transitway would be expected to result in a substantial shift of existing auto drivers and auto passengers once constructed.

2. Existing and future mode shares were obtained from Table 9.3 and Table 9.4of the EUC Phase 3 CDP MTS, respectively

The Chapel Hill Park and Ride at Navan Road and Brian Coburn Boulevard would have a limited benefit to the study area transit mode share as trips to and from the Park and Ride would remain on Brian Coburn Boulevard as an Auto trip.

Table 4-6 summarizes the existing and future mode shares without the proposed Cumberland Transitway in place. Without the additional transit infrastructure, the greater study area would rely on local transit routes to connect riders with the LRT to the north and parallel east-west bus lines.

The existing and future mode shares for the proposed development was directly referenced from *Table 9.4: Future Mode Share* from the East Urban Community (EUC) Phase 3 Area Community Design Plan – Master Transportation Study (CastleGlenn, December 2020)[3].

Table 4-7: Existing and Future Mode Shares – Without the Cumberland Transitway

Travel Mode	*Peak Existing Mode Shares*		*Forecast*	*Rationale*
	AM	*PM*	*AM & PM*	
Auto Driver	55%	65%	60%	Auto Mode anticipated to remain similar to existing without Transitway in place
Auto Passenger	20%	20%	15%	
Transit	15%	10%	20%	Increase in Transit due to Trim Rd. Extension and isolated transit improvements
Non-Motorized	10%	5%	5%	Active modes would likely be consistent across scenarios

4.1.5 Projected Development Trips by Mode

Table 4-8 and Table 4-9 summarize the forecast person-trips associated with each trip mode by dwelling type for each phase of the development assuming with and without the Cumberland Transitway in place, respectively. Regardless of the transit scenario, both person-trip forecasts sum to the same number of person trips.

3. Existing and future mode shares were obtained from Table 9.3 and Table 9.4 of the EUC Phase 3 CDP MTS, respectively

Table 4-8: Person Trips Forecast - Person-Trips-Per-Hour by Dwelling Type and Phase

Assumes Cumberland Transitway in Place

Travel Mode	**Single Detached Dwellings**								**Townhouses**								**Mid-Rise Apartments**							
	Mode Share	*Morning Peak Hour (person trips/hr)*			**Mode Share**	*Afternoon Peak Hour (person trips/hr)*			**Mode Share**	*Morning Peak Hour (person trips/hr)*			**Mode Share**	*Afternoon Peak Hour (person trips/hr)*			**Mode Share**	*Morning Peak Hour (person trips/hr)*			**Mode Share**	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*
Phase 1: 2037 Time Horizon																								
Auto Driver	55%	19	48	67	55%	46	28	74	55%	31	53	84	55%	53	47	100	55%	38	123	161	55%	128	78	206
Auto Passenger	10%	4	9	12	10%	8	5	13	10%	6	10	15	10%	10	9	19	10%	7	22	29	10%	23	14	37
Transit	30%	9	27	37	30%	25	15	40	30%	17	29	46	30%	28	25	53	30%	21	67	88	30%	69	42	111
Non-Motorized	5%	2	4	6	5%	4	3	7	5%	3	5	8	5%	5	4	9	5%	4	11	15	5%	12	7	19
Total (Phase 1)	**100%**	**34**	**88**	**122**	**100%**	**83**	**51**	**134**	**100%**	**57**	**97**	**153**	**100%**	**96**	**85**	**180**	**100%**	**70**	**223**	**293**	**100%**	**232**	**141**	**373**
Phase 2: 2042 Time Horizon																								
Auto Driver	55%	24	59	83	55%	56	36	92	55%	50	86	136	55%	85	76	161	55%	17	55	72	55%	57	35	92
Auto Passenger	10%	4	11	15	10%	10	6	16	10%	9	16	25	10%	16	13	29	10%	3	10	13	10%	11	6	17
Transit	30%	13	32	45	30%	31	19	50	30%	27	48	75	30%	46	41	87	30%	10	30	40	30%	32	19	51
Non-Motorized	5%	3	6	9	5%	6	3	9	5%	4	8	12	5%	8	7	15	5%	2	5	7	5%	5	3	8
Total (Phase 2)	**100%**	**44**	**108**	**152**	**100%**	**103**	**64**	**167**	**100%**	**90**	**158**	**248**	**100%**	**155**	**137**	**292**	**100%**	**32**	**100**	**132**	**100%**	**105**	**63**	**168**
Phase 3: 2047 Time Horizon																								
Auto Driver	55%	26	61	87	55%	60	37	97	55%	47	80	127	55%	81	70	151	55%	36	114	150	55%	119	74	193
Auto Passenger	10%	6	10	16	10%	11	7	18	10%	9	15	23	10%	15	13	28	10%	7	21	27	10%	22	13	35
Transit	30%	13	35	48	30%	33	20	53	30%	26	43	69	30%	44	41	85	30%	20	62	82	30%	65	40	105
Non-Motorized	5%	3	6	9	5%	6	3	9	5%	4	8	12	5%	6	6	12	5%	3	10	14	5%	11	7	18
Total (Phase 3)	**100%**	**48**	**112**	**160**	**100%**	**110**	**67**	**177**	**100%**	**86**	**146**	**232**	**100%**	**146**	**130**	**276**	**100%**	**66**	**207**	**273**	**100%**	**217**	**134**	**351**
Total Generated Trips																								
Auto Driver		69	168	237		162	101	263		128	219	347		219	193	412		74	233	307		243	149	392
Auto Passenger		14	30	43		29	18	47		24	41	63		41	35	76		15	48	63		77	48	125
Transit		35	94	130		89	54	143		70	120	190		118	107	226		57	180	238		184	110	294
Non-Motorized		8	16	24		16	9	25		11	21	32		19	17	36		22	69	90		50	31	81
Total (Build-Out)		**126**	**308**	**434**		**296**	**182**	**478**		**232**	**401**	**633**		**397**	**352**	**749**		**168**	**530**	**698**		**554**	**338**	**892**

Table 4-9: Person Trips Forecast - Person-Trips-Per-Hour by Dwelling Type and Phase

Without Cumberland Transitway in Place

Travel Mode	**Single Detached Dwellings**								**Townhouses**								**Mid-Rise Apartments**							
	Mode Share	*Morning Peak Hour (person trips/hr)*			*Mode Share*	*Afternoon Peak Hour (person trips/hr)*			*Mode Share*	*Morning Peak Hour (person trips/hr)*			*Mode Share*	*Afternoon Peak Hour (person trips/hr)*			*Mode Share*	*Morning Peak Hour (person trips/hr)*			*Mode Share*	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*		*In*	*Out*	*Total*
Phase 1 – Single Units																								
Auto Driver	60%	21	52	73	60%	50	31	80	60%	34	58	92	60%	57	51	108	60%	42	134	176	60%	139	85	224
Auto Passenger	15%	5	13	18	15%	12	7	20	15%	8	14	23	15%	15	13	28	15%	11	33	44	15%	35	21	56
Transit	20%	6	19	25	20%	17	10	26	20%	11	20	31	20%	19	17	36	20%	14	45	59	20%	46	28	74
Non-Motorized	5%	2	4	6	5%	4	3	7	5%	3	5	8	5%	5	4	9	5%	4	11	15	5%	12	7	19
Total (Phase 1)	**100%**	**34**	**88**	**122**	**100%**	**83**	**51**	**134**	**100%**	**56**	**97**	**153**	**100%**	**97**	**85**	**182**	**100%**	**71**	**223**	**294**	**100%**	**232**	**141**	**373**
Phase 2: 2042 Time Horizon																								
Auto Driver	60%	26	65	91	60%	62	38	100	60%	54	94	148	60%	93	82	175	60%	19	60	79	60%	63	38	101
Auto Passenger	15%	7	16	22	15%	15	9	24	15%	14	24	38	15%	23	20	43	15%	5	15	20	15%	16	9	25
Transit	20%	8	22	30	20%	20	14	34	20%	18	32	50	20%	31	28	59	20%	6	20	26	20%	21	13	34
Non-Motorized	5%	3	5	8	5%	6	3	9	5%	4	8	12	5%	8	7	15	5%	2	5	7	5%	5	3	8
Total (Phase 2)	**100%**	**44**	**108**	**152**	**100%**	**103**	**64**	**167**	**100%**	**90**	**158**	**248**	**100%**	**155**	**137**	**292**	**100%**	**32**	**100**	**132**	**100%**	**105**	**63**	**168**
Phase 3: 2047 Time Horizon																								
Auto Driver	60%	28	67	95	60%	66	40	106	60%	51	88	139	60%	90	78	168	60%	39	124	163	60%	130	80	211
Auto Passenger	15%	7	17	24	15%	16	10	26	15%	13	22	35	15%	21	20	41	15%	10	31	41	15%	33	20	53
Transit	20%	10	22	32	20%	22	14	36	20%	17	29	46	20%	29	26	55	20%	13	41	55	20%	43	27	70
Non-Motorized	5%	3	6	9	5%	6	3	9	5%	5	7	12	5%	6	6	12	5%	3	10	14	5%	11	7	18
Total (Phase 3)	**100%**	**48**	**112**	**160**	**100%**	**110**	**67**	**177**	**100%**	**86**	**146**	**232**	**100%**	**146**	**130**	**276**	**100%**	**65**	**206**	**273**	**100%**	**217**	**134**	**352**
Total Generated Trips																								
Auto Driver		75	184	259		178	109	287		139	240	379		240	211	451		100	318	418		332	203	536
Auto Passenger		19	46	64		43	26	70		35	60	96		59	53	112		26	79	105		84	50	134
Transit		24	63	87		59	38	96		46	81	127		79	71	150		33	106	140		110	68	178
Non-Motorized		8	15	23		16	9	25		12	20	32		19	17	36		9	26	36		28	17	45
Total (Build-Out)		**126**	**308**	**434**		**296**	**182**	**478**		**232**	**401**	**633**		**397**	**352**	**749**		**168**	**530**	**699**		**554**	**338**	**892**

Table 4-10 summarizes the cumulative total number of trips generated by the development by mode assuming with and without the Cumberland Transitway in place for each of the 3 time-horizons evaluated.

Table 4-10: Summary of Cumulative Trip Generation - Trailsedge North

Travel Mode	*Without Cumberland Transitway*						*With Cumberland Transitway*					
	Morning Peak Hour (trips/hr)			*Afternoon Peak Hour (trips/hr)*			*Morning Peak Hour (trips/hr)*			*Afternoon Peak Hour (trips/hr)*		
	In	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*
Phase 1: 2037 Time Horizon												
Auto Driver	97	244	341	247	168	415	88	224	312	227	153	380
Auto Passenger	24	61	85	62	41	103	16	41	57	41	28	69
Transit	31	81	112	82	55	137	48	122	170	123	83	206
Non-Motorized	9	20	29	21	14	35	9	20	29	21	14	35
Cumulative Total	**161**	**407**	**568**	**412**	**278**	**690**	**161**	**407**	**568**	**412**	**278**	**690**
Phase 2: 2042 Time Horizon												
Auto Driver	197	462	659	466	327	793	179	424	603	425	300	725
Auto Passenger	50	115	165	116	81	197	34	75	108	78	54	132
Transit	64	154	218	154	109	263	98	232	330	232	163	395
Non-Motorized	18	38	56	39	27	66	18	38	56	39	27	66
Cumulative Total	**329**	**769**	**1,098**	**775**	**544**	**1,319**	**329**	**769**	**1,097**	**774**	**544**	**1,319**
Phase 3: 2047 Time Horizon												
Auto Driver	315	741	1,056	750	525	1,275	288	680	968	685	481	1,166
Auto Passenger	80	185	265	187	131	318	53	122	175	126	87	213
Transit	103	247	350	248	175	423	158	371	529	374	263	637
Non-Motorized	27	61	88	62	44	106	26	61	87	62	44	106
Cumulative Total	**525**	**1,234**	**1,759**	**1,247**	**875**	**2,122**	**525**	**1,234**	**1,759**	**1,247**	**875**	**2,122**

The Auto-Driver mode encompasses the number of external trips from the proposed Trailsedge North development, including those trips destined to and from the Chapel Hill park and ride.

A comparison between the two transit scenarios was found to indicate:

- By 2037, the forecast two-way vehicle traffic generated by the development would be 29-to-35 vehicles per hour greater without the Cumberland Transitway, which would largely affect the Brian Coburn Boulevard corridor which accommodates the first phase of development within Trailsedge North;
- By 2042, there would be a difference of 56-to-68 vehicles per hour distributed to the Innes Road and Brian Coburn Boulevard corridors; and
- By 2047, there would be a difference of 88-to-109 vehicle trips during each peak hour of travel demand which would impact Brian Coburn Boulevard, Innes Road and Mer Bleue Road; and

- Altogether, the Cumberland Transitway is forecast to reduce auto trip peak hour volumes by less than 10% based on the above long-term planning assumptions.

Given the long-term planning horizon, and the unknown timing of the Cumberland Transitway, the remaining analysis has adopted the "Without Transitway" traffic volumes. This assumption remains consistent with the EUC Phase 3 MTS. Should the Cumberland Transitway timing become known with more certainty, the timing of infrastructure, and the overall impact of the development, could be further refined.

4.1.6 Trip Reduction Factors

Pass-by and internal trip reductions were considered to be negligible for the site since the proposed development is entirely residential until after the completion of Trailsedge North Phase 3.

4.1.7 Trip Distribution

Table 4-11 summarizes the traffic distribution adopted for the proposed site. Establishing the traffic distribution pattern involved a review of existing travel patterns, and local planning documents such as the EUC Phase 3 MTS (Castleglenn, December 2020) and the Trailsedge East MTS (Castleglenn, 2018).

To access areas west of the development, approximately 60% of the site generated traffic was assigned to/from the Brian Coburn Boulevard corridor, with the remainder assigned to Innes Road. Likewise to access areas east of the site, up to 50% of the traffic was assigned to the Brian Coburn Boulevard / Fern Casey Street intersection until the advent of the complete Vanguard Drive corridor, in which the distribution was reduced to 25%.

The employment areas in Phase 4 of the development were not considered in the analysis.

Table 4-11: Traffic Distribution

To/From	*Residential Traffic Distribution*
North	27%
East	17%
South	6%
West	50%

4.1.8 Trip Assignment

Following the EUC Phase III MTS, the study adopted a "shortest path" principle to assign auto traffic generated by the development to the surrounding network.

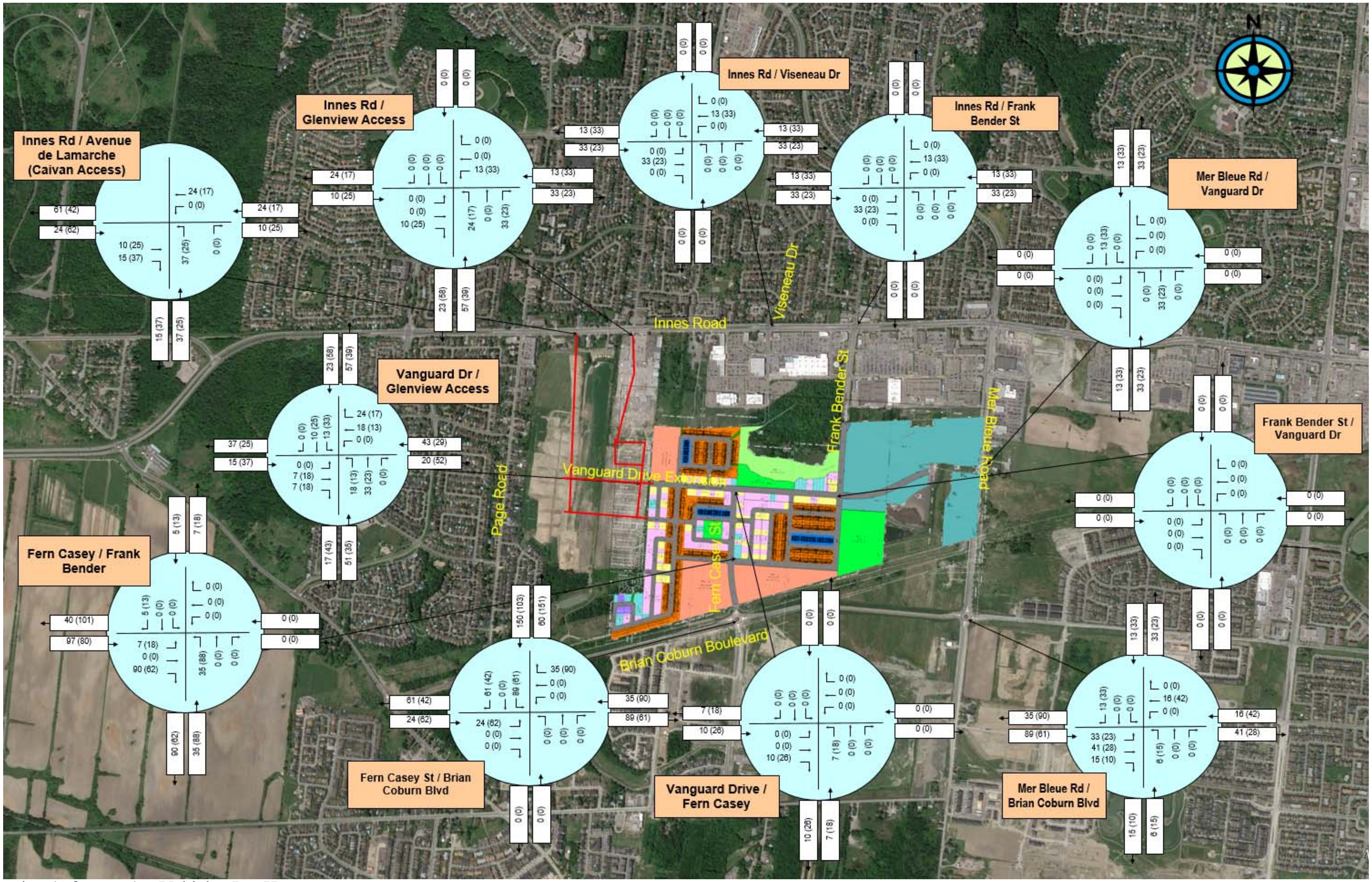
The following network assumptions were made during the assignment:

- The north leg of the Fern Casey Street / Brian Coburn Boulevard intersection was assumed to have been constructed by the 2037 time-horizon;
- Fern Casey Street and the western portion of Vanguard Drive were assumed to be in place at the completion of Phase 1 and would serve to connect the development to Innes Road through the Caivan and Glenview roadway networks;
- The Vanguard Drive extension was assumed to be extended to Frank Bender Street by 2042, and extended further to Mer Bleue Road by 2047. The west leg of the future Mer Bleue Road / Vanguard Drive intersection was assumed to be open by this time; and
- Brian Coburn Boulevard was assumed to have been upgraded to a 4-lane cross section by the 2037 time-horizon.

As each phase of the Trailsedge North development progresses and the advent of each of the above infrastructure elements becomes available, the site generated trips are re-assigned accordingly.

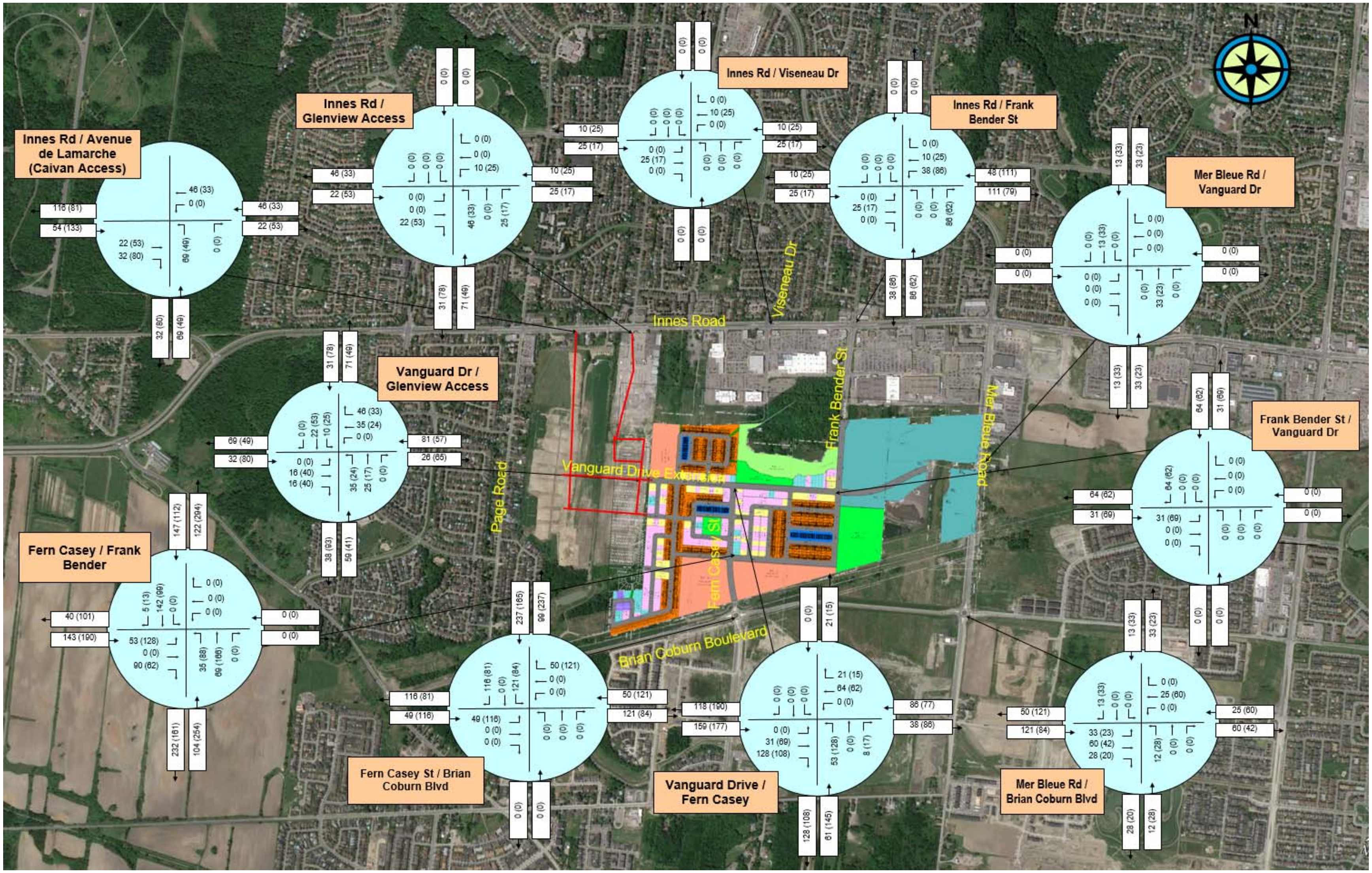
4.1.9 Site Traffic Volumes

Exhibit 4-1, Exhibit 4-2 and Exhibit 4-3 illustrate the cumulative morning and afternoon peak auto trips generated for each phase of the proposed Trailsedge North residential development



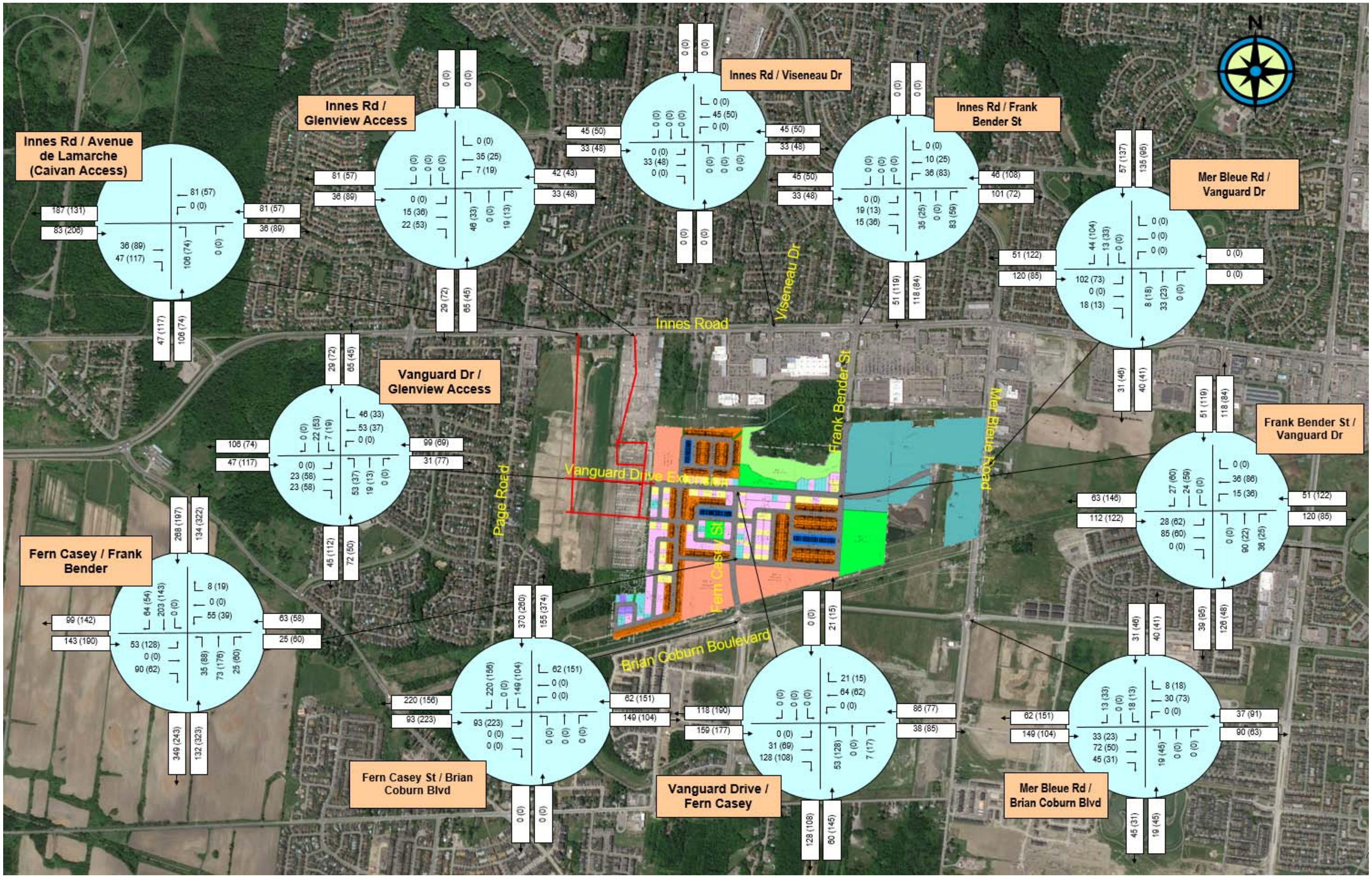
Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 4-1: Trailsedge North Site Generated Traffic: Phase 1 (2037)



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 4-2: Trailsedge North Site Generated Traffic: Phase 1 & 2 (2042)



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 4-3: Trailsedge North Site Generated Traffic: Phase 1-thru-3 (2047)

5.0 BACKGROUND NETWORK TRAFFIC

5.1 HISTORICAL BACKGROUND GROWTH RATE

The 2011 and 2031 Long-Range Transportation Model was reviewed to determine an appropriate background growth rate to be applied for the study area, given the long-term planning horizons. The average 20-year growth rate was found to be approximately 1% across the Innes Road- Brian Coburn Boulevard-Renaud Road screenline within the model horizons.

The EUC Phase III MTS undertook an extensive review of future developments to estimate forecast travel demand without the use of a general background growth rate. Alternatively, the MTSadopted an "Orphan Movement" approach that applied a 1% growth rate to movements that were not impacted by either the EUC Phase III area or any other adjacent development.

This study adopted a background growth rate of 1% per year to all existing turning movements to account for traffic volume growth attributed to developments outside of the study area and developments that could well occur beyond those already planned. This approach was adopted as the developments within the study area are likely to be near, or at complete build-out, by the initial phases of the Trailsedge North residential development.

5.2 SURROUNDING DEVELOPMENT TRAFFIC GENERATION

Appendix "D" contains exhibits that illustrate the anticipated impact of the adjacent developments as described below as well as relevant extracts from the respective traffic studies.

5.2.1 Richcraft Trailsedge East: Stage 3

The Trailsedge East CTS (Castleglenn, 2018) was reviewed to include the planned development and traffic distribution assigned to the Trailsedge area south of the proposed 6429 Renaud Road development. Richcraft provided a revised unit and build-out schedule that was adopted for this study.

Table 5-1 summarizes the Trailsedge Phase 3 cumulative residential dwelling unit forecasts and associated trip generation rates adopted for this study. Trailsedge East Phase 3 is expected to be fully built out by 2037.

Table 5-1: Trailsedge Phase 3 Development and Trips Rates

Land Use	*Source*	*Independent Variable*	*Morning Peak Hour*			*Afternoon Peak Hour*		
			Rate	*In*	*Out*	*Rate*	*In*	*Out*
Single-Detached Dwellings	TRANS (Table 6.2, 6.3)	343 Dwelling Units	0.7	29%	71%	0.9	62%	38%
Townhouses	TRANS (Table 6.2, 6.3)	712 Dwelling Units	0.54	37%	63%	0.71	53%	47%

5.2.2 Richcraft's Trailsedge Blocks 193 and 194

The "*Proposed Townhouse & Multi-Unit residential Development – 64429 Renaud Road (Blocks 193 and 194), Orleans, Ottawa Strategy Report*" (Castleglenn, December, 2020) report was directly referenced for this development initiative. It was assumed that full build-out of this development would occur well before the 2037 horizon year.

5.2.3 Stage 6 - Minto Avalon West & 2336 Tenth Line Road (Mer Bleue Road/Decoeur Drive):

Castleglenn Consultants has produced two technical letters, in addition to addendum letter reports for Avalon West Stage 5 (August, 2016) and Stage 6 (November, 2017), on behalf of Minto Communities Canada. These technical reports included

- "*Minto Avalon Network Analysis – Impacts of Delay in Completion of Brian Coburn Boulevard / Jerome Jodoin Drive Roundabout*" (October, 2019); and
- "*Minto Avalon Network Analysis – Mer Bleue Road & Decoeur Rd Improvements*" (October, 2019).

A review of these reports indicated that, between 2019 and 2023:

- an additional 256 townhomes and 180 single homes remain to be occupied within the Avalon Stage 6 development; and
- the 2336 Tenth Line Condo Development (located southeast of Mer Bleue and Decoeur Drive intersection) is anticipated to achieve full occupancy by Fall, 2021 (60 units).

The 2019 letter reports were directly referenced to develop the background traffic volumes developed for each of the 2037, 2042 and 2047 horizon years adopted for this study.

5.2.4 Orleans Family Health Hub – EUC Phase 3

The *2225 Mer Bleue Road – Orleans Health Hub Transportation Impact Study* (HDR, March 2018) was reviewed to determine the traffic impact of this development on the study area network. This report indicated that by the anticipated build-out year, that the health hub would employ 206 employees (109 full-time employees and 97 part-time learners). The anticipated build-out year of this health clinic is expected in 2021[4].

5.2.5 Mer Bleue Expansion Area – Summerside Phase 4-to-6

The *Summerside West Phase 4-6 TIA Strategy Report* (Parsons, September 2018) was reviewed to determine the traffic impact of the Mer Bleue Expansion Area that is expected to be developed by the build-out year and build-out-plus-5-year time horizons. In Phase 4 of this proposed development, 145 single family homes, and 100 dwelling units of townhomes are anticipated. In Phase 5-6, 257 single family homes and 236 dwelling units of townhomes are anticipated. Phase 4 and Phase 5-6 were assumed to be in place by 2037.

The adjacent Summerside Phase 1-3 development traffic volumes from the Summerside Phase 4-6 TIA were also incorporated into the background traffic volumes.

5.2.6 East Urban Community, Phase 2 Lands

The *"Draft Gloucester East Urban Community Phase II Community Transportation Study"* (Delcan, 2013) and the EUC Phase 3 MTS (Castleglenn, 2020) were reviewed to determine the relevant traffic generation and distribution for this area. It was assumed that substantial build-out of the EUC Phase 2 lands would occur by the interim buildout of the Trailsedge North development (728 singles, 630 townhouses).

5.2.7 Innes Road Developments – 3604 Innes Road, 3490 Innes Road, 4200 Innes Roads

The following Innes Road developments were combined on a single traffic layer:

- The *0 Innes Road Traffic Impact Assessment* (Novatech, 2019) Figure 6 was referenced to determine the traffic impact of this development along Innes Road.
- The *3490 Innes Road – Transportation Impact Study* (Parsons, 2016) & *Transportation Impact Study Rev. 1 – 3490 Innes Road, Lepins Corp (Parsons, Feb 2020)* studies were reviewed to determine background traffic at the future Innes Road / Lamarche Avenue intersection. From the February 2020 study, Figure 10: Ultimate Site Generated Traffic 2031 (All buildings) and Figure 16: 2031 Background Traffic Volumes were adopted within the background conditions.
- The *Smartreit Orleans 2025 Mer Bleue Road Community Transportation* (Stantec, 2017) Figure 8 was referenced to determine the impact of the proposed development on the study area. The development was assumed to be fully developed by 2037 with the Vanguard Drive Extension in place to Mer Bleue Road.

The respective extracts from the above reports have been included in Appendix "D".

4 https://www.obj.ca/article/ellisdon-puts-shovels-ground-new-orleans-health-hub

6.0 DEMAND RATIONALIZATION

This section provides a rationalization of forecast travel demands for the study area to assess the presence of auto capacity limitations upon the transportation network in the absence of the future Trailsedge North development. Therefore, this section does not assume any diversions to take place due to the presence of Fern Casey Street, the Vanguard Drive extension (west of Mer Bleue Road) or the Frank Bender Street extension. The following sections present an intersection capacity analysis used to identify existing and future transportation network constraints associated with:

- 2020 existing conditions;
- 2037 background conditions;
- 2042 background conditions; and
- 2047 background condition.

Appendix "F" provides the relevant Synchro and Sidra printouts for each of the above scenarios assuming the morning and afternoon peak hours of travel demand.

6.1 REVIEW OF EXISTING NETWORK CONSTRAINTS

Table 6-1 summarizes the existing (2020) intersection capacity analysis undertaken with Synchro™ 10 traffic software for signal control intersections and with SIDRA™ Intersections for roundabout intersections. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines.

Table 6-1 indicates, as expected, failure conditions of intersection along the Innes Road corridor for the **Innes Road and Belcourt/Frank Bender Street** traffic signal controlled intersection. This intersection was found to operate at an overall LOS "E" during the afternoon peak hour. The NB-LT was found to operate with an unacceptable LOS "F" during the afternoon peak hour of travel demand.

Table 6-1: Existing (2020) Intersection Capacity Analysis – Critical Movement Summary

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Signalized							
Innes Rd & Frank Bender Street	***WB-Th/RT (NB-LT)***	4 (206)	C **(F)**	0.78 **(1.32)**	7.2 (43)	B **(E)**	0.63 **(1.00)**
Innes Rd & Viseneau Dr	***WB-Th/RT (EB-Th)***	18 (34)	C (D)	0.80 (0.90)	16 (26)	B (C)	0.64 (0.76)
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (SB Approach)***	21.1 (9.0)	C (A)	0.98 (0.42)	14.5 (7.8)	B (A)	0.98 (0.56)
Brian Coburn Blvd & Fern Casey "T" intersection	***NB Approach (WB Approach)***	6.3 (6.5)	A (A)	0.15 (0.22)	5.7 (5.7)	A (A)	0.44 (0.22)

6.2 Review of Future Network Constraints

6.2.1 Phase 1 (2037) Background Traffic Analysis

Table 6-2 summarizes the intersection capacity analysis assuming the 2037 background traffic volumes illustrated within Exhibit 6-1. The analysis was undertaken using Synchro™ 10 traffic software for traffic signal controlled and STOP-control intersections and with SIDRA™ for roundabout configured intersections. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines.

The 2037 background traffic analysis assumes that Brian Coburn Boulevard has been widened to 4-lanes to achieve satisfactory levels-of-service within the study area.

Inspection of the table indicated the following critical movements and intersections:

- The **Innes Road and Belcourt/Frank Bender Street** traffic-signal controlled intersection was found to operate at LOS "F" overall and on the EB-Th movement during the afternoon peak hour;
- The **Innes Road / Viseneau Drive and Innes Road / Glenview Access** traffic-signal controlled intersections were also found to operate overall with LOS "E" and a LOS "F" for the WB-LT movement during the afternoon peak hour;

Table 6-2: 2037 Background Intersection Capacity Analysis: Critical Movement Summary

Intersection	*Weekday AM Peak Results (PM Peak Results)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	**Delay (seconds)**	**LOS**	**v/c**	**Delay (seconds)**	**LOS**	**v/c**
Signalized							
Innes Rd & Frank Bender Street	***WB-Th/RT (EB-Th)***	14 (73)	C **(F)**	0.77 **(1.06)**	22 (60)	C **(F)**	0.73 **(1.22)**
Innes Rd & Viseneau Dr	***WB-Th/RT (EB-Th)***	9 (36)	C **(E)**	0.66 **(0.95)**	7 (30)	B (D)	0.69 (0.86)
Innes Rd & Glenview Access	***WB-Th/RT (WB-LT)***	16 **(158)**	B **(F)**	0.66 **(1.09)**	14 (22)	A **(E)**	0.59 **(0.91)**
Innes Rd & Avenue de Lamarche (Caivan Access)	***NB-LT (EB-Th)***	57 (24)	D (E)	0.88 **(0.94)**	22 (19)	D **(E)**	0.86 **(0.91)**
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (SB Approach)***	9.7 (9.4)	C (B)	0.75 (0.70)	8.3 (8.8)	C (B)	0.75 (0.70)
Brian Coburn Blvd & Fern Casey	***WB Approach (WB Approach)***	6.7 (7.8)	A (A)	0.20 (0.25)	6.3 (6.7)	A (A)	0.34 (0.25)

6.2.2 Phase 2 (2042) Background Traffic Analysis

The 2042 background analysis was assumed to be marginally worse than the 2037 background traffic (See Exhibit 6-2) results as the effect of the annual 1% growth rate over 5-years was thought to be nominal.

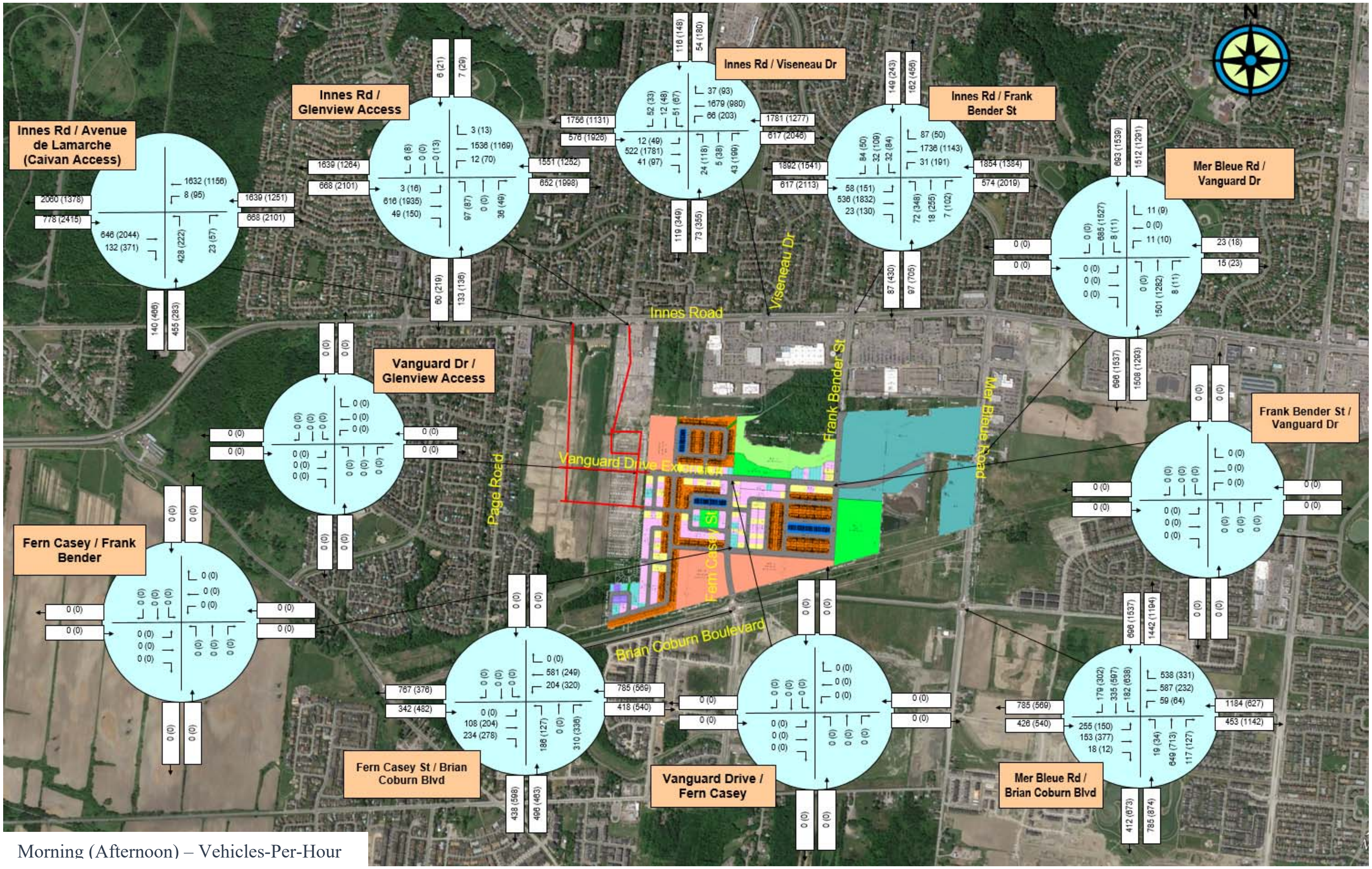


Exhibit 6-1: 2037 Background Traffic: Without the Proposed Development

No Demand Rationalization – Without EUC Phase II Infrastructure

6.2.3 Build-Out (2047) Background Traffic Analysis

Table 6-3 summarizes the intersection capacity analysis assuming the 2047 background traffic (See Exhibit 6-3) undertaken with Synchro^{TM} 10 traffic software for signal control and STOP-control intersections and with SIDRA^{TM} Intersections for roundabout intersections. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines.

In addition to the intersections identified as critical from the 2037 background traffic analysis, the following critical movements and intersections were noted for the 2047 background analysis:

- The **Innes Road / Glenview Access** traffic signal controlled intersection was found to operate with an overall LOS "E". The WB-LT movement was found to operate at a LOS "F"; and
- The **Innes Road / Caivan Access** traffic signal-controlled intersection was found to operate with LOS "E" overall. The critical EB-Th movement would operate with a LOS "E" in both peak periods of travel demand.

A review of the analysis was found to indicate that the Innes Road corridor is above capacity in the east-west direction during the peak hours of travel demand.

Table 6-3: 2047 Background Intersection Capacity Analysis – Critical Movement Summary

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Traffic Signals							
Innes Rd & Frank Bender Street	***WB-Th/RT (EB-Th)***	24 (87)	**D** **(F)**	0.89 **(1.16)**	23 (72)	C **(F)**	0.77 **(1.22)**
Innes Rd & Viseneau Dr	***WB-Th/RT (EB-Th)***	5 (34)	B **(E)**	0.70 **(0.93)**	12 (29)	C **(F)**	0.73 **(1.01)**
Innes Rd & Glenview Access	***WB-Th/RT (WB-LT)***	8 **(148)**	C **(F)**	0.66 **(1.08)**	7 (9)	C **(F)**	0.67 **(1.02)**
Innes Rd & Avenue de Lamarche (Caivan Access)	***NB-LT (EB-Th)***	57 (25)	D **(E)**	0.85 **(0.93)**	28 (22)	D **(E)**	0.89 **(0.92)**
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (SB Approach)***	9.7 (9.4)	C (B)	0.75 (0.70)	8.3 (8.8)	C (B)	0.75 (0.70)
Brian Coburn Blvd & Fern Casey	***WB Approach (WB Approach)***	6.7 (7.8)	A (A)	0.20 (0.25)	6.3 (6.7)	A (A)	0.34 (0.25)

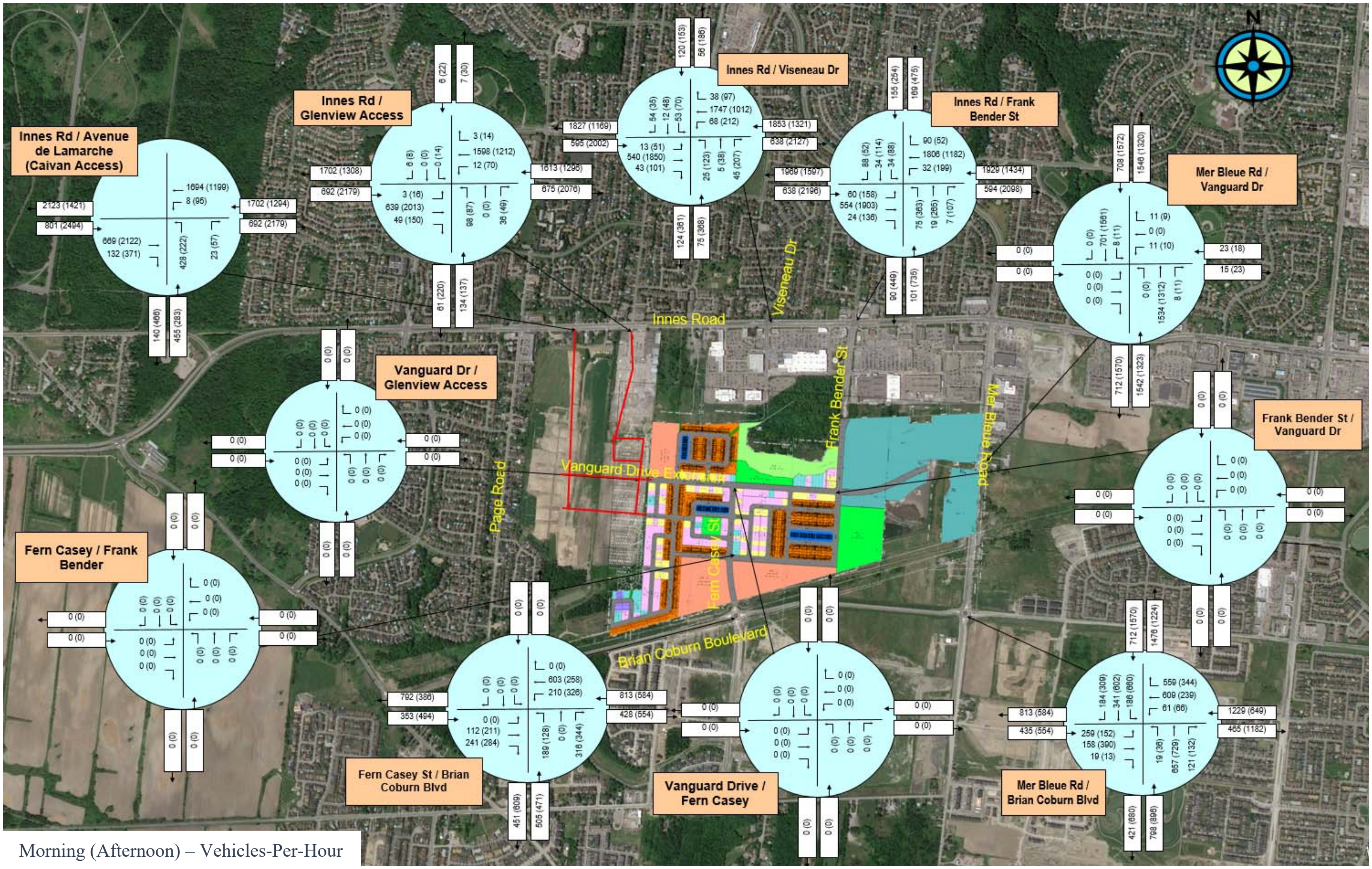


Exhibit 6-2: 2042 Background Traffic: Without the Proposed Development

No Demand Rationalization – Without EUC Phase II Infrastructure

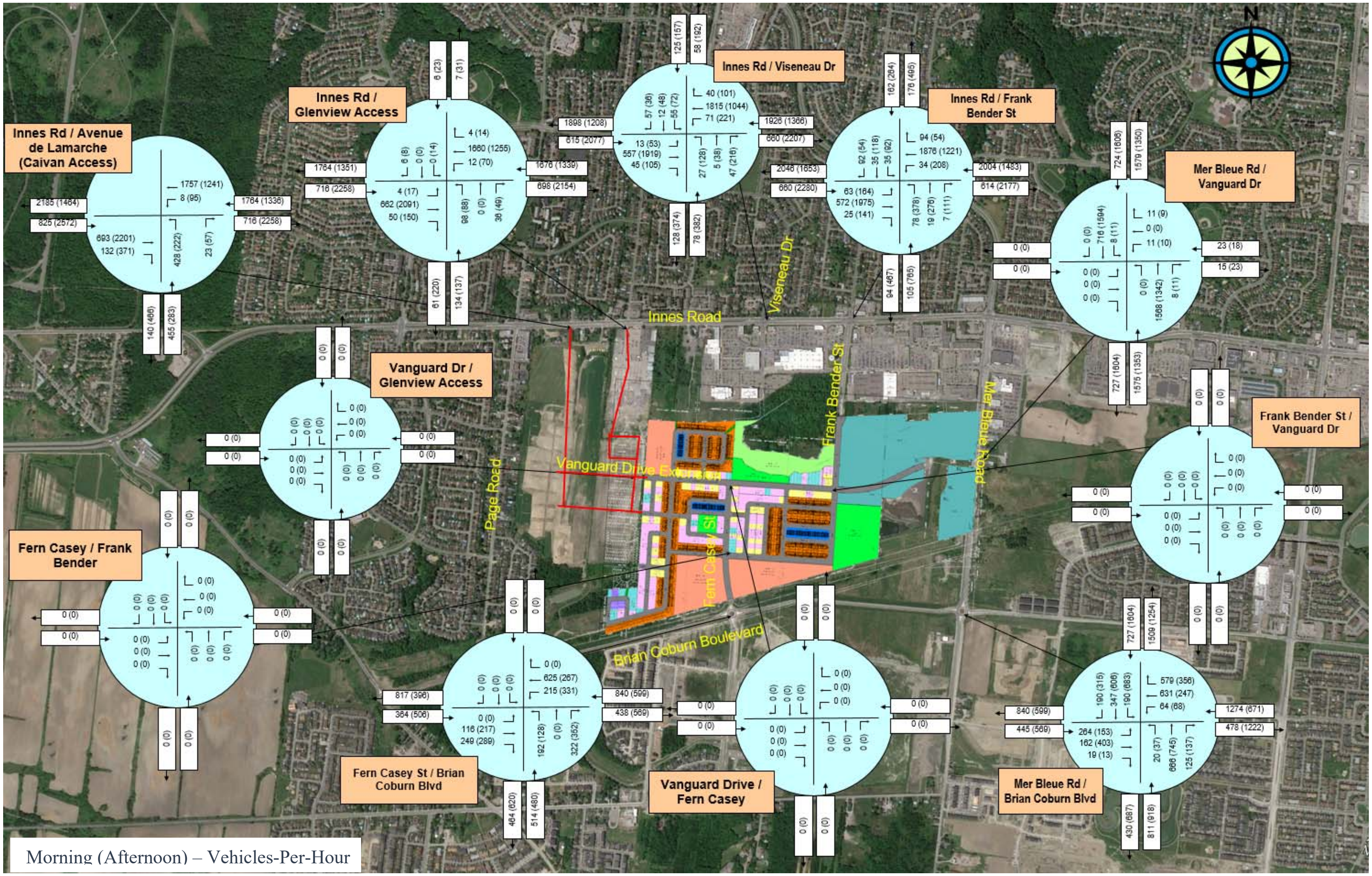


Exhibit 6-3: 2047 Background Traffic: Without the Proposed Development

No Demand Rationalization – Without EUC Phase II Infrastructure

6.3 Development Generated Demands

Table 4-10 indicated that the proposed Trailsedge North residential development is anticipated to generate between 1,050 and 1,275 two-way auto trips during the morning and afternoon peak hours of travel demand, respectively. It is anticipated that less than half of these auto vehicle volumes will impact the Innes Road corridor, while the remainder would utilize the Brian Coburn Boulevard to the south and Mer Bleue Road to the east. The traffic volume assigned to Innes Road will likely exacerbate the capacity issues evident in the 2037 and 2047 horizon years.

6.4 Potential for Reduction in Future Demand

The analysis of the background traffic forecast (in the absence of the proposed development) indicated capacity constraints along the Innes Road corridor which would likely be exacerbated by the addition of the Trailsedge North community. This finding is consistent with the EUC Phase III MTS which had also determined that the Innes Road corridor would operate with congested levels of service during peak hours of travel demand while recognizing limited right-of-way opportunities to widen the corridor to 6-lanes of travel.

It is likely that motorists will adapt to this condition through the following measures.:

- *Change in Travel Trip Time:* Motorist may change the time they leave for work or other trips to avoid travel during the peak congestion periods. This would cause a "flattening" of the peak demand, and increase the duration of the peak periods of travel demand;
- *Reduction in the Auto-Vehicle Share:* The advent of the LRT extension to Trim by 2024 and transit priority measures along Innes Road after the 2031 horizon year would likely involve an increase in transit share for the Orleans community; and
- *Change in Travel Route Choice:* The advent of the Trailsedge North community would develop collector connections between Innes Road, Mer Bleue Road and Brian Coburn Boulevard through the EUC Phase III CDP area. However, these connections, that include collector corridors such as Fern Casey Street, Frank Bender Street and Vanguard Drive, have been designed to discourage cut-through traffic from a network perspective. Therefore, assumptions have been developed that would see traffic future traffic from the Caivan, Glenview and Richcraft Trailsedge (South of Brian Coburn Boulevard) developments shift to alternative applicable routes such as Brian Coburn Boulevard (Stage 1), to Frank Bender Street (Stage 2) and to Vanguard Drive (Stage 3). However, it is not envisioned that significant volume would divert from the existing arterial system to a local collector system, as this type of cut-through traffic is undesirable from a community planning perspective.

Therefore, the following reductions in existing travel and background traffic growth are proposed:

- An estimate of a 5% overall reduction in existing auto-demand associated with all background traffic, excluding the proposed development, which would result in a significant decrease of traffic volumes along the Innes Road corridor; and

- A reduction of the assumed annual background traffic growth rate assigned to the east-west movements along Innes Road to 0.25%-per-year, from the 1% annual growth assumed in Section 6.2.2, which would effectively reduce the background traffic along Innes Road by 20% by the 2047 forecast horizon year.

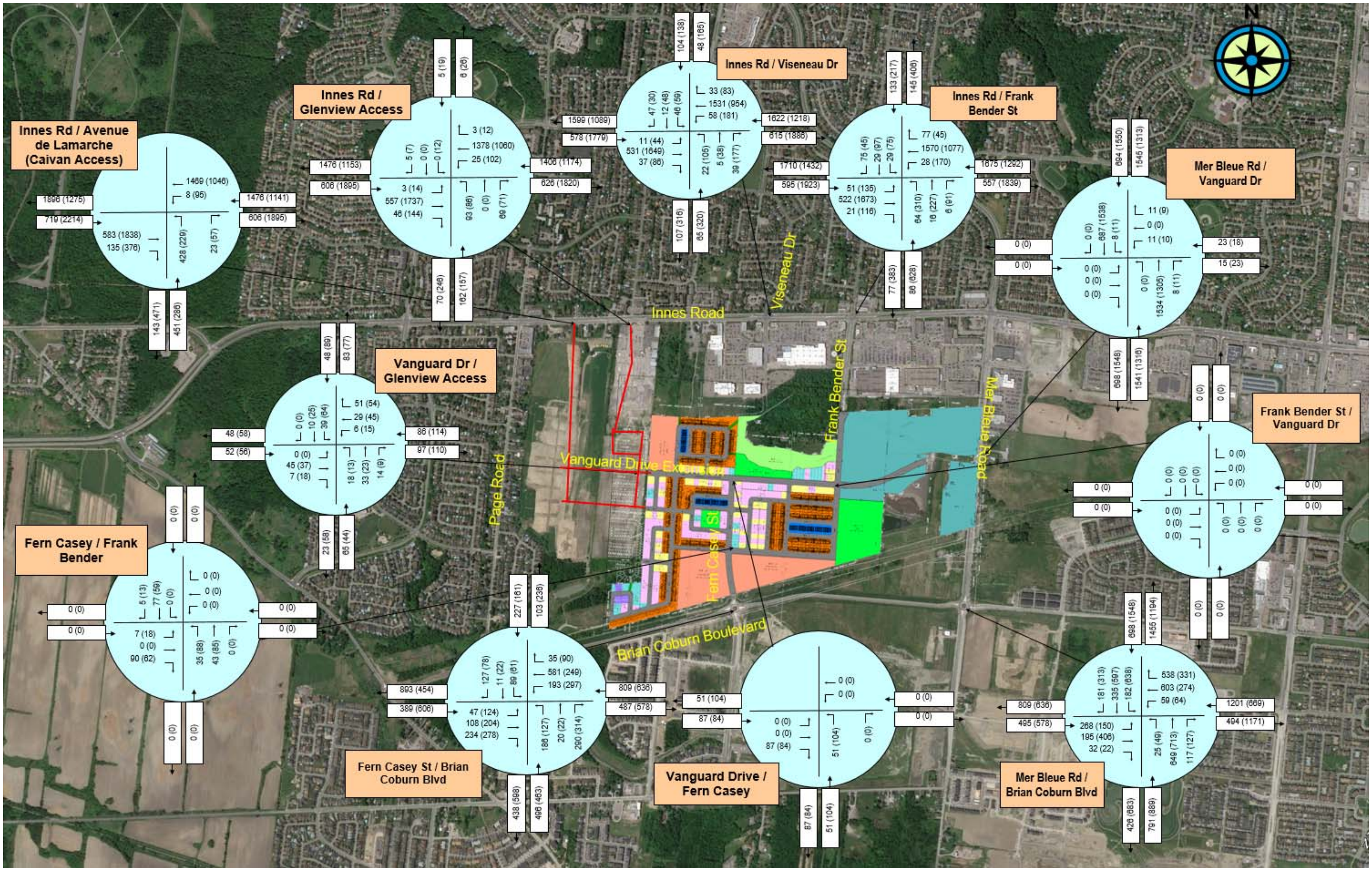
In addition to the proposed reductions in travel demand, alternative routes are envisioned to be available to the adjacent developments surrounding the EUC Phase III CDP area. The following diversions have been adopted within the traffic modelling approach:

- During Stage 1 of the development, 30% of Glenview and Caivan traffic destined to, and originating from, employment areas west of the study area would utilize Brian Coburn Boulevard to access the respective developments;
- During Stage 2 and 3 of the Trailsedge North development, 30% and 40% of Glenview and Caivan traffic respectively have been assigned to/from the east during the afternoon peak hour would utilize the Frank Bender Street and Vanguard Drive corridors. Similarly, no diversions have been assumed for the morning peak hour, as the majority of traffic is envisioned to be destined to/from areas west of the study area, as indicated by the trip distribution assigned to the Caivan development; and
- Stage 3 of the Trailsedge North development would see the traffic previously assigned to Frank Bender Street re-assigned to the Vanguard Drive/Mer Bleue Road intersection given the forecast capacity constraints at the Innes Road/Frank Bender Street intersection; and
- 20% of the demand to and from the south leg of the Fern Casey Drive/Brian Coburn Boulevard intersection has been assigned to the commercial areas along Innes Road. During Stage 1 of the development, these volumes have been assigned to the Glenview Access via Fern Casey and Vanguard Drive. Once the Frank Bender Street/Belcourt extension is in place for Stage 2, these trips would re-route to the new corridor.

The traffic generated by the Lepine Development has been assumed to remain unchanged given the advent of the EUC Phase III lands and its proximity to the Innes Road corridor. It is unlikely that vehicles from this development would back-track through the EUC Phase III community to then travel west to areas inside the Greenbelt, or to utilize Vanguard Drive to access the commercial areas along Innes Road to the east.

All diversions have been provided on exhibits within Appendix “E”.

Exhibit 6-4, Exhibit 6-5 and Exhibit 6-6 illustrate the Phase 1 (2037), Phase 2 (2042) and Phase 3 (2047) design traffic morning and afternoon forecast volumes, respectively. The exhibits have adopted the above demand reductions and traffic volume diversions. The advent of the above travel demand rationalization measures could enable additional capacity along the Innes Road corridor to accommodate the proposed residential development, future background traffic growth and future adjacent development growth.



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 6-4: 2037 Design Traffic Volumes – Combined Background and Development Traffic With Demand Rationalization Reduction

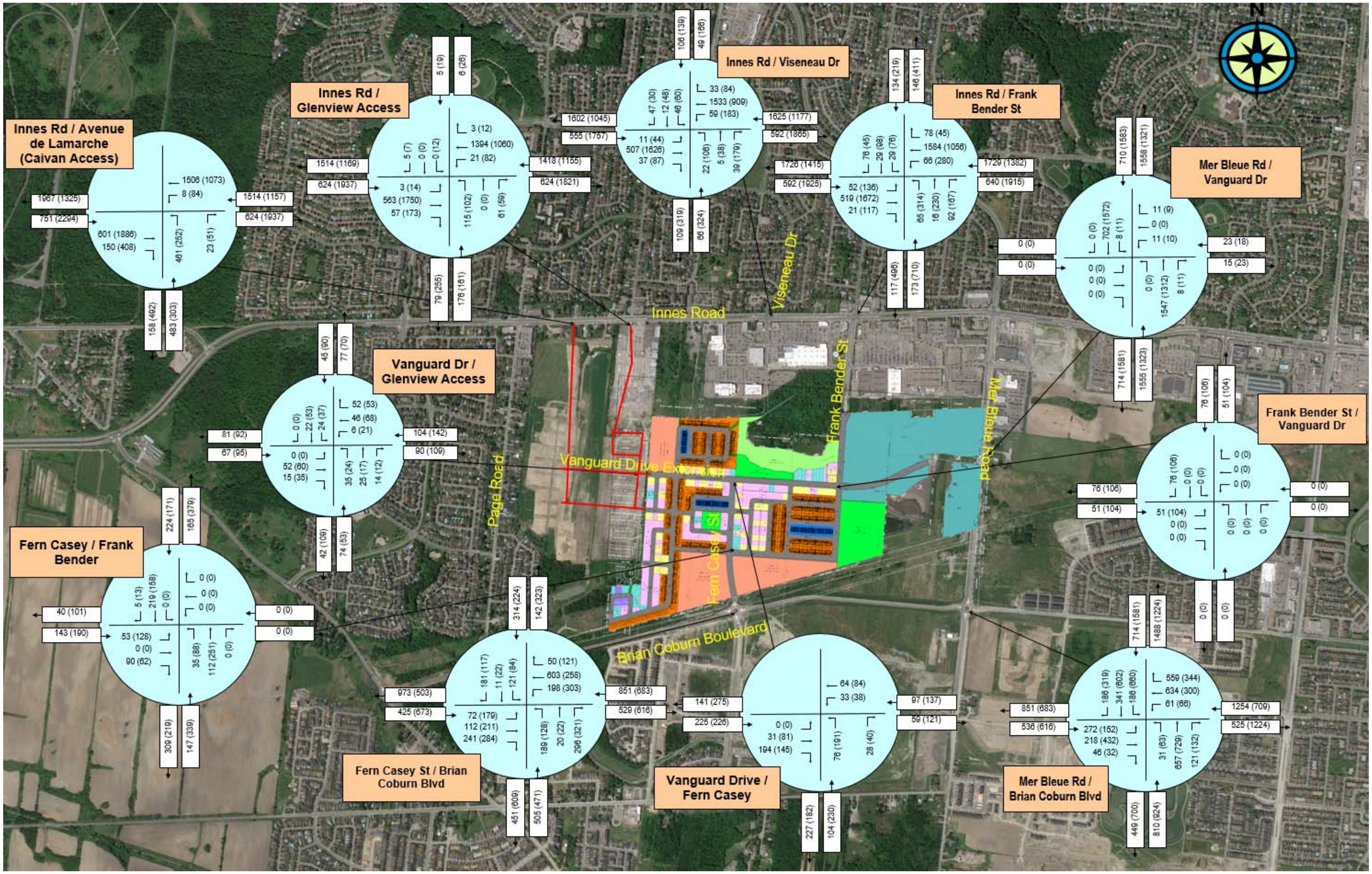


Exhibit 6-5: 2042 Design Traffic Volumes – Combined Background and Development Traffic With Demand Rationalization Reduction

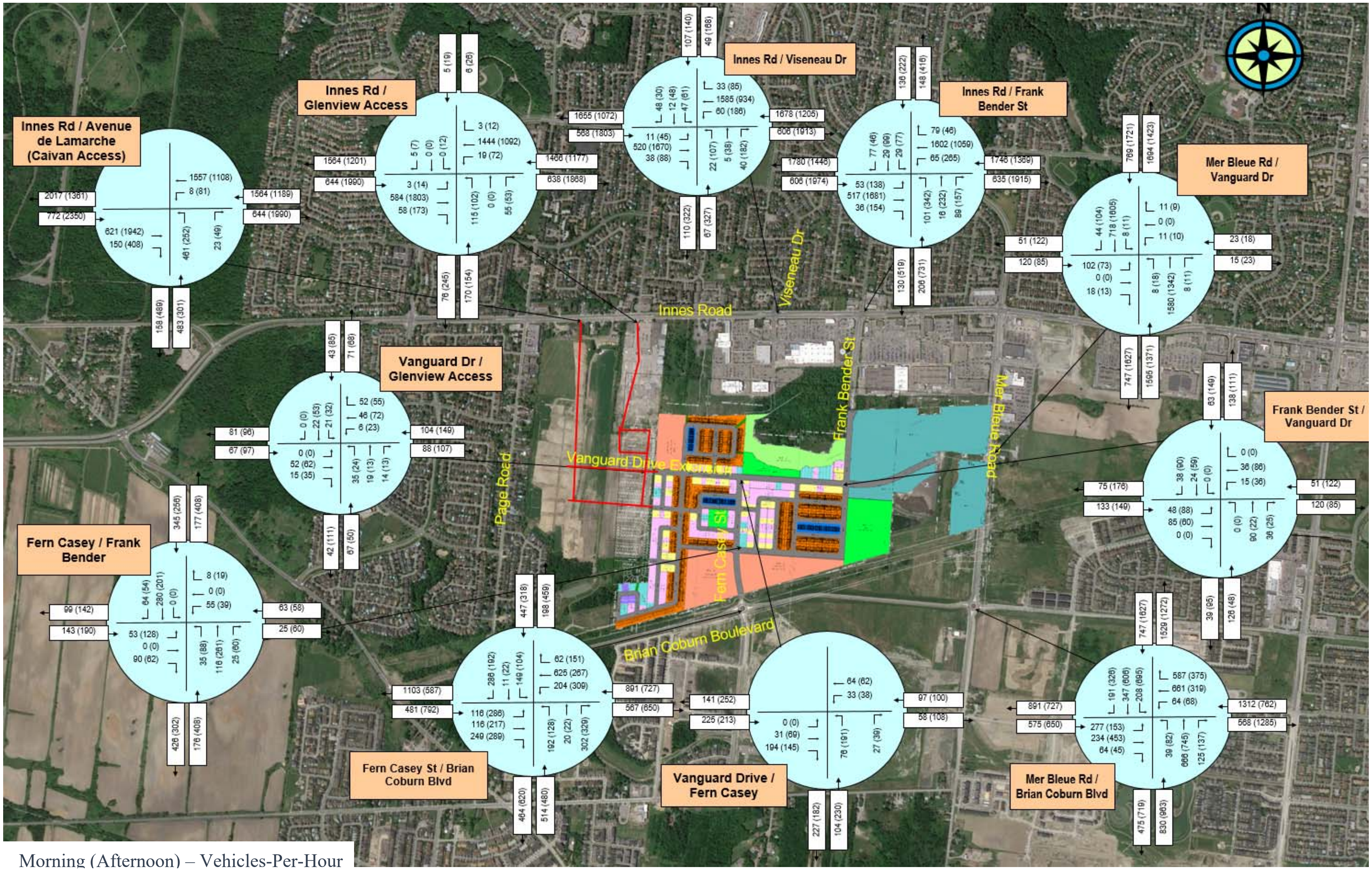


Exhibit 6-6: 2047 Design Traffic Volumes – Combined Background and Development Traffic With Demand Rationalization Reduction

7.0 ANALYSIS

7.1 DEVELOPMENT DESIGN

The following section reviews the transportation network elements within the vicinity of the proposed development to ensure they provide efficient access for all users.

7.1.1 Design for Sustainable Modes

Exhibit 7-1 illustrates the pedestrian and cyclist linkages as indicated by the *East Urban Community Phase III Community Development Plan.* The proposed Trailsedge North network affords a mix of pathway and sidewalk connections to the future BRT corridor located south of the proposed development. This combination is anticipated to serve as direct routes between transit stops, parks and residential areas within the community. A future pedestrian link is anticipated to connect Street No. 1, the Hydro corridor and the high density residential nearest Blocks 85-to-89. An additional link between Street No.1 and the Hydro Corridor is likely to occur west of Block 97. These pathways will be detailed in future submissions.

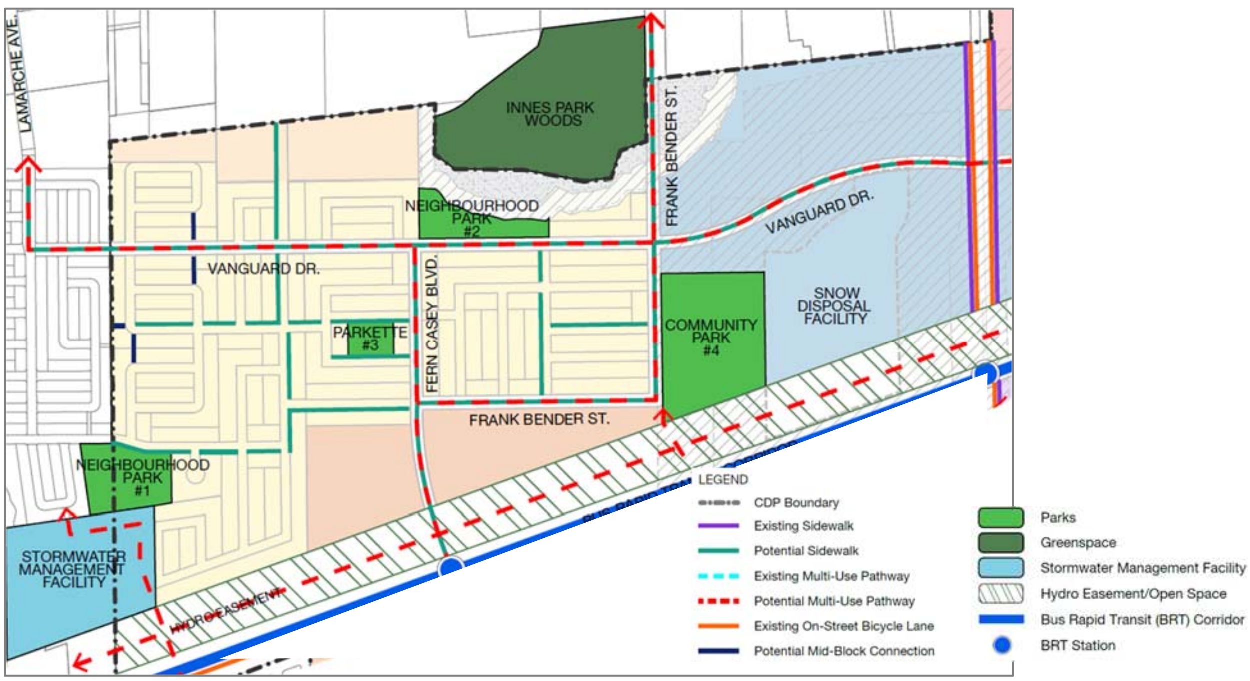


Exhibit 7-1: Trailsedge North Cycling and Pedestrian Linkages
[Source: EUC Phase III CDP, Pedestrian and Cyclist Plan]

The proposed development supports sustainable modes by:

- Providing a MUP connection for cyclists and pedestrians within the development along Frank Bender, Fern Casey and Vanguard Drive. This will serve to connect cyclists to the major arterial corridors that surround the proposed development;

- Sidewalk accommodations along all collectors and local roads within the development to accommodate pedestrian movements to the surrounding arterial network, transit stop locations and open/park spaces;
- The design of all local roads to a 30 km/hr design/operating speed as per the new Strategic Road Safety Action Plan Update. The roadway details to accomplish these measures would be developed during the subdivision detailed design; and
- Providing a 24m right-of-way for collector roads that is suitable for regular OC Transpo bus routes through the development. Future transit services can therefore be provided along the full length of Vanguard Drive, Fern Casey Street and Frank Bender Street.

Exhibit 7-2 illustrates the proposed typical cross-sections for the Major Collector and Collector roadways within the Trailsedge North community, extracted from the EUC Phase III MTS. Sufficient right of way shall be ensured to accommodate all proposed features.

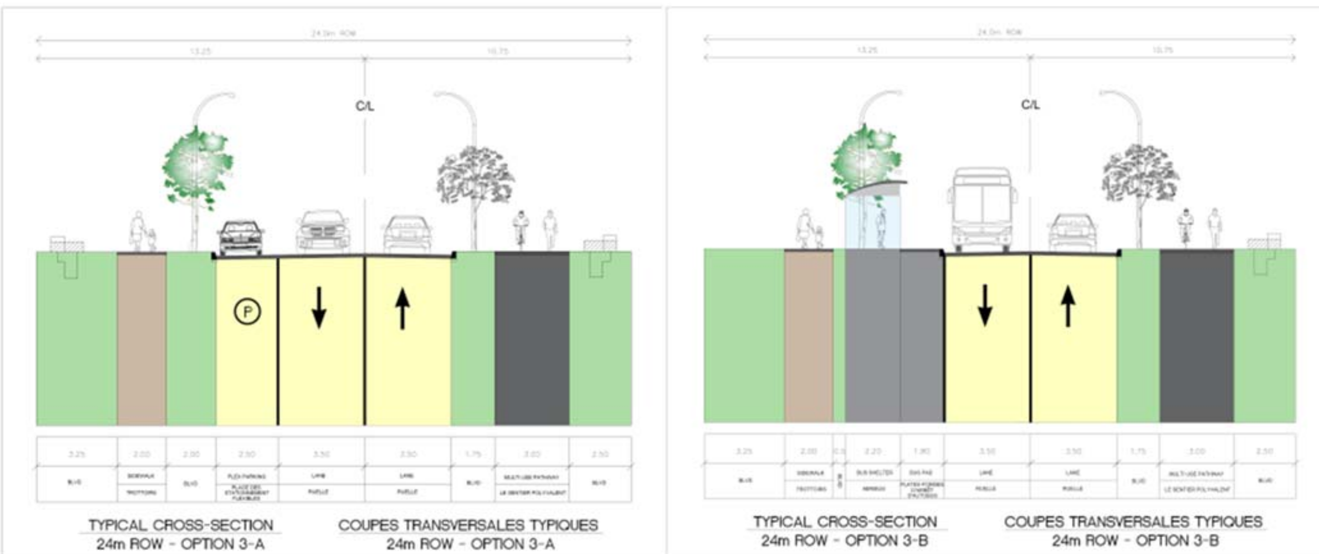


Exhibit 7-2: Typical Collector Cross Section Without (Left) and With (Right) Transit Stops
Exhibit 8.5a and 8.5b, Referenced from EUC Phase III MTS

The *Designing Neighborhood Collector Streets (Dec, 2019)* City of Ottawa guide to establishing cross-sections for Neighborhood Collector Streets was also reviewed to provide additional guidance for possible Trailsedge North collector cross sections. This guiding document was drafted following the development of the EUC Phase III CDP cross-sections and reflect recent developments in the desires to achieve a balanced roadway cross section for all modes. As noted in Section 4.3: Implementation, the pre-vetted cross section can be applied where possible with custom designs developed using principles laid out within the guidelines.

The collector streets within the EUC Phase III CDP have been established with 24.0m right-of-way widths, however there does exist the opportunity to modify elements within the right-of-way to better accommodate recent changes in design guidelines.

Exhibit 7-3 provides an extract from the City of Ottawa guidelines for an applicable 24.0m cross-section which provides for parking along one side of the street, high frequency transit service and is compatible with large trees in areas with sensitive marine clay soils. This 24.0m ROW allows only a single side of surface-mounted hydroelectric transformers, which can be a constraint in some areas with parks, schools, mixed-use areas, stacked townhomes and apartments. It is recognized that a 24.0m right of way would require some compromise when it comes to all elements depicted within the exhibit.

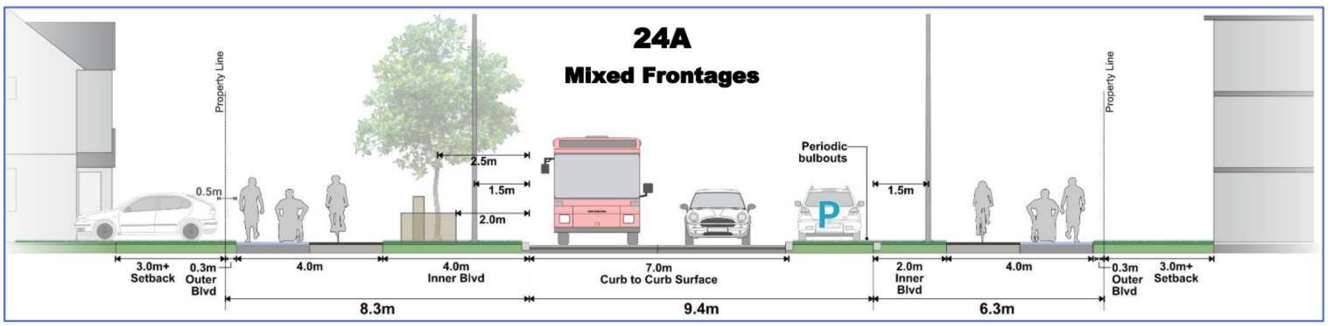
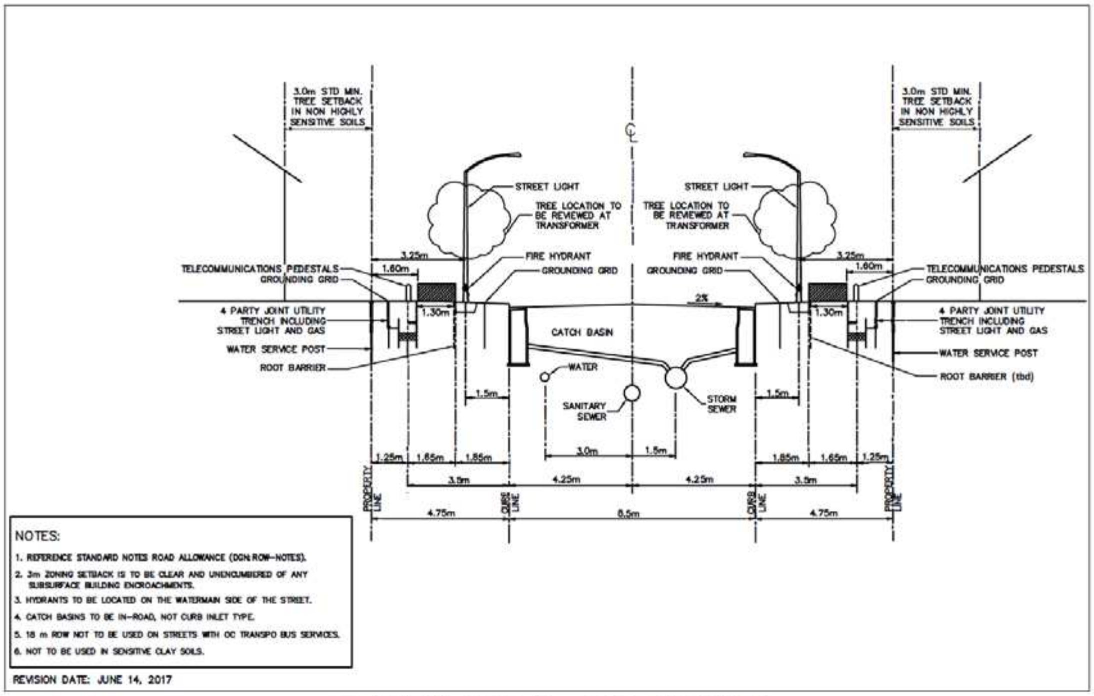


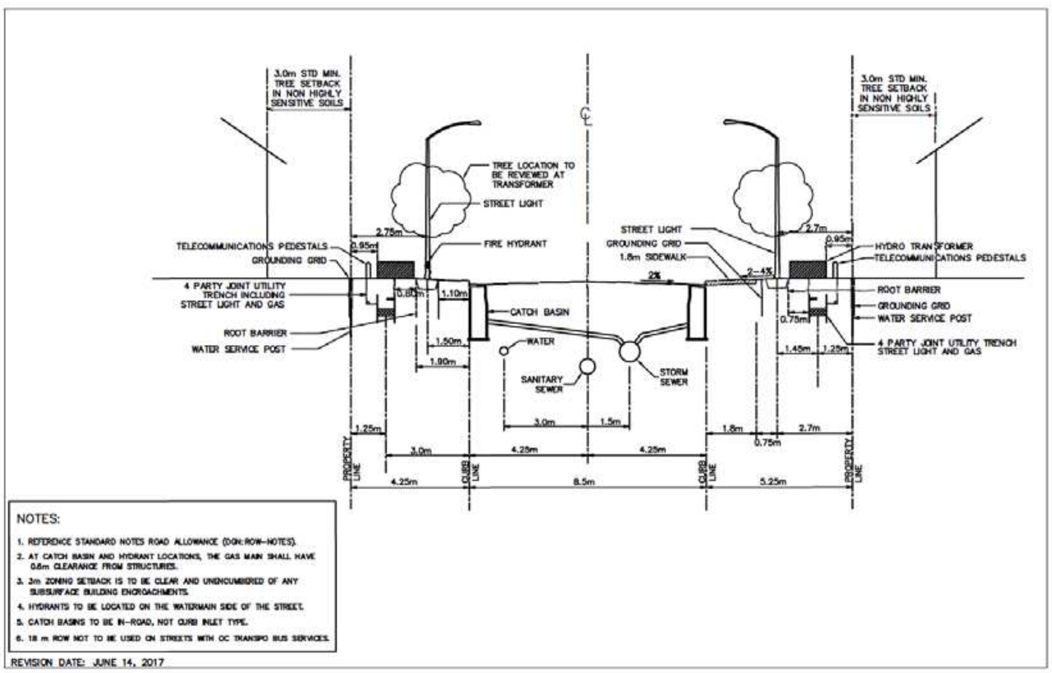
Exhibit 7-3: 24A – Mixed Frontages Cross Section,
Extract from Designing Neighborhood Collector Streets (Dec. 2019), Page 9

Exhibit 7-4 illustrates the typical cross-section proposed for local roadways within the Trailsedge North community, extracted from the EUC Phase III MTS. The local cross-section would include sidewalks on key local roadways to provide connections to the major pathways and local transit routes. It is recognized that local roadways are to be designed to a 30 km/hr operating/design speed which includes intersection narrowings, pinchpoints, vertical features and various parking strategies. These measures and refinements to the local cross sections will be determined at the time of detailed design.

The City of Ottawa's TDM Supportive Development Design and Infrastructure Checklist was also completed given that Blocks 36, 80 and 81 could provide for higher density development that should implement several TDM measures within the future site plan design. However exact site plan details remain to be determine during future design submissions for these high density blocks. These details should include active mode connections from Blocks 80/81 to the Hydro corridor and surrounding roadway network to improve connections throughout the community particularly between Streets 1, 5 and 14.



RESIDENTIAL ROAD 18m ROAD ALLOWANCE
4 PARTY JOINT USE TRENCH



RESIDENTIAL ROAD 18m ROAD ALLOWANCE
4 PARTY JOINT USE TRENCH

Exhibit 7-4: Typical 18.0m Right of Way for Local Streets – Without (top) and with (bottom) sidewalk
Exhibit 8.6a and 8.6b, EUC Phase III MTS

Exhibit 7-5 illustrates the proposed Trailsedge North development relative to nearby existing OC Transpo stops. The exhibit depicts a 400m radii circle that originates from the centre of the development which is considered the worst-case scenario for walking distance.

Exhibit 7-5: Site Location and OC Transpo Stops within 400m of Centroid

The exhibit illustrates that given land mass of the proposed development, there are no existing transit stops located within the 400m walking distance standard from the centre of the development. The Trailsedge North development would best be served with local routes along the primary collectors such as Vanguard Drive, Frank Bender Street and Fern Casey Street.

In the long term, two future BRT stations are anticipated to service the development, located:

- north of Brian Coburn Boulevard near the intersection with Fern Casey Street; and
- east of the proposed development, where the Hydro Corridor would intercept the Mer Bleue Road corridor.

To address the transit routing for the development, the following is suggested:

- In advanced of the Fern Casey Street-Vanguard Drive Extension corridor, a transit stop be located at the intersection of Brian Coburn Boulevard/Fern Casey Street to address transit for Phase 1 of the Trailsedge North development;
- Upon implementation of the Vanguard Drive and the Fern Casey Street corridor, a local transit route be established from Innes Road to Brian Coburn Boulevard through either of the Caivan and Glenview communities to the west. This route could afford transit stops at the intersections of Fern Casey Street and Street No.5, Fern Casey and Vanguard Drive and Vanguard Drive and Street No. 10

within the Trailsedge North development however transit stop locations remain to be determine at detailed design; and

- Phase 3 of the development would involve the completion of the Vanguard Drive and Frank Bender Street corridors. This provides an opportunity for an east-west transit route along Vanguard Drive which could also serve the Caivan and Glenview communities to the west. An additional transit stop at Vanguard Drive and Frank Bender Street would provide appropriate walking distances to transit within the proposed Trailsedge North development.

7.1.2 New Street Networks

The planned network street design is consistent with the principles and objectives defined within the City of Ottawa's *Urban Design Guidelines for Greenfield Neighborhoods*. The development design accomplishes several design objectives by:

- Locating the highest density development along the south boundary which is nearest the future Fern Casey Street BRT station;
- Connects to future developments such as Trailsedge Phase 4 and Terrace Flats to the south (by Fern Casey Street); and
- Collector streets, such as Fern Casey Street, Vanguard Drive and Frank Bender Street are disjointed to encourage traffic calming while serving as backbone corridors for the development.

Exhibit 7-6 illustrates the street classification system as envisioned in the *East Urban Community Phase III Community Development Plan.* The Trailsedge Phase 4 network design remains mostly in compliance with the road classifications and roadway layout as depicted within the CDP document. However, it is worth noting that no north south connection has been provided east of the Glenview community, and therefore a roundabout with Vanguard Drive/Street No 10 is unlikely to be required.

The Trailsedge North would involve the following new 2-lane Major Collector and Collector roadways that each provide a 24.0m ROW width, a MUP and a sidewalk:

- Fern Casey Street, between Brian Coburn Boulevard and Vanguard Drive;
- Vanguard Drive, between the Glenview development and Mer Bleue Road; and
- Frank Bender Street, from Fern Casey Street to the Belcourt Blvd / Innes Road Commercial intersection.

The 24.0m right of way is consistent with the approved roadway right of way widths approved through the EUC Phase III CDP process.

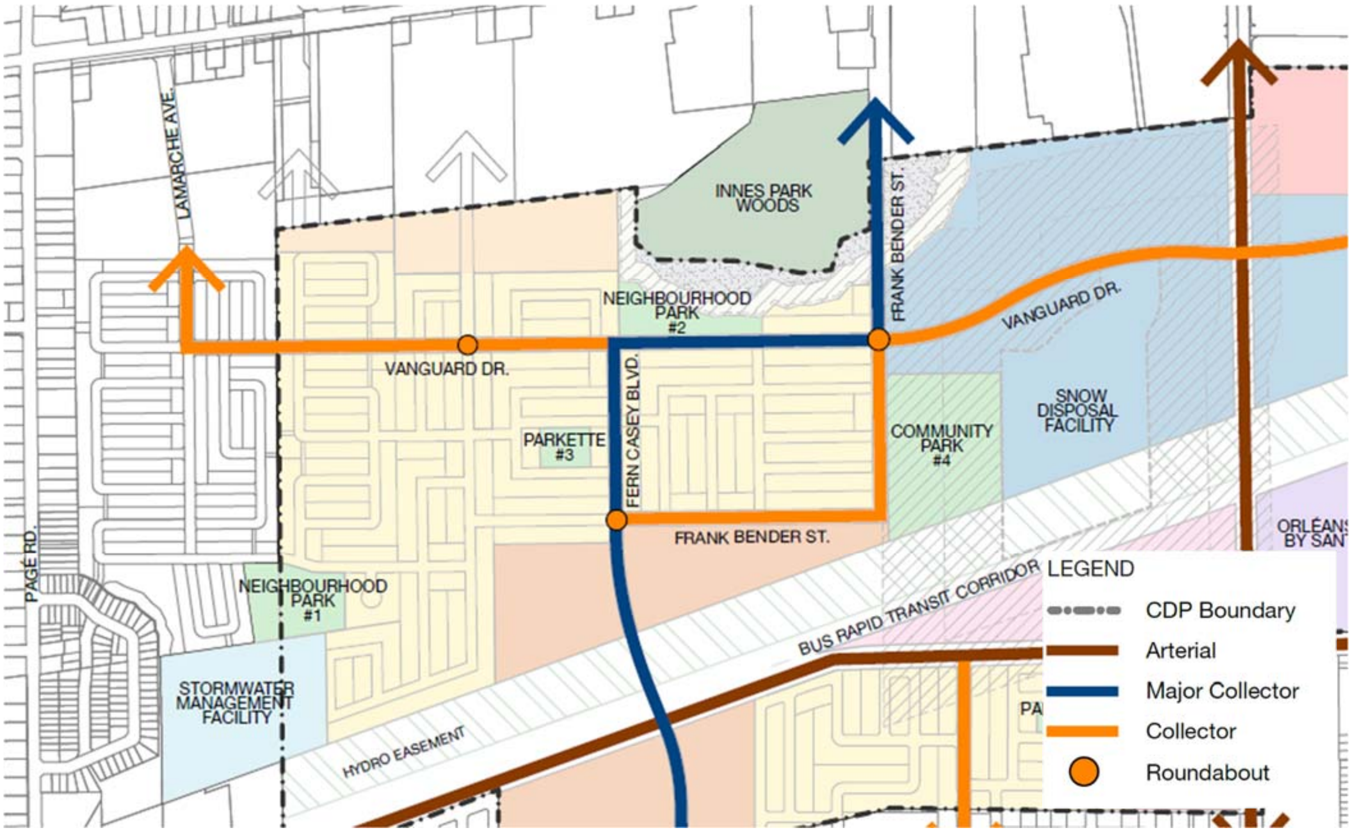


Exhibit 7-6: Trailsedge North Network Street Classification
[Source: EUC Phase III CDP, Street Hierarchy Plan]

7.2 BOUNDARY STREET DESIGN

7.2.1 Mobility – Segment MMLOS Analysis

The Multi-Modal Level-of-Service (MMLOS) guidelines were used to evaluate the segment level of service for all modes of transportation bounding the proposed development within the immediate study area.

Brian Coburn Boulevard, Innes Road and Mer Bleue Road were considered for this analysis. Table 7-1 summarizes the segment MMLOS analysis fronting the proposed development assuming the existing configuration for each segment fronting the proposed development.

The table incorporates the following analysis assumptions:

- The target MMLOS has been referenced from Exhibit 22 from the City of Ottawa Multi Modal Level of Service Guidelines (September 2015). The MMLOS targets are based on the "Mixed-Use Centre Official Plan Designation" as the proposed development is located within the Mer Bleue Mixed-Use Area;

- The proposed development does not propose significant roadway widenings or changes to the sidewalk/boulevard arrangements within the study area; and
- For the pedestrian and bike LOS analysis, the operating speed has been assumed to be 10 km/hr greater than the roadway posted speed[5].

Table 7-1: Segment MMLOS for Boundary Streets at Build-Out (2047)

Performance Measure	***Roadway Segments Adjacent to the Development***		
	Brian Coburn Blvd.	Innes Road	Mer Bleue Road
Pedestrian LOS (PLOS)			
Sidewalk Width (m)	3.7	1.8	2.5
Boulevard Width (m)	2.5	<2.0m	>2m (Cycle Lane)
Average Daily Curb Lane Traffic Volume	> 3,000	> 3,000	> 3,000
Presence of On-Street Parking	No	No	No
Operating Speed (km/h) Posted +10 km/hr	80	70	70
Segment PLOS	**D**	**E**	**E**
Target PLOS	C	C	C
Bicycle LOS (BLOS)			
Bikeway Type	Physically Separated Bikeway (MUP)	Bike Lane No Parking	Bike Lanes No Parking
Travel Lanes	N/A	2 (With Median)	2 (With Median)
Bike Lane Width (m)	N/A	1.8m	2m
Operating Speed (km/h) Posted +10 km/hr	N/A	70	70
Bike Lane Blockage	N/A	Rare	Rare
Segment BLOS	A	**E**	**E**
Target BLOS	D	B	D
Transit LOS (TLOS)			
Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic
Exposure to Parking/Driveway	Limited	Limited	Limited
Posted Speed Limit (km/h)	70	60	60
Segment TLOS	D	D	D
Target TLOS	D	D	D
Truck LOS (TkLOS)			
Number of lanes (in each direction)	1	2	2
Curb Lane Width (m)	~3.5	3.5	~3.6
Segment TkLOS	C	A	A
Target TkLOS	D	D	D

5 Section 2.5, "*Addendum to MMLOS Guidelines*", City of Ottawa, May 2017.

Review of Table 7-1 was found to indicate the following deficiencies and their possible mitigation measures for consideration:

Pedestrian LOS (PLOS)

- The Brian Coburn Boulevard analysis found to indicate a PLOS of "E", which was found to be deficient of the target PLOS "C". The PLOS "D is directly attributable to the operating speed of 80 km/hr along Brian Coburn Boulevard and the traffic volumes forecasted to occur by 2036. A reduction in the speed limit to from 70 km/hr to 50 km/hr would result in a PLOS which meets the MMLOS target for this segment. This improvement could be implemented with a future widening of Brian Coburn Boulevard;
- The Mer Bleue Road corridor provides for a sidewalk separated from the curb lane by a cycle lane. The elevated operating speed results in a poor PLOS "D". To improve the PLOS, a combination of a lower speed limit (including traffic calming measures) and on-street parking could serve to improve the PLOS. However, these measures are likely unsuitable for the Mer Bleue Road corridor;
- The Innes Road PLOS target of "C" is not met due to the high operating speeds and limited boulevard width. Widening the boulevard and sidewalk could improve the PLOS to a "D", but would remain below the PLOS "C" target. Additional measures, such as on-street parking and lowering the speed limit, would achieve the PLOS "C" target but likely be unsuitable for this corridor.

Bicycle LOS (BLOS)

- The Brian Coburn Boulevard analysis was found to indicate a BLOS of "A" which is directly attributable to the existing multi-use path on the south side of corridor.;
- The Mer Bleue Road and Innes Road corridors both present a BLOS "E" due to the 70 km/hr operating speed of the roadways. To achieve the BLOS target, either physically separated bikeways provides or a reduction in speed limit would be required. The reduction in speed limit along either corridor would likely require traffic calming measures that would be disruptive to the suburban-arterial function of these corridors. Innes Road could be a suitable candidate for a separated facility as the 2013 City of Ottawa TMP identifies this corridor as a "Cross-Town Bikeway".

7.3 Access Intersections Design

7.3.1 Location and Design of Site Access

The proposed site would be accommodated by three new accesses and one existing access that include the:

- **Vanguard Drive Extension / Glenview Development Full Movement Access (Street Two)**: The Vanguard Drive Extension is envisioned to extend west into the Caivan and Glenview developments providing alternative access for these residential neighbourhoods. This access is expected to be STOP controlled on the minor north and south approaches however the configuration is largely up to Glenview;
- **Vanguard Drive / Mer Bleue Road**: This access would ultimately be a signalized intersection as determined in the EUC Phase 3 MTS, with auxiliary left turn bay and shared through/right turn lane on the Vanguard Drive approaches. The location of this intersection with relation to nearby

intersections would be dependent on the ongoing Vanguard Drive Extension Environmental Assessment Study being undertaken by the City of Ottawa;

- **Brian Coburn Boulevard / Fern Casey Street**: This access would be a double-lane roundabout with YIELD condition on all approaches. The east-west approaches would be four-lane, and the minor north-south approaches would be a single lane. The centreline of the access is located approximately 950m west of the Brian Coburn Boulevard / Mer Bleue Road intersection and 1.5km east of the Brian Coburn Boulevard / Navan Road intersection; and
- **Innes Road / Frank Bender Street**: This access is currently a signalized intersection with an auxiliary NB-LT bay, a NB-RT bay and a NB-Th lane on the northbound approach. The centreline of the intersection is located approximately 260m west of a signalized access to the SmartCentres Orleans II shopping mall, and 370m east of the Innes Road / Viseneau Drive intersection.

7.3.2 Intersection Control

As indicated in Section 7.3.1:

- The **Vanguard Drive Extension / Glenview-Caivan Development** access would be STOP-controlled on the minor leg with free-flow conditions along Vanguard Drive. All approach cross-sections are anticipated to be two-lane, with a single shared LT/Th/RT lane on all approaches;
- The **Vanguard Drive / Mer Bleue Road** access intersection would be a signalized intersection with auxiliary LT bay and shared RT/Th lane on both the east and west approach of the intersection. The northbound approach is anticipated to have one auxiliary LT bay, one NB-Th lane and one shared NB-Th/RT lane. The southbound approach is anticipated to have one auxiliary RT bay, two SB-Th lanes and one auxiliary LT bay;
- The **Brian Coburn Boulevard / Fern Casey Street** access intersection would be a two-lane roundabout with YIELD control on all approaches; and
- The **Innes Road / Frank Bender Street** access intersection is currently a signalized intersection with control and design as described in the Existing Intersections section of the report.

7.3.3 Mini-Roundabout Screening for Subdivision Intersections

The EUC Phase III MTS recommended roundabout intersections, or mini-roundabouts, at the following three locations within the CDP area to provide traffic calming measures:

- Fern Casey Street/Frank Bender Street;
- Vanguard Drive/Glenview Access; and
- Vanguard Drive/Frank Bender Street.

Table 7-2 summarizes a review of the mini-roundabout screening criteria according to the City of Ottawa's *Mini-Roundabout Guidelines.* The table indicates the following key points:

- The Fern Casey Street corridor is classified as a "Major Collector" and is envisioned to be characterized by significant passenger vehicle and transit vehicle volumes. The implementation of a mini-roundabout is likely inappropriate to accommodate significant north-south volumes. Therefore, it is recommended that a full single-lane roundabout be considered at this location;

- The Vanguard Drive/Glenview Access intersection is located in the Glenview Community. The amount of dedicated right of way is unclear, and remains out of the purview of this study. However, should the required ROW for a mini-roundabout be provided at this location, all screening criteria would be considered met for the implementation of the roundabout configuration; and
- The Vanguard Drive/Frank Bender Street intersection meets all mini-roundabout screening criteria. However, each leg of the intersection cannot be considered local nor minor in nature, and the future employment lands to the east remained undefined. Therefore, it would be most prudent to plan for a full single lane roundabout at this intersection to serve as an “entry way” into the proposed community.

The implementation of a full single-lane roundabout would require between 40m-to-55m depending on the geometry and active mode provisions on each leg of the intersection. It is recommended that the detailed design of the subdivision accommodate sufficient right-of-way for a roundabout intersections for the junctions of Fern Casey Street/Frank Bender Street and Vanguard Drive/Frank Bender Street.

For the purposes of analysis, the Vanguard Drive/Glenview Access intersection has been assumed to remain with STOP-controlled conditions on the local north-south approaches. This configuration would be considered worst-case for intersection operations.

Table 7-2: Mini-Roundabout Screening for Subdivision intersections

Screening Criteria Conditions	*Fern Casey Street / Frank Bender Street*	*Vanguard Drive / Glenview Access*	*Vanguard Drive / Frank Bender Street*
Junction of minor collectors and/or local roads	No, Fern Casey is a Major Collector	Yes, Vanguard is a Collector, Glenview Access is a local	Yes, Vanguard Drive and Frank Bender are considered Collectors
ADT < 15,000 vpd with at least 10% from the minor leg approach	2047 Forecast ADT Estimate: 9,500-to-10,500 vpd	2047 Forecast ADT Estimate: 4,500-to-5,500 vpd	2047 Forecast ADT Estimate: 5,000-to-6,000 vpd
Operating Speed < 55 km/hr or Posted Speed < 50 km/hr in new area	Yes (posted 40 km/hr or 50 km/hr envisioned	Yes (Posted 40 km/hr or 50 km/hr envisioned)	**YES (POSTED 40 KM/HR OR 50 KM/HR ENVISIONED)**
Sufficient ROW to accommodate a 13m to 27m Inscribed Circle Diameter	Yes. Intersection diagonals provide for approximately 40m of ROW	Unknown. The lands are under the purview of Glenview Homes.	Yes. Intersection diagonals provide for approximately 42m of ROW
Non truck Route or without heavy truck movements	Yes	Yes	Yes, however there exists the possibility for industrial-related employment areas to the southeast
Maximum 4-legs	Yes	Yes	Yes

7.4 TRANSPORTATION DEMAND MANAGEMENT

7.4.1 Context for TDM

The proposed development is located in South Orleans within the East Urban Community (EUC) Phase III lands. The development is designated a Design Priority Area as it is contained within the Mer Bleue Mixed-Use Centre Lands.

A review of the TAZ was found to indicate a daily auto mode share of approximately 60% for all trip purposes. The target transit modal share was set at 20% assuming the Cumberland Transitway is not in place, which is a 2-fold increase in the number of transit trips for this area. The proposed development is supported by the recently opened Chapel Hill Park and Ride, the future advent of the LRT extension to the north, future Innes Road transit priority improvements, and the long-term BRT corridor located north of Brian Coburn Boulevard. The development involves higher density residential development to encourage multi-modal trip modes. There remains confidence that these mode shares will be achieved over the coming decades given the investment in transit infrastructure.

7.4.2 Need and Opportunity

The proposed development is located adjacent to Brian Coburn Boulevard and Innes Road. Both roads are east-west arterials connecting to Mer Bleue Road and Navan Road. Failure to meet the modal share targets would likely increase traffic along Brian Coburn Boulevard and Innes Road, particularly to-and-from the inner urban areas, but overall would have a low-risk of severe impacts on the surrounding roadway network.

The proposed development is supporting the mode share targets by providing:

- direct and convenient sidewalk access to the future BRT corridor located north of Brian Coburn Boulevard;
- encouraging pedestrian connectivity throughout the entire development; and
- providing higher density residential development nearest the future BRT corridor to encourage transit usage.
- Provides for the minimum required parking based on City of Ottawa By-Law requirements.

7.4.3 TDM Program

The City of Ottawa's TDM Measures Checklist was completed for the proposed subdivision development (See Appendix "G"). It is recommended that the proponent provide current transit information at the sales centre for current residents, and a multi-modal package on move-in to new owner's/tenants.

The City of Ottawa's TDM Supportive Development Design and Infrastructure Checklist was also completed given that Blocks 36, 80 and 81 could provide for higher density development that should implement several TDM measures within the future site plan design. However exact site plan details remain to be determine during future design submissions for these high density blocks.

7.5 TRANSIT

7.5.1 Route Capacity

The following analysis assumes no Cumberland Transitway in place and that all transit trips are accommodated within, and immediately adjacent to, the proposed Trailsedge North development. The study adopted a transit mode share of 20% for the proposed development in all time horizons. At this time, the exact transit routing remains uncertain but would likely involve local routes that bisect the community along the future collector roadways.

Table 7-3 summarizes the forecast peak direction cumulative boardings by development phase and the amount of transit capacity that would be occupied by each phase for a 20-minute, 15-minute and 10-minute transit route headway. The route capacity was assumed to vary by size of transit vehicle[6].

Table 7-3: Transit Capacity Analysis – By Phase of Residential Development

Demand / Capacity	Phase 1		Phase 2		Phase 3	
	AM - Outbound	PM - Inbound	AM - Outbound	PM - Inbound	AM - Outbound	PM - Inbound
Forecast Transit Trip Demand (boardings/peak hour)	81	62	154	154	247	187
20-Min Headway Demand / Capacity	39%-to-68%	30%-to-52%	73%-to-128%		118%-to-206%	89%-to-156%
15-Min Headway Demand / Capacity	29%-to-51%	22%-to-39%	55%-to-96%		88%-to-154%	67%-to-117%
10-Minute Headway Demand / Capacity	19%-to-34%	15%-to-26%	37%-to-64%		59%-to-103%	45%-to-78%

The exact transit routing remains to be determined as to afford a 400m walking distance service to the entirety of the EUC Phase III lands would likely require multiple transit routes that bisect the Trailsedge communities and the Glenview community. The above analysis indicates that, should a single route offer transit services to the proposed development:

- Phase 1 would require a transit route with a 15-to-20-minute headway in the peak direction;
- After the completion of Phase 2, a 10-to-15 minute headway would be required; and

6 A standard and articulated bus capacity is between 40 and 70 people, respectively.

- The completion of Phase 3 would require a 10-minute headway transit routing. However, transit trips are likely to be distributed to multiple routes at this point in time.

7.5.2 Transit Priority

The proposed development would likely be supported by the Cumberland Transitway to the south. A design of this corridor, and its future stations, remains uncertain. However, a station is anticipated near the Brian Coburn Boulevard / Fern Casey Street intersection to serve the East Urban Community Phase III lands.

The City of Ottawa Transportation Master Plan, Map 5, indicates Innes Road is slated for "Transit Priority Corridor (Isolated Measures)" improvements from the Blackburn By-pass to Trim Road east of the study area. Isolated measures could include:

- Exclusive transit lanes, which could involve widening of Innes Road, re-allocation of lanes or the addition of a median lane;
- Re-allocation of existing lanes, or the extension of curb lanes, to develop queue jumps to bypass congestion; and/or
- Signal priority at intersections (green extension, red truncation, etc).

Signal priority implementation, such as green time extension, should be explored by the City of Ottawa as a primary low-cost operations tool that can be implemented in the short term to reduce delays to transit vehicles, particularly where existing right-of-way and intersection configurations do not afford significant transit priority opportunities (i.e. lack of a right turn auxiliary lane).

Regarding more substantial transit priority measures, implementation of queue jumps and dedicated transit lanes must consider:

- That the Innes Road corridor is near-capacity in the existing conditions, and will only sustain additional travel demand from several future developments south of Innes Road. Therefore, the re-allocation of a lane in each direction to transit-dedicated would cause significant congestion issues along the corridor and could be seen as a non-starter;
- Significant widening of the Innes Road corridor to provide for new transit lanes in addition to the current auto lane configuration is likely not feasible given the existing property constraints along much of the corridor;
- The requirements for the existing transit system will change with the extension of the LRT to the east and the development of the communities south of Innes Road. Therefore, transit priority measures need to consider the long-term transit network operations and priorities; and
- Further detailed analysis would be required to assure necessary right-of-way, long term functionality and overall transit benefit which is beyond the scope of this study.

Based on the intersection capacity analysis, the Innes Road / Lamarche Avenue (Caivan Access) intersection would likely be best served by significant transit priority measures. Given the advent of the Caivan and

Lepine developments, it is anticipated that the south leg of the intersection would require a significant portion of green time to assure satisfactory traffic operations. This is expected to result in EB-Th queues potentially spilling towards the Innes Road / Page Road intersection. The following two transit priority measures could be considered with the design of this intersection:

- a future EB-RT should consider the opportunity for a transit queue jump lane with the EB curb lane. This could include a channelized island and the required receiving lane. The property impacts would need to be carefully examined to ensure feasibility of this improvement; and
- A double NB-LT lane, or provisions for a shared NB-Th/RT and allowing transit vehicles to complete the left turn from the curb lane, could provide the opportunity for future transit service along Lamarche Avenue improved access to Innes Road.

These improvements should be considered with the development and implementation of the Innes Road / Lamarche Avenue intersection.

7.6 Intersection Design

An assessment of the study area intersections was undertaken to determine their operational characteristics such as levels-of-service, delay, volume-to-capacity ratios and 95th percentile queue lengths. The intersection capacity analysis was undertaken using Synchro 10^{TM} intersection capacity analysis software for traffic signals and STOP-controlled intersections. Sidra roundabout capacity analysis was utilized to assess the future operations of the roundabouts existing and planned within the study area.

Appendix "H" provides the Synchro output sheets for both morning and afternoon peak hours of travel demand.

7.6.1 Multi-Modal LOS Analysis

Table 7-4 summarizes the intersection MMLOS results for the existing traffic signal controlled intersections in the study area.

The table indicates:

- the pedestrian levels of service, based on a PETSI points analysis. To determine the total number of lanes crossed within the PETSI analysis, the crossing distance was measured and divided 3.5 to reflect the typical travel lane width at an intersection. The PETSI analysis also considered a channelized right turn as a single lane;
- the transit level of service that is based on forecast 2047 delay results from the Synchro^{TM} analysis;
- the bicycle level of service that is based on the critical left-turn maneuvers; and
- the truck level of service analysis based on existing geometry and the number of receiving lanes..

Appendix "I" provides detailed calculations for the MMLOS analysis for each study area intersection.

The future Mer Bleue Road / Vanguard Drive traffic signal controlled intersection was excluded from the analysis due to the configuration remaining unknown ahead of the completion of the Vanguard Drive Environmental Assessment.

The following sections review the critical intersections by mode of transportation.

Pedestrian Level of Service (PLOS)

The PETSI analysis indicated that none of the study area intersections met the PLOS target of "C". The poor PLOS along the major Innes Road approaches are a direct result of the crossing distances required to accommodate the east-west thru lanes and auxiliary left turn lanes. A reduction in the number of east-west thru lanes, narrowing of the existing lanes, provisions for zebra striping, a pedestrian median refuge and a leading pedestrian interval would be required to achieve the target PLOS. With exception of the zebra striping, the aforementioned improvements would negatively impact east-west delays for passenger and transit vehicles.

The City is recommended to consider zebra striping improvements to elevate the level of comfort for pedestrians along the Innes Road corridor.

at all study area intersections that the intersection PLOS for the Navan Road / Renaud Road intersection was below the target PLOS of "C".

Bicycle Level of Service (BLOS)

The BLOS analysis indicated that, given the needed to cross at least 2 lanes along Innes Road, that all study area intersections failed to meet the BLOS target if "C" for a "Cross-town Bikeway". To achieve satisfactory BLOS along the Innes Road corridor, two-stage left turn bike boxes would be required at each study area intersection.

Transit Level of Service (TLOS)

Assuming 2047 design traffic volumes, delays were found to exceed 40 seconds/vehicle along Innes Road in the east-west direction for the majority of study are intersections, resulting in a TLOS "F". This is consistent with the EUC CDPD MTS which found the Innes Road corridor to be congested in the Ultimate scenario.

The Innes Road isolated transit priority measures remain to be determined however are anticipated to include signal priority measures and queue jump lanes to reduce transit delays along Innes Road.

Truck Level of Service (TkLOS)

A review of the TkLOS indicated that the study area intersections overall do not meet the TkLOS target of "D". However, this is primarily due to the minor intersection approaches offering a single departure/receiving lane and smaller corner radii. It is anticipated that heavy vehicles would use Viseneau

Drive, the BMR Access and Belcourt Blvd rarely. No intersection modifications are recommended to better accommodated heavy vehicles within the study area.

Table 7-4: MMLOS Analysis Results Summary – Full Build-Out

	Innes Road/Belcourt Blvd - Frank Bender Street - Intersection Leg				*Innes Road/Viseneau Drive - Intersection Leg*				*Innes Road/Glenview-BMR Access (473m east of Page)*			
Performance Measure	West Leg - Innes Road	East Leg - Innes Road	North Leg – Belcourt Blvd	South Leg - Frank Bender Street	West Leg - Innes Road	East Leg - Innes Road	North Leg - Viseneau Drive	South Leg - Commercial Access	West Leg - Innes Road	East Leg - Innes Road	North Leg – Local Access	South Leg – BMR Access
Pedestrian LOS (PLOS)												
Leg PLOS	F	F	E	F	F	F	E	F	F	F	D	F
Intersection PLOS	F				F				F			
Target PLOS	C				C				C			
Bicycle LOS (BLOS)												
Leg BLOS	F	F	D	D	F	F	B	D	F	F	B	B
Intersection BLOS	F				F							
Target BLOS	B				B				B			
Transit LOS (TLOS)												
Intersection TLOS	F	F	N/A	N/A	D	D	F	N/A	F	B	N/A	N/A
Target TLOS	D				D				D			
Truck LOS (TkLOS)												
Leg TkLOS	B	B	**E**	B	A	**E**	B	B	B	B	F	E
Intersection TkLOS	**E**				**E**				F			
Target TkLOS	D				D				D			

7.6.2 2037 Forecast Auto Capacity Analysis

Table 7-5 summarizes the intersection capacity analysis for the 2037 morning and afternoon peak hours of travel demand, when the Phase 1 residential component is anticipated to be built-out. The Vanguard Drive Extension east of Fern Casey Street is not anticipated to be in place by this time horizon. The table indicates the most critical movement at each study area intersection based on level-of-service (v/c ratio for traffic signals, delay for non-signalized). For roundabouts, the critical movement was selected based on delay. The level-of-service for traffic signal controlled intersections were based on the movement/intersection volume-to-capacity (v/c) ratio as per the MMLOS guidelines.

Table 7-5: 2037 Forecast Traffic Analysis – Design Traffic Volumes

Intersection	***Weekday AM Peak (PM Peak)***						
	Critical Movement				***Overall Intersection***		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Traffic Signals							
Innes Rd & Belcourt Blvd-Frank Bender Street	***WB-Th/RT (EB-Th)***	26 (**42**)	D (**E**)	0.86 (**0.97**)	22 (45)	C (**E**)	0.66 (**0.98**)
Innes Rd & Viseneau Dr	***WB-Th/RT (EB-Th)***	4 (5)	C (D)	0.78 (0.82)	9 (13)	B (D)	0.62 (0.81)
Innes Rd & Glenview Access	***NB-LT (EB-Th)***	53 (4)	A (D)	0.58 (0.85)	5 (7)	A (C)	0.54 (0.79)
Innes Rd & Avenue de Lamarche (Caivan Access)	***NB-LT (EB-Th)***	51 (23)	D (D)	0.85 (0.85)	17 (18)	D (D)	0.81 (0.86)
Mer Bleue Road & Vanguard Drive	***NB-Th/RT (SB-Th)***	3 (2)	A (A)	0.53 (0.44)	3 (3)	A (A)	0.52 (0.51)
STOP-Controlled							
Vanguard Drive & Street 1 (Glenview)	***NB Approach (SB Approach)***	10 (11)	A (B)	0.08 (0.12)	-	-	-
Roundabout							
Fern Casey Street / Frank Bender Street	***EB Approach (SB Approach)***	10 (7)	A (A)	0.08 (0.11)	5 (5)	A (A)	0.08 (0.11)
Brian Coburn Boulevard & Mer Bleue	***WB Approach (SB Approach)***	16 (14)	C (B)	0.70 (0.74)	8 (9)	A (A)	0.70 (0.74)
Brian Coburn Blvd & Fern Casey	***WB Approach (EB Approach)***	11 (11)	A (B)	0.35 (0.29)	7 (7)	A (A)	0.35 (0.29)

The City of Ottawa MMLOS Guidelines indicate a target auto LOS of “D” for overall intersection operations within the “General Urban Area”. The analysis indicated that Innes Road eastbound corridor is forecast to be at capacity for each of the study area intersections.

The **Innes Road / Frank Bender** signal-controlled intersection was the only study area intersection found to operate with an overall auto level-of-service below the target LOS “D” during the afternoon peak hour of travel demand. The most critical movement was found to be the EB-Th movement which was found to operate with a LOS “E”.

Operational improvements to this intersection are difficult to achieve without the addition of third eastbound thru-lane which would require additional right-of-way from the existing commercial developments to the south. This improvement would also negatively impact PLOS and BLOS along the Innes Road corridor.

7.6.3 2042 Forecast Auto Capacity Analysis)

Table 7-6 summarizes the intersection capacity analysis for the 2042 morning and afternoon peak hours of travel demand, when the Phase 2 residential component is expected to be built-out. The Vanguard Drive extension is not anticipated to be in place by 2042 at Mer Bleue Road, but the intersection of Frank Bender Street / Vanguard Drive is anticipated to be in place to support the development. The table indicates the most critical movement at each study area intersection based on level-of-service (v/c ratio for traffic signals, delay for non-signalized).

Table 7-6: 2042 Forecast Traffic Analysis – Design Traffic Volumes

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Traffic Signals							
Innes Rd & Belcourt Blvd-Frank Bender Street	***WB-Th/RT (EB-Th)***	28 (67)	E **(F)**	**0.92 (1.05)**	24 (58)	C (F)	0.65 **(1.18)**
Innes Rd & Viseneau Dr	***WB-Th/RT (EB-Th)***	22 (4)	D (D)	0.90 (0.85)	20 (11)	B (C)	0.64 (0.79)
Innes Rd & BMR Access-Glenview Access	***WB-Th/RT (EB-Th)***	4 (6)	B (**E**)	0.68 **(0.91)**	16 (38)	A (D)	0.62 (0.83)
Innes Rd & Avenue de Lamarche (Caivan Access)	***NB-LT (EB-Th)***	41 (27)	D (E)	0.87 **(0.94)**	22 (22)	**E (E)**	0.92 **(**0.92**)**
Mer Bleue Road & Vanguard Drive	***NB-Th/RT (SB-Th)***	4 (3)	A (A)	0.59 (0.44)	4 (3)	A (A)	0.58 (0.58)
STOP-Controlled Intersections							
Vanguard Drive & Fern Casey Street	***EB Approach (NB Approach)***	8 (10)	A (A)	0.24 (0.31)			
Vanguard Drive & Street 1 (Glenview) Two-Way STOP	***NB Approach (SB Approach)***	10 (11)	A (A)	0.09 (0.14)	-	-	-
Roundabout							
Fern Casey & Frank Bender	***EB Approach (NB Approach)***	10 (9)	A (A)	0.12 (0.26)	5 (6)	A (A)	0.15 (0.26)
Brian Coburn Boulevard & Mer Bleue	***WB Approach (SB Approach)***	16 (14)	C (B)	0.74 (0.74)	8 (9)	A (A)	0.74 (0.74)
Brian Coburn Blvd & Fern Casey	***WB Approach (EB Approach)***	11 (11)	A (B)	0.37 (0.33)	7 (8)	A (A)	0.37 (0.33)

The City of Ottawa MMLOS Guidelines indicate a target auto LOS of "D" for overall intersection operations within the "General Urban Area". When compared to the 2037 Phase 1 analysis, all study area intersections were found to operate with similar levels of service. The Innes Road eastbound corridor is forecast to be at capacity for each of the study area intersections during the afternoon peak hour, while the westbound corridor is approaching capacity in the morning peak hour.

In addition to the **Innes Road / Belcourt Blvd** signal-controlled intersection, the **Innes Road / Lamarche Avenue (Caivan Access)** was also found to operate with an overall auto level-of-service below the target LOS "D" during the both peak hours of travel demand. The most critical movement was found to be the EB-Th movement during the afternoon peak hour, which was found to operate with a LOS "E" which competes with signal time from the northbound approach.

7.6.4 2047 Forecast Auto Capacity Analysis

Table 7-7 summarizes the intersection capacity analysis for the 2047 morning and afternoon peak hours of travel demand, when the Phase 3 residential component is expected to be built-out. The Vanguard Drive Extension is anticipated to be in place by this time horizon. The table indicates the most critical movement at each study area intersection based on level-of-service (v/c ratio for traffic signals, delay for non-signalized).

The City of Ottawa MMLOS Guidelines indicate a target auto LOS of "D" for overall intersection operations within the "General Urban Area". When compared to the 2042 analysis, all study area intersections were found to operate with a similar level of service, given the opportunity for development traffic to utilize Vanguard Drive to travel to areas east and north of the study area. The Innes Road eastbound corridor is forecast to be at capacity for each of the study area intersections during the afternoon peak hour, while the westbound corridor is approaching capacity in the morning peak hour.

The **Innes Road / Belcourt Blvd** and **Innes Road / Caivan Access** intersections remain below the overall auto level-of-service below the target LOS "D" during the afternoon and both peak hours of travel demand, respectively.

Intersection improvements were evaluated at the intersection of **Innes Road / Frank Bender Street.** These improvements considered a combination of double NB and WB left turn lanes in an effort to improve the level of service at this intersection (See Appendix H). The analysis found that these improvements would only serve to incur additional lost time due to amber and red change periods thus negatively impacting the intersection. In the absence of additional east-west lanes, little could be accomplished to increase the auto LOS at this intersection given the heavy east-west forecast traffic volumes in combination with the commercial activity south of Innes Road. The future Vanguard Drive corridor is forecast to serve as an alternate access to both the EUC Phase 3 lands and the commercial lands south of Innes Road, thus diverting traffic from the Innes Road / Frank Bender Street intersection.

Table 7-7: 2047 Forecast Traffic Analysis – Design Traffic Volumes

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Traffic Signals							
Innes Rd & Belcourt Blvd-Frank Bender Street	***WB-Th/RT (EB-Th)***	32 (87)	**E (F)**	**0.94 (1.09)**	25 (73)	C (**F**)	0.72 (**1.23**)
Innes Rd & Viseneau Dr	***WB-Th/RT (EB-Th)***	4 (26)	D (D)	0.83 (0.85)	9 (24)	B (D)	0.67 (0.81)
Innes Rd & BMR Access-Glenview Access	***WB-Th/RT (EB-Th)***	4 (28)	B (E)	0.68 (**0.95**)	7 (21)	B (D)	0.62 (0.87)
Innes Rd & Avenue de Lamarche (Caivan Access)	***NB-LT (EB-Th)***	52 (31)	**E** (**E**)	**0.93 (0.95)**	23 (24)	E (**E**)	**0.92** (**0.91**)
Mer Bleue Road & Vanguard Drive	***NB-Th/RT (SB-Th)***	8 (7)	B (B)	0.70 (0.68)	8 (7)	B (A)	0.67 (0.64)
STOP-Controlled							
Vanguard Drive & Fern Casey Street	***EB Approach (NB Approach)***	8 (10)	A (A)	0.24 (0.31)			
Vanguard Drive & Street 1 (Glenview)	***NB Approach (SB Approach)***	11 (11)	B (B)	0.11 (0.12)	-	-	-
Roundabout							
Vanguard Drive & Frank Bender	***EB Approach (NB Approach)***	7 (8)	A (A)	0.14 (0.28)	4 (5)	A (A)	0.14 (0.28)
Fern Casey & Frank Bender	***SB Approach (NB Approach)***	8 (10)	A (B)	0.25 (0.64)	5 (7)	A (A)	0.25 (0.64)
Brian Coburn Boulevard & Mer Bleue	***WB Approach (SB Approach)***	17 (15)	B (B)	0.80 (0.77)	9 (10)	A (A)	0.80 (0.77)
Brian Coburn Blvd & Fern Casey	***SB Approach (EB Approach)***	15 (16)	A (B)	0.49 (0.74)	8 (12)	A (B)	0.49 (0.74)

8.0 TIA STRATEGY

Infrastructure to Support the Proposed Development

The Trailsedge North residential development proposes the following phase and residential unit breakdown:

- *Phase 1*: 95 single dwelling units, 155 townhouse dwelling units and 444 apartment dwelling units located northwest of the Brian Coburn Blvd / Fern Casey Street intersection;
- *Phase 2*: 119 single dwelling units, 188 townhouse dwelling units, 64 back-to-back townhouse dwelling units, and 200 dwelling apartment units.
- *Phase 3*: would see the remainder of the residential development being implemented, which would involve 126 single units, 186 townhouse dwelling units, 50 back-to-back townhouse dwelling units, and 415 apartment dwelling units.

The development would involve the following major collector/collector roadways each with a 24.0m ROW, a sidewalk and a MUP configuration as depicted within the EUC Phase III CDP:

- Fern Casey Street, between Brian Coburn Boulevard and Vanguard Drive;
- Vanguard Drive, between the Glenview development and Mer Bleue Road; and
- Frank Bender Street, from Fern Casey Street to the Belcourt Blvd / Innes Road Commercial intersection;

The following internal intersection configurations are recommended for the internal collector-collector junctions:

- A single-lane roundabout configuration at Fern Casey/Frank Bender and Vanguard Drive/Frank Bender; and
- A mini-roundabout configuration at the Vanguard Drive/Glenview access intersection. However, this improvement is beyond the purview of this study and would rely on the Glenview Subdivision application to follow the EUC Phase II MTS & CDP.

The detailed design of the Trailsedge North subdivision would be required to accommodate the required right-of-way for the recommended roundabout improvements.

The following intersection modifications would be required to accommodate access into the Trailsedge North community:

- The implementation of the north leg of the Brian Coburn Boulevard / Fern Casey Street roundabout intersection;
- The extension of Vanguard Drive to connect with Glenview Access (Street One) of the Glenview community to the west. This intersection is envisioned as either a mini-roundabout or with STOP-control on the minor legs; and
- the west leg of the Mer Bleue Road / Vanguard Drive intersection to support Phase 3 of the development and the future employment lands within the EUC Phase 3 community.

Recommended Transportation Network Improvements

The following transportation infrastructure improvements are recommended to be considered to support the network as a whole:

- The widening of Brian Coburn Boulevard to 4-lanes after the 2031 TMP horizon to provide additional east-west capacity and to support the Innes Road corridor. It is recognized that this improvement is not within the current TMP affordable or concept networks (2031);
- Pedestrian crossing improvements in the form of zebra striping at the intersections of Innes Road / Glenview-Former BMR Access, Innes Road / Viseneau Drive and Innes Road. This improvement could be implemented with isolated transit priority measures along the Innes Road corridor;
- Develop a planning timeframe for the implementation of the Cumberland Transit to provide a higher level of transit to the proposed development and the EUC Phase 3 lands as a whole;
- The investigation of transit priority measures at the intersection of Innes Road / Lamarche Avenue (Caivan Access) inclusive of an EB queue jump lane and a NB-LT transit lane; and
- The investigation of east-west left-turn bike boxes along Innes Road to support cycling along the corridor. The viability of the bike boxes depends on future transit initiatives along Innes Road to assure design consistency across the corridor.

8.1 CONCLUSION

Based on the above, it is recommended that the City of Ottawa be encouraged to assemble the appropriate conditions that would permit the development application for the Trailsedge North subdivision to proceed. It is recognized that, given the long-term planning horizons within this study and the pending EUC Phase 3 Community Design Plan approval, additional conditions could be applicable for this subdivision application.

Yours truly,

Mr. Arthur Gordon B.A. P.Eng
Principal Engineer
Castleglenn Consultants Inc.

Mr. Jake Berube , P.Eng
Traffic Planning Specialist
Castleglenn Consultants Inc.

Appendix A: City of Ottawa Report Comments and Responses

Jake Berube

From: Jake Berube
Sent: Wednesday, April 14, 2021 10:40 AM
To: Jake Berube
Subject: RE: 7255 - Trailsedge North - EUC Phase 3 Lands - Analysis/Strategy Report

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From: Giampa, Mike <Mike.Giampa@ottawa.ca>
Sent: Thursday, March 11, 2021 7:56 AM
To: Jake Berube <jBerube@castleglenn.ca>
Subject: RE: 7255 - Trailsedge North - EUC Phase 3 Lands - Analysis/Strategy Report

Hi Jake, sorry about the delay, the comments are below:

Transportation Engineering Services

FORECASTING COMMENTS:

When describing the Vanguard Drive and Glenview-Caivan Access intersection on page 8, note that this would connect to the Innes Road and Glenview Access intersection in addition to the Innes Road and Caivan Access intersection.

Response: Noted and Revised

Section 1.2 Existing Conditions:

The intersection of Innes Road and Frank Bender Street is described as having a “NB-RT auxiliary lane” on the eastbound approach. Please revise to “EB-RT auxiliary lane”.

Response: Noted and Revised

The intersection of Innes Road and Viseneau Drive is described as having a “NB-RT auxiliary bay” on the eastbound approach. Please revise to “EB-RT auxiliary lane”.

Response: Noted and Revised

Describe the existing intersection of Innes Road and the Glenview Access (473m east of Pagé Road).

Response: Noted and Revised

Section 1.3 - Planned Conditions

Stage 3 and Stage 4 of Richcraft Trailsedge East are bounded by Fern Casey Street to the west and Mer Bleue Road to the east. Please correct the development description.

Response: Noted and Revised

The existing Mer Bleue Road and Decoeur Drive intersection will be modified to provide a fourth west leg to provide access to the Trailsedge East development (not Trailsedge North). Please correct.

Response: Noted and Revised

Section 2.1 Study Area:

Please revise Section 2.1 to note that Innes Road and Mer Bleue Road were also analyzed as boundary streets in Section 7.2.1.

Response: Noted and Revised

A previous comment on the forecasting report asked for the study area to be expanded to include all signalized intersections within 1km of any edge of the site. This includes the intersection of Innes Road and Pagé Road, the intersection of Innes Road and Mer Bleue Road / Jeanne d'Arc Boulevard, the intersection of Mer Bleue Road and Roger Pharand Street, and the intersection of Mer Bleue Road and Brian Coburn Boulevard.

Response: The TIA study closely reflects a similar approach to the recently approved EUC Phase III MTS and was confirmed during the scoping process. It has been confirmed that no changes are proposed to the study area at this time. The internal study area has been addressed as per the comment below.

Section 2.1 lists three internal intersections as signalized: Vanguard Drive/ Fern Casey Street, Frank Bender Street/Vanguard Drive, and Frank Bender Street/ Fern Casey Street. Analysis and signal warrants should be provided within the TIA to support these signalization recommendations.

Response: Noted and Revised to indicate either roundabout, mini-roundabout or STOP-control.

Generally, the TIA lacks internal collector-collector intersection analysis. Analysis should also be provided at key intersections within the Caivan and Glenview developments, such as the Vanguard Drive and Lamarche Avenue.

Response: Noted and Revised to indicate either roundabout, mini-roundabout or STOP-control.

Section 3.0 Exemption Review:

Clarify whether the development contributes enough volume to the Caivan Access (Lamarche Avenue) and/or the Glenview Access to cause either of these accesses to exceed the ATM thresholds.

Response: Commentary provided. Trailsedge North traffic volumes are not anticipated to exceed ATM Thresholds for Lamarche Avenue and the Glenview Access north of Vanguard Drive.

Section 4.1.5 Projected Trips by Mode:

The first paragraph of this section starts with "Table 4-9 and Table 4-9". Assume this should be "Table 4-8 and Table 4-9". Please correct.

Response: Noted and Revised

Table 4-8 has numerous errors in the “Total Generated Trips”. The result is that total build-out person trips in Table 4-8 don’t match Table 4-9.

Response: Noted and Revised total columns for Single-Detached, Townhouses and Mid-Rise units in Table 4-8. Table 4-8 and 4-9 match. No changes to the analysis for trip generation have been undertaken from this comment.

Section 4.1.6 Trip Distribution and Section 4.1.8 Trip Assignment:

Provide more explicit information for the reviewer to understand trip assignment. For example, what percentage of the to/from west trips are via Innes Road versus via Brian Coburn Boulevard.

Response: Additional commentary provided to describe traffic assignment procedure, and how it changes over time with the addition of Frank Bender and Vanguard Drive.

Section 4.1.9 Site Traffic Volumes:

The approach of providing non-cumulative site-generated volume figures for each phase requires justification. Trips from earlier phases should be re-distributed once new access intersections are available in future horizon years.

Response: Revised to cumulative and commentary provided to describe traffic assignment procedure, and how it changes over time with the addition of Frank Bender and Vanguard Drive.

All volume figures display the subdivision location and proposed road network incorrectly. Specifically, the Trailsedge North subdivision is shown within the lands of the Glenview subdivision; the Glenview Access does not connect directly into the Trailsedge North subdivision.

Response: Revised exhibit to better illustrate the Glenview road patter, Vanguard Drive and the Trailsedge North lands.

Explain why the Vanguard Drive and Glenview Access intersection does not show any westbound volumes.

Response: Revised exhibit.

Section 5.0 Background Network Traffic:

The Trailsedge North development adds numerous collector roads providing connectivity between Innes Road, Brian Coburn Boulevard, and Mer Bleue Road. Provide assumptions related to reassignment of background network travel patterns as a result of these collector roads. For example, consider how many vehicles from the Caivan and Glenview subdivisions will re-distribute through the Trailsedge North subdivision. Consider whether any trips to/from the south and east of Trailsedge North are expected to re-distribute through the EUC Phase 3 collector roads.

Response: Section 6.4 describes the re-distribution of the Caivan, Glenview and Trailesdge communities to the new Trailsedge North network for each stage of the development. The CDP transportation network has been developed to create an accessible and efficient network while minimizing traffic infiltration. The future detailed design will incorporate features to achieve a 30 km/hr posted/design/operating speed along local roads, further reducing cut-through traffic incentives. Further diversions of from the surrounding arterial network, as well as from the future Lepine development, are viewed as unlikely to occur given the subdivision layout and the design direction of reducing cut-through traffic potential.

Section 5.2.7 states that extracts from the Innes Road development TIAs may be found in Appendix "D", but these extracts are actually found in Appendix "E". Please correct.

Response: Noted and Revised

Section 6.2 - Review of Future Network Constraints

Section 7.1 Development Design:

Ensure enough ROW to accommodate all features.

Response: Noted, to be refined during SPC/detailed design

Explore a pathway block connecting Street No. 1 to the hydro corridor in the vicinity of Block 91/Block 90. This would provide the Street 1/2/3 area in the southwest corner of the development with a connection to the multi-use pathway proposed along the hydro corridor, and would reduce walking distance to the future Cumberland Transitway station to be located where the hydro corridor intersects with Fern Casey Street. This pathway block would also allow Street No. 1 and Street No. 10 to function as a north-south local cycling route through the development, which would replace the function of the north-south Major Pathway proposed in the vicinity of Street No. 1 and Street No. 10 by the Ottawa Cycling Plan.

Response: Noted, the detailed design of the subdivision and high-density Block 81

The following comments on collector roads were previously made on the last circulation of the EUC Phase 3 CDP and should be considered in this plan of subdivision application:

Adjust the ROW widths for the internal collector roads as follows:

• Vanguard Drive – 26m to the west of Frank Bender and 24m to the east of Frank Bender;

• Frank Bender Street – 26m.

All collector roads must follow the new Designing Neighbourhood Collector Streets guidelines and are to include cycle tracks and sidewalks on both sides of the road.

Response: Right-of-way comments have been noted to the proponent

Update Exhibits 7-2 per ROW width comments above and with reference to the cross-section elements in the new Designing Neighbourhood Collector Streets guidelines. The pre-vetted cross-sections in the guideline consider driveway parking setbacks and include several options that allow for large trees in areas with sensitive marine clay soils.

Response: Exhibit 7-3 has included an extract from the new *Deisgning Neighborhood Collecot Streets* City of Ottawa Guidelines. It is recognized that elements within the EUC MTS cross-sections are subject to further design to accommodate both these new guidelines and the 30 km/hr design/operating speed for local roadways.

Section 7.2.1 Mobility – Segment MMLOS Analysis:

Please note in the second paragraph of Section 7.2.1 that Innes Road and Mer Bleue Road have also been considered for segment MMLOS analysis.

Response: Noted and Revised

Section 7.4 Transportation Demand Management:

The development would better support the mode share targets if the comments on Section 7.1 (see above) were integrated into the development design.

Response: Noted.

Note that the TDM Supportive Development Design and Infrastructure Checklist should typically be referenced as part of Element 4.1.1 – Design for Sustainable Modes.

Response: Noted and Revised

Section 7.5.2 Transit Priority:

Provide specific recommendations for transit priority along Innes Road given the congestion/capacity issues discussed in Section 7.6.

Response: Specific priority measures have been suggested for the Innes Road / Caivan (Lamarche) access as well as transit signal priority recommendations along Innes Road. However, a detailed feasibility assessment would be required to verify these suggestions with further design analysis to ensure both compatibility with existing right of way and long term transit plans.

Section 7.6 Intersection Design:

The EUC Phase 3 Area CDP recommends roundabouts at the Frank Bender Street and Vanguard Drive intersection, at the Fern Casey Boulevard and Frank Bender Street intersection, and at the Vanguard Drive and “future north-south road” (now Glenview Access) intersection. Please evaluate all internal collector-collector intersections and make preliminary traffic control recommendations. Intersections recommended for mini-roundabouts should meet the screening criteria of the City’s mini-roundabout guidelines. Any intersections recommended for mini roundabouts should have enough right-of-way reserved within the subdivision plan to accommodate roundabout geometry; no internal intersections in Appendix A currently seem to accommodate roundabout ROW requirements.

Response: Collector-Collector analysis has been provided with recommendations for roundabout, mini-roundabout or stop-controlled configurations. Given that it is early in the subdivision design process, the site plan with Appendix “A” is anticipated to change to suit the TIA recommendations.

In Section 7.6.4, the last paragraph on page 65 starts with “In addition to the Innes Road / Belcourt Boulevard and the…”. And the what?

Response: Noted and Revised

In Section 7.6.4 it is noted that the Innes Road and Caivan Access intersection degrades to an overall auto LOS “E” (below target auto LOS “D”) during the PM peak hour “due to the increase in background growth in the eastbound direction”. This is incorrect; a review of Exbibits 4-3, 6-5, and 6-6 shows that most of the increase in travel demand (post 2037) in the eastbound direction at this intersection is caused by Trailsedge North.

Response: Noted. Revised analysis indicates that this intersection operates with an overall LOS “E” during the background analysis, namely due to the Lepine development traffic forecasted to occur. The advent of Fern Casey, Frank Bender and Vanguard Drive provides some relief to the intersection.

Traffic Signal Design

No comments to this circulation. Traffic Signal Design and Specification reserves the right to make future comments based on subsequent submissions.

Future considerations:

If there are any future proposed changes in the existing roadway geometry for the purpose of construction of a new TCS(s) or modifications to existing TCS(s) the City of Ottawa Traffic Signal Design and Specification Unit is required to complete a review for traffic signal plant re-design and provide the actual re-design to the proponent or involved consulting entity.

If the proposed traffic signals are warranted/approved for installation or modifications to existing TCS are approved, and RMA approved, please forward an approved geometry detail design drawings (dwg digital format in NAD 83 coordinates) including following: base mapping, existing and new underground utilities/sewers, new/existing catch basins locations, AutoTurn-Radius Modeling for approved vehicles and approved pavement markings drawings in separate files , no Xref files attached in master file(s), for detail traffic plant design lay out.

Please send all digital (CADD) design files to Peter.Grajcar@ottawa.ca 613-580-2424x23035. If not sure as per above request and more detail info needed as per input files, (i.e. format, etc.) please ask for our Dispatch checklist document and it will be gladly provided.

Response: Noted to proponent.

Street Lighting

If the proposed TIA is accepted please contact Barrie Forrester at 613-580-2424 ext 23332 (Barrie.Forrester@ottawa.ca) to setup cost recovery for Street Lighting review/coordination.

Full roadway lighting as per City of Ottawa policy is required. Send streetlight design including point by point light calculations for review and approval to the assigned Street Lighting Coordinator.

The developer will be 100% responsible for all associated street light costs. City Street Lighting will require commencement of work notification so that we can inspect construction at all stages.

Upon completion, we require as-builts in both e-format (Microstation & dwg). Once received, we advise Hydro that the City will accept the energy charges. With that authorization (plus an ESA certificate obtained by the developer or his electrical contractor) Hydro will then energize.

Any queries such as required light levels or approved materials can be directed to the assigned Street Lighting Project Coordinator.

Response: Noted to proponent.

From: Jake Berube
Sent: Monday, January 4, 2021 10:39 AM
To: 'Giampa, Mike' <Mike.Giampa@ottawa.ca>
Cc: Arthur Gordon <agordon@castleglenn.ca>; Patrick Gaudreault <pgaudreault@richcraft.com>
Subject: RE: 7255 - Trailsedge North - EUC Phase 3 Lands - Analysis/Strategy Report

Good Morning Mike;

I would like to wish you a Happy New Year. I hope you had a pleasant holidays.

Please find attached the Analysis/Strategy Report for the Trailsedge North (EUC Phase 3) Lands north of Brian Coburn Boulevard incorporating the forecasting comments below.
We have updated the trip generation to reflect a "With" and "Without" Cumberland Transitway Scenario. The Analysis Report carried forward the more critical auto volume forecasts where the Cumberland Transitway is not in place.
I will forward the Synchro/Sidra files shortly.

We look forward to your review and comments.

Best Regards;

Jake Berube, P.Eng.
Transportation Engineer
CastleGlenn Consultants Inc.
2460 Lancaster Road, Suite 200
Ottawa, Ontario
K1B 4S5
(T) 613-731-4052 (F) 613-731-0253 (C) 613-854-1097
Castleglenn Consultants
Engineers, Project Managers & Planners

From: Giampa, Mike <Mike.Giampa@ottawa.ca>
Sent: Friday, October 9, 2020 1:31 PM
To: Jake Berube <jBerube@castleglenn.ca>
Cc: Arthur Gordon <agordon@castleglenn.ca>; Patrick Gaudreault <pgaudreault@richcraft.com>
Subject: RE: 7255 - Trailsedge North - EUC Phase 3 Lands - Forecasting Report

Hi Jake, the forecasting comments are below:

Transportation Engineering Services

Section 1.1 - Proposed Development

Correct Exhibit 1-1 and 1-2 as they do not seem to depict the same subdivision of lands with regards to the area northeast of Frank Bender Street and the Vanguard Drive Extension.

Area is considered approximate and not to scale.

Section 1.3 - Planned Conditions

Include a section regarding future cycling facilities in the area and through the development.

See Section 7.1.

Section 4.1.2 - Auto Trip Generation

The modal share rates are accepted for the condition when the Cumberland Transitway is in place.

Noted.

Section 4.1.4 - Existing and Future Mode Shares

Correct Table 4-4, the content is duplicated.

Corrected.

The recently finalized East Urban Community Phase 3 Master Transportation Study reviewed the proposed development without the Cumberland Transitway in place; assuming that high level transit would only be available post 2031.

This report assumes that the development will not move ahead until the Cumberland Transitway is in place. It is important to recognize this future condition but given the uncertainty in the construction timeline of the transitway extension, it is also necessary to indicate the impact the interim condition (when rapid transit is not available) has on the transportation network.

With each phase of the proposed development, indicate the impact of person trips with and without new transit infrastructure in place (varying the modal share) as the timing of the Cumberland Transitway is not yet known.

Additional forecast person-trip information provided with and without the Cumberland Transitway in place.

Given the expected time frame for the subdivision buildout, conditions may be required to finalize the subdivision agreement that reflect the uncertainty of the future transportation network.

Comment noted.

Reference the EUC Master Transportation Study (MTS) infrastructure recommendations that were made without the transitway in place.

Referenced.

Section 5.1 - Historical Background Growth Rate

The EUC Phase 3 MTS assumed 0% background growth (all development accounted for) except for those movements that were not affected by the known development. For those (orphan) movements, a 1% background growth was applied. Clarify why a different approach was taken to the background growth for this development application.

Justification provided.

Section 5.2 - Surrounding Development Traffic Generation

Include 3490 Innes Road (Lépine Development), 4200 Innes Road, and 3604 Innes Road (Application #: D07-16-19-0027) as adjacent developments.

Included the above 3 developments and their relevant traffic exhibits.

Section 6.1 - Review of Existing Network Constraints

Correct the text as it does not correspond with values in Table 6-1.

Corrected.

Section 6.2 - Review of Future Network Constraints

Combine the development-generated and background trips for all horizon years to analyze total auto demands and confirm that the proposed demand rationalization will bring the overall level of service of all intersections to LOS E or better. Consider the impacts on the existing road network if future planned infrastructure is not in place.

Noted. Combined background and development assuming Cumberland Transitway is not in place.

General Comments:

The widening of Brian Coburn is not in the current TMP affordable or concept networks (2031).

Noted. Widening is anticipated to occur beyond 2031.

See the comments submitted for the EUC Phase 3 MTS regarding ROW requirements and guidance.

Noted.

Ensure that TOD design elements highlighted in the EUC MTS are applied to the subdivision.

Noted.

Traffic Signal Operations

Innes Road is currently experiencing capacity constraints at signalized intersections that will be exacerbated by use of all modes from this proposed development and adjacent developments (especially given the time horizon). Remedial options should be considered outside of demand rationalization.

Noted. However, widening along Innes Road is considered difficult and costly to achieve given the available ROW/current arterial configuration.

From: Jake Berube <jBerube@castleglenn.ca>
Sent: September 16, 2020 12:03 PM

To: Giampa, Mike <Mike.Giampa@ottawa.ca>
Cc: Arthur Gordon <agordon@castleglenn.ca>; Patrick Gaudreault <pgaudreault@richcraft.com>
Subject: RE: 7255 - Trailsedge North - EUC Phase 3 Lands - Forecasting Report

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

I hope this finds you well.
Please find attached the Trailsedge North Forecasting Report. Please let me know if you require anything else for your review before we proceed to Analysis/Strategy.

Best Regards;

Jake Berube, EIT.
Transportation Planning Specialist
CastleGlenn Consultants Inc.
2460 Lancaster Road, Suite 200
Ottawa, Ontario
K1B 4S5
(T) 613-731-4052 (F) 613-731-0253 (C) 613-854-1097
Castleglenn Consultants
Engineers, Project Managers & Planners

From: Giampa, Mike <Mike.Giampa@ottawa.ca>
Sent: Thursday, September 3, 2020 10:20 AM
To: Jake Berube <jBerube@castleglenn.ca>
Subject: RE: Trailsedge North - EUC Phase 3 Lands - Screening and Scoping Report

Hi Jake,
Yes, please proceed to forecasting. Note that the Mer Bleue widening from Brian Coburn to Renaud is complete and the signalization of MB/Renaud is not on the affordable network.

From: Jake Berube <jBerube@castleglenn.ca>
Sent: September 03, 2020 9:27 AM
To: Giampa, Mike <Mike.Giampa@ottawa.ca>
Subject: RE: Trailsedge North - EUC Phase 3 Lands - Screening and Scoping Report

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ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Have you had an opportunity to review the Scoping and Screening Report for the Trailsedge North development?

We have updated our analysis to include the Caivan, Glenview and Lepine High-Rise developments along Innes Road. This will be reflected in future submissions.

Thank you;

Jake Berube, EIT.
Transportation Planning Specialist
CastleGlenn Consultants Inc.
2460 Lancaster Road, Suite 200
Ottawa, Ontario
K1B 4S5
(T) 613-731-4052 (F) 613-731-0253 (C) 613-854-1097
Castleglenn Consultants
Engineers, Project Managers & Planners

From: Jake Berube
Sent: Tuesday, August 11, 2020 4:59 PM
To: Giampa, Mike <Mike.Giampa@ottawa.ca>
Cc: Arthur Gordon <agordon@castleglenn.ca>; 'Patrick Gaudreault' <pgaudreault@richcraft.com>
Subject: Trailsedge North - EUC Phase 3 Lands - Screening and Scoping Report

Good Afternoon Mike;

I hope this finds you well.
Please find attached the Screening and Scoping Report for the EUC Phase 3 Lands, located north of the hydro corridor, for your review. We have suggested three horizon years for the TIA based on the planned phasing of the development.

If you could advise on any comments for this report, or for Trailsedge Phase 4, it would be greatly appreciated.

Thank you;

Jake Berube, EIT.
Transportation Planning Specialist
CastleGlenn Consultants Inc.
2460 Lancaster Road, Suite 200
Ottawa, Ontario
K1B 4S5
(T) 613-731-4052 (F) 613-731-0253 (C) 613-854-1097
Castleglenn Consultants
Engineers, Project Managers & Planners

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Appendix B: Certification Form for TIA Study Project Manager

TIA Plan Reports

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

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

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

CERTIFICATION

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

[1,2] **License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.**

Dated at Ottawa this 29 day of July, 20 20.
(City)

Name: Arthur Gordon
(Please Print)

Professional Title: Principal Engineer

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

Office Contact Information (Please Print)
Address: Sutie 200 - 2460 Lancaster Road
City / Postal Code: Ottawa / K1B 4S5
Telephone / Extension: 613 - 731 - 4052
E-Mail Address: agordon@castleglenn.ca

Stamp

APPENDIX C: SCREENING FORM

Castleglenn Consultants
Engineers, Project Managers & Planners

2460 Lancaster Road, Suite 200,
Ottawa, Ontario, K1B 4S5
Tel: 613-731-4052

City of Ottawa 2017 TIA Guidelines Screening Form

Mike Giampa, P.Eng. July 29th, 2020
Project Manager, Infrastructure Approvals
Planning, Infrastructure and Economic Development
City of Ottawa, 110 Laurier Avenue West, Ottawa, ON K1P 1J1

Please see below the completed screening form for the proposed Trailsedge North development.

1. Description of Proposed Development

Municipal Address	Unknown
Description of Location	The proposed site is located south of Innes Road, north of the Hydro corridor to the north, Mer Bleue Road to the east, Fern Casey Street. to the west and Trails Edge East to the south.
Land Use Classification	Townhomes / Single Unit / Apartment / Light Industrial
Development Size (units)	~ 2,040 residential units & Light Industrial Block (19.5 ha)
Development Size (m^2)	NA
Number of Accesses and Locations	Main access points to the subdivision: - Frank Bender Street & Future Vanguard Drive intersection; - Vanguard Drive & Mer Bleue Road; - Fern Casey Blvd & Brian Coburn Boulevard; and - Vanguard Drive & Street No. 4 (west access)
Phase of Development	Development in 3 Residential Phases and 1 Light Industrial Employment Phase
Buildout Year	Residential: Estimated 2047 Light Industrial: Unknown

2. Trip Generation Trigger

The development will consist of about 2,000 residential units; **therefore, the Trip Generation Trigger is satisfied.**

The first phase of the development would involve 93 singles, 113 townhouses and 444 apartment units.

**2460 Lancaster Road, Suite 200,
Ottawa, Ontario, K1B 4S5
Tel: 613-731-4052**

3. Location Triggers

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

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

Trailsedge North, as a community, would access Inness Road (Bike Route), Mer Bleue Road (Bike Route) and Brian Coburn Blvd (transit priority). The development is also part of the Mer Bleue Mixed Use Centre Design Priority Area. Therefore, **<u>the Location Trigger is satisfied</u>**.

4. Safety Triggers

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

2460 Lancaster Road, Suite 200,
Ottawa, Ontario, K1B 4S5
Tel: 613-731-4052

5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?	X	
Does the development satisfy the Location Trigger?	X	
Does the development satisfy the Safety Trigger?		X

Please review the above screening information and let us know your comments or questions before proceeding to the next step of the TIA.

Yours Truly,

Mr. Arthur Gordon B.A. P.Eng
Principal Engineer
Castleglenn Consultants Inc.

Mr. Jake Berube B.Eng. EIT
Traffic Planning Specialist
Castleglenn Consultants Inc.

APPENDIX D: EXISTING TRAFFIC VOLUMES, COLLISIONS AND SIGNAL TIMING

Transportation Services - Traffic Services

W.O. 36661

Turning Movement Count - 15 Minute Summary Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 12 Westbound: 4

	VISENEAU DR									INNES RD									
	Northbound				Southbound					Eastbound				Westbound					
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	17	4	6	**27**	12	2	12	**26**	**53**	4	64	5	**73**	6	368	4	**378**	**451**	**504**
07:15 07:30	5	1	9	**15**	11	1	12	**24**	**39**	2	82	3	**87**	10	385	9	**404**	**491**	**530**
07:30 07:45	5	1	13	**19**	15	3	13	**31**	**50**	4	108	9	**121**	8	358	5	**371**	**492**	**542**
07:45 08:00	7	0	9	**16**	9	6	7	**22**	**38**	4	109	12	**125**	11	350	14	**375**	**500**	**538**
08:00 08:15	5	3	8	**16**	11	3	15	**29**	**45**	1	99	13	**113**	30	333	5	**368**	**481**	**526**
08:15 08:30	16	1	7	**24**	10	7	12	**29**	**53**	2	108	12	**122**	26	299	11	**336**	**458**	**511**
08:30 08:45	11	5	8	**24**	11	8	4	**23**	**47**	2	106	20	**128**	42	277	10	**329**	**457**	**504**
08:45 09:00	8	3	8	**19**	16	6	11	**33**	**52**	2	114	19	**135**	43	191	8	**242**	**377**	**429**
09:00 09:15	8	4	12	**24**	11	10	7	**28**	**52**	7	111	11	**129**	30	216	8	**254**	**383**	**435**
09:15 09:30	22	1	16	**39**	10	11	5	**26**	**65**	3	131	14	**148**	38	163	12	**213**	**361**	**426**
09:30 09:45	23	2	18	**43**	9	6	8	**23**	**66**	1	141	6	**149**	22	159	6	**187**	**336**	**402**
09:45 10:00	21	0	18	**39**	10	8	5	**23**	**62**	3	135	17	**155**	34	124	9	**167**	**322**	**384**
11:30 11:45	35	5	51	**91**	14	7	6	**27**	**118**	4	160	21	**185**	27	138	14	**179**	**364**	**482**
11:45 12:00	26	5	35	**66**	9	8	3	**20**	**86**	2	199	22	**225**	48	171	16	**235**	**460**	**546**
12:00 12:15	36	13	36	**85**	8	6	3	**17**	**102**	3	163	13	**181**	36	161	10	**207**	**388**	**490**
12:15 12:30	29	7	35	**71**	13	6	3	**22**	**93**	4	212	18	**235**	36	183	12	**232**	**467**	**560**
12:30 12:45	36	4	34	**74**	13	2	7	**22**	**96**	4	126	14	**145**	37	185	7	**229**	**374**	**470**
12:45 13:00	22	10	34	**66**	15	8	3	**26**	**92**	2	147	18	**168**	36	165	15	**216**	**384**	**476**
13:00 13:15	34	22	34	**90**	9	12	10	**31**	**121**	8	145	16	**169**	31	169	10	**210**	**379**	**500**
13:15 13:30	27	9	46	**82**	15	9	4	**28**	**110**	7	167	23	**197**	39	147	22	**208**	**405**	**515**
15:00 15:15	35	5	37	**77**	13	8	3	**24**	**101**	7	278	17	**303**	34	207	22	**263**	**566**	**667**
15:15 15:30	28	6	47	**81**	14	6	3	**23**	**104**	15	296	23	**334**	32	176	24	**232**	**566**	**670**
15:30 15:45	19	10	40	**69**	9	7	8	**24**	**93**	10	311	16	**337**	38	193	20	**251**	**588**	**681**
15:45 16:00	26	7	38	**71**	15	13	8	**36**	**107**	12	332	22	**367**	45	166	21	**232**	**599**	**706**
16:00 16:15	31	12	37	**80**	18	23	6	**47**	**127**	11	343	16	**370**	54	134	26	**215**	**585**	**712**
16:15 16:30	19	13	52	**84**	21	8	8	**37**	**121**	13	365	22	**400**	42	173	23	**238**	**638**	**759**
16:30 16:45	36	11	38	**85**	19	13	6	**38**	**123**	9	374	21	**404**	40	170	20	**230**	**634**	**757**
16:45 17:00	24	10	45	**79**	11	12	7	**30**	**109**	10	348	25	**383**	41	163	25	**230**	**613**	**722**
17:00 17:15	27	6	44	**77**	9	18	9	**36**	**113**	12	369	19	**401**	60	167	16	**243**	**644**	**757**
17:15 17:30	32	8	37	**77**	16	9	6	**31**	**108**	13	328	21	**363**	60	147	20	**228**	**591**	**699**
17:30 17:45	26	5	37	**68**	23	6	10	**39**	**107**	8	319	18	**345**	55	183	19	**257**	**602**	**709**
17:45 18:00	28	13	42	**83**	14	12	6	**32**	**115**	8	302	16	**326**	57	158	17	**232**	**558**	**673**
TOTAL:	724	206	931	**1861**	413	264	230	**907**	**2768**	197	6592	522	**7323**	1148	6579	460	**8191**	**15514**	**18282**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36661

INNES RD @ VISENEAU DR

Count Date: Wednesday, January 25, 2017

Start Time: 07:00

	VISENEAU DR			INNES RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	0	1	**1**	**1**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	0	**0**	0	1	**1**	**1**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

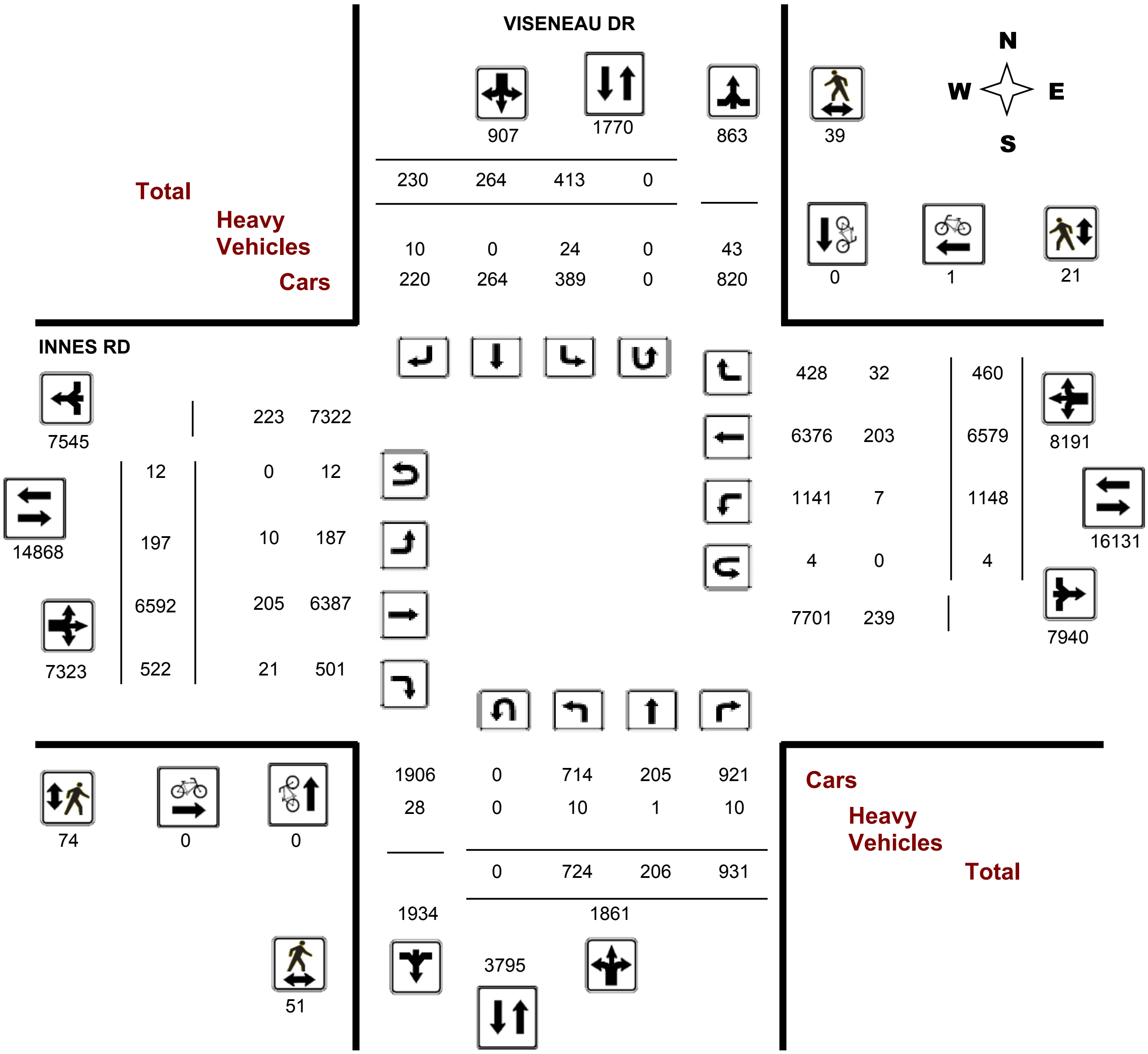
Turning Movement Count - Full Study Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

WO#: 36661

Device: Miovision



Comments

Transportation Services - Traffic Services

W.O. 36661

Turning Movement Count - Heavy Vehicle Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

Time Period		VISENEAU DR									INNES RD										
		Northbound				Southbound					Eastbound				Westbound						
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	0	0	4	**4**	2	0	0	**2**	**6**	7	35	2	**44**	1	32	7	**40**	**84**	**90**
08:00	09:00	1	0	1	**2**	5	0	1	**6**	**8**	2	25	4	**31**	2	34	5	**41**	**72**	**80**
09:00	10:00	4	0	2	**6**	2	0	0	**2**	**8**	0	30	7	**37**	2	28	3	**33**	**70**	**78**
11:30	12:30	1	0	1	**2**	3	0	0	**3**	**5**	0	30	4	**34**	0	14	4	**18**	**52**	**57**
12:30	13:30	3	0	1	**4**	2	0	0	**2**	**6**	0	28	3	**31**	2	14	2	**18**	**49**	**55**
15:00	16:00	1	0	1	**2**	3	0	2	**5**	**7**	1	22	1	**24**	0	36	7	**43**	**67**	**74**
16:00	17:00	0	1	0	**1**	5	0	3	**8**	**9**	0	18	0	**18**	0	24	2	**26**	**44**	**53**
17:00	18:00	0	0	0	**0**	2	0	4	**6**	**6**	0	17	0	**17**	0	21	2	**23**	**40**	**46**
Sub Total		10	1	10	**21**	24	0	10	**34**	**55**	10	205	21	**236**	7	203	32	**242**	**478**	**533**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		10	1	10	**0**	24	0	10	**34**	**55**	10	205	21	**236**	7	203	32	**242**	**478**	**533**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order 36661

Turning Movement Count - Pedestrian Volume Report

INNES RD @ VISENEAU DR

Count Date: Wednesday, January 25, 2017 **Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	**0**	3	0	**3**	**3**
07:15 07:30	1	1	**2**	0	1	**1**	**3**
07:30 07:45	0	1	**1**	0	0	**0**	**1**
07:45 08:00	0	1	**1**	0	1	**1**	**2**
07:00 08:00	1	3	**4**	3	2	**5**	**9**
08:00 08:15	0	0	**0**	1	0	**1**	**1**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	1	1	**2**	1	1	**2**	**4**
08:45 09:00	2	1	**3**	2	1	**3**	**6**
08:00 09:00	3	2	**5**	4	2	**6**	**11**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	1	2	**3**	2	0	**2**	**5**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	1	0	**1**	4	0	**4**	**5**
09:00 10:00	2	2	**4**	6	0	**6**	**10**
11:30 11:45	2	0	**2**	2	0	**2**	**4**
11:45 12:00	1	0	**1**	2	0	**2**	**3**
12:00 12:15	0	5	**5**	3	3	**6**	**11**
12:15 12:30	0	7	**7**	5	0	**5**	**12**
11:30 12:30	3	12	**15**	12	3	**15**	**30**
12:30 12:45	0	0	**0**	4	0	**4**	**4**
12:45 13:00	1	1	**2**	2	0	**2**	**4**
13:00 13:15	2	0	**2**	0	0	**0**	**2**
13:15 13:30	6	1	**7**	2	3	**5**	**12**
12:30 13:30	9	2	**11**	8	3	**11**	**22**
15:00 15:15	0	0	**0**	0	2	**2**	**2**
15:15 15:30	2	5	**7**	4	1	**5**	**12**
15:30 15:45	3	2	**5**	1	1	**2**	**7**
15:45 16:00	1	1	**2**	2	0	**2**	**4**
15:00 16:00	6	8	**14**	7	4	**11**	**25**
16:00 16:15	4	0	**4**	5	0	**5**	**9**
16:15 16:30	5	0	**5**	6	1	**7**	**12**
16:30 16:45	3	2	**5**	3	1	**4**	**9**
16:45 17:00	3	3	**6**	4	1	**5**	**11**
16:00 17:00	15	5	**20**	18	3	**21**	**41**
17:00 17:15	4	0	**4**	5	0	**5**	**9**
17:15 17:30	1	1	**2**	3	1	**4**	**6**
17:30 17:45	6	2	**8**	4	1	**5**	**13**
17:45 18:00	1	2	**3**	4	2	**6**	**9**
17:00 18:00	12	5	**17**	16	4	**20**	**37**
Total	51	39	**90**	74	21	**95**	**185**

Comment:

Transportation Services - Traffic Services

Work Order 36661

Turning Movement Count - Full Study Summary Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 12 Westbound: 4

AADT Factor 1.00

Full Study

Period	VISENEAU DR									INNES RD										
	Northbound				Southbound					Eastbound				Westbound						
	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	34	6	37	**77**	47	12	44	**103**	**180**	14	363	29	**406**	35	1461	32	**1528**	**1934**	**2114**
08:00 09:00	40	12	31	**83**	48	24	42	**114**	**197**	7	427	64	**498**	141	1100	34	**1275**	**1773**	**1970**
09:00 10:00	74	7	64	**145**	40	35	25	**100**	**245**	14	518	48	**580**	124	662	35	**821**	**1401**	**1646**
11:30 12:30	126	30	157	**313**	44	27	15	**86**	**399**	13	734	74	**821**	147	653	52	**852**	**1673**	**2072**
12:30 13:30	119	45	148	**312**	52	31	24	**107**	**419**	21	585	71	**677**	143	666	54	**863**	**1540**	**1959**
15:00 16:00	108	28	162	**298**	51	34	22	**107**	**405**	44	1217	78	**1339**	149	742	87	**978**	**2317**	**2722**
16:00 17:00	110	46	172	**328**	69	56	27	**152**	**480**	43	1430	84	**1557**	177	640	94	**911**	**2468**	**2948**
17:00 18:00	113	32	160	**305**	62	45	31	**138**	**443**	41	1318	74	**1433**	232	655	72	**959**	**2392**	**2835**
Sub Total	724	206	931	**1861**	413	264	230	**907**	**2768**	197	6592	522	**7311**	1148	6579	460	**8187**	**15498**	**18266**
U Turns				**0**				**0**	**0**				**12**				**4**	**16**	**16**
Total	724	206	931	**1861**	413	264	230	**907**	**2768**	197	6592	522	**7323**	1148	6579	460	**8191**	**15514**	**18282**
EQ 12Hr	1006	286	1294	**2587**	574	367	320	**1261**	**3848**	274	9163	726	**10179**	1596	9145	639	**11385**	**21564**	**25412**
AVG 12Hr	1006	286	1294	**2587**	574	367	320	**1261**	**3848**	274	9163	726	**10179**	1596	9145	639	**11385**	**21564**	**25412**
AVG 24Hr	1318	375	1695	**3389**	752	481	419	**1652**	**5041**	359	12003	951	**13334**	2090	11980	838	**14915**	**28249**	**33290**

Note (EQ 12Hr): These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**

Note (AVG 12Hr): These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **1.00**

Note (AVG 24Hr): These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. **1.31**

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

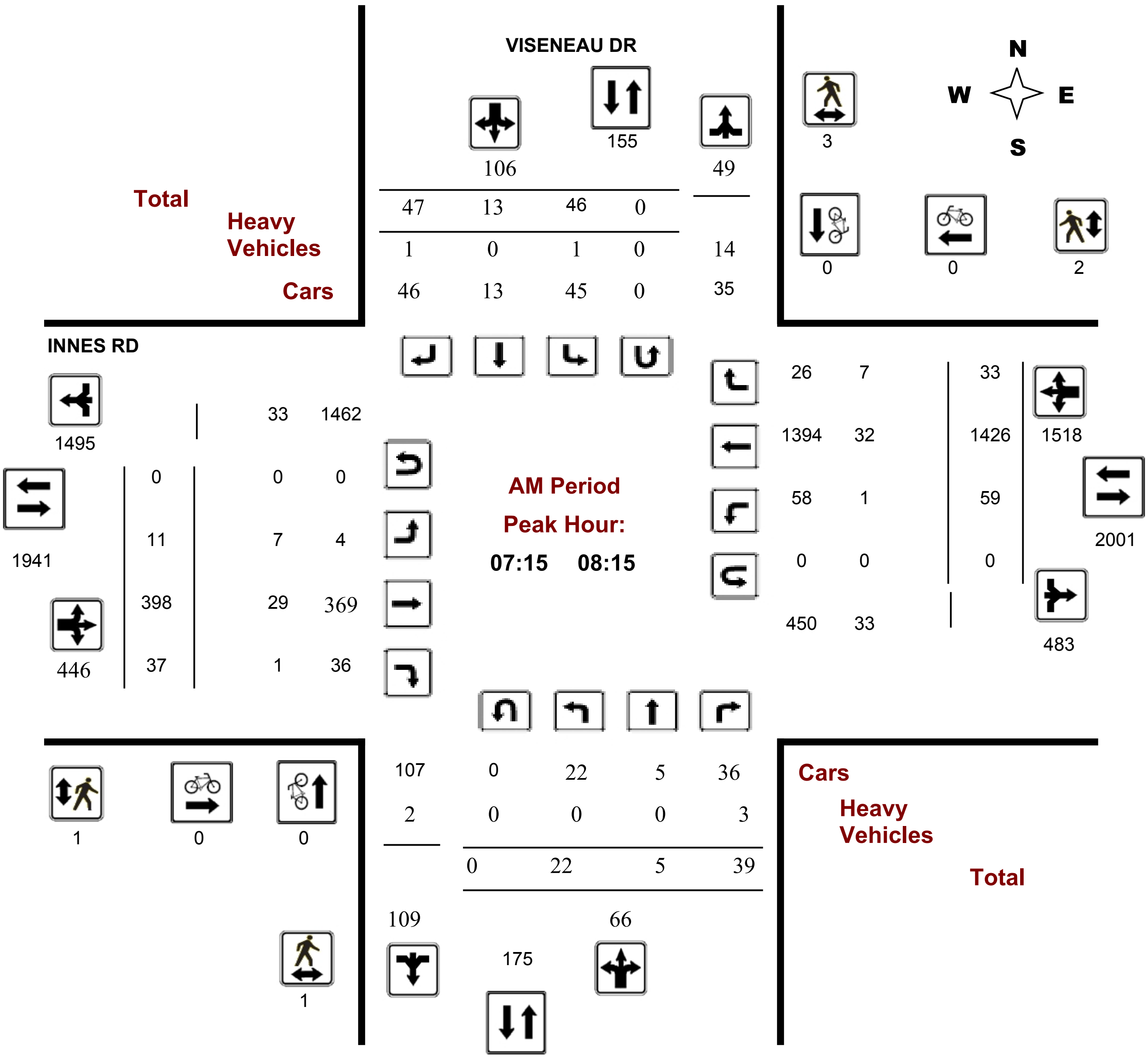
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

Start Time: 07:00 **Device:** Miovision



Comments

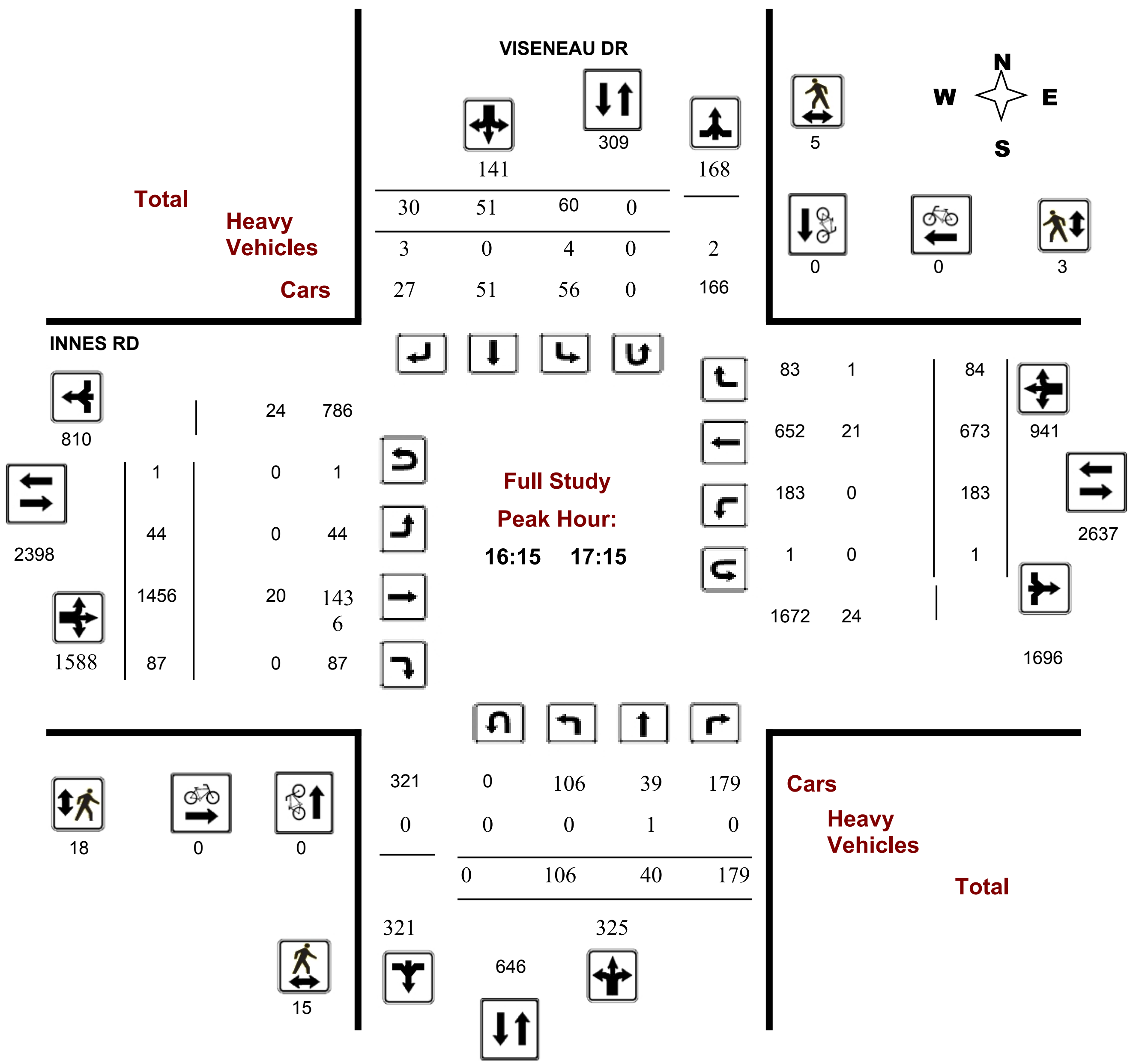
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

Start Time: 07:00 **Device:** Miovision



Comments

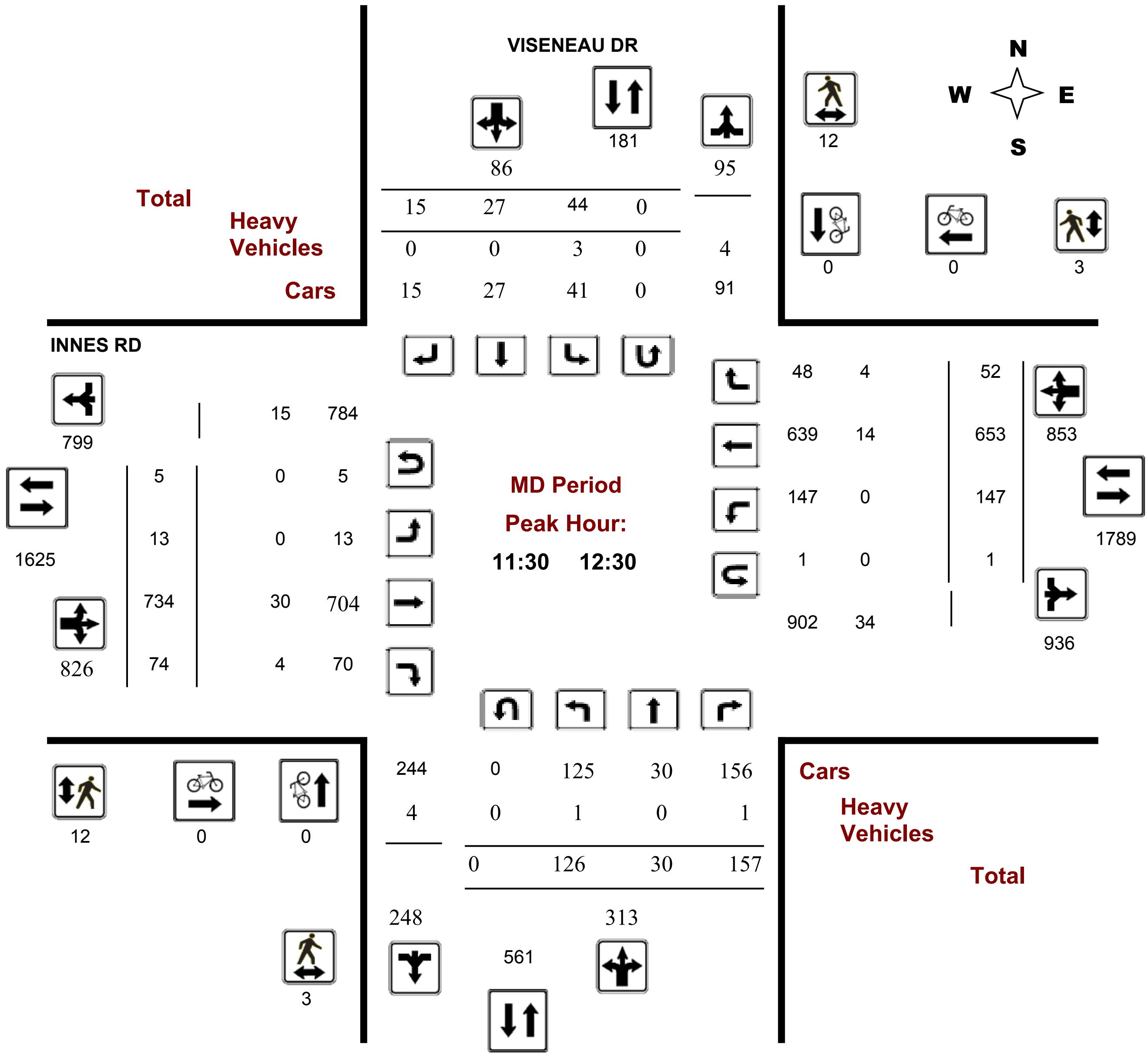
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

Start Time: 07:00 **Device:** Miovision



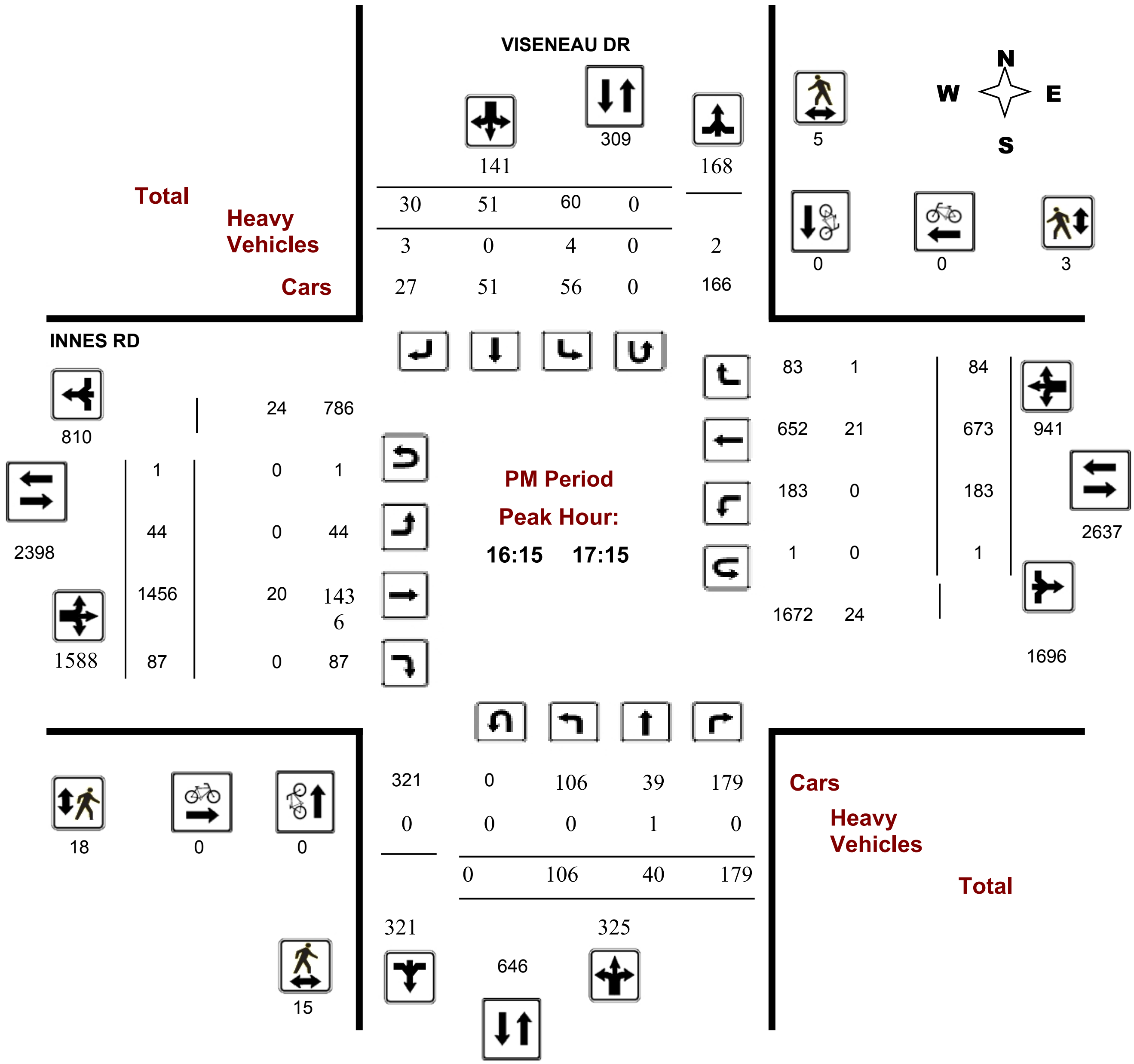
Comments

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017 **WO No:** 36661

Start Time: 07:00 **Device:** Miovision



Comments

Transportation Services - Traffic Services

Work Order
36661

Turning Movement Count - 15 Min U-Turn Total Report

INNES RD @ VISENEAU DR

Survey Date: Wednesday, January 25, 2017

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	1	0	1
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	2	0	2
12:00	12:15	0	0	2	0	2
12:15	12:30	0	0	1	1	2
12:30	12:45	0	0	1	0	1
12:45	13:00	0	0	1	0	1
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	1	0	1
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	1	0	1
16:00	16:15	0	0	0	1	1
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	1	1
17:00	17:15	0	0	1	0	1
17:15	17:30	0	0	1	1	2
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	12	4	16

Transportation Services - Traffic Services

W.O. 36979

Turning Movement Count - 15 Minute Summary Report

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 15 Westbound: 0

		JEANNE D'ARC BLVD/MER BLEUE RD									INNES RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	68	109	12	**189**	30	24	27	**81**	**270**	11	78	18	**107**	38	341	149	**528**	**635**	**905**
07:15	07:30	64	91	17	**172**	34	40	23	**97**	**269**	13	109	23	**145**	47	367	183	**597**	**742**	**1011**
07:30	07:45	60	138	19	**217**	53	43	17	**113**	**330**	7	101	16	**124**	43	314	167	**524**	**648**	**978**
07:45	08:00	56	88	24	**168**	49	36	11	**96**	**264**	11	117	18	**146**	43	285	139	**467**	**613**	**877**
08:00	08:15	67	102	20	**189**	28	39	27	**94**	**283**	10	90	19	**119**	36	277	131	**444**	**563**	**846**
08:15	08:30	64	76	18	**158**	42	34	17	**93**	**251**	8	117	15	**140**	31	309	102	**442**	**582**	**833**
08:30	08:45	53	101	10	**164**	57	42	15	**114**	**278**	18	135	24	**177**	30	238	72	**340**	**517**	**795**
08:45	09:00	45	52	9	**106**	47	32	16	**95**	**201**	8	140	23	**171**	35	221	71	**327**	**498**	**699**
09:00	09:15	39	50	13	**102**	53	48	19	**120**	**222**	7	106	20	**133**	37	226	51	**314**	**447**	**669**
09:15	09:30	47	43	18	**108**	65	43	18	**126**	**234**	19	138	19	**176**	39	177	48	**264**	**440**	**674**
09:30	09:45	30	35	19	**84**	53	36	18	**107**	**191**	17	165	19	**201**	41	205	61	**307**	**508**	**699**
09:45	10:00	30	44	18	**92**	63	39	10	**112**	**204**	9	169	20	**198**	37	182	55	**274**	**472**	**676**
11:30	11:45	30	36	38	**104**	77	53	21	**151**	**255**	23	195	31	**249**	55	198	82	**335**	**584**	**839**
11:45	12:00	32	43	26	**101**	71	52	15	**138**	**239**	26	202	35	**263**	49	169	66	**284**	**547**	**786**
12:00	12:15	44	35	28	**107**	72	54	18	**144**	**251**	28	193	34	**255**	39	160	56	**255**	**510**	**761**
12:15	12:30	34	32	48	**114**	71	43	15	**129**	**243**	27	242	29	**298**	42	183	51	**276**	**574**	**817**
12:30	12:45	34	43	41	**118**	82	54	23	**159**	**277**	23	215	23	**261**	55	242	79	**376**	**637**	**914**
12:45	13:00	34	25	43	**102**	77	49	18	**144**	**246**	25	228	30	**285**	50	214	52	**316**	**601**	**847**
13:00	13:15	28	42	61	**131**	77	56	19	**152**	**283**	24	243	27	**297**	63	215	49	**327**	**624**	**907**
13:15	13:30	28	44	53	**125**	83	52	12	**147**	**272**	25	222	35	**282**	52	187	59	**298**	**580**	**852**
15:00	15:15	33	45	56	**134**	87	84	21	**192**	**326**	30	251	41	**322**	53	205	90	**348**	**670**	**996**
15:15	15:30	29	58	51	**138**	112	65	22	**199**	**337**	38	298	46	**382**	44	225	98	**367**	**749**	**1086**
15:30	15:45	37	53	70	**160**	99	106	32	**237**	**397**	44	281	42	**367**	54	200	80	**334**	**701**	**1098**
15:45	16:00	32	61	74	**167**	106	99	30	**235**	**402**	38	310	32	**382**	52	188	79	**319**	**701**	**1103**
16:00	16:15	38	60	71	**169**	117	95	16	**228**	**397**	37	328	42	**411**	54	211	111	**376**	**787**	**1184**
16:15	16:30	33	60	64	**157**	106	101	17	**224**	**381**	32	348	50	**432**	51	195	73	**319**	**751**	**1132**
16:30	16:45	36	56	73	**165**	100	99	20	**219**	**384**	46	323	36	**406**	55	213	84	**352**	**758**	**1142**
16:45	17:00	33	85	78	**196**	121	86	22	**229**	**425**	36	350	41	**428**	49	208	85	**342**	**770**	**1195**
17:00	17:15	27	55	67	**149**	116	92	24	**232**	**381**	33	347	51	**431**	45	195	90	**330**	**761**	**1142**
17:15	17:30	44	61	70	**175**	104	83	25	**212**	**387**	32	373	47	**452**	41	219	96	**356**	**808**	**1195**
17:30	17:45	40	67	65	**172**	109	84	23	**216**	**388**	39	377	49	**465**	39	212	89	**340**	**805**	**1193**
17:45	18:00	33	71	58	**162**	100	83	20	**203**	**365**	36	394	58	**488**	39	214	99	**352**	**840**	**1205**
TOTAL:		1302	1961	1332	**4595**	2461	1946	631	**5038**	**9633**	780	7185	1013	**8993**	1438	7195	2797	**11430**	**20423**	**30056**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36979

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Count Date: Wednesday, May 03, 2017 **Start Time:** 07:00

	JEANNE D'ARC BLVD/MER BLEUE RD			INNES RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	1	0	**1**	0	7	**7**	**8**
08:00 09:00	3	1	**4**	1	2	**3**	**7**
09:00 10:00	0	0	**0**	1	0	**1**	**1**
11:30 12:30	2	0	**2**	0	1	**1**	**3**
12:30 13:30	1	0	**1**	1	1	**2**	**3**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	6	2	**8**	7	3	**10**	**18**
17:00 18:00	0	0	**0**	5	2	**7**	**7**
Total	13	3	**16**	15	16	**31**	**47**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

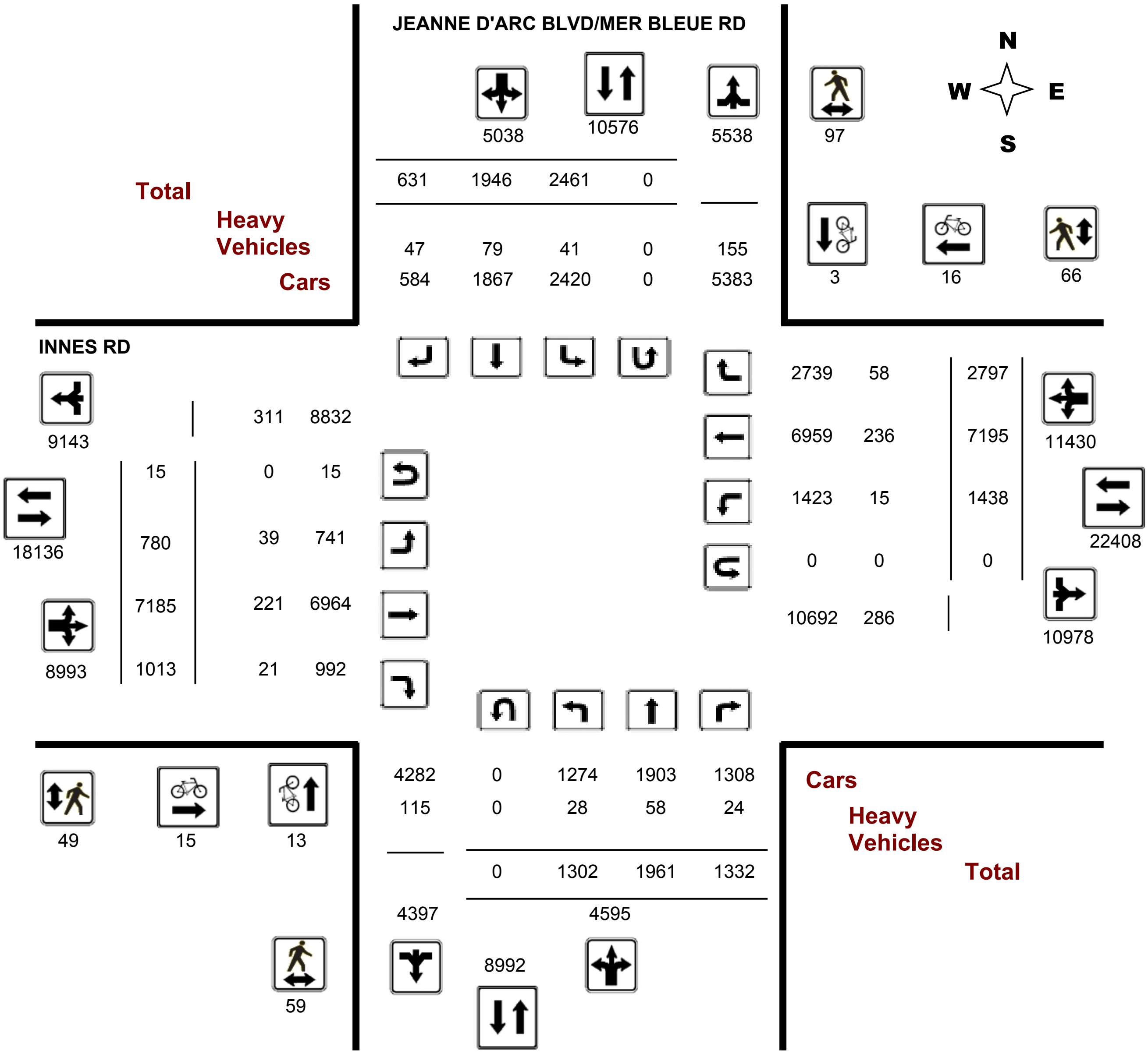
Turning Movement Count - Full Study Diagram

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017

WO#: 36979

Device: Miovision



Comments

Transportation Services - Traffic Services

W.O.
36979

Turning Movement Count - Heavy Vehicle Report

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017

	JEANNE D'ARC BLVD/MER BLEUE RD									INNES RD									
	Northbound				Southbound					Eastbound				Westbound					
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 08:00	5	10	7	**22**	3	8	7	**18**	**40**	7	34	2	**43**	2	42	12	**56**	**99**	**139**
08:00 09:00	3	13	1	**17**	4	9	7	**20**	**37**	7	33	4	**44**	7	40	5	**52**	**96**	**133**
09:00 10:00	4	10	2	**16**	8	13	5	**26**	**42**	6	34	4	**44**	2	34	3	**39**	**83**	**125**
11:30 12:30	5	5	5	**15**	4	9	6	**19**	**34**	3	24	4	**31**	2	17	10	**29**	**60**	**94**
12:30 13:30	2	4	3	**9**	6	9	6	**21**	**30**	5	30	0	**35**	1	29	4	**34**	**69**	**99**
15:00 16:00	4	8	4	**16**	7	10	6	**23**	**39**	4	16	4	**24**	1	35	6	**42**	**66**	**105**
16:00 17:00	3	4	1	**8**	3	11	7	**21**	**29**	4	29	2	**35**	0	20	11	**31**	**66**	**95**
17:00 18:00	2	4	1	**7**	6	10	3	**19**	**26**	3	21	1	**25**	0	19	7	**26**	**51**	**77**
Sub Total	28	58	24	**110**	41	79	47	**167**	**277**	39	221	21	**281**	15	236	58	**309**	**590**	**867**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	28	58	24	**0**	41	79	47	**167**	**277**	39	221	21	**281**	15	236	58	**309**	**590**	**867**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
36979

Turning Movement Count - Pedestrian Volume Report

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Count Date: Wednesday, May 03, 2017 **Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	1	2	**3**	0	0	**0**	**3**
07:15 07:30	0	5	**5**	2	1	**3**	**8**
07:30 07:45	1	1	**2**	2	2	**4**	**6**
07:45 08:00	1	0	**1**	0	0	**0**	**1**
07:00 08:00	3	8	**11**	4	3	**7**	**18**
08:00 08:15	0	1	**1**	0	0	**0**	**1**
08:15 08:30	3	4	**7**	2	0	**2**	**9**
08:30 08:45	2	2	**4**	1	1	**2**	**6**
08:45 09:00	1	4	**5**	1	0	**1**	**6**
08:00 09:00	6	11	**17**	4	1	**5**	**22**
09:00 09:15	0	1	**1**	0	1	**1**	**2**
09:15 09:30	1	3	**4**	1	1	**2**	**6**
09:30 09:45	0	4	**4**	1	0	**1**	**5**
09:45 10:00	1	0	**1**	1	1	**2**	**3**
09:00 10:00	2	8	**10**	3	3	**6**	**16**
11:30 11:45	4	0	**4**	0	0	**0**	**4**
11:45 12:00	3	1	**4**	1	0	**1**	**5**
12:00 12:15	4	5	**9**	2	0	**2**	**11**
12:15 12:30	1	1	**2**	0	0	**0**	**2**
11:30 12:30	12	7	**19**	3	0	**3**	**22**
12:30 12:45	3	1	**4**	0	0	**0**	**4**
12:45 13:00	1	3	**4**	1	0	**1**	**5**
13:00 13:15	0	1	**1**	0	3	**3**	**4**
13:15 13:30	2	1	**3**	0	1	**1**	**4**
12:30 13:30	6	6	**12**	1	4	**5**	**17**
15:00 15:15	2	3	**5**	2	5	**7**	**12**
15:15 15:30	5	0	**5**	1	5	**6**	**11**
15:30 15:45	4	4	**8**	3	4	**7**	**15**
15:45 16:00	3	9	**12**	1	5	**6**	**18**
15:00 16:00	14	16	**30**	7	19	**26**	**56**
16:00 16:15	1	12	**13**	5	6	**11**	**24**
16:15 16:30	2	3	**5**	4	4	**8**	**13**
16:30 16:45	3	2	**5**	3	3	**6**	**11**
16:45 17:00	3	5	**8**	2	6	**8**	**16**
16:00 17:00	9	22	**31**	14	19	**33**	**64**
17:00 17:15	3	9	**12**	9	5	**14**	**26**
17:15 17:30	2	2	**4**	1	2	**3**	**7**
17:30 17:45	2	6	**8**	2	6	**8**	**16**
17:45 18:00	0	2	**2**	1	4	**5**	**7**
17:00 18:00	7	19	**26**	13	17	**30**	**56**
Total	59	97	**156**	49	66	**115**	**271**

Comment:

Transportation Services - Traffic Services

Work Order
36979

Turning Movement Count - Full Study Summary Report

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 15 Westbound: 0

AADT Factor
.90

Full Study

	JEANNE D'ARC BLVD/MER BLEUE RD									INNES RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	248	426	72	**746**	166	143	78	**387**	**1133**	42	405	75	**522**	171	1307	638	**2116**	**2638**	**3771**
08:00 09:00	229	331	57	**617**	174	147	75	**396**	**1013**	44	482	81	**607**	132	1045	376	**1553**	**2160**	**3173**
09:00 10:00	146	172	68	**386**	234	166	65	**465**	**851**	52	578	78	**708**	154	790	215	**1159**	**1867**	**2718**
11:30 12:30	140	146	140	**426**	291	202	69	**562**	**988**	104	832	129	**1065**	185	710	255	**1150**	**2215**	**3203**
12:30 13:30	124	154	198	**476**	319	211	72	**602**	**1078**	97	908	115	**1120**	220	858	239	**1317**	**2437**	**3515**
15:00 16:00	131	217	251	**599**	404	354	105	**863**	**1462**	150	1140	161	**1451**	203	818	347	**1368**	**2819**	**4281**
16:00 17:00	140	261	286	**687**	444	381	75	**900**	**1587**	151	1349	169	**1669**	209	827	353	**1389**	**3058**	**4645**
17:00 18:00	144	254	260	**658**	429	342	92	**863**	**1521**	140	1491	205	**1836**	164	840	374	**1378**	**3214**	**4735**
Sub Total	1302	1961	1332	**4595**	2461	1946	631	**5038**	**9633**	780	7185	1013	**8978**	1438	7195	2797	**11430**	**20408**	**30041**
U Turns				**0**				**0**	**0**				**15**				**0**	**15**	**15**
Total	1302	1961	1332	**4595**	2461	1946	631	**5038**	**9633**	780	7185	1013	**8993**	1438	7195	2797	**11430**	**20423**	**30056**
EQ 12Hr	1810	2726	1851	**6387**	3421	2705	877	**7003**	**13390**	1084	9987	1408	**12500**	1999	10001	3888	**15888**	**28388**	**41778**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	1629	2453	1666	**5748**	3079	2434	789	**6303**	**12051**	976	8988	1267	**11250**	1799	9001	3499	**14299**	**25549**	**37600**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	2134	3214	2183	**7530**	4033	3189	1034	**8256**	**15786**	1278	11775	1660	**14738**	2357	11791	4584	**18732**	**33470**	**49256**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

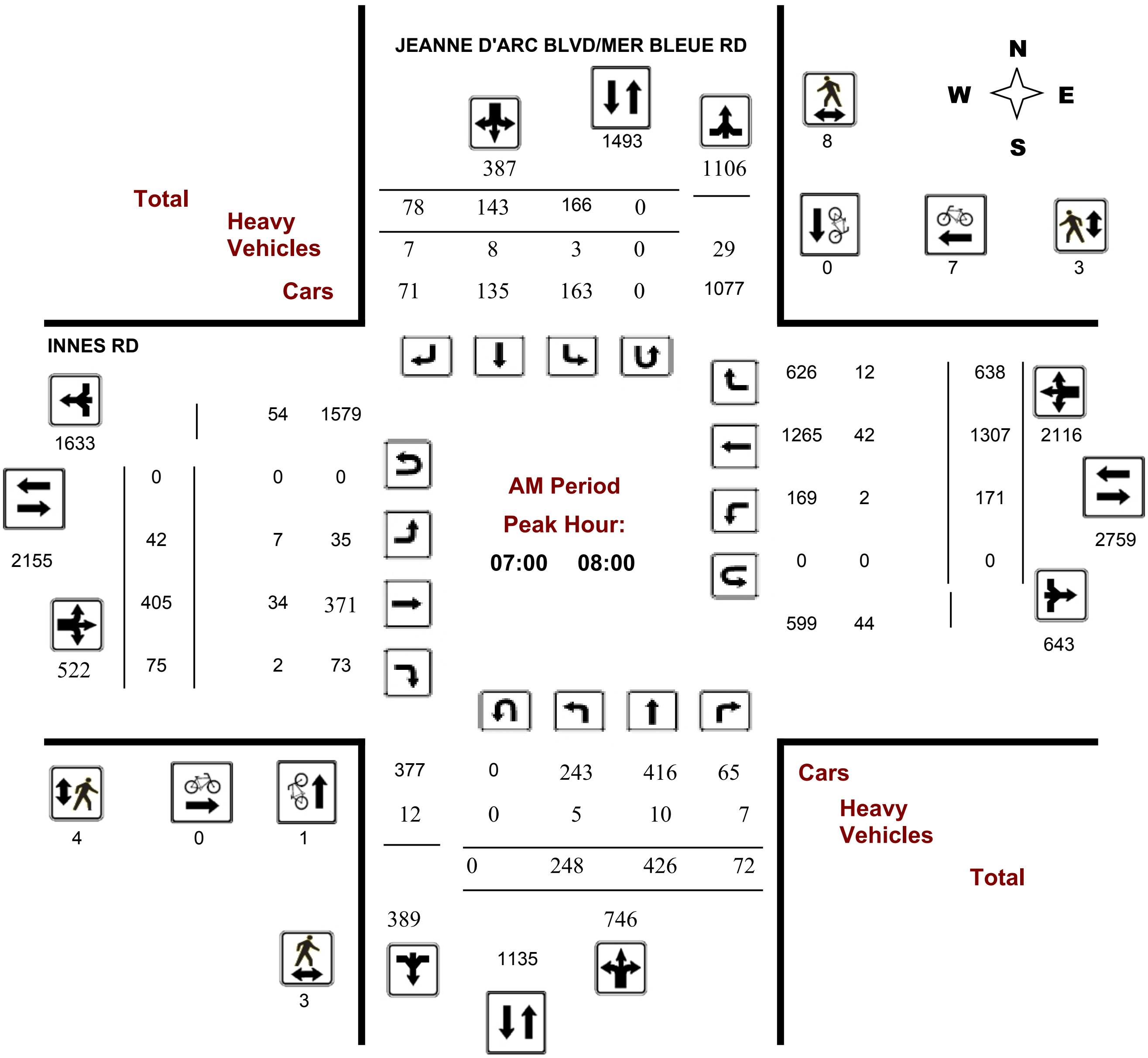
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017 **WO No:** 36979

Start Time: 07:00 **Device:** Miovision



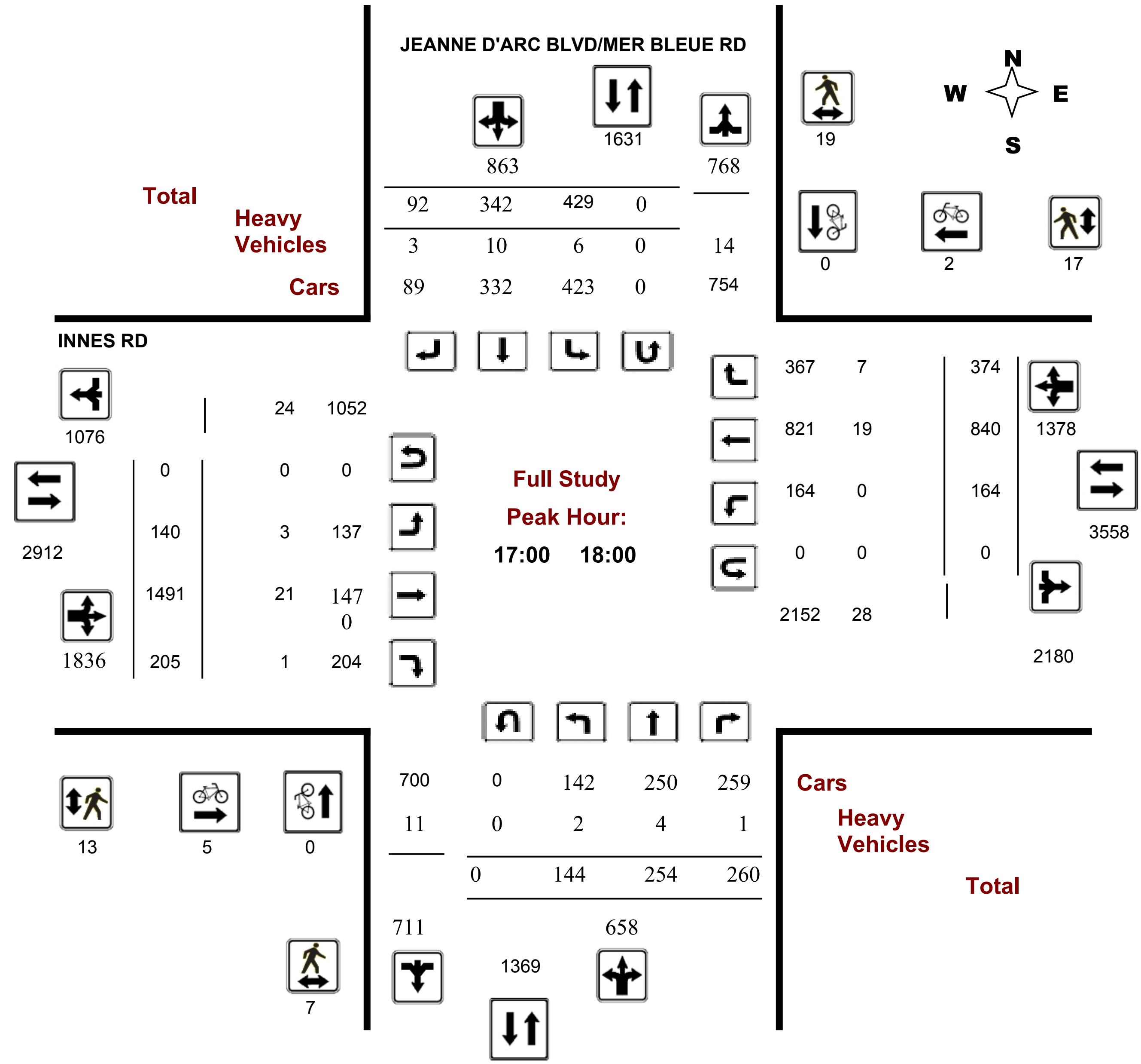
Comments

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017 **WO No:** 36979

Start Time: 07:00 **Device:** Miovision



Comments

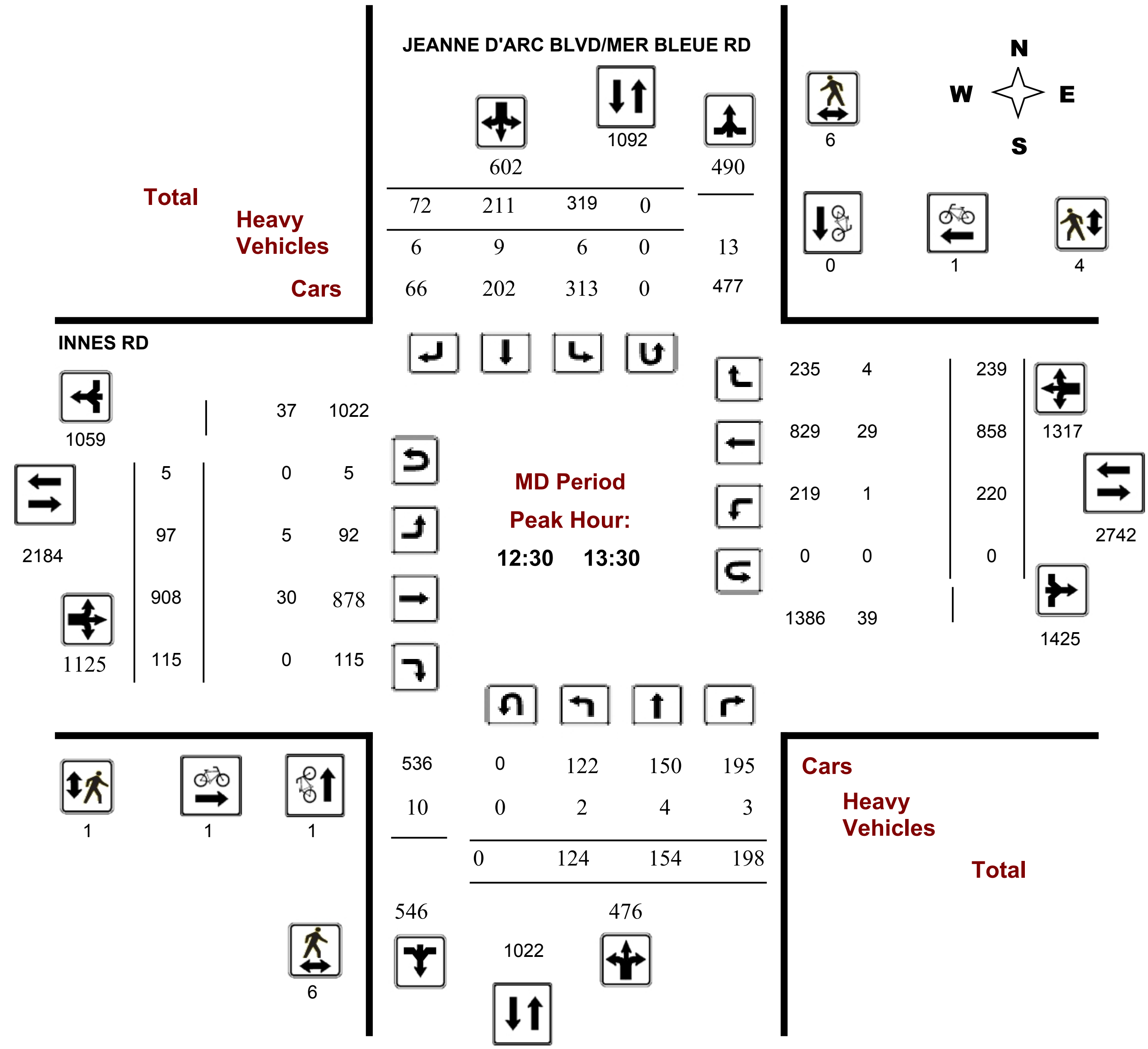
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017 **WO No:** 36979

Start Time: 07:00 **Device:** Miovision



Comments

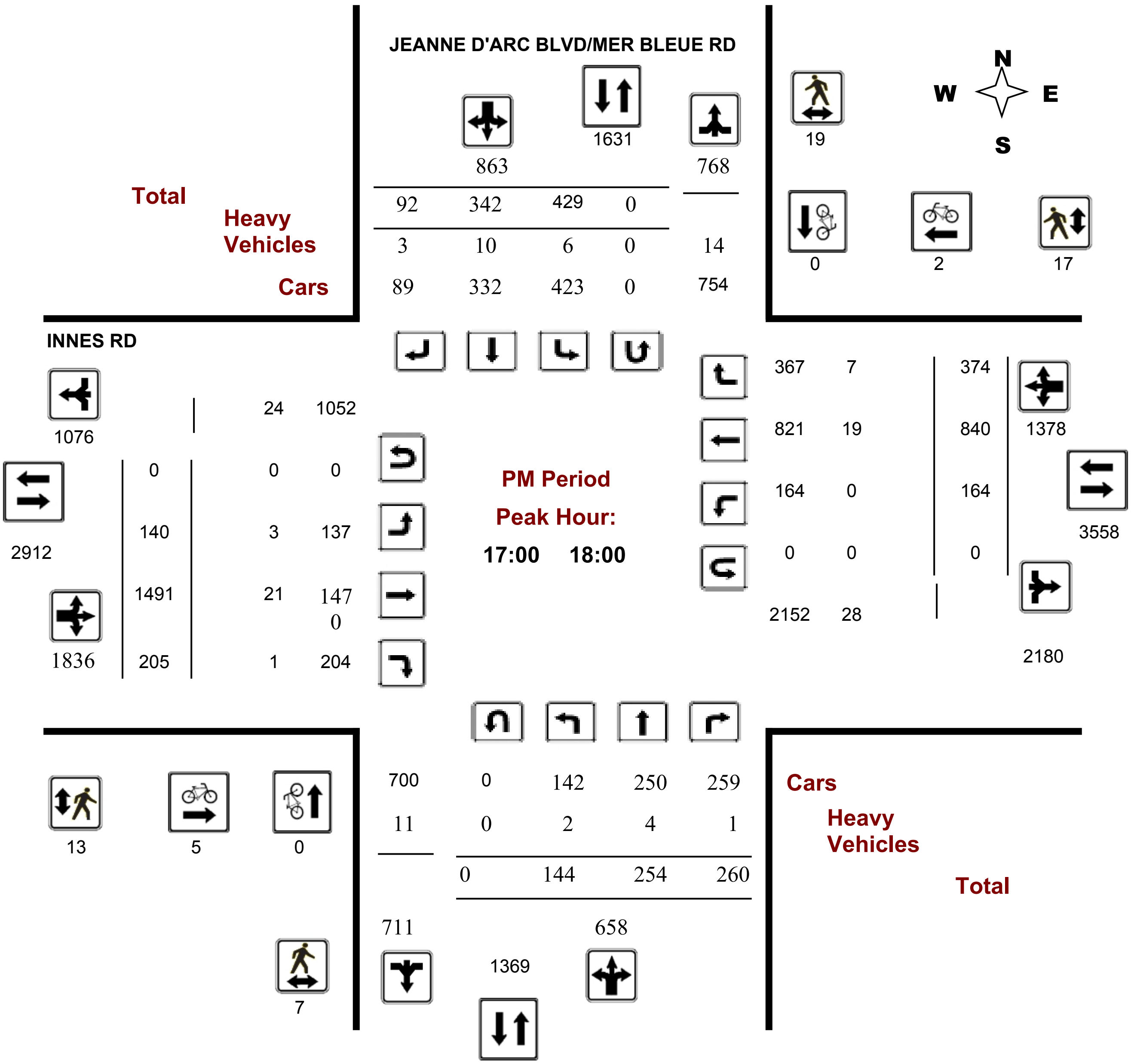
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017 **WO No:** 36979

Start Time: 07:00 **Device:** Miovision



Comments

Turning Movement Count - 15 Min U-Turn Total Report

INNES RD @ JEANNE D'ARC BLVD/MER BLEUE RD

Survey Date: Wednesday, May 03, 2017

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	2	0	2
13:00	13:15	0	0	3	0	3
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	2	0	2
16:00	16:15	0	0	4	0	4
16:15	16:30	0	0	2	0	2
16:30	16:45	0	0	1	0	1
16:45	17:00	0	0	1	0	1
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	15	0	15

Transportation Services - Traffic Services

W.O. 35061

Turning Movement Count - 15 Minute Summary Report

BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 18 Westbound: 0

	BELCOURT BLVD									INNES RD									
	Northbound				Southbound					Eastbound				Westbound					
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	9	1	2	**12**	6	6	23	**35**	**47**	10	72	6	**89**	12	404	18	**434**	**523**	**570**
07:15 07:30	13	1	2	**16**	6	11	16	**33**	**49**	16	88	4	**108**	8	349	21	**378**	**486**	**535**
07:30 07:45	13	11	1	**25**	6	5	22	**33**	**58**	12	96	4	**112**	1	424	21	**446**	**558**	**616**
07:45 08:00	30	3	1	**34**	11	7	15	**33**	**67**	14	121	7	**142**	7	360	18	**385**	**527**	**594**
08:00 08:15	6	5	0	**11**	9	5	9	**23**	**34**	8	116	3	**127**	7	359	22	**388**	**515**	**549**
08:15 08:30	15	5	1	**21**	14	10	13	**37**	**58**	21	103	4	**128**	13	292	9	**314**	**442**	**500**
08:30 08:45	12	4	4	**20**	5	9	12	**26**	**46**	15	112	11	**138**	15	332	14	**361**	**499**	**545**
08:45 09:00	19	8	0	**27**	12	17	9	**38**	**65**	17	144	13	**174**	14	278	11	**303**	**477**	**542**
09:00 09:15	21	5	0	**26**	9	8	6	**23**	**49**	15	133	20	**169**	10	347	10	**367**	**536**	**585**
09:15 09:30	34	6	5	**45**	14	20	13	**47**	**92**	16	136	10	**162**	15	273	14	**302**	**464**	**556**
09:30 09:45	21	8	5	**34**	15	15	13	**43**	**77**	14	158	17	**191**	8	239	6	**253**	**444**	**521**
09:45 10:00	33	19	12	**64**	21	17	11	**49**	**113**	26	183	18	**228**	11	218	22	**251**	**479**	**592**
11:30 11:45	66	44	20	**130**	15	40	6	**61**	**191**	26	247	4	**277**	27	218	31	**276**	**553**	**744**
11:45 12:00	41	27	20	**88**	20	37	17	**74**	**162**	31	241	7	**279**	31	280	40	**351**	**630**	**792**
12:00 12:15	32	40	13	**85**	21	23	11	**55**	**140**	26	222	15	**263**	31	228	16	**275**	**538**	**678**
12:15 12:30	50	18	27	**95**	21	31	18	**70**	**165**	32	228	7	**268**	19	381	20	**420**	**688**	**853**
12:30 12:45	46	33	16	**95**	24	21	18	**63**	**158**	22	191	3	**216**	37	296	5	**338**	**554**	**712**
12:45 13:00	44	46	15	**105**	17	37	12	**66**	**171**	15	230	1	**249**	52	475	25	**552**	**801**	**972**
13:00 13:15	54	47	12	**113**	18	45	15	**78**	**191**	26	217	7	**250**	15	321	105	**441**	**691**	**882**
13:15 13:30	58	52	12	**122**	16	32	17	**65**	**187**	34	259	6	**299**	19	303	13	**335**	**634**	**821**
15:00 15:15	73	77	32	**182**	15	17	2	**34**	**216**	24	299	17	**341**	46	514	17	**577**	**918**	**1134**
15:15 15:30	75	36	9	**120**	13	25	10	**48**	**168**	13	307	20	**340**	49	352	8	**409**	**749**	**917**
15:30 15:45	104	72	16	**192**	21	30	11	**62**	**254**	24	290	12	**326**	42	426	11	**479**	**805**	**1059**
15:45 16:00	60	60	33	**153**	16	28	8	**52**	**205**	33	372	27	**433**	31	519	9	**559**	**992**	**1197**
16:00 16:15	127	81	14	**222**	18	27	10	**55**	**277**	32	347	29	**408**	45	484	15	**544**	**952**	**1229**
16:15 16:30	65	46	18	**129**	22	28	15	**65**	**194**	40	394	27	**461**	47	510	15	**572**	**1033**	**1227**
16:30 16:45	61	42	27	**130**	20	15	12	**47**	**177**	31	330	34	**395**	49	457	6	**512**	**907**	**1084**
16:45 17:00	114	80	30	**224**	16	41	20	**77**	**301**	31	370	20	**422**	26	322	41	**389**	**811**	**1112**
17:00 17:15	28	27	15	**70**	14	22	15	**51**	**121**	25	358	12	**397**	35	297	44	**376**	**773**	**894**
17:15 17:30	70	47	10	**127**	20	27	19	**66**	**193**	27	361	24	**412**	43	268	94	**405**	**817**	**1010**
17:30 17:45	68	53	19	**140**	22	25	26	**73**	**213**	40	368	27	**436**	31	288	69	**388**	**824**	**1037**
17:45 18:00	45	37	14	**96**	15	23	18	**56**	**152**	27	324	15	**369**	2	265	26	**293**	**662**	**814**
TOTAL:	1507	1041	405	**2953**	492	704	442	**1638**	**4591**	743	7417	431	**8609**	798	11079	796	**12673**	**21282**	**25873**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
35061

BELCOURT BLVD @ INNES RD

Count Date: Tuesday, August 04, 2015

Start Time: 07:00

Time Period	BELCOURT BLVD Northbound	Southbound	**Street Total**	INNES RD Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	2	**2**	3	11	**14**	**16**
08:00 09:00	0	2	**2**	7	3	**10**	**12**
09:00 10:00	0	6	**6**	6	7	**13**	**19**
11:30 12:30	0	4	**4**	7	10	**17**	**21**
12:30 13:30	1	2	**3**	3	3	**6**	**9**
15:00 16:00	1	1	**2**	9	10	**19**	**21**
16:00 17:00	1	5	**6**	19	11	**30**	**36**
17:00 18:00	0	6	**6**	10	4	**14**	**20**
Total	3	28	**31**	64	59	**123**	**154**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

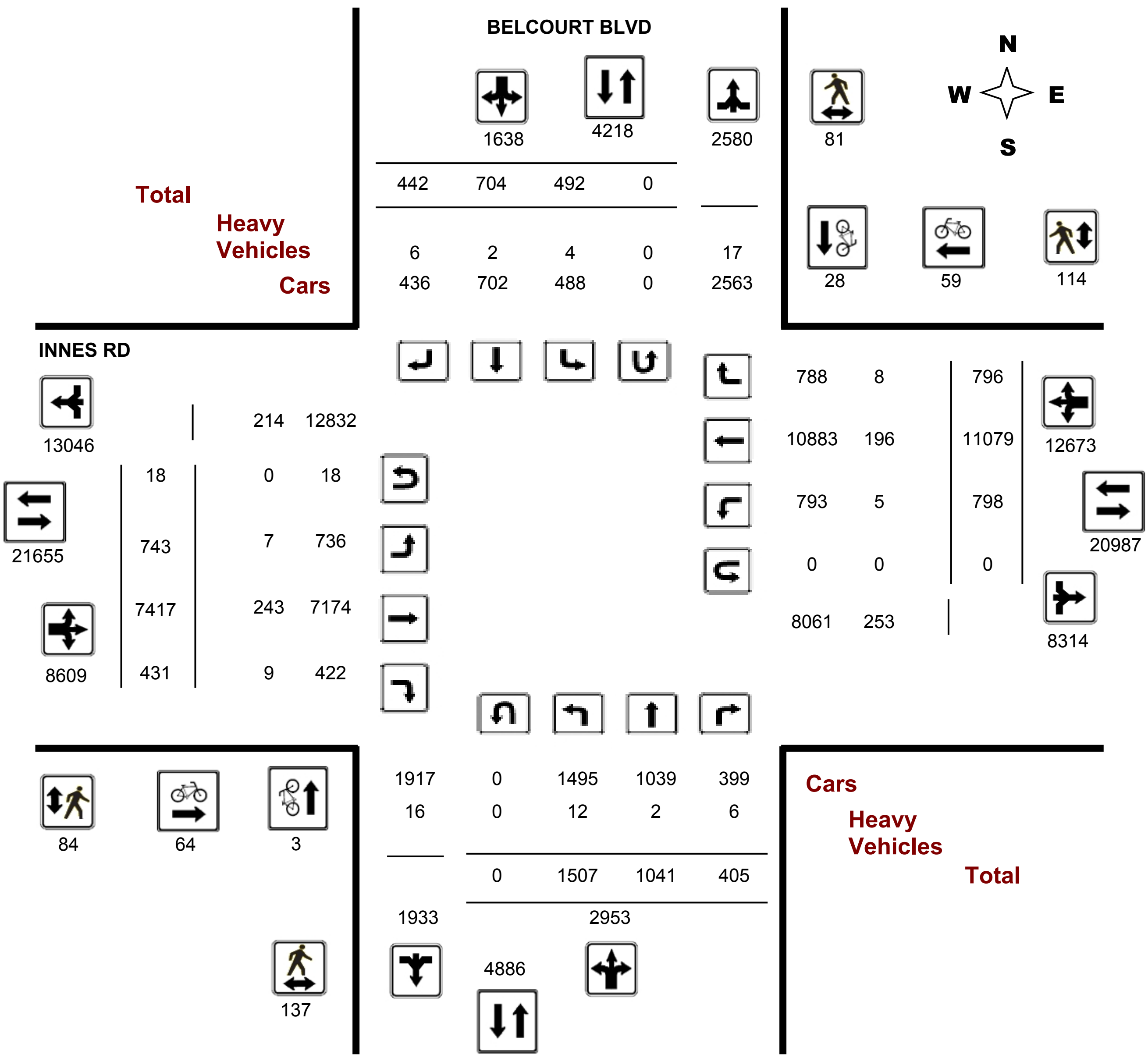
Turning Movement Count - Full Study Diagram

BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

WO#: 35061

Device: Jamar Technologies, Inc



Comments

Transportation Services - Traffic Services

W.O.
35061

Turning Movement Count - Heavy Vehicle Report

BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

	BELCOURT BLVD									INNES RD										
	Northbound				Southbound					Eastbound				Westbound						
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 08:00	2	1	1	**4**	0	1	2	**3**	**7**	3	41	2	**46**	1	35	0	**36**	**82**	**89**
08:00 09:00	1	1	1	**3**	1	0	1	**2**	**5**	1	34	4	**39**	1	30	0	**31**	**70**	**75**
09:00 10:00	1	0	1	**2**	1	0	0	**1**	**3**	0	35	0	**35**	1	23	0	**24**	**59**	**62**
11:30 12:30	2	0	1	**3**	0	0	0	**0**	**3**	0	30	0	**30**	0	17	0	**17**	**47**	**50**
12:30 13:30	1	0	1	**2**	1	0	1	**2**	**4**	2	26	0	**28**	0	30	5	**35**	**63**	**67**
15:00 16:00	0	0	0	**0**	0	1	0	**1**	**1**	0	22	1	**23**	1	22	0	**23**	**46**	**47**
16:00 17:00	3	0	1	**4**	0	0	1	**1**	**5**	0	29	1	**30**	1	28	2	**31**	**61**	**66**
17:00 18:00	2	0	0	**2**	1	0	1	**2**	**4**	1	26	1	**28**	0	11	1	**12**	**40**	**44**
Sub Total	12	2	6	**20**	4	2	6	**12**	**32**	7	243	9	**259**	5	196	8	**209**	**468**	**500**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	12	2	6	**0**	4	2	6	**12**	**32**	7	243	9	**259**	5	196	8	**209**	**468**	**500**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
35061

Turning Movement Count - Pedestrian Volume Report

BELCOURT BLVD @ INNES RD

Count Date: Tuesday, August 04, 2015 **Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	2	0	**2**	2	0	**2**	**4**
07:15 07:30	0	1	**1**	5	0	**5**	**6**
07:30 07:45	1	3	**4**	1	1	**2**	**6**
07:45 08:00	1	2	**3**	0	3	**3**	**6**
07:00 08:00	4	6	**10**	8	4	**12**	**22**
08:00 08:15	0	3	**3**	2	2	**4**	**7**
08:15 08:30	1	2	**3**	3	2	**5**	**8**
08:30 08:45	0	0	**0**	1	0	**1**	**1**
08:45 09:00	0	2	**2**	2	2	**4**	**6**
08:00 09:00	1	7	**8**	8	6	**14**	**22**
09:00 09:15	2	3	**5**	3	7	**10**	**15**
09:15 09:30	1	2	**3**	1	3	**4**	**7**
09:30 09:45	5	4	**9**	3	2	**5**	**14**
09:45 10:00	7	3	**10**	5	6	**11**	**21**
09:00 10:00	15	12	**27**	12	18	**30**	**57**
11:30 11:45	0	2	**2**	1	1	**2**	**4**
11:45 12:00	2	1	**3**	2	8	**10**	**13**
12:00 12:15	0	5	**5**	0	4	**4**	**9**
12:15 12:30	6	6	**12**	0	2	**2**	**14**
11:30 12:30	8	14	**22**	3	15	**18**	**40**
12:30 12:45	0	1	**1**	1	0	**1**	**2**
12:45 13:00	3	2	**5**	4	14	**18**	**23**
13:00 13:15	19	2	**21**	3	0	**3**	**24**
13:15 13:30	7	4	**11**	2	3	**5**	**16**
12:30 13:30	29	9	**38**	10	17	**27**	**65**
15:00 15:15	11	0	**11**	4	3	**7**	**18**
15:15 15:30	1	3	**4**	9	3	**12**	**16**
15:30 15:45	0	4	**4**	2	1	**3**	**7**
15:45 16:00	7	1	**8**	6	7	**13**	**21**
15:00 16:00	19	8	**27**	21	14	**35**	**62**
16:00 16:15	11	3	**14**	6	9	**15**	**29**
16:15 16:30	6	1	**7**	1	5	**6**	**13**
16:30 16:45	2	4	**6**	2	16	**18**	**24**
16:45 17:00	12	5	**17**	4	0	**4**	**21**
16:00 17:00	31	13	**44**	13	30	**43**	**87**
17:00 17:15	10	0	**10**	3	3	**6**	**16**
17:15 17:30	0	4	**4**	4	0	**4**	**8**
17:30 17:45	14	4	**18**	1	5	**6**	**24**
17:45 18:00	6	4	**10**	1	2	**3**	**13**
17:00 18:00	30	12	**42**	9	10	**19**	**61**
Total	137	81	**218**	84	114	**198**	**416**

Comment:

Transportation Services - Traffic Services

Work Order
35061

Turning Movement Count - Full Study Summary Report

BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 18 Westbound: 0

AADT Factor
.90

Full Study

	BELCOURT BLVD									INNES RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	**NB TOT**	LT	ST	RT	**SB TOT**	**STR TOT**	LT	ST	RT	**EB TOT**	LT	ST	RT	**WB TOT**	**STR TOT**	**Grand Total**
07:00 08:00	65	16	6	**87**	29	29	76	**134**	**221**	52	377	21	**450**	28	1537	78	**1643**	**2093**	**2314**
08:00 09:00	52	22	5	**79**	40	41	43	**124**	**203**	61	475	31	**567**	49	1261	56	**1366**	**1933**	**2136**
09:00 10:00	109	38	22	**169**	59	60	43	**162**	**331**	71	610	65	**746**	44	1077	52	**1173**	**1919**	**2250**
11:30 12:30	189	129	80	**398**	77	131	52	**260**	**658**	115	938	33	**1086**	108	1107	107	**1322**	**2408**	**3066**
12:30 13:30	202	178	55	**435**	75	135	62	**272**	**707**	97	897	17	**1011**	123	1395	148	**1666**	**2677**	**3384**
15:00 16:00	312	245	90	**647**	65	100	31	**196**	**843**	94	1268	76	**1438**	168	1811	45	**2024**	**3462**	**4305**
16:00 17:00	367	249	89	**705**	76	111	57	**244**	**949**	134	1441	110	**1685**	167	1773	77	**2017**	**3702**	**4651**
17:00 18:00	211	164	58	**433**	71	97	78	**246**	**679**	119	1411	78	**1608**	111	1118	233	**1462**	**3070**	**3749**
Sub Total	1507	1041	405	**2953**	492	704	442	**1638**	**4591**	743	7417	431	**8591**	798	11079	796	**12673**	**21264**	**25855**
U Turns				**0**				**0**	**0**				**18**				**0**	**18**	**18**
Total	1507	1041	405	**2953**	492	704	442	**1638**	**4591**	743	7417	431	**8609**	798	11079	796	**12673**	**21282**	**25873**
EQ 12Hr	2095	1447	563	**4105**	684	979	614	**2277**	**6382**	1033	10310	599	**11967**	1109	15400	1106	**17615**	**29582**	**35964**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	1885	1302	507	**3694**	615	881	553	**2049**	**5743**	929	9279	539	**10770**	998	13860	996	**15854**	**26624**	**32367**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	2470	1706	664	**4839**	806	1154	724	**2684**	**7523**	1218	12155	706	**14109**	1308	18156	1304	**20769**	**34878**	**42401**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

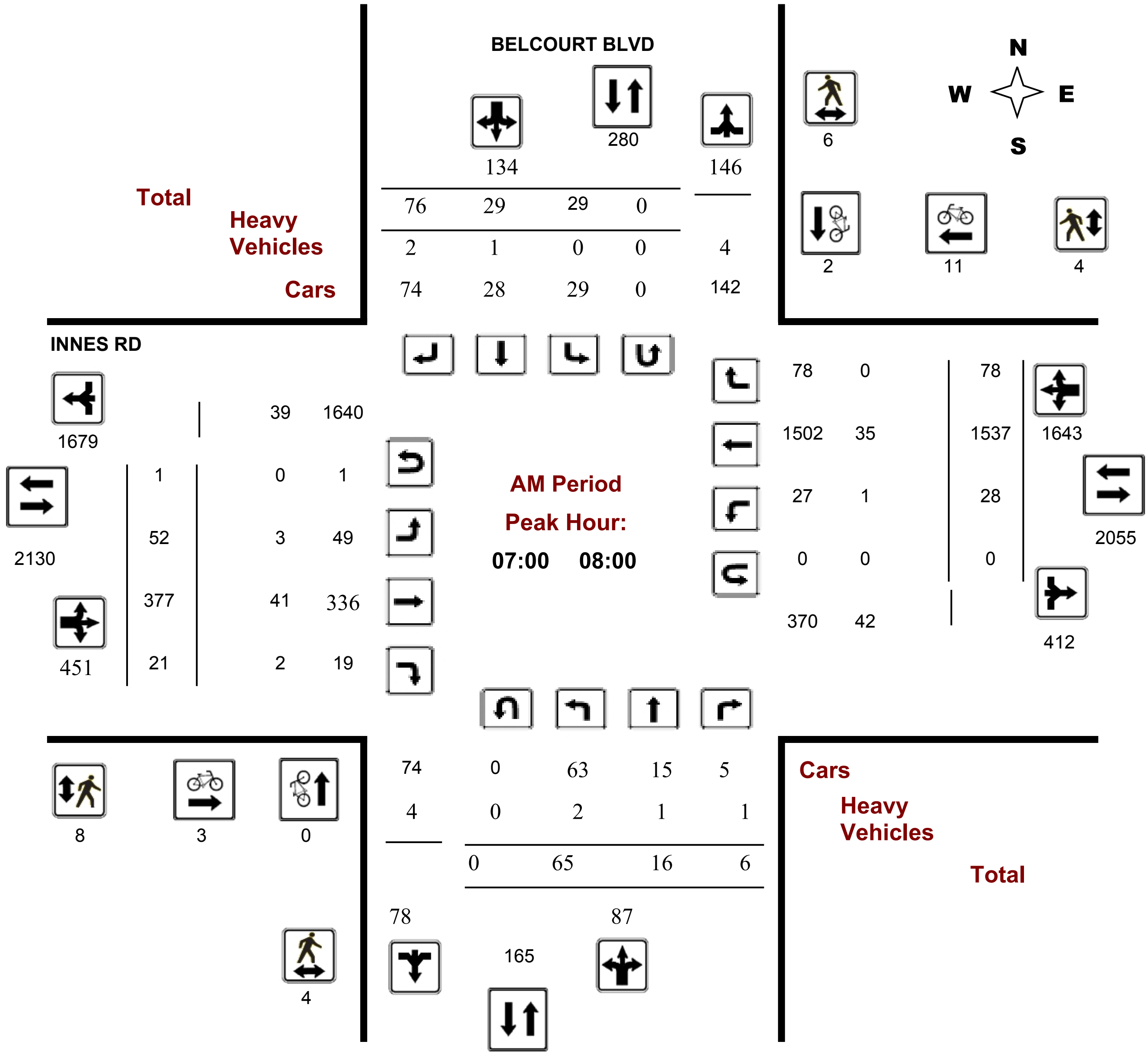
BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

Start Time: 07:00

WO No: 35061

Device: Jamar Technologies, Inc



Comments

Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

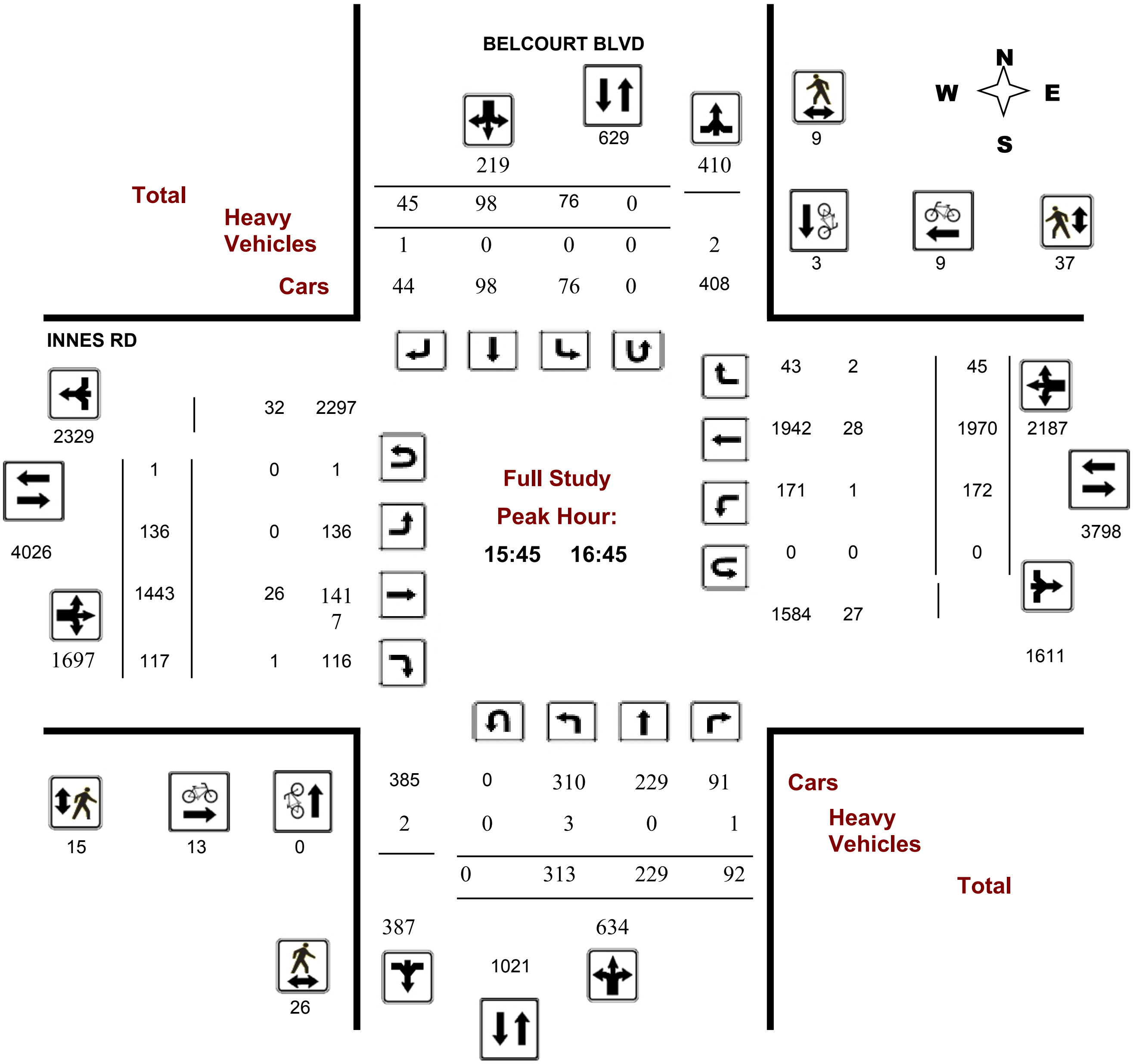
BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

Start Time: 07:00

WO No: 35061

Device: Jamar Technologies, Inc



Comments

Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

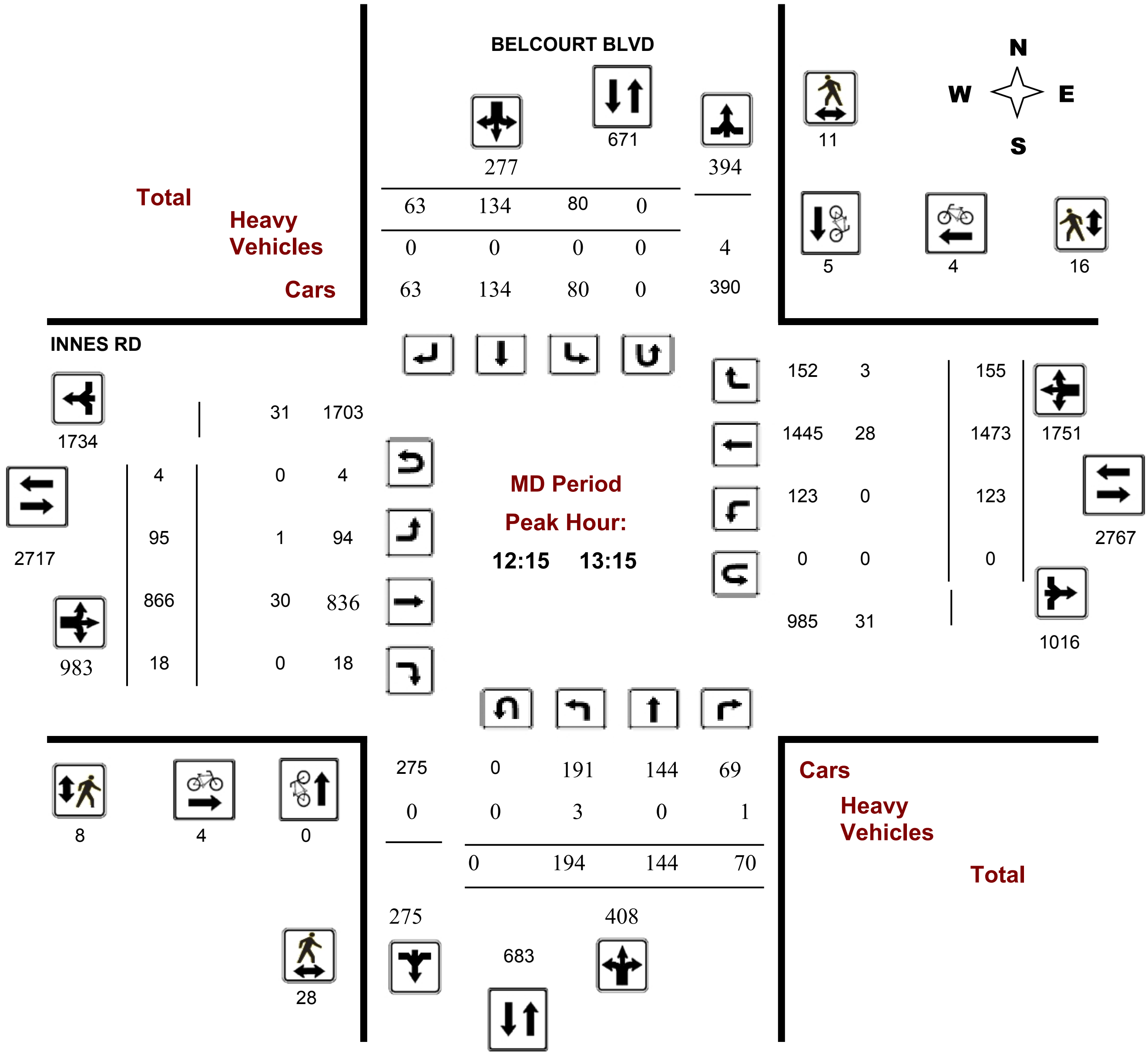
BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

Start Time: 07:00

WO No: 35061

Device: Jamar Technologies, Inc



Comments

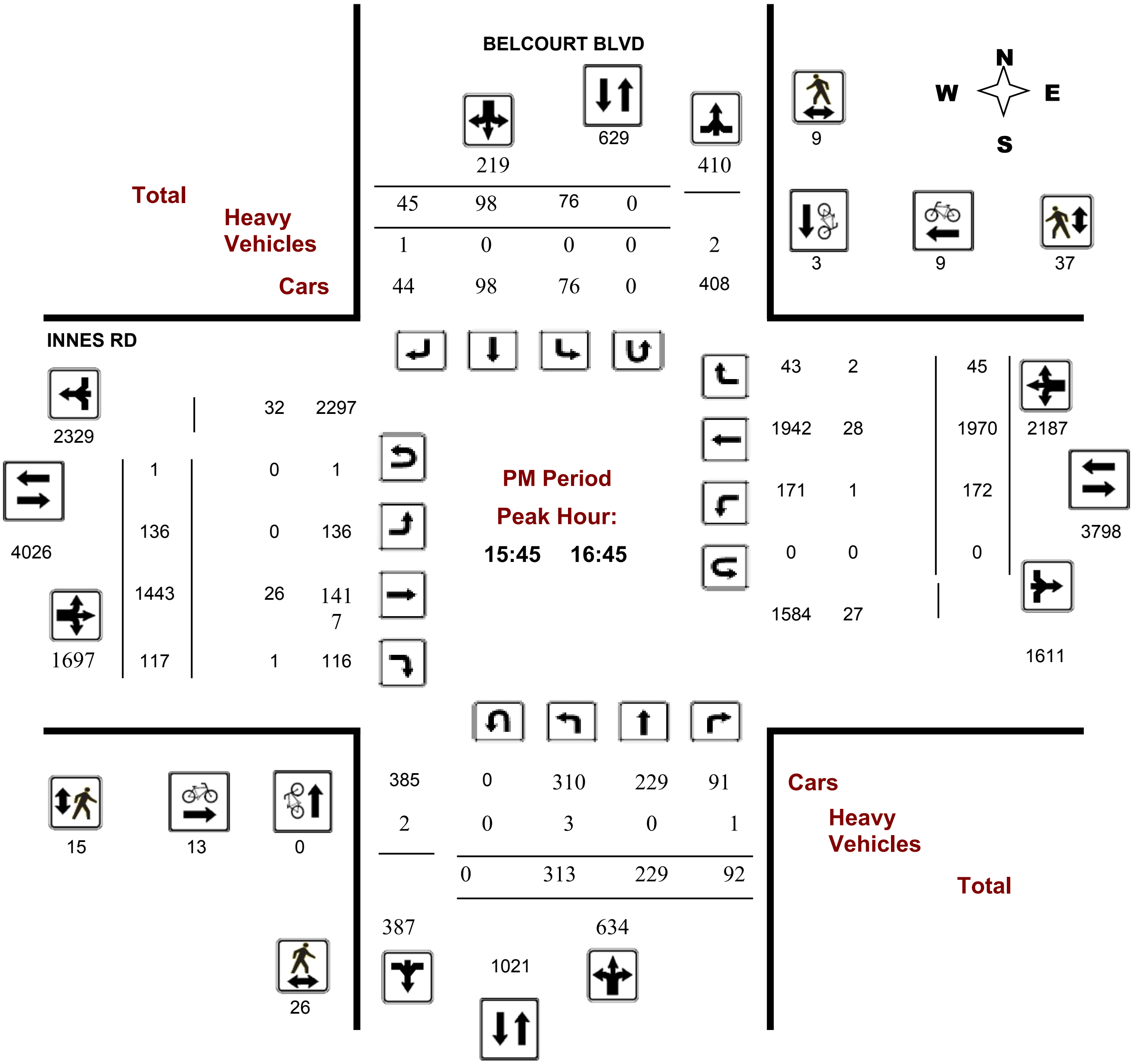
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015 **WO No:** 35061

Start Time: 07:00 **Device:** Jamar Technologies, Inc



Comments

Transportation Services - Traffic Services

Work Order
35061

Turning Movement Count - 15 Min U-Turn Total Report

BELCOURT BLVD @ INNES RD

Survey Date: Tuesday, August 04, 2015

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	1	0	1
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	1	0	1
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	2	0	2
09:45	10:00	0	0	1	0	1
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	1	0	1
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	3	0	3
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	1	0	1
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	1	0	1
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	1	0	1
17:00	17:15	0	0	2	0	2
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	1	0	1
17:45	18:00	0	0	3	0	3
Total		0	0	18	0	18

Transportation Services - Traffic Services

Collision Details Report - Public Version

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

Location: BELCOURT BLVD @ INNES RD

Traffic Control: Traffic signal **Total Collisions:** 34

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jan-03, Fri,13:15	Clear	Turning movement	P.D. only	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2014-Jan-24, Fri,17:15	Clear	Other	P.D. only	Dry	South	Reversing	Pick-up truck	Other motor vehicle	0
					North	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Feb-20, Thu,12:48	Clear	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Aug-05, Tue,18:20	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Passenger van	Other motor vehicle	0
					East	Turning left	Truck and trailer	Other motor vehicle	
					South	Turning left	Pick-up truck	Other motor vehicle	
2014-Aug-16, Sat,13:42	Rain	Rear end	P.D. only	Wet	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2014-Dec-07, Sun,15:00	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Jan-06, Tue,19:46	Clear	Rear end	P.D. only	Wet	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2015-Feb-14, Sat,08:15	Snow	Angle	P.D. only	Loose snow	West	Turning right	Passenger van	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Mar-04, Wed,14:41	Clear	Rear end	P.D. only	Dry	East	Going ahead	Unknown	Other motor vehicle	0
					East	Stopped	Municipal transit bus	Other motor vehicle	
2015-Aug-20, Thu,14:10	Clear	Sideswipe	P.D. only	Dry	East	Turning right	Passenger van	Other motor vehicle	0
					East	Turning right	Pick-up truck	Other motor vehicle	
2015-Sep-30, Wed,10:40	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Pick-up truck	Other motor vehicle	0
					West	Going ahead	Pick-up truck	Other motor vehicle	

Transportation Services - Traffic Services
Collision Details Report - Public Version

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

Location: BELCOURT BLVD @ INNES RD

Traffic Control: Traffic signal **Total Collisions:** 34

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Oct-05, Mon,19:07	Clear	Sideswipe	P.D. only	Dry	East	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Oct-09, Fri,15:10	Clear	Rear end	P.D. only	Wet	West	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Pick-up truck	Other motor vehicle	
2015-Oct-26, Mon,14:00	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Dec-20, Sun,17:03	Clear	Rear end	Non-fatal injury	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Passenger van	Other motor vehicle	
2015-Dec-28, Mon,12:15	Clear	Rear end	P.D. only	Dry	East	Going ahead	Delivery van	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jan-22, Fri,18:55	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Feb-05, Fri,15:16	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2016-Apr-03, Sun,17:09	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Turning right	Pick-up truck	Other motor vehicle	
2016-Apr-29, Fri,16:15	Clear	Turning movement	P.D. only	Dry	East	Turning left	Unknown	Other motor vehicle	0
					West	Turning right	Automobile, station wagon	Other motor vehicle	
2016-Oct-04, Tue,17:49	Clear	Rear end	Non-fatal injury	Dry	East	Turning right	Passenger van	Cyclist	0
					East	Turning right	Bicycle	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

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

Location: BELCOURT BLVD @ INNES RD

Traffic Control: Traffic signal **Total Collisions:** 34

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Oct-11, Tue,18:39	Clear	Turning movement	Non-fatal injury	Dry	East	Turning left	Automobile, station wagon	Cyclist	0
					West	Going ahead	Bicycle	Other motor vehicle	
2017-Jan-03, Tue,18:35	Rain	Rear end	P.D. only	Wet	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2017-Jul-27, Thu,05:55	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Oct-06, Fri,15:00	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Passenger van	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Oct-18, Wed,16:29	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Unknown	Other motor vehicle	0
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
2017-Dec-05, Tue,20:49	Rain	Turning movement	Non-fatal injury	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Dec-31, Sun,11:06	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Feb-05, Mon,08:46	Clear	Turning movement	Non-fatal injury	Packed snow	East	Turning left	Construction equipment	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-May-30, Wed,17:30	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Turning right	Automobile, station wagon	Other motor vehicle	
2018-Nov-10, Sat,12:00	Rain	Rear end	P.D. only	Wet	East	Changing lanes	Pick-up truck	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	

Transportation Services - Traffic Services
Collision Details Report - Public Version

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

Location: BELCOURT BLVD @ INNES RD

Traffic Control: Traffic signal **Total Collisions:** 34

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Nov-14, Wed,20:21	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Nov-17, Sat,17:00	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Nov-23, Fri,18:42	Clear	Rear end	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	

Location: INNES RD @ 473 E OF PAGE RD/BUILDERS' WAREHOUS

Traffic Control: Traffic signal **Total Collisions:** 5

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Jan-21, Wed,08:18	Rain	Rear end	P.D. only	Wet	West	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					West	Stopped	Passenger van	Other motor vehicle	
2016-Jun-30, Thu,06:35	Clear	Rear end	Non-fatal injury	Dry	West	Slowing or stopping	Motorcycle	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jul-05, Wed,15:30	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
2018-Jan-02, Tue,11:15	Snow	SMV other	P.D. only	Ice	East	Making "U" turn	Automobile, station wagon	Snowbank/drift	0
2018-May-28, Mon,12:27	Clear	Angle	P.D. only	Dry	North	Turning left	Pick-up truck	Other motor vehicle	0
					West	Turning left	Automobile, station wagon	Other motor vehicle	

Location: INNES RD @ VISENEAU DR

Traffic Control: Traffic signal **Total Collisions:** 37

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Mar-28, Fri,20:40	Rain	Rear end	P.D. only	Wet	East	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	

Transportation Services - Traffic Services
Collision Details Report - Public Version

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

Location: INNES RD @ VISENEAU DR

Traffic Control: Traffic signal **Total Collisions:** 37

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-May-14, Wed,16:00	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Bicycle	Other motor vehicle	0
					South	Turning right	Pick-up truck	Cyclist	
2014-Jun-18, Wed,06:44	Clear	Angle	Non-fatal injury	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2014-Aug-11, Mon,20:25	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Bicycle	Other motor vehicle	0
					West	Going ahead	Motorcycle	Cyclist	
2014-Oct-05, Sun,13:55	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Pick-up truck	Other motor vehicle	
2014-Nov-24, Mon,07:00	Rain	Turning movement	P.D. only	Wet	North	Turning right	Unknown	Other motor vehicle	0
					South	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Dec-14, Sun,12:32	Clear	Rear end	P.D. only	Wet	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Stopped	Passenger van	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Jan-02, Fri,18:19	Clear	Rear end	P.D. only	Dry	West	Turning left	Unknown	Other motor vehicle	0
					West	Turning left	Automobile, station wagon	Other motor vehicle	
2015-Jan-16, Fri,20:09	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2015-Jan-30, Fri,19:35	Clear	Rear end	P.D. only	Wet	South	Going ahead	Passenger van	Other motor vehicle	0
					South	Stopped	Pick-up truck	Other motor vehicle	
2015-Apr-30, Thu,14:06	Clear	Turning movement	Non-fatal injury	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

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

Location: INNES RD @ VISENEAU DR

Traffic Control: Traffic signal **Total Collisions:** 37

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Jun-10, Wed,08:20	Clear	Rear end	Non-fatal injury	Dry	West	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Oct-08, Thu,15:32	Clear	Turning movement	P.D. only	Dry	West	Turning left	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Feb-05, Fri,18:00	Clear	Other	P.D. only	Dry	Unknown	Unknown	Unknown	Other motor vehicle	0
					West	Slowing or stopping	Pick-up truck	Other motor vehicle	
2016-Feb-27, Sat,12:30	Clear	Rear end	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2016-Apr-04, Mon,13:34	Clear	Rear end	P.D. only	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Apr-06, Wed,20:10	Snow	Angle	P.D. only	Loose snow	West	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Apr-30, Sat,11:41	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jun-21, Tue,15:20	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2016-Aug-24, Wed,18:35	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Passenger van	Other motor vehicle	
2016-Nov-01, Tue,11:00	Clear	Angle	P.D. only	Dry	North	Turning right	Passenger van	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Nov-26, Sat,11:30	Clear	Rear end	Non-fatal injury	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	

Transportation Services - Traffic Services
Collision Details Report - Public Version

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

Location: INNES RD @ VISENEAU DR

Traffic Control: Traffic signal **Total Collisions:** 37

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Dec-23, Fri,11:55	Clear	Rear end	P.D. only	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Dec-29, Thu,18:05	Snow	Turning movement	P.D. only	Packed snow	South	Turning right	Municipal transit bus	Other motor vehicle	0
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Jan-04, Wed,18:00	Snow	Turning movement	P.D. only	Slush	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jan-10, Tue,21:06	Freezing Rain	Turning movement	P.D. only	Loose snow	West	Turning right	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Mar-20, Mon,10:17	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Nov-05, Sun,16:39	Rain	Turning movement	P.D. only	Wet	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Jan-05, Fri,17:31	Snow	Rear end	P.D. only	Slush	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Jan-15, Mon,15:54	Clear	Sideswipe	P.D. only	Packed snow	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Bus (other)	Other motor vehicle	
2018-Jan-20, Sat,14:22	Clear	Sideswipe	P.D. only	Wet	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Mar-19, Mon,17:20	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	

Transportation Services - Traffic Services
Collision Details Report - Public Version

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

Location: INNES RD @ VISENEAU DR

Traffic Control: Traffic signal **Total Collisions:** 37

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-May-25, Fri,16:41	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Jun-02, Sat,19:10	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Jul-17, Tue,16:09	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Oct-10, Wed,14:05	Clear	Rear end	P.D. only	Dry	East	Unknown	Unknown	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2018-Oct-12, Fri,09:45	Clear	Sideswipe	P.D. only	Dry	West	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					West	Turning left	Automobile, station wagon	Other motor vehicle	

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

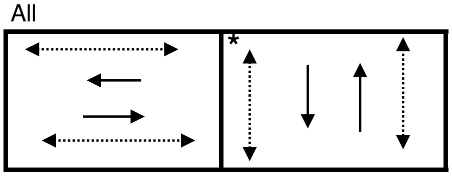
Intersection:	**Main:** Innes	**Side:**	Boyer/Builders Warehouse
Controller:	**MS-3200**	**TSD:**	**6370**
Author:	Jon Pach	**Date:**	05-Dec-2018

Existing Timing Plans†

	Plan						Ped Minimum Time		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	**AM Rush** 11	***Walk***	***DW***	***A+R***
Cycle	110	90	110	70	90	120			
Offset	0	43	36	X	43	0			
EB Thru	77	57	77	37	57	87	12	14	3.7 + 2.4
WB Thru	77	57	77	37	57	87	12	14	3.7 + 2.4
NB Thru	33	33	33	33	33	33	7	19	3.3 + 3.0
SB Thru	33	33	33	33	33	33	7	19	3.3 + 3.0

Phasing Sequence‡

Plan: All



Schedule

Weekday

Time	Plan
0:10	4
6:00	11
9:00	1
9:30	2
15:00	3
18:30	2
22:00	4

Saturday

Time	Plan
0:10	4
7:00	2
9:00	5
20:00	2
22:00	4

Sunday

Time	Plan
0:10	4
7:00	2
10:00	5
19:00	2
22:00	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·········► Pedestrian signal

Cost is $56.50 ($50 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

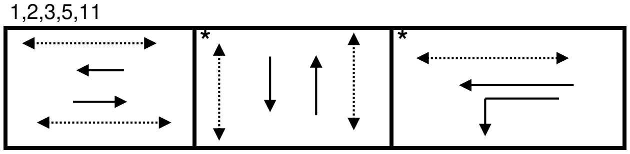
Intersection:	**Main:** Innes	**Side:**	Viseneau
Controller:	**MS-3200A**	**TSD:**	**6601**
Author:	Jon Pach	**Date:**	05-Dec-2018

Existing Timing Plans†

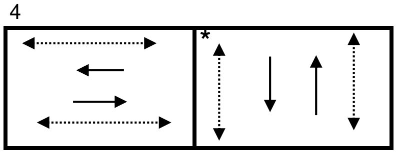
	Plan						Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Weekend 5	AM Rush 11	*Walk*	*DW*	*A+R*
Cycle	110	110	130	70	130	120			
Offset	45	64	105	X	52	40			
EB Thru	61	56	71	33	68	71	7	19	3.7 + 2.6
WB Thru	73	71	91	33	88	83	7	19	3.7 + 2.6
NB Thru	37	39	39	37	42	37	7	23	3.3 + 3.4
SB Thru	37	39	39	37	42	37	7	23	3.3 + 3.4
WB Left	12	15	20	-	20	12	-	-	3.7 + 2.6

Phasing Sequence‡

Plan: 1,2,3,5,11



Plan: 4



Schedule

Weekday

Time	Plan
0:10	4
6:00	11
9:00	1
9:30	2
15:00	3
18:30	2
22:00	4

Saturday

Time	Plan
0:10	4
7:00	2
9:00	5
20:00	2
22:00	4

Sunday

Time	Plan
0:10	4
7:00	2
10:00	5
19:00	2
22:00	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·········► Pedestrian signal

Cost is $56.50 ($50 + HST)

Traffic Signal Timing

City of Ottawa, Public Works Department

Roads & Traffic Operations and Maintenance Branch

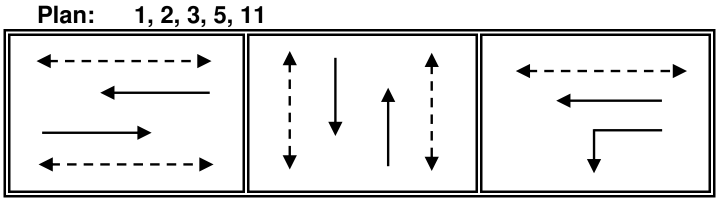
Intersection:	***Main:*** Innes	***Side:***	Belcourt
Controller:	MS3200	**TSD:**	6599
Author:	Marcel Ouellette	**Date:**	11-Jun-14

Existing Timing Plans †

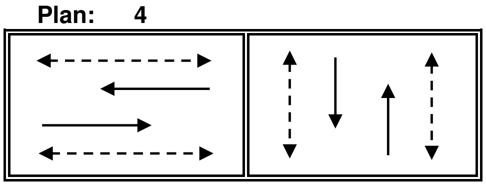
	Plan 1 AM Peak	Plan 2 Off Peak	Plan 3 PM Peak	Plan 4 Night	Plan 5 Weekend	Plan 11 AM Heavy			Pedestrian Timing and Clearance Intervals: Walk	DW	Amber + All-Red	Phase
Cycle	110	110	130	90	130	120						
Offset	33	64	116	ncs	67	33						
WBL(pp)*	12	15	20	-	25	10					3.7 + 1.0	1
EB Thru	63	60	75	59	60	79			7	21	3.7 + 2.9	2
-												3
SB Thru*	35	35	35	31	45	31			7	17	3.0 + 3.8	4
-												5
WB Thru	75	75	95	59	85	89			7	21	3.7 + 2.9	6
-												7
NB Thru*	35	35	35	31	45	31			7	17	3.0 + 3.8	8

Phasing Sequence ‡

Plan: 1, 2, 3, 5, 11



Plan: 4



Schedule

Weekday

Time	Plan
0:10	4
6:00	11
9:00	1
9:30	2
15:00	3
18:30	2
22:00	4

Saturday

Time	Plan
0:10	4
7:00	2
9:00	5
20:00	2
22:00	4

Sunday

Time	Plan
0:10	4
7:00	2
10:00	5
19:00	2
22:00	4

Notes

† Time for each direction includes amber and all red intervals

‡ Start of first phase should be used as reference point for offset

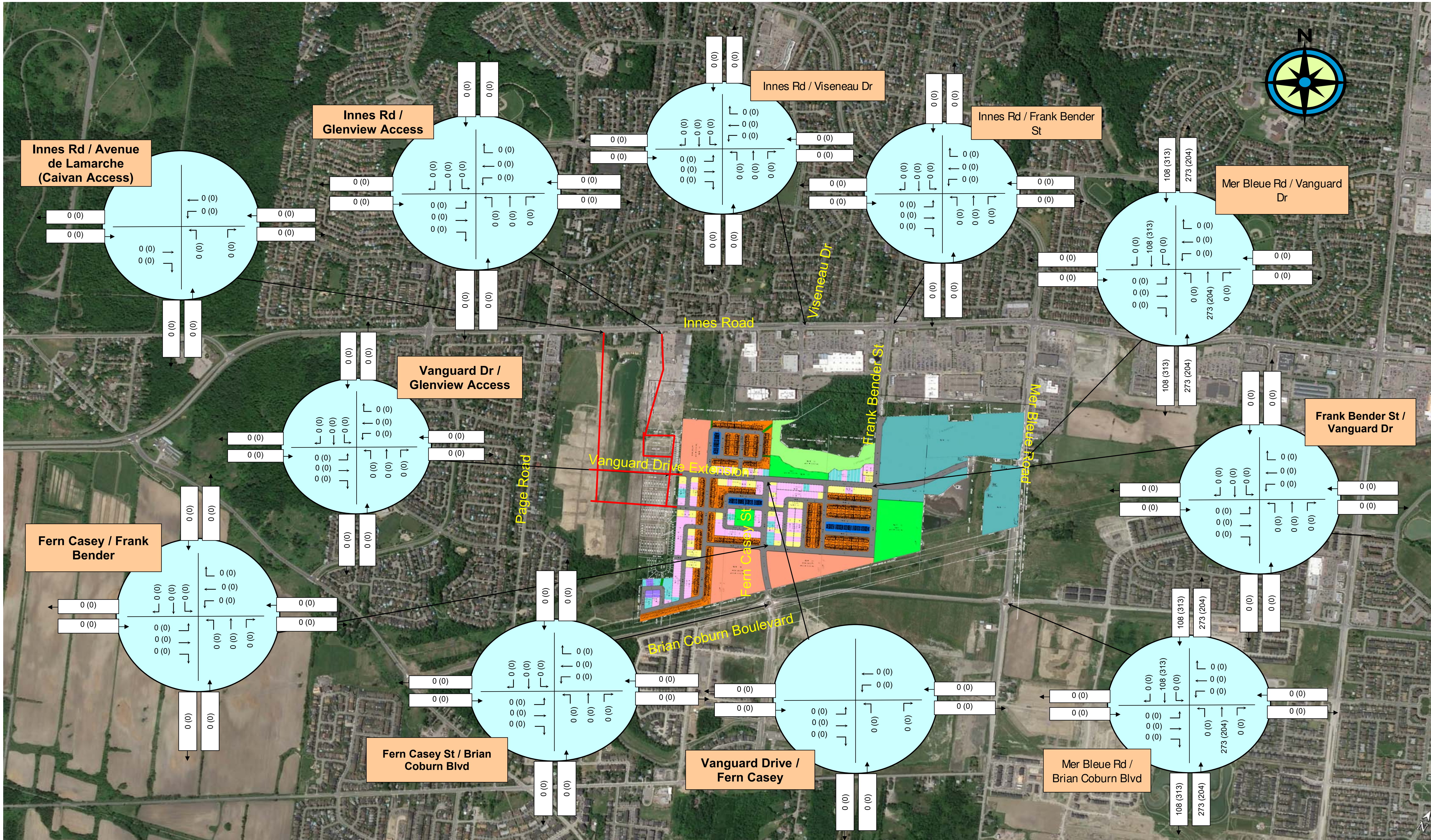
ncs: Non-coordinated signal

** Actuated phase*

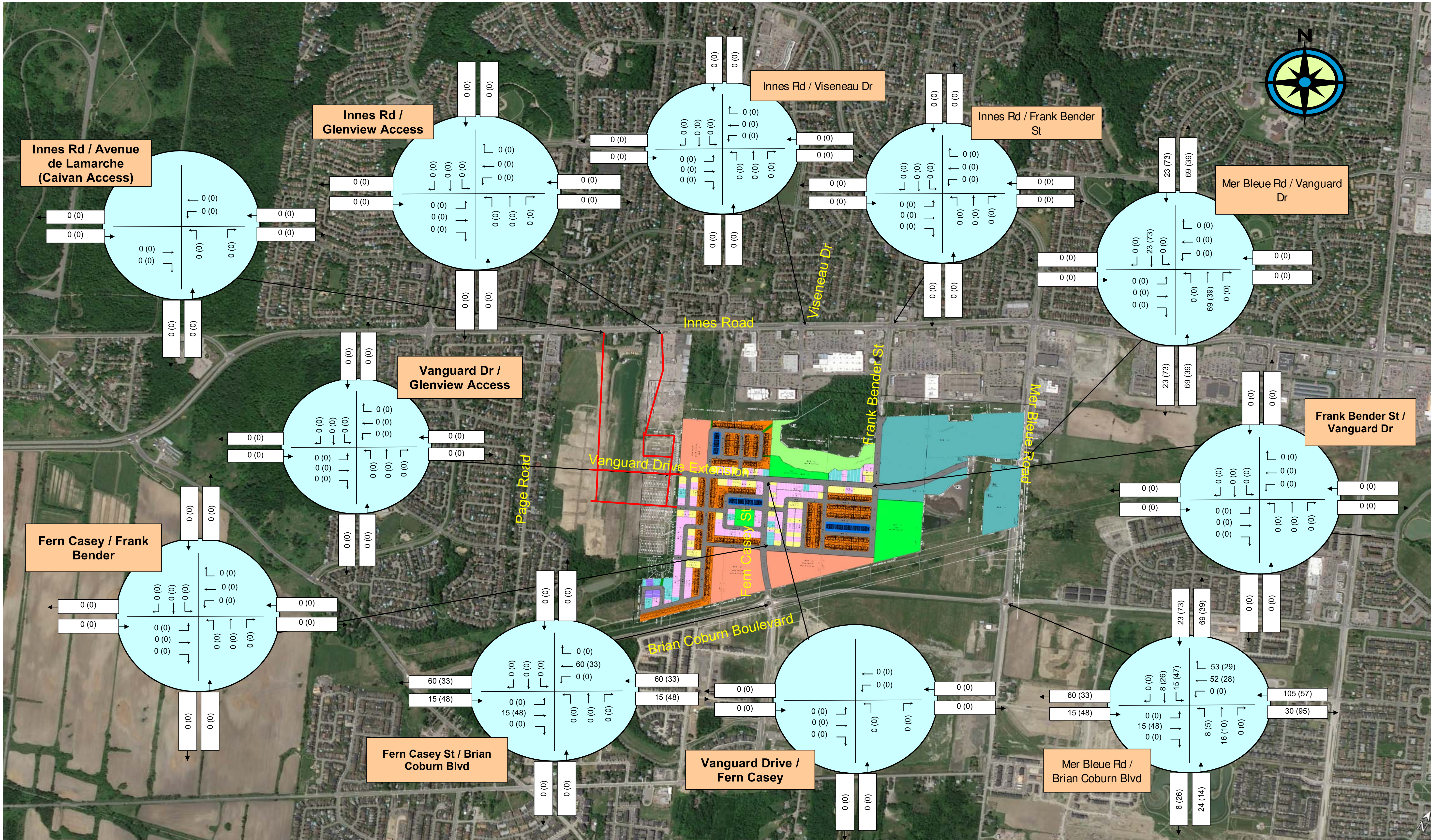
(fp) Fully Protected Left-Turn

(pp) Protected / Permissive Left-Turn

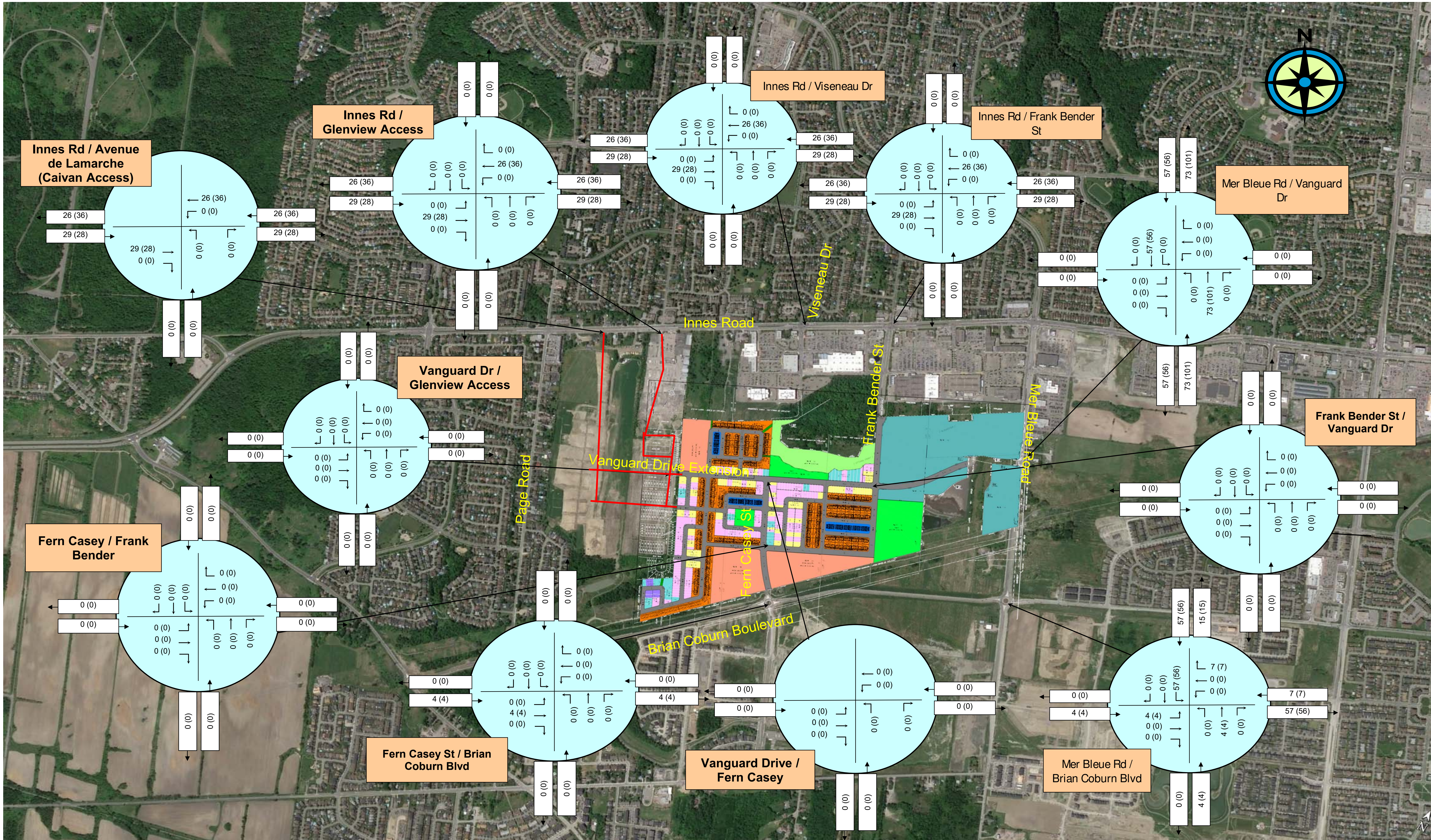
Appendix E: Adjacent Development Traffic Volume Exhibits and Extracts



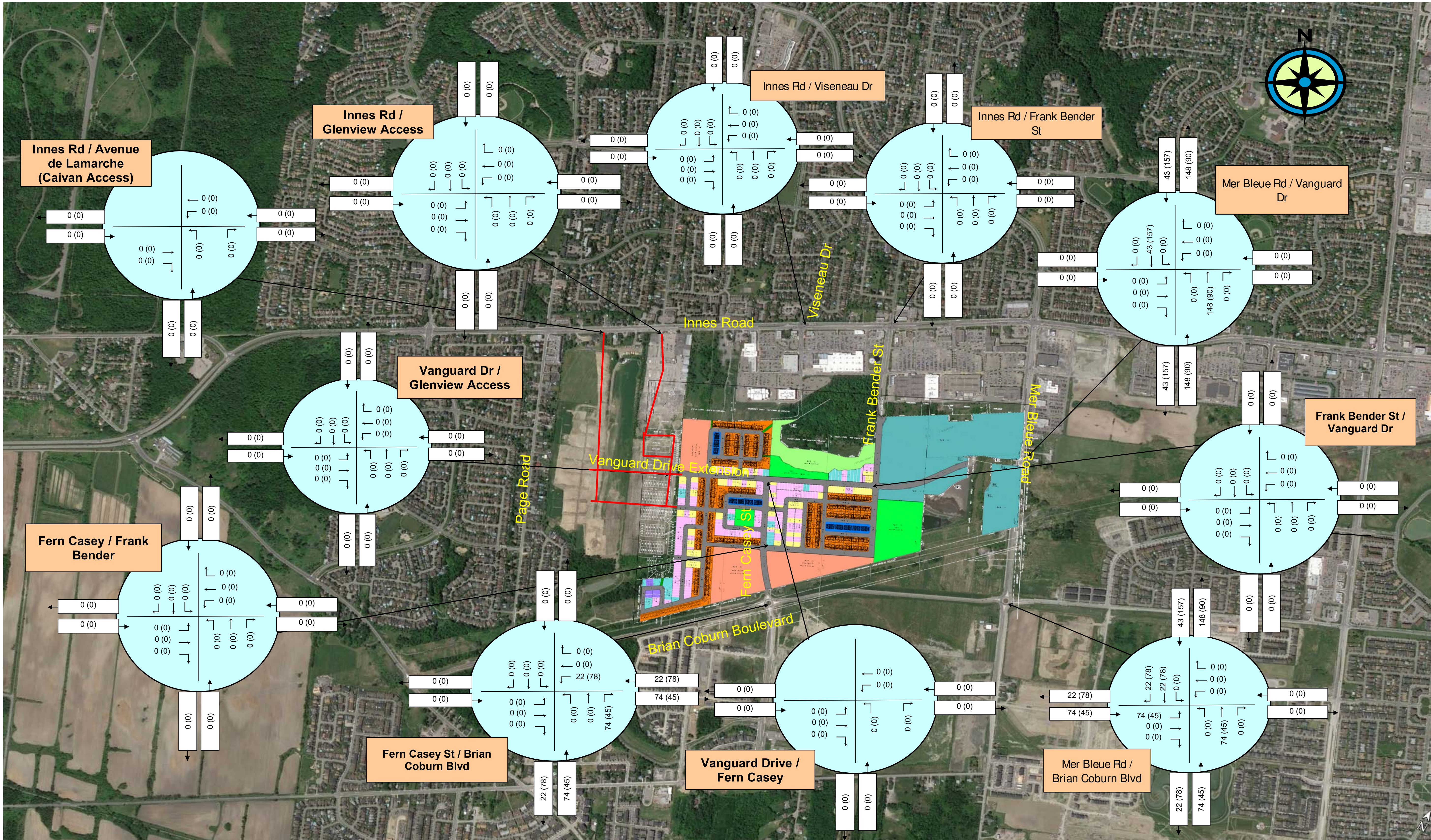
Summerside (Phase 1-6) Development Traffic



Minto Avalon Development Traffic

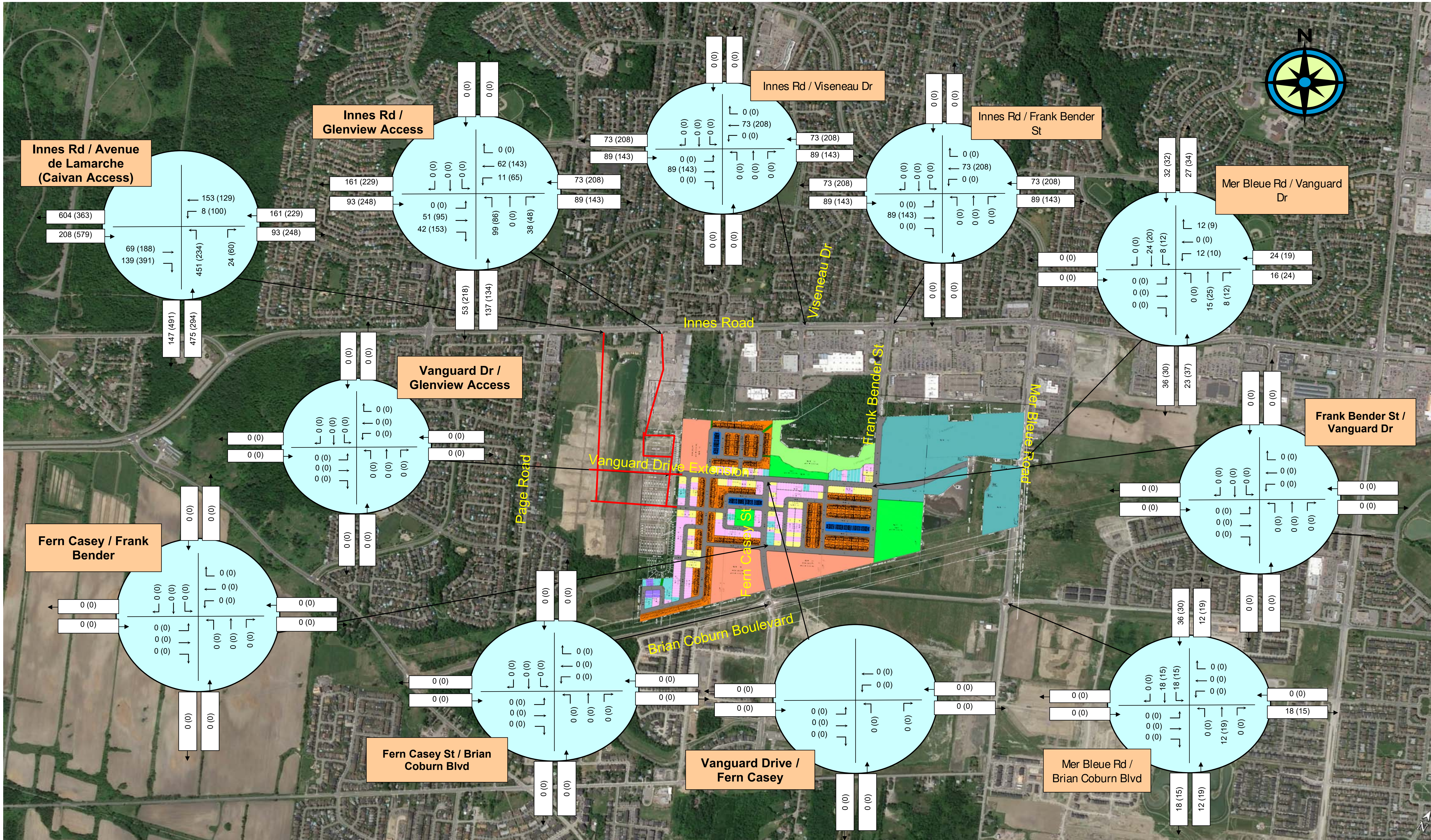


Orleans Health Hub Development Traffic

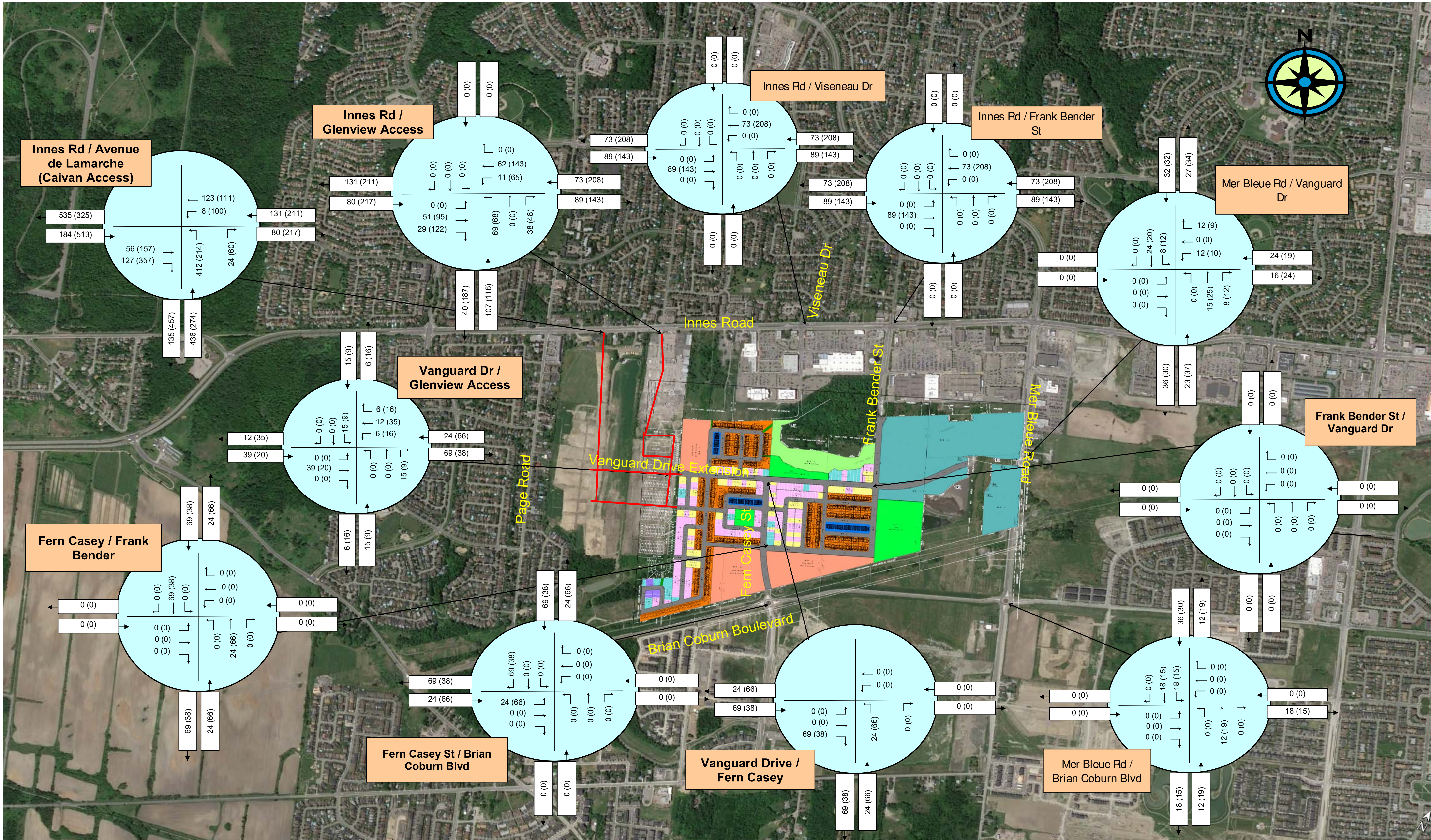


Innes Rd / Avenue de Lamarche (Caivan Access)
Innes Rd / Glenview Access
Innes Rd / Viseneau Dr
Innes Rd / Frank Bender St
Mer Bleue Rd / Vanguard Dr
Vanguard Dr / Glenview Access
Frank Bender St / Vanguard Dr
Fern Casey / Frank Bender
Fern Casey St / Brian Coburn Blvd
Vanguard Drive / Fern Casey
Mer Bleue Rd / Brian Coburn Blvd
Innes Road
Viseneau Dr
Frank Bender St
Mer Bleue Road
Page Road
Vanguard Drive Extension
Fern Casey St
Brian Coburn Boulevard
43 (157)
148 (90)
22 (78)
74 (45)
0 (0)
N

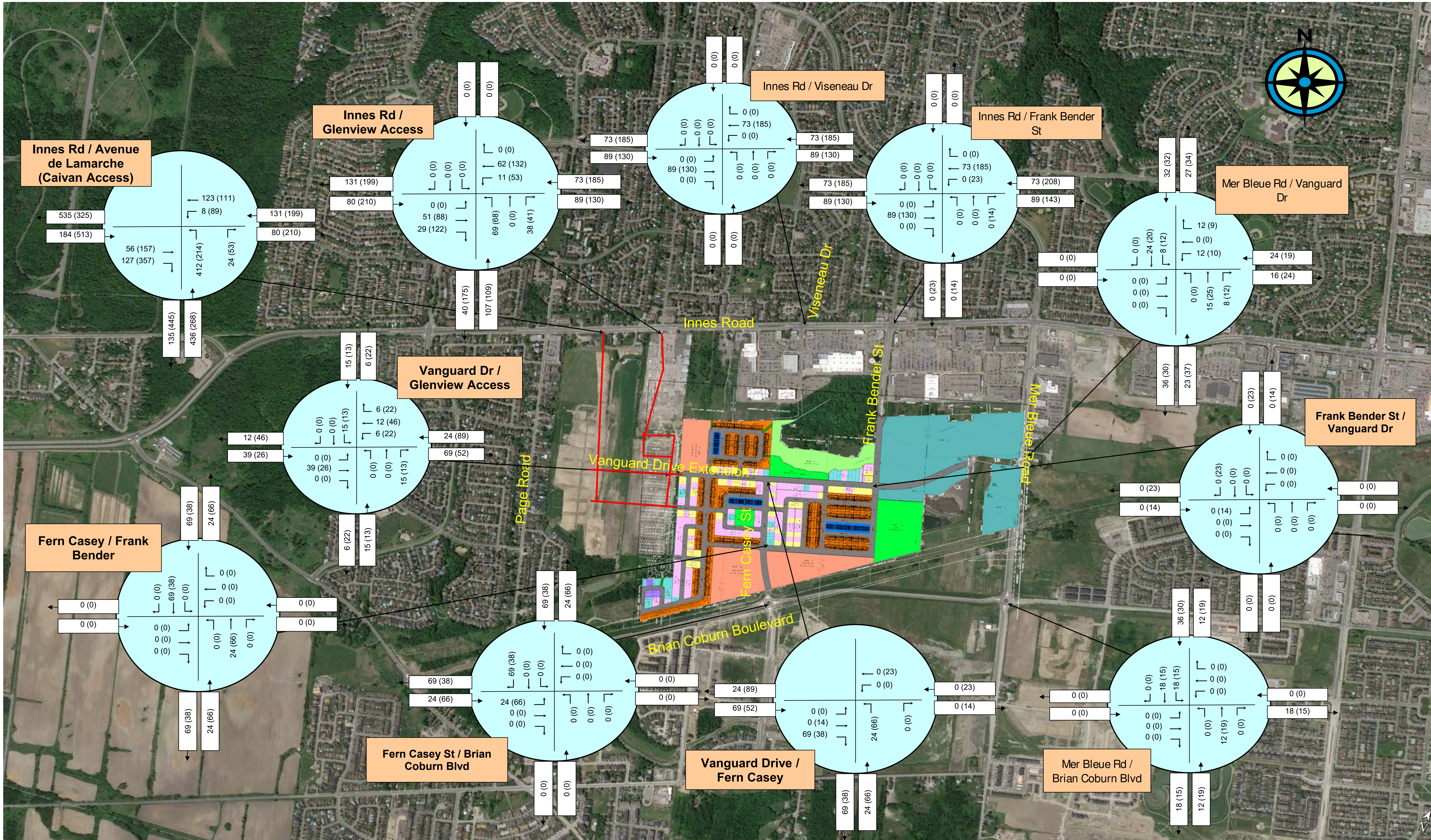
EUC Phase 2



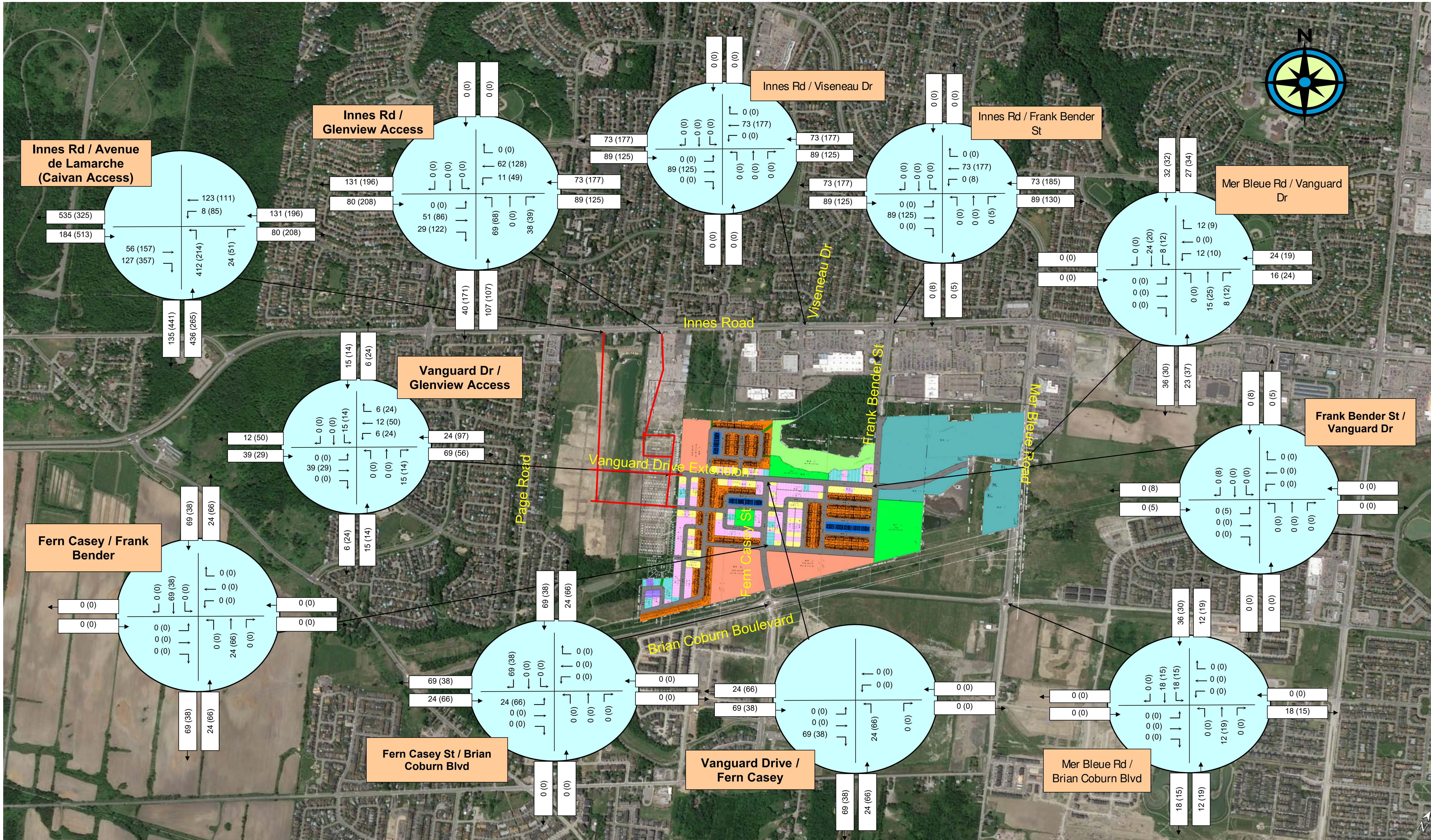
Innes Road Development Traffic - No Diversions



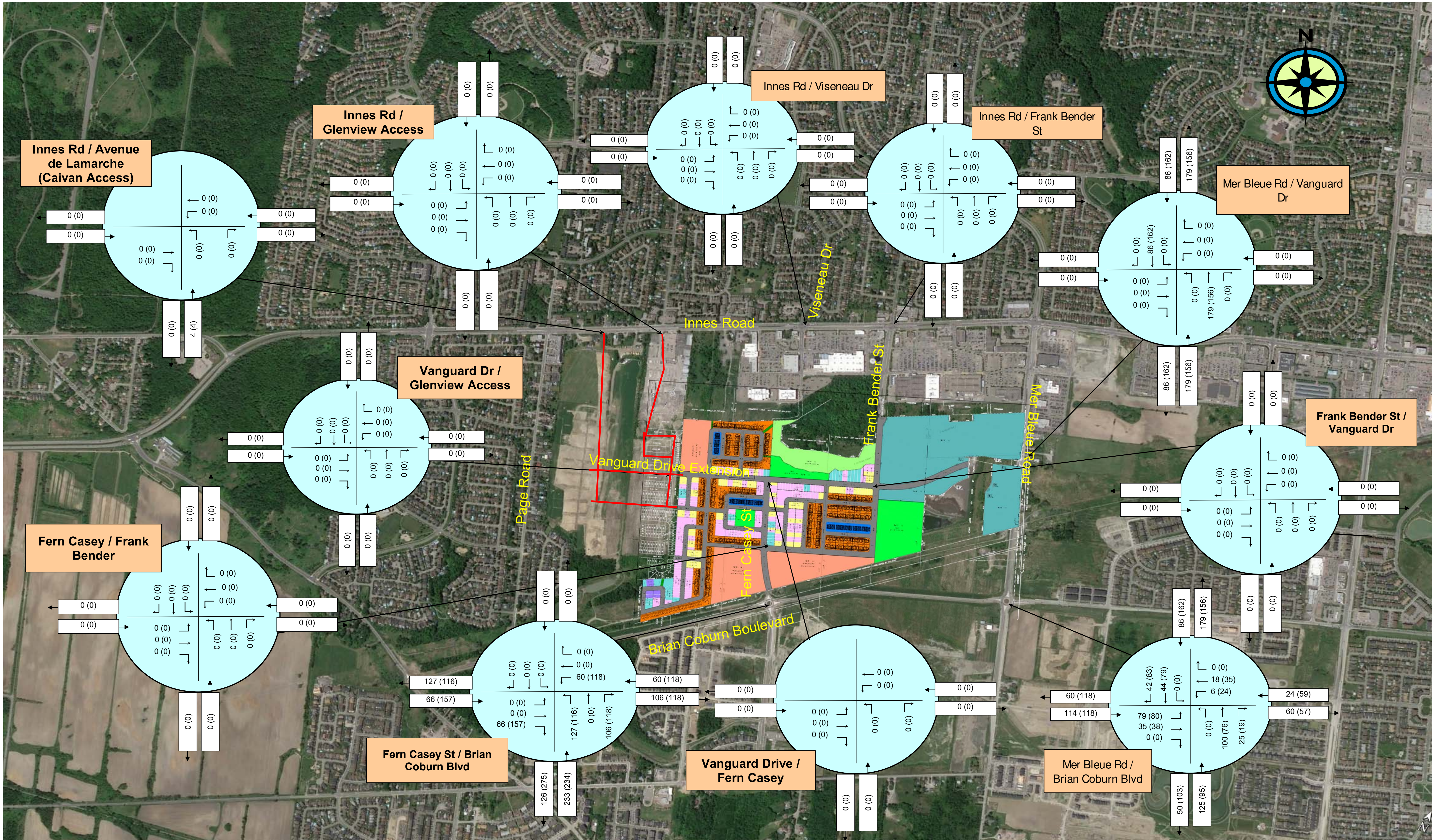
Innes Road Development Traffic - With Diversions - 2037 - Stage 1 (Vanguard/Fern casey Connection)



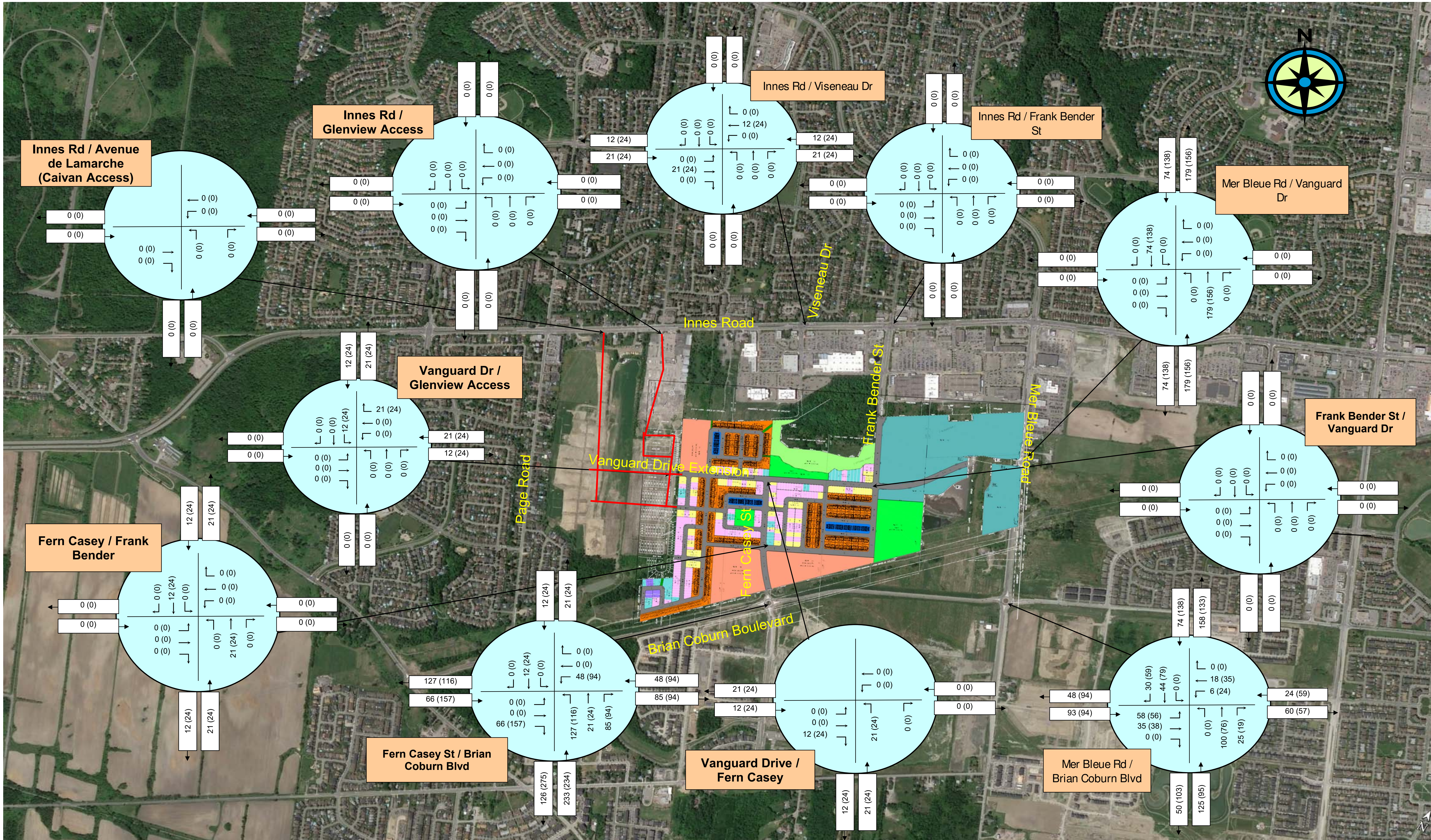
Innes Road Development Traffic - With Diversions - 2042 - Stage 2 (Frank Bender/Vanguard Connection)



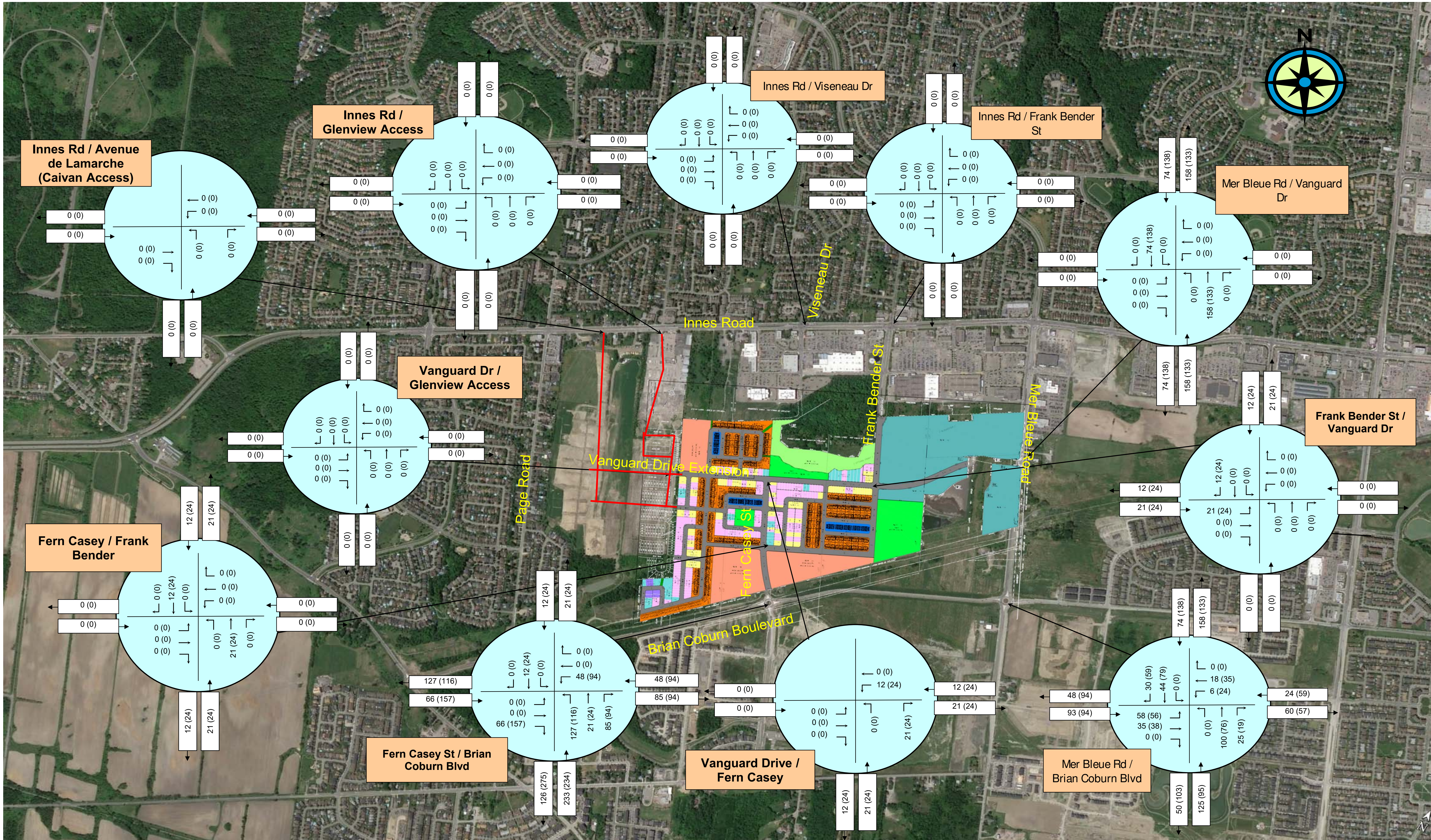
Innes Road Development Traffic - With Diversions - 2047 - Stage 3 (Full Vanguard Drive Connection)



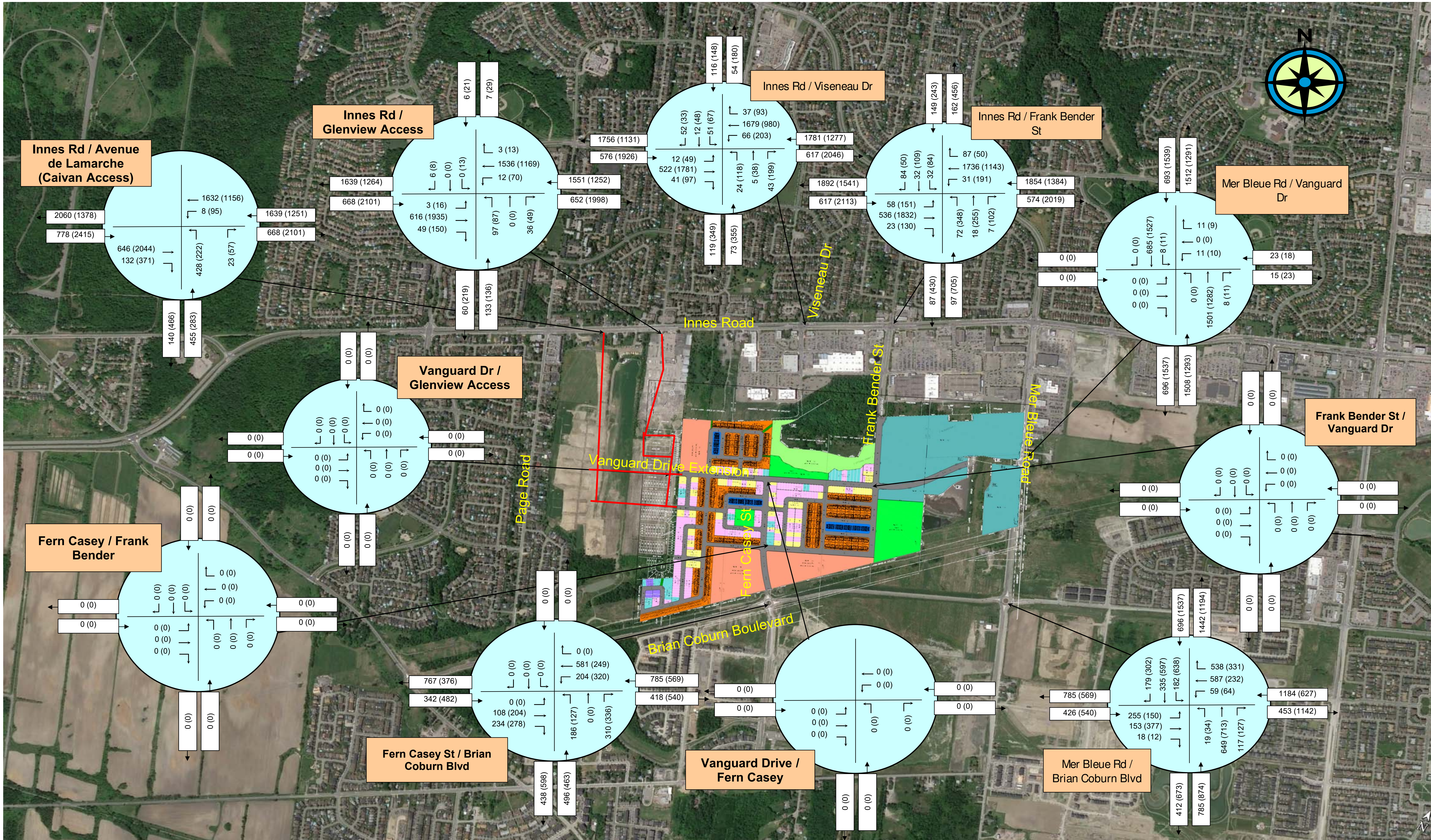
Trailsedge Developments - Blocks 193 & 194 and Phase 3



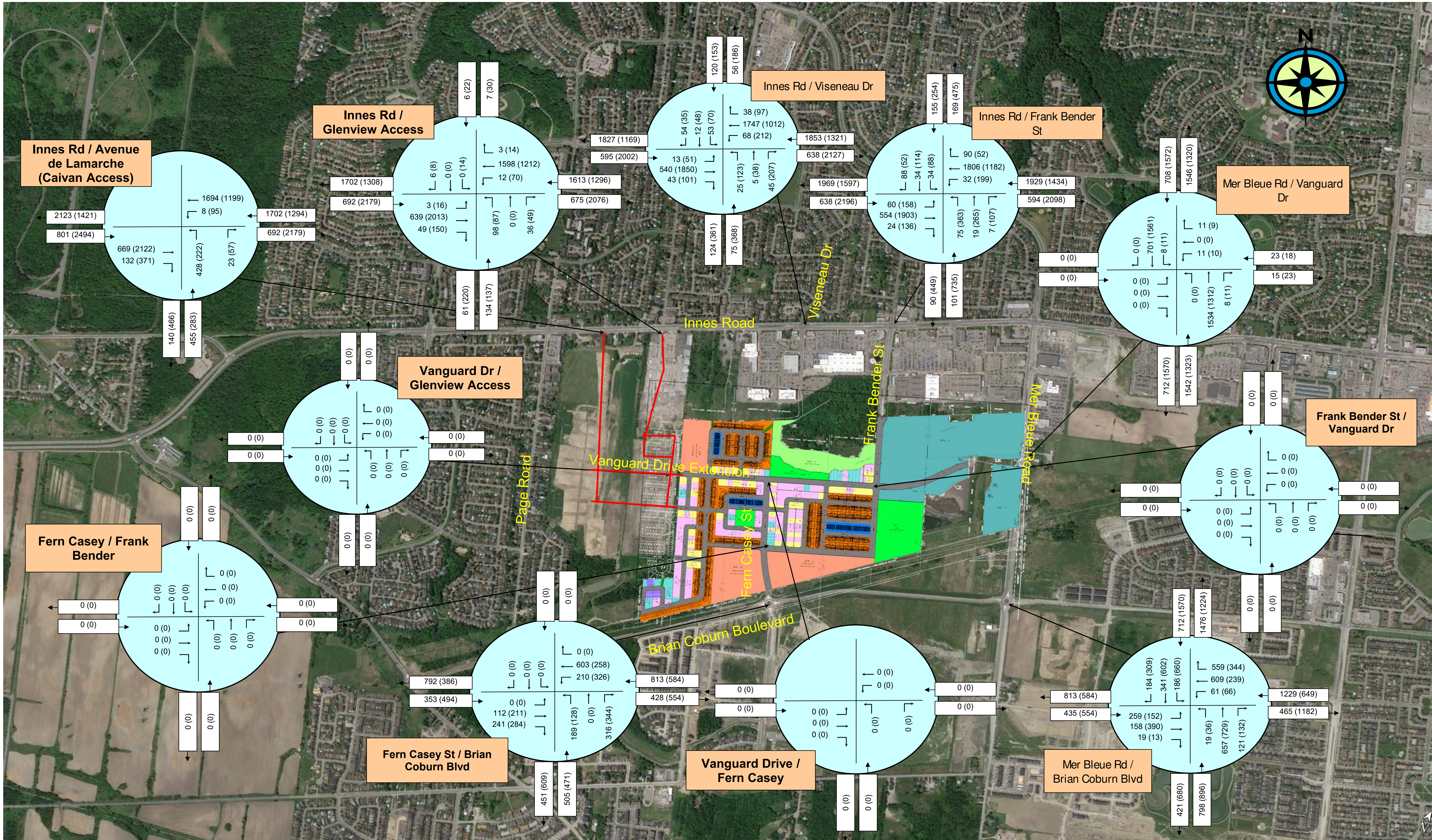
Trailsedge Diversions - 2037 Horizon (Stage 1)



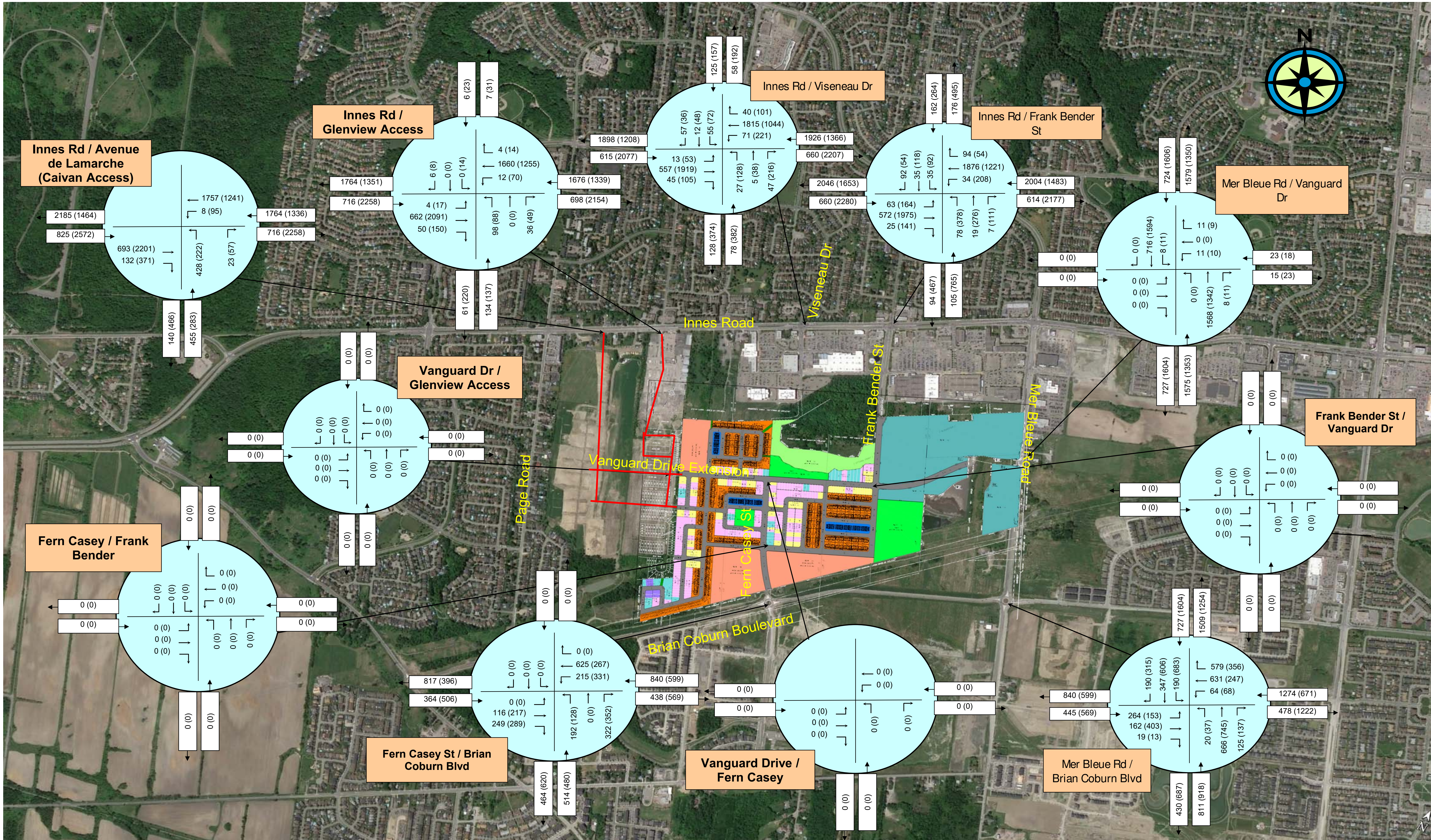
Trailsedge Diversions - 2042 & 2047 Horizon (Stage 2 & 3)



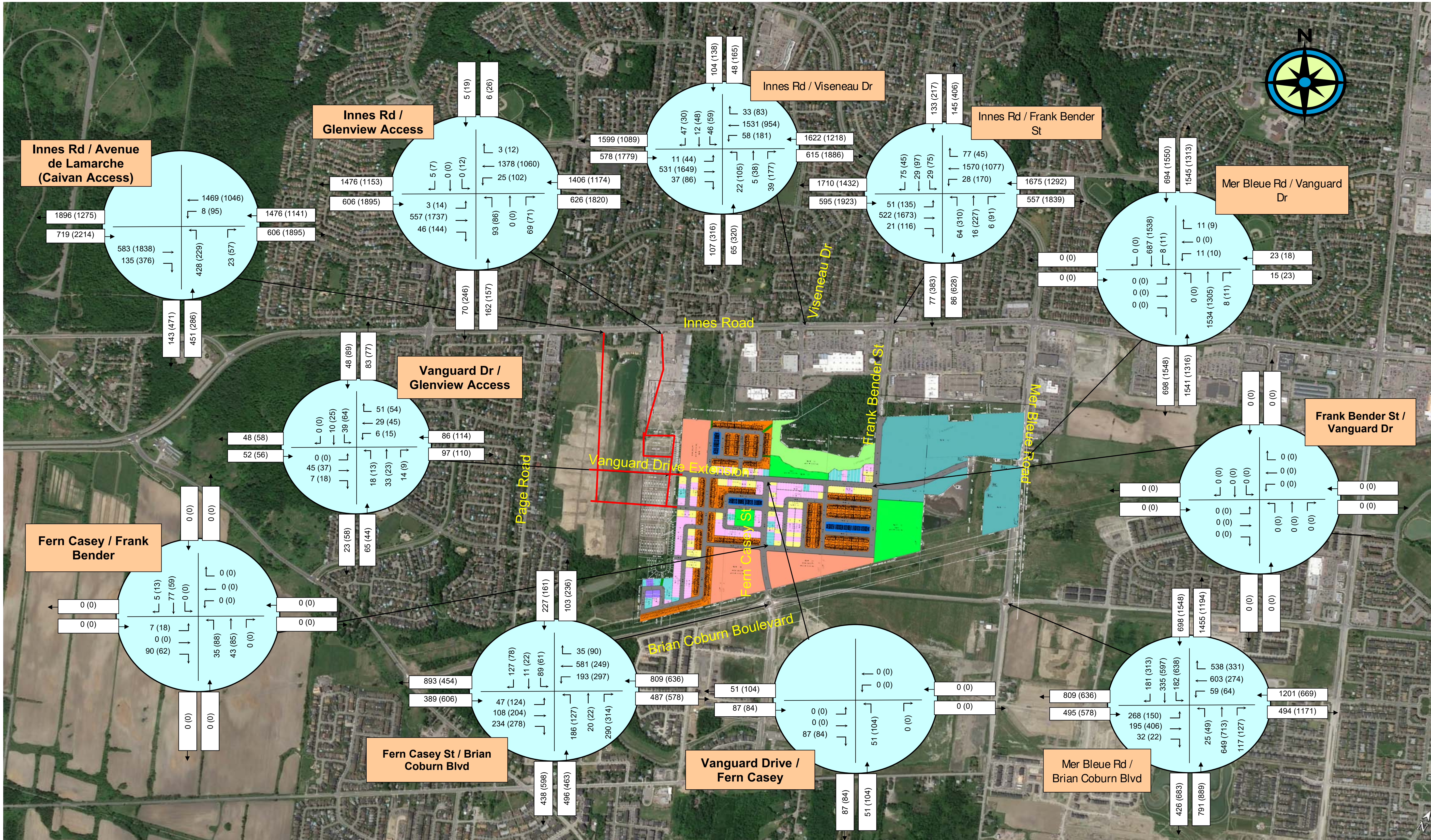
Background Traffic Volumes - 2037 Forecast - AM (PM)



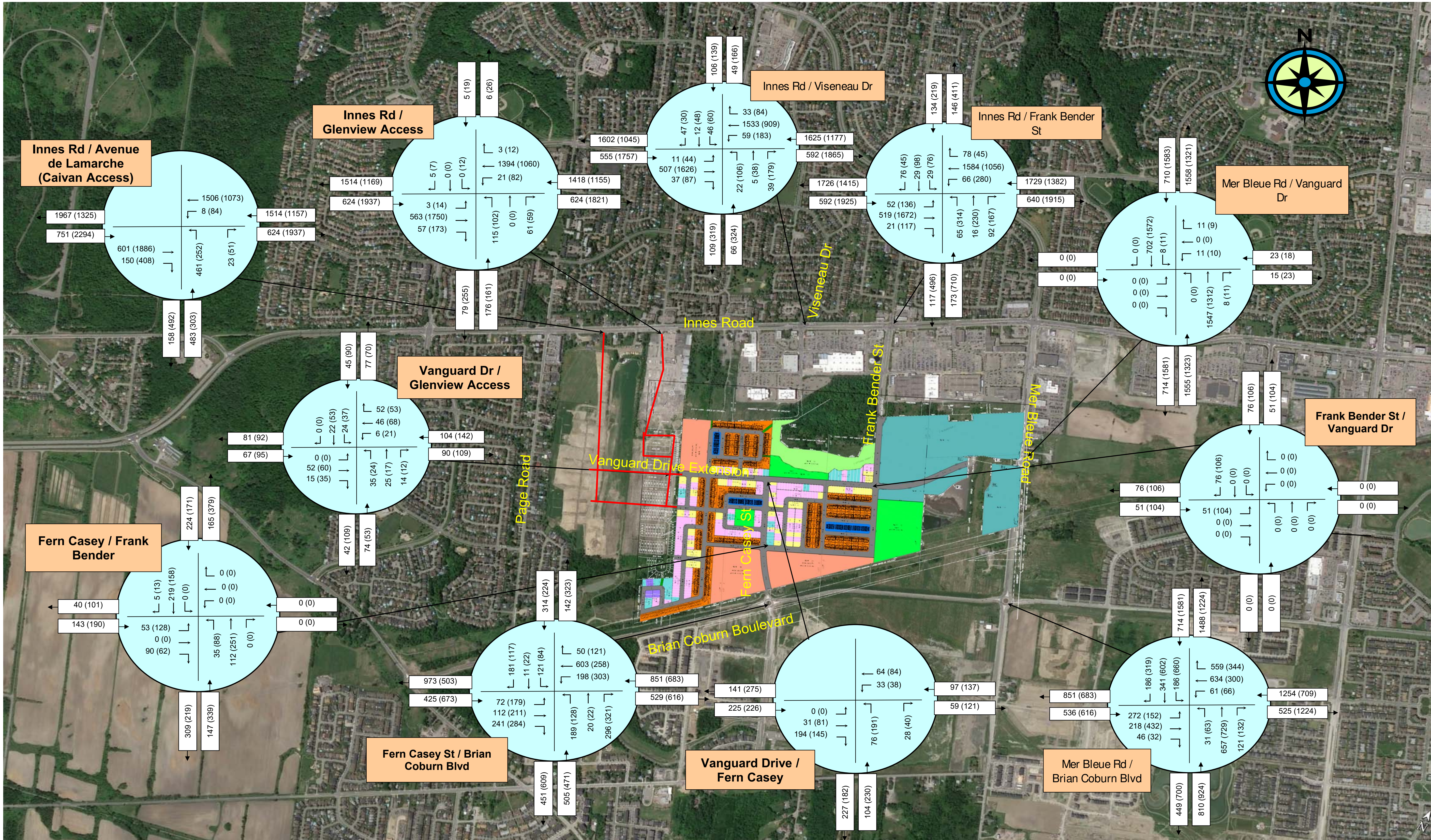
Background Traffic Volumes - 2042 Forecast - AM (PM)



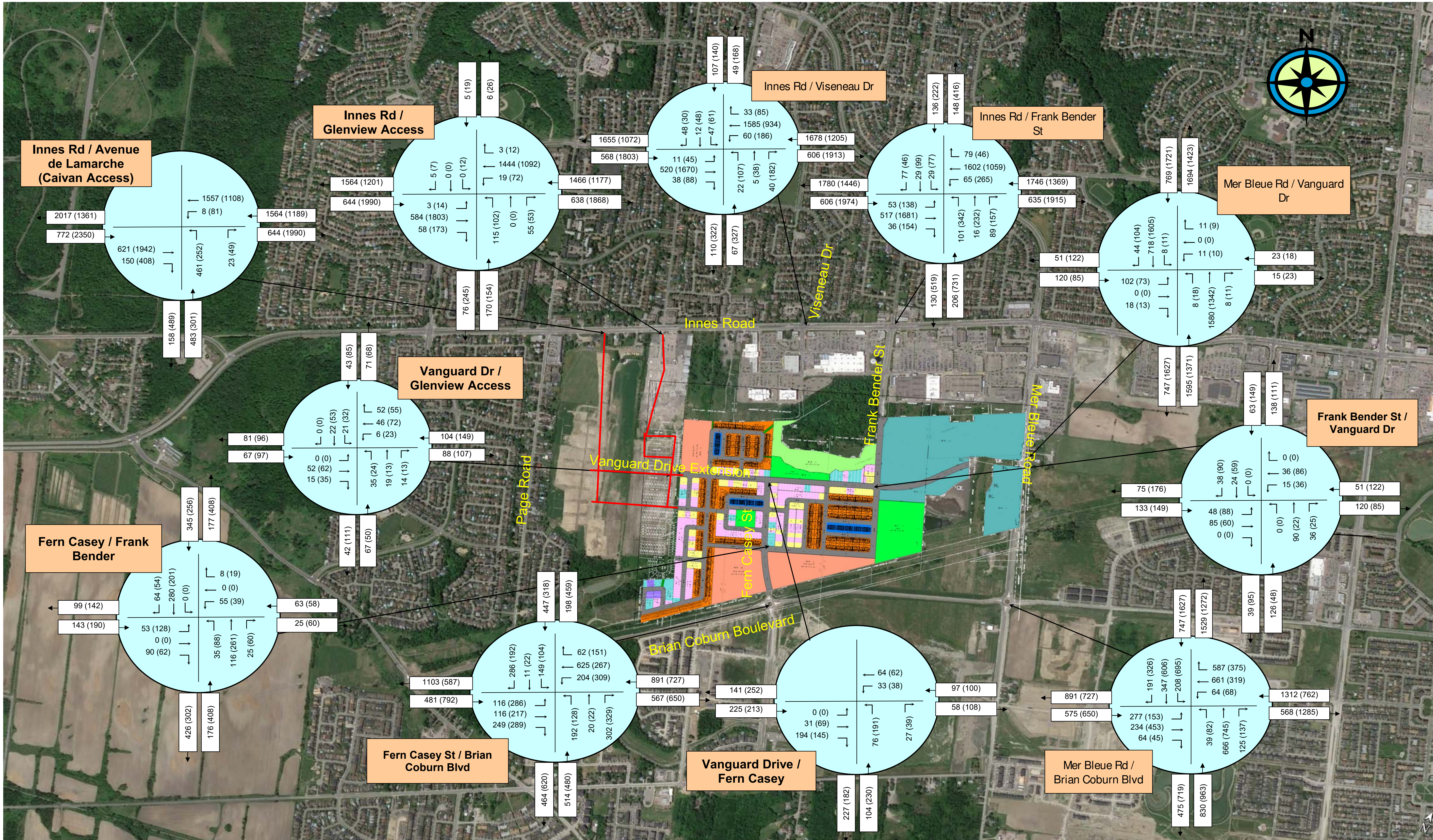
Background Traffic Volumes - 2047 Forecast - AM (PM)



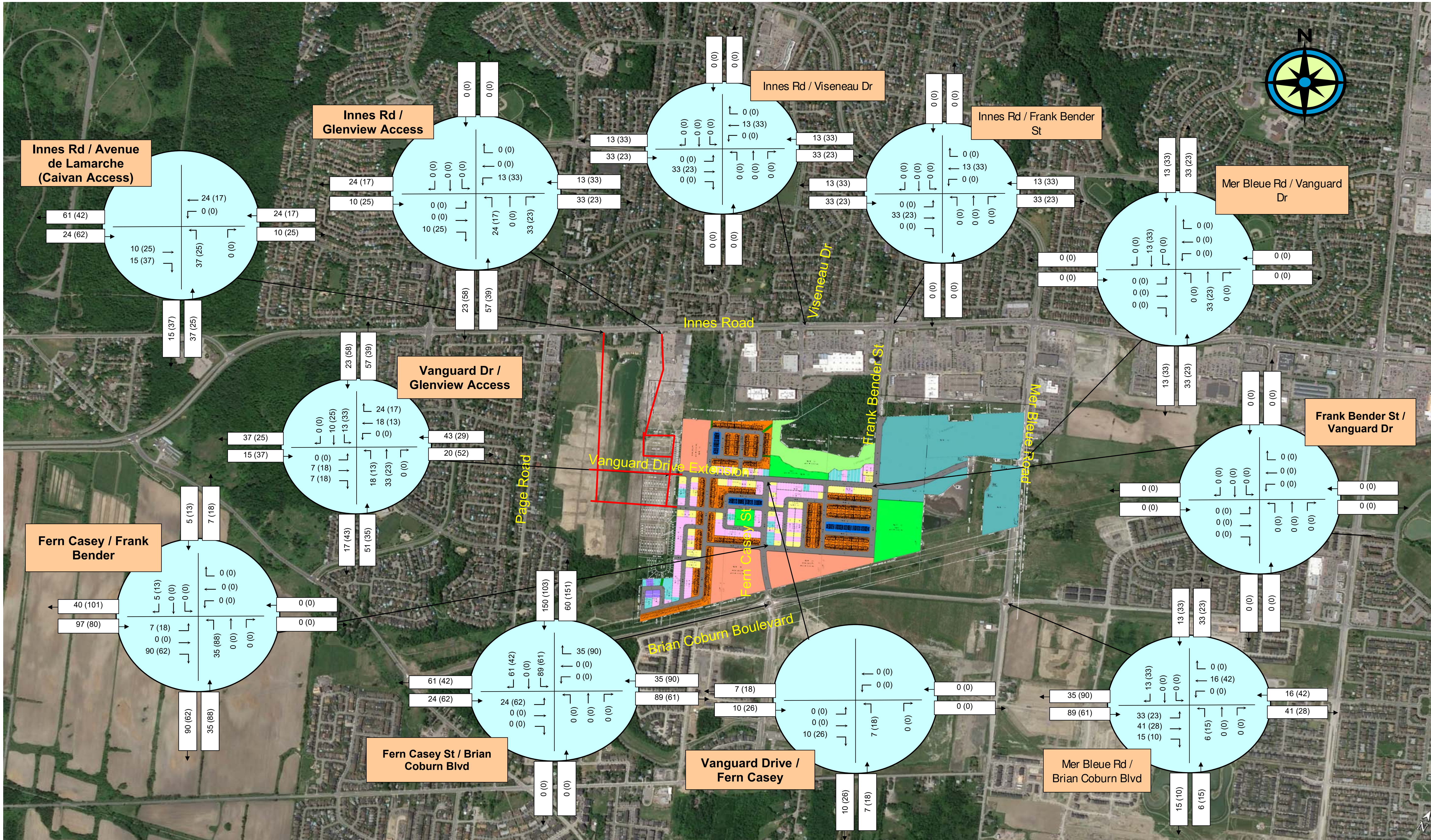
Design Volume Traffic Forecast (2037) - AM (PM) Peak Hour Volumes



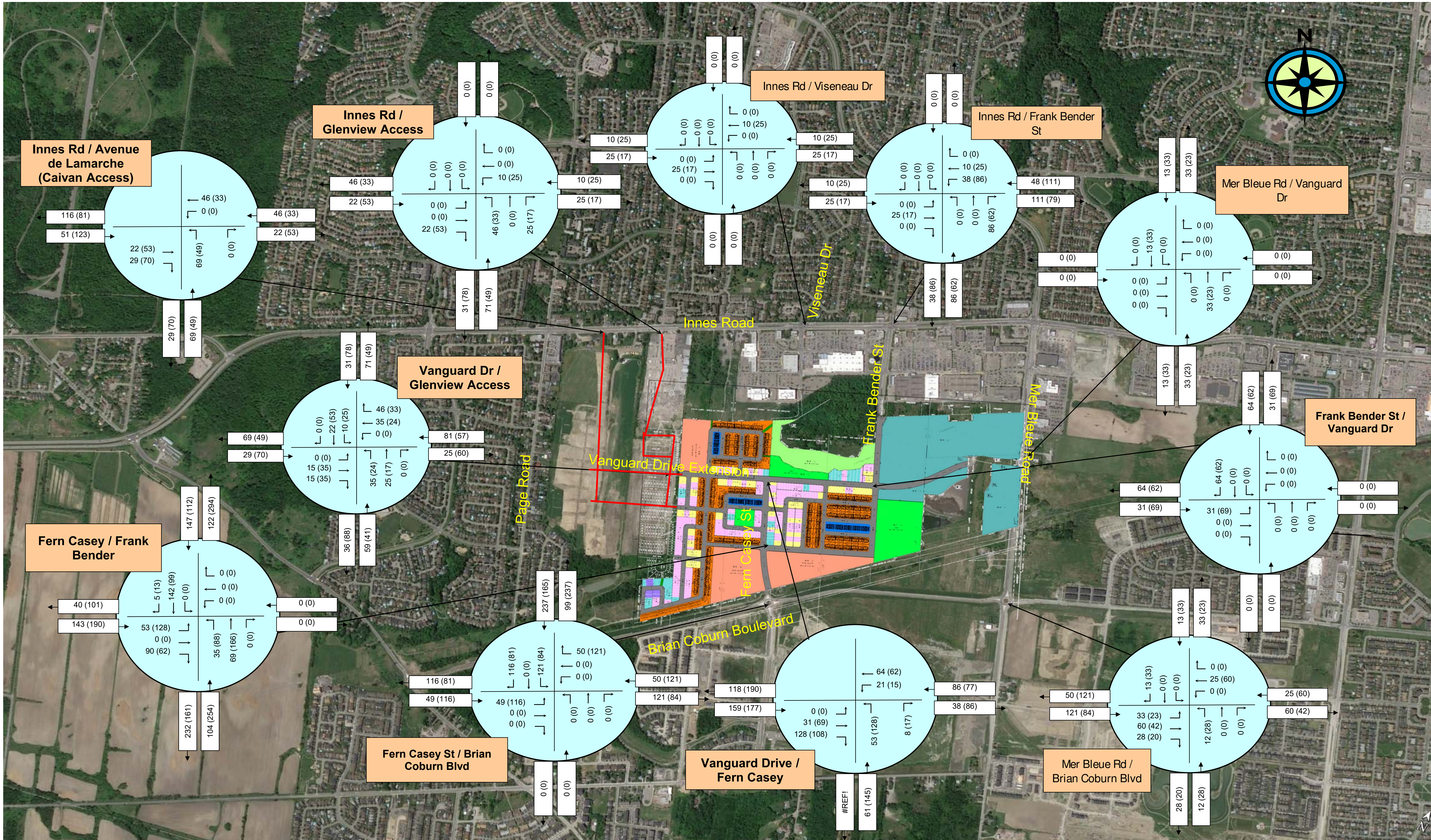
Design Volume Traffic Forecast (2042) - AM (PM) Peak Hour Volumes



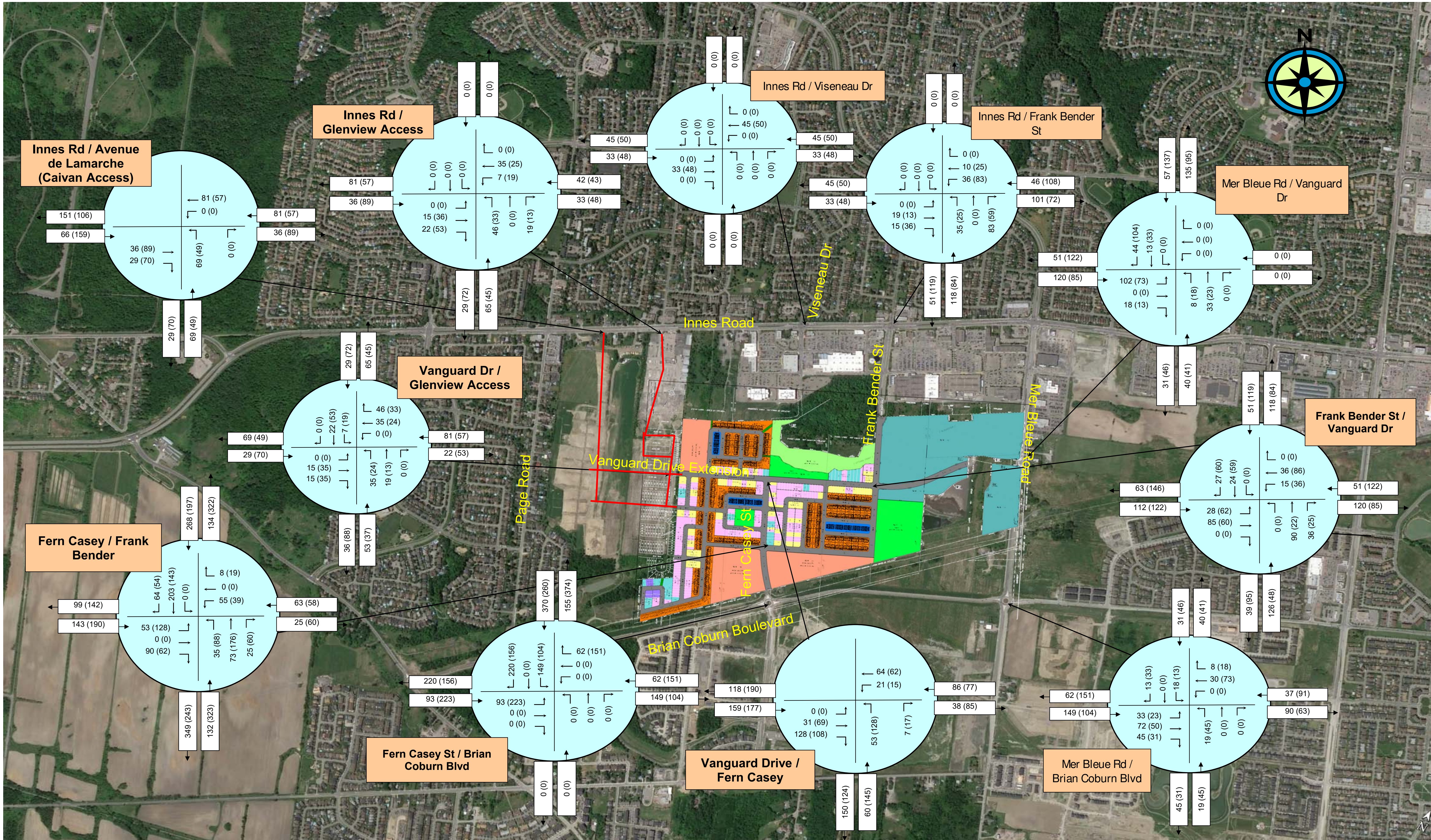
Design Volume Traffic Forecast (2047) - AM (PM) Peak Hour Volumes



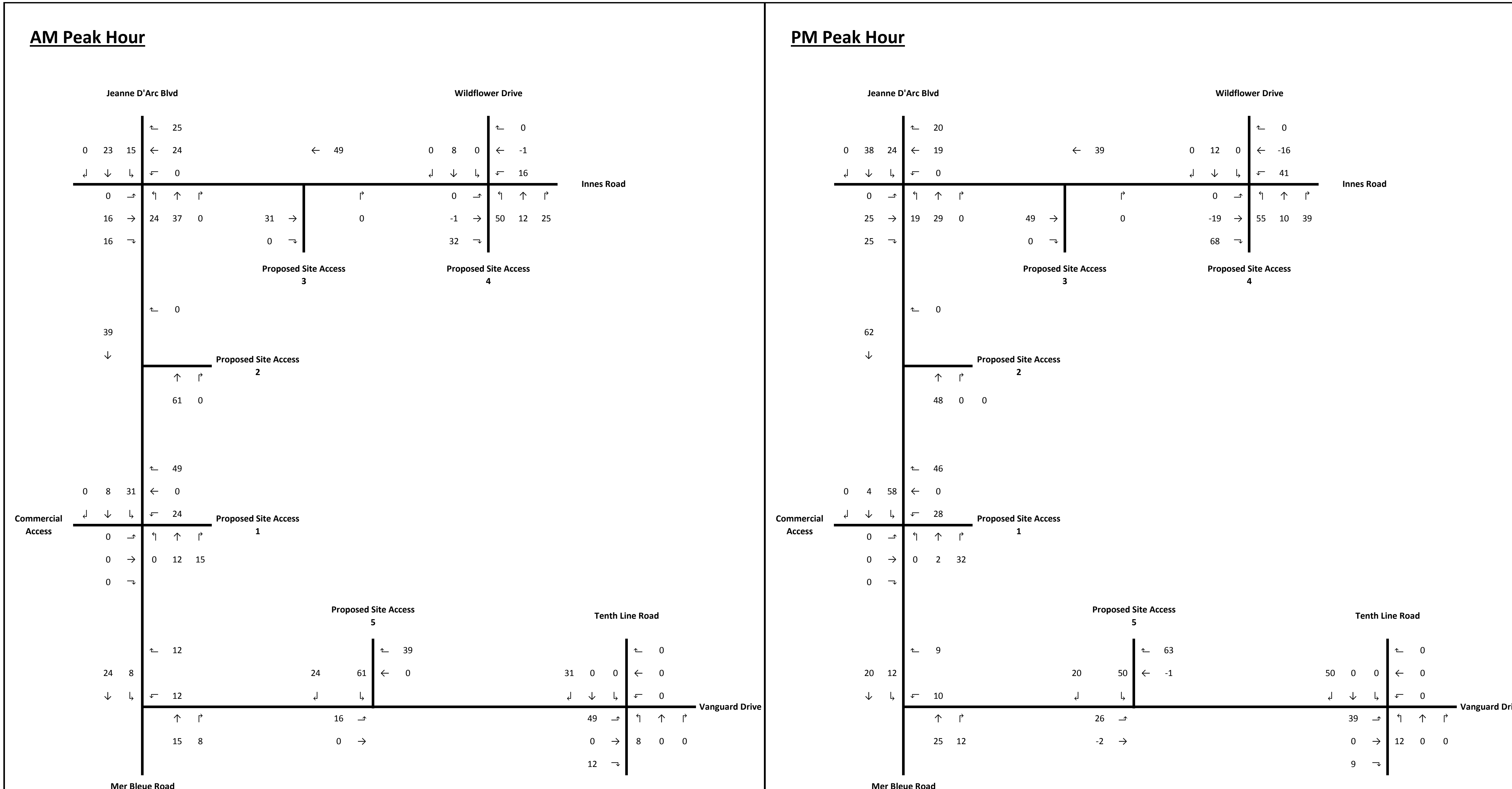
Trailsedge North Phase 1



Trailssedge North Phase 1 & 2



Trailsedge North Phase 1-to-3



SmartREIT
Orleans Development
Figure 8: Net New Site Trips
with the Vanguard Drive Extension

Figure 6: Phase 1 'New' Site-Generated Traffic Volumes

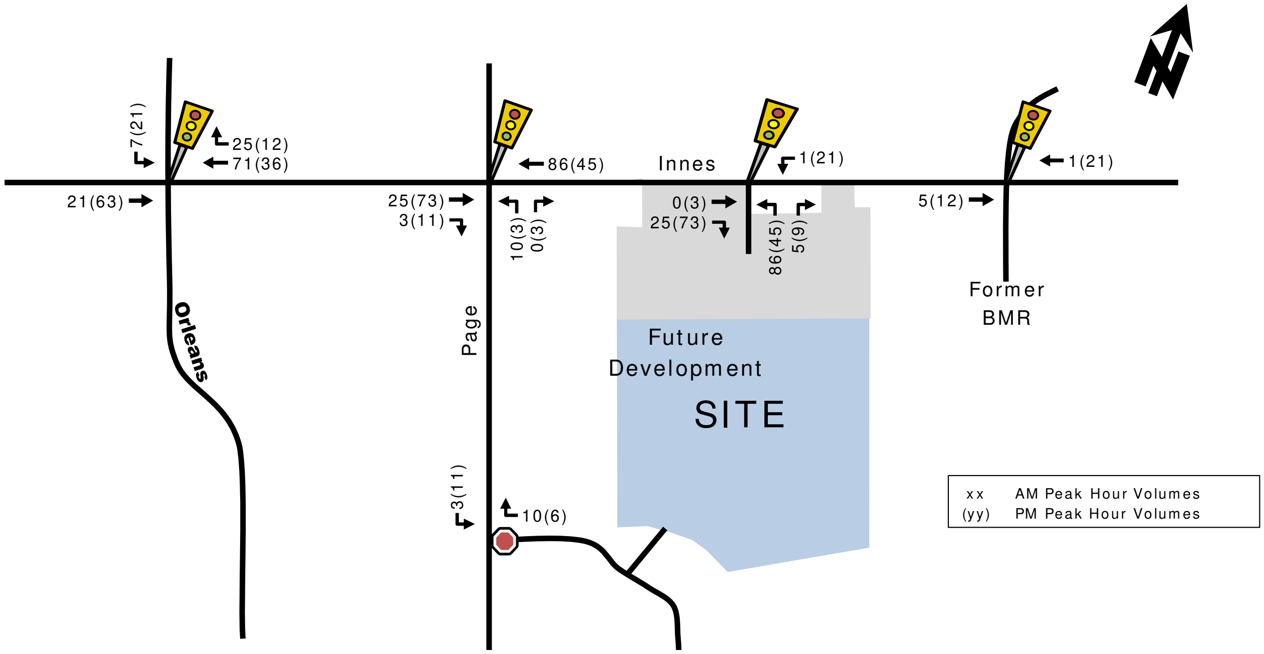


Figure 7: Phases 1 and 2 'New' Site-Generated Traffic Volumes

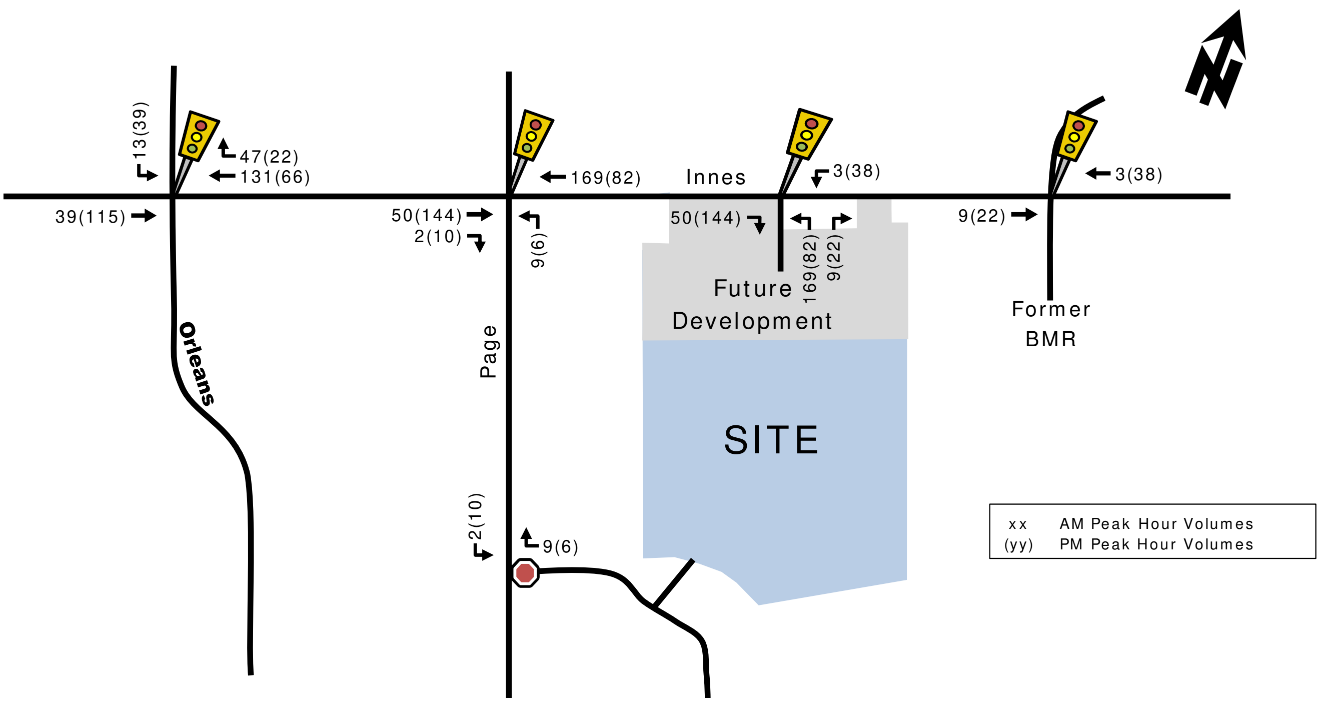
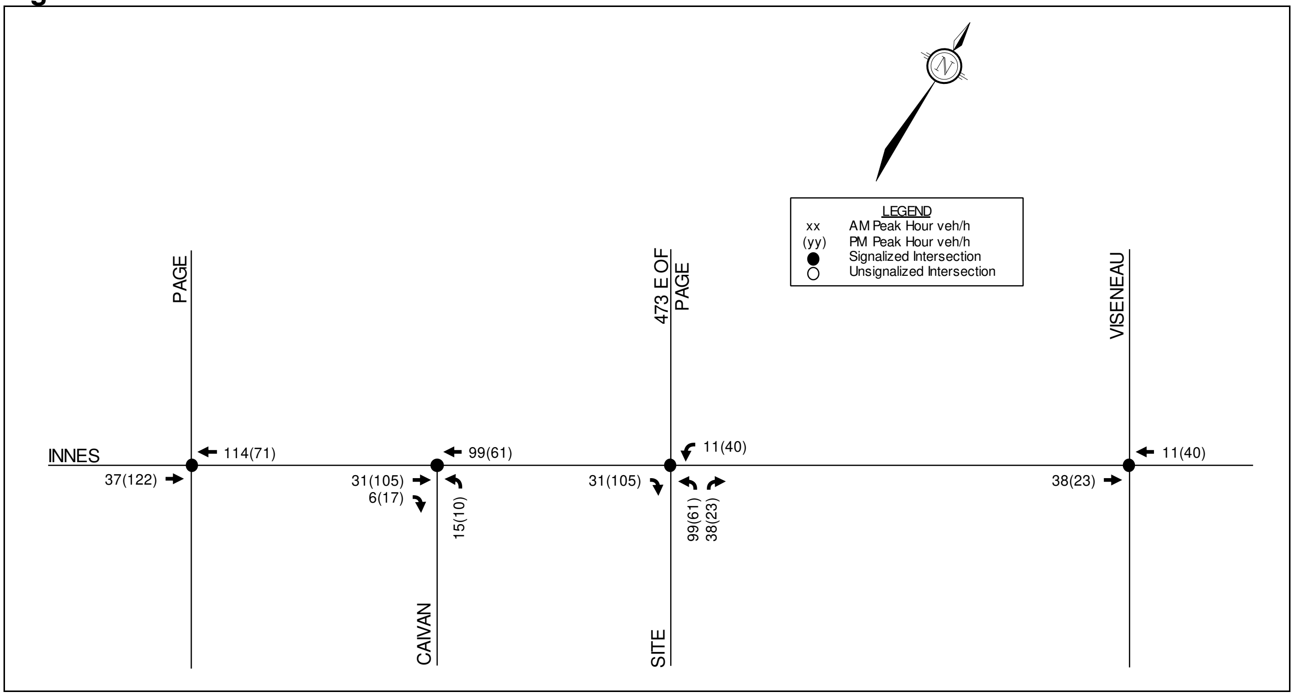


Figure 6: 2023/2028 Site-Generated Traffic



5.2 Background Traffic

5.2.1 General Background Growth Rate

A rate of background growth has been established through a review of the City of Ottawa's 2013 Transportation Master Plan (TMP) and the City's Strategic Long Range Model (comparing snapshots of 2011 and 2031 AM peak hour volumes). Section 2.3 of the TMP projects a 33% growth in the population of the Orléans area between 2011 and 2031, which translates to an annual growth rate of approximately 1.4% per annum. The snapshots indicate traffic volume reductions on Innes Road due to the opening of Brian Coburn Boulevard, which acts as an alternate east-west arterial route. To account for potential developments in the area that are not discussed below, a 1% background growth has been applied to the eastbound and westbound through volumes on Innes Road throughout the study area.

5.2.2 Other Area Developments

Within the study area, multiple developments are anticipated or are in the approval process. The following developments will be added to the background traffic to maintain a conservative analysis. Relevant excerpts of the studies associated with the following developments are included in **Appendix F**.

3443 Innes Road (Six-Storey Mixed-Use Building)
A TIA was prepared by Novatech in December 2017 and later revised in June 2018, in support of a six-storey mixed-use development (Site Plan Application D07-12-17-0169). The development consists of 35 residential units and ground floor commercial units. All trips generated by the development have been added to the background traffic in 2021, 2023, and 2028.

Figure 19: Future Projected Full Buildout Conditions

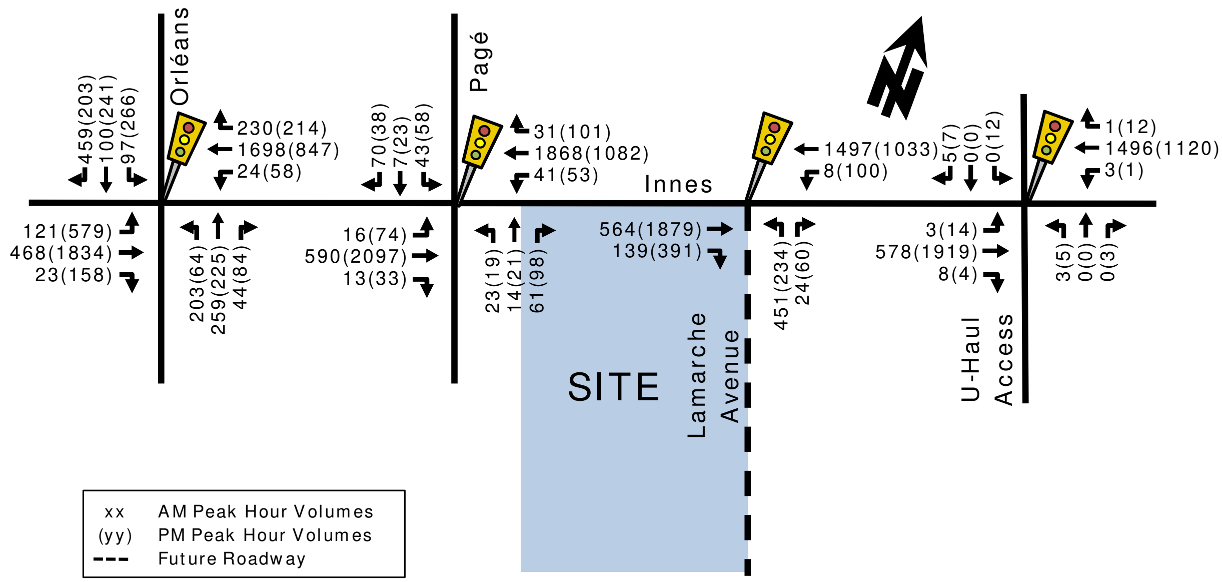


Table 20: Future Projected Full Buildout Operations at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Orléans/Innes	E(F)	0.91(1.24)	WBT(EBT)	31.1(79.2)	D(F)	0.85(1.13)
Pagé/Innes	C(E)	0.75(0.97)	WBT(EBT)	13.0(20.3)	C(E)	0.72(0.91)
U-Haul/Innes	A(C)	0.56(0.74)	WBT(EBT)	5.0(14.9)	A(C)	0.56(0.73)
Lamarche/Innes	D(F)	0.88(1.22)	NBL(WBL)	20.7(15.5)	C(C)	0.77(0.80)
Note: Analysis of signalized intersections assumes a PHF of 1.0 and a saturation flow rate of 1800 veh/h/lane.						

As shown in **Table 20**, all of the intersections within the subject area are projected to operate 'as a whole' at acceptable LoS 'D' or better during the AM peak hour. The U-Haul/Innes and Lamarche/Innes intersections are expected to operate within well in the PM peak hour. However, the Pagé/Innes is projected to approach capacity (LoS 'E') and the Orléans/Innes intersection is projected to exceed capacity (LoS 'F').

To achieve these LoS targets, the Lamarche/Innes intersection will need to be constructed with an EBR turn lane and a WBL. In recent comments, the City of Ottawa agreed that an EBR turn lane has merit and there is sufficient space within the existing right-of-way to accommodate it. Should the WBL movement become permissive-protected, the intersection 'as a whole' would operate with an LoS 'E' and significantly increase the EBT queue. However, the WBL failure would improve to a LoS 'A.'

Timing plans for the intersections were optimized to improve critical turning movements while maintaining existing cycle lengths. No significant change between background and buildout conditions were noted, indicating that the majority of vehicles impacting the operations at the study area intersections were more affected by background growth.

APPENDIX F: INTERSECTION CAPACITY ANALYSIS
EXISTING, 2031 BACKGROUND, 2036 BACKGROUND

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	381	21	28	1477	78	65	16	6	29	29	76
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		160.0	85.0		0.0	85.0		0.0	29.9		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.992				0.850		0.892	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1729	3202	1334	1729	3366	0	1729	1820	1547	1729	1612	0
Flt Permitted	0.077			0.485			0.619			0.746		
Satd. Flow (perm)	140	3202	1334	883	3366	0	1127	1820	1547	1358	1612	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65		9				64		83	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		363.9			255.4			201.8			448.1	
Travel Time (s)		21.8			15.3			14.5			32.3	
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
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Adj. Flow (vph)	57	414	23	30	1605	85	71	17	7	32	32	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	414	23	30	1690	0	71	17	7	32	115	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			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	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26		14	26		14	26		14	26		14
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	8.0	34.6	34.6	12.0	34.4		30.8	30.8	30.8	30.8	30.8	
Total Split (s)	8.0	86.7	86.7	12.0	90.7		31.3	31.3	31.3	31.3	31.3	
Total Split (%)	6.2%	66.7%	66.7%	9.2%	69.8%		24.1%	24.1%	24.1%	24.1%	24.1%	
Yellow Time (s)	3.5	3.7	3.7	3.7	3.5		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	0.5	2.9	2.9	1.0	2.9		3.8	3.8	3.8	3.8	3.8	
Lost Time Adjust (s)	-2.6	-2.6	-2.6	-0.7	-2.4		-2.8	-2.8	-2.8	-2.8	-2.8	
Total Lost Time (s)	1.4	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	None	None	None	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Act Effct Green (s)	89.8	83.3	83.3	89.5	83.7		31.9	31.9	31.9	31.9	31.9	
Actuated g/C Ratio	0.69	0.64	0.64	0.69	0.64		0.25	0.25	0.25	0.25	0.25	
v/c Ratio	0.32	0.20	0.03	0.05	0.78		0.26	0.04	0.02	0.10	0.25	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	9.6	9.9	0.0	1.1	3.5		45.5	41.3	0.0	42.4	16.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	9.6	9.9	0.0	1.1	3.5		45.5	41.3	0.0	42.4	16.2	
LOS	A	A	A	A	A		D	D	A	D	B	
Approach Delay		9.4			3.4			41.4			21.9	
Approach LOS		A			A			D			C	
Queue Length 50th (m)	3.5	22.2	0.0	0.3	9.6		16.1	3.6	0.0	7.0	6.9	
Queue Length 95th (m)	6.9	30.1	0.0	m0.5	12.4		31.2	10.5	0.0	16.4	23.7	
Internal Link Dist (m)		339.9			231.4			177.8			424.1	
Turn Bay Length (m)	60.0		160.0	85.0			85.0			29.9		
Base Capacity (vph)	177	2085	891	664	2247		276	446	427	332	457	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.32	0.20	0.03	0.05	0.75		0.26	0.04	0.02	0.10	0.25	

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 86.7 (67%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 7.2 Intersection LOS: A
Intersection Capacity Utilization 62.9% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Frank Bender & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	369	37	59	1526	33	22	5	39	46	13	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.1		60.0	64.9		0.0	75.0		20.1	0.0		0.0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.997				0.850		0.940	
Flt Protected	0.950			0.950			0.950				0.979	
Satd. Flow (prot)	1394	3172	1419	1729	3345	0	1662	1820	1547	0	1584	0
Flt Permitted	0.087			0.463			0.664				0.881	
Satd. Flow (perm)	128	3172	1419	843	3345	0	1162	1820	1547	0	1426	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			99		4				95		36	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		398.8			363.9			303.9			414.7	
Travel Time (s)		23.9			21.8			21.9			29.9	
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
Heavy Vehicles (%)	24%	9%	9%	0%	3%	6%	4%	0%	0%	6%	0%	7%
Adj. Flow (vph)	12	401	40	64	1659	36	24	5	42	50	14	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	401	40	64	1695	0	24	5	42	0	115	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			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	1.06	1.06	1.06	1.06	1.06	1.06
Turning Speed (k/h)	26		14	26		14	26		14	26		14
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	2	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.3	29.3	29.3	11.3	29.3		33.7	33.7	33.7	33.7	33.7	
Total Split (s)	64.0	64.0	64.0	12.0	76.0		34.0	34.0	34.0	34.0	34.0	
Total Split (%)	58.2%	58.2%	58.2%	10.9%	69.1%		30.9%	30.9%	30.9%	30.9%	30.9%	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	-2.3	-2.3	-2.3	-2.3	-2.3		-2.7	-2.7	-2.7		-2.7	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Recall Mode	None	None	None	None	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Act Effct Green (s)	60.2	60.2	60.2	69.8	69.8		32.2	32.2	32.2		32.2	
Actuated g/C Ratio	0.55	0.55	0.55	0.63	0.63		0.29	0.29	0.29		0.29	
v/c Ratio	0.17	0.23	0.05	0.11	0.80		0.07	0.01	0.08		0.26	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	20.0	13.5	0.1	7.4	18.1		30.5	29.4	0.3		23.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	20.0	13.5	0.1	7.4	18.1		30.5	29.4	0.3		23.1	
LOS	B	B	A	A	B		C	C	A		C	
Approach Delay		12.5			17.7			12.6			23.1	
Approach LOS		B			B			B			C	
Queue Length 50th (m)	1.3	23.3	0.0	4.7	126.7		4.0	0.8	0.0		13.6	
Queue Length 95th (m)	5.8	32.3	0.0	9.5	157.5		10.8	3.8	0.0		29.2	
Internal Link Dist (m)		374.8			339.9			279.9			390.7	
Turn Bay Length (m)	45.1		60.0	64.9			75.0		20.1			
Base Capacity (vph)	70	1750	827	599	2190		339	532	520		443	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.17	0.23	0.05	0.11	0.77		0.07	0.01	0.08		0.26	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 64 (58%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 16.8 Intersection LOS: B
Intersection Capacity Utilization 71.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 4: Viseneau Dr & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	136	1502	117	172	820	45	313	229	92	76	98	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	60.0		160.0	85.0		0.0	85.0		0.0	30.0		0.0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.992				0.850		0.953	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1693	3386	1515	1629	3314	0	1710	1800	1530	1710	1715	0
Flt Permitted	0.304			0.055			0.557			0.397		
Satd. Flow (perm)	542	3386	1515	94	3314	0	1003	1800	1530	715	1715	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			127		10				100		17	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		374.3			265.7			175.2			448.0	
Travel Time (s)		22.5			15.9			12.6			32.3	
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
Heavy Vehicles (%)	1%	1%	1%	5%	2%	9%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	148	1633	127	187	891	49	340	249	100	83	107	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	148	1633	127	187	940	0	340	249	100	83	156	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			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	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	2	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	34.6	34.6	34.6	9.7	34.6		30.8	30.8	30.8	30.8	30.8	
Total Split (s)	75.0	75.0	75.0	20.0	95.0		35.0	35.0	35.0	35.0	35.0	
Total Split (%)	57.7%	57.7%	57.7%	15.4%	73.1%		26.9%	26.9%	26.9%	26.9%	26.9%	
Maximum Green (s)	68.4	68.4	68.4	15.3	88.4		28.2	28.2	28.2	28.2	28.2	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.9	2.9	2.9	1.0	2.9		3.8	3.8	3.8	3.8	3.8	
Lost Time Adjust (s)	-2.6	-2.6	-2.6	-0.7	-2.6		-2.8	-2.8	-2.8	-2.8	-2.8	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0		7.0		7.0	7.0	7.0	7.0	7.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	21.0	21.0	21.0		21.0		17.0	17.0	17.0	17.0	17.0	
Pedestrian Calls (#/hr)	0	0	0		0		0	0	0	0	0	
Act Effct Green (s)	70.0	70.0	70.0	88.5	88.5		33.5	33.5	33.5	33.5	33.5	
Actuated g/C Ratio	0.54	0.54	0.54	0.68	0.68		0.26	0.26	0.26	0.26	0.26	
v/c Ratio	0.51	0.90	0.15	0.80	0.42		1.32	0.54	0.21	0.45	0.34	
Control Delay	26.3	34.5	2.7	61.6	7.7		205.6	47.6	8.5	51.4	38.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	26.3	34.5	2.7	61.6	7.7		205.6	47.6	8.5	51.4	38.4	
LOS	C	C	A	E	A		F	D	A	D	D	
Approach Delay		31.7			16.7			119.9			42.9	
Approach LOS		C			B			F			D	
Queue Length 50th (m)	24.0	195.6	0.0	42.4	39.1		~123.5	59.7	0.0	19.4	31.4	
Queue Length 95th (m)	46.4	234.1	9.5	#69.4	48.5		#185.1	88.9	14.7	38.0	52.8	
Internal Link Dist (m)		350.3			241.7			151.2			424.0	
Turn Bay Length (m)	60.0		160.0	85.0			85.0			30.0		
Base Capacity (vph)	296	1849	885	252	2322		258	464	469	184	454	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.50	0.88	0.14	0.74	0.40		1.32	0.54	0.21	0.45	0.34	

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 75 (58%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.32
Intersection Signal Delay: 43.4 Intersection LOS: D
Intersection Capacity Utilization 93.9% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Frank Bender & Innes Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	1516	87	183	911	84	106	40	179	60	51	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		70.0	65.0		0.0	75.0		20.0	0.0		0.0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.987				0.850		0.971	
Flt Protected	0.950			0.950			0.950				0.979	
Satd. Flow (prot)	1693	3353	1500	1710	3243	0	1710	1800	1530	0	1651	0
Flt Permitted	0.264			0.053			0.599				0.855	
Satd. Flow (perm)	470	3353	1500	95	3243	0	1078	1800	1530	0	1442	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			87		18				195		10	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		373.2			374.3			303.9			414.8	
Travel Time (s)		22.4			22.5			21.9			29.9	
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
Heavy Vehicles (%)	1%	2%	2%	0%	4%	5%	0%	0%	0%	3%	0%	11%
Adj. Flow (vph)	48	1648	95	199	990	91	115	43	195	65	55	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	1648	95	199	1081	0	115	43	195	0	153	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			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	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	2	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	29.6	29.6	29.6	11.3	29.6		34.1	34.1	34.1	34.1	34.1	
Total Split (s)	76.0	76.0	76.0	20.0	96.0		34.1	34.1	34.1	34.1	34.1	
Total Split (%)	58.4%	58.4%	58.4%	15.4%	73.8%		26.2%	26.2%	26.2%	26.2%	26.2%	
Maximum Green (s)	69.7	69.7	69.7	13.7	89.7		27.4	27.4	27.4	27.0	27.0	
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7		3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6		3.4	3.4	3.4	3.8	3.8	
Lost Time Adjust (s)	-2.3	-2.3	-2.3	-2.3	-2.3		-2.7	-2.7	-2.7		-3.1	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0		7.0		7.0	7.0	7.0	7.0	7.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	16.0	16.0	16.0		16.0		20.0	20.0	20.0	20.0	20.0	
Pedestrian Calls (#/hr)	0	0	0		0		0	0	0	0	0	
Act Effct Green (s)	71.0	71.0	71.0	90.3	90.3		31.8	31.8	31.8		31.8	
Actuated g/C Ratio	0.55	0.55	0.55	0.69	0.69		0.24	0.24	0.24		0.24	
v/c Ratio	0.19	0.90	0.11	0.78	0.48		0.44	0.10	0.37		0.42	
Control Delay	16.9	34.4	3.6	53.6	9.6		48.7	40.2	7.6		43.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay	16.9	34.4	3.6	53.6	9.6		48.7	40.2	7.6		43.7	
LOS	B	C	A	D	A		D	D	A		D	
Approach Delay		32.3			16.5			25.0			43.7	
Approach LOS		C			B			C			D	
Queue Length 50th (m)	6.2	197.6	0.9	35.9	59.6		26.9	9.2	0.0		33.3	
Queue Length 95th (m)	14.2	236.6	9.0	#71.7	73.1		47.3	19.8	19.8		55.8	
Internal Link Dist (m)		349.2			350.3			279.9			390.8	
Turn Bay Length (m)	45.0		70.0	65.0			75.0		20.0			
Base Capacity (vph)	260	1855	868	264	2298		263	440	521		360	
Starvation Cap Reductn	0	0	0	0	0		0	0	0		0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0		0	
Storage Cap Reductn	0	0	0	0	0		0	0	0		0	
Reduced v/c Ratio	0.18	0.89	0.11	0.75	0.47		0.44	0.10	0.37		0.42	

Intersection Summary

Area Type: Other
Cycle Length: 130.1
Actuated Cycle Length: 130.1
Offset: 50.9 (39%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 26.4 Intersection LOS: C
Intersection Capacity Utilization 79.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Viseneau Dr & Innes Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	535	23	31	1736	87	72	18	7	32	32	84
Future Volume (vph)	58	535	23	31	1736	87	72	18	7	32	32	84
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	1729	3369		1695	1820	1517	1729	1611	
Flt Permitted	0.07	1.00	1.00	0.45	1.00		0.65	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	133	3202	1334	824	3369		1165	1820	1517	1357	1611	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	58	535	23	31	1736	87	72	18	7	32	32	84
RTOR Reduction (vph)	0	0	7	0	2	0	0	0	6	0	75	0
Lane Group Flow (vph)	58	535	16	31	1821	0	72	18	1	32	41	0
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	2%	0%	2%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	90.4	85.0	85.0	88.1	84.3		13.1	13.1	13.1	13.1	13.1	
Effective Green, g (s)	90.4	85.0	85.0	88.1	84.3		13.1	13.1	13.1	13.1	13.1	
Actuated g/C Ratio	0.75	0.71	0.71	0.73	0.70		0.11	0.11	0.11	0.11	0.11	
Clearance Time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	172	2268	944	633	2366		127	198	165	148	175	
v/s Ratio Prot	c0.02	0.17		0.00	c0.54			0.01			0.03	
v/s Ratio Perm	0.24		0.01	0.03			c0.06		0.00	0.02		
v/c Ratio	0.34	0.24	0.02	0.05	0.77		0.57	0.09	0.00	0.22	0.24	
Uniform Delay, d1	10.7	6.1	5.2	4.3	11.6		50.8	48.1	47.6	48.8	48.9	
Progression Factor	3.30	2.20	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.2	0.0	0.0	2.5		5.7	0.2	0.0	0.7	0.7	
Delay (s)	36.6	13.7	5.2	4.3	14.0		56.5	48.3	47.7	49.5	49.6	
Level of Service	D	B	A	A	B		E	D	D	D	D	
Approach Delay (s)		15.5			13.9			54.3			49.6	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	522	41	66	1679	37	24	5	43	51	12	52
Future Volume (vph)	12	522	41	66	1679	37	24	5	43	51	12	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1393	3172	1373	1725	3342		1654	1820	1518		1562	
Flt Permitted	0.12	1.00	1.00	0.42	1.00		0.63	1.00	1.00		0.85	
Satd. Flow (perm)	183	3172	1373	768	3342		1101	1820	1518		1365	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	12	522	41	66	1679	37	24	5	43	51	12	52
RTOR Reduction (vph)	0	0	13	0	1	0	0	0	38	0	28	0
Lane Group Flow (vph)	12	522	28	66	1715	0	24	5	5	0	87	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Heavy Vehicles (%)	24%	9%	9%	0%	3%	6%	4%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	81.7	81.7	81.7	93.5	93.5		13.5	13.5	13.5		13.5	
Effective Green, g (s)	81.7	81.7	81.7	93.5	93.5		13.5	13.5	13.5		13.5	
Actuated g/C Ratio	0.68	0.68	0.68	0.78	0.78		0.11	0.11	0.11		0.11	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	124	2159	934	642	2603		123	204	170		153	
v/s Ratio Prot		0.16		0.00	c0.51			0.00				
v/s Ratio Perm	0.07		0.02	0.08			0.02		0.00		c0.06	
v/c Ratio	0.10	0.24	0.03	0.10	0.66		0.20	0.02	0.03		0.57	
Uniform Delay, d1	6.5	7.3	6.2	3.3	6.0		48.3	47.4	47.4		50.5	
Progression Factor	0.55	0.66	1.00	0.43	0.33		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	0.3	0.1	0.0	0.9		0.8	0.0	0.1		4.7	
Delay (s)	5.1	5.1	6.3	1.4	2.9		49.1	47.4	47.5		55.2	
Level of Service	A	A	A	A	A		D	D	D		E	
Approach Delay (s)		5.2			2.8			48.0			55.2	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	616	49	12	1536	3	97	0	36	0	0	6
Future Volume (vph)	3	616	49	12	1536	3	97	0	36	0	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1503	3143		1695	3389		1712	1532			1499	
Flt Permitted	0.12	1.00		0.39	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	187	3143		687	3389		1358	1532			1499	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	616	49	12	1536	3	97	0	36	0	0	6
RTOR Reduction (vph)	0	5	0	0	0	0	0	29	0	0	5	0
Lane Group Flow (vph)	3	660	0	12	1539	0	97	7	0	0	1	0
Heavy Vehicles (%)	15%	8%	19%	2%	2%	0%	1%	0%	1%	0%	0%	5%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	82.9	82.9		82.9	82.9		24.7	24.7			24.7	
Effective Green, g (s)	82.9	82.9		82.9	82.9		24.7	24.7			24.7	
Actuated g/C Ratio	0.69	0.69		0.69	0.69		0.21	0.21			0.21	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	129	2171		474	2341		279	315			308	
v/s Ratio Prot		0.21			c0.45			0.00			0.00	
v/s Ratio Perm	0.02			0.02			c0.07					
v/c Ratio	0.02	0.30		0.03	0.66		0.35	0.02			0.00	
Uniform Delay, d1	5.8	7.3		5.8	10.5		40.8	38.0			37.9	
Progression Factor	0.04	0.15		1.34	0.87		1.00	1.00			1.00	
Incremental Delay, d2	0.3	0.3		0.1	1.1		3.4	0.1			0.0	
Delay (s)	0.6	1.4		7.9	10.2		44.2	38.2			37.9	
Level of Service	A	A		A	B		D	D			D	
Approach Delay (s)		1.4			10.2			42.5			37.9	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	646	132	8	1632	428	23
Future Volume (vph)	646	132	8	1632	428	23
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3262	1532	1712	3390	1712	1532
Flt Permitted	1.00	1.00	0.34	1.00	0.95	1.00
Satd. Flow (perm)	3262	1532	609	3390	1712	1532
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	646	132	8	1632	428	23
RTOR Reduction (vph)	0	58	0	0	0	16
Lane Group Flow (vph)	646	74	8	1632	428	7
Heavy Vehicles (%)	6%	1%	1%	2%	1%	1%
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	67.0	67.0	73.8	73.8	34.2	34.2
Effective Green, g (s)	67.0	67.0	73.8	73.8	34.2	34.2
Actuated g/C Ratio	0.56	0.56	0.61	0.61	0.29	0.29
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1821	855	381	2084	487	436
v/s Ratio Prot	0.20		0.00	c0.48		
v/s Ratio Perm		0.05	0.01		c0.25	0.00
v/c Ratio	0.35	0.09	0.02	0.78	0.88	0.02
Uniform Delay, d1	14.6	12.3	9.6	17.2	40.9	30.8
Progression Factor	1.00	1.00	1.29	1.04	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.0	2.3	16.3	0.0
Delay (s)	15.1	12.5	12.4	20.2	57.3	30.8
Level of Service	B	B	B	C	E	C
Approach Delay (s)	14.7			20.2	55.9	
Approach LOS	B			C	E	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	151	1832	130	191	1143	50	348	255	102	84	109	53
Future Volume (vph)	151	1832	130	191	1143	50	348	255	102	84	109	53
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.6	6.6	6.6	4.7	6.6		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1693	3386	1515	1629	3322		1710	1800	1530	1710	1712	
Flt Permitted	0.21	1.00	1.00	0.06	1.00		0.62	1.00	1.00	0.46	1.00	
Satd. Flow (perm)	378	3386	1515	104	3322		1115	1800	1530	837	1712	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	151	1832	130	191	1143	50	348	255	102	84	109	53
RTOR Reduction (vph)	0	0	63	0	3	0	0	0	74	0	14	0
Lane Group Flow (vph)	151	1832	67	191	1190	0	348	255	28	84	148	0
Heavy Vehicles (%)	1%	1%	1%	5%	2%	9%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	61.4	61.4	61.4	73.4	73.4		33.2	33.2	33.2	33.2	33.2	
Effective Green, g (s)	61.4	61.4	61.4	73.4	73.4		33.2	33.2	33.2	33.2	33.2	
Actuated g/C Ratio	0.51	0.51	0.51	0.61	0.61		0.28	0.28	0.28	0.28	0.28	
Clearance Time (s)	6.6	6.6	6.6	4.7	6.6		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	193	1732	775	156	2031		308	498	423	231	473	
v/s Ratio Prot		0.54		c0.07	0.36			0.14			0.09	
v/s Ratio Perm	0.40		0.04	c0.67			c0.31		0.02	0.10		
v/c Ratio	0.78	1.06	0.09	1.22	0.59		1.13	0.51	0.07	0.36	0.31	
Uniform Delay, d1	23.9	29.3	15.0	37.2	14.1		43.4	36.6	32.0	34.9	34.4	
Progression Factor	1.42	1.47	2.79	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.5	33.4	0.1	144.9	1.2		91.1	0.9	0.1	1.0	0.4	
Delay (s)	48.4	76.3	41.9	182.1	15.4		134.5	37.5	32.0	35.9	34.7	
Level of Service	D	E	D	F	B		F	D	C	D	C	
Approach Delay (s)		72.2			38.4			84.6			35.1	
Approach LOS		E			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	61.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1781	97	203	980	93	118	38	199	67	48	33
Future Volume (vph)	49	1781	97	203	980	93	118	38	199	67	48	33
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		7.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1693	3353	1500	1710	3243		1710	1800	1530		1645	
Flt Permitted	0.27	1.00	1.00	0.05	1.00		0.60	1.00	1.00		0.84	
Satd. Flow (perm)	475	3353	1500	98	3243		1087	1800	1530		1406	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	1781	97	203	980	93	118	38	199	67	48	33
RTOR Reduction (vph)	0	0	42	0	5	0	0	0	137	0	9	0
Lane Group Flow (vph)	49	1781	55	203	1068	0	118	38	62	0	139	0
Heavy Vehicles (%)	1%	2%	2%	0%	4%	5%	0%	0%	0%	3%	0%	11%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	67.4	67.4	67.4	89.3	89.3		17.7	17.7	17.7		17.3	
Effective Green, g (s)	67.4	67.4	67.4	89.3	89.3		17.7	17.7	17.7		17.3	
Actuated g/C Ratio	0.56	0.56	0.56	0.74	0.74		0.15	0.15	0.15		0.14	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		7.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	266	1883	842	282	2413		160	265	225		202	
v/s Ratio Prot		c0.53		c0.09	0.33			0.02				
v/s Ratio Perm	0.10		0.04	0.44			c0.11		0.04		0.10	
v/c Ratio	0.18	0.95	0.07	0.72	0.44		0.74	0.14	0.27		0.69	
Uniform Delay, d1	12.9	24.6	12.0	36.6	5.9		48.9	44.5	45.4		48.8	
Progression Factor	1.00	1.00	1.00	0.64	1.38		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	11.4	0.2	6.1	0.4		16.2	0.2	0.7		9.3	
Delay (s)	14.4	36.0	12.1	29.5	8.5		65.1	44.8	46.1		58.1	
Level of Service	B	D	B	C	A		E	D	D		E	
Approach Delay (s)		34.2			11.9			52.3			58.1	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.7
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	1935	150	70	1169	13	87	0	49	13	0	8
Future Volume (vph)	16	1935	150	70	1169	13	87	0	49	13	0	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1710	3317		1676	3249		1676	1500			1656	
Flt Permitted	0.20	1.00		0.05	1.00		0.74	1.00			0.86	
Satd. Flow (perm)	359	3317		94	3249		1312	1500			1462	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	16	1935	150	70	1169	13	87	0	49	13	0	8
RTOR Reduction (vph)	0	5	0	0	1	0	0	25	0	0	17	0
Lane Group Flow (vph)	16	2080	0	70	1181	0	87	24	0	0	4	0
Heavy Vehicles (%)	0%	2%	2%	2%	5%	12%	2%	0%	2%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	74.9	74.9		74.9	74.9		22.7	22.7			22.7	
Effective Green, g (s)	74.9	74.9		74.9	74.9		22.7	22.7			22.7	
Actuated g/C Ratio	0.68	0.68		0.68	0.68		0.21	0.21			0.21	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	244	2258		64	2212		270	309			301	
v/s Ratio Prot		0.63			0.36			0.02				
v/s Ratio Perm	0.04			c0.74			c0.07				0.00	
v/c Ratio	0.07	0.92		1.09	0.53		0.32	0.08			0.01	
Uniform Delay, d1	5.9	15.0		17.5	8.8		37.1	35.2			34.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.5	7.7		140.6	0.9		3.1	0.5			0.1	
Delay (s)	6.4	22.7		158.2	9.7		40.2	35.7			34.8	
Level of Service	A	C		F	A		D	D			C	
Approach Delay (s)		22.6			18.0			38.6			34.8	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	2044	371	95	1156	222	57
Future Volume (vph)	2044	371	95	1156	222	57
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3353	1515	1693	3257	1693	1515
Flt Permitted	1.00	1.00	0.06	1.00	0.95	1.00
Satd. Flow (perm)	3353	1515	114	3257	1693	1515
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2044	371	95	1156	222	57
RTOR Reduction (vph)	0	95	0	0	0	48
Lane Group Flow (vph)	2044	276	95	1156	222	9
Heavy Vehicles (%)	2%	1%	1%	5%	1%	1%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	58.3	58.3	66.2	66.2	14.8	14.8
Effective Green, g (s)	58.3	58.3	66.2	66.2	14.8	14.8
Actuated g/C Ratio	0.65	0.65	0.74	0.74	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2171	981	143	2395	278	249
v/s Ratio Prot	c0.61		0.03	c0.35	c0.13	
v/s Ratio Perm		0.18	0.46			0.01
v/c Ratio	0.94	0.28	0.66	0.48	0.80	0.04
Uniform Delay, d1	14.3	6.8	18.9	4.9	36.2	31.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.7	0.7	11.1	0.7	14.7	0.1
Delay (s)	24.1	7.5	30.0	5.6	50.9	31.7
Level of Service	C	A	C	A	D	C
Approach Delay (s)	21.5			7.4	47.0	
Approach LOS	C			A	D	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	572	25	34	1876	94	78	19	7	35	35	92
Future Volume (vph)	63	572	25	34	1876	94	78	19	7	35	35	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3232	1357	1729	3369		1729	1820	1547	1729	1611	
Flt Permitted	0.05	1.00	1.00	0.42	1.00		0.64	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	87	3232	1357	757	3369		1168	1820	1547	1356	1611	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	63	572	25	34	1876	94	78	19	7	35	35	92
RTOR Reduction (vph)	0	0	9	0	3	0	0	0	6	0	58	0
Lane Group Flow (vph)	63	572	16	34	1967	0	78	19	1	35	69	0
Heavy Vehicles (%)	0%	7%	14%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	86.8	83.6	83.6	89.1	85.2		24.4	24.4	24.4	24.4	24.4	
Effective Green, g (s)	86.8	83.6	83.6	89.1	85.2		24.4	24.4	24.4	24.4	24.4	
Actuated g/C Ratio	0.67	0.64	0.64	0.69	0.66		0.19	0.19	0.19	0.19	0.19	
Clearance Time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	98	2078	872	547	2207		219	341	290	254	302	
v/s Ratio Prot	c0.02	0.18		0.00	c0.58			0.01			0.04	
v/s Ratio Perm	0.41		0.01	0.04			c0.07		0.00	0.03		
v/c Ratio	0.64	0.28	0.02	0.06	0.89		0.36	0.06	0.00	0.14	0.23	
Uniform Delay, d1	22.2	10.1	8.4	6.6	18.6		46.0	43.3	42.9	44.0	44.8	
Progression Factor	1.79	0.82	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.3	0.3	0.0	0.0	6.0		4.5	0.3	0.0	1.1	1.7	
Delay (s)	53.0	8.6	8.4	6.7	24.5		50.4	43.7	43.0	45.2	46.5	
Level of Service	D	A	A	A	C		D	D	D	D	D	
Approach Delay (s)		12.8			24.2			48.7			46.2	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	557	45	71	1815	40	27	5	47	55	12	57
Future Volume (vph)	13	557	45	71	1815	40	27	5	47	55	12	57
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1394	3202	1459	1729	3376		1662	1820	1547		1577	
Flt Permitted	0.10	1.00	1.00	0.41	1.00		0.60	1.00	1.00		0.85	
Satd. Flow (perm)	148	3202	1459	742	3376		1050	1820	1547		1378	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	557	45	71	1815	40	27	5	47	55	12	57
RTOR Reduction (vph)	0	0	14	0	1	0	0	0	42	0	27	0
Lane Group Flow (vph)	13	557	31	71	1854	0	27	5	5	0	97	0
Heavy Vehicles (%)	24%	8%	6%	0%	2%	6%	4%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	90.2	90.2	90.2	102.1	102.1		14.9	14.9	14.9		14.9	
Effective Green, g (s)	90.2	90.2	90.2	102.1	102.1		14.9	14.9	14.9		14.9	
Actuated g/C Ratio	0.69	0.69	0.69	0.79	0.79		0.11	0.11	0.11		0.11	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	102	2221	1012	625	2651		120	208	177		157	
v/s Ratio Prot		0.17		0.00	c0.55			0.00				
v/s Ratio Perm	0.09		0.02	0.08			0.03		0.00		c0.07	
v/c Ratio	0.13	0.25	0.03	0.11	0.70		0.23	0.02	0.03		0.62	
Uniform Delay, d1	6.7	7.4	6.2	3.4	6.6		52.3	51.1	51.1		54.9	
Progression Factor	0.64	0.43	6.77	0.69	0.52		1.00	1.00	1.00		1.00	
Incremental Delay, d2	2.5	0.3	0.1	0.0	0.8		1.0	0.0	0.1		7.4	
Delay (s)	6.7	3.5	42.2	2.4	4.2		53.3	51.1	51.2		62.3	
Level of Service	A	A	D	A	A		D	D	D		E	
Approach Delay (s)		6.4			4.2			51.9			62.3	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	662	50	12	1660	12	98	0	36	0	0	6
Future Volume (vph)	4	662	50	12	1660	12	98	0	36	0	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1478	3061		1281	3354		1168	1031			1050	
Flt Permitted	0.11	1.00		0.37	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	171	3061		502	3354		927	1031			1050	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	662	50	12	1660	12	98	0	36	0	0	6
RTOR Reduction (vph)	0	3	0	0	0	0	0	31	0	0	5	0
Lane Group Flow (vph)	4	709	0	12	1672	0	98	5	0	0	1	0
Heavy Vehicles (%)	17%	11%	22%	35%	3%	0%	48%	0%	50%	0%	0%	50%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	98.6	98.6		98.6	98.6		19.0	19.0			19.0	
Effective Green, g (s)	98.6	98.6		98.6	98.6		19.0	19.0			19.0	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.15	0.15			0.15	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	129	2321		380	2543		135	150			153	
v/s Ratio Prot		0.23			c0.50			0.01			0.00	
v/s Ratio Perm	0.02			0.02			c0.11					
v/c Ratio	0.03	0.31		0.03	0.66		0.73	0.04			0.01	
Uniform Delay, d1	3.9	4.9		3.9	7.6		53.0	47.6			47.4	
Progression Factor	1.01	1.09		0.25	0.32		1.00	1.00			1.00	
Incremental Delay, d2	0.4	0.3		0.1	1.0		17.6	0.1			0.0	
Delay (s)	4.3	5.7		1.1	3.4		70.6	47.7			47.4	
Level of Service	A	A		A	A		E	D			D	
Approach Delay (s)		5.7			3.3			64.4			47.4	
Approach LOS		A			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	693	132	8	1757	428	23
Future Volume (vph)	693	132	8	1757	428	23
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3202	1532	1712	3390	1712	1532
Flt Permitted	1.00	1.00	0.32	1.00	0.95	1.00
Satd. Flow (perm)	3202	1532	572	3390	1712	1532
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	693	132	8	1757	428	23
RTOR Reduction (vph)	0	58	0	0	0	15
Lane Group Flow (vph)	693	74	8	1757	428	8
Heavy Vehicles (%)	8%	1%	1%	2%	1%	1%
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	73.1	73.1	79.9	79.9	38.1	38.1
Effective Green, g (s)	73.1	73.1	79.9	79.9	38.1	38.1
Actuated g/C Ratio	0.56	0.56	0.61	0.61	0.29	0.29
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1800	861	358	2083	501	448
v/s Ratio Prot	0.22		0.00	c0.52		
v/s Ratio Perm		0.05	0.01		c0.25	0.01
v/c Ratio	0.39	0.09	0.02	0.84	0.85	0.02
Uniform Delay, d1	15.9	13.1	10.5	20.0	43.3	32.7
Progression Factor	1.00	1.00	0.65	1.16	1.00	1.00
Incremental Delay, d2	0.6	0.2	0.0	3.4	13.3	0.0
Delay (s)	16.5	13.3	6.9	26.6	56.6	32.7
Level of Service	B	B	A	C	E	C
Approach Delay (s)	16.0			26.5	55.4	
Approach LOS	B			C	E	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	1975	141	208	1221	54	378	276	111	92	118	54
Future Volume (vph)	164	1975	141	208	1221	54	378	276	111	92	118	54
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.6	6.6	6.6	4.7	6.6		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1693	3386	1515	1629	3322		1710	1800	1530	1710	1715	
Flt Permitted	0.18	1.00	1.00	0.06	1.00		0.60	1.00	1.00	0.44	1.00	
Satd. Flow (perm)	322	3386	1515	98	3322		1079	1800	1530	789	1715	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	164	1975	141	208	1221	54	378	276	111	92	118	54
RTOR Reduction (vph)	0	0	70	0	2	0	0	0	78	0	13	0
Lane Group Flow (vph)	164	1975	71	208	1273	0	378	276	33	92	159	0
Heavy Vehicles (%)	1%	1%	1%	5%	2%	9%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	65.4	65.4	65.4	78.4	78.4		38.2	38.2	38.2	38.2	38.2	
Effective Green, g (s)	65.4	65.4	65.4	78.4	78.4		38.2	38.2	38.2	38.2	38.2	
Actuated g/C Ratio	0.50	0.50	0.50	0.60	0.60		0.29	0.29	0.29	0.29	0.29	
Clearance Time (s)	6.6	6.6	6.6	4.7	6.6		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	161	1703	762	156	2003		317	528	449	231	503	
v/s Ratio Prot		0.58		c0.08	0.38			0.15			0.09	
v/s Ratio Perm	0.51		0.05	c0.72			c0.35		0.02	0.12		
v/c Ratio	1.02	1.16	0.09	1.33	0.64		1.19	0.52	0.07	0.40	0.32	
Uniform Delay, d1	32.3	32.3	16.8	41.3	16.6		45.9	38.3	33.1	36.7	35.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	75.9	78.9	0.2	187.0	1.6		113.4	0.9	0.1	1.1	0.4	
Delay (s)	108.2	111.2	17.1	228.3	18.2		159.3	39.2	33.2	37.8	36.1	
Level of Service	F	F	B	F	B		F	D	C	D	D	
Approach Delay (s)		105.1			47.6			97.7			36.7	
Approach LOS		F			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	82.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	122.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	1919	105	221	1044	101	128	38	216	72	48	36
Future Volume (vph)	53	1919	105	221	1044	101	128	38	216	72	48	36
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		7.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1693	3353	1500	1710	3242		1710	1800	1530		1640	
Flt Permitted	0.22	1.00	1.00	0.04	1.00		0.58	1.00	1.00		0.83	
Satd. Flow (perm)	387	3353	1500	78	3242		1047	1800	1530		1399	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	53	1919	105	221	1044	101	128	38	216	72	48	36
RTOR Reduction (vph)	0	0	31	0	4	0	0	0	144	0	9	0
Lane Group Flow (vph)	53	1919	74	221	1141	0	128	38	72	0	147	0
Heavy Vehicles (%)	1%	2%	2%	0%	4%	5%	0%	0%	0%	3%	0%	11%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	86.1	86.1	86.1	106.1	106.1		20.9	20.9	20.9		20.5	
Effective Green, g (s)	86.1	86.1	86.1	106.1	106.1		20.9	20.9	20.9		20.5	
Actuated g/C Ratio	0.61	0.61	0.61	0.76	0.76		0.15	0.15	0.15		0.15	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		7.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	238	2062	922	218	2456		156	268	228		204	
v/s Ratio Prot		0.57		c0.10	0.35			0.02				
v/s Ratio Perm	0.14		0.05	c0.67			c0.12		0.05		0.11	
v/c Ratio	0.22	0.93	0.08	1.01	0.46		0.82	0.14	0.32		0.72	
Uniform Delay, d1	12.0	24.3	10.9	48.2	6.3		57.7	51.8	53.2		57.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	2.2	9.1	0.2	64.5	0.6		27.9	0.2	0.8		11.9	
Delay (s)	14.2	33.3	11.1	112.7	7.0		85.6	52.0	54.0		69.0	
Level of Service	B	C	B	F	A		F	D	D		E	
Approach Delay (s)		31.7			24.1			64.4			69.0	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	19.7
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	2091	150	70	1255	14	88	0	49	14	0	8
Future Volume (vph)	17	2091	150	70	1255	14	88	0	49	14	0	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1710	3321		1693	3280		1693	1515			1659	
Flt Permitted	0.20	1.00		0.05	1.00		0.74	1.00			0.81	
Satd. Flow (perm)	357	3321		82	3280		1324	1515			1381	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	2091	150	70	1255	14	88	0	49	14	0	8
RTOR Reduction (vph)	0	3	0	0	0	0	0	23	0	0	20	0
Lane Group Flow (vph)	17	2238	0	70	1269	0	88	26	0	0	2	0
Heavy Vehicles (%)	0%	2%	1%	1%	4%	12%	1%	0%	1%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	103.3	103.3		103.3	103.3		14.3	14.3			14.3	
Effective Green, g (s)	103.3	103.3		103.3	103.3		14.3	14.3			14.3	
Actuated g/C Ratio	0.79	0.79		0.79	0.79		0.11	0.11			0.11	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	283	2638		65	2606		145	166			151	
v/s Ratio Prot		0.67			0.39			0.02				
v/s Ratio Perm	0.05			c0.86			c0.07				0.00	
v/c Ratio	0.06	0.85		1.08	0.49		0.61	0.16			0.02	
Uniform Delay, d1	2.9	8.4		13.4	4.5		55.2	52.4			51.6	
Progression Factor	0.06	0.15		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.2	1.5		134.4	0.7		7.0	0.4			0.0	
Delay (s)	0.3	2.7		147.8	5.1		62.2	52.8			51.6	
Level of Service	A	A		F	A		E	D			D	
Approach Delay (s)		2.7			12.6			58.8			51.6	
Approach LOS		A			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	2201	371	95	1241	222	57
Future Volume (vph)	2201	371	95	1241	222	57
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3353	1500	1676	3353	1676	1500
Flt Permitted	1.00	1.00	0.04	1.00	0.95	1.00
Satd. Flow (perm)	3353	1500	73	3353	1676	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2201	371	95	1241	222	57
RTOR Reduction (vph)	0	64	0	0	0	49
Lane Group Flow (vph)	2201	307	95	1241	222	8
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	91.7	91.7	102.0	102.0	19.0	19.0
Effective Green, g (s)	91.7	91.7	102.0	102.0	19.0	19.0
Actuated g/C Ratio	0.71	0.71	0.78	0.78	0.15	0.15
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2365	1058	128	2630	244	219
v/s Ratio Prot	c0.66		c0.03	0.37	c0.13	
v/s Ratio Perm		0.20	0.54			0.01
v/c Ratio	0.93	0.29	0.74	0.47	0.91	0.04
Uniform Delay, d1	16.4	7.1	36.2	4.8	54.7	47.7
Progression Factor	1.00	1.00	1.43	0.83	1.00	1.00
Incremental Delay, d2	8.1	0.7	18.6	0.5	34.0	0.1
Delay (s)	24.5	7.8	70.5	4.5	88.7	47.7
Level of Service	C	A	E	A	F	D
Approach Delay (s)	22.1			9.2	80.3	
Approach LOS	C			A	F	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: Existing 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	66	2.0	0.154	10.0	LOS A	0.8	6.4	0.26	0.54	56.6
18	R2	139	2.0	0.154	4.6	LOS A	0.8	6.4	0.26	0.54	57.8
Approach		204	2.0	0.154	6.3	LOS A	0.8	6.4	0.26	0.54	57.5
East: Brian Coburn											
1	L2	127	2.0	0.443	10.0	LOS A	3.5	27.0	0.31	0.47	59.0
6	T1	523	2.0	0.443	4.8	LOS A	3.5	27.0	0.31	0.47	60.1
Approach		650	2.0	0.443	5.8	LOS A	3.5	27.0	0.31	0.47	59.9
West: Brian Coburn											
2	T1	90	2.0	0.204	5.0	LOS A	1.1	8.6	0.32	0.49	60.9
12	R2	171	2.0	0.204	4.8	LOS A	1.1	8.6	0.32	0.49	55.7
Approach		261	2.0	0.204	4.9	LOS A	1.1	8.6	0.32	0.49	58.1
All Vehicles		1116	2.0	0.443	5.7	LOS A	3.5	27.0	0.30	0.49	59.2

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Existing AM - BCB/Mer Bleue

New Site
Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	11	3.0	0.130	10.9	LOS B	0.5	3.9	0.38	0.50	59.4
8	T1	194	3.0	0.130	5.1	LOS A	0.5	3.9	0.38	0.51	59.4
18	R2	93	3.0	0.130	5.0	LOS A	0.5	3.9	0.37	0.52	57.9
Approach		299	3.0	0.130	5.3	LOS A	0.5	3.9	0.38	0.51	59.0
East: Brian Coburn											
1	L2	53	3.0	0.976	26.6	LOS C	27.4	213.3	1.00	1.35	48.5
6	T1	520	3.0	0.976	20.9	LOS C	27.4	213.3	1.00	1.35	48.4
16	R2	481	3.0	0.976	20.6	LOS C	27.4	213.3	1.00	1.35	47.2
Approach		1054	3.0	0.976	21.1	LOS C	27.4	213.3	1.00	1.35	47.8
North: Mer Bleue											
7	L2	97	3.0	0.211	11.7	LOS B	0.9	7.3	0.62	0.73	56.4
4	T1	146	3.0	0.211	5.8	LOS A	1.0	7.7	0.61	0.65	57.5
14	R2	119	3.0	0.211	5.5	LOS A	1.0	7.7	0.61	0.58	56.8
Approach		361	3.0	0.211	7.3	LOS A	1.0	7.7	0.61	0.65	57.0
West: RoadName											
5	L2	106	3.0	0.229	11.1	LOS B	1.0	7.7	0.44	0.63	57.7
2	T1	106	3.0	0.229	5.4	LOS A	1.0	7.7	0.44	0.63	57.5
12	R2	18	3.0	0.229	5.1	LOS A	1.0	7.7	0.44	0.63	55.8
Approach		229	3.0	0.229	8.0	LOS A	1.0	7.7	0.44	0.63	57.4
All Vehicles		1943	3.0	0.976	14.5	LOS B	27.4	213.3	0.77	1.01	51.9

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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											
3	L2	30	3.0	0.299	12.5	LOS B	1.1	8.8	0.61	0.67	57.8
8	T1	373	3.0	0.299	6.4	LOS A	1.2	9.0	0.60	0.64	58.1
18	R2	109	3.0	0.299	6.0	LOS A	1.2	9.0	0.59	0.60	56.7
Approach		512	3.0	0.299	6.7	LOS A	1.2	9.0	0.60	0.63	57.8
East: Brian Coburn											
1	L2	41	3.0	0.559	12.8	LOS B	3.6	27.8	0.68	0.79	58.3
6	T1	172	3.0	0.559	7.1	LOS A	3.6	27.8	0.68	0.79	58.1
16	R2	297	3.0	0.559	6.8	LOS A	3.6	27.8	0.68	0.79	56.4
Approach		510	3.0	0.559	7.4	LOS A	3.6	27.8	0.68	0.79	57.1
North: Mer Bleue											
7	L2	526	3.0	0.416	10.8	LOS B	2.4	18.9	0.49	0.70	55.0
4	T1	111	3.0	0.264	5.3	LOS A	1.2	9.7	0.44	0.55	59.6
14	R2	149	3.0	0.264	5.3	LOS A	1.2	9.7	0.44	0.55	57.6
Approach		786	3.0	0.416	9.0	LOS A	2.4	18.9	0.47	0.65	56.1
West: Brian Coburn											
5	L2	28	3.0	0.419	12.8	LOS B	1.9	14.9	0.64	0.70	57.8
2	T1	296	3.0	0.419	7.1	LOS A	1.9	14.9	0.64	0.70	57.7
12	R2	12	3.0	0.419	6.8	LOS A	1.9	14.9	0.64	0.70	56.0
Approach		336	3.0	0.419	7.6	LOS A	1.9	14.9	0.64	0.70	57.6
All Vehicles		2143	3.0	0.559	7.8	LOS A	3.6	27.8	0.58	0.69	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Existing PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	17	2.0	0.162	10.3	LOS A	0.8	6.4	0.35	0.54	57.5
18	R2	181	2.0	0.162	4.9	LOS A	0.8	6.4	0.35	0.54	58.5
Approach		198	2.0	0.162	5.3	LOS A	0.8	6.4	0.35	0.54	58.4
East: Brian Coburn											
1	L2	133	2.0	0.221	9.7	LOS A	1.4	10.7	0.11	0.51	59.2
6	T1	218	2.0	0.221	4.5	LOS A	1.4	10.7	0.11	0.51	60.2
Approach		351	2.0	0.221	6.5	LOS A	1.4	10.7	0.11	0.51	59.9
West: Brian Coburn											
2	T1	154	2.0	0.220	5.1	LOS A	1.2	9.0	0.32	0.49	60.8
12	R2	129	2.0	0.220	4.8	LOS A	1.2	9.0	0.32	0.49	55.5
Approach		283	2.0	0.220	5.0	LOS A	1.2	9.0	0.32	0.49	59.1
All Vehicles		832	2.0	0.221	5.7	LOS A	1.4	10.7	0.24	0.51	59.3

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2037 Background AM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	192	2.0	0.201	10.0	LOS B	0.9	7.2	0.27	0.62	54.1
18	R2	331	2.0	0.201	4.8	LOS A	0.9	7.3	0.26	0.53	58.2
Approach		523	2.0	0.201	6.7	LOS A	0.9	7.3	0.26	0.56	57.0
East: Brian Coburn											
1	L2	215	2.0	0.341	10.4	LOS B	1.7	13.2	0.39	0.61	57.5
6	T1	625	2.0	0.341	5.2	LOS A	1.7	13.3	0.38	0.52	59.9
Approach		840	2.0	0.341	6.5	LOS A	1.7	13.3	0.38	0.54	59.3
West: Brian Coburn											
2	T1	116	2.0	0.121	5.4	LOS A	0.5	3.7	0.35	0.50	60.4
12	R2	249	2.0	0.205	5.1	LOS A	0.9	7.0	0.35	0.56	55.4
Approach		365	2.0	0.205	5.2	LOS A	0.9	7.0	0.35	0.54	57.6
All Vehicles		1728	2.0	0.341	6.3	LOS A	1.7	13.3	0.34	0.55	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2037 Background AM - Mer Bleue / Brian Coburn (4-lane)

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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	20	2.0	0.406	12.3	LOS B	1.9	14.4	0.61	0.62	60.0
8	T1	666	2.0	0.406	6.1	LOS A	1.9	14.7	0.60	0.60	58.1
18	R2	125	2.0	0.406	5.7	LOS A	1.9	14.7	0.59	0.58	56.5
Approach		811	2.0	0.406	6.2	LOS A	1.9	14.7	0.60	0.60	57.9
East: Brian Coburn											
1	L2	64	2.0	0.754	16.3	LOS B	5.1	39.3	0.85	1.04	55.3
6	T1	630	2.0	0.754	9.9	LOS A	5.5	42.6	0.85	1.03	58.4
16	R2	579	2.0	0.754	8.8	LOS A	5.5	42.6	0.86	1.02	55.5
Approach		1273	2.0	0.754	9.7	LOS A	5.5	42.6	0.85	1.03	57.2
North: Mer Bleue											
7	L2	190	2.0	0.413	12.6	LOS B	2.0	15.4	0.68	0.81	56.3
4	T1	347	2.0	0.413	6.2	LOS A	2.1	16.1	0.68	0.70	57.2
14	R2	190	2.0	0.413	5.9	LOS A	2.1	16.1	0.67	0.62	58.7
Approach		727	2.0	0.413	7.8	LOS A	2.1	16.1	0.68	0.71	57.5
West: Brian Coburn											
5	L2	264	2.0	0.248	11.3	LOS B	1.0	8.0	0.54	0.76	57.3
2	T1	163	2.0	0.212	5.9	LOS A	0.8	6.4	0.55	0.56	60.4
12	R2	19	2.0	0.212	6.0	LOS A	0.8	6.4	0.55	0.56	58.7
Approach		446	2.0	0.248	9.1	LOS A	1.0	8.0	0.54	0.68	58.5
All Vehicles		3257	2.0	0.754	8.3	LOS A	5.5	42.6	0.71	0.80	57.6

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2037 Background PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	129	2.0	0.204	10.4	LOS B	0.9	7.0	0.37	0.64	54.7
18	R2	351	2.0	0.204	5.1	LOS A	0.9	7.1	0.36	0.59	57.8
Approach		480	2.0	0.204	6.5	LOS A	0.9	7.1	0.36	0.60	57.2
East: Brian Coburn											
1	L2	331	2.0	0.248	10.0	LOS B	1.2	9.4	0.29	0.64	56.2
6	T1	267	2.0	0.221	5.0	LOS A	1.0	8.0	0.29	0.46	60.7
Approach		598	2.0	0.248	7.8	LOS A	1.2	9.4	0.29	0.56	58.3
West: Brian Coburn											
2	T1	217	2.0	0.215	5.7	LOS A	0.9	6.7	0.43	0.53	60.1
12	R2	289	2.0	0.253	5.5	LOS A	1.1	8.4	0.43	0.62	55.0
Approach		506	2.0	0.253	5.6	LOS A	1.1	8.4	0.43	0.58	57.9
All Vehicles		1584	2.0	0.253	6.7	LOS A	1.2	9.4	0.36	0.58	57.8

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2037 Background 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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	37	2.0	0.621	15.3	LOS B	3.0	23.5	0.80	0.95	58.8
8	T1	745	2.0	0.621	8.4	LOS A	3.3	25.6	0.79	0.87	56.9
18	R2	137	2.0	0.621	7.5	LOS A	3.3	25.6	0.78	0.81	55.4
Approach		919	2.0	0.621	8.5	LOS A	3.3	25.6	0.79	0.87	56.8
East: Brian Coburn											
1	L2	68	2.0	0.420	13.2	LOS B	1.9	14.5	0.70	0.76	56.4
6	T1	246	2.0	0.420	7.1	LOS A	2.0	15.4	0.70	0.76	59.1
16	R2	356	2.0	0.420	6.4	LOS A	2.0	15.4	0.70	0.73	56.8
Approach		670	2.0	0.420	7.3	LOS A	2.0	15.4	0.70	0.75	57.8
North: Mer Bleue											
7	L2	683	2.0	0.700	13.2	LOS B	6.5	50.0	0.79	0.90	54.5
4	T1	606	2.0	0.700	6.7	LOS A	6.7	51.7	0.78	0.73	57.1
14	R2	315	2.0	0.700	6.5	LOS A	6.7	51.7	0.78	0.71	58.2
Approach		1604	2.0	0.700	9.4	LOS A	6.7	51.7	0.79	0.80	56.2
West: Brian Coburn											
5	L2	153	2.0	0.452	14.2	LOS B	1.9	14.5	0.79	0.92	57.4
2	T1	402	2.0	0.452	7.0	LOS A	2.1	15.9	0.76	0.71	59.0
12	R2	13	2.0	0.452	6.8	LOS A	2.1	15.9	0.76	0.66	57.7
Approach		568	2.0	0.452	8.9	LOS A	2.1	15.9	0.77	0.76	58.5
All Vehicles		3761	2.0	0.700	8.8	LOS A	6.7	51.7	0.77	0.80	57.0

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Background 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	192	2.0	0.201	10.0	LOS B	0.9	7.2	0.27	0.62	54.1
18	R2	331	2.0	0.201	4.8	LOS A	0.9	7.3	0.26	0.53	58.2
Approach		523	2.0	0.201	6.7	LOS A	0.9	7.3	0.26	0.56	57.0
East: Brian Coburn											
1	L2	215	2.0	0.341	10.4	LOS B	1.7	13.2	0.39	0.61	57.5
6	T1	625	2.0	0.341	5.2	LOS A	1.7	13.3	0.38	0.52	59.9
Approach		840	2.0	0.341	6.5	LOS A	1.7	13.3	0.38	0.54	59.3
West: Brian Coburn											
2	T1	116	2.0	0.121	5.4	LOS A	0.5	3.7	0.35	0.50	60.4
12	R2	249	2.0	0.205	5.1	LOS A	0.9	7.0	0.35	0.56	55.4
Approach		365	2.0	0.205	5.2	LOS A	0.9	7.0	0.35	0.54	57.6
All Vehicles		1728	2.0	0.341	6.3	LOS A	1.7	13.3	0.34	0.55	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Background AM - Mer Bleue / Brian Coburn (4-lane)

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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	20	2.0	0.406	12.3	LOS B	1.9	14.4	0.61	0.62	60.0
8	T1	666	2.0	0.406	6.1	LOS A	1.9	14.7	0.60	0.60	58.1
18	R2	125	2.0	0.406	5.7	LOS A	1.9	14.7	0.59	0.58	56.5
Approach		811	2.0	0.406	6.2	LOS A	1.9	14.7	0.60	0.60	57.9
East: Brian Coburn											
1	L2	64	2.0	0.754	16.3	LOS B	5.1	39.3	0.85	1.04	55.3
6	T1	630	2.0	0.754	9.9	LOS A	5.5	42.6	0.85	1.03	58.4
16	R2	579	2.0	0.754	8.8	LOS A	5.5	42.6	0.86	1.02	55.5
Approach		1273	2.0	0.754	9.7	LOS A	5.5	42.6	0.85	1.03	57.2
North: Mer Bleue											
7	L2	190	2.0	0.413	12.6	LOS B	2.0	15.4	0.68	0.81	56.3
4	T1	347	2.0	0.413	6.2	LOS A	2.1	16.1	0.68	0.70	57.2
14	R2	190	2.0	0.413	5.9	LOS A	2.1	16.1	0.67	0.62	58.7
Approach		727	2.0	0.413	7.8	LOS A	2.1	16.1	0.68	0.71	57.5
West: Brian Coburn											
5	L2	264	2.0	0.248	11.3	LOS B	1.0	8.0	0.54	0.76	57.3
2	T1	163	2.0	0.212	5.9	LOS A	0.8	6.4	0.55	0.56	60.4
12	R2	19	2.0	0.212	6.0	LOS A	0.8	6.4	0.55	0.56	58.7
Approach		446	2.0	0.248	9.1	LOS A	1.0	8.0	0.54	0.68	58.5
All Vehicles		3257	2.0	0.754	8.3	LOS A	5.5	42.6	0.71	0.80	57.6

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Background PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	129	2.0	0.204	10.4	LOS B	0.9	7.0	0.37	0.64	54.7
18	R2	351	2.0	0.204	5.1	LOS A	0.9	7.1	0.36	0.59	57.8
Approach		480	2.0	0.204	6.5	LOS A	0.9	7.1	0.36	0.60	57.2
East: Brian Coburn											
1	L2	331	2.0	0.248	10.0	LOS B	1.2	9.4	0.29	0.64	56.2
6	T1	267	2.0	0.221	5.0	LOS A	1.0	8.0	0.29	0.46	60.7
Approach		598	2.0	0.248	7.8	LOS A	1.2	9.4	0.29	0.56	58.3
West: Brian Coburn											
2	T1	217	2.0	0.215	5.7	LOS A	0.9	6.7	0.43	0.53	60.1
12	R2	289	2.0	0.253	5.5	LOS A	1.1	8.4	0.43	0.62	55.0
Approach		506	2.0	0.253	5.6	LOS A	1.1	8.4	0.43	0.58	57.9
All Vehicles		1584	2.0	0.253	6.7	LOS A	1.2	9.4	0.36	0.58	57.8

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Background 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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	37	2.0	0.621	15.3	LOS B	3.0	23.5	0.80	0.95	58.8
8	T1	745	2.0	0.621	8.4	LOS A	3.3	25.6	0.79	0.87	56.9
18	R2	137	2.0	0.621	7.5	LOS A	3.3	25.6	0.78	0.81	55.4
Approach		919	2.0	0.621	8.5	LOS A	3.3	25.6	0.79	0.87	56.8
East: Brian Coburn											
1	L2	68	2.0	0.420	13.2	LOS B	1.9	14.5	0.70	0.76	56.4
6	T1	246	2.0	0.420	7.1	LOS A	2.0	15.4	0.70	0.76	59.1
16	R2	356	2.0	0.420	6.4	LOS A	2.0	15.4	0.70	0.73	56.8
Approach		670	2.0	0.420	7.3	LOS A	2.0	15.4	0.70	0.75	57.8
North: Mer Bleue											
7	L2	683	2.0	0.700	13.2	LOS B	6.5	50.0	0.79	0.90	54.5
4	T1	606	2.0	0.700	6.7	LOS A	6.7	51.7	0.78	0.73	57.1
14	R2	315	2.0	0.700	6.5	LOS A	6.7	51.7	0.78	0.71	58.2
Approach		1604	2.0	0.700	9.4	LOS A	6.7	51.7	0.79	0.80	56.2
West: Brian Coburn											
5	L2	153	2.0	0.452	14.2	LOS B	1.9	14.5	0.79	0.92	57.4
2	T1	402	2.0	0.452	7.0	LOS A	2.1	15.9	0.76	0.71	59.0
12	R2	13	2.0	0.452	6.8	LOS A	2.1	15.9	0.76	0.66	57.7
Approach		568	2.0	0.452	8.9	LOS A	2.1	15.9	0.77	0.76	58.5
All Vehicles		3761	2.0	0.700	8.8	LOS A	6.7	51.7	0.77	0.80	57.0

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2047 Background AM - Mer Bleue / Brian Coburn (4-lane)

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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	20	2.0	0.406	12.3	LOS B	1.9	14.4	0.61	0.62	60.0
8	T1	666	2.0	0.406	6.1	LOS A	1.9	14.7	0.60	0.60	58.1
18	R2	125	2.0	0.406	5.7	LOS A	1.9	14.7	0.59	0.58	56.5
Approach		811	2.0	0.406	6.2	LOS A	1.9	14.7	0.60	0.60	57.9
East: Brian Coburn											
1	L2	64	2.0	0.754	16.3	LOS B	5.1	39.3	0.85	1.04	55.3
6	T1	630	2.0	0.754	9.9	LOS A	5.5	42.6	0.85	1.03	58.4
16	R2	579	2.0	0.754	8.8	LOS A	5.5	42.6	0.86	1.02	55.5
Approach		1273	2.0	0.754	9.7	LOS A	5.5	42.6	0.85	1.03	57.2
North: Mer Bleue											
7	L2	190	2.0	0.413	12.6	LOS B	2.0	15.4	0.68	0.81	56.3
4	T1	347	2.0	0.413	6.2	LOS A	2.1	16.1	0.68	0.70	57.2
14	R2	190	2.0	0.413	5.9	LOS A	2.1	16.1	0.67	0.62	58.7
Approach		727	2.0	0.413	7.8	LOS A	2.1	16.1	0.68	0.71	57.5
West: Brian Coburn											
5	L2	264	2.0	0.248	11.3	LOS B	1.0	8.0	0.54	0.76	57.3
2	T1	163	2.0	0.212	5.9	LOS A	0.8	6.4	0.55	0.56	60.4
12	R2	19	2.0	0.212	6.0	LOS A	0.8	6.4	0.55	0.56	58.7
Approach		446	2.0	0.248	9.1	LOS A	1.0	8.0	0.54	0.68	58.5
All Vehicles		3257	2.0	0.754	8.3	LOS A	5.5	42.6	0.71	0.80	57.6

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2047 Background AM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	192	2.0	0.201	10.0	LOS B	0.9	7.2	0.27	0.62	54.1
18	R2	331	2.0	0.201	4.8	LOS A	0.9	7.3	0.26	0.53	58.2
Approach		523	2.0	0.201	6.7	LOS A	0.9	7.3	0.26	0.56	57.0
East: Brian Coburn											
1	L2	215	2.0	0.341	10.4	LOS B	1.7	13.2	0.39	0.61	57.5
6	T1	625	2.0	0.341	5.2	LOS A	1.7	13.3	0.38	0.52	59.9
Approach		840	2.0	0.341	6.5	LOS A	1.7	13.3	0.38	0.54	59.3
West: Brian Coburn											
2	T1	116	2.0	0.121	5.4	LOS A	0.5	3.7	0.35	0.50	60.4
12	R2	249	2.0	0.205	5.1	LOS A	0.9	7.0	0.35	0.56	55.4
Approach		365	2.0	0.205	5.2	LOS A	0.9	7.0	0.35	0.54	57.6
All Vehicles		1728	2.0	0.341	6.3	LOS A	1.7	13.3	0.34	0.55	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2047 Background PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	129	2.0	0.204	10.4	LOS B	0.9	7.0	0.37	0.64	54.7
18	R2	351	2.0	0.204	5.1	LOS A	0.9	7.1	0.36	0.59	57.8
Approach		480	2.0	0.204	6.5	LOS A	0.9	7.1	0.36	0.60	57.2
East: Brian Coburn											
1	L2	331	2.0	0.248	10.0	LOS B	1.2	9.4	0.29	0.64	56.2
6	T1	267	2.0	0.221	5.0	LOS A	1.0	8.0	0.29	0.46	60.7
Approach		598	2.0	0.248	7.8	LOS A	1.2	9.4	0.29	0.56	58.3
West: Brian Coburn											
2	T1	217	2.0	0.215	5.7	LOS A	0.9	6.7	0.43	0.53	60.1
12	R2	289	2.0	0.253	5.5	LOS A	1.1	8.4	0.43	0.62	55.0
Approach		506	2.0	0.253	5.6	LOS A	1.1	8.4	0.43	0.58	57.9
All Vehicles		1584	2.0	0.253	6.7	LOS A	1.2	9.4	0.36	0.58	57.8

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2047 Background 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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	37	2.0	0.621	15.3	LOS B	3.0	23.5	0.80	0.95	58.8
8	T1	745	2.0	0.621	8.4	LOS A	3.3	25.6	0.79	0.87	56.9
18	R2	137	2.0	0.621	7.5	LOS A	3.3	25.6	0.78	0.81	55.4
Approach		919	2.0	0.621	8.5	LOS A	3.3	25.6	0.79	0.87	56.8
East: Brian Coburn											
1	L2	68	2.0	0.420	13.2	LOS B	1.9	14.5	0.70	0.76	56.4
6	T1	246	2.0	0.420	7.1	LOS A	2.0	15.4	0.70	0.76	59.1
16	R2	356	2.0	0.420	6.4	LOS A	2.0	15.4	0.70	0.73	56.8
Approach		670	2.0	0.420	7.3	LOS A	2.0	15.4	0.70	0.75	57.8
North: Mer Bleue											
7	L2	683	2.0	0.700	13.2	LOS B	6.5	50.0	0.79	0.90	54.5
4	T1	606	2.0	0.700	6.7	LOS A	6.7	51.7	0.78	0.73	57.1
14	R2	315	2.0	0.700	6.5	LOS A	6.7	51.7	0.78	0.71	58.2
Approach		1604	2.0	0.700	9.4	LOS A	6.7	51.7	0.79	0.80	56.2
West: Brian Coburn											
5	L2	153	2.0	0.452	14.2	LOS B	1.9	14.5	0.79	0.92	57.4
2	T1	402	2.0	0.452	7.0	LOS A	2.1	15.9	0.76	0.71	59.0
12	R2	13	2.0	0.452	6.8	LOS A	2.1	15.9	0.76	0.66	57.7
Approach		568	2.0	0.452	8.9	LOS A	2.1	15.9	0.77	0.76	58.5
All Vehicles		3761	2.0	0.700	8.8	LOS A	6.7	51.7	0.77	0.80	57.0

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX G: TDM MEASURES CHECKLIST (SUBDIVISIONS)

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

Legend

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

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

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

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☒ Recommended to be provided at sales center
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☐

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

Legend

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

		TDM-supportive design & infrastructure measures: ***Residential developments***	**Check if completed & add descriptions, explanations or plan/drawing references**
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☒ Parking areas are to be located interior to the development. Residential units are located near the street
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☒ Building entrances are to minimize walking to adjacent Major Collector and Collector Roadways (Fern Casey, Vanguard, Frank Bender)
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☒ Building entrances are to ensure visibility
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☒ MUPS / Sidewalks along all Collectors. Sidewalks along select key local roads.
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate,	☒ Site walkways are to be provided in front of each building and between adjacent buildings. All buildings are to be connected to external sidewalks along Collector roadways

	TDM-supportive design & infrastructure measures: *Residential developments*		Check if completed & add descriptions, explanations or plan/drawing references
		such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks *(see Official Plan policy 4.3.10)*	☒ Sidewalks to be continuous. Pedestrian Areas crossing local linkages to be demarcated
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps *(see Official Plan policy 4.3.10)*	☒ Sidewalks border local parks / parkettes
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and on-road cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians *(see Official Plan policy 4.3.11)*	☒ Pedestrian connections to be provided internal to condo/multi-family developments and between residential buildings. Allow connections to Collectors.
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☒ Direct walking route to transit stops via sidewalk and MUPs
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☒ Walking routes to have adequate street lights and visibility
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	☒ Local Roads to be designed to 30 km/hr operating speed according to City guidelines
	1.3	**Amenities for walking & cycling**	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	☐
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	☐

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	2.	**WALKING & CYCLING: END-OF-TRIP FACILITIES**	
	2.1	**Bicycle parking**	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible *(see Official Plan policy 4.3.6)*	☒ Bicycle Parking to be provided according to City of Ottawa By-Law, as required
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas *(see Zoning By-law Section 111)*	☒ Meet minimum and maximum parking requirements
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored *(see Zoning By-law Section 111)*	☒ Bicycle Storage accessible to eb accesible
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists	☐
	2.2	**Secure bicycle parking**	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers *(see Zoning By-law Section 111)*	☒ Identify enclosed bicycle parking areas
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐
	2.3	**Bicycle repair station**	
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	☐
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☐ TBD
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	☐ TBD
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐

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

APPENDIX H: INTERSECTION CAPACITY ANALYSIS
2037 DESIGN, 2042 DESIGN AND 2047 DESIGN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	522	21	28	1570	77	64	16	6	29	29	75
Future Volume (vph)	51	522	21	28	1570	77	64	16	6	29	29	75
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	1729	3370		1729	1820	1547	1729	1612	
Flt Permitted	0.07	1.00	1.00	0.41	1.00		0.69	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	135	3202	1334	740	3370		1255	1820	1547	1360	1612	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	51	522	21	28	1570	77	64	16	6	29	29	75
RTOR Reduction (vph)	0	0	9	0	3	0	0	0	5	0	58	0
Lane Group Flow (vph)	51	522	12	28	1644	0	64	16	1	29	46	0
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	68.6	66.0	66.0	64.9	64.9		26.8	26.8	26.8	26.8	26.8	
Effective Green, g (s)	68.6	66.0	66.0	64.9	64.9		26.8	26.8	26.8	26.8	26.8	
Actuated g/C Ratio	0.60	0.57	0.57	0.56	0.56		0.23	0.23	0.23	0.23	0.23	
Clearance Time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	165	1837	765	452	1901		292	424	360	316	375	
v/s Ratio Prot	c0.02	0.16		0.00	c0.49			0.01			0.03	
v/s Ratio Perm	0.17		0.01	0.03			c0.05		0.00	0.02		
v/c Ratio	0.31	0.28	0.02	0.06	0.86		0.22	0.04	0.00	0.09	0.12	
Uniform Delay, d1	32.3	12.5	10.5	11.3	21.3		35.6	34.1	33.9	34.6	34.8	
Progression Factor	0.52	0.53	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.1	0.0	0.1	4.4		1.7	0.2	0.0	0.6	0.7	
Delay (s)	17.8	6.7	10.5	11.4	25.7		37.4	34.3	33.9	35.1	35.5	
Level of Service	B	A	B	B	C		D	C	C	D	D	
Approach Delay (s)		7.8			25.5			36.5			35.4	
Approach LOS		A			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	531	37	58	1531	33	22	5	39	46	12	47
Future Volume (vph)	11	531	37	58	1531	33	22	5	39	46	12	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1394	3202	1432	1729	3377		1662	1820	1547		1582	
Flt Permitted	0.10	1.00	1.00	0.38	1.00		0.71	1.00	1.00		0.88	
Satd. Flow (perm)	147	3202	1432	690	3377		1241	1820	1547		1416	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	11	531	37	58	1531	33	22	5	39	46	12	47
RTOR Reduction (vph)	0	0	19	0	1	0	0	0	28	0	24	0
Lane Group Flow (vph)	11	531	18	58	1563	0	22	5	11	0	81	0
Heavy Vehicles (%)	24%	8%	8%	0%	2%	6%	4%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	57.3	57.3	57.3	68.3	68.3		33.7	33.7	33.7		33.7	
Effective Green, g (s)	57.3	57.3	57.3	68.3	68.3		33.7	33.7	33.7		33.7	
Actuated g/C Ratio	0.50	0.50	0.50	0.59	0.59		0.29	0.29	0.29		0.29	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	73	1595	713	452	2005		363	533	453		414	
v/s Ratio Prot		0.17		0.01	c0.46			0.00				
v/s Ratio Perm	0.07		0.01	0.07			0.02		0.01		c0.06	
v/c Ratio	0.15	0.33	0.03	0.13	0.78		0.06	0.01	0.03		0.20	
Uniform Delay, d1	15.7	17.4	14.7	10.3	17.7		29.3	28.8	29.0		30.5	
Progression Factor	0.97	0.95	1.00	0.21	0.14		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.9	0.1	0.0	0.1	1.2		0.3	0.0	0.1		1.1	
Delay (s)	16.1	16.5	14.7	2.2	3.7		29.6	28.8	29.1		31.5	
Level of Service	B	B	B	A	A		C	C	C		C	
Approach Delay (s)		16.4			3.6			29.2			31.5	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	557	46	25	1378	3	93	0	69	0	0	5
Future Volume (vph)	3	557	46	25	1378	3	93	0	69	0	0	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1478	3179		1695	3356		1695	1517			1050	
Flt Permitted	0.17	1.00		0.42	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	264	3179		756	3356		1346	1517			1050	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	557	46	25	1378	3	93	0	69	0	0	5
RTOR Reduction (vph)	0	3	0	0	0	0	0	61	0	0	4	0
Lane Group Flow (vph)	3	600	0	25	1381	0	93	8	0	0	1	0
Heavy Vehicles (%)	17%	8%	2%	2%	3%	0%	2%	0%	2%	0%	0%	50%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	88.8	88.8		88.8	88.8		13.8	13.8			13.8	
Effective Green, g (s)	88.8	88.8		88.8	88.8		13.8	13.8			13.8	
Actuated g/C Ratio	0.77	0.77		0.77	0.77		0.12	0.12			0.12	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	203	2454		583	2591		161	182			126	
v/s Ratio Prot		0.19			c0.41			0.01			0.00	
v/s Ratio Perm	0.01			0.03			c0.07					
v/c Ratio	0.01	0.24		0.04	0.53		0.58	0.05			0.00	
Uniform Delay, d1	3.0	3.7		3.1	5.1		47.8	44.8			44.6	
Progression Factor	0.76	0.80		0.14	0.11		1.00	1.00			1.00	
Incremental Delay, d2	0.1	0.2		0.1	0.5		4.9	0.1			0.0	
Delay (s)	2.4	3.2		0.5	1.1		52.8	44.9			44.6	
Level of Service	A	A		A	A		D	D			D	
Approach Delay (s)		3.2			1.1			49.4			44.6	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	11	1534	8	8	687
Future Volume (vph)	11	11	1534	8	8	687
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7	5.9		5.9	5.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1695	1517	3388		1695	3390
Flt Permitted	0.95	1.00	1.00		0.16	1.00
Satd. Flow (perm)	1695	1517	3388		278	3390
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	11	11	1534	8	8	687
RTOR Reduction (vph)	0	11	0	0	0	0
Lane Group Flow (vph)	11	0	1542	0	8	687
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	2.7	2.7	91.7		91.7	91.7
Effective Green, g (s)	2.7	2.7	91.7		91.7	91.7
Actuated g/C Ratio	0.03	0.03	0.87		0.87	0.87
Clearance Time (s)	5.7	5.7	5.9		5.9	5.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	43	38	2930		240	2932
v/s Ratio Prot	c0.01		c0.46			0.20
v/s Ratio Perm		0.00			0.03	
v/c Ratio	0.26	0.01	0.53		0.03	0.23
Uniform Delay, d1	50.7	50.3	1.8		1.0	1.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.1	0.1	0.7		0.3	0.2
Delay (s)	53.8	50.4	2.5		1.3	1.4
Level of Service	D	D	A		A	A
Approach Delay (s)	52.1		2.5			1.4
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	45	7	6	29	51	16	33	14	39	10	0
Future Volume (Veh/h)	0	45	7	6	29	51	16	33	14	39	10	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	0	45	7	6	29	51	16	33	14	39	10	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	80			52			120	140	48	146	118	54
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	80			52			120	140	48	146	118	54
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	96	99	95	99	100
cM capacity (veh/h)	1531			1567			849	751	1026	787	773	1018

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	52	86	63	49
Volume Left	0	6	16	39
Volume Right	7	51	14	0
cSH	1531	1567	825	784
Volume to Capacity	0.00	0.00	0.08	0.06
Queue Length 95th (m)	0.0	0.1	2.0	1.6
Control Delay (s)	0.0	0.5	9.7	9.9
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.5	9.7	9.9
Approach LOS			A	A

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	583	135	8	1469	428	23
Future Volume (vph)	583	135	8	1469	428	23
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3390	1517	1695	3390	1695	1517
Flt Permitted	1.00	1.00	0.36	1.00	0.95	1.00
Satd. Flow (perm)	3390	1517	648	3390	1695	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	583	135	8	1469	428	23
RTOR Reduction (vph)	0	62	0	0	0	16
Lane Group Flow (vph)	583	73	8	1469	428	7
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	62.1	62.1	68.9	68.9	34.1	34.1
Effective Green, g (s)	62.1	62.1	68.9	68.9	34.1	34.1
Actuated g/C Ratio	0.54	0.54	0.60	0.60	0.30	0.30
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1830	819	395	2031	502	449
v/s Ratio Prot	0.17		0.00	c0.43		
v/s Ratio Perm		0.05	0.01		c0.25	0.00
v/c Ratio	0.32	0.09	0.02	0.72	0.85	0.02
Uniform Delay, d1	14.7	12.8	9.8	16.3	38.1	28.6
Progression Factor	1.00	1.00	0.36	0.33	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.0	2.0	13.2	0.0
Delay (s)	15.2	13.0	3.6	7.3	51.2	28.6
Level of Service	B	B	A	A	D	C
Approach Delay (s)	14.7			7.3	50.1	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	1639	116	170	1077	45	310	227	91	75	97	45
Future Volume (vph)	135	1639	116	170	1077	45	310	227	91	75	97	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3293	1432	1729	3372		1729	1820	1547	1729	1728	
Flt Permitted	0.16	1.00	1.00	0.07	1.00		0.66	1.00	1.00	0.51	1.00	
Satd. Flow (perm)	287	3293	1432	131	3372		1204	1820	1547	923	1728	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	135	1639	116	170	1077	45	310	227	91	75	97	45
RTOR Reduction (vph)	0	0	57	0	2	0	0	0	68	0	15	0
Lane Group Flow (vph)	135	1639	59	170	1120	0	310	227	23	75	127	0
Heavy Vehicles (%)	0%	5%	8%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	65.0	56.4	56.4	62.8	55.5		28.2	28.2	28.2	28.2	28.2	
Effective Green, g (s)	65.0	56.4	56.4	62.8	55.5		28.2	28.2	28.2	28.2	28.2	
Actuated g/C Ratio	0.59	0.51	0.51	0.57	0.50		0.26	0.26	0.26	0.26	0.26	
Clearance Time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	282	1688	734	180	1701		308	466	396	236	442	
v/s Ratio Prot	0.04	c0.50		c0.06	0.33			0.12			0.07	
v/s Ratio Perm	0.24		0.04	0.47			c0.26		0.02	0.08		
v/c Ratio	0.48	0.97	0.08	0.94	0.66		1.01	0.49	0.06	0.32	0.29	
Uniform Delay, d1	12.9	26.0	13.6	28.6	20.2		40.9	34.8	30.9	33.1	32.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	16.0	0.2	50.7	2.0		52.9	0.8	0.1	0.8	0.4	
Delay (s)	14.2	42.0	13.8	79.4	22.2		93.8	35.6	30.9	33.9	33.2	
Level of Service	B	D	B	E	C		F	D	C	C	C	
Approach Delay (s)		38.3			29.7			63.7			33.4	
Approach LOS		D			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	105.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1649	86	181	954	83	105	38	177	59	48	30
Future Volume (vph)	44	1649	86	181	954	83	105	38	177	59	48	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1394	3172	1419	1729	3309		1662	1820	1547		1661	
Flt Permitted	0.25	1.00	1.00	0.08	1.00		0.60	1.00	1.00		0.84	
Satd. Flow (perm)	371	3172	1419	154	3309		1043	1820	1547		1430	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	1649	86	181	954	83	105	38	177	59	48	30
RTOR Reduction (vph)	0	0	32	0	4	0	0	0	135	0	10	0
Lane Group Flow (vph)	44	1649	54	181	1033	0	105	38	42	0	127	0
Heavy Vehicles (%)	24%	9%	9%	0%	3%	6%	4%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	78.8	78.8	78.8	95.0	95.0		17.0	17.0	17.0		17.0	
Effective Green, g (s)	78.8	78.8	78.8	95.0	95.0		17.0	17.0	17.0		17.0	
Actuated g/C Ratio	0.63	0.63	0.63	0.76	0.76		0.14	0.14	0.14		0.14	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	233	1999	894	241	2514		141	247	210		194	
v/s Ratio Prot		c0.52		c0.06	0.31			0.02				
v/s Ratio Perm	0.12		0.04	0.51			c0.10		0.03		0.09	
v/c Ratio	0.19	0.82	0.06	0.75	0.41		0.74	0.15	0.20		0.66	
Uniform Delay, d1	9.7	17.8	8.9	31.8	5.2		51.9	47.7	48.0		51.2	
Progression Factor	0.10	0.13	0.03	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.0	2.3	0.1	12.4	0.5		19.0	0.3	0.5		7.8	
Delay (s)	1.9	4.6	0.4	44.1	5.7		71.0	47.9	48.4		59.0	
Level of Service	A	A	A	D	A		E	D	D		E	
Approach Delay (s)		4.3			11.4			55.8			59.0	
Approach LOS		A			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1737	144	102	1060	12	86	0	71	12	0	7
Future Volume (vph)	14	1737	144	102	1060	12	86	0	71	12	0	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		4.9	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1478	3234		1695	3353		1695	1517			1416	
Flt Permitted	0.25	1.00		0.06	1.00		0.75	1.00			0.80	
Satd. Flow (perm)	386	3234		113	3353		1329	1517			1172	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	1737	144	102	1060	12	86	0	71	12	0	7
RTOR Reduction (vph)	0	4	0	0	0	0	0	63	0	0	17	0
Lane Group Flow (vph)	14	1877	0	102	1072	0	86	8	0	0	2	0
Heavy Vehicles (%)	17%	6%	2%	2%	3%	0%	2%	0%	2%	0%	0%	50%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	85.4	85.4		99.9	98.7		13.9	13.9			13.9	
Effective Green, g (s)	85.4	85.4		99.9	98.7		13.9	13.9			13.9	
Actuated g/C Ratio	0.68	0.68		0.80	0.79		0.11	0.11			0.11	
Clearance Time (s)	6.1	6.1		4.9	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	263	2209		196	2647		147	168			130	
v/s Ratio Prot		c0.58		c0.03	0.32			0.01				
v/s Ratio Perm	0.04			0.38			c0.06				0.00	
v/c Ratio	0.05	0.85		0.52	0.40		0.59	0.05			0.02	
Uniform Delay, d1	6.5	15.0		31.7	4.1		52.8	49.6			49.5	
Progression Factor	0.07	0.10		0.83	1.04		1.00	1.00			1.00	
Incremental Delay, d2	0.2	2.3		2.3	0.4		5.8	0.1			0.1	
Delay (s)	0.7	3.9		28.8	4.7		58.6	49.7			49.5	
Level of Service	A	A		C	A		E	D			D	
Approach Delay (s)		3.8			6.7			54.6			49.5	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	9	1305	11	11	1550
Future Volume (vph)	10	9	1305	11	11	1550
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7	5.9		5.9	5.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1695	1517	3386		1695	3390
Flt Permitted	0.95	1.00	1.00		0.20	1.00
Satd. Flow (perm)	1695	1517	3386		362	3390
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	9	1305	11	11	1550
RTOR Reduction (vph)	0	9	0	0	0	0
Lane Group Flow (vph)	10	0	1316	0	11	1550
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	2.8	2.8	104.5		104.5	104.5
Effective Green, g (s)	2.8	2.8	104.5		104.5	104.5
Actuated g/C Ratio	0.02	0.02	0.88		0.88	0.88
Clearance Time (s)	5.7	5.7	5.9		5.9	5.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	39	35	2975		318	2979
v/s Ratio Prot	c0.01		0.39			c0.46
v/s Ratio Perm		0.00			0.03	
v/c Ratio	0.26	0.01	0.44		0.03	0.52
Uniform Delay, d1	57.0	56.7	1.4		0.9	1.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.5	0.1	0.5		0.2	0.7
Delay (s)	60.5	56.8	1.9		1.1	2.3
Level of Service	E	E	A		A	A
Approach Delay (s)	58.7		1.9			2.3
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	2.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	118.9	Sum of lost time (s)	11.6
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	37	18	15	45	54	13	23	9	64	25	0
Future Volume (Veh/h)	0	37	18	15	45	54	13	23	9	64	25	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	0	37	18	15	45	54	13	23	9	64	25	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	99			55			160	175	46	168	157	72
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	99			55			160	175	46	168	157	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			98	97	99	92	97	100
cM capacity (veh/h)	1494			1550			778	711	1023	763	728	990

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	55	114	45	89
Volume Left	0	15	13	64
Volume Right	18	54	9	0
cSH	1494	1550	778	753
Volume to Capacity	0.00	0.01	0.06	0.12
Queue Length 95th (m)	0.0	0.2	1.5	3.2
Control Delay (s)	0.0	1.0	9.9	10.4
Lane LOS		A	A	B
Approach Delay (s)	0.0	1.0	9.9	10.4
Approach LOS			A	B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1838	376	95	1006	229	57
Future Volume (vph)	1838	376	95	1006	229	57
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3390	1532	1712	3262	1712	1532
Flt Permitted	1.00	1.00	0.06	1.00	0.95	1.00
Satd. Flow (perm)	3390	1532	100	3262	1712	1532
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1838	376	95	1006	229	57
RTOR Reduction (vph)	0	78	0	0	0	48
Lane Group Flow (vph)	1838	298	95	1006	229	9
Heavy Vehicles (%)	2%	1%	1%	6%	1%	1%
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	79.6	79.6	92.6	92.6	20.4	20.4
Effective Green, g (s)	79.6	79.6	92.6	92.6	20.4	20.4
Actuated g/C Ratio	0.64	0.64	0.74	0.74	0.16	0.16
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2158	975	164	2416	279	250
v/s Ratio Prot	c0.54		c0.03	0.31		
v/s Ratio Perm		0.19	0.39		c0.13	0.01
v/c Ratio	0.85	0.31	0.58	0.42	0.82	0.04
Uniform Delay, d1	18.0	10.2	37.7	6.1	50.5	44.0
Progression Factor	1.00	1.00	1.12	1.11	1.00	1.00
Incremental Delay, d2	4.5	0.8	4.6	0.5	17.3	0.1
Delay (s)	22.5	11.1	46.9	7.2	67.9	44.1
Level of Service	C	B	D	A	E	D
Approach Delay (s)	20.6			10.7	63.1	
Approach LOS	C			B	E	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	519	21	63	1584	78	65	16	84	29	29	76
Future Volume (vph)	52	519	21	63	1584	78	65	16	84	29	29	76
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	1.4	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.91	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	1729	3369		1574	1820	1547	1729	1611	
Flt Permitted	0.09	1.00	1.00	0.38	1.00		0.69	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	165	3202	1334	692	3369		1142	1820	1547	1360	1611	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	52	519	21	63	1584	78	65	16	84	29	29	76
RTOR Reduction (vph)	0	0	11	0	4	0	0	0	58	0	53	0
Lane Group Flow (vph)	52	519	10	63	1658	0	65	16	26	29	52	0
Confl. Peds. (#/hr)							92					
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	43.9	41.5	41.5	51.0	45.5		24.9	24.9	24.9	24.9	24.9	
Effective Green, g (s)	49.1	44.1	44.1	52.4	47.9		27.7	27.7	27.7	27.7	27.7	
Actuated g/C Ratio	0.55	0.49	0.49	0.58	0.53		0.31	0.31	0.31	0.31	0.31	
Clearance Time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	176	1568	653	474	1793		351	560	476	418	495	
v/s Ratio Prot	c0.02	0.16		0.01	c0.49			0.01			0.03	
v/s Ratio Perm	0.14		0.01	0.07			c0.06		0.02	0.02		
v/c Ratio	0.30	0.33	0.02	0.13	0.92		0.19	0.03	0.05	0.07	0.11	
Uniform Delay, d1	15.8	14.0	11.8	8.5	19.4		22.9	21.8	21.9	22.0	22.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.1	0.0	0.1	8.6		1.2	0.1	0.2	0.3	0.4	
Delay (s)	16.7	14.1	11.8	8.7	28.0		24.0	21.8	22.1	22.4	22.7	
Level of Service	B	B	B	A	C		C	C	C	C	C	
Approach Delay (s)		14.2			27.3			22.9			22.6	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	507	37	59	1533	33	22	9	39	46	12	47
Future Volume (vph)	11	507	37	59	1533	33	22	9	39	46	12	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1394	3172	1419	1729	3345		1662	1820	1547		1582	
Flt Permitted	0.13	1.00	1.00	0.36	1.00		0.72	1.00	1.00		0.89	
Satd. Flow (perm)	197	3172	1419	650	3345		1259	1820	1547		1440	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	11	507	37	59	1533	33	22	9	39	46	12	47
RTOR Reduction (vph)	0	0	22	0	2	0	0	0	24	0	9	0
Lane Group Flow (vph)	11	507	15	59	1564	0	22	9	15	0	96	0
Heavy Vehicles (%)	24%	9%	9%	0%	3%	6%	4%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	27.5	27.5	27.5	36.8	36.8		25.2	25.2	25.2		25.2	
Effective Green, g (s)	29.8	29.8	29.8	39.1	39.1		27.9	27.9	27.9		27.9	
Actuated g/C Ratio	0.40	0.40	0.40	0.52	0.52		0.37	0.37	0.37		0.37	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	78	1260	563	415	1743		468	677	575		535	
v/s Ratio Prot		0.16		0.01	c0.47			0.00				
v/s Ratio Perm	0.06		0.01	0.06			0.02		0.01		c0.07	
v/c Ratio	0.14	0.40	0.03	0.14	0.90		0.05	0.01	0.03		0.18	
Uniform Delay, d1	14.4	16.2	13.8	9.3	16.1		15.1	14.9	14.9		15.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.8	0.2	0.0	0.2	6.5		0.2	0.0	0.1		0.7	
Delay (s)	15.3	16.4	13.8	9.5	22.7		15.2	14.9	15.0		16.6	
Level of Service	B	B	B	A	C		B	B	B		B	
Approach Delay (s)		16.2			22.2			15.1			16.6	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	563	57	21	1394	3	115	0	61	0	0	5
Future Volume (vph)	3	563	57	21	1394	3	115	0	61	0	0	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1478	3174		1695	3356		1695	1517			1050	
Flt Permitted	0.12	1.00		0.38	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	190	3174		672	3356		1346	1517			1050	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	563	57	21	1394	3	115	0	61	0	0	5
RTOR Reduction (vph)	0	12	0	0	0	0	0	38	0	0	3	0
Lane Group Flow (vph)	3	608	0	21	1397	0	115	23	0	0	2	0
Heavy Vehicles (%)	17%	8%	2%	2%	3%	0%	2%	0%	2%	0%	0%	50%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.6	30.6		30.6	30.6		22.0	22.0			22.0	
Effective Green, g (s)	32.7	32.7		32.7	32.7		24.3	24.3			24.3	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.37	0.37			0.37	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	95	1596		338	1688		503	567			392	
v/s Ratio Prot		0.19			c0.42			0.02			0.00	
v/s Ratio Perm	0.02			0.03			c0.09					
v/c Ratio	0.03	0.38		0.06	0.83		0.23	0.04			0.00	
Uniform Delay, d1	8.2	9.9		8.3	13.8		13.9	12.9			12.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.6	0.7		0.4	4.8		1.1	0.1			0.0	
Delay (s)	8.8	10.6		8.6	18.6		15.0	13.1			12.8	
Level of Service	A	B		A	B		B	B			B	
Approach Delay (s)		10.6			18.4			14.3			12.8	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	11	1548	8	8	702
Future Volume (vph)	11	11	1548	8	8	702
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7	5.9		5.9	5.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1695	1517	3388		1695	3390
Flt Permitted	0.95	1.00	1.00		0.15	1.00
Satd. Flow (perm)	1695	1517	3388		262	3390
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	11	11	1548	8	8	702
RTOR Reduction (vph)	0	9	0	0	0	0
Lane Group Flow (vph)	11	2	1556	0	8	702
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	1.2	1.2	46.7		46.7	46.7
Effective Green, g (s)	1.2	1.2	46.7		46.7	46.7
Actuated g/C Ratio	0.02	0.02	0.78		0.78	0.78
Clearance Time (s)	5.7	5.7	5.9		5.9	5.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	34	30	2659		205	2660
v/s Ratio Prot	c0.01		c0.46			0.21
v/s Ratio Perm		0.00			0.03	
v/c Ratio	0.32	0.07	0.59		0.04	0.26
Uniform Delay, d1	28.7	28.6	2.5		1.4	1.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.5	1.0	0.9		0.4	0.2
Delay (s)	34.2	29.6	3.5		1.8	2.0
Level of Service	C	C	A		A	A
Approach Delay (s)	31.9		3.5			2.0
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	59.5	Sum of lost time (s)	11.6
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	53	16	6	46	52	35	25	14	24	22	0
Future Volume (Veh/h)	0	53	16	6	46	52	35	25	14	24	22	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	0	53	16	6	46	52	35	25	14	24	22	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	98			69			156	171	61	172	153	72
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	98			69			156	171	61	172	153	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			96	97	99	97	97	100
cM capacity (veh/h)	1495			1532			790	719	1004	758	736	990

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	69	104	74	46
Volume Left	0	6	35	24
Volume Right	16	52	14	0
cSH	1495	1532	795	747
Volume to Capacity	0.00	0.00	0.09	0.06
Queue Length 95th (m)	0.0	0.1	2.4	1.6
Control Delay (s)	0.0	0.5	10.0	10.1
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.5	10.0	10.1
Approach LOS			A	B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	23.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	31	194	33	64	76	28
Future Volume (vph)	31	194	33	64	76	28
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	31	194	33	64	76	28

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	225	97	104
Volume Left (vph)	0	33	76
Volume Right (vph)	194	0	28
Hadj (s)	-0.48	0.10	0.02
Departure Headway (s)	3.8	4.5	4.6
Degree Utilization, x	0.24	0.12	0.13
Capacity (veh/h)	924	769	734
Control Delay (s)	7.9	8.1	8.3
Approach Delay (s)	7.9	8.1	8.3
Approach LOS	A	A	A

Intersection Summary			
Delay	8.1		
Level of Service	A		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	601	150	8	1506	461	23
Future Volume (vph)	601	150	8	1506	461	23
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3390	1517	1695	3390	1695	1517
Flt Permitted	1.00	1.00	0.33	1.00	0.95	1.00
Satd. Flow (perm)	3390	1517	591	3390	1695	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	601	150	8	1506	461	23
RTOR Reduction (vph)	0	82	0	0	0	16
Lane Group Flow (vph)	601	68	8	1506	461	7
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	36.3	36.3	43.1	43.1	24.9	24.9
Effective Green, g (s)	36.3	36.3	43.1	43.1	24.9	24.9
Actuated g/C Ratio	0.45	0.45	0.54	0.54	0.31	0.31
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1538	688	329	1826	527	472
v/s Ratio Prot	0.18		0.00	c0.44		
v/s Ratio Perm		0.04	0.01		c0.27	0.00
v/c Ratio	0.39	0.10	0.02	0.82	0.87	0.02
Uniform Delay, d1	14.5	12.5	9.1	15.3	26.1	19.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3	0.0	4.4	14.9	0.0
Delay (s)	15.3	12.8	9.1	19.7	41.0	19.1
Level of Service	B	B	A	B	D	B
Approach Delay (s)	14.8			19.7	40.0	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	1672	87	280	1056	45	314	230	167	76	98	45
Future Volume (vph)	136	1672	87	280	1056	45	314	230	167	76	98	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	1729	3372		1729	1820	1547	1729	1729	
Flt Permitted	0.19	1.00	1.00	0.06	1.00		0.64	1.00	1.00	0.48	1.00	
Satd. Flow (perm)	342	3202	1334	114	3372		1172	1820	1547	879	1729	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	136	1672	87	280	1056	45	314	230	167	76	98	45
RTOR Reduction (vph)	0	0	44	0	2	0	0	0	125	0	14	0
Lane Group Flow (vph)	136	1672	43	280	1099	0	314	230	42	76	129	0
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	68.5	59.8	59.8	76.1	63.8		29.8	29.8	29.8	29.8	29.8	
Effective Green, g (s)	68.5	59.8	59.8	76.1	63.8		29.8	29.8	29.8	29.8	29.8	
Actuated g/C Ratio	0.57	0.50	0.50	0.63	0.53		0.25	0.25	0.25	0.25	0.25	
Clearance Time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	295	1595	664	237	1792		291	451	384	218	429	
v/s Ratio Prot	0.03	0.52		c0.12	0.33			0.13			0.07	
v/s Ratio Perm	0.23		0.03	c0.63			c0.27		0.03	0.09		
v/c Ratio	0.46	1.05	0.07	1.18	0.61		1.08	0.51	0.11	0.35	0.30	
Uniform Delay, d1	13.6	30.1	15.6	39.9	19.5		45.1	38.8	34.9	37.1	36.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	36.4	0.2	116.3	1.6		75.4	0.9	0.1	1.0	0.4	
Delay (s)	14.7	66.5	15.8	156.2	21.1		120.5	39.7	35.0	38.1	37.0	
Level of Service	B	E	B	F	C		F	D	C	D	D	
Approach Delay (s)		60.4			48.5			74.3			37.4	
Approach LOS		E			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	57.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	112.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1626	87	183	909	84	106	38	179	60	48	30
Future Volume (vph)	44	1626	87	183	909	84	106	38	179	60	48	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1394	3172	1517	1729	3307		1695	1820	1547		1660	
Flt Permitted	0.27	1.00	1.00	0.09	1.00		0.62	1.00	1.00		0.84	
Satd. Flow (perm)	390	3172	1517	157	3307		1102	1820	1547		1428	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	1626	87	183	909	84	106	38	179	60	48	30
RTOR Reduction (vph)	0	0	33	0	4	0	0	0	124	0	10	0
Lane Group Flow (vph)	44	1626	54	183	989	0	106	38	55	0	128	0
Heavy Vehicles (%)	24%	9%	2%	0%	3%	6%	2%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	67.7	67.7	67.7	81.5	81.5		15.5	15.5	15.5		15.5	
Effective Green, g (s)	67.7	67.7	67.7	81.5	81.5		15.5	15.5	15.5		15.5	
Actuated g/C Ratio	0.62	0.62	0.62	0.74	0.74		0.14	0.14	0.14		0.14	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	240	1952	933	223	2450		155	256	217		201	
v/s Ratio Prot		0.51		c0.06	0.30			0.02				
v/s Ratio Perm	0.11		0.04	c0.55			c0.10		0.04		0.09	
v/c Ratio	0.18	0.83	0.06	0.82	0.40		0.68	0.15	0.25		0.64	
Uniform Delay, d1	9.2	16.7	8.4	29.2	5.3		44.9	41.5	42.1		44.6	
Progression Factor	0.13	0.17	0.01	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.8	2.1	0.1	20.9	0.5		11.8	0.3	0.6		6.4	
Delay (s)	1.9	4.9	0.2	50.1	5.8		56.7	41.7	42.7		51.0	
Level of Service	A	A	A	D	A		E	D	D		D	
Approach Delay (s)		4.6			12.7			47.2			51.0	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1750	173	82	1060	12	102	0	59	12	0	7
Future Volume (vph)	14	1750	173	82	1060	12	102	0	59	12	0	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		4.9	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1478	3229		1695	3353		1695	1517			1416	
Flt Permitted	0.24	1.00		0.05	1.00		0.75	1.00			0.82	
Satd. Flow (perm)	380	3229		92	3353		1329	1517			1192	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	1750	173	82	1060	12	102	0	59	12	0	7
RTOR Reduction (vph)	0	5	0	0	0	0	0	51	0	0	17	0
Lane Group Flow (vph)	14	1918	0	82	1072	0	102	8	0	0	2	0
Heavy Vehicles (%)	17%	6%	2%	2%	3%	0%	2%	0%	2%	0%	0%	50%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	71.9	71.9		84.6	83.4		14.2	14.2			14.2	
Effective Green, g (s)	71.9	71.9		84.6	83.4		14.2	14.2			14.2	
Actuated g/C Ratio	0.65	0.65		0.77	0.76		0.13	0.13			0.13	
Clearance Time (s)	6.1	6.1		4.9	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	248	2110		166	2542		171	195			153	
v/s Ratio Prot		c0.59		0.03	c0.32			0.01				
v/s Ratio Perm	0.04			0.35			c0.08				0.00	
v/c Ratio	0.06	0.91		0.49	0.42		0.60	0.04			0.02	
Uniform Delay, d1	6.9	16.3		32.3	4.7		45.2	41.9			41.8	
Progression Factor	1.00	1.00		1.05	1.42		1.00	1.00			1.00	
Incremental Delay, d2	0.4	7.2		2.2	0.5		5.5	0.1			0.0	
Delay (s)	7.3	23.5		36.1	7.2		50.7	42.0			41.8	
Level of Service	A	C		D	A		D	D			D	
Approach Delay (s)		23.4			9.2			47.5			41.8	
Approach LOS		C			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	9	1312	11	11	1583
Future Volume (vph)	10	9	1312	11	11	1583
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7	5.9		5.9	5.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1695	1517	3386		1695	3390
Flt Permitted	0.95	1.00	1.00		0.20	1.00
Satd. Flow (perm)	1695	1517	3386		359	3390
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	9	1312	11	11	1583
RTOR Reduction (vph)	0	9	0	0	0	0
Lane Group Flow (vph)	10	0	1323	0	11	1583
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	2.8	2.8	104.5		104.5	104.5
Effective Green, g (s)	2.8	2.8	104.5		104.5	104.5
Actuated g/C Ratio	0.02	0.02	0.88		0.88	0.88
Clearance Time (s)	5.7	5.7	5.9		5.9	5.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	39	35	2975		315	2979
v/s Ratio Prot	c0.01		0.39			c0.47
v/s Ratio Perm		0.00			0.03	
v/c Ratio	0.26	0.01	0.44		0.03	0.53
Uniform Delay, d1	57.0	56.7	1.4		0.9	1.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.5	0.1	0.5		0.2	0.7
Delay (s)	60.5	56.8	1.9		1.1	2.3
Level of Service	E	E	A		A	A
Approach Delay (s)	58.7		1.9			2.3
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	2.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	118.9	Sum of lost time (s)	11.6
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	65	40	21	68	53	24	17	12	37	53	0
Future Volume (Veh/h)	0	65	40	21	68	53	24	17	12	37	53	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	0	65	40	21	68	53	24	17	12	37	53	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	121			105			248	248	85	242	242	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	121			105			248	248	85	242	242	94
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			96	97	99	95	92	100
cM capacity (veh/h)	1467			1486			655	645	974	682	651	962

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	105	142	53	90
Volume Left	0	21	24	37
Volume Right	40	53	12	0
cSH	1467	1486	704	663
Volume to Capacity	0.00	0.01	0.08	0.14
Queue Length 95th (m)	0.0	0.3	1.9	3.7
Control Delay (s)	0.0	1.2	10.5	11.3
Lane LOS		A	B	B
Approach Delay (s)	0.0	1.2	10.5	11.3
Approach LOS			B	B

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	81	145	38	84	191	40
Future Volume (vph)	81	145	38	84	191	40
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	81	145	38	84	191	40

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	226	122	231
Volume Left (vph)	0	38	191
Volume Right (vph)	145	0	40
Hadj (s)	-0.35	0.10	0.10
Departure Headway (s)	4.3	4.9	4.8
Degree Utilization, x	0.27	0.16	0.31
Capacity (veh/h)	787	694	709
Control Delay (s)	8.9	8.8	9.9
Approach Delay (s)	8.9	8.8	9.9
Approach LOS	A	A	A

Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1886	408	84	1073	252	51
Future Volume (vph)	1886	408	84	1073	252	51
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3390	1517	1695	3293	1695	1517
Flt Permitted	1.00	1.00	0.07	1.00	0.95	1.00
Satd. Flow (perm)	3390	1517	120	3293	1695	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1886	408	84	1073	252	51
RTOR Reduction (vph)	0	116	0	0	0	42
Lane Group Flow (vph)	1886	292	84	1073	252	9
Heavy Vehicles (%)	2%	2%	2%	5%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	53.3	53.3	62.5	62.5	15.5	15.5
Effective Green, g (s)	53.3	53.3	62.5	62.5	15.5	15.5
Actuated g/C Ratio	0.59	0.59	0.69	0.69	0.17	0.17
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2007	898	139	2286	291	261
v/s Ratio Prot	c0.56		0.02	c0.33		
v/s Ratio Perm		0.19	0.40		c0.15	0.01
v/c Ratio	0.94	0.32	0.60	0.47	0.87	0.03
Uniform Delay, d1	16.9	9.3	18.0	6.2	36.2	31.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.2	1.0	7.2	0.7	22.6	0.1
Delay (s)	27.0	10.2	25.2	6.9	58.8	31.1
Level of Service	C	B	C	A	E	C
Approach Delay (s)	24.1			8.3	54.1	
Approach LOS	C			A	D	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	517	36	65	1602	79	101	16	157	29	29	77
Future Volume (vph)	53	517	36	65	1602	79	101	16	157	29	29	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	1729	3369		1729	1820	1547	1729	1610	
Flt Permitted	0.08	1.00	1.00	0.39	1.00		0.69	1.00	1.00	0.75	1.00	
Satd. Flow (perm)	148	3202	1334	715	3369		1253	1820	1547	1360	1610	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	53	517	36	65	1602	79	101	16	157	29	29	77
RTOR Reduction (vph)	0	0	18	0	4	0	0	0	116	0	35	0
Lane Group Flow (vph)	53	517	18	65	1677	0	101	16	41	29	71	0
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	52.5	49.9	49.9	53.1	53.1		26.3	26.3	26.3	26.3	26.3	
Effective Green, g (s)	52.5	49.9	49.9	53.1	53.1		26.3	26.3	26.3	26.3	26.3	
Actuated g/C Ratio	0.52	0.50	0.50	0.53	0.53		0.26	0.26	0.26	0.26	0.26	
Clearance Time (s)	4.0	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	131	1597	665	437	1788		329	478	406	357	423	
v/s Ratio Prot	c0.01	0.16		0.01	c0.50			0.01			0.04	
v/s Ratio Perm	0.20		0.01	0.07			c0.08		0.03	0.02		
v/c Ratio	0.40	0.32	0.03	0.15	0.94		0.31	0.03	0.10	0.08	0.17	
Uniform Delay, d1	34.0	15.0	12.7	11.7	21.9		29.5	27.4	27.9	27.8	28.4	
Progression Factor	0.38	0.31	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.0	0.1	0.0	0.2	10.0		2.4	0.1	0.5	0.4	0.9	
Delay (s)	14.8	4.8	12.7	11.9	31.9		31.9	27.5	28.4	28.2	29.3	
Level of Service	B	A	B	B	C		C	C	C	C	C	
Approach Delay (s)		6.1			31.1			29.7			29.0	
Approach LOS		A			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	520	38	60	1585	33	22	5	40	47	12	48
Future Volume (vph)	11	520	38	60	1585	33	22	5	40	47	12	48
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1394	3172	1419	1729	3345		1662	1820	1547		1582	
Flt Permitted	0.13	1.00	1.00	0.39	1.00		0.72	1.00	1.00		0.87	
Satd. Flow (perm)	188	3172	1419	702	3345		1263	1820	1547		1414	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	11	520	38	60	1585	33	22	5	40	47	12	48
RTOR Reduction (vph)	0	0	26	0	2	0	0	0	28	0	21	0
Lane Group Flow (vph)	11	520	12	60	1616	0	22	5	12	0	86	0
Heavy Vehicles (%)	24%	9%	9%	0%	3%	6%	4%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	31.2	31.2	31.2	58.0	58.0		29.0	29.0	29.0		29.0	
Effective Green, g (s)	31.2	31.2	31.2	58.0	58.0		29.0	29.0	29.0		29.0	
Actuated g/C Ratio	0.31	0.31	0.31	0.58	0.58		0.29	0.29	0.29		0.29	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	58	989	442	617	1940		366	527	448		410	
v/s Ratio Prot		0.16		0.02	c0.48			0.00				
v/s Ratio Perm	0.06		0.01	0.04			0.02		0.01		c0.06	
v/c Ratio	0.19	0.53	0.03	0.10	0.83		0.06	0.01	0.03		0.21	
Uniform Delay, d1	25.2	28.3	23.9	12.4	17.1		25.7	25.3	25.4		26.8	
Progression Factor	0.74	0.77	1.00	0.22	0.16		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	0.5	0.0	0.0	1.6		0.3	0.0	0.1		1.2	
Delay (s)	20.1	22.4	23.9	2.7	4.2		26.0	25.3	25.5		28.0	
Level of Service	C	C	C	A	A		C	C	C		C	
Approach Delay (s)		22.5			4.2			25.6			28.0	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	584	58	19	1444	3	155	0	69	0	0	5
Future Volume (vph)	3	584	58	19	1444	3	155	0	69	0	0	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1478	3229		1695	3389		1695	1517			1050	
Flt Permitted	0.12	1.00		0.39	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	189	3229		699	3389		1346	1517			1050	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	584	58	19	1444	3	155	0	69	0	0	5
RTOR Reduction (vph)	0	7	0	0	0	0	0	52	0	0	4	0
Lane Group Flow (vph)	3	635	0	19	1447	0	155	17	0	0	1	0
Heavy Vehicles (%)	17%	6%	2%	2%	2%	0%	2%	0%	2%	0%	0%	50%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	62.9	62.9		62.9	62.9		24.7	24.7			24.7	
Effective Green, g (s)	62.9	62.9		62.9	62.9		24.7	24.7			24.7	
Actuated g/C Ratio	0.63	0.63		0.63	0.63		0.25	0.25			0.25	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	118	2031		439	2131		332	374			259	
v/s Ratio Prot		0.20			c0.43			0.01			0.00	
v/s Ratio Perm	0.02			0.03			c0.12					
v/c Ratio	0.03	0.31		0.04	0.68		0.47	0.05			0.00	
Uniform Delay, d1	7.0	8.6		7.1	12.0		32.0	28.7			28.4	
Progression Factor	1.00	1.00		0.14	0.26		1.00	1.00			1.00	
Incremental Delay, d2	0.4	0.4		0.1	1.0		4.7	0.2			0.0	
Delay (s)	7.4	9.0		1.1	4.2		36.7	28.9			28.4	
Level of Service	A	A		A	A		D	C			C	
Approach Delay (s)		9.0			4.2			34.3			28.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	1	18	11	1	11	8	1580	8	8	718	44
Future Volume (vph)	102	1	18	11	1	11	8	1580	8	8	718	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.86		1.00	0.86		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1695	1531		1695	1539		1695	3388		1695	3390	1517
Flt Permitted	0.75	1.00		0.75	1.00		0.38	1.00		0.11	1.00	1.00
Satd. Flow (perm)	1338	1531		1329	1539		676	3388		202	3390	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	102	1	18	11	1	11	8	1580	8	8	718	44
RTOR Reduction (vph)	0	15	0	0	9	0	0	0	0	0	0	14
Lane Group Flow (vph)	102	4	0	11	3	0	8	1588	0	8	718	30
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	9.1	9.1		9.1	9.1		42.3	42.3		42.3	42.3	42.3
Effective Green, g (s)	9.1	9.1		9.1	9.1		42.3	42.3		42.3	42.3	42.3
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.67	0.67		0.67	0.67	0.67
Clearance Time (s)	5.7	5.7		5.7	5.7		5.9	5.9		5.9	5.9	5.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	193	221		191	222		453	2274		135	2276	1018
v/s Ratio Prot		0.00			0.00			c0.47			0.21	
v/s Ratio Perm	c0.08			0.01			0.01			0.04		0.02
v/c Ratio	0.53	0.02		0.06	0.01		0.02	0.70		0.06	0.32	0.03
Uniform Delay, d1	25.0	23.1		23.3	23.1		3.4	6.4		3.5	4.3	3.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.6	0.0		0.1	0.0		0.0	1.0		0.2	0.1	0.0
Delay (s)	27.6	23.1		23.4	23.1		3.5	7.4		3.7	4.4	3.5
Level of Service	C	C		C	C		A	A		A	A	A
Approach Delay (s)		26.9			23.2			7.3			4.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	63.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	61	23	6	64	52	53	19	14	21	22	0
Future Volume (Veh/h)	0	61	23	6	64	52	53	19	14	21	22	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	0	61	23	6	64	52	53	19	14	21	22	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	116			84			186	200	72	198	186	90
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116			84			186	200	72	198	186	90
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			93	97	99	97	97	100
cM capacity (veh/h)	1473			1513			755	693	990	732	706	968

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	84	122	86	43
Volume Left	0	6	53	21
Volume Right	23	52	14	0
cSH	1473	1513	769	718
Volume to Capacity	0.00	0.00	0.11	0.06
Queue Length 95th (m)	0.0	0.1	3.0	1.5
Control Delay (s)	0.0	0.4	10.3	10.3
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.4	10.3	10.3
Approach LOS			B	B

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	31	194	33	64	76	27
Future Volume (vph)	31	194	33	64	76	27
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	31	194	33	64	76	27

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	225	97	103
Volume Left (vph)	0	33	76
Volume Right (vph)	194	0	27
Hadj (s)	-0.48	0.10	0.02
Departure Headway (s)	3.8	4.5	4.6
Degree Utilization, x	0.24	0.12	0.13
Capacity (veh/h)	925	770	733
Control Delay (s)	7.9	8.1	8.3
Approach Delay (s)	7.9	8.1	8.3
Approach LOS	A	A	A

Intersection Summary			
Delay	8.1		
Level of Service	A		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	621	150	8	1557	461	23
Future Volume (vph)	621	150	8	1557	461	23
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3390	1517	1695	3390	1695	1517
Flt Permitted	1.00	1.00	0.38	1.00	0.95	1.00
Satd. Flow (perm)	3390	1517	678	3390	1695	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	621	150	8	1557	461	23
RTOR Reduction (vph)	0	82	0	0	0	16
Lane Group Flow (vph)	621	68	8	1557	461	7
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	36.3	36.3	44.6	44.6	23.4	23.4
Effective Green, g (s)	36.3	36.3	44.6	44.6	23.4	23.4
Actuated g/C Ratio	0.45	0.45	0.56	0.56	0.29	0.29
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1538	688	407	1889	495	443
v/s Ratio Prot	0.18		0.00	c0.46		
v/s Ratio Perm		0.04	0.01		c0.27	0.00
v/c Ratio	0.40	0.10	0.02	0.82	0.93	0.02
Uniform Delay, d1	14.6	12.5	9.7	14.5	27.5	20.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.3	0.0	4.2	24.4	0.0
Delay (s)	15.4	12.8	9.7	18.7	52.0	20.1
Level of Service	B	B	A	B	D	C
Approach Delay (s)	14.9			18.7	50.5	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	517	36	65	1602	79	101	16	157	29	29	77
Future Volume (vph)	53	517	36	65	1602	79	101	16	157	29	29	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.6	6.6	4.7	6.4		4.5	6.8	6.8	4.5	6.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	3354	3369		3354	1820	1547	1729	1610	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1729	3202	1334	3354	3369		3354	1820	1547	1729	1610	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	53	517	36	65	1602	79	101	16	157	29	29	77
RTOR Reduction (vph)	0	0	16	0	2	0	0	0	132	0	67	0
Lane Group Flow (vph)	53	517	20	65	1679	0	101	16	25	29	39	0
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	8.0	69.5	69.5	8.0	69.9		8.1	20.1	20.1	4.8	16.8	
Effective Green, g (s)	8.0	69.5	69.5	8.0	69.9		8.1	20.1	20.1	4.8	16.8	
Actuated g/C Ratio	0.06	0.56	0.56	0.06	0.56		0.06	0.16	0.16	0.04	0.13	
Clearance Time (s)	4.5	6.6	6.6	4.7	6.4		4.5	6.8	6.8	4.5	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	110	1780	741	214	1883		217	292	248	66	216	
v/s Ratio Prot	c0.03	0.16		0.02	c0.50		c0.03	0.01		0.02	c0.02	
v/s Ratio Perm			0.02						c0.02			
v/c Ratio	0.48	0.29	0.03	0.30	0.89		0.47	0.05	0.10	0.44	0.18	
Uniform Delay, d1	56.5	14.7	12.5	55.8	24.2		56.4	44.4	44.7	58.8	48.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.3	0.4	0.1	0.8	6.9		1.6	0.1	0.2	4.6	0.4	
Delay (s)	59.8	15.1	12.6	56.6	31.1		57.9	44.5	44.9	63.4	48.4	
Level of Service	E	B	B	E	C		E	D	D	E	D	
Approach Delay (s)		18.9			32.1			49.7			51.6	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	22.6
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	1681	154	329	1059	45	342	232	157	77	99	46
Future Volume (vph)	138	1681	154	329	1059	45	342	232	157	77	99	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	1729	3372		1729	1820	1547	1729	1728	
Flt Permitted	0.12	1.00	1.00	0.07	1.00		0.63	1.00	1.00	0.48	1.00	
Satd. Flow (perm)	214	3202	1334	136	3372		1153	1820	1547	877	1728	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	1681	154	329	1059	45	342	232	157	77	99	46
RTOR Reduction (vph)	0	0	80	0	2	0	0	0	116	0	13	0
Lane Group Flow (vph)	138	1681	74	329	1102	0	342	232	41	77	132	0
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	62.4	62.4	62.4	68.9	67.2		34.2	34.2	34.2	34.2	34.2	
Effective Green, g (s)	62.4	62.4	62.4	68.9	67.2		34.2	34.2	34.2	34.2	34.2	
Actuated g/C Ratio	0.48	0.48	0.48	0.53	0.52		0.26	0.26	0.26	0.26	0.26	
Clearance Time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	229	1536	640	259	1743		303	478	406	230	454	
v/s Ratio Prot	0.05	c0.53		c0.15	0.33			0.13			0.08	
v/s Ratio Perm	0.24		0.06	c0.52			c0.30		0.03	0.09		
v/c Ratio	0.60	1.09	0.12	1.27	0.63		1.13	0.49	0.10	0.33	0.29	
Uniform Delay, d1	23.4	33.8	18.6	51.2	22.5		47.9	40.5	36.3	38.7	38.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.4	53.3	0.4	148.4	1.8		91.1	0.8	0.1	0.9	0.4	
Delay (s)	27.8	87.1	19.0	199.6	24.3		139.0	41.2	36.4	39.6	38.6	
Level of Service	C	F	B	F	C		F	D	D	D	D	
Approach Delay (s)		77.6			64.5			85.9			38.9	
Approach LOS		E			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	72.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	117.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	1670	88	186	934	85	107	42	182	61	48	30
Future Volume (vph)	45	1670	88	186	934	85	107	42	182	61	48	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1394	3172	1419	1729	3307		1662	1820	1547		1660	
Flt Permitted	0.26	1.00	1.00	0.08	1.00		0.62	1.00	1.00		0.84	
Satd. Flow (perm)	377	3172	1419	141	3307		1081	1820	1547		1423	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	45	1670	88	186	934	85	107	42	182	61	48	30
RTOR Reduction (vph)	0	0	34	0	4	0	0	0	125	0	10	0
Lane Group Flow (vph)	45	1670	54	186	1015	0	107	42	57	0	129	0
Heavy Vehicles (%)	24%	9%	9%	0%	3%	6%	4%	0%	0%	6%	0%	7%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	67.3	67.3	67.3	81.3	81.3		15.7	15.7	15.7		15.7	
Effective Green, g (s)	67.3	67.3	67.3	81.3	81.3		15.7	15.7	15.7		15.7	
Actuated g/C Ratio	0.61	0.61	0.61	0.74	0.74		0.14	0.14	0.14		0.14	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3		6.7	6.7	6.7		6.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	230	1940	868	215	2444		154	259	220		203	
v/s Ratio Prot		0.53		c0.06	0.31			0.02				
v/s Ratio Perm	0.12		0.04	c0.58			c0.10		0.04		0.09	
v/c Ratio	0.20	0.86	0.06	0.87	0.42		0.69	0.16	0.26		0.63	
Uniform Delay, d1	9.4	17.5	8.6	30.7	5.4		44.9	41.4	42.0		44.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.9	5.3	0.1	28.4	0.5		12.8	0.3	0.6		6.3	
Delay (s)	11.3	22.8	8.8	59.1	5.9		57.6	41.7	42.6		50.8	
Level of Service	B	C	A	E	A		E	D	D		D	
Approach Delay (s)		21.8			14.1			47.3			50.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1803	173	72	1092	12	102	0	53	12	0	7
Future Volume (vph)	14	1803	173	72	1092	12	102	0	53	12	0	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.1	6.1		4.9	6.1		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)	1478	3230		1695	3385		1695	1517			1416	
Flt Permitted	0.26	1.00		0.06	1.00		0.75	1.00			0.82	
Satd. Flow (perm)	402	3230		99	3385		1329	1517			1193	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	1803	173	72	1092	12	102	0	53	12	0	7
RTOR Reduction (vph)	0	5	0	0	0	0	0	46	0	0	17	0
Lane Group Flow (vph)	14	1971	0	72	1104	0	102	7	0	0	2	0
Heavy Vehicles (%)	17%	6%	2%	2%	2%	0%	2%	0%	2%	0%	0%	50%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	67.4	67.4		78.9	78.9		13.7	13.7			13.7	
Effective Green, g (s)	67.4	67.4		78.9	78.9		13.7	13.7			13.7	
Actuated g/C Ratio	0.64	0.64		0.75	0.75		0.13	0.13			0.13	
Clearance Time (s)	6.1	6.1		4.9	6.1		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	258	2073		174	2543		173	197			155	
v/s Ratio Prot		c0.61		0.03	c0.33			0.00				
v/s Ratio Perm	0.03			0.28			c0.08				0.00	
v/c Ratio	0.05	0.95		0.41	0.43		0.59	0.04			0.02	
Uniform Delay, d1	7.0	17.3		18.9	4.8		43.0	39.9			39.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.1	10.5		1.6	0.1		5.1	0.1			0.0	
Delay (s)	7.1	27.8		20.4	4.9		48.1	39.9			39.8	
Level of Service	A	C		C	A		D	D			D	
Approach Delay (s)		27.6			5.9			45.3			39.8	
Approach LOS		C			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	82.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	1	13	10	1	9	18	1365	11	11	1605	104
Future Volume (vph)	73	1	13	10	1	9	18	1365	11	11	1605	104
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.7	5.7		5.7	5.7		5.9	5.9		5.9	5.9	5.9
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.86		1.00	0.86		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1695	1536		1695	1543		1695	3386		1695	3390	1517
Flt Permitted	0.75	1.00		0.75	1.00		0.12	1.00		0.17	1.00	1.00
Satd. Flow (perm)	1340	1536		1335	1543		209	3386		295	3390	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	73	1	13	10	1	9	18	1365	11	11	1605	104
RTOR Reduction (vph)	0	11	0	0	8	0	0	0	0	0	0	31
Lane Group Flow (vph)	73	3	0	10	2	0	18	1376	0	11	1605	73
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	7.9	7.9		7.9	7.9		45.6	45.6		45.6	45.6	45.6
Effective Green, g (s)	7.9	7.9		7.9	7.9		45.6	45.6		45.6	45.6	45.6
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.70	0.70		0.70	0.70	0.70
Clearance Time (s)	5.7	5.7		5.7	5.7		5.9	5.9		5.9	5.9	5.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	162	186		162	187		146	2371		206	2374	1062
v/s Ratio Prot		0.00			0.00			0.41			c0.47	
v/s Ratio Perm	c0.05			0.01			0.09			0.04		0.05
v/c Ratio	0.45	0.01		0.06	0.01		0.12	0.58		0.05	0.68	0.07
Uniform Delay, d1	26.6	25.2		25.3	25.2		3.2	4.9		3.0	5.5	3.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.0	0.0		0.2	0.0		0.4	0.4		0.1	0.8	0.0
Delay (s)	28.6	25.2		25.5	25.2		3.6	5.3		3.1	6.3	3.1
Level of Service	C	C		C	C		A	A		A	A	A
Approach Delay (s)		28.0			25.3			5.3			6.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	65.1	Sum of lost time (s)	11.6
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	0	86	58	23	84	55	37	13	13	21	22	0
Future Volume (Veh/h)	0	86	58	23	84	55	37	13	13	21	22	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	0	86	58	23	84	55	37	13	13	21	22	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	139			144			284	300	115	292	302	112
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	139			144			284	300	115	292	302	112
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			94	98	99	97	96	100
cM capacity (veh/h)	1445			1438			642	603	937	633	601	942

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	144	162	63	43
Volume Left	0	23	37	21
Volume Right	58	55	13	0
cSH	1445	1438	677	616
Volume to Capacity	0.00	0.02	0.09	0.07
Queue Length 95th (m)	0.0	0.4	2.4	1.8
Control Delay (s)	0.0	1.2	10.9	11.3
Lane LOS		A	B	B
Approach Delay (s)	0.0	1.2	10.9	11.3
Approach LOS			B	B

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	69	145	38	62	191	39
Future Volume (vph)	69	145	38	62	191	39
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	69	145	38	62	191	39

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	214	100	230
Volume Left (vph)	0	38	191
Volume Right (vph)	145	0	39
Hadj (s)	-0.37	0.11	0.10
Departure Headway (s)	4.2	4.8	4.7
Degree Utilization, x	0.25	0.13	0.30
Capacity (veh/h)	798	696	724
Control Delay (s)	8.7	8.6	9.7
Approach Delay (s)	8.7	8.6	9.7
Approach LOS	A	A	A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1942	408	81	1108	252	49
Future Volume (vph)	1942	408	81	1108	252	49
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3390	1517	1695	3390	1695	1517
Flt Permitted	1.00	1.00	0.06	1.00	0.95	1.00
Satd. Flow (perm)	3390	1517	98	3390	1695	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1942	408	81	1108	252	49
RTOR Reduction (vph)	0	88	0	0	0	40
Lane Group Flow (vph)	1942	320	81	1108	252	9
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	2		1	6		
Permitted Phases		2	6		8	8
Actuated Green, G (s)	66.7	66.7	78.6	78.6	19.4	19.4
Effective Green, g (s)	66.7	66.7	78.6	78.6	19.4	19.4
Actuated g/C Ratio	0.61	0.61	0.71	0.71	0.18	0.18
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2055	919	155	2422	298	267
v/s Ratio Prot	c0.57		0.03	c0.33		
v/s Ratio Perm		0.21	0.34		c0.15	0.01
v/c Ratio	0.95	0.35	0.52	0.46	0.85	0.03
Uniform Delay, d1	20.0	10.8	22.6	6.7	43.9	37.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.6	1.0	3.2	0.6	19.3	0.0
Delay (s)	30.5	11.8	25.8	7.3	63.1	37.6
Level of Service	C	B	C	A	E	D
Approach Delay (s)	27.3			8.5	59.0	
Approach LOS	C			A	E	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	1681	154	329	1059	45	342	232	157	77	99	46
Future Volume (vph)	138	1681	154	329	1059	45	342	232	157	77	99	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1729	3202	1334	3354	3372		3354	1820	1547	3354	1728	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1729	3202	1334	3354	3372		3354	1820	1547	3354	1728	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	1681	154	329	1059	45	342	232	157	77	99	46
RTOR Reduction (vph)	0	0	74	0	2	0	0	0	128	0	12	0
Lane Group Flow (vph)	138	1681	80	329	1102	0	342	232	29	77	133	0
Heavy Vehicles (%)	0%	8%	16%	0%	2%	0%	0%	0%	0%	0%	0%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	17.5	73.2	73.2	10.3	66.4		20.0	26.4	26.4	10.2	16.6	
Effective Green, g (s)	17.5	73.2	73.2	10.3	66.4		20.0	26.4	26.4	10.2	16.6	
Actuated g/C Ratio	0.12	0.50	0.50	0.07	0.46		0.14	0.18	0.18	0.07	0.11	
Clearance Time (s)	4.5	6.6	6.6	4.7	6.4		6.8	6.8	6.8	6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	208	1616	673	238	1544		462	331	281	235	197	
v/s Ratio Prot	0.08	c0.53		c0.10	0.33		c0.10	c0.13		0.02	0.08	
v/s Ratio Perm			0.06						0.02			
v/c Ratio	0.66	1.04	0.12	1.38	0.71		0.74	0.70	0.10	0.33	0.67	
Uniform Delay, d1	60.9	35.9	18.9	67.3	31.7		60.0	55.6	49.4	64.1	61.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.7	33.6	0.4	196.1	2.8		6.3	6.6	0.2	0.8	8.7	
Delay (s)	68.7	69.5	19.3	263.4	34.5		66.3	62.2	49.6	65.0	70.3	
Level of Service	E	E	B	F	C		E	E	D	E	E	
Approach Delay (s)		65.5			87.1			61.4			68.5	
Approach LOS		E			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	72.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	24.9
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

MOVEMENT SUMMARY

Site: 2037 Design 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: Fern Casey											
3	L2	186	2.0	0.194	10.7	LOS B	0.8	6.1	0.37	0.68	53.2
8	T1	20	3.0	0.194	5.4	LOS A	0.8	6.1	0.37	0.68	52.8
18	R2	290	2.0	0.241	5.2	LOS A	1.0	8.1	0.37	0.58	58.4
Approach		496	2.0	0.241	7.3	LOS A	1.0	8.1	0.37	0.62	56.5
East: Brian Coburn											
1	L2	193	2.0	0.347	10.8	LOS B	1.7	13.1	0.44	0.62	57.7
6	T1	581	2.0	0.347	5.3	LOS A	1.7	13.2	0.43	0.54	60.0
16	R2	35	3.0	0.347	5.4	LOS A	1.7	13.2	0.43	0.50	58.8
Approach		809	2.0	0.347	6.6	LOS A	1.7	13.2	0.43	0.56	59.4
North: Fern Casey											
7	L2	89	3.0	0.168	13.0	LOS B	0.6	4.3	0.59	0.86	56.8
4	T1	11	3.0	0.168	7.7	LOS A	0.6	4.3	0.59	0.86	51.5
14	R2	127	3.0	0.190	7.0	LOS A	0.6	5.0	0.59	0.78	57.1
Approach		227	3.0	0.190	9.4	LOS A	0.6	5.0	0.59	0.81	56.8
West: Brian Coburn											
5	L2	47	3.0	0.154	10.7	LOS B	0.6	4.7	0.39	0.59	57.5
2	T1	108	2.0	0.154	5.6	LOS A	0.6	4.7	0.39	0.59	59.5
12	R2	234	2.0	0.201	5.3	LOS A	0.8	6.4	0.39	0.60	55.2
Approach		389	2.1	0.201	6.0	LOS A	0.8	6.4	0.39	0.60	57.1
All Vehicles		1921	2.2	0.347	7.0	LOS A	1.7	13.2	0.43	0.61	58.1

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2037 Design AM - Mer Bleue / Brian Coburn (4-lane)

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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	25	2.0	0.393	12.3	LOS B	1.8	13.6	0.61	0.62	59.9
8	T1	638	2.0	0.393	6.0	LOS A	1.8	13.9	0.60	0.60	58.1
18	R2	117	2.0	0.393	5.7	LOS A	1.8	13.9	0.59	0.57	56.5
Approach		780	2.0	0.393	6.2	LOS A	1.8	13.9	0.60	0.60	58.0
East: Brian Coburn											
1	L2	59	2.0	0.704	15.5	LOS B	4.4	33.9	0.82	1.00	56.1
6	T1	603	2.0	0.704	9.2	LOS A	4.7	36.5	0.82	0.99	58.9
16	R2	538	2.0	0.704	8.2	LOS A	4.7	36.5	0.82	0.97	56.0
Approach		1200	2.0	0.704	9.0	LOS A	4.7	36.5	0.82	0.98	57.7
North: Mer Bleue											
7	L2	165	2.0	0.368	12.3	LOS B	1.7	13.0	0.65	0.78	56.6
4	T1	318	2.0	0.368	6.0	LOS A	1.7	13.5	0.64	0.67	57.4
14	R2	181	2.0	0.368	5.6	LOS A	1.7	13.5	0.64	0.60	58.9
Approach		664	2.0	0.368	7.5	LOS A	1.7	13.5	0.64	0.68	57.7
West: Brian Coburn											
5	L2	268	2.0	0.244	11.3	LOS B	1.0	8.0	0.52	0.75	57.4
2	T1	195	2.0	0.244	5.7	LOS A	1.0	8.0	0.54	0.55	60.5
12	R2	32	2.0	0.244	5.8	LOS A	1.0	7.7	0.54	0.55	58.7
Approach		495	2.0	0.244	8.7	LOS A	1.0	8.0	0.53	0.66	58.6
All Vehicles		3139	2.0	0.704	7.9	LOS A	4.7	36.5	0.68	0.77	57.9

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2037 Design AM - Fern Casey / Frank Bender

New Site
Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
Movement Performance - Vehicles											
South: Fern Casey St											
3	L2	35	3.0	0.051	7.3	LOS A	0.3	2.0	0.05	0.47	48.1
8	T1	43	3.0	0.051	2.8	LOS A	0.3	2.0	0.05	0.47	47.9
Approach		78	3.0	0.051	4.8	LOS A	0.3	2.0	0.05	0.47	48.0
North: Fern Casey St											
4	T1	77	3.0	0.060	4.9	LOS A	0.3	2.2	0.13	0.42	59.5
14	R2	5	3.0	0.060	4.5	LOS A	0.3	2.2	0.13	0.42	58.0
Approach		82	3.0	0.060	4.8	LOS A	0.3	2.2	0.13	0.42	59.4
West: Frank Bender St											
5	L2	7	3.0	0.076	9.8	LOS A	0.4	2.9	0.22	0.50	59.0
12	R2	90	3.0	0.076	4.7	LOS A	0.4	2.9	0.22	0.50	57.7
Approach		97	3.0	0.076	5.1	LOS A	0.4	2.9	0.22	0.50	57.8
All Vehicles		257	3.0	0.076	4.9	LOS A	0.4	2.9	0.14	0.47	54.8

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: 2037 Design PM - Fern Casey / Frank Bender

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
1	L2	88	0.0	0.112	7.4	LOS A	0.6	4.1	0.09	0.48	47.9
2	T1	85	0.0	0.112	2.9	LOS A	0.6	4.1	0.09	0.48	47.7
Approach		173	0.0	0.112	5.1	LOS A	0.6	4.1	0.09	0.48	47.8
North: Fern Casey											
8	T1	59	0.0	0.056	4.5	LOS A	0.3	1.8	0.22	0.42	55.9
9	R2	13	0.0	0.056	4.3	LOS A	0.3	1.8	0.22	0.42	54.5
Approach		72	0.0	0.056	4.4	LOS A	0.3	1.8	0.22	0.42	55.6
West: Frank Bender											
10	L2	18	0.0	0.060	9.0	LOS A	0.3	2.1	0.18	0.50	55.5
12	R2	62	0.0	0.060	4.1	LOS A	0.3	2.1	0.18	0.50	54.2
Approach		80	0.0	0.060	5.2	LOS A	0.3	2.1	0.18	0.50	54.5
All Vehicles		325	0.0	0.112	5.0	LOS A	0.6	4.1	0.14	0.47	50.9

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 2037 Design PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	127	2.0	0.176	11.4	LOS B	0.7	5.2	0.47	0.74	53.0
8	T1	22	3.0	0.176	6.2	LOS A	0.7	5.2	0.47	0.74	52.7
18	R2	314	2.0	0.287	5.7	LOS A	1.3	9.7	0.48	0.64	58.0
Approach		463	2.0	0.287	7.2	LOS A	1.3	9.7	0.48	0.68	56.7
East: Brian Coburn											
1	L2	297	2.0	0.279	10.8	LOS B	1.2	9.5	0.42	0.71	56.1
6	T1	249	2.0	0.279	5.3	LOS A	1.2	9.6	0.41	0.53	60.5
16	R2	90	3.0	0.279	5.4	LOS A	1.2	9.6	0.41	0.52	59.0
Approach		636	2.1	0.279	7.9	LOS A	1.2	9.6	0.41	0.61	58.3
North: Fern Casey											
7	L2	61	3.0	0.108	11.9	LOS B	0.4	2.8	0.51	0.78	57.9
4	T1	22	3.0	0.108	6.5	LOS A	0.4	2.8	0.51	0.78	53.1
14	R2	78	3.0	0.104	6.4	LOS A	0.3	2.7	0.51	0.72	57.5
Approach		161	3.0	0.108	8.5	LOS A	0.4	2.8	0.51	0.75	57.2
West: Brian Coburn											
5	L2	124	3.0	0.287	11.0	LOS B	1.2	9.6	0.48	0.66	56.7
2	T1	204	2.0	0.287	5.8	LOS A	1.2	9.6	0.48	0.65	59.2
12	R2	278	2.0	0.287	5.6	LOS A	1.2	9.6	0.47	0.63	54.7
Approach		606	2.2	0.287	6.8	LOS A	1.2	9.6	0.48	0.64	57.1
All Vehicles		1866	2.2	0.287	7.4	LOS A	1.3	9.7	0.46	0.65	57.5

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2037 Design 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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	52	2.0	0.639	15.3	LOS B	3.3	25.2	0.81	0.96	58.7
8	T1	745	2.0	0.639	8.4	LOS A	3.6	27.5	0.81	0.88	56.7
18	R2	137	2.0	0.639	7.6	LOS A	3.6	27.5	0.80	0.82	55.3
Approach		934	2.0	0.639	8.7	LOS A	3.6	27.5	0.80	0.88	56.7
East: Brian Coburn											
1	L2	68	2.0	0.476	13.8	LOS B	2.1	16.5	0.73	0.82	56.2
6	T1	288	2.0	0.476	7.7	LOS A	2.3	17.7	0.73	0.81	59.0
16	R2	356	2.0	0.476	6.8	LOS A	2.3	17.7	0.73	0.78	56.5
Approach		712	2.0	0.476	7.8	LOS A	2.3	17.7	0.73	0.80	57.7
North: Mer Bleue											
7	L2	683	2.0	0.744	14.1	LOS B	7.3	56.3	0.86	0.99	54.2
4	T1	606	2.0	0.744	7.4	LOS A	7.6	58.8	0.85	0.84	56.6
14	R2	348	2.0	0.744	7.3	LOS A	7.6	58.8	0.85	0.82	58.0
Approach		1637	2.0	0.744	10.2	LOS B	7.6	58.8	0.86	0.90	56.0
West: Brian Coburn											
5	L2	297	2.0	0.441	12.7	LOS B	2.0	15.5	0.76	0.88	56.9
2	T1	204	2.0	0.441	8.0	LOS A	2.0	15.5	0.79	0.82	59.1
12	R2	34	2.0	0.441	8.3	LOS A	1.8	14.1	0.80	0.81	57.6
Approach		535	2.0	0.441	10.7	LOS B	2.0	15.5	0.78	0.85	57.8
All Vehicles		3818	2.0	0.744	9.4	LOS A	7.6	58.8	0.81	0.87	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Design AM - Fern Casey / Frank Bender

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
1	L2	35	0.0	0.106	7.5	LOS A	0.6	4.0	0.19	0.40	48.3
2	T1	112	0.0	0.106	3.0	LOS A	0.6	4.0	0.19	0.40	48.1
Approach		147	0.0	0.106	4.1	LOS A	0.6	4.0	0.19	0.40	48.1
North: Fern Casey											
8	T1	219	0.0	0.151	4.2	LOS A	0.8	5.7	0.14	0.39	56.2
9	R2	5	0.0	0.151	4.0	LOS A	0.8	5.7	0.14	0.39	54.9
Approach		224	0.0	0.151	4.2	LOS A	0.8	5.7	0.14	0.39	56.2
West: Frank Bender											
10	L2	53	0.0	0.123	9.8	LOS A	0.6	4.4	0.38	0.58	54.3
12	R2	90	0.0	0.123	4.9	LOS A	0.6	4.4	0.38	0.58	53.1
Approach		143	0.0	0.123	6.7	LOS A	0.6	4.4	0.38	0.58	53.5
All Vehicles		514	0.0	0.151	4.9	LOS A	0.8	5.7	0.22	0.45	52.9

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 2042 Design 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	189	2.0	0.206	10.9	LOS B	0.8	6.4	0.41	0.71	53.0
8	T1	20	3.0	0.206	5.7	LOS A	0.8	6.4	0.41	0.71	52.7
18	R2	296	2.0	0.255	5.4	LOS A	1.1	8.5	0.41	0.62	58.2
Approach		505	2.0	0.255	7.5	LOS A	1.1	8.5	0.41	0.65	56.4
East: Brian Coburn											
1	L2	198	2.0	0.373	10.9	LOS B	1.8	14.2	0.47	0.64	57.7
6	T1	603	2.0	0.373	5.4	LOS A	1.9	14.4	0.46	0.56	59.9
16	R2	50	3.0	0.373	5.5	LOS A	1.9	14.4	0.46	0.51	58.7
Approach		851	2.1	0.373	6.7	LOS A	1.9	14.4	0.46	0.57	59.3
North: RoadName											
7	L2	121	3.0	0.234	13.4	LOS B	0.8	6.1	0.63	0.87	56.5
4	T1	11	3.0	0.234	8.0	LOS A	0.8	6.1	0.63	0.87	51.1
14	R2	181	3.0	0.277	7.3	LOS A	1.0	7.6	0.62	0.80	56.9
Approach		313	3.0	0.277	9.7	LOS A	1.0	7.6	0.63	0.83	56.6
West: Brian Coburn											
5	L2	72	3.0	0.182	10.8	LOS B	0.7	5.6	0.42	0.62	57.1
2	T1	112	2.0	0.182	5.6	LOS A	0.7	5.6	0.42	0.62	59.2
12	R2	241	2.0	0.211	5.4	LOS A	0.9	6.7	0.41	0.62	55.1
Approach		425	2.2	0.211	6.4	LOS A	0.9	6.7	0.41	0.62	56.9
All Vehicles		2094	2.2	0.373	7.3	LOS A	1.9	14.4	0.47	0.64	57.9

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Design AM - Mer Bleue / Brian Coburn (4-lane)

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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	31	2.0	0.410	12.5	LOS B	1.9	14.5	0.62	0.65	59.8
8	T1	647	2.0	0.410	6.2	LOS A	1.9	14.9	0.61	0.62	58.0
18	R2	121	2.0	0.410	5.8	LOS A	1.9	14.9	0.61	0.59	56.4
Approach		799	2.0	0.410	6.4	LOS A	1.9	14.9	0.61	0.62	57.9
East: Brian Coburn											
1	L2	61	2.0	0.744	16.1	LOS B	4.9	38.0	0.84	1.03	55.5
6	T1	634	2.0	0.744	9.8	LOS A	5.3	41.2	0.84	1.02	58.5
16	R2	559	2.0	0.744	8.6	LOS A	5.3	41.2	0.85	1.01	55.6
Approach		1254	2.0	0.744	9.6	LOS A	5.3	41.2	0.85	1.02	57.3
North: Mer Bleue											
7	L2	169	2.0	0.387	12.5	LOS B	1.8	13.9	0.67	0.79	56.5
4	T1	324	2.0	0.387	6.1	LOS A	1.9	14.5	0.66	0.69	57.2
14	R2	186	2.0	0.387	5.8	LOS A	1.9	14.5	0.66	0.62	58.8
Approach		679	2.0	0.387	7.6	LOS A	1.9	14.5	0.66	0.69	57.6
West: Brian Coburn											
5	L2	272	2.0	0.267	11.3	LOS B	1.1	8.9	0.54	0.75	57.6
2	T1	218	2.0	0.267	5.7	LOS A	1.1	8.9	0.55	0.57	60.2
12	R2	46	2.0	0.267	5.9	LOS A	1.1	8.6	0.55	0.56	58.7
Approach		536	2.0	0.267	8.6	LOS A	1.1	8.9	0.54	0.66	58.7
All Vehicles		3268	2.0	0.744	8.2	LOS A	5.3	41.2	0.70	0.79	57.7

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Design PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	128	2.0	0.188	11.7	LOS B	0.7	5.5	0.50	0.78	52.8
8	T1	22	3.0	0.188	6.5	LOS A	0.7	5.5	0.50	0.78	52.5
18	R2	321	2.0	0.307	5.9	LOS A	1.3	10.2	0.52	0.67	57.9
Approach		471	2.0	0.307	7.5	LOS A	1.3	10.2	0.52	0.71	56.5
East: Brian Coburn											
1	L2	303	2.0	0.311	11.0	LOS B	1.4	10.7	0.46	0.73	56.1
6	T1	258	2.0	0.311	5.5	LOS A	1.4	10.9	0.46	0.57	60.2
16	R2	121	3.0	0.311	5.6	LOS A	1.4	10.9	0.45	0.55	58.8
Approach		682	2.2	0.311	7.9	LOS A	1.4	10.9	0.46	0.64	58.2
North: Fern Casey											
7	L2	84	3.0	0.145	12.1	LOS B	0.5	3.9	0.54	0.81	57.6
4	T1	22	3.0	0.145	6.7	LOS A	0.5	3.9	0.54	0.81	52.7
14	R2	117	3.0	0.154	6.4	LOS A	0.5	4.2	0.53	0.72	57.4
Approach		223	3.0	0.154	8.6	LOS A	0.5	4.2	0.54	0.77	57.2
West: Brian Coburn											
5	L2	179	3.0	0.326	11.2	LOS B	1.4	11.2	0.52	0.71	56.1
2	T1	211	2.0	0.326	5.9	LOS A	1.5	11.3	0.51	0.68	59.1
12	R2	284	2.0	0.326	5.8	LOS A	1.5	11.3	0.50	0.63	54.5
Approach		674	2.3	0.326	7.3	LOS A	1.5	11.3	0.51	0.67	56.8
All Vehicles		2050	2.3	0.326	7.7	LOS A	1.5	11.3	0.50	0.68	57.3

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Design 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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	63	2.0	0.608	15.1	LOS B	2.9	22.7	0.79	0.94	58.6
8	T1	711	2.0	0.608	8.2	LOS A	3.2	24.7	0.78	0.86	56.8
18	R2	132	2.0	0.608	7.4	LOS A	3.2	24.7	0.78	0.80	55.5
Approach		906	2.0	0.608	8.6	LOS A	3.2	24.7	0.78	0.86	56.8
East: Brian Coburn											
1	L2	66	2.0	0.442	13.3	LOS B	2.0	15.7	0.71	0.77	56.5
6	T1	300	2.0	0.442	7.1	LOS A	2.1	16.6	0.71	0.76	59.2
16	R2	344	2.0	0.442	6.5	LOS A	2.1	16.6	0.70	0.73	56.6
Approach		710	2.0	0.442	7.4	LOS A	2.1	16.6	0.71	0.75	57.9
North: Mer Bleue											
7	L2	646	2.0	0.714	13.9	LOS B	6.4	49.3	0.82	0.98	54.4
4	T1	587	2.0	0.714	7.2	LOS A	6.7	51.4	0.82	0.81	56.8
14	R2	319	2.0	0.714	7.1	LOS A	6.7	51.4	0.82	0.79	58.1
Approach		1552	2.0	0.714	9.9	LOS A	6.7	51.4	0.82	0.87	56.1
West: Brian Coburn											
5	L2	152	2.0	0.484	14.3	LOS B	2.1	16.2	0.79	0.91	57.5
2	T1	432	2.0	0.484	7.1	LOS A	2.3	17.7	0.77	0.73	58.9
12	R2	32	2.0	0.484	6.9	LOS A	2.3	17.7	0.77	0.68	57.7
Approach		616	2.0	0.484	8.9	LOS A	2.3	17.7	0.78	0.78	58.5
All Vehicles		3784	2.0	0.714	9.0	LOS A	6.7	51.4	0.78	0.83	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2042 Design PM - Fern Casey / Frank Bender

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
1	L2	88	2.0	0.264	8.0	LOS A	1.6	11.6	0.34	0.46	47.7
2	T1	251	2.0	0.264	3.5	LOS A	1.6	11.6	0.34	0.46	47.5
Approach		339	2.0	0.264	4.7	LOS A	1.6	11.6	0.34	0.46	47.5
North: Fern Casey											
8	T1	158	2.0	0.131	4.5	LOS A	0.7	5.1	0.25	0.42	55.6
9	R2	13	2.0	0.131	4.3	LOS A	0.7	5.1	0.25	0.42	54.3
Approach		171	2.0	0.131	4.5	LOS A	0.7	5.1	0.25	0.42	55.5
West: Frank Bender											
10	L2	128	2.0	0.158	9.5	LOS A	0.9	6.1	0.35	0.60	53.3
12	R2	62	2.0	0.158	4.7	LOS A	0.9	6.1	0.35	0.60	52.1
Approach		190	2.0	0.158	8.0	LOS A	0.9	6.1	0.35	0.60	52.9
All Vehicles		700	2.0	0.264	5.5	LOS A	1.6	11.6	0.32	0.49	50.7

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 2047 Design AM - Fern Casey / Frank Bender

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
1	L2	35	2.0	0.127	7.5	LOS A	0.7	5.2	0.20	0.40	48.3
2	T1	116	2.0	0.127	3.0	LOS A	0.7	5.2	0.20	0.40	48.1
3	R2	25	2.0	0.127	3.1	LOS A	0.7	5.2	0.20	0.40	47.0
Approach		176	2.0	0.127	3.9	LOS A	0.7	5.2	0.20	0.40	48.0
East: Frank Bender											
4	L2	55	2.0	0.055	8.2	LOS A	0.3	1.9	0.35	0.58	46.3
5	T1	1	2.0	0.055	3.7	LOS A	0.3	1.9	0.35	0.58	46.1
6	R2	8	2.0	0.055	3.8	LOS A	0.3	1.9	0.35	0.58	45.1
Approach		64	2.0	0.055	7.6	LOS A	0.3	1.9	0.35	0.58	46.1
North: Fern Casey											
7	L2	1	2.0	0.254	7.8	LOS A	1.5	10.8	0.28	0.37	48.5
8	T1	280	2.0	0.254	3.3	LOS A	1.5	10.8	0.28	0.37	48.3
9	R2	64	2.0	0.254	3.3	LOS A	1.5	10.8	0.28	0.37	47.2
Approach		345	2.0	0.254	3.3	LOS A	1.5	10.8	0.28	0.37	48.1
West: Frank Bender											
10	L2	53	2.0	0.138	9.0	LOS A	0.7	5.3	0.49	0.60	47.3
11	T1	1	2.0	0.138	4.5	LOS A	0.7	5.3	0.49	0.60	47.1
12	R2	90	2.0	0.138	4.6	LOS A	0.7	5.3	0.49	0.60	46.0
Approach		144	2.0	0.138	6.2	LOS A	0.7	5.3	0.49	0.60	46.5
All Vehicles		729	2.0	0.254	4.4	LOS A	1.5	10.8	0.31	0.44	47.6

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.

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Project: \\cgc01s3\Fileshare\CastleGlenn\Projects\Ontario Projects\Ottawa\7255 - Richcraft Trailsedge North TIA\Traffic\SIDRA\Phase 3\13-Trailsedge North (EUC P3) 2047 Design AM Analysis 4-In BCB.sip6

MOVEMENT SUMMARY

Site: 2047 Design AM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	192	2.0	0.225	11.2	LOS B	0.9	6.9	0.47	0.75	52.8
8	T1	22	3.0	0.225	6.0	LOS A	0.9	6.9	0.47	0.75	52.5
18	R2	302	2.0	0.275	5.7	LOS A	1.2	8.9	0.47	0.65	58.0
Approach		516	2.0	0.275	7.8	LOS A	1.2	8.9	0.47	0.69	56.2
East: Brian Coburn											
1	L2	204	2.0	0.410	11.2	LOS B	2.0	15.6	0.52	0.66	57.5
6	T1	625	2.0	0.410	5.7	LOS A	2.0	15.8	0.51	0.58	59.7
16	R2	67	3.0	0.410	5.7	LOS A	2.0	15.8	0.51	0.54	58.5
Approach		896	2.1	0.410	6.9	LOS A	2.0	15.8	0.51	0.60	59.1
North: Fern Casey											
7	L2	162	3.0	0.354	14.8	LOS B	1.3	10.2	0.70	0.92	55.7
4	T1	12	3.0	0.354	9.4	LOS A	1.3	10.2	0.70	0.92	49.9
14	R2	311	3.0	0.490	8.6	LOS A	2.2	16.9	0.71	0.89	55.8
Approach		485	3.0	0.490	10.7	LOS B	2.2	16.9	0.71	0.90	55.6
West: Brian Coburn											
5	L2	126	3.0	0.232	10.9	LOS B	1.0	7.4	0.46	0.67	56.4
2	T1	116	2.0	0.232	5.8	LOS A	1.0	7.4	0.46	0.67	58.7
12	R2	249	2.0	0.232	5.6	LOS A	1.0	7.4	0.45	0.63	54.9
Approach		491	2.3	0.232	7.0	LOS A	1.0	7.4	0.45	0.65	56.6
All Vehicles		2388	2.3	0.490	7.9	LOS A	2.2	16.9	0.53	0.69	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2047 Design AM - Mer Bleue / Brian Coburn (4-lane)

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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	39	2.0	0.439	12.8	LOS B	2.1	16.0	0.65	0.69	59.6
8	T1	666	2.0	0.439	6.5	LOS A	2.1	16.5	0.64	0.66	57.8
18	R2	125	2.0	0.439	6.0	LOS A	2.1	16.5	0.63	0.62	56.2
Approach		830	2.0	0.439	6.7	LOS A	2.1	16.5	0.64	0.65	57.7
East: Brian Coburn											
1	L2	64	2.0	0.795	17.2	LOS B	5.7	44.1	0.88	1.08	54.6
6	T1	661	2.0	0.795	10.8	LOS B	6.2	48.2	0.88	1.08	57.9
16	R2	587	2.0	0.795	9.4	LOS A	6.2	48.2	0.89	1.07	55.0
Approach		1312	2.0	0.795	10.5	LOS B	6.2	48.2	0.89	1.07	56.7
North: Mer Bleue											
7	L2	208	2.0	0.439	12.9	LOS B	2.1	16.6	0.70	0.84	56.0
4	T1	347	2.0	0.439	6.4	LOS A	2.3	17.5	0.70	0.72	57.0
14	R2	191	2.0	0.439	6.0	LOS A	2.3	17.5	0.70	0.65	58.6
Approach		746	2.0	0.439	8.1	LOS A	2.3	17.5	0.70	0.73	57.3
West: Brian Coburn											
5	L2	277	2.0	0.312	11.9	LOS B	1.3	10.3	0.59	0.79	57.2
2	T1	234	2.0	0.283	5.5	LOS A	1.2	9.4	0.56	0.53	60.4
12	R2	64	2.0	0.283	5.6	LOS A	1.2	9.4	0.56	0.53	58.7
Approach		575	2.0	0.312	8.6	LOS A	1.3	10.3	0.58	0.66	58.6
All Vehicles		3463	2.0	0.795	8.7	LOS A	6.2	48.2	0.74	0.83	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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2047 Design AM - Fern Casey / 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: Fern Casey											
1	L2	76	2.0	0.073	7.4	LOS A	0.4	2.5	0.13	0.54	47.2
2	T1	1	2.0	0.073	2.9	LOS A	0.4	2.5	0.13	0.54	47.0
3	R2	27	2.0	0.073	3.0	LOS A	0.4	2.5	0.13	0.54	46.0
Approach		104	2.0	0.073	6.2	LOS A	0.4	2.5	0.13	0.54	46.8
East: Vanguard											
4	L2	11	2.0	0.074	7.7	LOS A	0.4	2.6	0.21	0.39	48.5
5	T1	64	2.0	0.074	3.1	LOS A	0.4	2.6	0.21	0.39	48.3
6	R2	21	2.0	0.074	3.2	LOS A	0.4	2.6	0.21	0.39	47.2
Approach		96	2.0	0.074	3.7	LOS A	0.4	2.6	0.21	0.39	48.1
North: Fern Casey											
7	L2	1	2.0	0.002	7.9	LOS A	0.0	0.1	0.29	0.44	47.8
8	T1	1	2.0	0.002	3.4	LOS A	0.0	0.1	0.29	0.44	47.6
9	R2	1	2.0	0.002	3.4	LOS A	0.0	0.1	0.29	0.44	46.5
Approach		3	2.0	0.002	4.9	LOS A	0.0	0.1	0.29	0.44	47.3
West: Vanguard											
10	L2	1	2.0	0.143	7.4	LOS A	0.8	5.5	0.08	0.38	49.3
11	T1	31	2.0	0.143	2.8	LOS A	0.8	5.5	0.08	0.38	49.1
12	R2	194	2.0	0.143	2.9	LOS A	0.8	5.5	0.08	0.38	47.9
Approach		226	2.0	0.143	2.9	LOS A	0.8	5.5	0.08	0.38	48.1
All Vehicles		429	2.0	0.143	3.9	LOS A	0.8	5.5	0.12	0.42	47.8

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 2047 Design 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	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	82	2.0	0.677	16.0	LOS B	3.5	26.7	0.84	1.00	58.0
8	T1	745	2.0	0.677	8.9	LOS A	3.8	29.5	0.83	0.92	56.3
18	R2	137	2.0	0.677	7.9	LOS A	3.8	29.5	0.82	0.86	55.2
Approach		964	2.0	0.677	9.3	LOS A	3.8	29.5	0.83	0.92	56.3
East: Brian Coburn											
1	L2	68	2.0	0.496	13.7	LOS B	2.4	18.3	0.74	0.81	56.3
6	T1	319	2.0	0.496	7.5	LOS A	2.5	19.6	0.74	0.80	59.1
16	R2	375	2.0	0.496	6.7	LOS A	2.5	19.6	0.74	0.78	56.5
Approach		762	2.0	0.496	7.7	LOS A	2.5	19.6	0.74	0.79	57.7
North: Mer Bleue											
7	L2	695	2.0	0.769	14.9	LOS B	7.6	58.5	0.89	1.06	53.6
4	T1	606	2.0	0.769	8.0	LOS A	8.0	61.5	0.89	0.91	56.5
14	R2	326	2.0	0.769	7.9	LOS A	8.0	61.5	0.89	0.90	57.8
Approach		1627	2.0	0.769	10.9	LOS B	8.0	61.5	0.89	0.97	55.6
West: Brian Coburn											
5	L2	153	2.0	0.551	14.8	LOS B	2.5	19.0	0.83	0.95	57.3
2	T1	453	2.0	0.551	7.8	LOS A	2.7	21.1	0.81	0.80	58.7
12	R2	45	2.0	0.551	7.5	LOS A	2.7	21.1	0.81	0.75	57.5
Approach		651	2.0	0.551	9.4	LOS A	2.7	21.1	0.82	0.83	58.3
All Vehicles		4004	2.0	0.769	9.7	LOS A	8.0	61.5	0.83	0.90	56.7

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2047 Design PM - Fern Casey / Frank Bender

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
1	L2	263	2.0	0.641	10.2	LOS B	6.5	46.5	0.75	0.71	46.2
2	T1	387	2.0	0.641	5.7	LOS A	6.5	46.5	0.75	0.71	46.0
3	R2	60	2.0	0.641	5.8	LOS A	6.5	46.5	0.75	0.71	45.0
Approach		710	2.0	0.641	7.4	LOS A	6.5	46.5	0.75	0.71	46.0
East: Frank Bender											
4	L2	39	2.0	0.106	13.9	LOS B	0.7	5.0	0.85	0.81	44.0
5	T1	1	2.0	0.106	9.4	LOS A	0.7	5.0	0.85	0.81	43.8
6	R2	19	2.0	0.106	9.4	LOS A	0.7	5.0	0.85	0.81	42.9
Approach		59	2.0	0.106	12.4	LOS B	0.7	5.0	0.85	0.81	43.6
North: Fern Casey											
7	L2	1	2.0	0.354	9.2	LOS A	2.4	17.3	0.59	0.55	47.4
8	T1	287	2.0	0.354	4.7	LOS A	2.4	17.3	0.59	0.55	47.3
9	R2	80	2.0	0.354	4.7	LOS A	2.4	17.3	0.59	0.55	46.2
Approach		368	2.0	0.354	4.7	LOS A	2.4	17.3	0.59	0.55	47.0
West: Frank Bender											
10	L2	274	2.0	0.444	9.5	LOS A	3.2	22.9	0.64	0.70	46.3
11	T1	1	2.0	0.444	5.0	LOS A	3.2	22.9	0.64	0.70	46.2
12	R2	185	2.0	0.444	5.1	LOS A	3.2	22.9	0.64	0.70	45.1
Approach		460	2.0	0.444	7.7	LOS A	3.2	22.9	0.64	0.70	45.8
All Vehicles		1597	2.0	0.641	7.1	LOS A	6.5	46.5	0.69	0.68	46.1

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 2047 Design PM - Fern Casey / Vanguard

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Fern Casey											
1	L2	297	2.0	0.277	8.1	LOS A	1.6	11.6	0.35	0.58	46.4
2	T1	1	2.0	0.277	3.6	LOS A	1.6	11.6	0.35	0.58	46.2
3	R2	56	2.0	0.277	3.6	LOS A	1.6	11.6	0.35	0.58	45.2
Approach		354	2.0	0.277	7.4	LOS A	1.6	11.6	0.35	0.58	46.2
East: Vanguard											
4	L2	22	2.0	0.165	8.9	LOS A	0.9	6.5	0.48	0.53	47.6
5	T1	123	2.0	0.165	4.3	LOS A	0.9	6.5	0.48	0.53	47.4
6	R2	31	2.0	0.165	4.4	LOS A	0.9	6.5	0.48	0.53	46.3
Approach		176	2.0	0.165	4.9	LOS A	0.9	6.5	0.48	0.53	47.2
North: Fern Casey											
7	L2	1	2.0	0.003	9.3	LOS A	0.0	0.1	0.51	0.49	47.1
8	T1	1	2.0	0.003	4.7	LOS A	0.0	0.1	0.51	0.49	46.9
9	R2	1	2.0	0.003	4.8	LOS A	0.0	0.1	0.51	0.49	45.9
Approach		3	2.0	0.003	6.3	LOS A	0.0	0.1	0.51	0.49	46.6
West: Vanguard											
10	L2	1	2.0	0.259	7.4	LOS A	1.7	12.2	0.14	0.36	49.1
11	T1	137	2.0	0.259	2.9	LOS A	1.7	12.2	0.14	0.36	48.9
12	R2	265	2.0	0.259	3.0	LOS A	1.7	12.2	0.14	0.36	47.7
Approach		403	2.0	0.259	2.9	LOS A	1.7	12.2	0.14	0.36	48.1
All Vehicles		936	2.0	0.277	5.0	LOS A	1.7	12.2	0.28	0.48	47.2

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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: 2047 Design PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	349	2.0	0.589	14.3	LOS B	3.2	24.5	0.77	0.98	50.6
8	T1	45	3.0	0.589	9.1	LOS A	3.2	24.5	0.77	0.98	50.3
18	R2	531	2.0	0.644	8.3	LOS A	3.9	30.5	0.80	0.97	56.6
Approach		925	2.0	0.644	10.6	LOS B	3.9	30.5	0.79	0.98	54.4
East: Brian Coburn											
1	L2	511	2.0	0.713	15.3	LOS B	4.8	37.1	0.84	1.05	53.5
6	T1	267	2.0	0.713	8.9	LOS A	5.0	39.1	0.84	0.98	58.6
16	R2	362	3.0	0.713	9.1	LOS A	5.0	39.1	0.84	0.98	57.3
Approach		1140	2.3	0.713	11.8	LOS B	5.0	39.1	0.84	1.01	56.0
North: Fern Casey											
7	L2	249	3.0	0.523	14.6	LOS B	2.4	18.4	0.77	0.97	56.1
4	T1	45	3.0	0.523	9.2	LOS A	2.4	18.4	0.77	0.97	50.4
14	R2	279	3.0	0.541	9.7	LOS A	2.4	19.0	0.79	0.94	54.8
Approach		573	3.0	0.541	11.8	LOS B	2.4	19.0	0.78	0.96	55.2
West: Brian Coburn											
5	L2	401	3.0	0.740	15.7	LOS B	5.1	40.1	0.86	1.06	52.3
2	T1	217	2.0	0.740	9.9	LOS A	5.5	42.2	0.87	1.05	56.9
12	R2	517	2.0	0.740	9.3	LOS A	5.5	42.2	0.87	1.03	51.9
Approach		1135	2.4	0.740	11.7	LOS B	5.5	42.2	0.87	1.05	53.3
All Vehicles		3773	2.4	0.740	11.5	LOS B	5.5	42.2	0.83	1.00	54.8

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: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: CASTLEGLENN CONSULTANTS | Processed: Monday, April 12, 2021 8:10:49 PM
Project: \\cgc01s3\Fileshare\CastleGlenn\Projects\Ontario Projects\Ottawa\7255 - Richcraft Trailsedge North TIA\Traffic\SIDRA\Phase 3\14 - Trailsedge North (EUC P3) 2047 Design PM Analysis 4-In BCB.sip6

APPENDIX I: INTERSECTION MMLOS ANALYSIS DETAILS

Table 1: Multi-Modal Level of Service - Innes Road and Viseneau Drive

Performance Measure	Intersection Leg			
	West Leg - Innes Road	East leg - Innes Road	North Leg - Viseneau Drive	South Leg - Commercial Access
Pedestrian LOS (PLOS)				
Total Travel Lanes	9	8	5	7
Median > 2.4m	No	No	No	No
Island Refuge	No	No	No	No
Left Turn Type	Permissive	Permissive	Permissive	Perm + Prot
Right Turn Type	Permissive	Permissive	Permissive	Permissive
Right Turns on Red	Allowed	Allowed	Allowed	Allowed
Leading Pedestrian Interval	No	No	No	No
Corner Radius	10 to 15m	10 to 15m	10 to 15m	15m to 25m
Right Turn Channel	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)
Crosswalk Treatment	Zebra Stripe	Zebra Stripe	Standard Transverse	Standard Transverse
PETSI Points	-26	-9	39	4
Intersection PLOS	F	F	E	F
Target PLOS	C	C	C	C
Bicycle LOS (BLOS)				
Bikeway Type	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Mixed Traffic
Left Turn Approach	Two lanes crossed	Two lanes crossed	No lanes crossed	One lane crossed
Right Turn Lane Configuration of Approach	Exclusive RT, right of bike lane	Shared Th/RT	Shared LT/Th/RT	Exclusive RT
Length of Right Turn Lane	> 50	N/A	N/A	> 50
Turning Speed of Right Turning Vehicles	< 25	< 25	< 25	< 25
Operating Speed (km/h)	70	70	50	50
Intersection BLOS	F	F	B	D
Target BLOS	B	B	B	B
Transit LOS (TLOS)				
Delay (2047 Development + Background)	27 (EB-Th, PM)	26 (WB-Th/RT, AM)	17 (SB Approach, AM) 54 (SB Approach, PM)	N/A
Intersection TLOS	D	D	F	N/A
Target TLOS	D	D	D	N/A
Truck LOS (TkLOS)				
Effective Corner Radius (m)	>15m	10 to 15m	10 to 15m	10 to 15m
Number of Receiving Lanes on Departing Leg	2	1	2	2
Intersection TkLOS	A	E	B	B
Target TkLOS	D	D	No Target	No Target

23.74588235 23.42778865
15.15372549 27.84090909

Table 2: Multi-Modal Level of Service - Innes Road / Belcourt Boulevard-Frank Bender Street

	Intersection Leg			
Performance Measure	West Leg - Innes Road	East leg - Innes Road	North Leg - Belcourt Blvd	South Leg - Frank Bender Street
Pedestrian LOS (PLOS)				
Total Travel Lanes	9	8	6	8
Median > 2.4m	No	No	No	No
Island Refuge	No	No	No	No
Left Turn Type	Permissive	Permissive	Protected	Protected
Right Turn Type	Permissive	Permissive	Permissive	Permissive
Right Turns on Red	Allowed	Allowed	Allowed	Allowed
Leading Pedestrian Interval	No	No	No	No
Corner Radius	10 to 15m	10 to 15m	10 to 15m	10 to 15m
Right Turn Channel	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)
Crosswalk Treatment	Standard Transverse	Standard Transverse	Standard Transverse	Standard Transverse
PETSI Points	-29	-12	39	-8
Intersection PLOS	F	F	E	F
Target PLOS	C	C	C	C
Bicycle LOS (BLOS)				
Bikeway Type	Mixed Traffic	Mixed Traffic	Bike Lane	Bike Lane
Left Turn Approach	2 Lanes Crossed	2 Lanes Crossed	No Lanes Crossed	1 Lane Crossed
Right Turn Lane Configuration of Approach	Dedicated Right tu	Shared Th/RT	Exclusive RT, right of bike lane	Exclusive RT, right of bike lane
Length of Right Turn Lane	> 50	> 50	> 50	> 50
Turning Speed of Right Turning Vehicles	< 25	< 25	< 25	< 25
Operating Speed (km/h)	70	70	50	50
Intersection BLOS	F	F	D	D
Target BLOS	B	B	B	B
Transit LOS (TLOS)				
Delay (2047 Development + Background)	15 (EB-Th, AM) 71 (EB-Th, PM)	34.8 (WB-Th/RT, AM) 57 (WB-Th/RT, PM)	N/A	N/A
Intersection TLOS	F	F	N/A	N/A
Target TLOS	D	D	N/A	N/A
Truck LOS (TkLOS)				
Effective Corner Radius (m)	10 to 15m	10 to 15m	10 to 15m	10 to 15m
Number of Receiving Lanes on Departing Leg	2	2	1	2
Intersection TkLOS	B	B	E	B
Target TkLOS	D	D	NA	D

Table 3: Multi-Modal Level of Service - Innes Road / 473m East of Page Road (Glenview Access)

	Intersection Leg			
Performance Measure	West Leg - Innes Road	East leg - Innes Road	North Leg - 3615-21 Innes Road Plaza	South Leg - Glenview Access
	Pedestrian LOS (PLOS)			
Total Travel Lanes	7	7	4	6
Median > 2.4m	No	No	No	No
Island Refuge	No	No	No	No
Left Turn Type	Permissive	Permissive	Permissive	Permissive
Right Turn Type	Permissive	Permissive	Permissive	Permissive
Right Turns on Red	Allowed	Allowed	Allowed	Allowed
Leading Pedestrian Interval	No	No	No	No
Corner Radius	10 to 15	10 to 15	5 to 10	10 to 15
Right Turn Channel	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)
Crosswalk Treatment	Standard Transverse	Standard Transverse	Standard Transverse	Standard Transverse
PETSI Points	4	4	54	20
Intersection PLOS	F	F	D	F
Target PLOS	C	C	C	C
	Bicycle LOS (BLOS)			
Bikeway Type	Bike Lane	Bike Lane	Mixed Traffic	Mixed Traffic
Left Turn Approach	Two lanes crossed	Two lanes crossed	No lanes crossed	One lane crossed
Right Turn Lane Configuration of Approach	Shared Th/RT	Shared Th/RT	Shared Th/RT	Shared Th/RT
Length of Right Turn Lane	N/A	N/A	N/A	N/A
Turning Speed of Right Turning Vehicles	< 25	< 25	< 25	< 25
Operating Speed (km/h)	60	60	50	50
Intersection BLOS	F	F	B	B
Target BLOS	B	B	B	B
	Transit LOS (TLOS)			
Delay (2047 Development + Background)	63 (EB-Th/RT, PM)	20 (WB-Th/RT, AM)	N/A	N/A
Intersection TLOS	F	B	N/A	N/A
Target TLOS	D	D	N/A	N/A
	Truck LOS (TkLOS)			
Effective Corner Radius (m)	10 to 15	10 to 15	5 to 10	10 to 15
Number of Receiving Lanes on Departing Leg	2	2	1	1
Intersection TkLOS	B	B	F	E
Target TkLOS	D	D	N/A	N/A

APPENDIX J: DRAFT SUBDIVISION PLAN

SKETCH TO ILLUSTRATE UNIT LAYOUT ON

PHASE 1, 2, 3 and 4
TRAILS EDGE NORTH
CITY OF OTTAWA

Prepared by Annis , O'Sullivan , Vollebekk Ltd.
August 13, 2020

Scale 1 : 1250
50 37.5 25 12.5 0 25 50 Metres

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

LEGEND

31 Foot Product (9.45) =	109 Units	(32%)
35 Foot Product (10.67) =	190 Units	(56%)
44 Foot Product (13.41) =	35 Units	(10%)
50 Foot Product (15.24) =	6 Units	(2%)
TOTAL SINGLE UNITS = 340		
Townhomes =	529 Units	
Back to Back Towns =	114 Units	

TABLE TO ILLUSTRATE PROPOSED LAND USE

	PROPOSED USE	NUMBER OF UNITS	UNITS	AREA (Ha/Ac)
	SINGLE 9.45 (31 FOOT)	109	32%	12.37 / 30.57
	SINGLE 10.67 (35 FOOT)	190	56%	
	SINGLE 13.41 (44 FOOT)	35	10%	
	SINGLE 15.24 (50 FOOT)	6	2%	
	SUB TOTAL SINGLES	340	100%	
	TOWNS (3X5)	15		12.05 / 29.78
	TOWNS (4X41)	164		
	TOWNS (5X28)	140		
	TOWNS (6X35)	210		
	SUB TOTAL TOWNS	529		
	BACK TO BACK	114		1.45 / 3.59
	HIGH DENSITY	BLOCKS 36, 80 AND 81		11.11 / 27.45
	STREETS			15.49 / 38.28
	PARKS			6.41 / 15.84
	WALKWAYS			0.12 / 0.28
	EMPLOYMENT LANDS	BLOCKS 76, 77 AND 78		19.34 / 47.79
	OTHER	BLOCKS 52		3.65 / 9.03
	SITE TOTAL	...		81.99 / 202.6

REVISION SCHEDULE

NO.	REVISION	DATE	BY
4	REVISIONS	AUG. 13, 2020	N
3	REVISIONS	AUG. 7, 2020	AR/N
2	REVISIONS	JULY 16, 2020	N
1	PLAN PREPARED	JAN 6, 2020	N

Ontario Land Surveyors
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