PROPOSED TOWNHOUSE & MULTI-UNIT RESIDENTIAL DEVELOPMENT

6429 RENAUD ROAD (BLOCKS 193 AND 194), ORLEANS, OTTAWA

RICHCRAFT HOMES

TRAFFIC IMPACT ASSESSMENT

Submitted to:

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Project 7252

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 site which is in the southeast quadrant of the Brian Coburn Boulevard/Fern Casey Street intersection in Orleans South. The site is located within the future East Urban Community (EUC) Phase 3 lands.

Exhibit 1-2 illustrates the proposed site plan (September, 2019) and access arrangement. The proposed development is anticipated to provide for 186 residential dwellings that consist of:

- 90 back-to-back townhomes within 11 structures that are to be located on the east side of the development which would be serviced by individual driveways and garages; and
- 96 mid-rise terrace dwellings within 8 structures are to be located along the north, south and west sides of the development. A total of 135 motor-vehicle parking stalls and 50 interior bicycle parking stalls would be provided for the terrace dwellings.

The proposed development is located in the General Urban Area. A review of the existing Zoning By-law indicates a “DR” - Development Reserve Zone” designation. The site is currently greenfield. This traffic study report is in support of a Major Zoning By-Law Amendment application and an application for Site Plan Control Approval. The likely intended future zoning of the site would be an “R4F” designated zone intended for low-rise multiple-unit residential dwellings.

Exhibit 1-1: Site Location Context

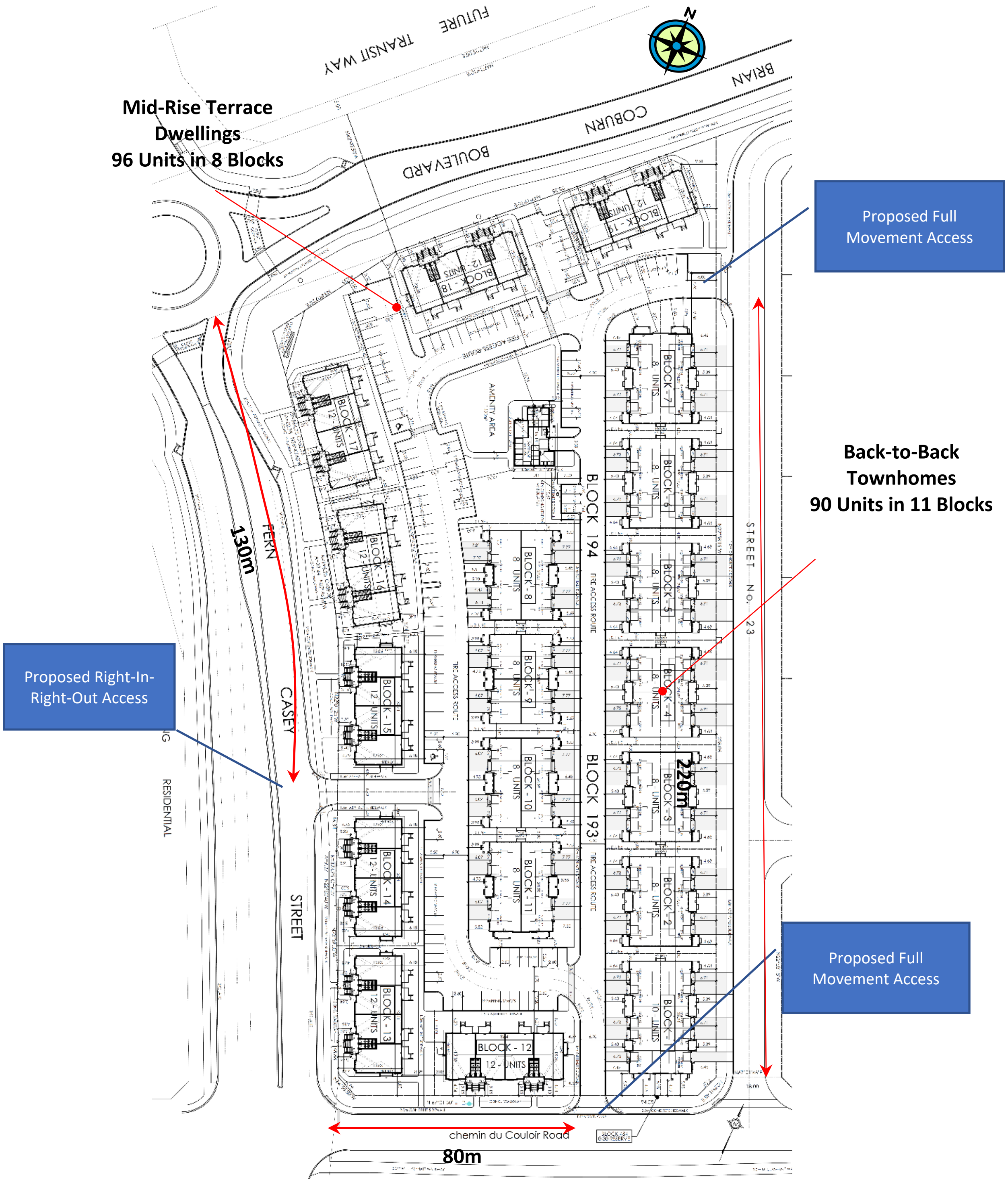


Exhibit 1-2: Site Plan of Proposed Development **(Nov. 2020)**

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

- A right-in right-out access is proposed along Fern Casey Street approximately 130m south of the existing Brian Coburn Boulevard/Fern Casey Street roundabout;
- A full movement access is proposed to connect to Couloir Road, approximately 80m to the east of the Fern Casey Street/Couloir Road intersection; and
- A full movement access is proposed to connect to Street No. 23, approximately 220m north of the Street No. 23/Couloir Road intersection.

Street No. 23 would be constructed as part of this site plan application to a 30 km/hr design/operating speed with a 1.8m sidewalk.

The proposed site is anticipated to be built in a single phase with a date of occupancy of approximately 2024. The transportation analysis will consider applicable guidelines as laid out within the City of Ottawa Official Plan and regulations as laid out within the City's Zoning and other relevant by-laws.

1.2 EXISTING CONDITIONS

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:

- **Brian Coburn Boulevard** is an existing 2-lane east-west undivided two-lane arterial roadway (posted speed 70 km/hr) located north 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 in-development and planned 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;
- **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 60 km/hr posted speed limit, a concrete median and a 42m right-of-way;
- **Renaud Road** is an east-west collector with 2-lanes of travel (one lane per-direction) that connects Mer Bleue Road in the east to Navan Road in the west. The surrounding land uses are planned to be residential, with the Trailsedge community on the north side and the Crème and Eastboro developments on the south side. In general, Renaud Road is posted at 50 km/h, with a lower speed limit of 40 km/h in the vicinity of the Notre-Dame-des-Champs school, located at the corner of Renaud Road and Fern Casey Street. Sidewalks currently exist to the west of the recently constructed school;
- **Navan Road** is a north-south arterial located west of the proposed site with 2-lanes of travel (one lane per-direction) and a rural cross-section. The posted speed limit is 70 km/h south of the Blackburn Hamlet Bypass and 60 km/h near the Navan Road/Orléans Boulevard intersection. The corridor is bounded by mostly rural residential and commercial properties.
- **Mer Bleue Road** is a 4-lane (two lanes per-direction) north-south arterial that starts south of Innes Road and tapers to a 2-lanes roadway just north of Renaud Road. The 4-lane section 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 characterized by a rural cross-section with un-cultivated farmland, agricultural land and existing rural residences on both sides. Mer Bleue Road between Innes Road and Renaud Road is posted at 60 km/h. The posted speed is reduced to 50km/hr south of Renaud Road.

Area Driveways and Land Uses

The following surrounding land uses and driveways along Fern Casey Street:

- *Axis Way* and *Locust Ridge* provide access to the existing Richcraft Trailsedge Phase 2 residential development west of the proposed site from Fern Casey Street; and
- *Crevasse Road* and *Couloir Road* provide access to Trailsedge Phase 3 located south of the proposed site.

Area Traffic Management

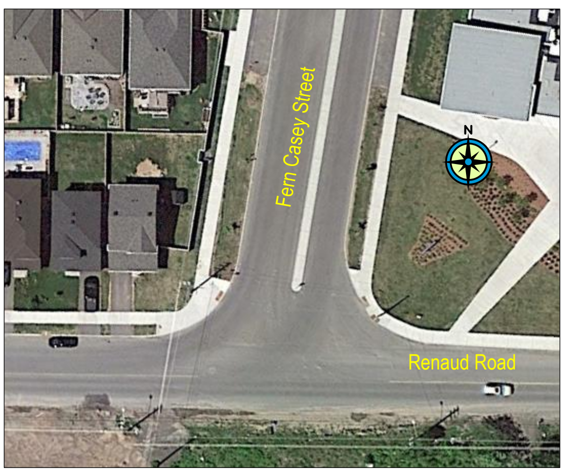
No Area Traffic Management strategies have been identified for the boundary roads within the area.

Area Intersections

Navan Road/Renaud Road: This intersection is a 4-leg traffic signal-controlled intersection. All approaches provide for a single thru lane and auxiliary left turn bay. The northbound approach provides for a short NB-RT taper and channelized island. The eastbound approach affords a dedicated EB-RT auxiliary lane.

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;

Brian Coburn Boulevard/Navan Road: This roundabout was recently constructed as a 3-leg, single lane roundabout intersection.



Renaud Road/Fern Casey Street: This "T" intersection is currently STOP-controlled on the north leg. An EB-LT auxiliary lane is provided from Renaud Road with single-lane thru movements on each approach.

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.

Renaud Road/Mer Bleue Road: This intersection is currently configured a "T"-intersection with STOP-control on all approaches.

Fern Casey Street/Axis Way-Couloir Road : This intersection is currently configured as a "T"-intersection with STOP-control on the minor east-west approaches. The northbound approach allows for an auxiliary NB-LT bay and a shared NB-Th/RT lane. The southbound approach allows for a SB-Th lane, an auxiliary SB-RT lane and a dedicated SB-LT lane.

Existing Cycling Facilities

The City of Ottawa's "*Map 1: Cycling Network – Primary Urban"* from the Transportation Master Plan indicated:

- 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;
- Navan Road and Mer Bleue Road are both designated as cycling "Spine Routes" that provide on-street cycling lanes; and
- Page Road is designated as a north-south "Spine Route" that intersects Brian Coburn Boulevard at a pedestrian crossing to the west of the proposed site.

The following peak period traffic counts undertaken in 2018 (AM, Mid-day, PM peaks) were reviewed to gain an understanding of existing cyclist volumes:

- The July, 2018 traffic count at the Brian Coburn Boulevard/Navan Road intersection indicated 2 north-south cyclists along Navan Road and 3 westbound cyclists along Brian Coburn Boulevard;
- The May, 2018 traffic count at the Renaud Road/Fern Casey Street intersection indicated 9 east-west cyclists along Renaud Road and no cyclists along Fern Casey Street; and
- The November, 2018 count at the Renaud Road/Mer Bleue Road intersection indicated no cyclists in either direction.

In general, the recorded current cyclists traffic information indicated negligible cyclist traffic.

Existing Pedestrian Facilities

Pedestrian provisions are afforded on each of the boundary streets to the proposed development. A sidewalk and boulevard arrangement exists along the full length of either side of Fern Casey Street while an MUP is provided on the south side of Brian Coburn Boulevard.

The peak period traffic counts undertaken in 2018 indicated:

- 15 pedestrians crossed Renaud Road at the Fern Casey Street/Renaud Road intersection adjacent to the new school;
- 4 pedestrians were recorded throughout the entire 12-hour traffic count undertaken at the Renaud Road/Mer Bleue Road intersection; and
- 3 pedestrians were recorded throughout the peak-hour at the Brian Coburn Boulevard/Navan Road intersection traffic count.

Overall, the recorded current pedestrian traffic at each of the above intersections were determined to be insignificant.

Existing Transit Provisions

Exhibit 1-3 illustrates the transit routes that serve the proposed site. The exhibit also illustrates the Chapel Hill Park-and-Ride facility located nearest the Brian Coburn Boulevard/Navan Road intersection. The nearest transit stops are located at the intersection of Fern Casey Street and Chemin de la Crevasse Road to the south of the site.

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

- **Route 225** would serve as the primary existing transit route to connect 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, September 22nd indicated that this route runs only in the peak period with 20-minute headways between buses.
- **Route 34** also connects the Chapel Hill Park-and-Ride to Blair Station via Montreal Road. This route runs with an approximate 15-minute headway during the peak periods and a 30-minute headway during non-peak periods.

- **Route 228** travels along Renaud Road and Navan Road to the south of the proposed development. The route serves to connect the Navan Road corridor to the existing Blair Station and is scheduled with 30-minute headways in the peak direction during the peak periods.

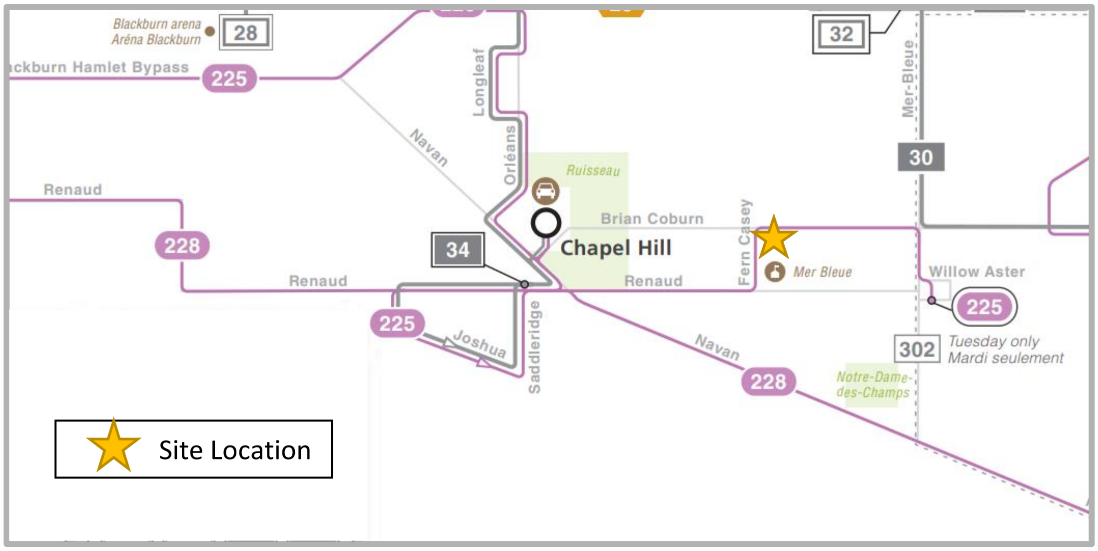


Exhibit 1-3: Existing Transit Routes

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 area intersections:

- Brian Coburn Boulevard/Navan Road (City Count: July 2018);
- Brian Coburn Boulevard/Fern Casey Street (Castleglenn Count: December, 2018);
- Fern Casey Street/Renaud Road (City Count: May 2018);
- Mer Bleue Road/Renaud Road (City Count: November 2018);
- Navan Road/Renaud Road (City Count: October 29th, 2019);
- Mer Bleue Road/Brian Coburn Boulevard (TIS 2225 Mer Bleue Rd – Orleans Health Hub: Dec. 2017);
- Fern Casey Street/Axis Way-Couloir Road ("T" intersection) (Castleglenn Count: December, 2018); and
- Mer Bleue Road/Deceour Drive (Castleglenn Count: September, 2019).

Existing Road Safety Information

Five (5) year (January 1st, 2014 to December 31st, 2018) historical collision information was reviewed for the area intersections. The collision information provides:

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

For each intersection within the 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 56% (5) 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;
- **Fern Casey Street/Renaud Road**: Two collisions have occurred at this intersection in the past 5 years, both of which were angle collisions. This resulted in a collision rate of 0.2/MEV;
- **Renaud Road/Mer Bleue Road**: Three collisions occurred at this intersection all of which resulted in property damage. A collision rate of 0.25/MEV was determined for this location;
- **Navan Road/Renaud Road:** A total of 14 collisions occurred at this intersection in the past 5 years. About 43% (6) of these collisions were rear-end collisions (3 in east direction, 2 in north direction and one in west direction) and 36% (5) were angle collisions (2 east / south direction and 2 in north / east direction, one in south / west direction). The majority (79%) of the collisions resulted in property damage. A single collision involved a pedestrian, which resulted in a non-fatal injury. A collision rate of 0.54 collisions/MEV was determined for this intersection
- **Brian Coburn Boulevard/Fern Casey Street:** This intersection was only recently constructed, however, three collisions have occurred at the intersection in 2018 (2 property damage only, one non-fatal injury). A collision rate of 0.16 was calculated for this intersection.
- **Brian Coburn Boulevard/Navan Road:** This intersection was only recently constructed, however, three collisions have occurred at the intersection (3 property damage only, one non-fatal injury). A collision rate of 0.14 was calculated for this intersection

The 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

Planned Transportation Network Changes

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

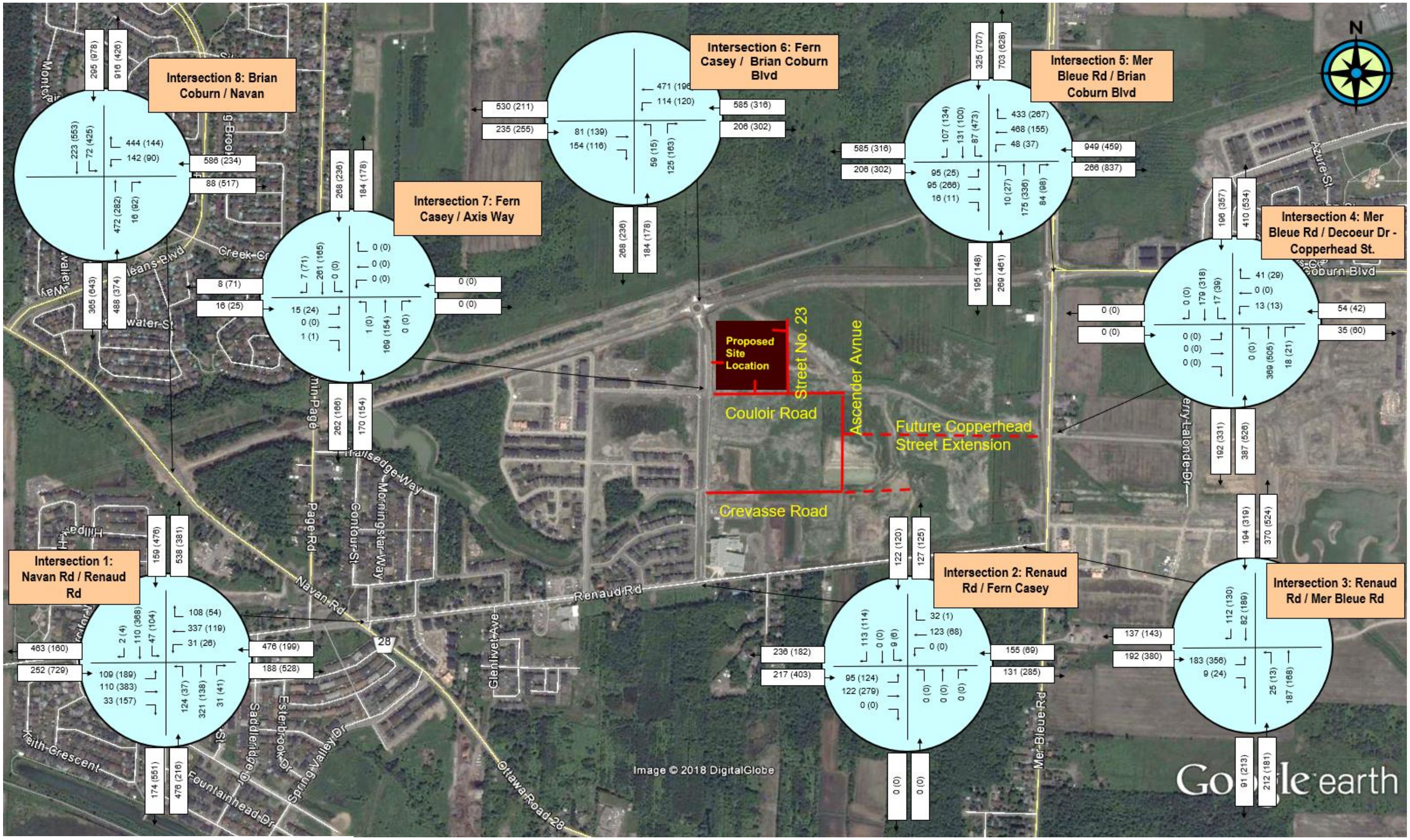
- Mer Bleue Road is scheduled for widening from Brian Coburn Boulevard to Renaud Road by 2024. This is assumed to include intersection improvements at Decoeur Drive and Renaud Road. The Mer Bleue/Renaud Road intersection is to receive traffic signal control improvements within the nest 10-years, with the design to-be-determined;
- The realignment of Mer Bleue Road between Renaud Road and Navan Road has been included in the 2031 TMP Network Concept;

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

- The Blackburn Hamlet Bypass Extension between Navan Road and Orleans Boulevard is scheduled to occur before 2024;
- Fern Casey Street is to be extended northward into the EUC Phase 3 lands to connect with the Vanguard Drive Extension and Frank Bender Street. This would form a local connection to Innes Road for the future residential development within the area;
- Brian Coburn Boulevard would be upgraded with transit signal priority (Isolated Measures) between Blackburn Hamlet Bypass and Tenth Line Road, in order to improve transit service between Orleans South and the Inner Area in lieu of other BRT measures such as the Cumberland Transitway;
- Vanguard Drive is to be extended to the west as a collector roadway through the East Urban Community Phase 3 lands, to connect Tenth Line Road to Mer Bleue and Lamarche Avenue; 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)".

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 north of the proposed development. This will greatly benefit the future transit share. However, the extension of the Transitway is anticipated to occur well beyond the 2031 Official Plan horizon and would have no impact on this traffic study report analyses/evaluation.



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 1-4: Existing (2020) Morning and Afternoon Peak Hour Traffic Volumes

Adjacent Development Initiatives

A review of adjacent developments planned within the immediate area was undertaken as part of this scoping report. As the proposed 6429 Renaud Road development is located within the East Urban Community Phase 3 lands, this traffic study report would assume similar rates of development for adjacent initiatives:

- ***East Urban Community, Phase 3 Lands (Draft MTS, Castleglenn, May 2020)***: The EUC Phase 3 lands encompass the proposed development, Trailsedge North and the Orleans Health Hub near the Brian Coburn Boulevard/Mer Bleue Road intersection. The precise timing of the development of the lands north of the Hydro Corridor is uncertain, but would almost certainly beyond the City of Ottawa 2031 planning horizon and after the build-out of the proposed Blocks 193 and 194 (6429 Renaud Road) development.
- ***Richcraft Trailsedge - Phase 4*****:** The Trailsedge Phase 4 subdivision is located to the east of the proposed 6429 Renaud Road development. A site plan concept indicated 917 residential dwellings (142 singles / 285 townhouses and 490 apartment units) as well as 300 mixed-use jobs and 180 commercial jobs. This development would connect to Brian Coburn Boulevard via the future Ascender Way and to the Mer Bleue Drive corridor via a fourth west leg at the Mer Bleue Road/Decoeur Drive intersection. It is understood that any Phase 4 development would occur after the 2031 TMP forecast horizon year;
- ***Richcraft Trailsedge East: Stage 3:*** The Trailsedge East development is located immediately south of the proposed 6429 Renaud Road development. The Trailsedge East development is bounded by Fern Casey in the west, Mer Bleue in the east and Renaud Road in the south. Stage 3-1 of the development is currently in development, with the entire development potential remaining of 945 units by 2029;
- ***Stage 6 - Minto Avalon West & 2336 Tenth Line Road (Mer Bleue Road/Decoeur Drive):*** The Minto Avalon West residential development located east of the proposed development, 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 North 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.

2.0 Traffic Forecast Area and Time Periods

2.1 The Traffic Forecast Area

The proposed 6429 Renaud Road development meets the trip generation triggers requiring both a Design Review and Network.

The traffic forecast area is proposed to include Fern Casey Street, Couloir Road, Street No. 23, and Brian Coburn Blvd as Boundary Streets for analysis.

Therefore, the traffic forecast area will address the following intersections:

- Brian Coburn Boulevard/Mer Bleue Road (Roundabout);
- Brian Coburn Boulevard / Fern Casey Street (Roundabout);
- Brian Coburn Boulevard / Navan Road (Roundabout);
- Mer Bleue Road / Future Decoeur-Copperhead Street (2029 - Roundabout[2]);
- Mer Bleue Road / Renaud Road (Un-signalized);
- Renaud Road / Fern Casey Street (Un-signalized);
- Renaud Road / Navan Road (signalized); and
- Fern Casey Street / Couloir Road - Axis Way (Un-signalized).

2.2 Time Periods

The forecast area includes an analysis of 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

The forecast report leads to an analysis of a full build-out year (understood to be the 2024 horizon year) and a build-out-plus-five-year (assumed to be 2029) horizon.

2 Mer Bleue Road and Decoeur Drive Functional Design and Option Analysis Rev. 1, Robinson Consultants, August 21st 2019

3.0 EXEMPTION REVIEW

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

Castleglenn would request the City of Ottawa to provide exemptions for Elements 4.1.3, 4.2.2, 4.61 and Module 4.8 as indicated within Table 3-1.

It's recognized that subsequent to the review of this traffic study report, the inclusions/exemptions could be revised ahead of the Step 4: Analysis report.

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.	**Yes**
	4.1.3 New Street Networks	Only required for plans of subdivision	No
4.2 Parking	**4.2.1 Parking Supply**	Required for site plan.	**Yes**
	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 (which is a major collector).	**Yes**
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 situated outside the Greenbelt in a predominately suburban area. The development is residential in nature with 90 back-to-back townhomes and 96 mid-rise dwellings. The future zoning is intended to be "R4F" which *"allows a mix of residential building forms ranged from detached to low rise apartment dwellings, in some cases limited to four units, and in no case more than four storeys, in areas designated as **General Urban Area** in the Official Plan".*

4.1.1 Auto Trip Generation

Table 4-1 summarizes the auto trip generation rates that were used for this assessment. The trip generation rates were referenced from Table 6.3 of the TRANS Trip Generation Residential Trip Rates Study (2009). Vehicle trip directional splits were referenced from Table 6.2 of the "*TRANS Trip Generation Study*". The "Low-Rise Condominium" (LU Code 231) was adopted for the "Mid-Rise Terrace Flats" stacked units as it is more conservative than the "Low-Rise Apartments" (LU Code 221) trip generation rates.

Table 4-1: Trip Generation Rates adopted for the 6429 Renaud Road Development

Land Use	*Source*	*Independent Variable*	*Morning Peak Hour*			*Afternoon Peak Hour*		
			Rate	*In %*	*Out %*	*Rate*	*In %*	*Out %*
Semi-Detached Dwellings, Townhouses, Rowhouses	TRANS (Table 6.2, 6.3) ITE LU 224	Dwelling Units	0.54	37%	63%	0.71	53%	47%
Low-Rise Condominiums	TRANS (Table 6.2, 6.3) ITE LU 231	Dwelling Units	0.60	31%	69%	0.66	56%	44%

Table 4-2 demonstrates the anticipated auto vehicle trips generated by the proposed development assuming full build-out.

Table 4-2: Base Auto Trips Generated By 6429 Renaud Road Development

Land Use	*Source*	*Size*	*Morning Peak Hour (veh/hr)*			*Afternoon Peak Hour (veh/hr)*		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Back-to-Back Townhouses	TRANS	90 Dwelling Units	18	32	50	35	30	65
Mid-Rise Terrace Flats	TRANS	96 Dwelling Units	18	40	58	35	28	63
Total Auto Trips-per-Hour			**36**	**72**	**108**	**70**	**58**	**128**

4.1.2 Estimate of Total Development Generated Person Trips

The base auto trips generated by the development were then converted to an equivalent number of person-trips.

Table 3.13 of the "*TRANS Trip Generation Study*" was referenced for applicable mode share rates for the townhouse and terrace dwelling components of the development. The apartment mode share in Table 3.13 of the TRANS Study was used for the terrace dwellings, as there was no mode share specific to the low-rise condominium dwelling unit type. Table 4-3 and Table 4-4 summarize the mode share conversion from auto-trips to person-trips for the proposed townhouse and terrace flat units.

Table 4-3: Mode Share: Person Trips-per-Hour: Townhouses

Travel Mode	*Mode Share[1]*	*Morning Peak Hour (person trips/hr)*			*Mode Share[1]*	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	18	32	50	61%	35	30	65
Auto Passenger	10%	3	6	9	11%	6	5	11
Transit	27%	9	16	25	22%	13	11	24
Non-Motorized	8%	3	5	7	6%	3	3	6
Total	100%	33	58	91	100%	57	49	106

1. Mode Share Percentages referenced from Table 3.13 of the "*TRANS Trip Generation Study*"

Table 4-4: Mode Share: Person Trips-per-Hour: Mid-Rise Terrace Flats

Travel Mode	*Mode Share[1]*	*Morning Peak Hour (person trips/hr)*			*Mode Share[1]*	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	44%	18	40	58	44%	35	28	63
Auto Passenger	9%	4	8	12	14%	11	9	20
Transit	34%	14	31	45	33%	26	21	47
Non-Motorized	13%	6	12	17	9%	6	6	12
Total	100%	41	91	132	100%	78	64	144

1. Mode Share Percentages referenced from Table 3.13 of the "*TRANS Trip Generation Study*"

4.1.3 Existing and Future Mode Shares

The values were referenced from the "*East Urban Community (EUC) Phase 3 Area Community Design Plan – Master Transportation Study*" (Table 9.3 and Table 9.4 CastleGlenn, May 2020). 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 as mentioned in Section 1.3,

- Use of the Chapel Hill Park and Ride at Navan Road and Brian Coburn Boulevard;
- Extension of the LRT to east of Jeanne d'Arc Blvd, and;
- the assumption that the Cumberland Transitway would **not** be in place by either the build-out or build-out + 5-year horizon.

Table 4-5 summarizes the existing and future mode shares adopted for the proposed development, as well as a rationale for the assumed future mode shares.

Table 4-5: Existing and Future Mode Shares

Land Use	*Travel Mode*	*Peak Existing Mode Shares*		*Forecast (2024 and 2029)*	*Rationale*
		AM	*PM*	*AM & PM*	
Back-to-Back Townhomes	Auto Driver	55%	65%	60%	Auto mode assumed to be similar to existing mode share
	Auto Passenger	20%	20%	15%	
	Transit	15%	10%	20%	Increase in Transit due to Trim Rd. Extension, isolated transit improvements
	Non-Motorized	10%	5%	5%	
Mid-Rise Terrace Flats	Auto Driver	55%	65%	60%	Auto mode assumed to be similar to existing mode share
	Auto Passenger	20%	20%	15%	
	Transit	15%	10%	20%	Increase in Transit due to Trim Rd. Extension, isolated transit improvements
	Non-Motorized	10%	5%	5%	

4.1.4 Projected Development Trips by Mode

Table 4-6 summarizes the full build-out traffic demand generated by the proposed development for each separate residential component as well as the total number of trips generated.

A review of the table indicates that the development is anticipated to generate:

- approximately 140 additional passenger vehicles trips in the morning peak hour;
- approximately 150 additional passenger vehicles trips in the afternoon peak hour; and
- 44-to-50 additional transit trips during the peak hour of travel demand (which would be expected to use north-south bus routes to access the LRT extension to Trim Rd).

Table 4-6: Summary of Traffic Generation - 6429 Renaud Road
(Person Trips per Hour)

Residential Component: Back-to-Back Townhouses								
Travel Mode	***Mode Share***	***Morning Peak Hour***			***Mode Share***	***Afternoon Peak Hour***		
		In	***Out***	***Total***		***In***	***Out***	***Total***
Auto Driver (Passenger Vehicles)	60%	19	34	55	60%	34	30	64
Auto Passenger	15%	5	9	14	15%	9	7	16
Transit	20%	7	12	18	20%	11	10	21
Non-Motorized	5%	2	3	5	5%	3	2	5
Total	**100%**	**33**	**58**	**92**	**100%**	**57**	**49**	**106**
Residential Component: Mid-Rise Terrace Dwellings								
Travel Mode	***Mode Share***	***Morning Peak Hour***			***Mode Share***	***Afternoon Peak Hour***		
		In	***Out***	***Total***		***In***	***Out***	***Total***
Auto Driver (Passenger Vehicles)	60%	25	55	79	60%	47	39	86
Auto Passenger	15%	6	14	20	15%	12	9	21
Transit	20%	8	19	26	20%	16	13	29
Non-Motorized	5%	2	5	7	5%	4	3	7
Total Person Trips/Hour	**100%**	**41**	**93**	**132**	**100%**	**79**	**64**	**143**

Total Residential - Summary of Traffic Generation by all Modes						
Travel Mode	***Morning Peak Hour***			***Afternoon Peak Hour***		
	In	***Out***	***Total***	***In***	***Out***	***Total***
Auto Driver (Passenger Vehicle Trips)	44	89	134	81	69	150
Auto Passenger	11	23	34	21	16	37
Transit	15	31	44	27	23	50
Non-Motorized	4	8	12	7	5	12
Total	**74**	**151**	**224**	**136**	**113**	**249**

Zoning: A Worst-Case Density Discussion

This traffic study report is intended to support a Major Zoning By-Law Amendment from the existing Development Reserve (DR) zoning to a proposed Residential Fourth Density Zone (R4F). The R4 zoning designation permits a wide variety of residential land uses ranging from single detached dwellings to low-rise apartment units. For analyses purposes, a worst-case traffic generation scenario was considered where it was assumed that the entirety of the 19 residential blocks could be developed as either:

- *"Terrace Flats" Stacked Units*; Build-out of this type of unit would result in 230 units and the application of a lower trip rate. Assuming the Suburban trip rate from TRANS Table 6.3 for "Low-Rise Condominiums", this scenario would generate approximately 207 vehicle trips and 345 person trips during the afternoon peak hour; or
- *"Back-to-Back Townhouse" Units*; Build-out of this type of unit would result in up to 160 townhouse units and the application of a larger trip generation rate. Assuming the Suburban trip rate from Trans Table 6.3 for "Townhouses", this scenario would generate approximately 112 vehicle trips and 186 person-trips during the afternoon peak hour.

It is evident that the "Terrace Flats" unit would pose a worst-case trip generation scenario for the R4 zoning, given its higher density of development. When the worst-case is compared to the proposed site plan, the worst-case zoning would produce:

- An additional 90 person-trip and 50 two-way vehicle trips in the morning peak hour; and
- An additional 104 person-trips and 67 two-way vehicle trips in the afternoon peak hour.

Should the worst-case density occur for this zoning, it is anticipated to put a negligible-to-minor strain on the supporting roadway and transit service frequency. The "worst-case" is very unlikely to occur as the site plan is being applied for at the same time as the zoning by-law amendment and as such the density of proposed development is fixed.

4.1.5 Trip Reduction Factors

Pass-by and internalization reductions were excluded from the analysis as the site is entirely residential.

4.1.6 Trip Distribution

The traffic distribution developed for the proposed site involved a review of existing travel patterns, and local planning documents such as the EUC Phase 3 MTS (Castleglenn, 2020) and the Trailsedge East MTS (Castleglenn, 2018). Table 4-7 summarizes the traffic distribution adopted for the proposed site. Exhibit 4-1 illustrates the distribution of traffic at each intersection.

Table 4-7: Assumed Traffic Distribution

To/From	*Residential Traffic Distribution*
North	34%
East	17%

To/From	*Residential Traffic Distribution*
South	5%
West	44%

4.1.7 Trip Assignment

The traffic distribution values illustrated within Exhibit 4-1 were used to develop both the 2024 forecast (build-out) and 2029 forecast (build-out + 5 years). A "shortest path" principle was adopted as the procedure to assign auto traffic generated by the development to the surrounding network. The following network assumptions were made during the assignment:

- The Renaud Road/Navan Road intersection remains open in 2029 with full access;
- The Brian Coburn Boulevard/Navan Road intersection remains a 3-leg roundabout;
- EUC Phase 3 and the corresponding north leg of the Fern Casey Street/Brian Coburn Boulevard intersection was assumed to not have been constructed by the build-out horizon (2029); and
- The Copperhead Street connection from Trailsedge Phase 3 would be in place by 2029 to form a 4-leg roundabout intersection with Mer Bleue and Decoeur Drive

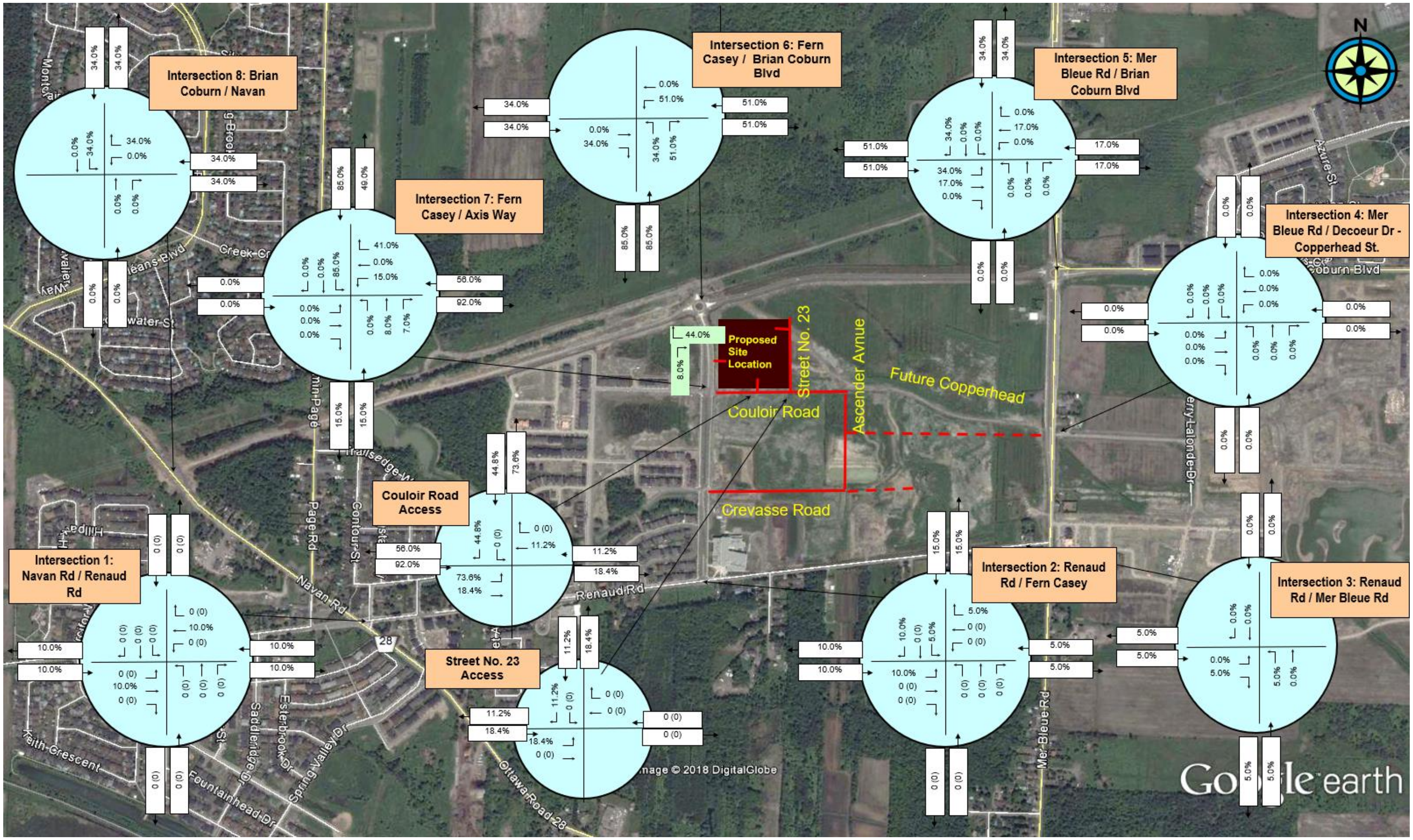


Exhibit 4-1: 6429 Renaud Road: Traffic Distribution

4.1.8 Site Traffic Volumes

Exhibit 4-2 illustrates the full build-out traffic generated by the proposed Blocks 193 and 194 (6429 Renaud Road) development.

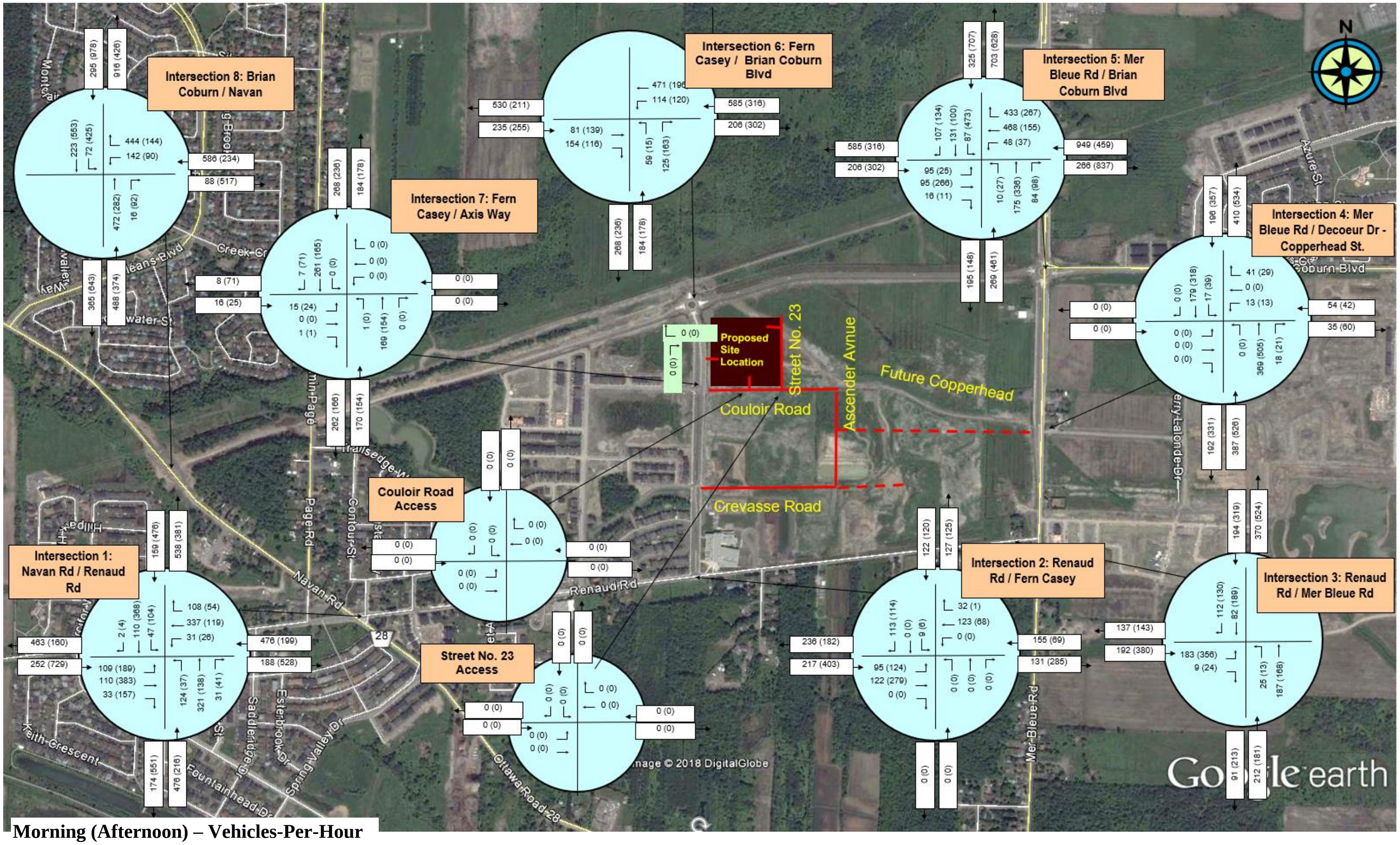


Exhibit 4-2: Site Generated Traffic Volumes: Full Build-Out

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. The average 20-year growth rate was found to be approximately 1% across the Innes Road- Brian Coburn Boulevard-Renaud Road screenline. A review of background traffic growth generated by adjacent developments was found to exceed 4% across the same screenline. Therefore, the assumed background development growth could be considered aggressive resulting in a conservative estimate in background traffic growth solely from adjacent developments.

Therefore, no additional background growth beyond that already accounted for within the adjacent development initiatives was superimposed upon the roadway network.

5.2 SURROUNDING DEVELOPMENT TRAFFIC GENERATION

Appendix "D" contains exhibits that illustrate the anticipated impact of the adjacent developments as referenced from relevant traffic studies. The East Urban Community, Phase 3 lands and the Richcraft Trailsedge, Phase 4 lands would occur beyond the 2029 time-horizon and were not addressed within the horizons of this traffic study report.

5.2.1 Richcraft Trailsedge East: Stage 3

The Trailsedge East CTS (Castleglenn, 2018) was reviewed to appreciate the effect that this planned development would have upon the Trailsedge area south of the proposed 6429 Renaud Road development. Richcraft also indicated a revised build-out and unit schedule.

Table 5-1 summarizes the adopted 2024 and 2029 Trailsedge Phase 3 cumulative residential dwelling unit forecasts, the associated traffic generation rates and inbound/outbound percentages. The 2029 horizon year represents full build-out of the Trailsedge East Phase 3 development.

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

Land Use	*Source*	*Independent Variable*	*Horizon Year*		*Morning Peak Hour*			*Afternoon Peak Hour*		
			2024	*2029*	*Rate*	*In*	*Out*	*Rate*	*In*	*Out*
Single-Detached Dwellings	TRANS (Table 6.2, 6.3)	Dwelling Units	171	343	0.7	29%	71%	0.9	62%	38%
Townhouses	TRANS (Table 6.2, 6.3)	Dwelling Units	435	712	0.54	37%	63%	0.71	53%	47%

5.2.2 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).

These reports indicate that, between 2019 and 2023:

- an additional 256 townhomes and 180 single homes remain to be occupied/closed 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 have first occupancy by June 2020 and have full occupancy by Fall 2021 (60 units);

The 2019 letter reports were directly referenced to develop the 2024 and 2029 background traffic volumes.

5.2.3 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 area roadway 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 was expected to occur in 2021[3].

5.2.4 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 was assumed to be in place by 2020, while the anticipated build-out of Phase 5-6 was assumed to occur by 2024.

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

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

5.2.5 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 (Castlgelenn, 2020) were reviewed to determine the relevant traffic generation and distribution for this area. In following with the EUC Phase 3 MTS, it was assumed that 20% of the EUC Phase 2 lands (146 singles, 126 townhouses) are occupied by 2024 while 40% of the EUC Phase 2 lands (291 singles, 252 townhouses) are occupied by 2029.

The south leg of the Renaud Road / Fern Casey Street intersection was assumed operational by 2024.

6.0 DEMAND RATIONALIZATION

This section rationalizes the future travel demands for the area to determine if there are any auto capacity limitations within the transportation network. The following sections detail an intersection capacity analysis undertaken assuming:

- Existing 2020 traffic conditions;
- Forecast 2024 background traffic without the proposed development; and
- Forecast 2029 background traffic without the proposed development.

All intersection capacity analysis was undertaken with Synchro™ 10 traffic software for signal control and STOP-control intersections and with SIDRA™ Intersections for roundabout intersections.

6.1 EXISTING NETWORK CONSTRAINTS

Table 6-1 summarizes the existing (2020) intersection capacity analysis. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines. The table indicates that no capacity constraints are evident within the existing network. All intersections are anticipated to operate with an auto LOS equal to-or-better-than "C", which exceeds the LOS target of "D" for this area.

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							
Navan Road & Renaud Road	***WB-Th/RT (SB-Th/RT)***	31 (22)	C (C)	0.78 (0.71)	25.6 (16.5)	C (B)	0.71 (0.67)
STOP-Controlled							
Fern Casey & Axis Way "T" intersection	***EB-LT/Th/RT (EB-LT/Th/RT)***	12 (12)	B (B)	0.04 (0.05)	-	-	-
Renaud Rd & Fern Casey	***SB-LT/RT (SB-LT/RT)***	10 (9)	B (A)	0.16 (0.15)	-	-	-
Mer Bleue Rd & Renaud Rd	***EB-LT/RT (EB-LT/RT)***	11 (19)	B (C)	0.31 (0.65)	-	-	-
Mer Bleue Rd & Deceour "T" intersection	***WB-LT/RT (WB-LT/RT)***	11 (13)	B (B)	0.31 (0.10)	-	-	-
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (SB Approach)***	21.1 (9.0)	E (A)	0.98 (0.42)	14.5 (7.8)	E (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)
Brian Coburn Blvd & Navan Road	***WB Approach (NB Approach)***	14.1 (8.7)	C (A)	0.79 (0.52)	9.5 (8.3)	C (D)	0.79 (0.81)

6.2 Future Network Constraints: Without the Proposed Site

6.2.1 Build-Out (2024) Background Traffic Analysis

Exhibit 6-1 illustrates the 2024 forecast traffic conditions assuming the proposed development is not in place and Table 6-2 summarizes the resulting intersection capacity analysis. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines.

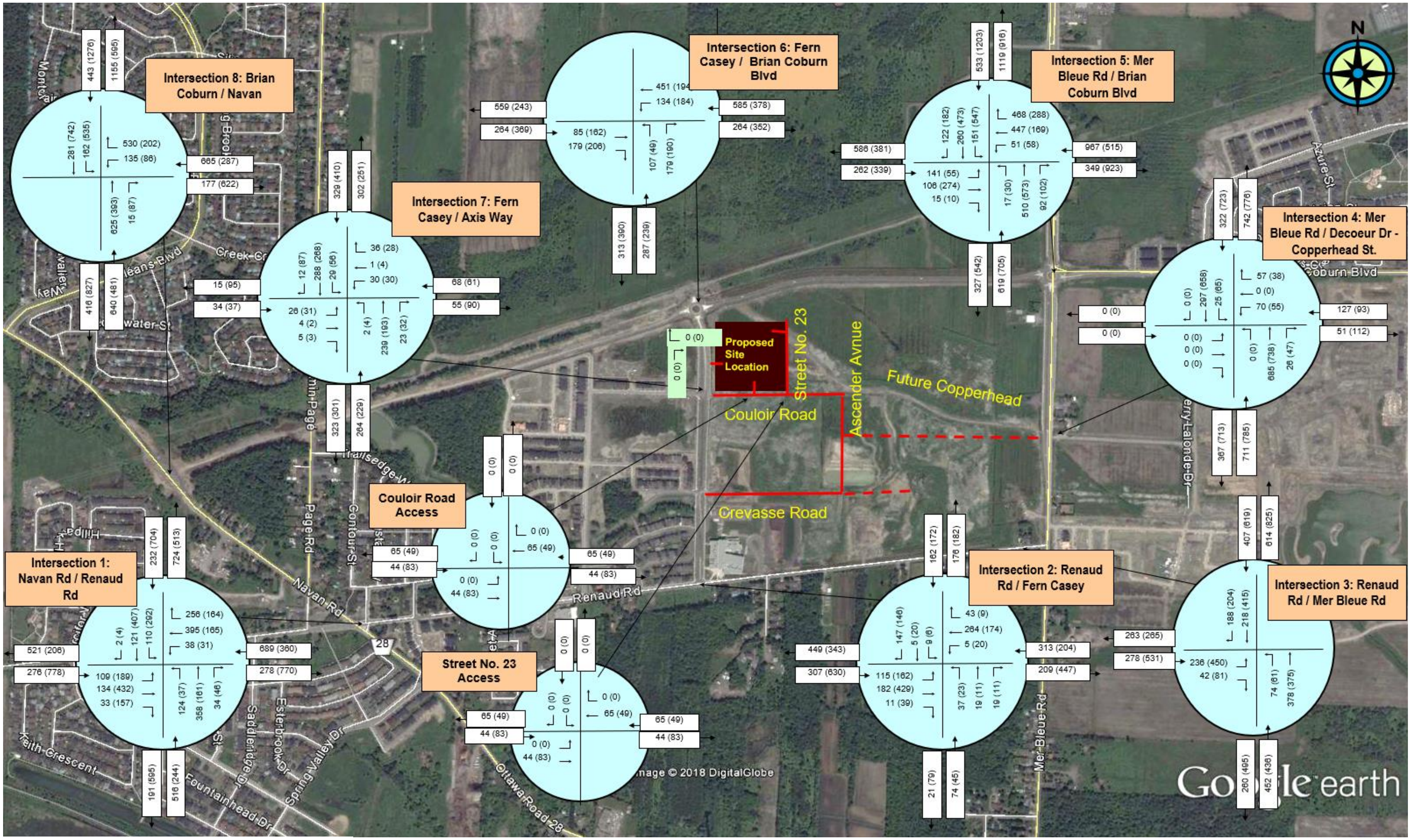
Table 6-2 indicates the majority of intersections would operate at, or better than, the Auto MMLOS target of "D", with exception of the following critical movements and intersections:

- The **Mer Bleue Road / Renaud Road** STOP-controlled intersection was found to operate with a LOS "F" in the afternoon peak hour.
- The **Brian Coburn Boulevard / Mer Bleue Road** roundabout intersection was found to operate with a poor LOS "F" on the westbound approach during the morning peak period. This level of service is attributed to traffic originating from east of the area; and
- The **Brian Coburn Boulevard/Navan Road** roundabout intersection was found to operate with a poor LOS "F" in both the afternoon and morning peak periods of travel demand;

Table 6-2: Forecast (2024) 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							
Navan Road & Renaud Road	***WB-Th/RT (WB-Th/RT)***	50 (28)	**E** (C)	**0.96** (0.74)	37 (20)	D (B)	0.88 (0.70)
STOP-Controlled							
Renaud Rd & Fern Casey[1]	***NB-LT/Th/RT (NB-LT/Th/RT)***	19 (33)	C (D)	0.22 (0.26)	-	-	-
Fern Casey & Axis Way/Couloir Road	***EB-LT/Th/RT (EB-LT/Th/RT)***	15 (16)	B (C)	0.09 (0.10)	-	-	-
Mer Bleue Rd & Renaud Rd	***NB-LT/Th (EB-LT/RT)***	20 **(112)**	C **(F)**	0.70 **(1.15)**	-	-	-
Mer Bleue Rd & Decoeur "T" intersection[1]	***WB-LT/RT (WB-LT/RT)***	20 (31)	C (D)	0.35 (0.41)	-	-	-
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (EB Approach)***	71.8 (8.9)	**F** (A)	**1.13** (0.50)	33.1 (7.8)	**F** (B)	**1.13** (0.63)
Brian Coburn Blvd & Fern Casey "T" intersection	***NB Approach (WB Approach)***	6.6 (7.2)	A (A)	0.21 (0.26)	6.0 (6.2)	A (A)	0.43 (0.30)
Brian Coburn Blvd & Navan Road	***WB Approach (NB Approach)***	21.7 (10.6)	**E** (B)	**0.91** (0.66)	12.4 (9.0)	**E (E)**	**0.91 (0.93)**

1. Both the Renaud Road/Fern Casey and Mer Bleue/Decoeur Road intersections are scheduled for intersection improvements in the near-term



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 6-1: 2024 Forecast Traffic – Background Traffic (No Development)

6.2.2 Build-Out + 5-Years (2029) Background Analysis

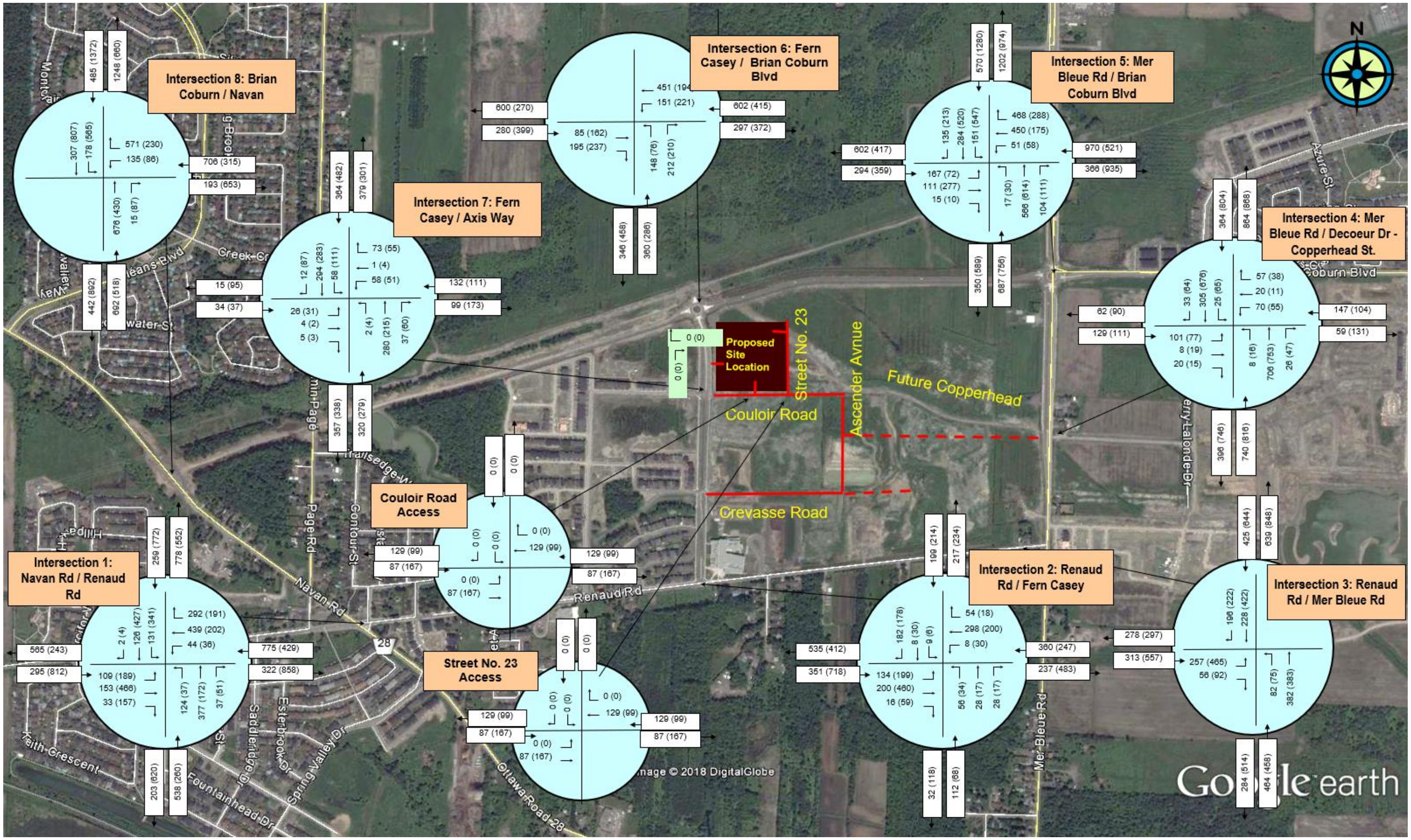
Exhibit 6-2 illustrates the 2029 forecast traffic conditions assuming the proposed development is not in place and Table 6-3 summarizes the resulting intersection capacity analysis. The level of service for the traffic signal control intersections and roundabouts are based on Section 6.1 of the City of Ottawa MMLOS Guidelines.

Table 6-3: Forecast (2029) 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							
Navan Road & Renaud Road	***WB-Th/RT (WB-Th/RT)***	77 (32)	**F** (C)	**1.05** (0.79)	55 (24)	F (C)	1.01 (0.77)
STOP-Controlled							
Renaud Rd & Fern Casey	***NB-LT/Th/RT (NB-LT/Th/RT)***	37 (60)	E (F)	0.51 (0.53)	-	-	-
Fern Casey & Axis Way-Couloir Road "4-Leg" intersection	***WB-LT/Th/RT (EB-LT/Th/RT)***	18 (21)	C (C)	0.11 (0.14)	-	-	-
Mer Bleue Rd & Renaud Rd	***EB-LT/RT (SB-Th/RT)***	24 (129)	C (**F**)	0.74 (**1.20**)	-	-	-
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (EB Approach)***	98.2 (9.5)	**F** (A)	**1.19** (0.55)	41.9 (8.0)	**F** (B)	**1.19** (0.65)
	EB Approach [1] ***(SB Approach)*** [1]	8.7 (7.7)	A (A)	0.15 (0.52)	6.9 (7.3)	A (A)	0.52 (0.52)
Brian Coburn Blvd & Fern Casey "T" intersection	***WB Approach (WB Approach)***	6.6 (7.6)	A (A)	0.46 (0.30)	6.3 (6.5)	A (A)	0.46 (0.34)
Brian Coburn Blvd & Navan Road	***WB Approach (SB Approach)***	45.3 (14.4)	**F** (E)	**1.03** (0.99)	21.3 (13.0)	**F (E)**	**1.03 (0.99)**
	WB Approach [2] ***(NB Approach)*** [2]	8.7 (7.9)	A (A)	0.45 (0.48)	7.3 (7.4)	A (A)	0.55 (0.52)
Mer Bleue Rd & Decoeur Drive / Copperhead St.	***EB Approach (EB Approach)***	10.1 (10.7)	A (A)	0.12 (0.14)	6.0 (5.8)	A (A)	0.55 (0.62)

1. Assumes a 4lane Brian Coburn Blvd West and East Approaches at Mer Bleue Road
2. Assumes a 4lane Brian Coburn Blvd West Approach and 4-lane Navan Road North of Brian Coburn.

Overall, the area intersections were found to operate with lower levels of service and greater delays than the 2024 forecast analysis. The table indicates that all traffic signals and roundabout intersections would operate better than the Auto MMLOS target of "D" assuming a 4-lane Brian Coburn Boulevard corridor.



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 6-2: 2029 Forecast Traffic – Background Traffic (No Development)

Analysis of the forecast 2029 traffic conditions indicate that the following turning movements are anticipated to become critical due to the increase in background traffic growth:

- The **Navan Road / Renaud Road** signal-controlled intersection was found to operate with poor levels-of-service "F" during the morning peak hour of travel demand. The City is in the process of evaluating the proposed interim and ultimate solution for the configuration of this intersection; and
- The **Renaud Road / Fern Casey Street** intersection assuming a 4-leg STOP-controlled configuration was found to operate with unacceptable LOS "F" during the afternoon peak hour of travel demand due to the increase of traffic from the EUC Phase II areas south of Renaud Road. A review of the EUC Phase II MTS was found to indicate that traffic signal control with auxiliary lanes was recommended for this intersection.

Assuming a 4-lane Brian Coburn Boulevard configuration indicated satisfactory intersection operations, however, the widening of Brian Coburn Boulevard is not anticipated to occur beyond the (2031) Official Plan horizon year.

6.3 Development Generated Demand

As indicated within Table 4-6, the proposed development is anticipated to generate:

- 134 passenger vehicle trips during the morning peak period; and
- 150 passenger vehicle trips during the afternoon peak period.

Exhibit 4-1 indicated:

- Up to 85% of the proposed development traffic is destined to the Brian Coburn Boulevard corridor, which is the nearest arterial corridor to the development. Brian Coburn Boulevard provides access to areas to the west, north and east of the development; and
- The remaining 15% of development traffic is destined to and from the Renaud Road corridor, which provides access to rural areas to the south and an alternate route to the downtown core through Renaud road.

Given the low traffic generation associated with the proposed development, the incremental impact of the proposed development upon the Brian Coburn Boulevard corridor was thought from the outset to result in a low-to-minor incremental traffic impact as the corridor functions as the primary east-west arterial for the development and is ultimately planned to be widened.

6.4 Reduction in Future Demand

The resulting 2024 and 2029 background traffic forecast intersection capacity analysis indicated that the intersections along Brian Coburn Boulevard are above capacity in the westbound direction during the afternoon peak hour of travel demand. However, the following reductions in travel demand could be considered to occur by the 2024 forecast year:

- *Change in Trip Time:* Motorist may have the option of changing the time they leave for work or complete retail trips. It was envisioned that 10% of east-west trips along Brian Coburn Boulevard This would cause a “flattening” of the peak hour, and increase the duration of the peak periods of travel demand; and
- *Reduction in Auto Modal Share:* The advent of the LRT extension to Trim by 2024 would likely involve an increased transit share for the Orleans community. A 5% auto reduction to background traffic is proposed to account for a shift from the auto mode share to a transit mode share between opening of the LRT in 2024 which would coincide with the 2024 build-out horizon year. A greater transit share could be warranted once the advent of the Brian Coburn/Cumberland Transitway dedicated facilities have been realized.

The advent of these travel demand rationalization measures could enable sufficient capacity at the Brian Coburn Boulevard / Mer Bleue Road roundabout intersection to better accommodate anticipated future background traffic growth.

7.0 ANALYSIS AND TIA STRATEGY

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

The City of Ottawa's TDM-Supportive Development Design and Infrastructure Checklist and TDM Measures Checklist for Multi-Family Residential Developments were completed for the proposed development (See Appendix "G"). The development was found to offer excellent pedestrian linkages throughout the site in addition to a plentiful supply of bicycle parking stalls that would support sustainable active modes of travel. As regards cycling parking accommodations, safe and secure indoor bike storage is to be afforded to residents. A total of 50 bike parking stations are to be provided, all of which are located within a secure indoor building near the amenity area.

Exhibit 7-1 illustrates the site location relative to two OC Transpo stops (Transit Stop 8139 (Route 225 NB) Transit Stop 8138 (Route 225 SB), located at the intersection of Fern Casey Street / Crevasse Road.

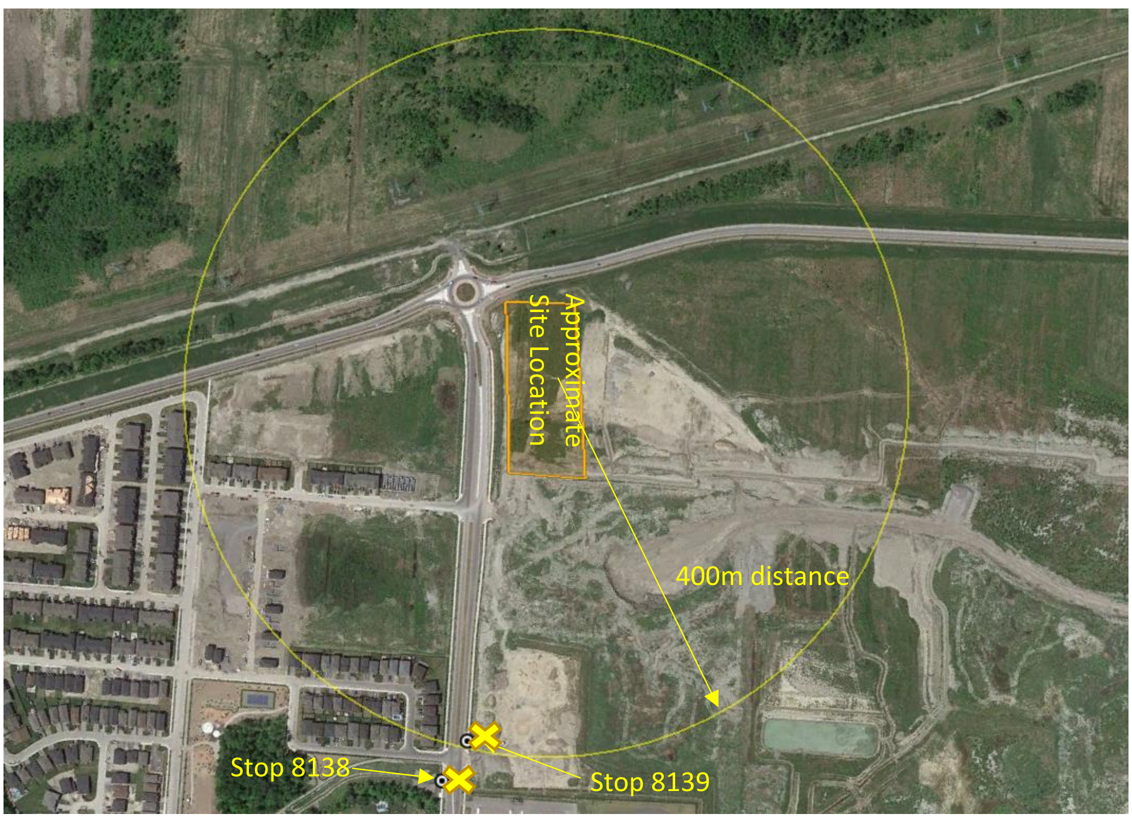


Exhibit 7-1: Site Location and OC Transpo Stops within 400m of Centroid

The exhibit illustrates a 400m radii originating from the centre of the Terrace Flats development representing the accessible walking distance to transit services. The exhibit indicates that both the nearest existing transit stops are at the limit of the 400m walking standard for OC Transpo transit stop locations. In the long term, a future BRT station is anticipated to be located north of Brian Coburn Boulevard near the intersection with Fern Casey Street.

The northern half of the site is more than 400m from the nearest transit stop location. Route 225 currently circulates along Brian Coburn Boulevard to reach Fern Casey Street. In the short-term, transit stops could be arranged at the intersection of Fern Casey Street and Couloir Road.

7.1.2 Circulation and Access

There are no anticipated impacts to the surrounding roadways as all municipal services and deliveries are anticipated to be accommodated on-site. The site plan also indicates:

- Waste collection refuse would be provided within the Amenity Area Building which is accessed from a garbage bay from an internal road. It is anticipated that waste pick-up will be completed from a parallel-park arrangement at the curb front; and
- Emergency services can access the site from either Couloir Road, Street No. 23 or Fern Casey Street. A fire truck route has been designated within the proposed site.

7.2 Parking

7.2.1 Motor Vehicle Parking

Table 7-1 summarizes the parking requirements and on-site parking supply for the proposed development. The development is located within Area "C' of Schedule 1A (Zoning By-law No.2008-250) and is entirely residential in nature. The table indicates the proposed 136 stall on-site parking supply would satisfy the parking requirements for the proposed mid-rise terrace dwelling component of the development.

Table 7-1: Parking Requirements: Mid-Rise Terrace Dwellings

Parking Type	*Rate*	*Unit*	*Parking Requirements*	*Provided Parking**
Residential - Tenant (Table 101)[1]	1.2 stalls / unit	96 Units	115 Stalls	136 Surface stalls
Residential - Visitor (Table 102)[1]	0.2 stalls / unit	96 Units	20 Stalls	
Total Parking Stalls			**135 Stalls Required**	**136 Stalls to be Provided**

1. Referenced from Area "C' of Schedule 1A (Zoning By-law No.2008-250)

The back-to-back townhouse component of the development is planned to provide an individual garage and driveway access for each of the 90 dwelling units, which also satisfies the parking requirements. No visitor parking is required based on Section 102(4) of the Zoning By-law. It is forecast that there would be no parking spillover on adjacent roadways.

7.2.2 Bicycle Parking

A review of By-Law Section 111 indicates:

- 0.50 bicycle parking spaces are required per-dwelling-unit for the mid-rise terrace dwellings. Therefore, 48 bicycle spaces (96 units) would be required for this portion of the development; and
- No bicycle parking is required for the back-to-back townhomes since a garage/carport is provided.

The proposed site plan provides for 50 bicycle stalls, which will be located in an interior bicycle storage area located near the amenity area for the development. This supply of bicycle parking exceeds the 48 minimum bicycle stall requirement.

7.3 Boundary Street Design

7.3.1 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 transportations within the immediate study area. The following four boundary road segments were considered with this analysis:

- Fern Casey Street (between Axis Way and Brian Coburn Boulevard);
- Chemin du Coulour Road (fronting the site);
- Brian Coburn Boulevard (fronting the site); and
- Street No. 23 (fronting the site);

At the time of this study, a complete street design remains to be developed for these roadways. Table 7-2 summarizes the segment MMLOS analysis fronting the proposed development assuming the existing configurations of Fern Casey Street, Coulour Road, and Brian Coburn Boulevard. The table incorporates the following analysis assumptions:

- The target MMLOS has been referenced from Exhibit 22 of the City of Ottawa Multi Modal Level of Service Guidelines (September 2015). The MMLOS targets are based on the "Mixed-Use Centre Official Plan area" 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;
- For the pedestrian and bike LOS analysis, the operating speed along Brian Coburn Boulevard, Fern Casey Street and Couloir Road has been assumed to be 10 km/hr greater than the roadway posted speed[4]; and

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

- The Street No. 23 corridor is anticipated to be constructed as part of the Blocks 193 and 194 (6429 Renaud Road) site plan application. For the interim, this facility would serve as a local connection to the back-to-back townhomes along the eastern edge of the proposed development. The roadway is to be designed and constructed according to preliminary guidelines to achieve a 30 km/hr operating/design speed. Street No. 23 would feature a 1.8m sidewalk with parking along both sides of the roadway.

Table 7-2: Segment MMLOS for Boundary Streets at Build-Out (2029)

Performance Measure	***Roadway Segments Adjacent to the Development***			
	Northbound Fern Casey Street	Westbound Couloir Road	Eastbound Brian Coburn Blvd.	Southbound Street No. 23
Pedestrian LOS (PLOS)				
Sidewalk Width (m)	2.0	>2.0	3.7	1.8
Boulevard Width (m)	>3	0	2.5	0
Average Daily Curb Lane Traffic Volume	~4,300	1,800	3,400	150
Presence of On-Street Parking	No	Yes	No	N/A
Operating Speed (km/h) Posted +10 km/hr	70	50	80	30
Segment PLOS	**D**	B	**D**	A
Target PLOS	C	C	C	C
Bicycle LOS (BLOS)				
Bikeway Type	Bike Lanes	Mixed Traffic	Physically Separated Bikeway (Multi-Use Path)	Mixed Traffic
Travel Lanes	2	2	N/A	2 (residential)
Bike Lane Width (m)	>2m	N/A	N/A	N/A
Operating Speed (km/h) Posted +10 km/hr	70	50	N/A	30
Bike Lane Blockage	N/A	N/A	N/A	N/A
Segment BLOS	**E**	B	A	A
Target BLOS	B	B	D	D
Transit LOS (TLOS)				
Facility Type	Mixed Traffic	N/A	Mixed Traffic	N/A
Level/Exposure to Parking/Driveway Friction	Limited		Limited	
Posted Speed Limit (km/h)	60		70	
Segment TLOS	D		D	
Target TLOS	N/A		D	
Truck LOS (TkLOS)				
Number of lanes (in each direction)	N/A	N/A	1	N/A
Curb Lane Width (m)	N/A	N/A	~3.5	N/A
Segment TkLOS	N/A	N/A	C	N/A
Target TkLOS	N/A	N/A	D	N/A

The following sections provide an overview of the modal levels of service (LOS) results indicated within Table 7-2 and serves to identify the deficiencies and their possible remedies for consideration.

Pedestrian LOS (PLOS)

- A forecast PLOS of “D” resulted at the Brian Coburn Boulevard roadway segment which exceeds the target PLOS “C”. The PLOS “D is directly attributable to the operating speed of 80 km/hr and the forecast 2029 traffic volumes along Brian Coburn Boulevard corridor. The existing 3.2m wide multiuse pathways that runs along the south side of Brian Coburn Boulevard is a facility likely to be used by pedestrians. The calculated PLOS may not account for the presence of this facility and the boulevard separation and may not be considered as being as a deficiency. A reduction in the speed limit from 70 km/hr to 50 km/hr could result in the desired PLOS “C” if deemed to be appropriate. This improvement could be implemented with a future widening of Brian Coburn Boulevard;
- A forecast PLOS “D” along Fern Casey north of the Fern Casey Street/Couloir Road intersection. A PLOS “C” could be achieved by a 25% reduction in daily forecast traffic volumes, the addition of on-street parking or a reduction in the 60 km/hr speed limit. A reduction to 40 km/hr would result in a PLOS “B”, exceeding the target.

Bicycle LOS (BLOS)

- A forecast BLOS of “E” resulted at the Fern Casey Street roadway segment which exceeds the target BLOS “B” for a “Local Cycling Route”. The BLOS “E” is directly attributable to the operating speed of 70 km/hr along Fern Casey Street adjacent to the dedicated bike lanes. A reduction in the speed limit to 40 km/hr would result in a BLOS “A”;
- To achieve a satisfactory BLOS “B”, the Couloir Road corridor was found to require a posted speed limit no more than 40 km/hr, a mixed-traffic arrangement and no marked centerline.

Transit LOS

- The TLOS analysis did not find any deficiencies in the roadway segments bordering the development. No additional transit improvements are planned within this study horizon that would affect the TLOS;

7.4 Access Intersections Design

7.4.1 Location and Design of Site Access

The proposed site would be accommodated by three new accesses that include the:

- **Fern Casey Right-In/Right-Out Access**: This access would be YIELD-controlled with signage facing the minor leg approach. The centerline of the access is located approximately 130m from the Tenth Line Road / Gerry Lalonde Drive intersection. A clear throat length of greater than 30m is provided;
- **Chemin du Couloir Road Full Movement Access**: This access would be STOP-controlled with signage facing the minor leg approach. The centreline of the access is located approximately 80m east

of the Fern Casey / Couloir Road intersection and 35m west of the Couloir Road / Street No. 23 intersection; and

- **Street No. 23 Full Movement Access**: This access would be STOP-controlled with signage facing the minor leg approach. The centreline of the access is located approximately 220m north of the Couloir Road / Street No. 23 intersection. This access is anticipated to receive low traffic volumes as it is a local access internal to the subdivision.

7.4.2 Intersection Control

As indicated in Section 7.4.1:

- The Fern Casey Street right-in right-out access will be YIELD-controlled on the minor leg with free-flow conditions along Fern Casey Street;
- The Couloir Road access would be STOP-controlled on the minor leg with free-flow conditions along Couloir Road; and
- The local Street No. 23 access would be STOP-controlled on the minor leg with free-flow conditions along Street No. 23.

7.4.3 Intersection Design

Table 7-3 summarizes the results of a Synchro™ analysis of the two proposed site accesses assuming 2029 forecast traffic volumes. For this analysis, excessive queue lengths, a LOS "E" or a v/c ratio greater than 0.90 was considered unacceptable.

Table 7-3: Summary of Traffic (2029) Operations: Proposed Site Accesses

Intersection	*Weekday Morning Peak Hour (Afternoon Peak Hour)*				
	Critical Movement				
	Approach / Movement	**Queue Length (m)**	**Delay (seconds)**	**LOS**	**v/c**
Fern Casey Street & RI-RO Access	***WB-RT (WB-RT)***	0.2 (0.3)	11.9 (11.1)	B (B)	0.07 (0.1)
Couloir Road & Site Access	***SB-LT/RT (SB-LT/RT)***	0.2 (0.2)	9.7 (9.2)	A (A)	0.05 (0.07)
Couloir Road and Street No. 23 Access	***SB-LT/RT (SB-LT/RT)***	0 (0.1)	9.4 (8.9)	A (A)	0.01 (0.02)

Table 7-3 indicates satisfactory traffic operations of at least LOS "C" for all outbound movements at all three site accesses during the during both the morning and afternoon peak hours of travel demand.

7.5 TRANSPORTATION DEMAND MANAGEMENT

7.5.1 Context for TDM

The proposed development is located in South Orleans within the East Urban Community (EUC) Phase III lands. It is entirely residential in nature and would consist of 90 back-to-back townhouse units and 96 mid-rise terrace dwellings. The development is designated a Design Priority Area as it is contained within the Mer Bleue Mixed-Use Centre Lands. The majority of the person trips generated by the site are anticipated to be work related.

A review of the TAZ was found to indicate a daily transit share of approximately 10%-to-15% for all trip purposes. The 5-year target transit modal share was set at 20% as an auto mode share, a moderate increase when compared to the 2011 OD survey. With the opening of the Chapel Hill Park and Ride, the future advent of the LRT extension and encouraging higher density residential development, it remains plausible that these mode shares can be achieved.

7.5.2 Need and Opportunity

The proposed development is located adjacent to Brian Coburn Boulevard, a continuous east-west arterial that provides connections to Renaud Road in the west and Trim Road in the east. Failure to meet the modal share targets would likely increase traffic along Brian Coburn Boulevard, particularly to-and-from the inner urban areas, but overall would have a low-risk of severe impacts on the surrounding roadways.

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

- direct and convenient sidewalk access to adjacent transit stops;
- pedestrian connectivity throughout the entire development;
- 50 indoor bicycle stalls for the mid-rise terrace dwelling units, which exceeds the minimum of 48 required stalls; and
- the required amount of parking based on City of Ottawa By-Law requirements.

7.5.3 TDM Program

The City of Ottawa's TDM-Supportive Development Design and Infrastructure Checklist and TDM Measures Checklist for Multi-Family Residential Developments were completed for the proposed development (See Appendix "G"). The TDM checklist was completed for the proposed development. The development was found to provide excellent pedestrian linkages throughout the site and a significant number of bicycle parking stalls to support sustainable modes. The cycle stalls have been provided in a secure facility for the terrace dwelling units of the development.

Based on the TDM Measures checklist, the proponent is to consider:

- Offering PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit;
- Unbundling parking from rent, if applicable; and
- Offering a multi-modal package, such as transit route maps, as part of a move in package for new residents/tenants.

7.6 Neighbourhood Traffic Management

The purpose of this module is to identify the impact of the proposed development on collector and local roadways. The development is located on the southeast quadrant of the Brian Coburn Boulevard / Fern Casey Street roundabout intersection, with access to Fern Casey Street and Couloir Road.

The following collector and major collector roadways are impacted by the proposed development:

- Fern Casey Street, which is classified as a major collector, connects the proposed development and the adjacent Trailsedge developments to Brian Coburn Boulevard in the north and Renaud Road to the south; and
- Chemin du Couloir Road which is classified as a collector roadway. Couloir Road is an east west roadway that connects the proposed development and the adjacent Trailsedge developments to Fern Casey Street.

7.6.1 Adjacent Neighbourhoods

A review of site generated traffic and the site traffic assignment was found to indicate that:

- 85% of the site generated travel demand would utilize the major collector segment along Fern Casey Street south of Brian Coburn Boulevard. This traffic assignment was found to result in an increase of approximately 80 vehicles-per-hour-to-130 vehicles-per-hour in the peak northbound direction during the morning peak period and afternoon peak period, respectively;
- the remaining 15% of all site generated traffic would utilize Fern Casey south of Couloir Road. This was found to result in an increase of approximately 10 vehicles-per-hour-to-25 vehicles-per-hour in the peak southbound direction during the morning peak period and afternoon peak period, respectively; and
- 56% of outbound and 92% of inbound traffic would utilize Couloir Road to access the development. This was found to result in an increase in up to 40-to-80 vehicle-per-hour increase in the inbound

According to the City of Ottawa TIA Guidelines:

- A Collector Road would carry a maximum of 2,500 vehicles-per-day, or 300 vehicles during the peak hour; and
- A Major Collector Roadway would carry a maximum of 5,000 vehicles per day, or 600 vehicles during the peak hour.

It is assumed that these thresholds refer to the peak direction of travel.

Table 7-4 summarizes the forecast 2029 background traffic and the forecast 2029 design traffic assuming the full build-out of the development at the key collector roadways within the study area.

Inspection of the table and the three key study area links found to indicate that the forecast full-build out traffic volumes:

- along Fern Casey Street south of Brian Coburn Boulevard remains below the 600 vph threshold during the afternoon peak hour in the southbound direction;
- along Fern Casey Casey south of Couloir Road does not exceed the Major Collector threshold; and
- along Chemin du Couloir Road, while significant, remain below the 300 vph threshold for a collector.

Table 7-4: 2029 Forecast Background and Design Traffic
Major Collector and Collector Roads

Roadway Segment	***Weekday AM Peak (PM Peak)***	
	Southbound Inbound	**Northbound Outbound**
Fern Casey Street – Major Collector		
South of Brian Coburn Boulevard	Background: 313 (390) With Development: 384 (516)	Background: 471 (326) With Development: 345 (319)
South of Couloir Road	Background: 323 (301) With Development: 371 (360)	Background: 345 (319) With Development:352 (329)
Roadway Segment	**Eastbound Inbound**	**Westbound Outbound**
Chemin du Couloir Road - Collector		
East of Fern Casey	Background: 55 (90) With Development: 140 (236)	Background: 68 (61) With Development: 182 (195)

It is therefore anticipated that the role and function of the Fern Casey Street corridor and the Couloir Road corridor will remain unchanged as both segments serve as primary accesses between the development and the arterial network. This study does not recommend additional Neighbourhood Traffic Management measures as it would impact the only route provided to the proposed development, particularly before additional roadway linkages are provided.

7.7 Transit

7.7.1 Route Capacity

The study adopted a transit mode share of 20% for the proposed development. The forecast transit activity (See Table 4-6) associated with the proposed development was estimated to be in the order of approximately 50 persons trips during the peak hours of travel demand. The transit mode share discussed in Section 6.4: Demand Rationalization applies to the Orleans community as a whole, and was not accounted for in the analysis below as these trips could well occur outside the study area.

Route 225 is anticipated to be the primary existing transit route that would be used by residents to commute north or east-west of the proposed development. The route runs north-south on Fern Casey Street and east-west on Brian Coburn Boulevard and is nearest the proposed development. Route 225 operates with 20-minute headways during the morning and afternoon peak periods in the respective peak directions. While it could prove prudent to provide additional routes with greater headway and scheduled during the mid-day period to promote transit activity in the area, it is likely that the demand for transit may not warrant such route frequency. This level of demand should be evaluated subsequent to the LRT extension to Trim Road.

A standard and articulated bus capacity is between 40 and 70 people, respectively. Therefore, the Route 225 capacity would range from 120-to-210 persons per peak hour, per direction.

The route capacity analysis indicated:

- During the morning peak hour, in the outbound direction, the development transit trips would occupy between 15%-to-26% of available route capacity; and
- During the afternoon peak hour, in the inbound direction, the development transit trips would occupy between 13%-to-23% of the available route capacity.

Therefore, Route 225 would likely have sufficient capacity to accommodate the proposed development without unnecessary constraints and at the current headway. The route capacity could be further enhanced by providing a 15-minute headway for the route.

7.7.2 Transit Priority

The proposed development would utilize existing transit infrastructure that includes transit stops along Fern Casey Street. The development is not anticipated to impact transit travel times of the existing Route 234 or trigger the need for transit priority measures within the study area.

7.8 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 "I" provides the Synchro results for both morning and afternoon peak hours of travel demand assuming the 2024 and 2029 design traffic forecasts. The design traffic forecasts incorporate the Demand Rationalization demand reductions from Section 6.4.

7.8.1 2024 Forecast Auto Capacity Analysis

Table 7-5 provides a summary of the intersection capacity analysis results representing the morning and afternoon peak hours of travel demand at the time (2024) of the anticipated "Build-Out" of the proposed 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). For roundabouts, the critical movement was selected based on delay, and level-of-service was based on the v/c ratio as per the MMLOS guidelines.

The City of Ottawa MMLOS Guidelines indicate a target auto LOS of "D" for overall intersection operations within the "General Urban Area".

The following intersections were found not to meet the target auto LOS "D":

- The **Navan Road / Renaud Road** traffic signal-controlled intersection was found to operate with an overall acceptable level-of-service, however the critical movement was found to be the WB-Th/RT which was forecast to operate with a LOS "E" during the morning peak hour;
- The **Mer Bleue Road / Renaud Road** STOP-controlled intersection was forecast to exhibit an EB approach that would operate at a forecast LOS "F" during the afternoon peak hour. A traffic signal warrant analysis was conducted that indicated additional improvements are warranted, whether in the form of a traffic signal or roundabout. This analysis suggests that improvements are likely warranted within the next 5-to-10 years to assure satisfactory levels-of-service. These improvements are likely to come in advance of the Mer Bleue widening and realignment;
- Both the **Brian Coburn Boulevard / Mer Bleue Road** roundabout intersection and the **Brian Coburn Boulevard / Navan Road** roundabout intersection were forecast to operate at a LOS "F" during the AM peak hour despite the reduction in background travel demand along Brian Coburn Boulevard.

Table 7-5: 2024 "Build-Out" Forecast Traffic Operations

Intersection	***Weekday AM Peak (PM Peak)***						
	Critical Movement				***Overall Intersection***		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Signalized							
Navan Road & Renaud Road	***WB-Th/RT (WB-Th/RT)***	54 (28)	**E** (C)	**0.98** (0.74)	39 (21)	D (C)	0.89 (0.71)
STOP-Controlled							
Renaud Rd & Fern Casey	***NB-LT/Th/RT (NB-LT/Th/RT)***	23 (35)	C (D)	0.27 (0.27)	-	-	-
Fern Casey & Axis Way/Couloir Road	***EB-LT/Th/RT (EB-LT/Th/RT)***	18 (23)	C (C)	0.11 (0.15)	-	-	-
Mer Bleue Rd & Renaud Rd	***NB-LT/Th (EB-LT/RT)***	24 **(110)**	C **(F)**	0.75 **(1.15)**	-	-	-
Mer Bleue Rd & Deceour "T" intersection	***WB-LT/RT (WB-LT/RT)***	22 (31)	C (D)	0.38 (0.41)	-	-	-
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (EB Approach)***	84.6 (10.3)	**F** (B)	**1.16** (0.62)	37.7 (8.2)	**F** (B)	**1.16** (0.65)
Brian Coburn Blvd & Fern Casey "T" intersection	***WB Approach (WB Approach)***	6.6 (7.7)	A (A)	0.46 (0.30)	6.3 (6.5)	A (A)	0.46 (0.33)
Brian Coburn Blvd & Navan Road	***WB Approach (NB Approach)***	28.1 (11.0)	**E** (B)	**0.96** (0.68)	15.1 (9.2)	**E (E)**	**0.96 (0.94)**

7.8.2 2029 Forecast Auto Capacity Analysis

Table 7-6 summarizes the intersection capacity analysis for the 2029 "Build-Out + 5 year" morning and afternoon peak hours of travel demand. 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, and level-of-service was based on the v/c ratio as per the MMLOS guidelines. The 2029 forecast assumes full build-out of the proposed Blocks 193 and 194 development as well as the adjacent developments.

Table 7-6: 2029 Forecast (5-Years Beyond Build-Out) Traffic Operations

Intersection	***Weekday AM Peak (PM Peak)***						
	Critical Movement				***Overall Intersection***		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Signalized							
Navan Road & Renaud Road	***WB-Th/RT (WB-Th/RT)***	**174** (36)	**F** (D)	**1.17** (0.82)	76 (25)	**F** (C)	**1.13** (0.80)
Renaud Rd & Fern Casey	***WB-Th/RT (EB-Th/RT)***	22 (7)	B (B)	0.69 (0.62)	17 (7)	A (A)	0.33 (0.47)
Mer Bleue Rd & Renaud Rd	***EB-LT (EB-LT)***	25 (21)	B (C)	0.65 (0.80)	11 (16)	A (B)	0.45 (0.70)
STOP-Controlled							
Fern Casey & Axis Way-Couloir Road "4-Leg" intersection	***WB-LT/Th/RT (EB-LT/Th/RT)***	24 (30)	C (D)	0.49 (0.20)	-	-	-
Roundabout							
Brian Coburn Boulevard & Mer Bleue	***WB Approach (EB Approach)***	**112.2** (11.1)	**F** (B)	**1.22** (0.67)	67.1 (8.4)	**F** (B)	**1.22** (0.69)
	EB Approach [1] (EB Approach) [1]	8.8 (8.1)	A (A)	0.17 (0.29)	7.0 (7.4)	A (A)	0.53 (0.54)
Brian Coburn Blvd & Fern Casey "T" intersection	***WB Approach (WB Approach)***	7.0 (8.0)	A (A)	0.50 (0.34)	6.5 (6.8)	A (A)	0.50 (0.37)
	NB Approach[2] (WB Approach)[2]	6.8 (7.8)	A (A)	0.16 (0.19)	6.3 (6.6)	A (A)	0.25 (0.22)
Brian Coburn Blvd & Navan Road	***WB Approach (SB Approach)***	62.8 (19.5)	**F (F)**	**1.09 (1.01)**	28.3 (16.1)	**F (F)**	**1.09 (1.01)**
	WB Approach[3] (NB Approach) [3]	8.8 (8.0)	A (A)	0.47 (0.48)	7.4 (7.4)	A (A)	0.56 (0.53)
Mer Bleue Rd & Deceour Drive / Axis Way	***EB Approach (EB Approach)***	10.1 (10.7)	A (A)	0.12 (0.14)	6.0 (5.8)	A (B)	0.55 (0.62)

1. Assumes a 4lane Brian Coburn Blvd West and East Approaches at Mer Bleue Road
2. Assumes a 4lane Brian Coburn Blvd West and East Approach at Fern Casey St.
3. Approach and 4lane Brian Coburn Blvd West Approach and 4-lane Navan Road North of Brian Coburn.

Table 7-6 indicates an overall decrease in the level of service for the study area intersections. The following critical movements at intersections within the study area were found to be below the target auto LOS of "D" for intersection operations as specified within the City of Ottawa MMLOS Guidelines:

- The **Navan Road / Renaud Road** traffic-signal controlled intersection was found to operate with an overall poor level-of-service during both peak hours of travel demand. The provision of a dedicated WB-RT to separate the thru traffic would serve to remedy the issue. However, the configuration of this intersection remains to be confirmed by the City given that, at one time, a re-located roundabout was determined to be the preferred option with the west leg of the intersection realigned into the Trailsedge Way development.

A review of the intersections along Brian Coburn Boulevard indicated acceptable levels-of-service after the widening of Brian Coburn to a 4-lane cross section. This suggest that congested conditions along

Brian Coburn Boulevard may be experienced over the next decade in the absence of the future widening of the corridor.

7.8.3 Multi-Modal LOS Analysis

The intersection MMLOS is only applicable to traffic-signal controlled intersections, of which the Navan Road / Renaud Road intersection is the only intersection in the study area to be configured as such.

Table 7-7 summarizes the intersection MMLOS results for the Navan Road / Renaud Road traffic-signal controlled intersection and 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 2029 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.

Table 7-7: MMLOS Analysis Results Summary: Navan Road / Renaud Road

	Navan Road/Renaud Road - Intersection Leg			
Performance Measure	West Leg - Renaud Road	East Leg - Renaud Road	North Leg - Navan Road	South Leg - Navan Road
Pedestrian LOS (PLOS)				
Leg PLOS	**F**	**E**	**E**	**E**
Intersection PLOS	**F**			
Target PLOS	C			
Bicycle LOS (BLOS)				
Leg BLOS	**E**	**F**	**F**	**F**
Intersection BLOS	**F**		**F**	
Target BLOS	D		C	
Transit LOS (TLOS)				
Intersection TLOS	C	**F**	C	C
Target TLOS	N/A	N/A	N/A	N/A
Truck LOS (TkLOS)				
Leg BLOS	E	E	**F**	**E**
Intersection BLOS	E		**F**	
Target BLOS	E	E	D	D

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

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

Pedestrian Level of Service (PLOS)

The PETSI analysis indicated that the intersection PLOS for the Navan Road / Renaud Road intersection was below the target PLOS of "C".

A review of analysis of the intersection legs was found to indicate:

- The west leg of the intersection was found to be the critical leg in terms of PLOS as it was found to achieve a PLOS "F" as pedestrians are required to cross approximately 27m of distance (~8 lanes) given the angle of the cross walk to Renaud Road;
- The east, north and south legs of the intersection were found to achieve a PLOS "E"

To achieve the PLOS target of "C", significant improvements including the reduction in number of lanes would be required. These improvements would likely not be suitable for an intersection in a suburban area such as Renaud Road / Navan Road.

Bicycle Level of Service (BLOS)

The BLOS analysis indicated that the overall Navan Road / Renaud Road intersection BLOS was "F", which is below the target BLOS of "C/D" for the intersection. A 40 km/hr posted speed would be required to achieve the target BLOS "C/D" for the intersection. A combination of operating speed changes and pocket bike lanes or bike lanes on the north/south legs would improve the BLOS to "C".

The above improvements are not recommended to be implemented and are only provided as a reference to potential future measures to meet LOS targets should upgrades be required at this intersection.

Transit Level of Service (TLOS)

The Navan Road / Renaud Road intersection is frequented by OC Transpo Routes 225 (EB-LT/WB-Th) and 228 (NB-LT/EB-RT). However, the Navan Road and Renaud Road intersection does not have any existing or planned rapid transit or transit priority measures, therefore no target TLOS is applicable.

Calculation of the Navan Road / Renaud Road intersection TLOS was found to indicate:

- The west, north and south legs of the intersection were found to operate with TLOS "C", with control delay below 30 seconds;
- The east leg of the intersection was found to operate at TLOS "F" due to the control delay in the WB-Th direction in the AM and PM peak hour, with control delay greater than 40 seconds.

Truck Level of Service (TkLOS)

Navan Road is a designated restricted loads truck route. Therefore, the TkLOS target for these corridors was determined to be a TkLOS "D". Inspection of the TkLOS analysis was found to indicate:

- Renaud Road was found to operate at TkLOS "E", due to the presence of a single receiving lane and modest turning radii;
- Navan Road was found to operate at an overall TkLOS "F" due to the presence of a single receiving lane and small turning radii on the north leg of the intersection. However, truck turns would accommodate north of the Navan Road / Renaud Road intersection at the intersection of Navan Road / Page Road.

Conclusion: The City of Ottawa has plans in place to ultimately widen Navan road to a 4-lane configuration and the Navan Road/Renaud Road East intersection is to be relocated and designed as a roundabout. The east leg of Renaud Road is to be realigned into the Trailsedge Way subdivision. These significant modifications will address the above modal deficiencies.

8.0 TIA STRATEGY

The following transportation infrastructure improvements are recommended:

- The Street No. 23 corridor be constructed as part of the Block 193 and 194 (6429 Renaud Road) application. The roadway is to be designed and constructed according to a 30 km/hr operating speed with a 1.8m sidewalk;
- A lower speed limit along Fern Casey Street of 40 km/hr which would be suitable for the school zone nearest the Renaud Road corridor. This would serve to meet both the pedestrian and cyclist level of service targets for the area;
- The Renaud Road / Fern Casey Street intersection receive traffic signal control improvements when the south leg becomes open to traffic and the traffic volumes at the intersection warrant future improvements;
- The Mer Bleue Road / Renaud Road intersection receive traffic signal control improvements within the next 5-to-10 years, likely in advanced of any widening that could take place in the area;
- Intersection improvements to the Mer Bleue Road / Copperhead Street-Decoeur Drive intersection given the advent of the east leg of the intersection, and sufficient development occur on the east side of Mer Bleue Road, which is anticipated to occur within the next decade with the advent of Trailsedge East Phase 3[5]. A roundabout configuration would be suitable at this intersection provided sufficient right-of-way exists to accommodate the current design proposal, however, a traffic signal remains a viable alternative given the land constraints[6]; and
- The City of Ottawa consider the four-lane widening of the Brian Coburn Boulevard corridor within the next 10-to-15-years to meet the demands of the developments within the study area.

8.1 CONCLUSION

The proposed development of Blocks 193 and 194 development (6429 Renaud Road) would consist of 186 residential dwelling, of which 90 will be back-to-back townhomes, and 96 will be mid-rise terrace dwellings. It is recommended that the City of Ottawa be encouraged to assemble the appropriate conditions that would permit the development application for the development to proceed.

Yours truly,

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Transportation Engineer
Castleglenn Consultants Inc.

5 Proposed TrailsEdge East Development – Community Transportation Study, Castleglenn Consultants Inc, November 2016.
6 Mer Bleue Road and Decoeur Drive Functional Design and Option Analysis Rev. 1, Robinson Consultants, August 21st 2019

Appendix A: Certification Form for TIA Study Project Manager

APPENDIX B: SCREENING FORM

APPENDIX C: EXISTING TRAFFIC VOLUMES AND COLLISIONS

APPENDIX D: ADJACENT DEVELOPMENT TRAFFIC VOLUME EXHIBITS AND EXTRACTS

Appendix E: Synchro Intersection Capacity Analysis
Existing, Background 2024 Forecast, Background 2029 Forecast

Appendix F: Sidra Intersection Capacity Analysis
Existing, Background 2024 Forecast, Background 2029 Forecast

Appendix G: TDM Supportive Development Design and Infrastructure Checklist

APPENDIX H: MULTI-MODAL LEVEL OF SERVICE ANALYSIS DETAILS

APPENDIX I: SYNCHRO INTERSECTION CAPACITY ANALYSIS
2024 DESIGN FORECAST, 2029 DESIGN FORECAST

Appendix J: Sidra Intersection Capacity Analysis 2024 Design Forecast, 2029 Design Forecast

APPENDIX A: 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.**

City Of Ottawa
Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d 'infrastructure et Viabilité des collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at Ottawa this 21 day of May, 2020.

(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 B: 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

Ms. Josiane Gervais
Project Manager, City of Ottawa
110 Laurier Avenue West,
Ottawa, ON, K1G 6J9

June 04, 2020

Please see below the completed screening form for the proposed mid-high density residential development located in Trailsedge, Orleans. The proposed 6429 Renaud Road (Blocks 193 & 194) development is located southeast of the Brian Coburn Blvd / Fern Casey Street intersection, and is to be composed of:

- 84 back-to-back townhomes, located on the eastern side of the development; and
- 108 mid-rise terrace dwelling units

In summary, the 192 residential units was found to meet the trip generation trigger. Therefore, the 6429 Renaud Road TIA would address the Design review and Network Impact modules.

1. Description of Proposed Development

Municipal Address	6429 Renaud Road; Trailsedge Block 193 & 194 Orleans, Ottawa
Description of Location	Located within the EUC Phase 3 lands at the southeast quadrant of the Brian Coburn Blvd / Fern Casey Street roundabout intersection
Land Use Classification	Mid-High Density Residential;
Development Size (units)	84 townhouse dwelling units 108 mid-rise dwelling units
Development Size (m^2)	N/A
Number of Accesses and Locations	The development will access the network at 2 accesses along Couloir Road and 1 access along Fern Casey Street. The back-to-back townhouse driveways are located along Street No. 23 of the Trailsedge development.
Phase of Development	Submission of Site Plan Control Application
Buildout Year	Full Build-Out by Q3 2021

2. Trip Generation Trigger

The development site plan indicates:

- 84 back-to-back townhomes, located on the eastern side of the development; and
- 108 mid-rise terrace dwelling units

Castleglenn Consultants
Engineers, Project Managers & Planners

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

The site is proposed to be accommodated by driveways for the townhomes and 152 auto stalls for the mid-rise residential homes. A total of 56 bicycle parking stations are provided for the 108 mid-rise dwelling units. The site is currently greenfield.

Land Use Type	Development Size
Residential Dwelling Units (Apartments / Townhomes	192 Units

The proposed residential development size exceeds the minimum development size threshold. Therefore, a full TIA would be required to support the site plan control application.

Table 2: Trip Generation Trigger

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

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).*

The Terrace Flats development is located with the East Urban Community MUC lands and is part of the Meer Bleue Mixed Use Centre lands. Therefore the Location Trigger is satisfied.

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Engineers, Project Managers & Planners

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

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 (adjacent roundabout)	
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

The development proposes an access approximately 110m south of the Brian Coburn Blvd / Fern Casey Street roundabout. The desired configuration is unknown at this time.

Therefore, the Safety Trigger is satisfied.

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 form information and let us know if you have any comments or questions before proceeding to Step 2: Scoping.

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 C: EXISTING TRAFFIC VOLUMES AND COLLISIONS

Transportation Services - Traffic Services
Collision Details Report - Public Version

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

Location: BRIAN COBURN BLVD @ FERN CASEY ST

Traffic Control: Roundabout **Total Collisions:** 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Feb-25, Sun,09:22	Freezing Rain	SMV other	P.D. only	Ice	West	Slowing or stopping	Automobile, station wagon	Skidding/sliding	0
2018-Mar-24, Sat,18:55	Clear	Angle	P.D. only	Dry	North	Merging	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Dec-07, Fri,12:20	Clear	SMV other	Non-fatal injury	Dry	East	Slowing or stopping	Automobile, station wagon	Pole (utility, power)	0

Location: BRIAN COBURN BLVD @ MER BLEUE RD

Traffic Control: Stop sign **Total Collisions:** 9

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2015-Apr-14, Tue,15:51	Clear	Angle	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Sep-24, Thu,17:33	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jan-04, Mon,19:37	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2016-Oct-04, Tue,07:15	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Feb-07, Tue,22:38	Snow	SMV other	P.D. only	Loose snow	South	Going ahead	Automobile, station wagon	Skidding/sliding	0
2017-Mar-08, Wed,07:20	Freezing Rain	SMV other	P.D. only	Ice	South	Slowing or stopping	Automobile, station wagon	Pole (utility, power)	0
2017-Mar-30, Thu,20:52	Clear	Angle	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Passenger van	Other motor vehicle	
2017-Sep-27, Wed,18:30	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2018-Jun-22, Fri,10:17	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	

Location: BRIAN COBURN BLVD @ NAVAN RD

Traffic Control: Roundabout **Total Collisions:** 4

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Feb-25, Sun,08:30	Freezing Rain	SMV other	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Curb	0
2018-Apr-05, Thu,07:25	Clear	Angle	P.D. only	Dry	North	Merging	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-09, Thu,13:04	Clear	Approaching	P.D. only	Dry	West	Going ahead	Unknown	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Nov-16, Fri,10:47	Clear	Rear end	Non-fatal injury	Dry	East	Unknown	Unknown	Other motor vehicle	0
					East	Stopped	Automobile, station wagon	Other motor vehicle	

Location: FERN CASEY ST @ RENAUD RD

Traffic Control: Stop sign **Total Collisions:** 2

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Dec-20, Tue,08:03	Clear	Angle	P.D. only	Loose snow	South	Turning left	Passenger van	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Feb-03, Sat,18:19	Snow	Angle	P.D. only	Loose snow	South	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD @ MER BLEUE RD

Traffic Control: Stop sign **Total Collisions:** 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Aug-14, Sun,08:47	Clear	SMV other	P.D. only	Dry	East	Turning left	Automobile, station wagon	Ran off road	0
2017-Feb-03, Fri,16:33	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2017-Mar-02, Thu,16:06	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Unknown	Other motor vehicle	0
					South	Stopped	Pick-up truck	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

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

Location: RENAUD RD @ NAVAN RD

Traffic Control: Traffic signal **Total Collisions:** 14

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Mar-10, Mon,22:19	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Pick-up truck	Skidding/sliding	0
2014-Apr-22, Tue,16:50	Clear	Rear end	P.D. only	Dry	North	Going ahead	Passenger van	Other motor vehicle	0
					North	Turning right	Passenger van	Other motor vehicle	
2014-Apr-28, Mon,05:42	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Stopped	Pick-up truck	Other motor vehicle	
2015-Feb-04, Wed,10:37	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Automobile, station wagon	Skidding/sliding	0
2015-Mar-04, Wed,07:29	Clear	Rear end	P.D. only	Slush	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2015-Apr-14, Tue,12:35	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	
2015-Oct-05, Mon,17:25	Clear	Rear end	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Pick-up truck	Other motor vehicle	
2016-Jan-05, Tue,18:41	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Turning left	Pick-up truck	Other motor vehicle	
2016-Jan-07, Thu,16:17	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
2017-Oct-19, Thu,13:03	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Unknown	Other motor vehicle	
2017-Oct-24, Tue,07:24	Rain	SMV other	Non-fatal injury	Wet	West	Turning left	Pick-up truck	Pedestrian	1
2018-Jul-17, Tue,21:43	Clear	Angle	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-31, Fri,09:20	Clear	Angle	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

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

Location: RENAUD RD @ NAVAN RD

Traffic Control: Traffic signal **Total Collisions:** 14

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Mar-10, Mon,22:19	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Pick-up truck	Skidding/sliding	0
2014-Apr-22, Tue,16:50	Clear	Rear end	P.D. only	Dry	North	Going ahead	Passenger van	Other motor vehicle	0
					North	Turning right	Passenger van	Other motor vehicle	
2014-Apr-28, Mon,05:42	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Stopped	Pick-up truck	Other motor vehicle	
2015-Feb-04, Wed,10:37	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Automobile, station wagon	Skidding/sliding	0
2015-Mar-04, Wed,07:29	Clear	Rear end	P.D. only	Slush	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2015-Apr-14, Tue,12:35	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	
2015-Oct-05, Mon,17:25	Clear	Rear end	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Turning right	Pick-up truck	Other motor vehicle	
2016-Jan-05, Tue,18:41	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Turning left	Pick-up truck	Other motor vehicle	
2016-Jan-07, Thu,16:17	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
2017-Oct-19, Thu,13:03	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Unknown	Other motor vehicle	
2017-Oct-24, Tue,07:24	Rain	SMV other	Non-fatal injury	Wet	West	Turning left	Pick-up truck	Pedestrian	1
2018-Jul-17, Tue,21:43	Clear	Angle	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-31, Fri,09:20	Clear	Angle	Non-fatal injury	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

Transportation Services - Traffic Services
Collision Details Report - Public Version

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

Location: RENAUD RD @ NAVAN RD

Traffic Control: Traffic signal **Total Collisions:** 14

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Dec-10, Mon,10:05	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2013 **To:** December 31, 2017

Location: BRIAN COBURN BLVD @ MER BLEUE RD

Traffic Control: Roundabout **Total Collisions:** 9

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Nov-23, Sat,13:09	Snow	Angle	P.D. only	Ice	West	Turning right	Automobile, station wagon	Skidding/sliding	
					South	Going ahead	Pick-up truck	Other motor vehicle	
2015-Sep-24, Thu,17:33	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Pick-up truck	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Apr-14, Tue,15:51	Clear	Angle	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2016-Jan-04, Mon,19:37	Clear	Rear end	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
2016-Oct-04, Tue,07:15	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					West	Stopped	Automobile, station wagon	Other motor vehicle	
2017-Mar-08, Wed,07:20	Freezing Rain	SMV other	P.D. only	Ice	South	Slowing or stopping	Automobile, station wagon	Pole (utility, power)	

2017-Mar-30, Thu,20:52	Clear	Angle	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	
					East	Going ahead	Passenger van	Other motor vehicle	
2017-Feb-07, Tue,22:38	Snow	SMV other	P.D. only	Loose snow	South	Going ahead	Automobile, station wagon	Skidding/sliding	
2017-Sep-27, Wed,18:30	Clear	Rear end	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

Location: FERN CASEY ST @ RENAUD RD

Traffic Control: Stop sign **Total Collisions:** 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2016-Dec-20, Tue,08:03	Clear	Angle	P.D. only	Loose snow	South	Turning left	Passenger van	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD @ MER BLEUE RD

Traffic Control: Stop sign **Total Collisions:** 4

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Nov-04, Mon,21:45	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild	
2016-Aug-14, Sun,08:47	Clear	SMV other	P.D. only	Dry	East	Turning left	Automobile, station wagon	Ran off road	
2017-Mar-02, Thu,16:06	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Unknown	Other motor vehicle	
					South	Stopped	Pick-up truck	Other motor vehicle	

2017-Feb-03, Fri,16:33	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	

Location: RENAUD RD @ NAVAN RD

Traffic Control: Traffic signal **Total Collisions:** 16

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Jan-06, Sun,14:00	Snow	Angle	P.D. only	Ice	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Pick-up truck	Other motor vehicle	
2013-Apr-02, Tue,08:48	Clear	Angle	P.D. only	Dry	East	Turning left	Municipal transit bus	Other motor vehicle	
					North	Turning left	Pick-up truck	Other motor vehicle	
2013-May-29, Wed,09:24	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Pick-up truck	Other motor vehicle	
2013-Oct-23, Wed,17:47	Clear	Rear end	Non-fatal injury	Dry	East	Going ahead	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
					East	Stopped	Pick-up truck	Other motor vehicle	
2013-Dec-24, Tue,13:00	Clear	Angle	P.D. only	Dry	North	Turning left	Pick-up truck	Other motor vehicle	

					East	Going ahead	Passenger van	Other motor vehicle
2014-Mar-10, Mon,22:19	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Pick-up truck	Skidding/sliding
2014-Apr-28, Mon,05:42	Clear	Rear end	P.D. only	Dry	West	Going ahead	Pick-up truck	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2014-Apr-22, Tue,16:50	Clear	Rear end	P.D. only	Dry	North	Going ahead	Passenger van	Other motor vehicle
					North	Turning right	Passenger van	Other motor vehicle
2015-Feb-04, Wed,10:37	Snow	SMV other	P.D. only	Loose snow	North	Turning right	Automobile, station wagon	Skidding/sliding
2015-Mar-04, Wed,07:29	Clear	Rear end	P.D. only	Slush	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Pick-up truck	Other motor vehicle
2015-Apr-14, Tue,12:35	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Pick-up truck	Other motor vehicle
2015-Oct-05, Mon,17:25	Clear	Rear end	Non-fatal injury	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					East	Turning right	Pick-up truck	Other motor vehicle
2016-Jan-05, Tue,18:41	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle

					East	Turning left	Pick-up truck	Other motor vehicle	
2016-Jan-07, Thu,16:17	Clear	Rear end	P.D. only	Dry	East	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					East	Slowing or stopping	Pick-up truck	Other motor vehicle	
2017-Oct-19, Thu,13:03	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Unknown	Other motor vehicle	
2017-Oct-24, Tue,07:24	Rain	SMV other	Non-fatal injury	Wet	West	Turning left	Pick-up truck	Pedestrian	1

Transportation Services - Traffic Services

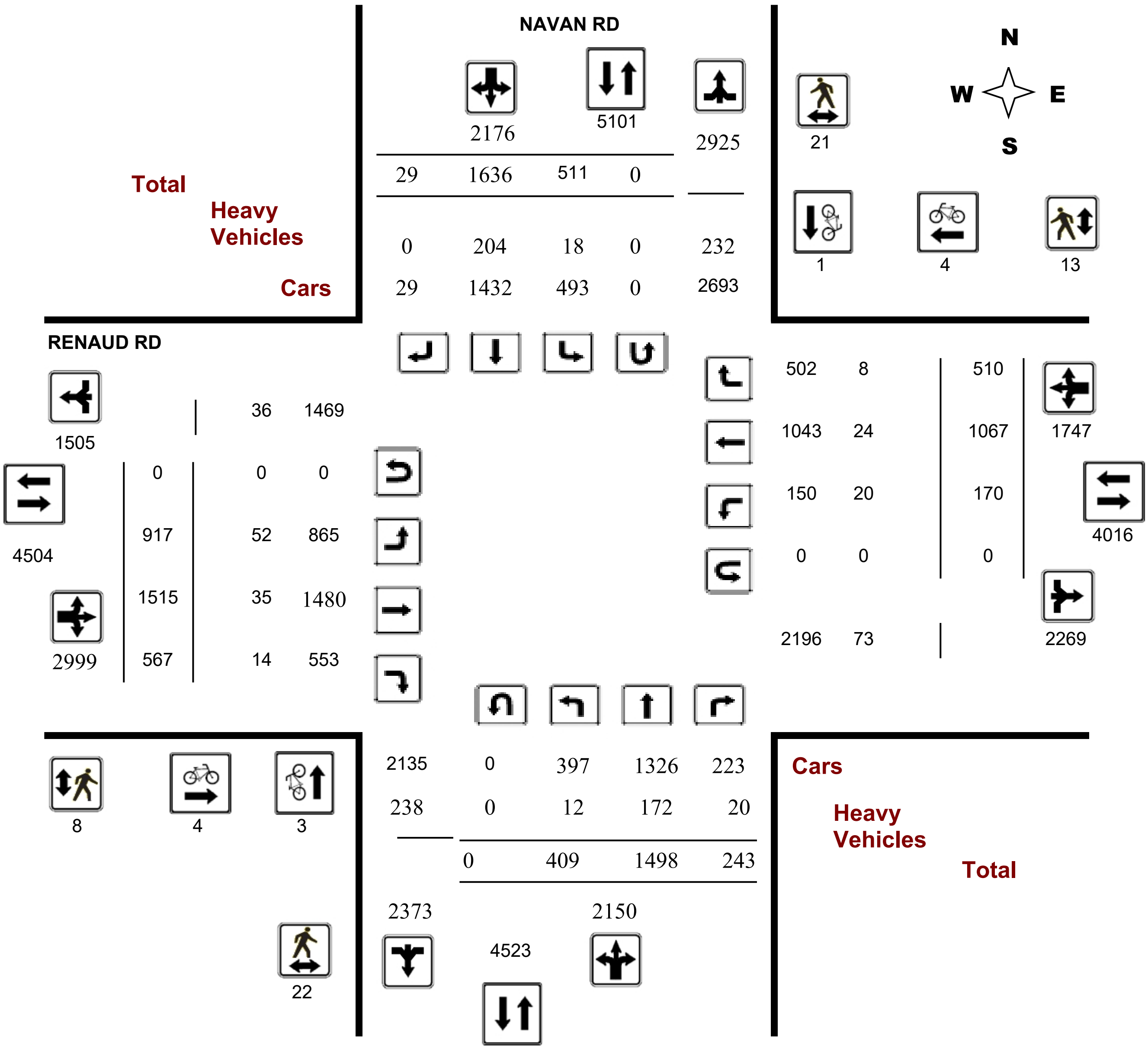
Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study Diagram



Transportation Services - Traffic Services

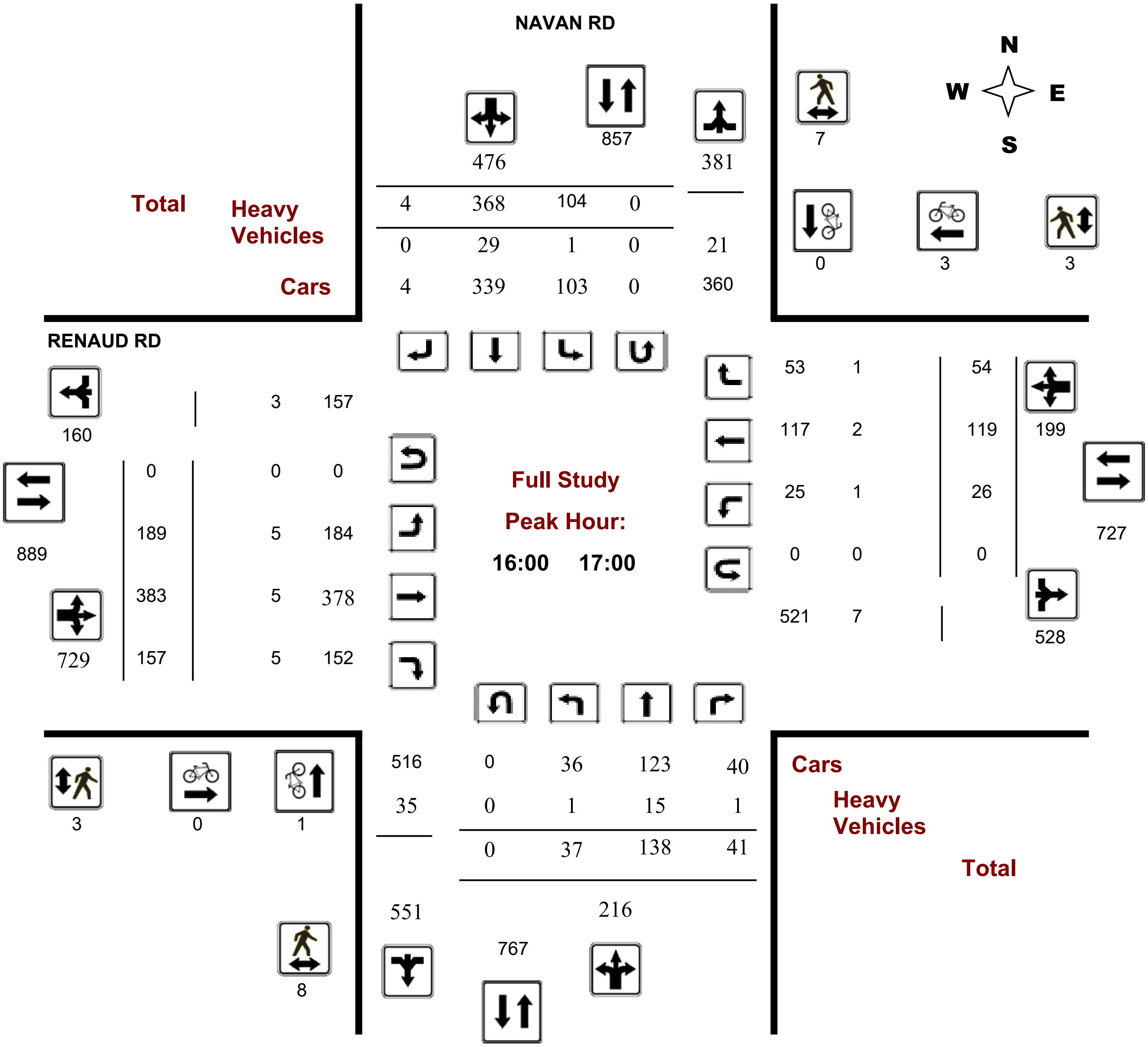
Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study Peak Hour Diagram



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

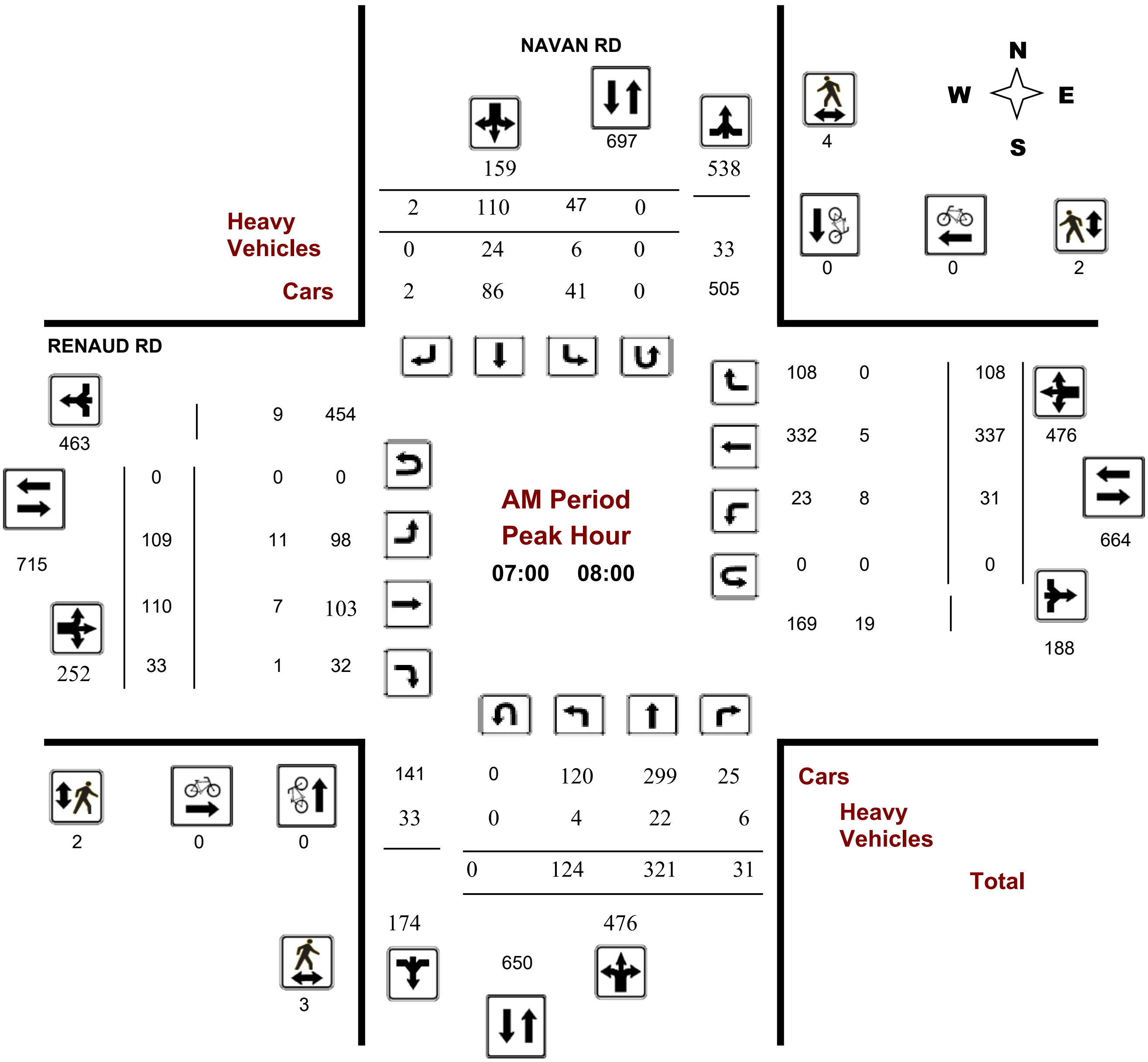
RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019

Start Time: 07:00

WO No: 38897

Device: Miovision



Comments

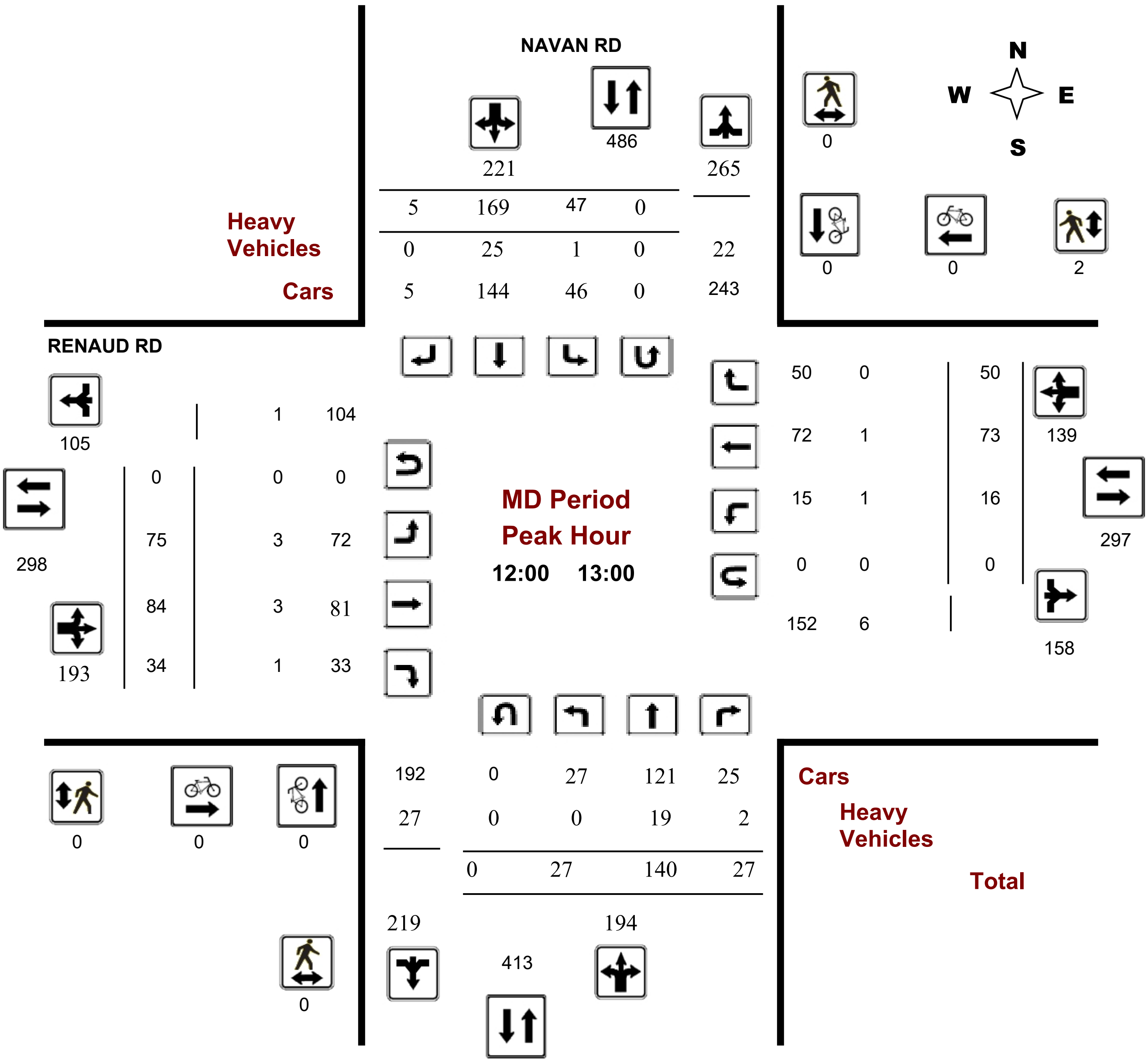
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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



Comments

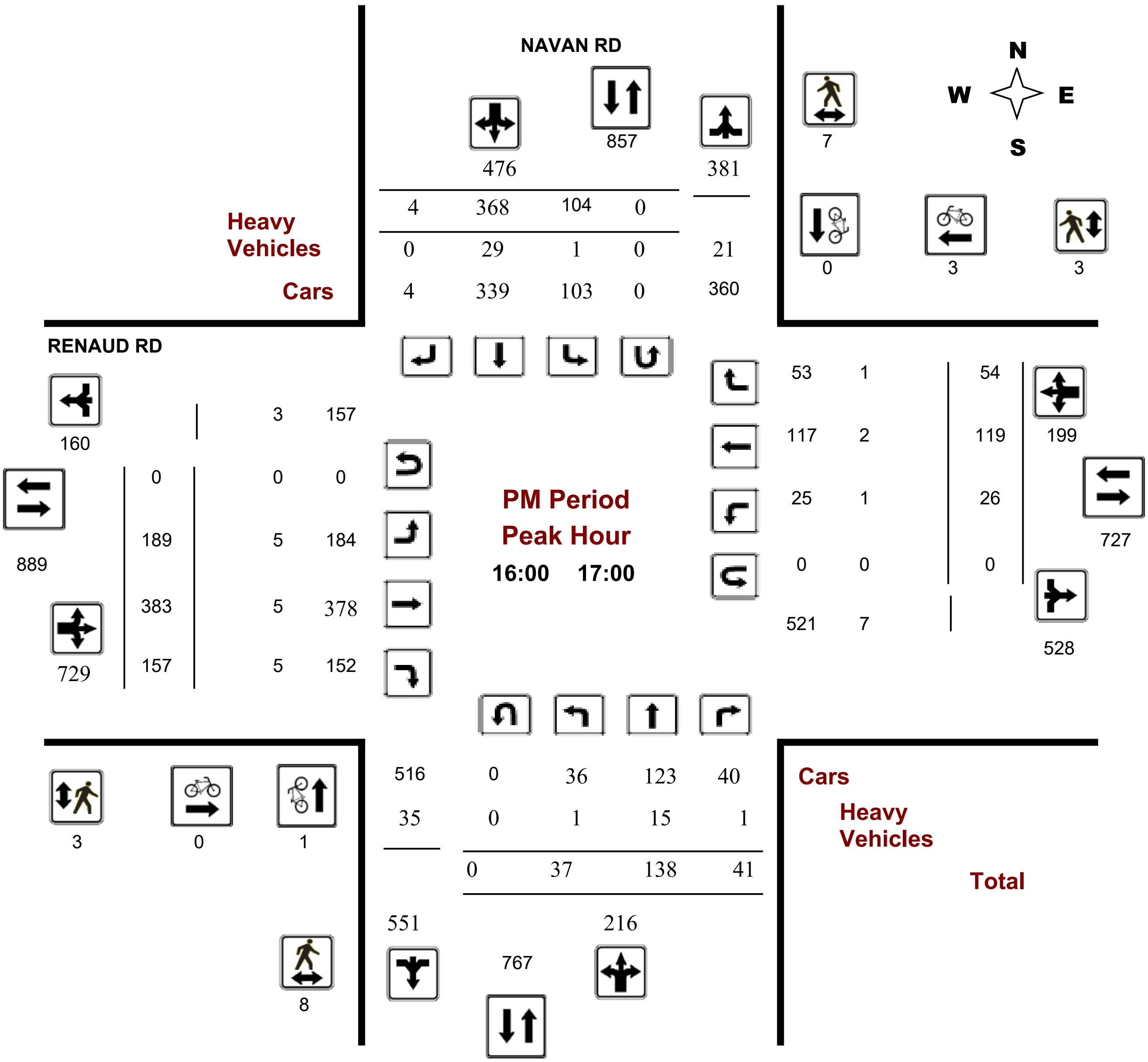
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study Summary (8 HR Standard)

Survey Date: Tuesday, October 29, 2019

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor

.90

	NAVAN RD									RENAUD 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	124	321	31	**476**	47	110	2	**159**	**635**	109	110	33	**252**	31	337	108	**476**	**728**	**1363**
08:00 09:00	94	241	36	**371**	41	119	2	**162**	**533**	115	135	26	**276**	18	195	91	**304**	**580**	**1113**
09:00 10:00	32	182	26	**240**	30	145	6	**181**	**421**	68	88	21	**177**	12	73	67	**152**	**329**	**750**
11:30 12:30	28	153	23	**204**	46	141	3	**190**	**394**	72	73	27	**172**	15	61	42	**118**	**290**	**684**
12:30 13:30	21	153	26	**200**	43	164	5	**212**	**412**	67	96	39	**202**	16	69	44	**129**	**331**	**743**
15:00 16:00	40	176	35	**251**	68	284	5	**357**	**608**	142	266	127	**535**	32	106	50	**188**	**723**	**1331**
16:00 17:00	37	138	41	**216**	104	368	4	**476**	**692**	189	383	157	**729**	26	119	54	**199**	**928**	**1620**
17:00 18:00	33	134	25	**192**	132	305	2	**439**	**631**	155	364	137	**656**	20	107	54	**181**	**837**	**1468**
Sub Total	409	1498	243	**2150**	511	1636	29	**2176**	**4326**	917	1515	567	**2999**	170	1067	510	**1747**	**4746**	**9072**
U Turns	0			**0**	0			**0**	**0**	**0**			**0**	0			**0**	**0**	**0**
Total	409	1498	243	**2150**	511	1636	29	**2176**	**4326**	917	1515	567	**2999**	170	1067	510	**1747**	**4746**	**9072**
EQ 12Hr	569	2082	338	**2989**	710	2274	40	**3024**	**6013**	1275	2106	788	**4169**	236	1483	709	**2428**	**6597**	**12610**

Note: These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**

AVG 12Hr	512	1874	304	**2690**	639	2047	36	**2722**	**5412**	1148	1895	709	**3752**	212	1335	638	**2185**	**5937**	**11349**

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **.90**

AVG 24Hr	671	2455	398	**3524**	837	2682	47	**3566**	**7090**	1504	2482	929	**4915**	278	1749	836	**2863**	**7778**	**14868**

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

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

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study 15 Minute Increments

		NAVAN RD									RENAUD 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	36	77	10	123	6	22	0	28	**151**	19	18	6	43	3	92	30	125	**168**	**319**
07:15	07:30	36	84	11	131	6	36	0	42	**173**	26	12	11	49	13	98	28	139	**188**	**361**
07:30	07:45	26	79	4	109	13	26	1	40	**149**	35	47	7	89	9	78	21	108	**197**	**346**
07:45	08:00	26	81	6	113	22	26	1	49	**162**	29	33	9	71	6	69	29	104	**175**	**337**
08:00	08:15	25	64	12	101	14	32	1	47	**148**	24	29	4	57	3	45	21	69	**126**	**274**
08:15	08:30	27	67	8	102	9	31	0	40	**142**	26	38	4	68	4	58	24	86	**154**	**296**
08:30	08:45	20	54	9	83	9	29	0	38	**121**	32	41	9	82	5	49	24	78	**160**	**281**
08:45	09:00	22	56	7	85	9	27	1	37	**122**	33	27	9	69	6	43	22	71	**140**	**262**
09:00	09:15	20	50	7	77	8	33	0	41	**118**	23	27	5	55	6	24	22	52	**107**	**225**
09:15	09:30	3	50	2	55	9	43	2	54	**109**	15	18	3	36	2	23	13	38	**74**	**183**
09:30	09:45	6	46	10	62	6	34	1	41	**103**	17	18	4	39	1	13	16	30	**69**	**172**
09:45	10:00	3	36	7	46	7	35	3	45	**91**	13	25	9	47	3	13	16	32	**79**	**170**
11:30	11:45	7	44	1	52	8	41	2	51	**103**	11	16	8	35	5	9	6	20	**55**	**158**
11:45	12:00	4	39	7	50	12	28	0	40	**90**	17	16	6	39	1	18	12	31	**70**	**160**
12:00	12:15	8	36	5	49	10	36	1	47	**96**	25	19	6	50	3	23	10	36	**86**	**182**
12:15	12:30	9	34	10	53	16	36	0	52	**105**	19	22	7	48	6	11	14	31	**79**	**184**
12:30	12:45	4	40	6	50	8	49	3	60	**110**	16	17	8	41	3	25	17	45	**86**	**196**
12:45	13:00	6	30	6	42	13	48	1	62	**104**	15	26	13	54	4	14	9	27	**81**	**185**
13:00	13:15	5	42	8	55	12	27	1	40	**95**	19	28	10	57	3	12	10	25	**82**	**177**
13:15	13:30	6	41	6	53	10	40	0	50	**103**	17	25	8	50	6	18	8	32	**82**	**185**
15:00	15:15	9	44	10	63	10	62	2	74	**137**	30	39	27	96	4	15	11	30	**126**	**263**
15:15	15:30	10	50	11	71	25	61	0	86	**157**	37	76	33	146	10	36	19	65	**211**	**368**
15:30	15:45	12	40	7	59	13	77	2	92	**151**	28	73	27	128	11	30	13	54	**182**	**333**
15:45	16:00	9	42	7	58	20	84	1	105	**163**	47	78	40	165	7	25	7	39	**204**	**367**
16:00	16:15	10	38	8	56	21	96	2	119	**175**	42	106	37	185	4	30	11	45	**230**	**405**
16:15	16:30	11	46	12	69	27	106	1	134	**203**	38	75	45	158	8	31	12	51	**209**	**412**
16:30	16:45	8	24	10	42	24	86	0	110	**152**	48	101	41	190	5	29	14	48	**238**	**390**
16:45	17:00	8	30	11	49	32	80	1	113	**162**	61	101	34	196	9	29	17	55	**251**	**413**
17:00	17:15	10	37	5	52	29	90	0	119	**171**	37	95	34	166	7	28	7	42	**208**	**379**
17:15	17:30	4	33	2	39	22	85	0	107	**146**	45	106	39	190	3	25	15	43	**233**	**379**
17:30	17:45	8	34	6	48	42	74	1	117	**165**	44	85	40	169	6	32	17	55	**224**	**389**
17:45	18:00	11	30	12	53	39	56	1	96	**149**	29	78	24	131	4	22	15	41	**172**	**321**
Total:		409	1498	243	2150	511	1636	29	2176	**4326**	917	1515	567	2999	170	1067	510	1747	**4326**	**9,072**

Note: U-Turns are included in Totals.

Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study Cyclist Volume

Time Period		NAVAN RD Northbound	Southbound	Street Total	RENAUD RD Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	**0**	0	0	**0**	**0**
07:15	07:30	0	0	**0**	0	0	**0**	**0**
07:30	07:45	0	0	**0**	0	0	**0**	**0**
07:45	08:00	0	0	**0**	0	0	**0**	**0**
08:00	08:15	0	0	**0**	0	0	**0**	**0**
08:15	08:30	0	0	**0**	0	0	**0**	**0**
08:30	08:45	0	0	**0**	0	0	**0**	**0**
08:45	09:00	0	0	**0**	1	0	**1**	**1**
09:00	09:15	0	0	**0**	0	0	**0**	**0**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	0	**0**	0	0	**0**	**0**
09:45	10:00	0	0	**0**	0	0	**0**	**0**
11:30	11:45	0	0	**0**	1	0	**1**	**1**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	0	**0**	0	0	**0**	**0**
12:15	12:30	0	0	**0**	0	0	**0**	**0**
12:30	12:45	0	0	**0**	0	0	**0**	**0**
12:45	13:00	0	0	**0**	0	0	**0**	**0**
13:00	13:15	0	1	**1**	0	0	**0**	**1**
13:15	13:30	0	0	**0**	0	0	**0**	**0**
15:00	15:15	0	0	**0**	0	1	**1**	**1**
15:15	15:30	0	0	**0**	0	0	**0**	**0**
15:30	15:45	0	0	**0**	0	0	**0**	**0**
15:45	16:00	0	0	**0**	1	0	**1**	**1**
16:00	16:15	1	0	**1**	0	2	**2**	**3**
16:15	16:30	0	0	**0**	0	0	**0**	**0**
16:30	16:45	0	0	**0**	0	1	**1**	**1**
16:45	17:00	0	0	**0**	0	0	**0**	**0**
17:00	17:15	1	0	**1**	0	0	**0**	**1**
17:15	17:30	0	0	**0**	1	0	**1**	**1**
17:30	17:45	0	0	**0**	0	0	**0**	**0**
17:45	18:00	1	0	**1**	0	0	**0**	**1**
Total		3	1	**4**	4	4	**8**	**12**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study Pedestrian Volume

Time Period	NAVAN RD NB Approach (E or W Crossing)	NAVAN RD SB Approach (E or W Crossing)	Total	RENAUD RD EB Approach (N or S Crossing)	RENAUD RD WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	**0**	0	1	**1**	**1**
07:15 07:30	3	2	**5**	2	1	**3**	**8**
07:30 07:45	0	1	**1**	0	0	**0**	**1**
07:45 08:00	0	1	**1**	0	0	**0**	**1**
08:00 08:15	0	0	**0**	0	0	**0**	**0**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	0	0	**0**	0	0	**0**	**0**
08:45 09:00	0	2	**2**	0	0	**0**	**2**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	1	0	**1**	0	0	**0**	**1**
09:45 10:00	0	1	**1**	0	0	**0**	**1**
11:30 11:45	0	1	**1**	0	0	**0**	**1**
11:45 12:00	0	0	**0**	0	0	**0**	**0**
12:00 12:15	0	0	**0**	0	1	**1**	**1**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	0	0	**0**	0	1	**1**	**1**
13:00 13:15	1	0	**1**	0	0	**0**	**1**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
15:00 15:15	0	0	**0**	0	0	**0**	**0**
15:15 15:30	1	1	**2**	1	1	**2**	**4**
15:30 15:45	2	1	**3**	1	0	**1**	**4**
15:45 16:00	0	1	**1**	0	0	**0**	**1**
16:00 16:15	0	5	**5**	1	1	**2**	**7**
16:15 16:30	1	0	**1**	0	2	**2**	**3**
16:30 16:45	4	2	**6**	0	0	**0**	**6**
16:45 17:00	3	0	**3**	2	0	**2**	**5**
17:00 17:15	4	0	**4**	0	2	**2**	**6**
17:15 17:30	0	1	**1**	1	0	**1**	**2**
17:30 17:45	0	2	**2**	0	0	**0**	**2**
17:45 18:00	2	0	**2**	0	3	**3**	**5**
Total	22	21	**43**	8	13	**21**	**64**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study Heavy Vehicles

		NAVAN RD									RENAUD 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	1	5	2	**8**	2	2	0	**4**	**12**	2	1	0	**3**	0	1	0	**1**	**4**	**16**
07:15	07:30	0	6	2	**8**	0	6	0	**6**	**14**	3	0	1	**4**	4	0	0	**4**	**8**	**22**
07:30	07:45	2	4	1	**7**	2	9	0	**11**	**18**	2	6	0	**8**	2	2	0	**4**	**12**	**30**
07:45	08:00	1	7	1	**9**	2	7	0	**9**	**18**	4	0	0	**4**	2	2	0	**4**	**8**	**26**
08:00	08:15	1	8	0	**9**	0	8	0	**8**	**17**	4	4	0	**8**	0	1	1	**2**	**10**	**27**
08:15	08:30	0	12	1	**13**	2	9	0	**11**	**24**	4	2	0	**6**	3	2	0	**5**	**11**	**35**
08:30	08:45	0	10	0	**10**	1	8	0	**9**	**19**	5	1	0	**6**	3	2	0	**5**	**11**	**30**
08:45	09:00	2	10	1	**13**	1	5	0	**6**	**19**	3	2	0	**5**	0	2	0	**2**	**7**	**26**
09:00	09:15	0	10	0	**10**	0	7	0	**7**	**17**	3	0	1	**4**	0	0	0	**0**	**4**	**21**
09:15	09:30	0	5	1	**6**	1	10	0	**11**	**17**	1	0	0	**1**	1	0	0	**1**	**2**	**19**
09:30	09:45	0	2	3	**5**	3	9	0	**12**	**17**	0	1	0	**1**	0	0	2	**2**	**3**	**20**
09:45	10:00	0	8	0	**8**	0	11	0	**11**	**19**	1	0	0	**1**	0	0	1	**1**	**2**	**21**
11:30	11:45	1	7	0	**8**	0	7	0	**7**	**15**	0	0	0	**0**	0	0	0	**0**	**0**	**15**
11:45	12:00	0	7	0	**7**	0	3	0	**3**	**10**	1	0	0	**1**	0	0	0	**0**	**1**	**11**
12:00	12:15	0	8	0	**8**	0	6	0	**6**	**14**	1	0	0	**1**	1	1	0	**2**	**3**	**17**
12:15	12:30	0	3	1	**4**	1	7	0	**8**	**12**	1	1	0	**2**	0	0	0	**0**	**2**	**14**
12:30	12:45	0	3	1	**4**	0	8	0	**8**	**12**	0	1	1	**2**	0	0	0	**0**	**2**	**14**
12:45	13:00	0	5	0	**5**	0	4	0	**4**	**9**	1	1	0	**2**	0	0	0	**0**	**2**	**11**
13:00	13:15	1	8	1	**10**	0	5	0	**5**	**15**	0	0	0	**0**	0	0	1	**1**	**1**	**16**
13:15	13:30	0	5	2	**7**	1	5	0	**6**	**13**	1	1	1	**3**	1	0	0	**1**	**4**	**17**
15:00	15:15	1	4	1	**6**	1	8	0	**9**	**15**	1	0	0	**1**	0	1	1	**2**	**3**	**18**
15:15	15:30	1	7	1	**9**	0	6	0	**6**	**15**	2	0	0	**2**	1	4	0	**5**	**7**	**22**
15:30	15:45	0	7	0	**7**	0	7	0	**7**	**14**	2	1	1	**4**	0	3	1	**4**	**8**	**22**
15:45	16:00	0	4	0	**4**	0	6	0	**6**	**10**	2	2	1	**5**	0	0	0	**0**	**5**	**15**
16:00	16:15	0	4	0	**4**	0	9	0	**9**	**13**	2	1	0	**3**	0	0	0	**0**	**3**	**16**
16:15	16:30	0	6	1	**7**	1	8	0	**9**	**16**	2	3	4	**9**	0	1	1	**2**	**11**	**27**
16:30	16:45	0	3	0	**3**	0	8	0	**8**	**11**	0	0	1	**1**	1	0	0	**1**	**2**	**13**
16:45	17:00	1	2	0	**3**	0	4	0	**4**	**7**	1	1	0	**2**	0	1	0	**1**	**3**	**10**
17:00	17:15	0	1	0	**1**	0	2	0	**2**	**3**	1	3	1	**5**	0	1	0	**1**	**6**	**9**
17:15	17:30	0	0	0	**0**	0	1	0	**1**	**1**	2	1	0	**3**	0	0	0	**0**	**3**	**4**
17:30	17:45	0	1	0	**1**	0	4	0	**4**	**5**	0	0	1	**1**	0	0	0	**0**	**1**	**6**
17:45	18:00	0	0	0	**0**	0	5	0	**5**	**5**	0	2	1	**3**	1	0	0	**1**	**4**	**9**
Total:	None	12	172	20	**204**	18	204	0	**222**	**426**	52	35	14	**101**	20	24	8	**52**	**153**	**579**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

RENAUD RD @ NAVAN RD

Survey Date: Tuesday, October 29, 2019 **WO No:** 38897

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

Full Study 15 Minute U-Turn Total

Time Period		NAVAN RD Northbound U-Turn Total	NAVAN RD Southbound U-Turn Total	RENAUD RD Eastbound U-Turn Total	RENAUD RD 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	0	0	**0**
13:00	13:15	0	0	0	0	**0**
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	0	0	**0**
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	0	0	**0**
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	0	0	**0**

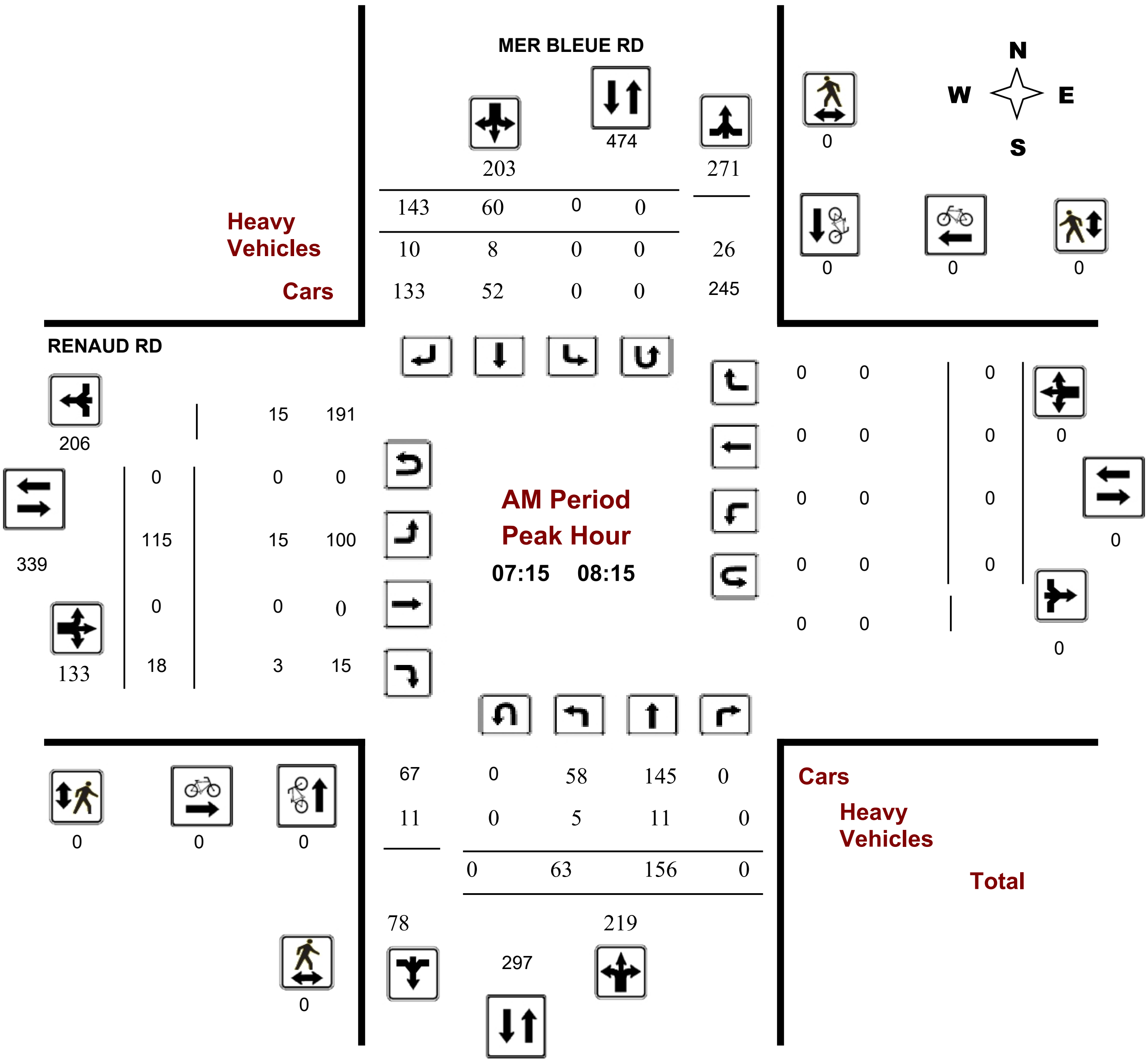
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38121

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



Comments

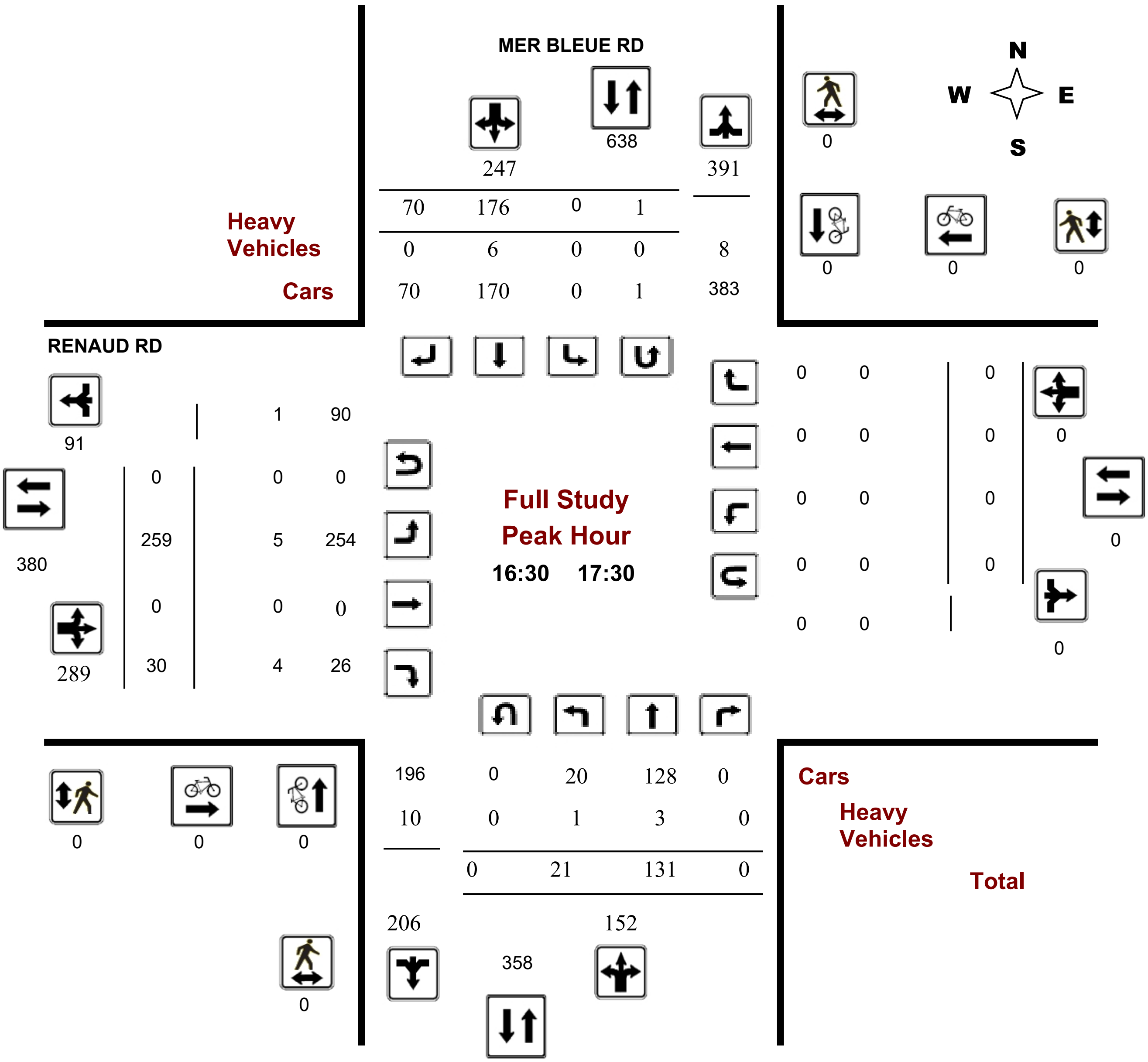
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38121

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



Comments

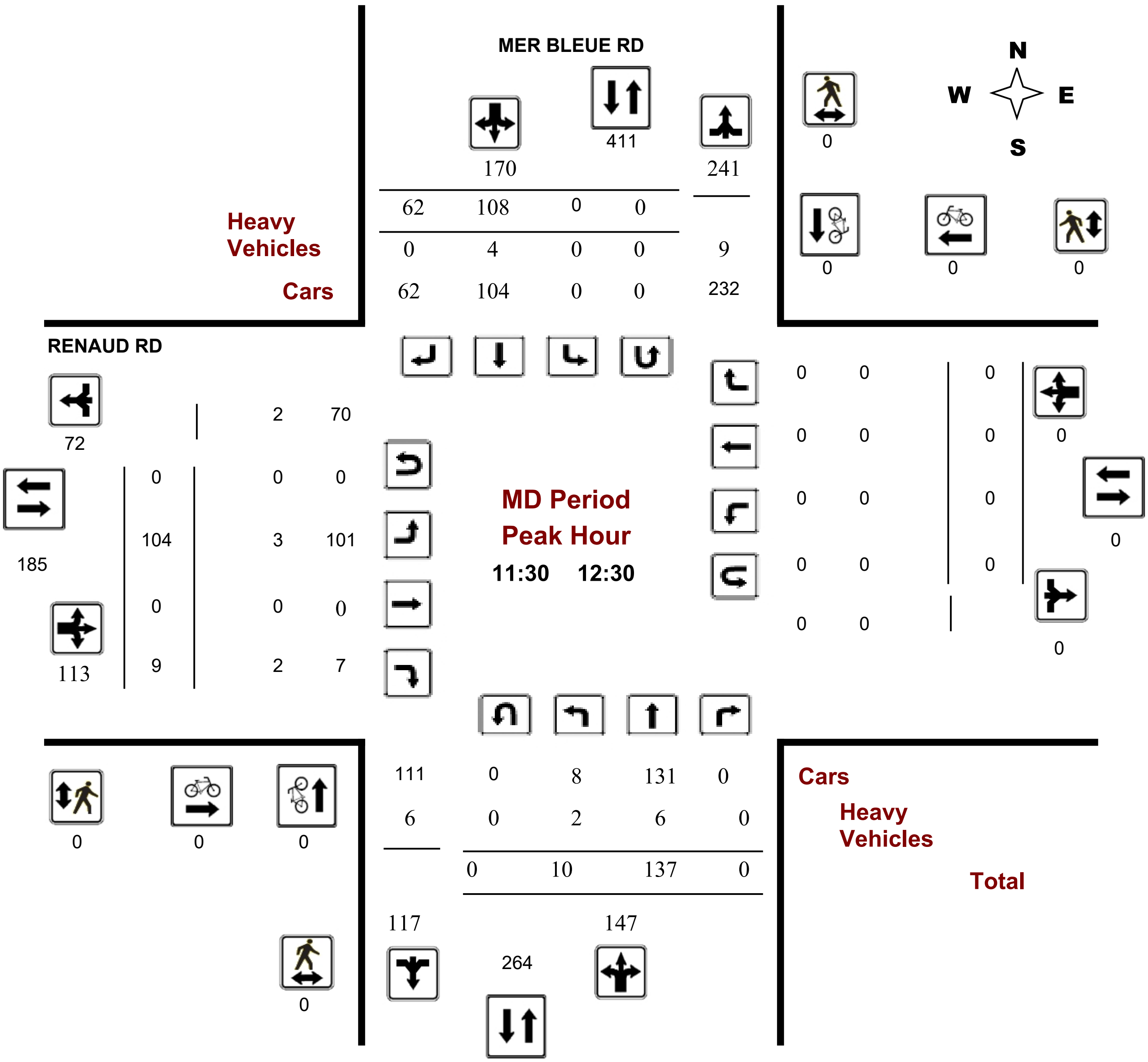
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38121

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



Comments

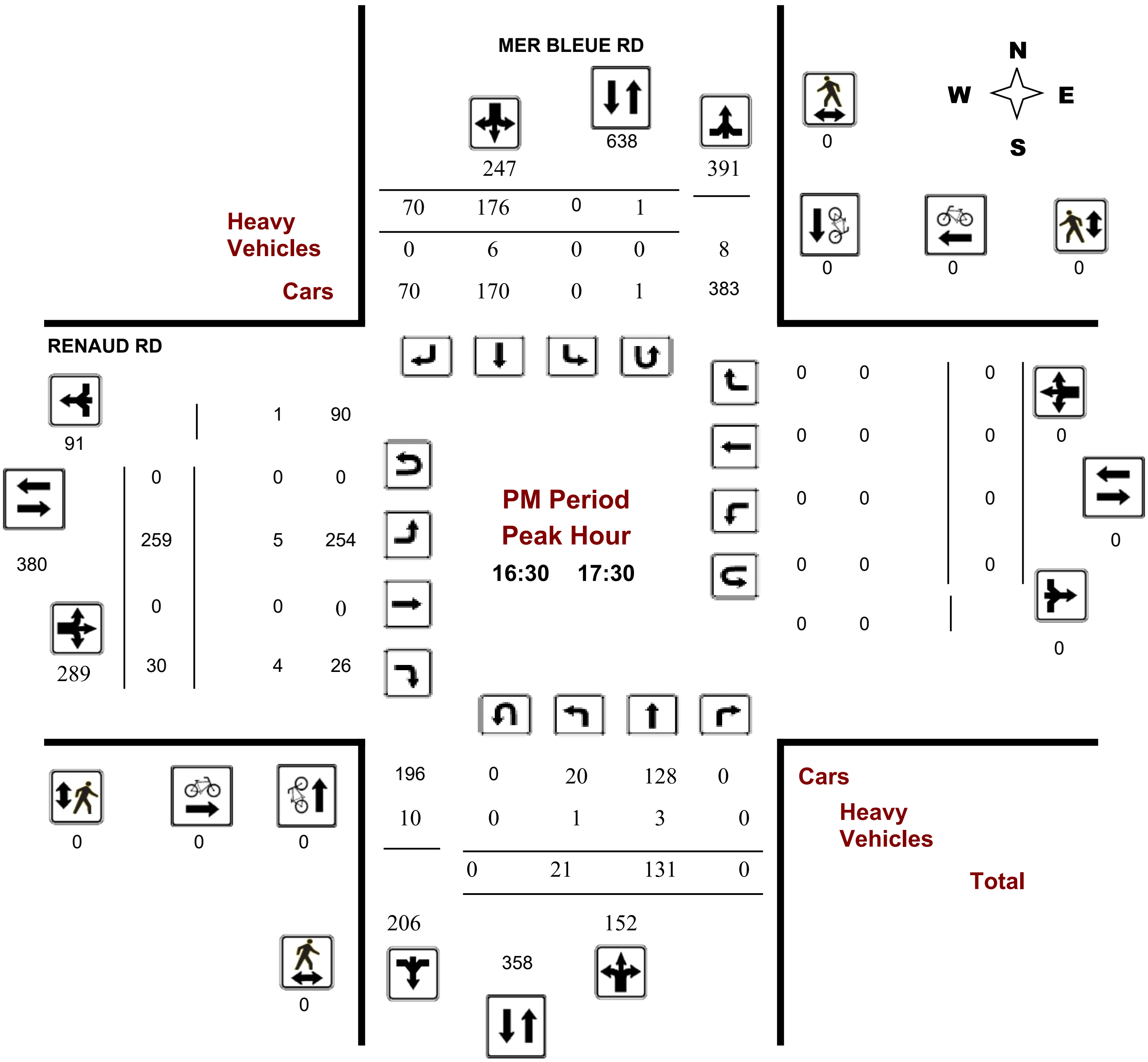
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018 **WO No:** 38121

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



Comments

Transportation Services - Traffic Services

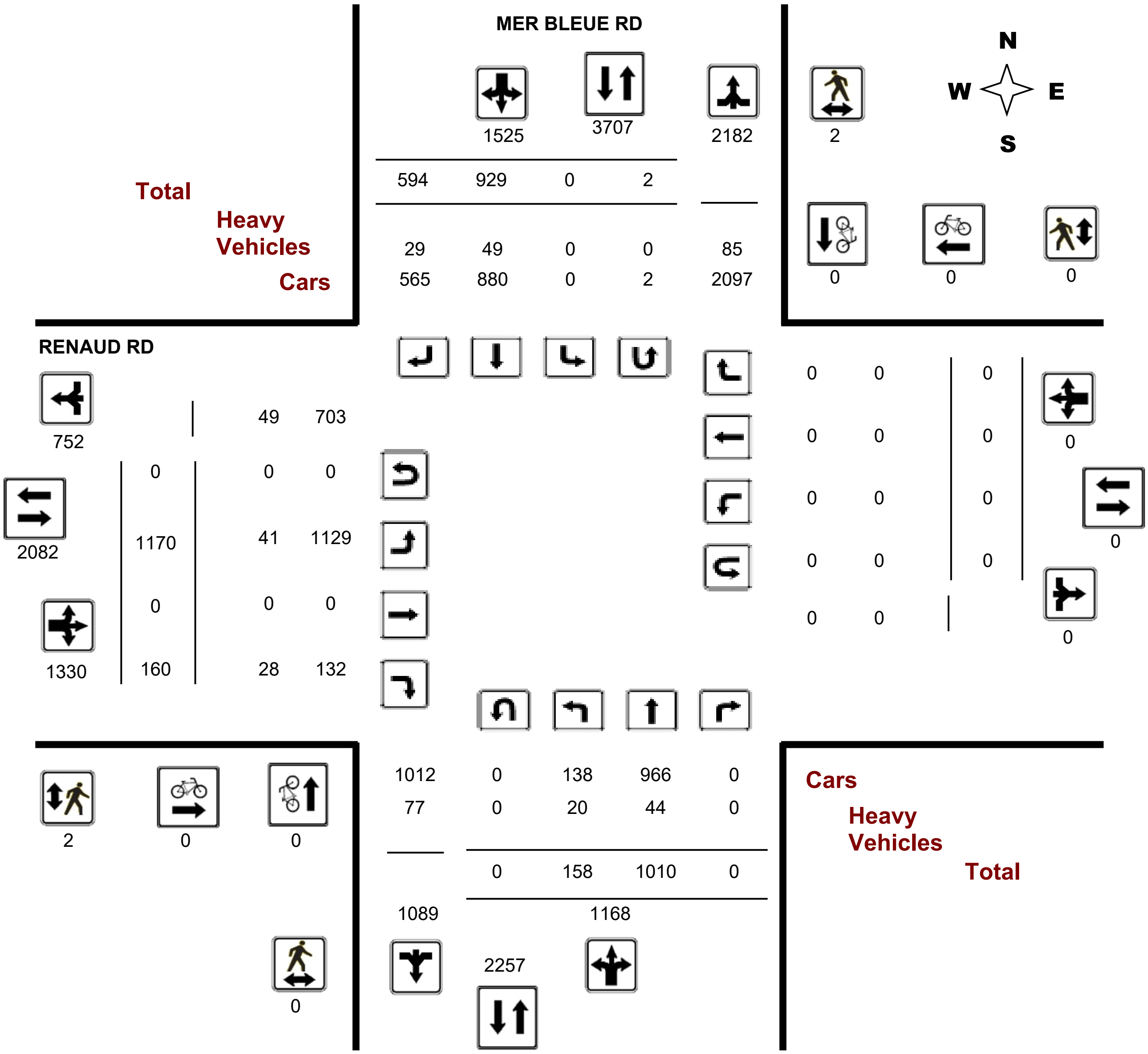
Turning Movement Count - Full Study Diagram

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018

WO#: 38121

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
38121

Turning Movement Count - Full Study Summary Report

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 2
Eastbound: 0 Westbound: 0

AADT Factor
.90

Full Study

	MER BLEUE RD									RENAUD 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	67	148	0	**215**	0	42	147	**189**	**404**	103	0	17	**120**	0	0	0	**0**	**120**	**524**
08:00 09:00	21	131	0	**152**	0	68	86	**154**	**306**	128	0	14	**142**	0	0	0	**0**	**142**	**448**
09:00 10:00	10	128	0	**138**	0	76	50	**126**	**264**	84	0	12	**96**	0	0	0	**0**	**96**	**360**
11:30 12:30	10	137	0	**147**	0	108	62	**170**	**317**	104	0	9	**113**	0	0	0	**0**	**113**	**430**
12:30 13:30	5	96	0	**101**	0	127	47	**174**	**275**	90	0	10	**100**	0	0	0	**0**	**100**	**375**
15:00 16:00	11	123	0	**134**	0	151	62	**213**	**347**	183	0	31	**214**	0	0	0	**0**	**214**	**561**
16:00 17:00	21	121	0	**142**	0	178	62	**240**	**382**	235	0	42	**277**	0	0	0	**0**	**277**	**659**
17:00 18:00	13	126	0	**139**	0	179	78	**257**	**396**	243	0	25	**268**	0	0	0	**0**	**268**	**664**
Sub Total	158	1010	0	**1168**	0	929	594	**1523**	**2691**	1170	0	160	**1330**	0	0	0	**0**	**1330**	**4021**
U Turns				**0**				**2**	**2**				**0**				**0**	**0**	**2**
Total	158	1010	0	**1168**	0	929	594	**1525**	**2693**	1170	0	160	**1330**	0	0	0	**0**	**1330**	**4023**
EQ 12Hr	220	1404	0	**1624**	0	1291	826	**2120**	**3744**	1626	0	222	**1849**	0	0	0	**0**	**1849**	**5593**

Note: These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**

	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
AVG 12Hr	198	1264	0	**1461**	0	1162	743	**1908**	**3369**	1464	0	200	**1664**	0	0	0	**0**	**1664**	**5033**

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **.90**

	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
AVG 24Hr	259	1655	0	**1914**	0	1522	973	**2499**	**4413**	1917	0	262	**2180**	0	0	0	**0**	**2180**	**6593**

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

W.O. 38121

Turning Movement Count - 15 Minute Summary Report

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 2

Eastbound: 0 Westbound: 0

	MER BLEUE RD									RENAUD 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	11	20	0	**31**	0	4	29	**33**	**64**	14	0	3	**17**	0	0	0	**0**	**17**	**81**
07:15 07:30	22	37	0	**59**	0	14	44	**58**	**117**	23	0	5	**28**	0	0	0	**0**	**28**	**145**
07:30 07:45	20	52	0	**72**	0	12	38	**50**	**122**	24	0	0	**24**	0	0	0	**0**	**24**	**146**
07:45 08:00	14	39	0	**53**	0	12	36	**48**	**101**	42	0	9	**51**	0	0	0	**0**	**51**	**152**
08:00 08:15	7	28	0	**35**	0	22	25	**47**	**82**	26	0	4	**30**	0	0	0	**0**	**30**	**112**
08:15 08:30	8	29	0	**37**	0	15	20	**35**	**72**	30	0	2	**32**	0	0	0	**0**	**32**	**104**
08:30 08:45	2	33	0	**35**	0	13	25	**38**	**73**	31	0	5	**36**	0	0	0	**0**	**36**	**109**
08:45 09:00	4	41	0	**45**	0	18	16	**34**	**79**	41	0	3	**44**	0	0	0	**0**	**44**	**123**
09:00 09:15	5	35	0	**40**	0	18	12	**30**	**70**	19	0	1	**20**	0	0	0	**0**	**20**	**90**
09:15 09:30	0	27	0	**27**	0	15	10	**25**	**52**	19	0	4	**23**	0	0	0	**0**	**23**	**75**
09:30 09:45	4	40	0	**44**	0	25	15	**40**	**84**	23	0	3	**26**	0	0	0	**0**	**26**	**110**
09:45 10:00	1	26	0	**27**	0	18	13	**31**	**58**	23	0	4	**27**	0	0	0	**0**	**27**	**85**
11:30 11:45	2	39	0	**41**	0	30	15	**45**	**86**	20	0	1	**21**	0	0	0	**0**	**21**	**107**
11:45 12:00	3	31	0	**34**	0	26	18	**44**	**78**	24	0	1	**25**	0	0	0	**0**	**25**	**103**
12:00 12:15	2	29	0	**31**	0	22	18	**40**	**71**	31	0	4	**35**	0	0	0	**0**	**35**	**106**
12:15 12:30	3	38	0	**41**	0	30	11	**41**	**82**	29	0	3	**32**	0	0	0	**0**	**32**	**114**
12:30 12:45	3	22	0	**25**	0	33	16	**49**	**74**	16	0	1	**17**	0	0	0	**0**	**17**	**91**
12:45 13:00	1	27	0	**28**	0	37	10	**47**	**75**	22	0	1	**23**	0	0	0	**0**	**23**	**98**
13:00 13:15	0	26	0	**26**	0	29	11	**40**	**66**	27	0	3	**30**	0	0	0	**0**	**30**	**96**
13:15 13:30	1	21	0	**22**	0	28	10	**38**	**60**	25	0	5	**30**	0	0	0	**0**	**30**	**90**
15:00 15:15	1	28	0	**29**	0	34	20	**54**	**83**	40	0	3	**43**	0	0	0	**0**	**43**	**126**
15:15 15:30	5	31	0	**36**	0	45	14	**59**	**95**	45	0	6	**51**	0	0	0	**0**	**51**	**146**
15:30 15:45	3	29	0	**32**	0	34	11	**45**	**77**	52	0	13	**65**	0	0	0	**0**	**65**	**142**
15:45 16:00	2	35	0	**37**	0	38	17	**55**	**92**	46	0	9	**55**	0	0	0	**0**	**55**	**147**
16:00 16:15	5	29	0	**34**	0	52	22	**74**	**108**	48	0	10	**58**	0	0	0	**0**	**58**	**166**
16:15 16:30	5	28	0	**33**	0	43	13	**56**	**89**	66	0	14	**80**	0	0	0	**0**	**80**	**169**
16:30 16:45	7	34	0	**41**	0	43	12	**56**	**97**	67	0	9	**76**	0	0	0	**0**	**76**	**173**
16:45 17:00	4	30	0	**34**	0	40	15	**55**	**89**	54	0	9	**63**	0	0	0	**0**	**63**	**152**
17:00 17:15	5	36	0	**41**	0	53	26	**79**	**120**	64	0	3	**67**	0	0	0	**0**	**67**	**187**
17:15 17:30	5	31	0	**36**	0	40	17	**57**	**93**	74	0	9	**83**	0	0	0	**0**	**83**	**176**
17:30 17:45	2	26	0	**28**	0	54	12	**66**	**94**	62	0	8	**70**	0	0	0	**0**	**70**	**164**
17:45 18:00	1	33	0	**34**	0	32	23	**56**	**90**	43	0	5	**48**	0	0	0	**0**	**48**	**138**
TOTAL:	158	1010	0	**1168**	0	929	594	**1525**	**2693**	1170	0	160	**1330**	0	0	0	**0**	**1330**	**4023**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
38121

RENAUD RD @ MER BLEUE RD

Count Date: Thursday, November 15, 2018 **Start Time:** 07:00

	MER BLEUE RD			RENAUD 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	0	**0**	**0**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	0	**0**	0	0	**0**	**0**

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

W.O.
38121

Turning Movement Count - Heavy Vehicle Report

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018

	MER BLEUE RD									RENAUD 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	6	14	0	**20**	0	3	10	**13**	**33**	15	0	3	**18**	0	0	0	**0**	**18**	**51**
08:00 09:00	3	7	0	**10**	0	11	6	**17**	**27**	5	0	3	**8**	0	0	0	**0**	**8**	**35**
09:00 10:00	1	6	0	**7**	0	7	4	**11**	**18**	3	0	4	**7**	0	0	0	**0**	**7**	**25**
11:30 12:30	2	6	0	**8**	0	4	0	**4**	**12**	3	0	2	**5**	0	0	0	**0**	**5**	**17**
12:30 13:30	2	0	0	**2**	0	3	1	**4**	**6**	5	0	4	**9**	0	0	0	**0**	**9**	**15**
15:00 16:00	2	6	0	**8**	0	4	3	**7**	**15**	0	0	3	**3**	0	0	0	**0**	**3**	**18**
16:00 17:00	2	4	0	**6**	0	15	2	**17**	**23**	4	0	7	**11**	0	0	0	**0**	**11**	**34**
17:00 18:00	2	1	0	**3**	0	2	3	**5**	**8**	6	0	2	**8**	0	0	0	**0**	**8**	**16**
Sub Total	20	44	0	**64**	0	49	29	**78**	**142**	41	0	28	**69**	0	0	0	**0**	**69**	**211**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	20	44	0	**0**	0	49	29	**78**	**142**	41	0	28	**69**	0	0	0	**0**	**69**	**211**

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
38121

Turning Movement Count - Pedestrian Volume Report

RENAUD RD @ MER BLEUE RD

Count Date: Thursday, November 15, 2018 **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**	0	0	**0**	**0**
07:15 07:30	0	0	**0**	0	0	**0**	**0**
07:30 07:45	0	0	**0**	0	0	**0**	**0**
07:45 08:00	0	0	**0**	0	0	**0**	**0**
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 08:15	0	0	**0**	0	0	**0**	**0**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	0	0	**0**	0	0	**0**	**0**
08:45 09:00	0	0	**0**	1	0	**1**	**1**
08:00 09:00	0	0	**0**	1	0	**1**	**1**
09:00 09:15	0	1	**1**	0	0	**0**	**1**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	1	**1**	0	0	**0**	**1**
11:30 11:45	0	0	**0**	0	0	**0**	**0**
11:45 12:00	0	0	**0**	0	0	**0**	**0**
12:00 12:15	0	0	**0**	0	0	**0**	**0**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	0	0	**0**	0	0	**0**	**0**
13:00 13:15	0	0	**0**	0	0	**0**	**0**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 15:15	0	1	**1**	0	0	**0**	**1**
15:15 15:30	0	0	**0**	0	0	**0**	**0**
15:30 15:45	0	0	**0**	0	0	**0**	**0**
15:45 16:00	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	1	**1**	0	0	**0**	**1**
16:00 16:15	0	0	**0**	0	0	**0**	**0**
16:15 16:30	0	0	**0**	1	0	**1**	**1**
16:30 16:45	0	0	**0**	0	0	**0**	**0**
16:45 17:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	1	0	**1**	**1**
17:00 17:15	0	0	**0**	0	0	**0**	**0**
17:15 17:30	0	0	**0**	0	0	**0**	**0**
17:30 17:45	0	0	**0**	0	0	**0**	**0**
17:45 18:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	2	**2**	2	0	**2**	**4**

Comment:

Transportation Services - Traffic Services

Work Order
38121

Turning Movement Count - 15 Min U-Turn Total Report

RENAUD RD @ MER BLEUE RD

Survey Date: Thursday, November 15, 2018

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	0	0	0
13:00	13:15	0	0	0	0	0
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	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	1	0	0	1
16:45	17:00	0	0	0	0	0
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	1	0	0	1
Total		0	2	0	0	2

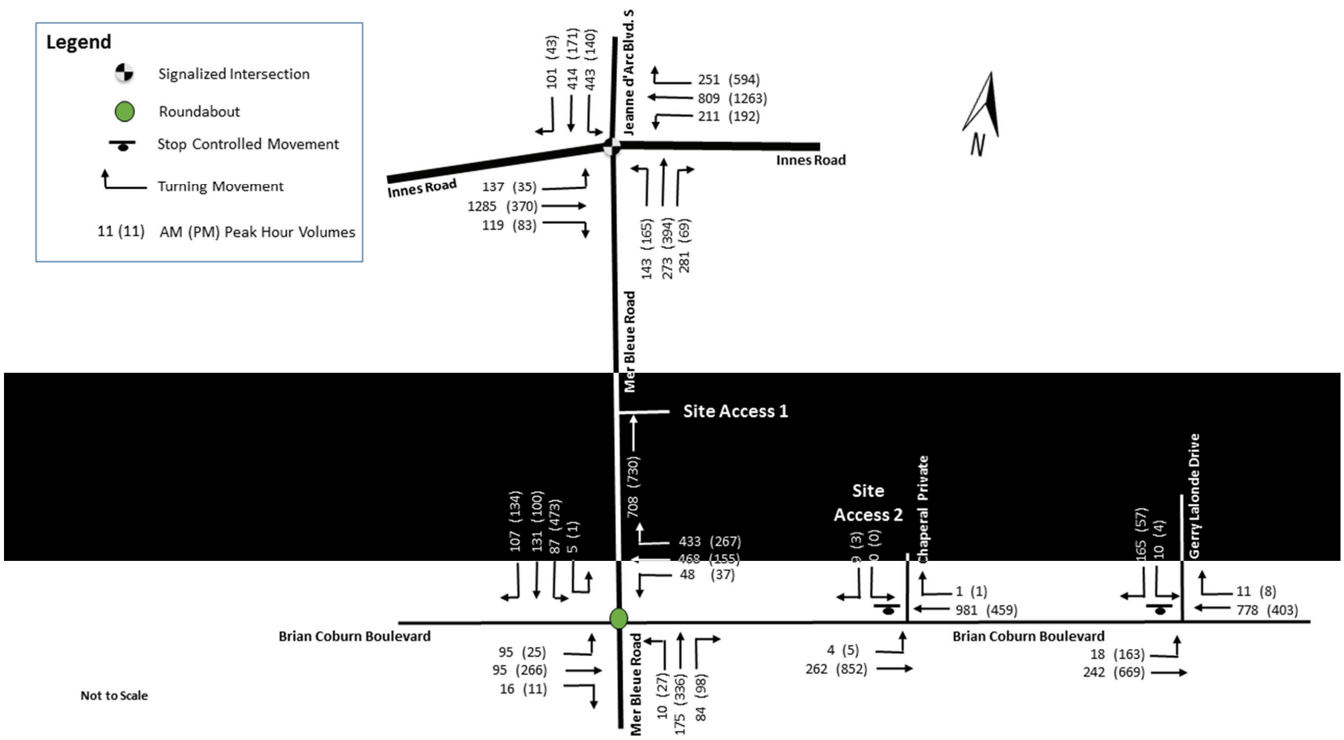


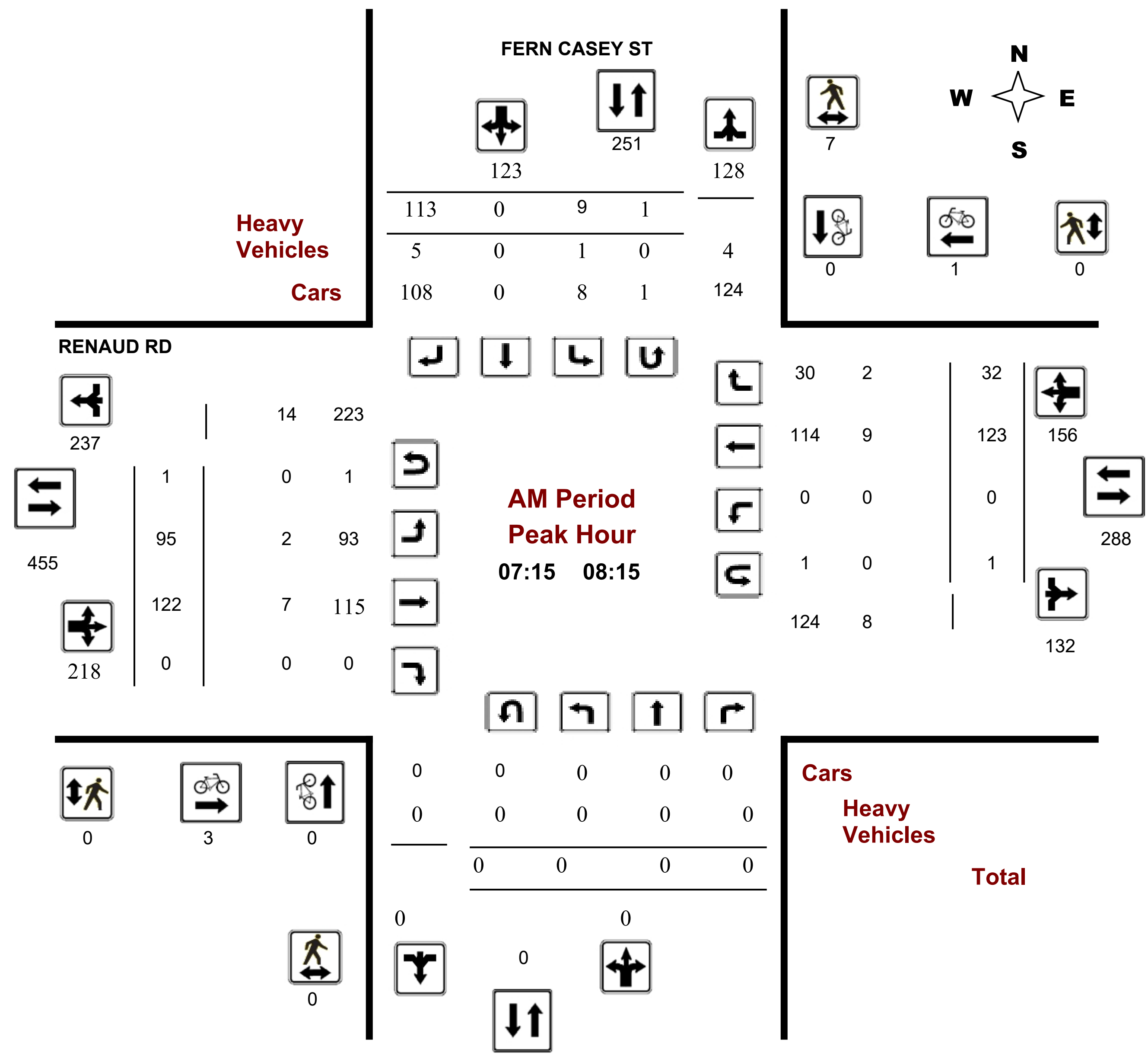
Exhibit 6: Existing 2017 Traffic Volumes

Turning Movement Count - Peak Hour Diagram

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018 **WO No:** 37829

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



Comments

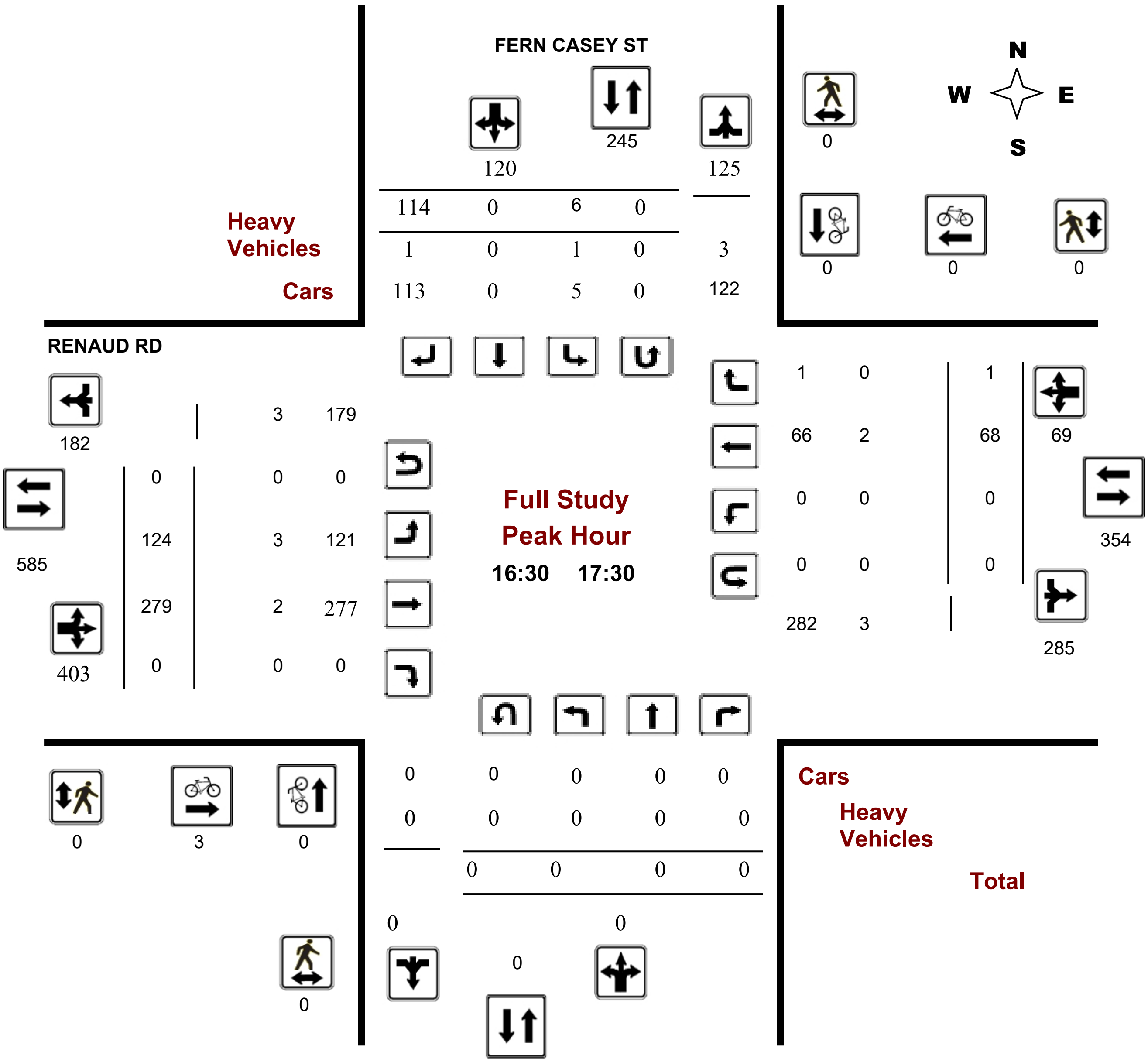
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018 **WO No:** 37829

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



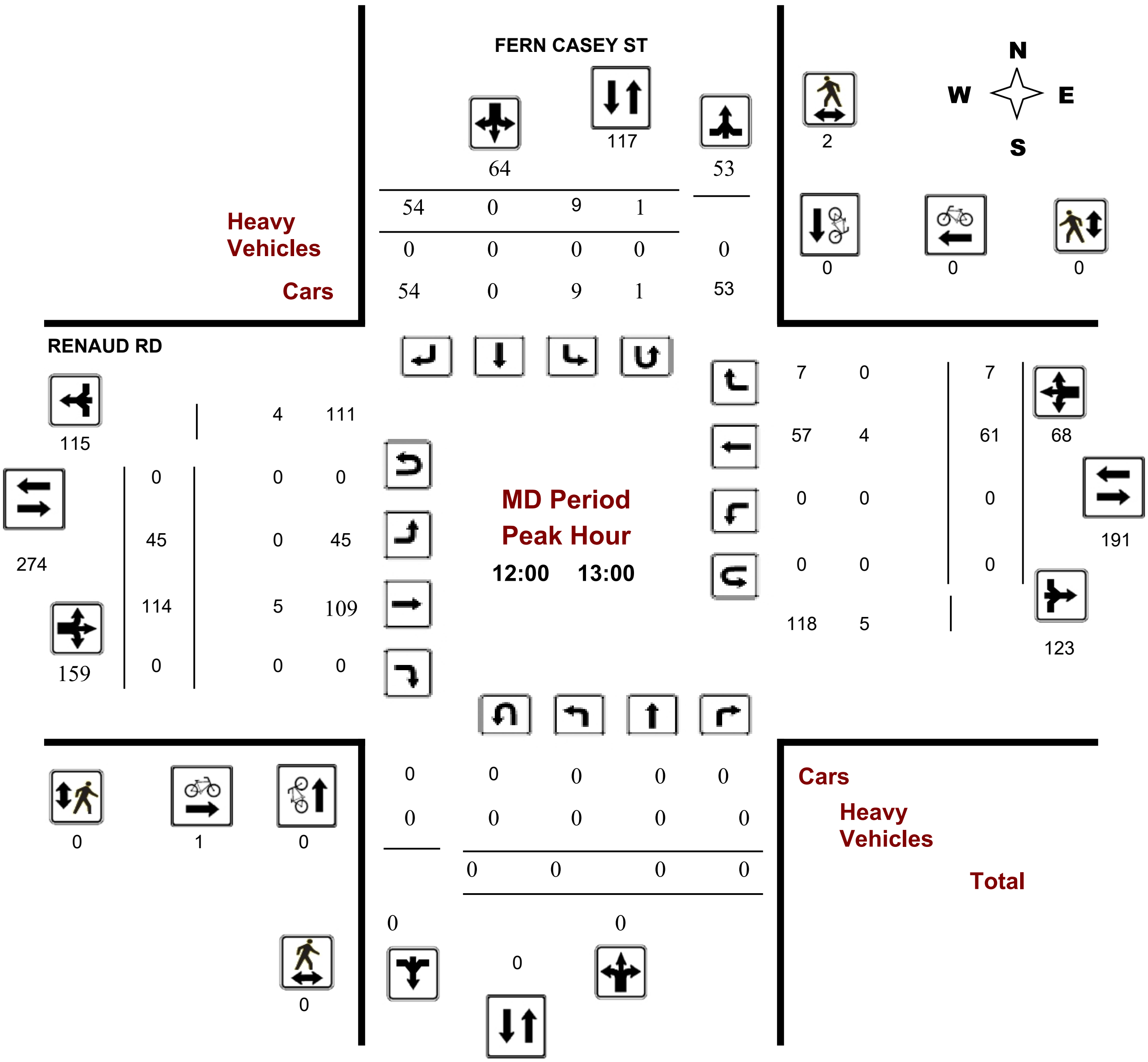
Comments

Turning Movement Count - Peak Hour Diagram

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018 **WO No:** 37829

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



Comments

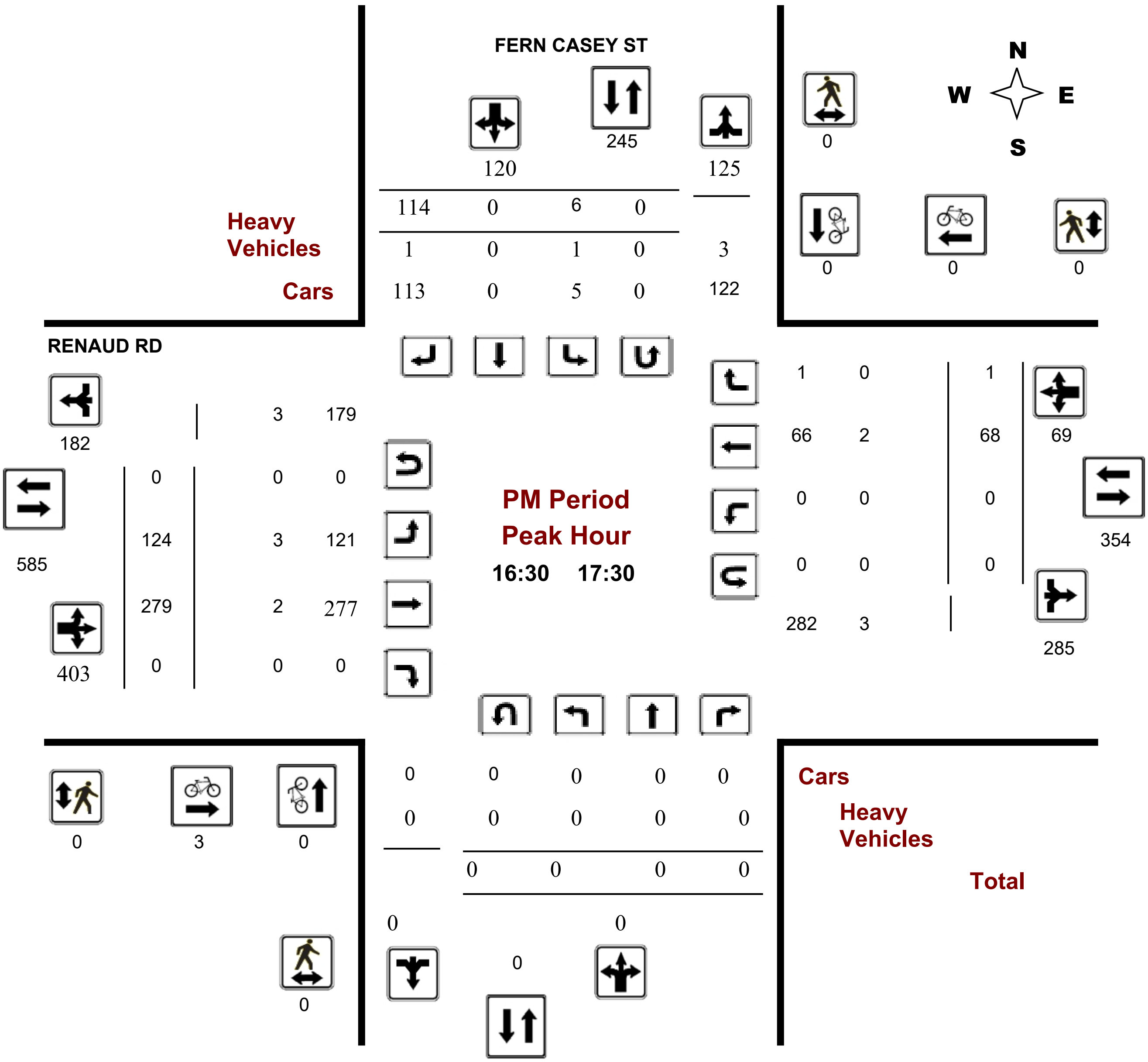
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018 **WO No:** 37829

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



Comments

Transportation Services - Traffic Services

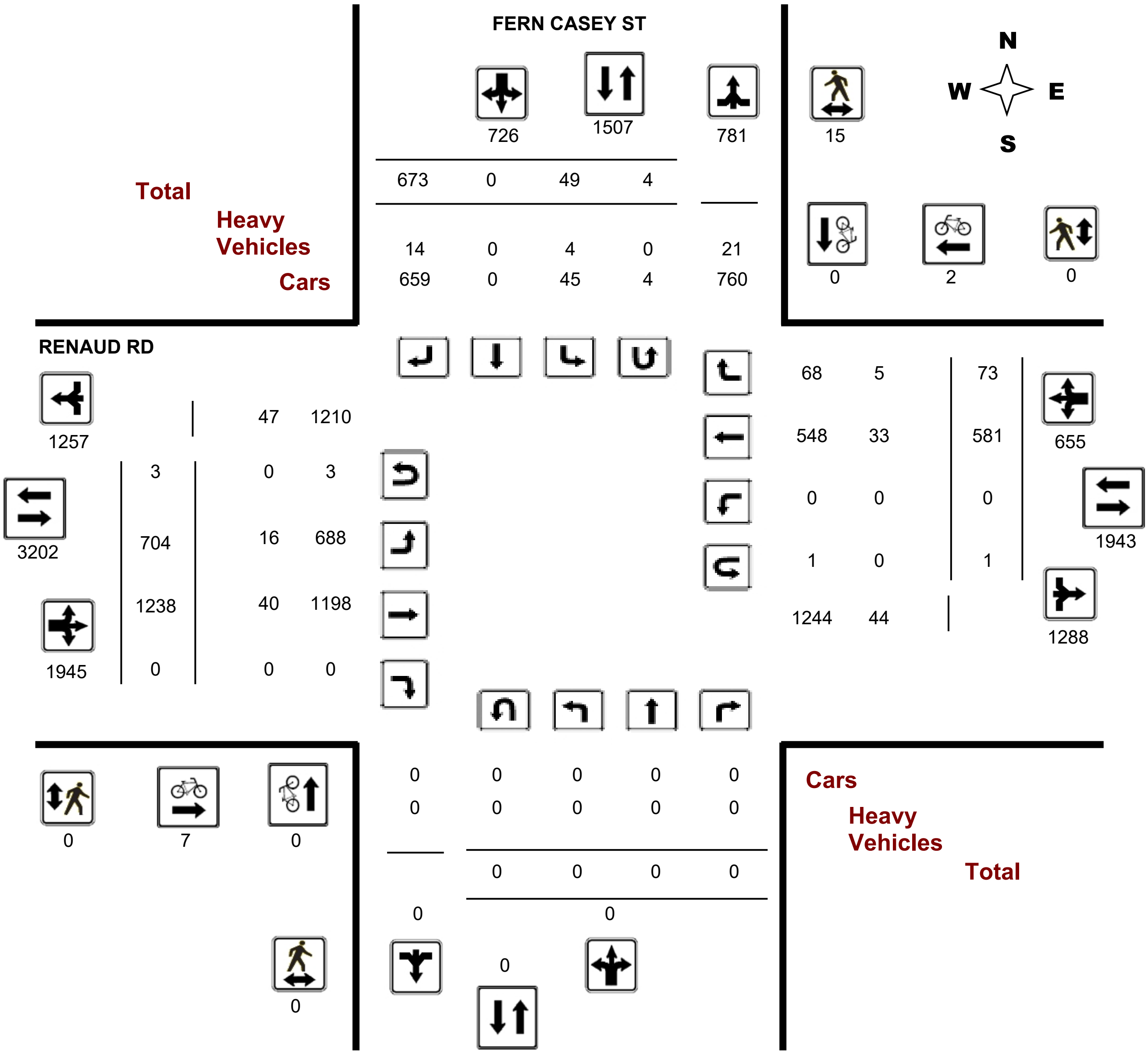
Turning Movement Count - Full Study Diagram

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018

WO#: 37829

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
37829

Turning Movement Count - Full Study Summary Report

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 4
Eastbound: 3 Westbound: 1

AADT Factor
.90

Full Study

	FERN CASEY ST									RENAUD 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	0	0	0	**0**	8	0	115	**123**	**123**	95	107	0	**202**	0	127	30	**157**	**359**	**482**
08:00 09:00	0	0	0	**0**	3	0	72	**75**	**75**	70	123	0	**193**	0	89	13	**102**	**295**	**370**
09:00 10:00	0	0	0	**0**	3	0	54	**57**	**57**	59	91	0	**150**	0	52	11	**63**	**213**	**270**
11:30 12:30	0	0	0	**0**	7	0	60	**67**	**67**	38	106	0	**144**	0	56	6	**62**	**206**	**273**
12:30 13:30	0	0	0	**0**	7	0	58	**65**	**65**	54	94	0	**148**	0	63	7	**70**	**218**	**283**
15:00 16:00	0	0	0	**0**	9	0	96	**105**	**105**	111	204	0	**315**	0	76	2	**78**	**393**	**498**
16:00 17:00	0	0	0	**0**	8	0	108	**116**	**116**	136	263	0	**399**	0	65	3	**68**	**467**	**583**
17:00 18:00	0	0	0	**0**	4	0	110	**114**	**114**	141	250	0	**391**	0	53	1	**54**	**445**	**559**
Sub Total	0	0	0	**0**	49	0	673	**722**	**722**	704	1238	0	**1942**	0	581	73	**654**	**2596**	**3318**
U Turns				**0**				**4**	**4**				**3**				**1**	**4**	**8**
Total	0	0	0	**0**	49	0	673	**726**	**726**	704	1238	0	**1945**	0	581	73	**655**	**2600**	**3326**
EQ 12Hr	0	0	0	**0**	68	0	935	**1009**	**1009**	979	1721	0	**2704**	0	808	101	**910**	**3614**	**4623**
AVG 12Hr	0	0	0	**0**	61	0	842	**908**	**908**	881	1549	0	**2433**	0	727	91	**819**	**3252**	**4160**
AVG 24Hr	0	0	0	**0**	80	0	1103	**1190**	**1190**	1154	2029	0	**3187**	0	952	120	**1073**	**4260**	**5450**

Note: These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **.90**

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

W.O. 37829

Turning Movement Count - 15 Minute Summary Report

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 4

Eastbound: 3 Westbound: 1

	FERN CASEY ST									RENAUD 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	0	0	0	**0**	0	0	26	**26**	**26**	17	19	0	**37**	0	30	4	**34**	**71**	**97**
07:15 07:30	0	0	0	**0**	1	0	30	**31**	**31**	24	27	0	**52**	0	33	6	**39**	**91**	**122**
07:30 07:45	0	0	0	**0**	1	0	33	**34**	**34**	36	30	0	**66**	0	27	8	**35**	**101**	**135**
07:45 08:00	0	0	0	**0**	6	0	26	**33**	**33**	18	31	0	**49**	0	37	12	**50**	**99**	**132**
08:00 08:15	0	0	0	**0**	1	0	24	**25**	**25**	17	34	0	**51**	0	26	6	**32**	**83**	**108**
08:15 08:30	0	0	0	**0**	1	0	22	**23**	**23**	14	24	0	**38**	0	25	2	**27**	**65**	**88**
08:30 08:45	0	0	0	**0**	1	0	17	**18**	**18**	23	43	0	**66**	0	30	1	**31**	**97**	**115**
08:45 09:00	0	0	0	**0**	0	0	9	**9**	**9**	16	22	0	**38**	0	8	4	**12**	**50**	**59**
09:00 09:15	0	0	0	**0**	1	0	9	**10**	**10**	22	28	0	**50**	0	15	5	**20**	**70**	**80**
09:15 09:30	0	0	0	**0**	0	0	16	**16**	**16**	12	21	0	**34**	0	11	2	**13**	**47**	**63**
09:30 09:45	0	0	0	**0**	1	0	17	**18**	**18**	10	15	0	**25**	0	12	0	**12**	**37**	**55**
09:45 10:00	0	0	0	**0**	1	0	12	**13**	**13**	15	27	0	**42**	0	14	4	**18**	**60**	**73**
11:30 11:45	0	0	0	**0**	3	0	15	**18**	**18**	13	24	0	**37**	0	15	2	**17**	**54**	**72**
11:45 12:00	0	0	0	**0**	0	0	15	**15**	**15**	10	18	0	**28**	0	14	2	**16**	**44**	**59**
12:00 12:15	0	0	0	**0**	1	0	14	**15**	**15**	7	34	0	**41**	0	16	0	**16**	**57**	**72**
12:15 12:30	0	0	0	**0**	3	0	16	**20**	**20**	8	30	0	**38**	0	11	2	**13**	**51**	**71**
12:30 12:45	0	0	0	**0**	3	0	9	**12**	**12**	8	28	0	**36**	0	16	5	**21**	**57**	**69**
12:45 13:00	0	0	0	**0**	2	0	15	**17**	**17**	22	22	0	**44**	0	18	0	**18**	**62**	**79**
13:00 13:15	0	0	0	**0**	1	0	24	**25**	**25**	11	14	0	**25**	0	17	2	**19**	**44**	**69**
13:15 13:30	0	0	0	**0**	1	0	10	**12**	**12**	13	30	0	**43**	0	12	0	**12**	**55**	**67**
15:00 15:15	0	0	0	**0**	2	0	28	**30**	**30**	15	35	0	**50**	0	26	0	**26**	**76**	**106**
15:15 15:30	0	0	0	**0**	2	0	20	**22**	**22**	34	56	0	**90**	0	17	1	**18**	**108**	**130**
15:30 15:45	0	0	0	**0**	4	0	21	**25**	**25**	35	50	0	**85**	0	20	0	**20**	**105**	**130**
15:45 16:00	0	0	0	**0**	1	0	27	**28**	**28**	27	63	0	**90**	0	13	1	**14**	**104**	**132**
16:00 16:15	0	0	0	**0**	2	0	27	**30**	**30**	36	61	0	**97**	0	10	1	**11**	**108**	**138**
16:15 16:30	0	0	0	**0**	1	0	27	**28**	**28**	41	59	0	**100**	0	14	2	**16**	**116**	**144**
16:30 16:45	0	0	0	**0**	3	0	23	**26**	**26**	29	62	0	**91**	0	23	0	**23**	**114**	**140**
16:45 17:00	0	0	0	**0**	2	0	31	**33**	**33**	30	81	0	**111**	0	18	0	**18**	**129**	**162**
17:00 17:15	0	0	0	**0**	0	0	29	**29**	**29**	32	65	0	**97**	0	14	0	**14**	**111**	**140**
17:15 17:30	0	0	0	**0**	1	0	31	**32**	**32**	33	71	0	**104**	0	13	1	**14**	**118**	**150**
17:30 17:45	0	0	0	**0**	3	0	25	**28**	**28**	37	50	0	**87**	0	12	0	**12**	**99**	**127**
17:45 18:00	0	0	0	**0**	0	0	25	**25**	**25**	39	64	0	**103**	0	14	0	**14**	**117**	**142**
TOTAL:	0	0	0	**0**	49	0	673	**726**	**726**	704	1238	0	**1945**	0	581	73	**655**	**2600**	**3326**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
37829

FERN CASEY ST @ RENAUD RD

Count Date: Wednesday, May 16, 2018

Start Time: 07:00

	FERN CASEY ST			RENAUD RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	0	0	**0**	3	0	**3**	**3**
08:00 09:00	0	0	**0**	0	1	**1**	**1**
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**	1	1	**2**	**2**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	3	0	**3**	**3**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	0	0	**0**	7	2	**9**	**9**

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

W.O. 37829

Turning Movement Count - Heavy Vehicle Report

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018

	FERN CASEY ST									RENAUD 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	0	0	0	**0**	1	0	4	**5**	**5**	2	8	0	**10**	0	10	1	**11**	**21**	**26**
08:00 09:00	0	0	0	**0**	0	0	5	**5**	**5**	2	6	0	**8**	0	4	3	**7**	**15**	**20**
09:00 10:00	0	0	0	**0**	0	0	1	**1**	**1**	2	7	0	**9**	0	6	1	**7**	**16**	**17**
11:30 12:30	0	0	0	**0**	0	0	0	**0**	**0**	0	5	0	**5**	0	2	0	**2**	**7**	**7**
12:30 13:30	0	0	0	**0**	0	0	1	**1**	**1**	0	7	0	**7**	0	5	0	**5**	**12**	**13**
15:00 16:00	0	0	0	**0**	1	0	1	**2**	**2**	2	2	0	**4**	0	4	0	**4**	**8**	**10**
16:00 17:00	0	0	0	**0**	2	0	2	**4**	**4**	5	4	0	**9**	0	2	0	**2**	**11**	**15**
17:00 18:00	0	0	0	**0**	0	0	0	**0**	**0**	3	1	0	**4**	0	0	0	**0**	**4**	**4**
Sub Total	0	0	0	**0**	4	0	14	**18**	**18**	16	40	0	**56**	0	33	5	**38**	**94**	**112**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	0	0	0	**0**	4	0	14	**18**	**18**	16	40	0	**56**	0	33	5	**38**	**94**	**112**

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
37829

Turning Movement Count - Pedestrian Volume Report

FERN CASEY ST @ RENAUD RD

Count Date: Wednesday, May 16, 2018 **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	1	**1**	0	0	**0**	**1**
07:15 07:30	0	1	**1**	0	0	**0**	**1**
07:30 07:45	0	1	**1**	0	0	**0**	**1**
07:45 08:00	0	4	**4**	0	0	**0**	**4**
07:00 08:00	0	7	**7**	0	0	**0**	**7**
08:00 08:15	0	1	**1**	0	0	**0**	**1**
08:15 08:30	0	2	**2**	0	0	**0**	**2**
08:30 08:45	0	0	**0**	0	0	**0**	**0**
08:45 09:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	3	**3**	0	0	**0**	**3**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 11:45	0	0	**0**	0	0	**0**	**0**
11:45 12:00	0	0	**0**	0	0	**0**	**0**
12:00 12:15	0	0	**0**	0	0	**0**	**0**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
11:30 12:30	0	0	**0**	0	0	**0**	**0**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	0	2	**2**	0	0	**0**	**2**
13:00 13:15	0	1	**1**	0	0	**0**	**1**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	3	**3**	0	0	**0**	**3**
15:00 15:15	0	1	**1**	0	0	**0**	**1**
15:15 15:30	0	0	**0**	0	0	**0**	**0**
15:30 15:45	0	0	**0**	0	0	**0**	**0**
15:45 16:00	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	1	**1**	0	0	**0**	**1**
16:00 16:15	0	0	**0**	0	0	**0**	**0**
16:15 16:30	0	0	**0**	0	0	**0**	**0**
16:30 16:45	0	0	**0**	0	0	**0**	**0**
16:45 17:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 17:15	0	0	**0**	0	0	**0**	**0**
17:15 17:30	0	0	**0**	0	0	**0**	**0**
17:30 17:45	0	0	**0**	0	0	**0**	**0**
17:45 18:00	0	1	**1**	0	0	**0**	**1**
17:00 18:00	0	1	**1**	0	0	**0**	**1**
Total	0	15	**15**	0	0	**0**	**15**

Comment:

Transportation Services - Traffic Services

Work Order
37829

Turning Movement Count - 15 Min U-Turn Total Report

FERN CASEY ST @ RENAUD RD

Survey Date: Wednesday, May 16, 2018

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	1	0	1
07:30	07:45	0	0	0	0	0
07:45	08:00	0	1	0	1	2
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	1	0	1
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	1	0	0	1
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	1	0	0	1
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	0	0	0
16:00	16:15	0	1	0	0	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	0	0
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	4	3	1	8

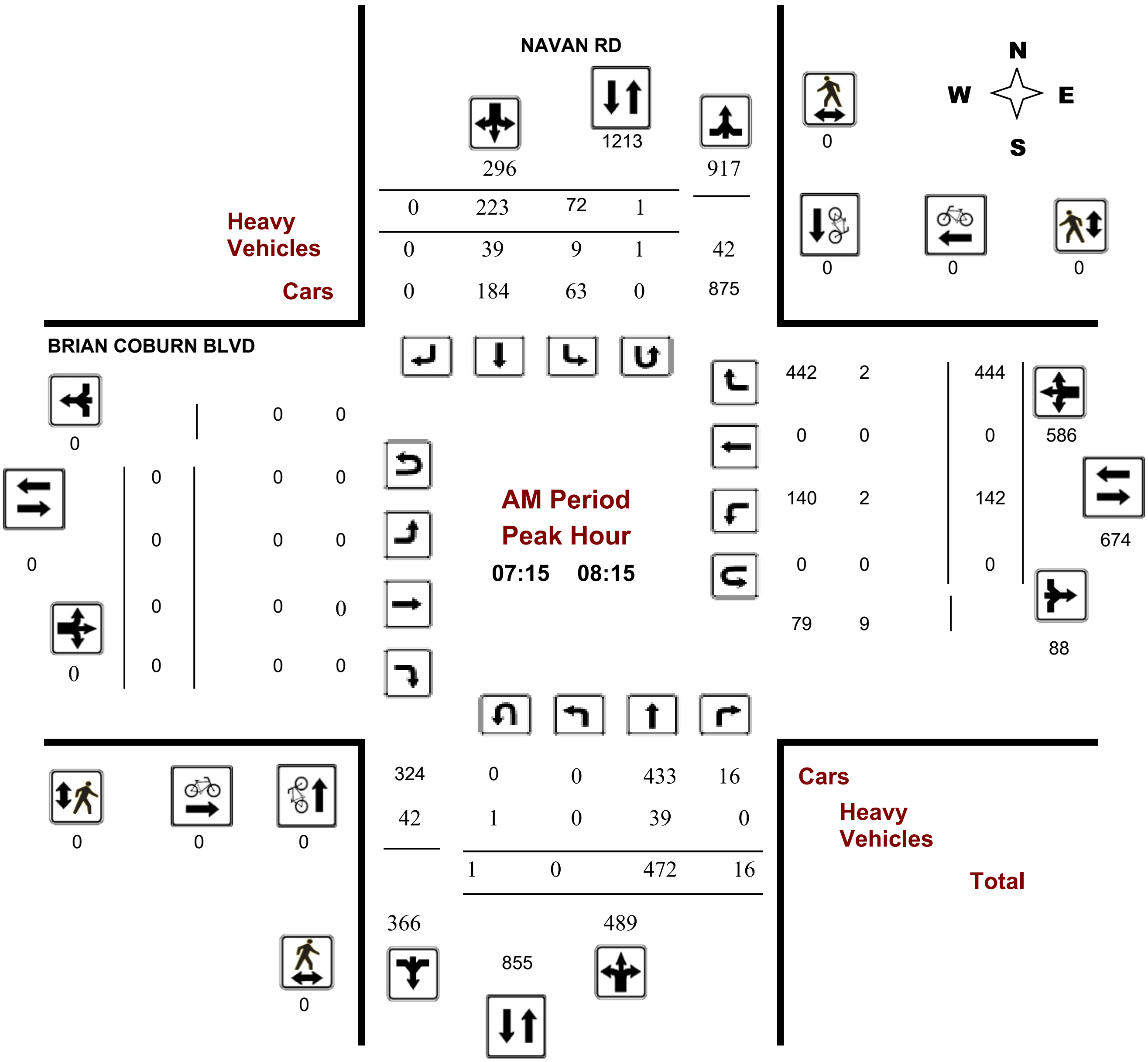
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018 **WO No:** 38030

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



Comments

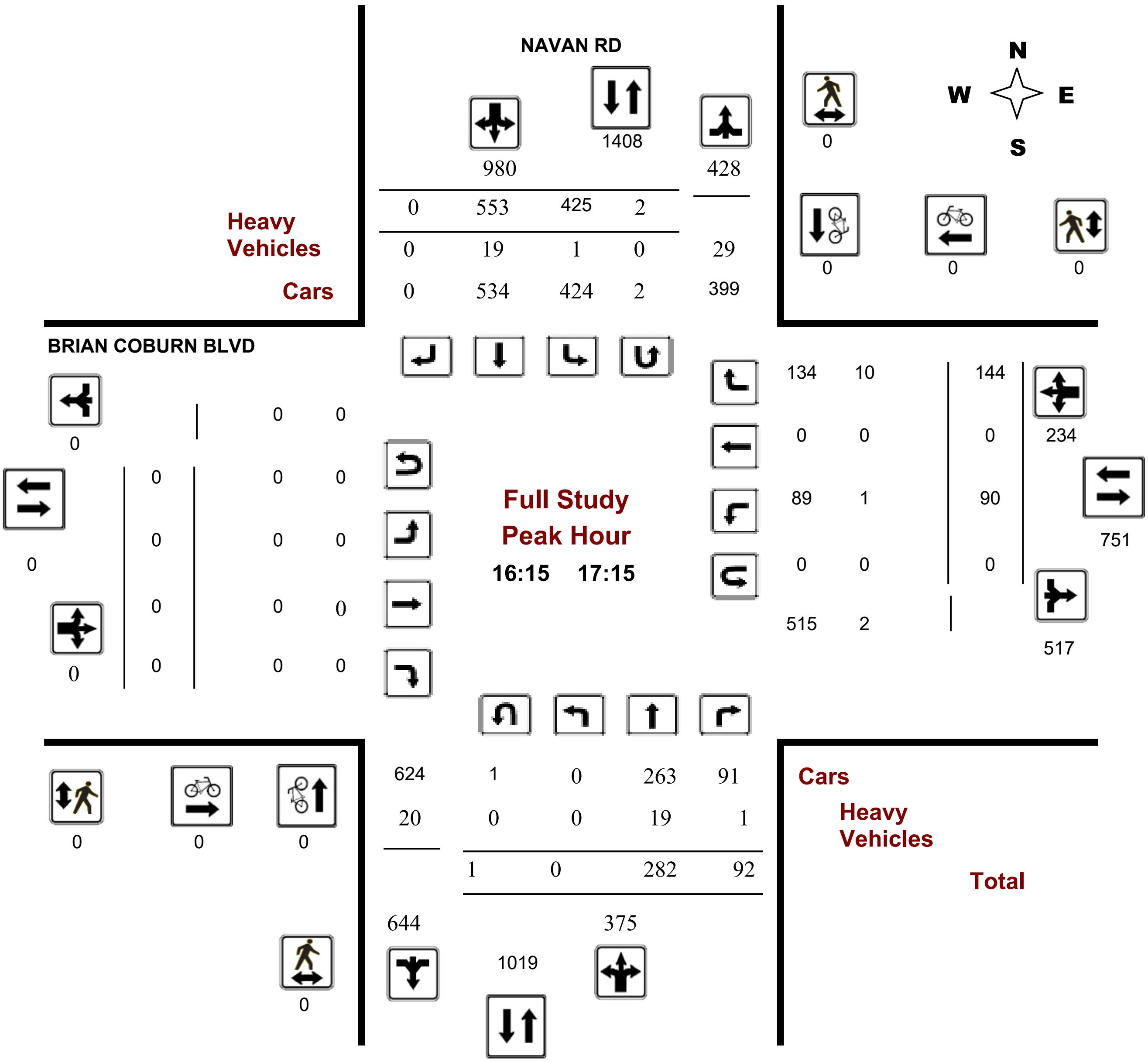
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018 **WO No:** 38030

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



Comments

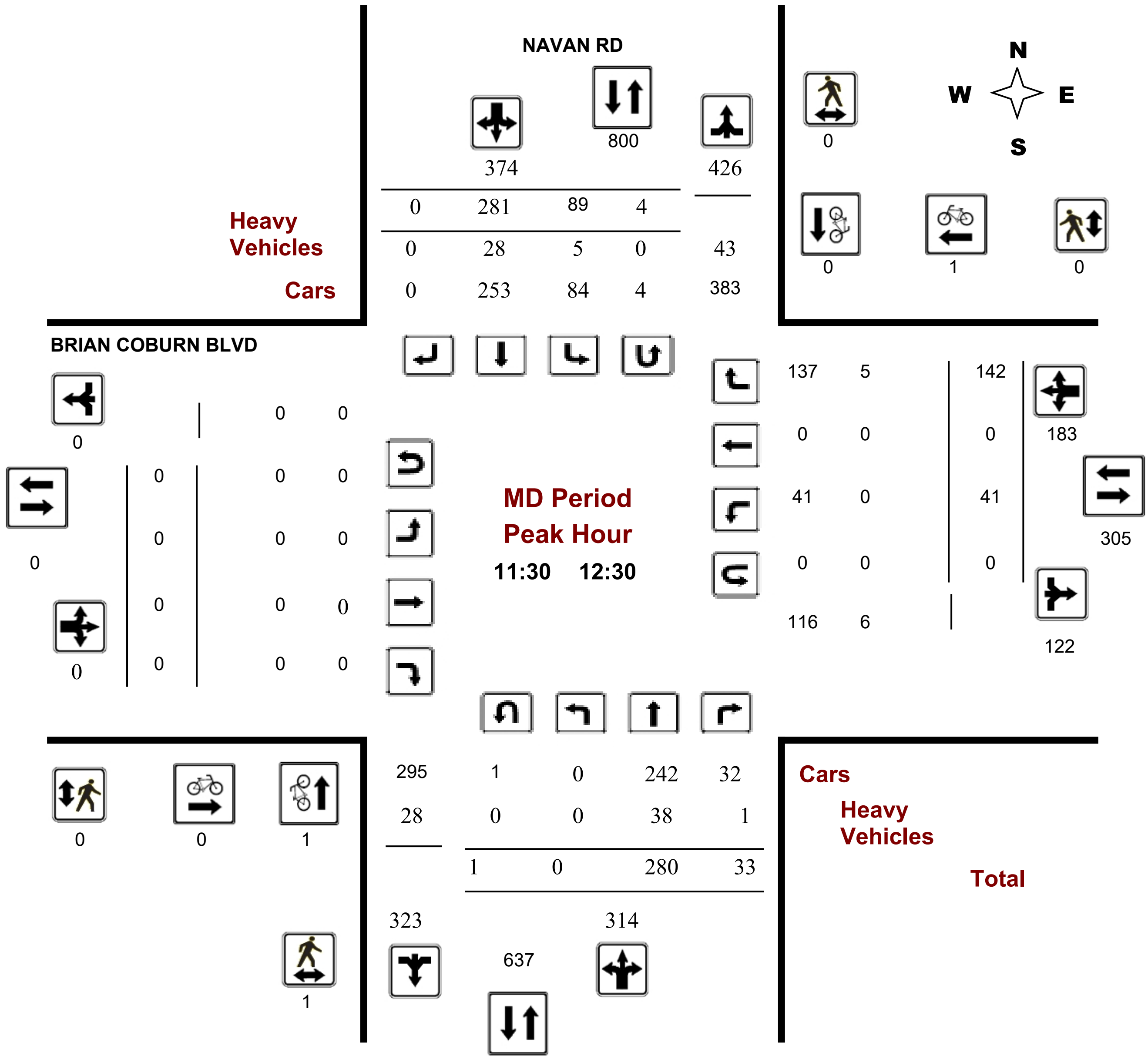
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018 **WO No:** 38030

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



Comments

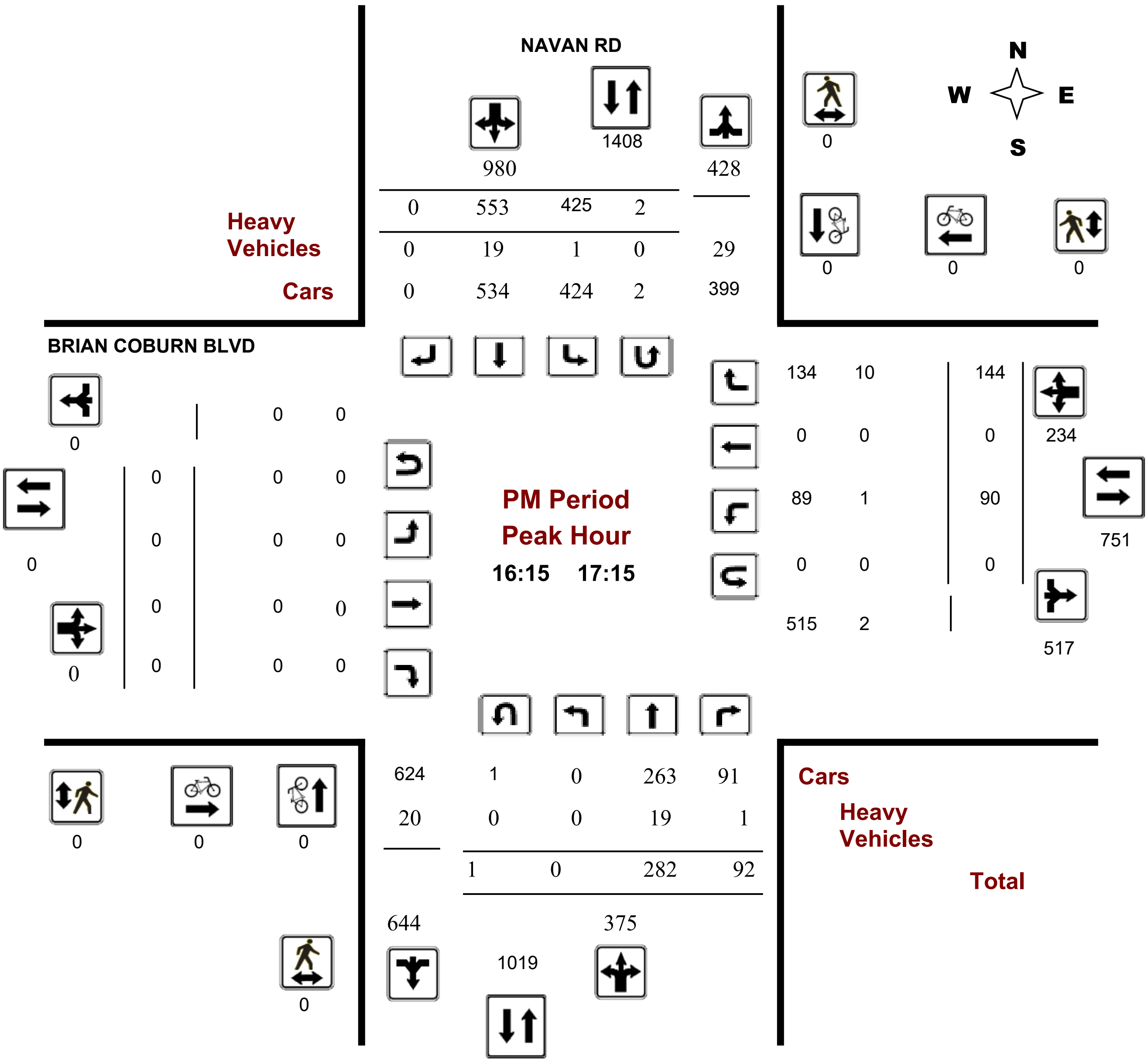
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018 **WO No:** 38030

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



Comments

Transportation Services - Traffic Services

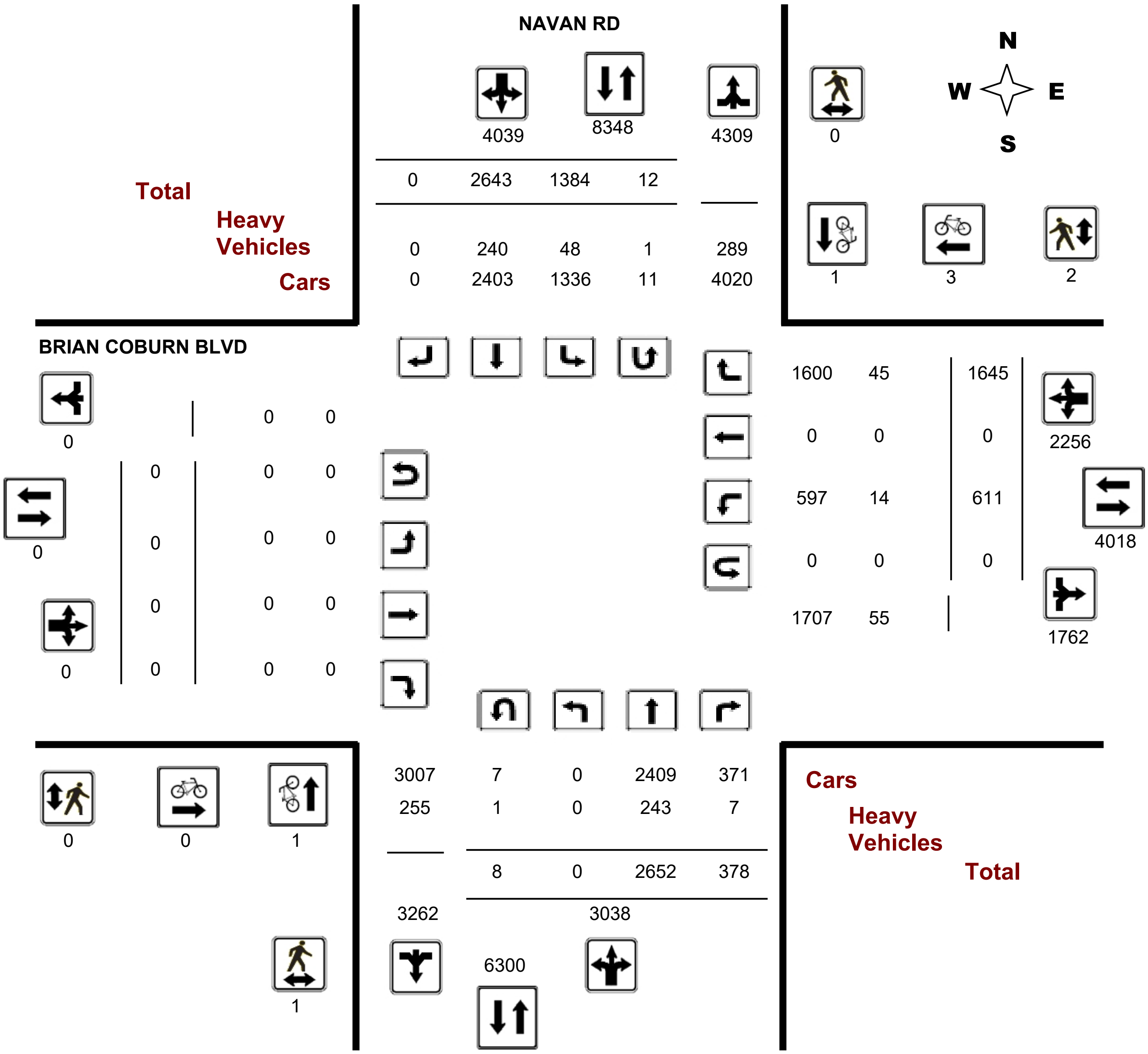
Turning Movement Count - Full Study Diagram

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018

WO#: 38030

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
38030

Turning Movement Count - Full Study Summary Report

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018

Total Observed U-Turns

Northbound: 8 Southbound: 12
Eastbound: 0 Westbound: 0

AADT Factor
.90

Full Study

	NAVAN RD									BRIAN COBURN BLVD									
	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	0	487	13	**500**	72	203	0	**275**	**775**	0	0	0	**0**	142	0	449	**591**	**591**	**1366**
08:00 09:00	0	423	35	**458**	70	221	0	**291**	**749**	0	0	0	**0**	107	0	381	**488**	**488**	**1237**
09:00 10:00	0	327	30	**357**	55	230	0	**285**	**642**	0	0	0	**0**	46	0	162	**208**	**208**	**850**
11:30 12:30	0	280	33	**313**	89	281	0	**370**	**683**	0	0	0	**0**	41	0	142	**183**	**183**	**866**
12:30 13:30	0	246	34	**280**	92	252	0	**344**	**624**	0	0	0	**0**	51	0	108	**159**	**159**	**783**
15:00 16:00	0	281	61	**342**	253	415	0	**668**	**1010**	0	0	0	**0**	69	0	124	**193**	**193**	**1203**
16:00 17:00	0	301	82	**383**	397	540	0	**937**	**1320**	0	0	0	**0**	95	0	136	**231**	**231**	**1551**
17:00 18:00	0	307	90	**397**	356	501	0	**857**	**1254**	0	0	0	**0**	60	0	143	**203**	**203**	**1457**
Sub Total	0	2652	378	**3030**	1384	2643	0	**4027**	**7057**	0	0	0	**0**	611	0	1645	**2256**	**2256**	**9313**
U Turns				**8**				**12**	**20**				**0**				**0**	**0**	**20**
Total	0	2652	378	**3038**	1384	2643	0	**4039**	**7077**	0	0	0	**0**	611	0	1645	**2256**	**2256**	**9333**
EQ 12Hr	0	3686	525	**4223**	1924	3674	0	**5614**	**9837**	0	0	0	**0**	849	0	2287	**3136**	**3136**	**12973**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	0	3318	473	**3801**	1731	3306	0	**5053**	**8854**	0	0	0	**0**	764	0	2058	**2822**	**2822**	**11676**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	0	4346	619	**4979**	2268	4331	0	**6619**	**11598**	0	0	0	**0**	1001	0	2696	**3697**	**3697**	**15295**
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.

Ottawa

Transportation Services - Traffic Services

W.O. 38030

Turning Movement Count - 15 Minute Summary Report

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018

Total Observed U-Turns

Northbound: 8 Southbound: 12
Eastbound: 0 Westbound: 0

	NAVAN RD									BRIAN COBURN BLVD									
	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	0	117	4	**121**	17	45	0	**62**	**183**	0	0	0	**0**	30	0	117	**147**	**147**	**330**
07:15 07:30	0	130	2	**132**	16	49	0	**65**	**197**	0	0	0	**0**	43	0	140	**183**	**183**	**380**
07:30 07:45	0	118	2	**121**	25	41	0	**66**	**187**	0	0	0	**0**	37	0	110	**147**	**147**	**334**
07:45 08:00	0	122	5	**127**	14	68	0	**82**	**209**	0	0	0	**0**	32	0	82	**114**	**114**	**323**
08:00 08:15	0	102	7	**109**	17	65	0	**83**	**192**	0	0	0	**0**	30	0	112	**142**	**142**	**334**
08:15 08:30	0	104	11	**115**	18	55	0	**73**	**188**	0	0	0	**0**	31	0	101	**132**	**132**	**320**
08:30 08:45	0	108	7	**115**	25	51	0	**76**	**191**	0	0	0	**0**	26	0	96	**122**	**122**	**313**
08:45 09:00	0	109	10	**122**	10	50	0	**60**	**182**	0	0	0	**0**	20	0	72	**92**	**92**	**274**
09:00 09:15	0	78	6	**84**	12	70	0	**83**	**167**	0	0	0	**0**	20	0	58	**78**	**78**	**245**
09:15 09:30	0	85	6	**91**	12	46	0	**58**	**149**	0	0	0	**0**	8	0	42	**50**	**50**	**199**
09:30 09:45	0	86	9	**95**	13	59	0	**72**	**167**	0	0	0	**0**	6	0	27	**33**	**33**	**200**
09:45 10:00	0	78	9	**87**	18	55	0	**73**	**160**	0	0	0	**0**	12	0	35	**47**	**47**	**207**
11:30 11:45	0	77	9	**86**	24	56	0	**81**	**167**	0	0	0	**0**	12	0	38	**50**	**50**	**217**
11:45 12:00	0	70	6	**77**	14	70	0	**84**	**161**	0	0	0	**0**	8	0	39	**47**	**47**	**208**
12:00 12:15	0	65	12	**77**	27	76	0	**105**	**182**	0	0	0	**0**	17	0	31	**48**	**48**	**230**
12:15 12:30	0	68	6	**74**	24	79	0	**104**	**178**	0	0	0	**0**	4	0	34	**38**	**38**	**216**
12:30 12:45	0	59	6	**65**	20	51	0	**71**	**136**	0	0	0	**0**	14	0	24	**38**	**38**	**174**
12:45 13:00	0	72	10	**83**	23	59	0	**83**	**166**	0	0	0	**0**	12	0	25	**37**	**37**	**203**
13:00 13:15	0	48	11	**59**	33	73	0	**107**	**166**	0	0	0	**0**	11	0	34	**45**	**45**	**211**
13:15 13:30	0	67	7	**74**	16	69	0	**85**	**159**	0	0	0	**0**	14	0	25	**39**	**39**	**198**
15:00 15:15	0	68	11	**80**	44	91	0	**135**	**215**	0	0	0	**0**	16	0	32	**48**	**48**	**263**
15:15 15:30	0	70	18	**88**	60	94	0	**154**	**242**	0	0	0	**0**	13	0	36	**49**	**49**	**291**
15:30 15:45	0	70	13	**83**	62	102	0	**165**	**248**	0	0	0	**0**	17	0	27	**44**	**44**	**292**
15:45 16:00	0	73	19	**92**	87	128	0	**215**	**307**	0	0	0	**0**	23	0	29	**52**	**52**	**359**
16:00 16:15	0	80	15	**95**	82	129	0	**212**	**307**	0	0	0	**0**	21	0	28	**49**	**49**	**356**
16:15 16:30	0	87	25	**112**	91	140	0	**231**	**343**	0	0	0	**0**	24	0	37	**61**	**61**	**404**
16:30 16:45	0	64	22	**87**	113	138	0	**252**	**339**	0	0	0	**0**	25	0	43	**68**	**68**	**407**
16:45 17:00	0	70	20	**90**	111	133	0	**244**	**334**	0	0	0	**0**	25	0	28	**53**	**53**	**387**
17:00 17:15	0	61	25	**86**	110	142	0	**253**	**339**	0	0	0	**0**	16	0	36	**52**	**52**	**391**
17:15 17:30	0	74	33	**107**	93	113	0	**206**	**313**	0	0	0	**0**	21	0	27	**48**	**48**	**361**
17:30 17:45	0	82	21	**103**	90	139	0	**229**	**332**	0	0	0	**0**	12	0	46	**58**	**58**	**390**
17:45 18:00	0	90	11	**101**	63	107	0	**170**	**271**	0	0	0	**0**	11	0	34	**45**	**45**	**316**
TOTAL:	0	2652	378	**3038**	1384	2643	0	**4039**	**7077**	0	0	0	**0**	611	0	1645	**2256**	**2256**	**9333**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
38030

BRIAN COBURN BLVD @ NAVAN RD

Count Date: Thursday, July 19, 2018 **Start Time:** 07:00

	NAVAN RD			BRIAN COBURN BLVD			
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	1	**1**	0	0	**0**	**1**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 12:30	1	0	**1**	0	1	**1**	**2**
12:30 13:30	0	0	**0**	0	2	**2**	**2**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	1	1	**2**	0	3	**3**	**5**

Comment:

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

Ottawa

Transportation Services - Traffic Services

W.O.
38030

Turning Movement Count - Heavy Vehicle Report

BRIAN COBURN BLVD @ NAVAN RD

Survey Date: Thursday, July 19, 2018

	NAVAN RD									BRIAN COBURN BLVD									
	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	0	34	0	**35**	15	34	0	**49**	**84**	0	0	0	**0**	2	0	1	**3**	**3**	**87**
08:00 09:00	0	42	0	**42**	5	40	0	**46**	**88**	0	0	0	**0**	1	0	2	**3**	**3**	**91**
09:00 10:00	0	42	2	**44**	7	45	0	**52**	**96**	0	0	0	**0**	5	0	9	**14**	**14**	**110**
11:30 12:30	0	38	1	**39**	5	28	0	**33**	**72**	0	0	0	**0**	0	0	5	**5**	**5**	**77**
12:30 13:30	0	28	1	**29**	8	26	0	**34**	**63**	0	0	0	**0**	0	0	3	**3**	**3**	**66**
15:00 16:00	0	23	2	**25**	4	21	0	**25**	**50**	0	0	0	**0**	2	0	8	**10**	**10**	**60**
16:00 17:00	0	18	0	**18**	3	26	0	**29**	**47**	0	0	0	**0**	2	0	11	**13**	**13**	**60**
17:00 18:00	0	18	1	**19**	1	20	0	**21**	**40**	0	0	0	**0**	2	0	6	**8**	**8**	**48**
Sub Total	0	243	7	**251**	48	240	0	**289**	**540**	0	0	0	**0**	14	0	45	**59**	**59**	**599**
U-Turns (Heavy Vehicles)				**1**				**1**	**2**				**0**				**0**	**0**	**2**
Total	0	243	7	**0**	48	240	0	**290**	**542**	0	0	0	**0**	14	0	45	**59**	**59**	**601**

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

Transportation Services - Traffic Services

Turning Movement Count - Pedestrian Volume Report

BRIAN COBURN BLVD @ NAVAN RD

Count Date: Thursday, July 19, 2018 **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**	0	0	**0**	**0**
07:15 07:30	0	0	**0**	0	0	**0**	**0**
07:30 07:45	0	0	**0**	0	0	**0**	**0**
07:45 08:00	0	0	**0**	0	0	**0**	**0**
07:00 08:00	0	0	**0**	0	0	**0**	**0**
08:00 08:15	0	0	**0**	0	0	**0**	**0**
08:15 08:30	0	0	**0**	0	0	**0**	**0**
08:30 08:45	0	0	**0**	0	0	**0**	**0**
08:45 09:00	0	0	**0**	0	0	**0**	**0**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	0	**0**	0	0	**0**	**0**
11:30 11:45	0	0	**0**	0	0	**0**	**0**
11:45 12:00	1	0	**1**	0	0	**0**	**1**
12:00 12:15	0	0	**0**	0	0	**0**	**0**
12:15 12:30	0	0	**0**	0	0	**0**	**0**
11:30 12:30	1	0	**1**	0	0	**0**	**1**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	0	0	**0**	0	0	**0**	**0**
13:00 13:15	0	0	**0**	0	0	**0**	**0**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
12:30 13:30	0	0	**0**	0	0	**0**	**0**
15:00 15:15	0	0	**0**	0	0	**0**	**0**
15:15 15:30	0	0	**0**	0	0	**0**	**0**
15:30 15:45	0	0	**0**	0	0	**0**	**0**
15:45 16:00	0	0	**0**	0	0	**0**	**0**
15:00 16:00	0	0	**0**	0	0	**0**	**0**
16:00 16:15	0	0	**0**	0	2	**2**	**2**
16:15 16:30	0	0	**0**	0	0	**0**	**0**
16:30 16:45	0	0	**0**	0	0	**0**	**0**
16:45 17:00	0	0	**0**	0	0	**0**	**0**
16:00 17:00	0	0	**0**	0	2	**2**	**2**
17:00 17:15	0	0	**0**	0	0	**0**	**0**
17:15 17:30	0	0	**0**	0	0	**0**	**0**
17:30 17:45	0	0	**0**	0	0	**0**	**0**
17:45 18:00	0	0	**0**	0	0	**0**	**0**
17:00 18:00	0	0	**0**	0	0	**0**	**0**
Total	1	0	**1**	0	2	**2**	**3**

Comment:

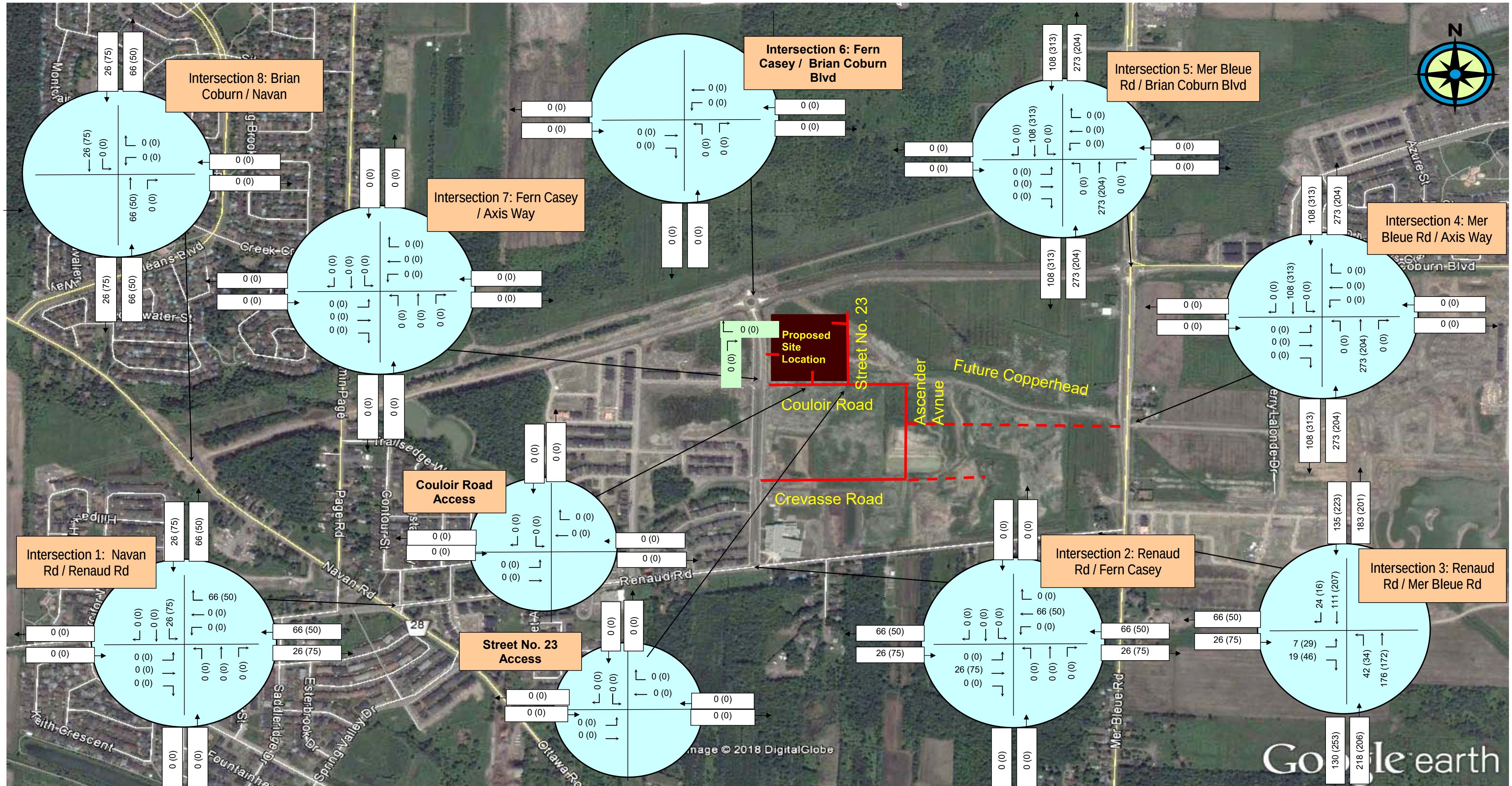
Turning Movement Count - 15 Min U-Turn Total Report

BRIAN COBURN BLVD @ NAVAN RD

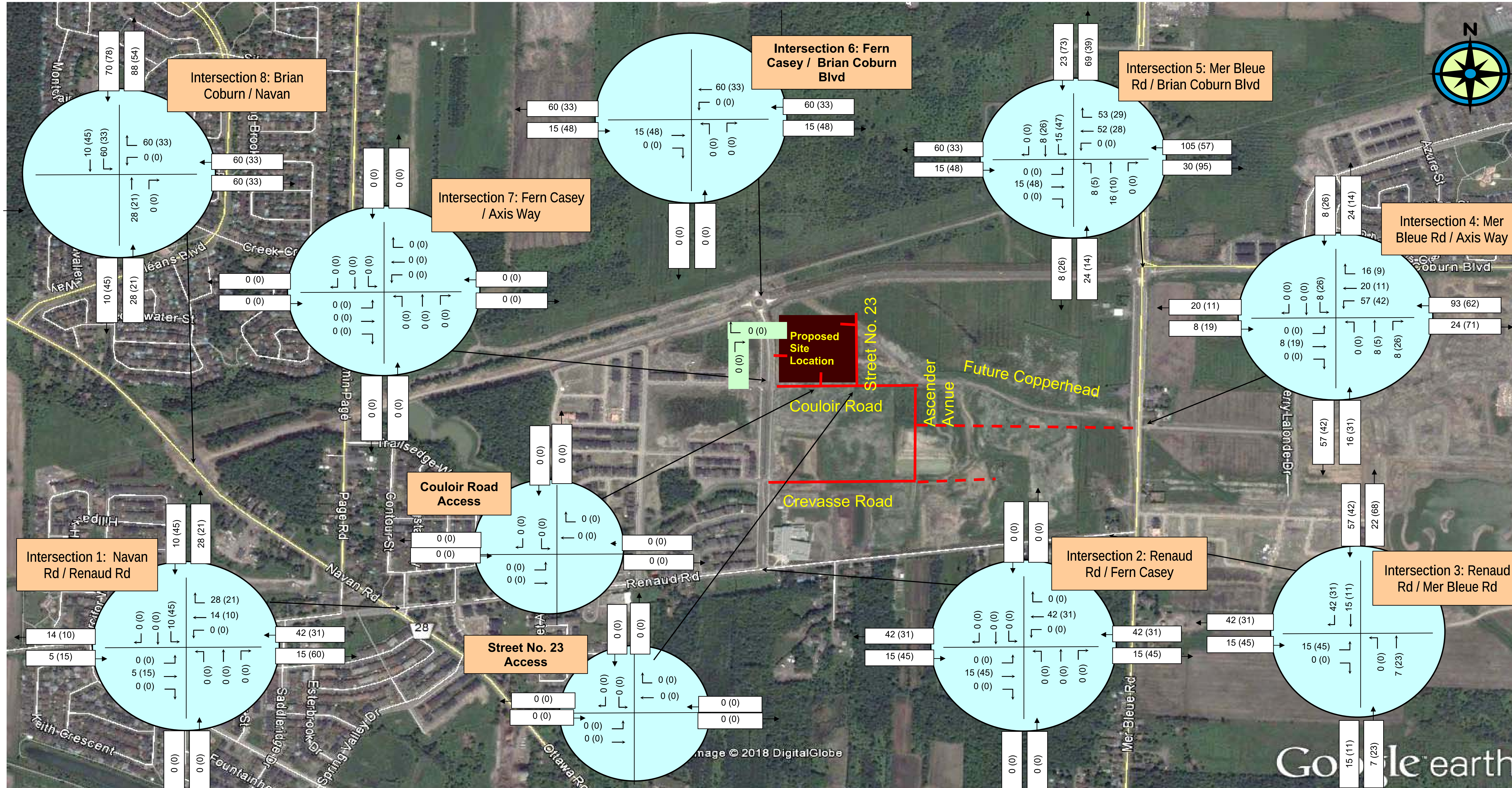
Survey Date: Thursday, July 19, 2018

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	1	0	0	0	1
07:45	08:00	0	0	0	0	0
08:00	08:15	0	1	0	0	1
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	3	0	0	0	3
09:00	09:15	0	1	0	0	1
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	1	0	0	1
11:45	12:00	1	0	0	0	1
12:00	12:15	0	2	0	0	2
12:15	12:30	0	1	0	0	1
12:30	12:45	0	0	0	0	0
12:45	13:00	1	1	0	0	2
13:00	13:15	0	1	0	0	1
13:15	13:30	0	0	0	0	0
15:00	15:15	1	0	0	0	1
15:15	15:30	0	0	0	0	0
15:30	15:45	0	1	0	0	1
15:45	16:00	0	0	0	0	0
16:00	16:15	0	1	0	0	1
16:15	16:30	0	0	0	0	0
16:30	16:45	1	1	0	0	2
16:45	17:00	0	0	0	0	0
17:00	17:15	0	1	0	0	1
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		8	12	0	0	20

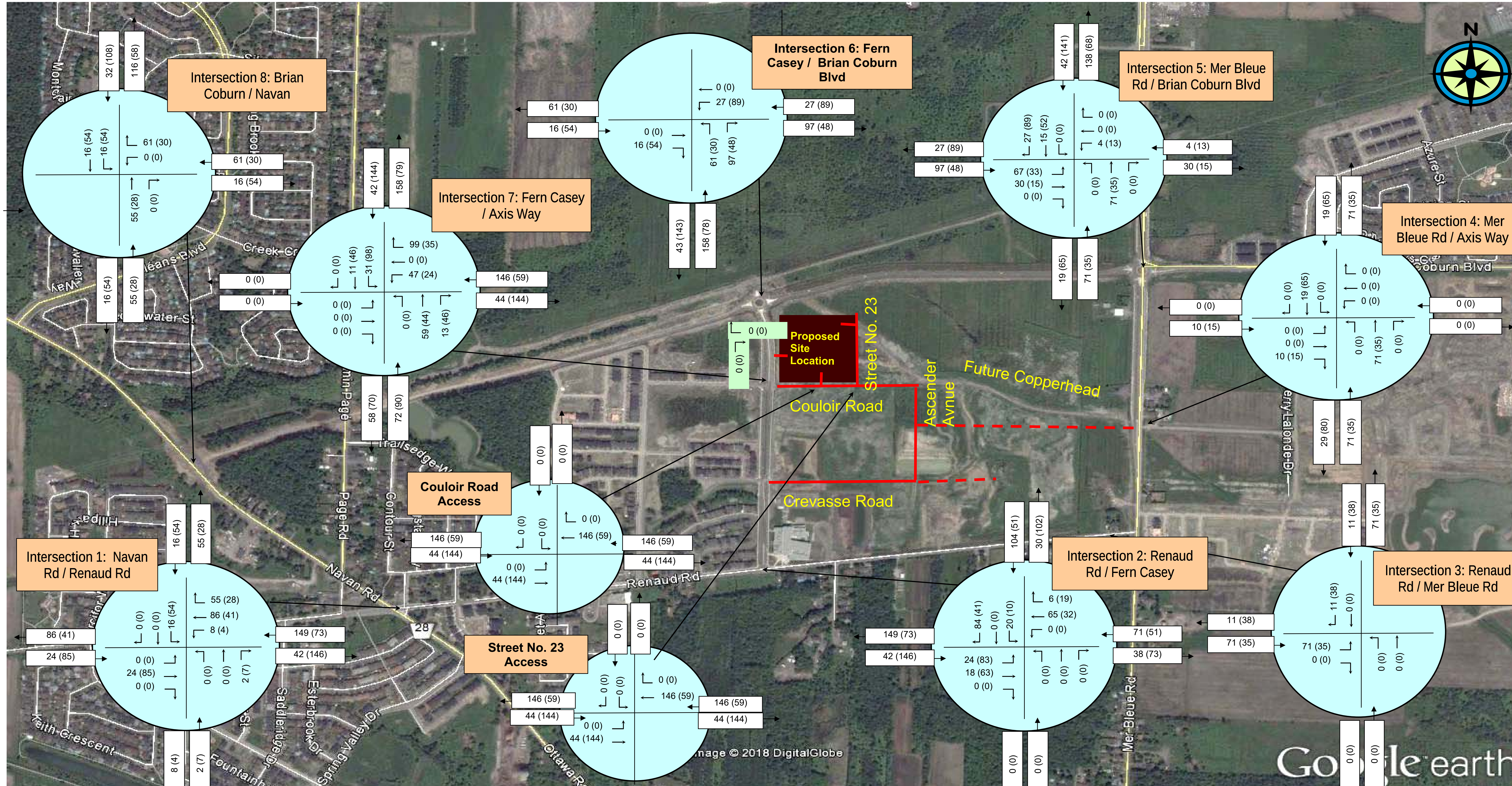
APPENDIX D: ADJACENT DEVELOPMENT TRAFFIC VOLUME EXHIBITS AND EXTRACTS



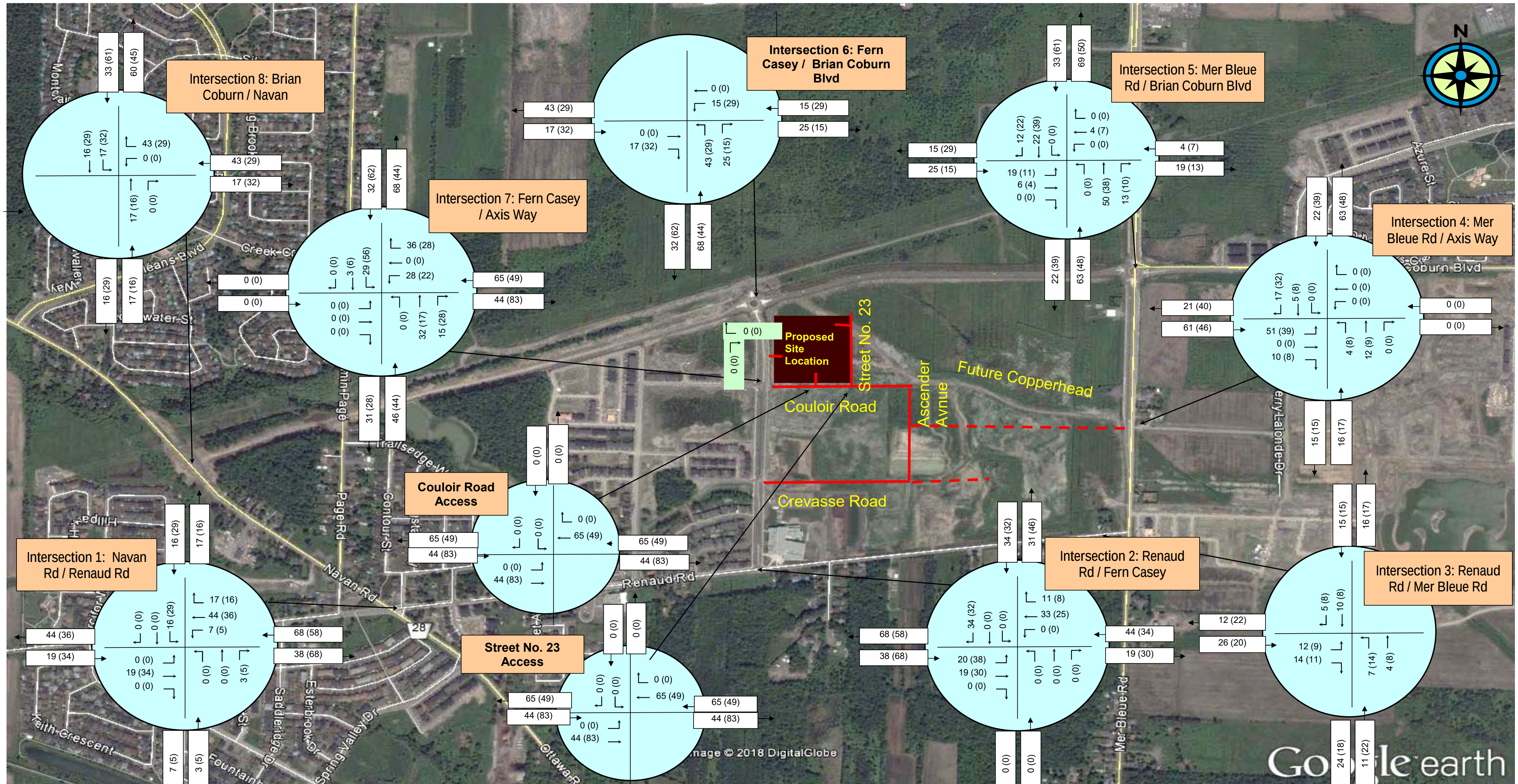
Summerside (Phase 1-6) Development Traffic



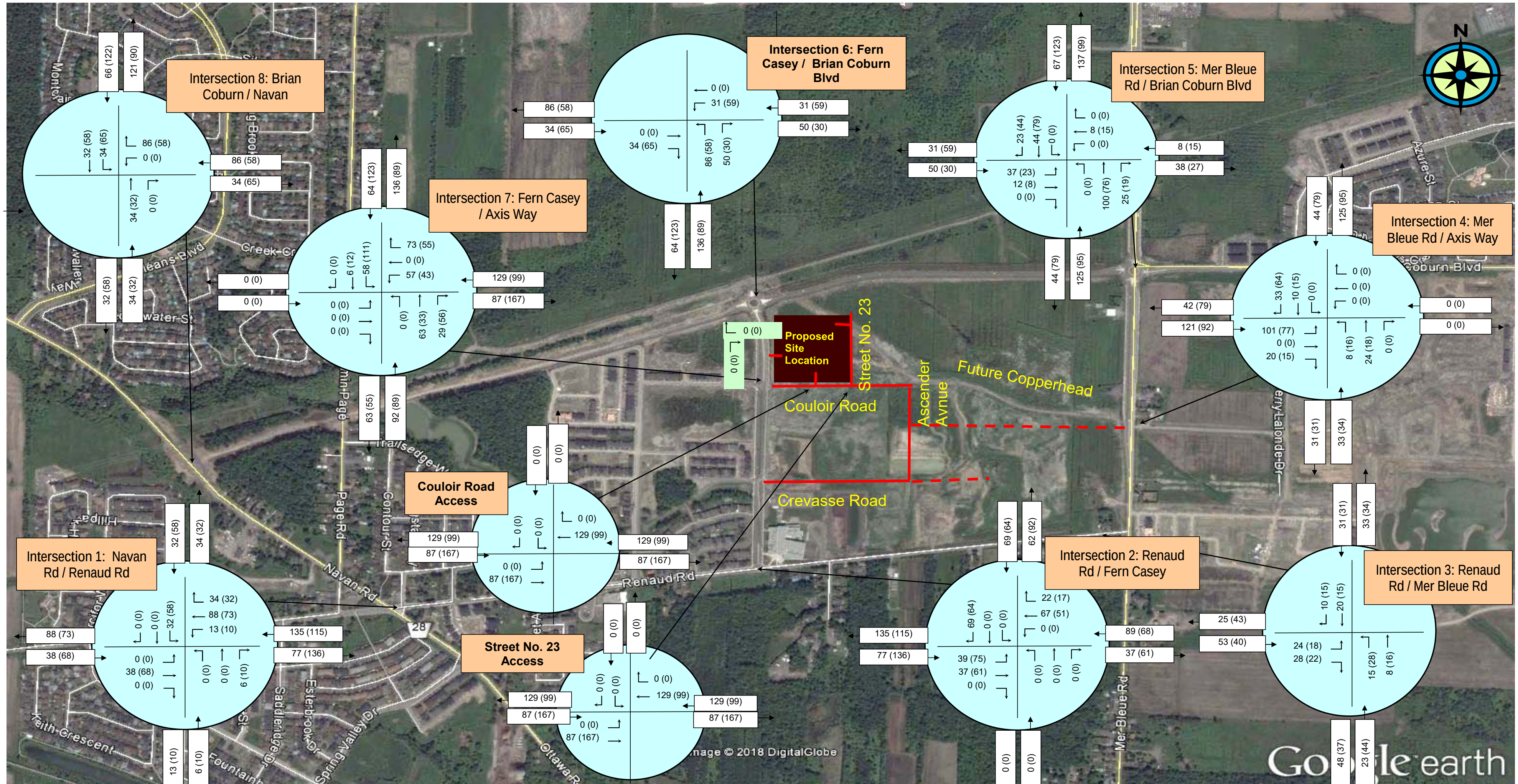
Minto Avalon Development Traffic



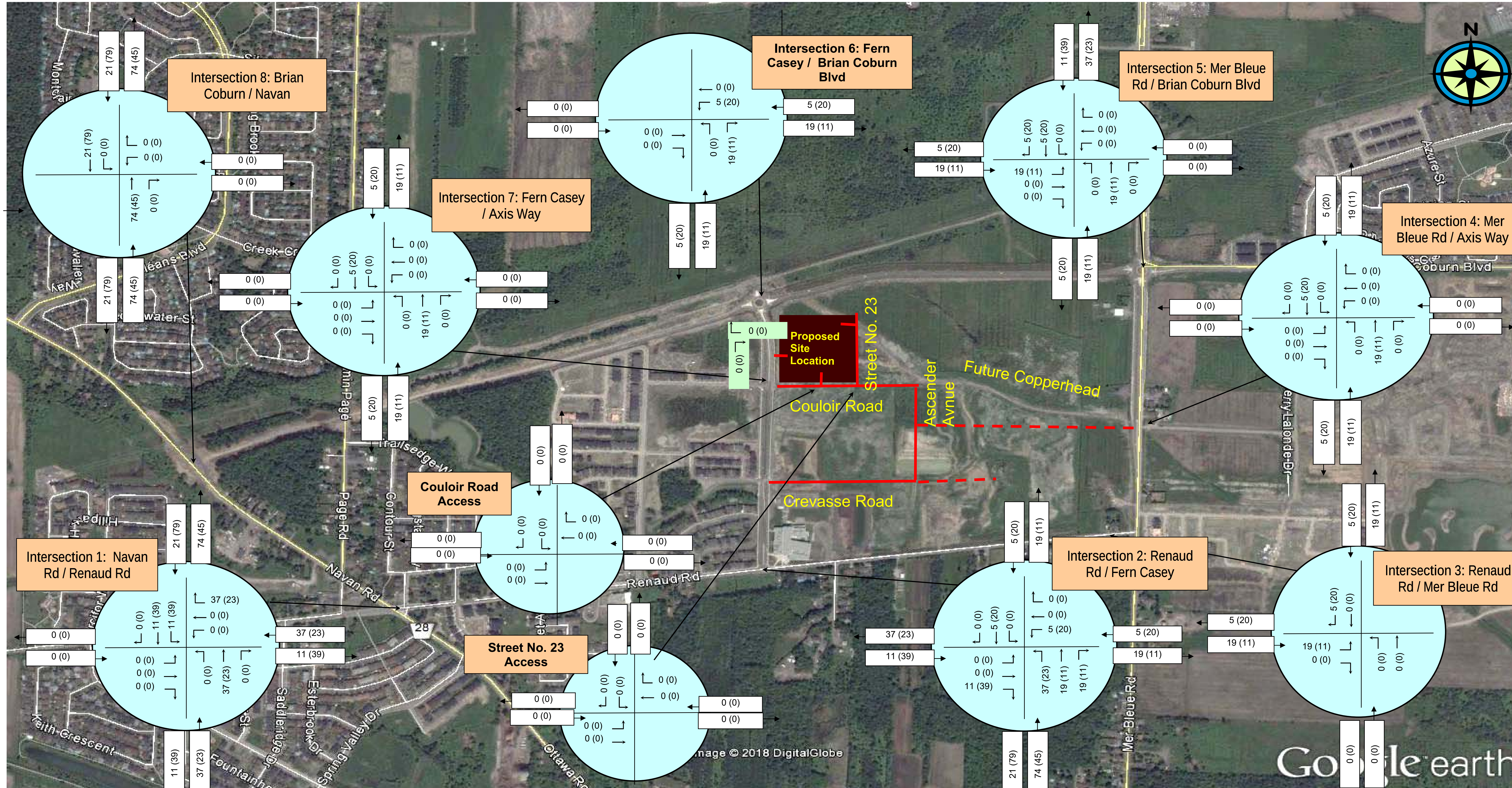
Trailsedge Phase 3 Development (2024)



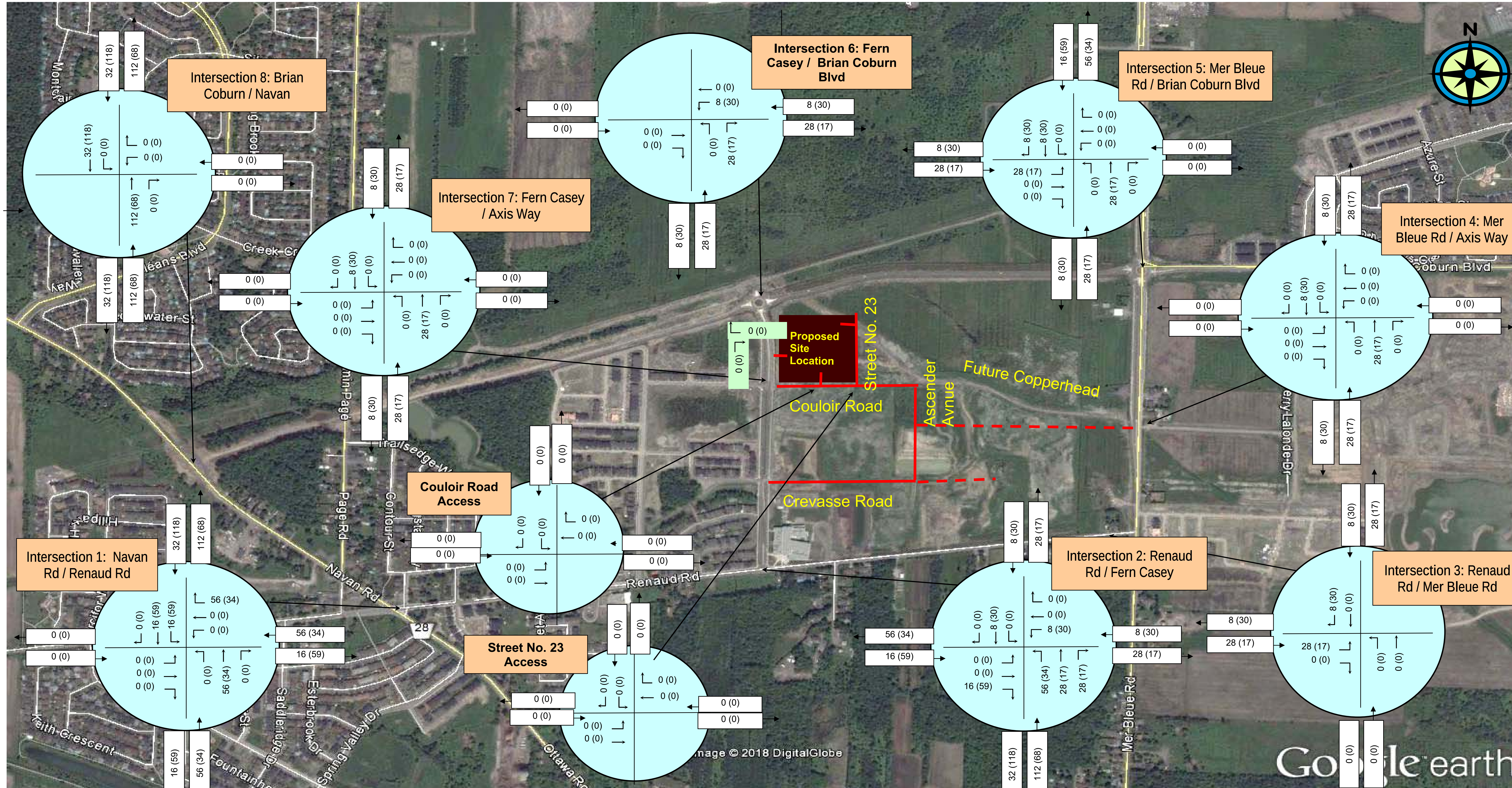
Trailsedge Phase 3 Development (2024)



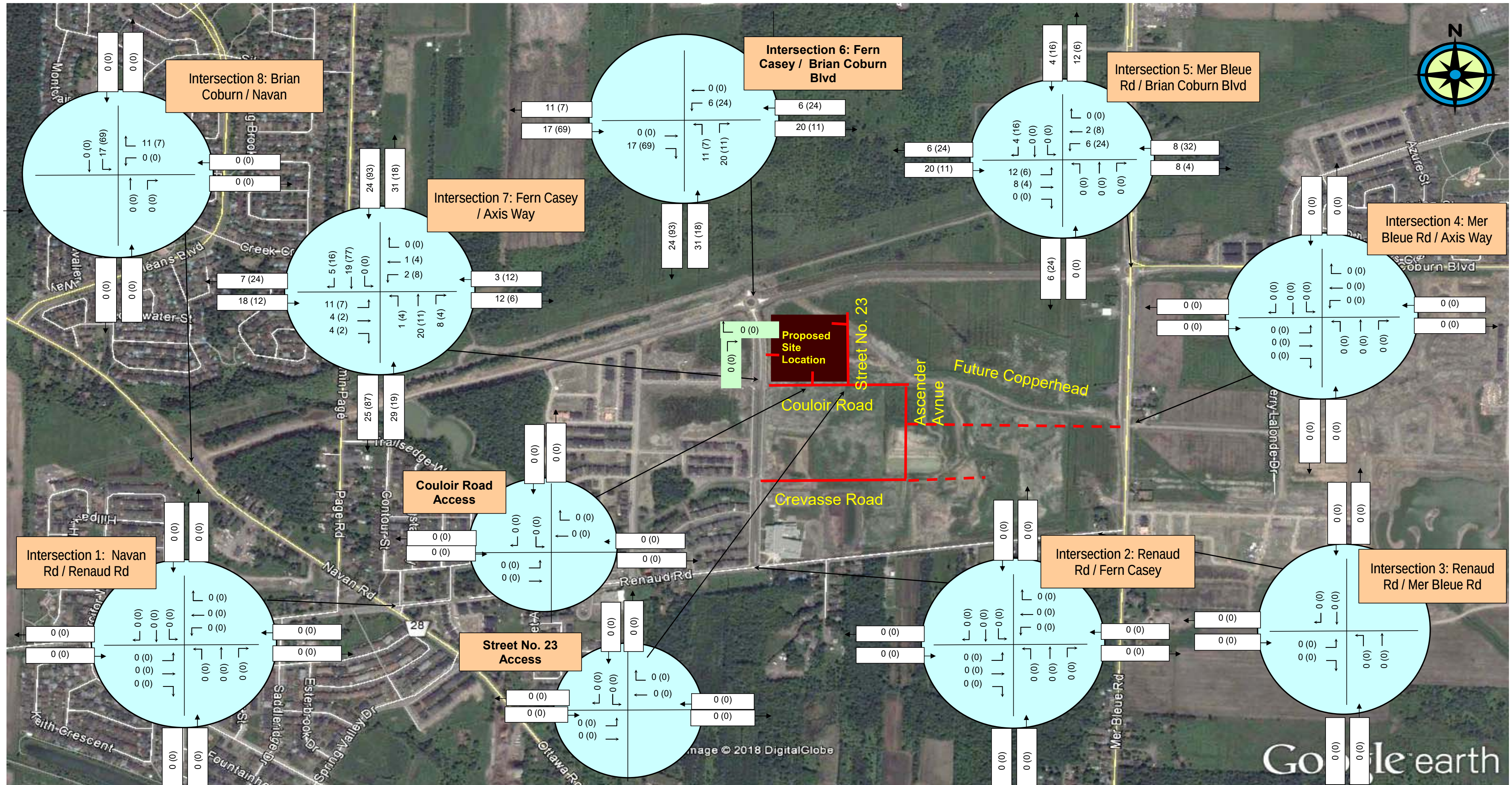
Trailsedge Phase 3 Development (2029)



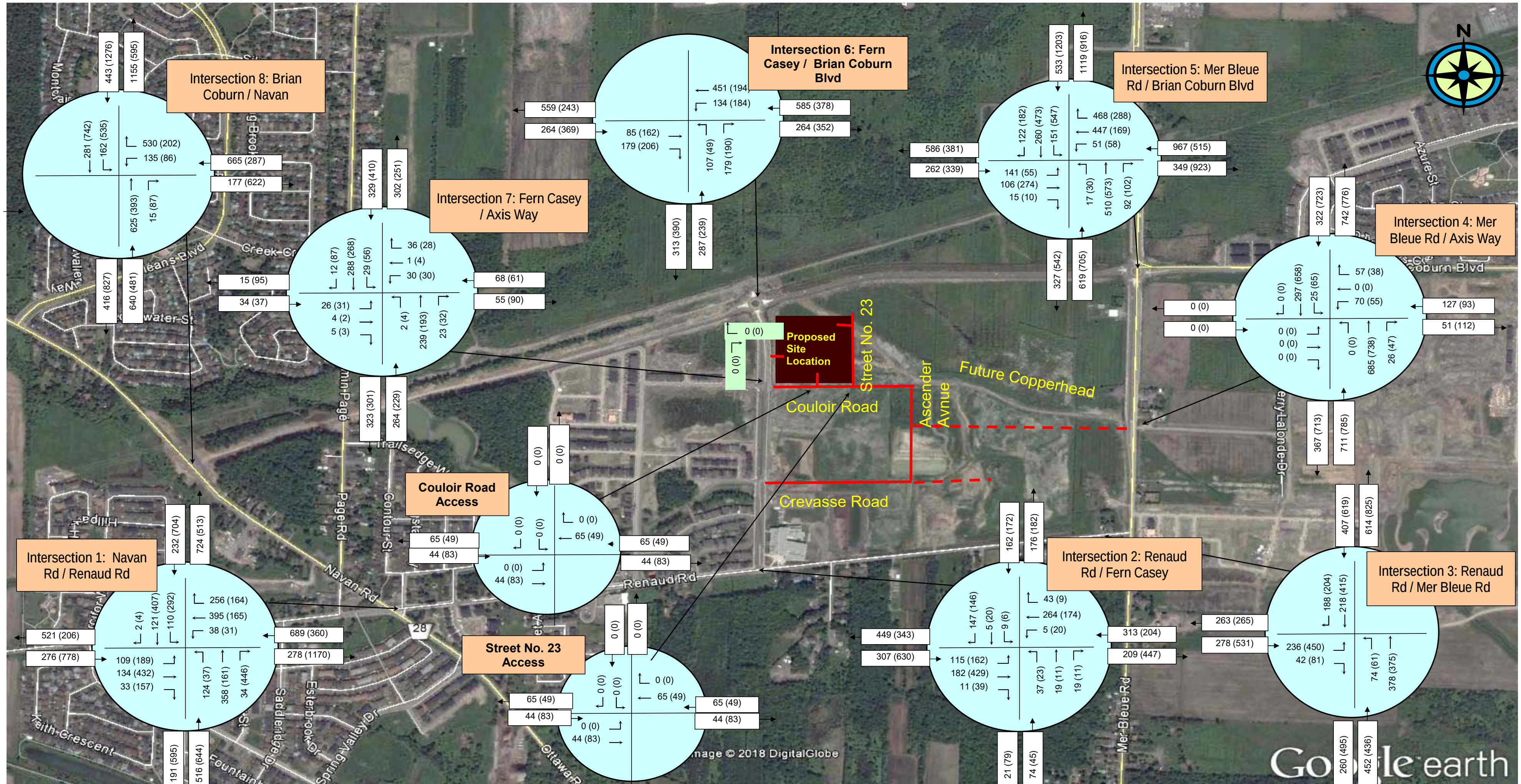
EUC Phase 2 (2024)



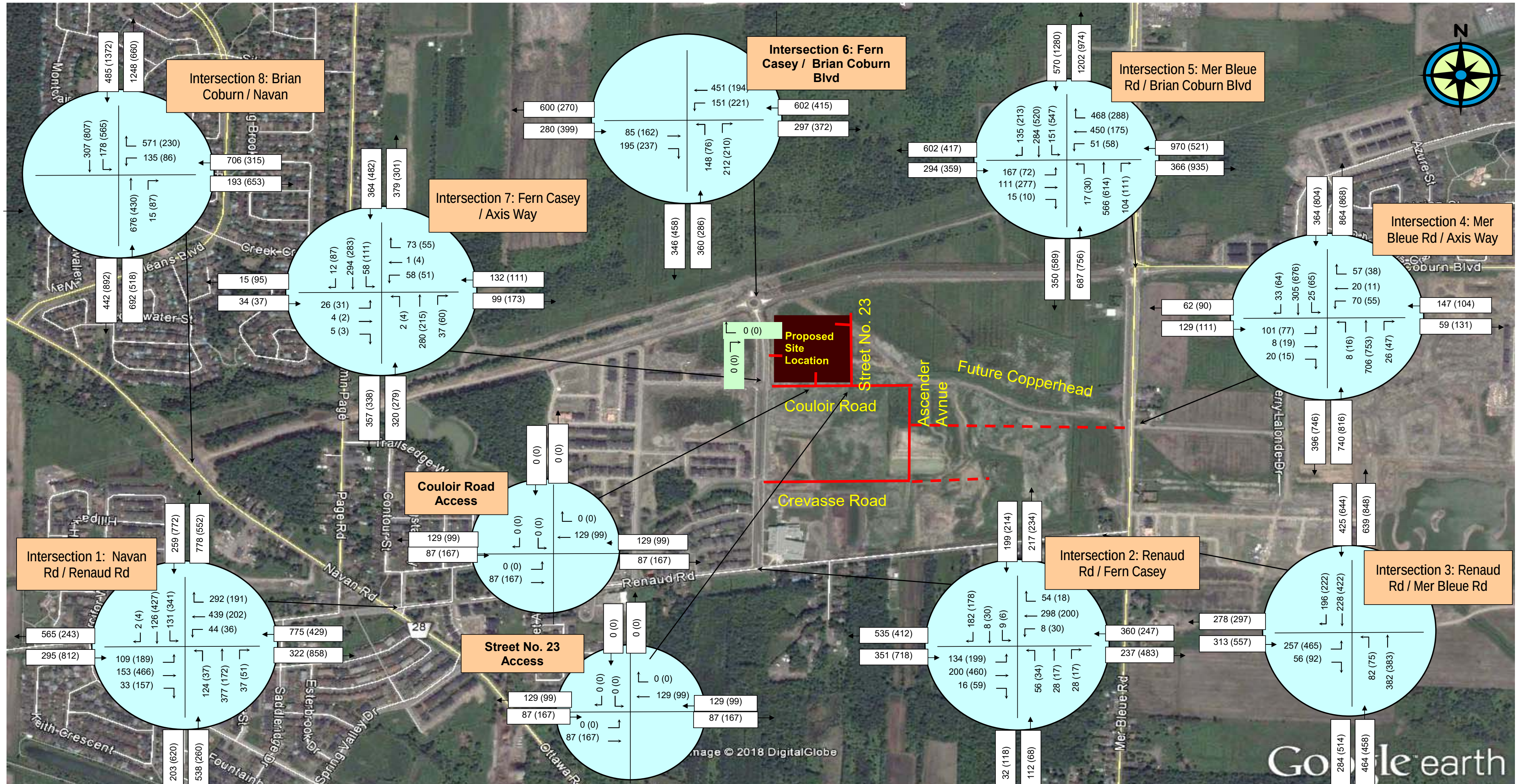
EUC Phase 2 (2029)



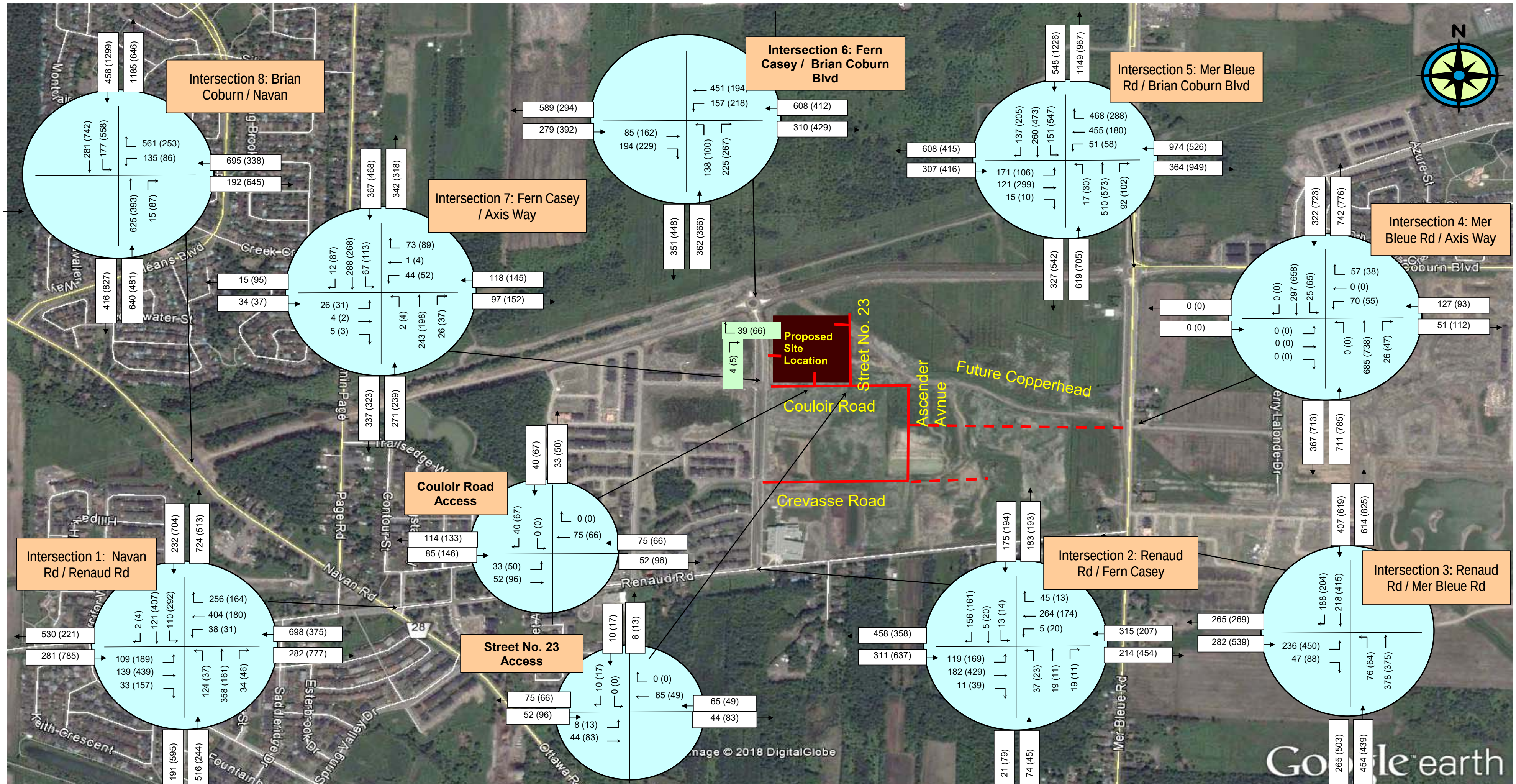
Trailsedge (West of Fern Casey)



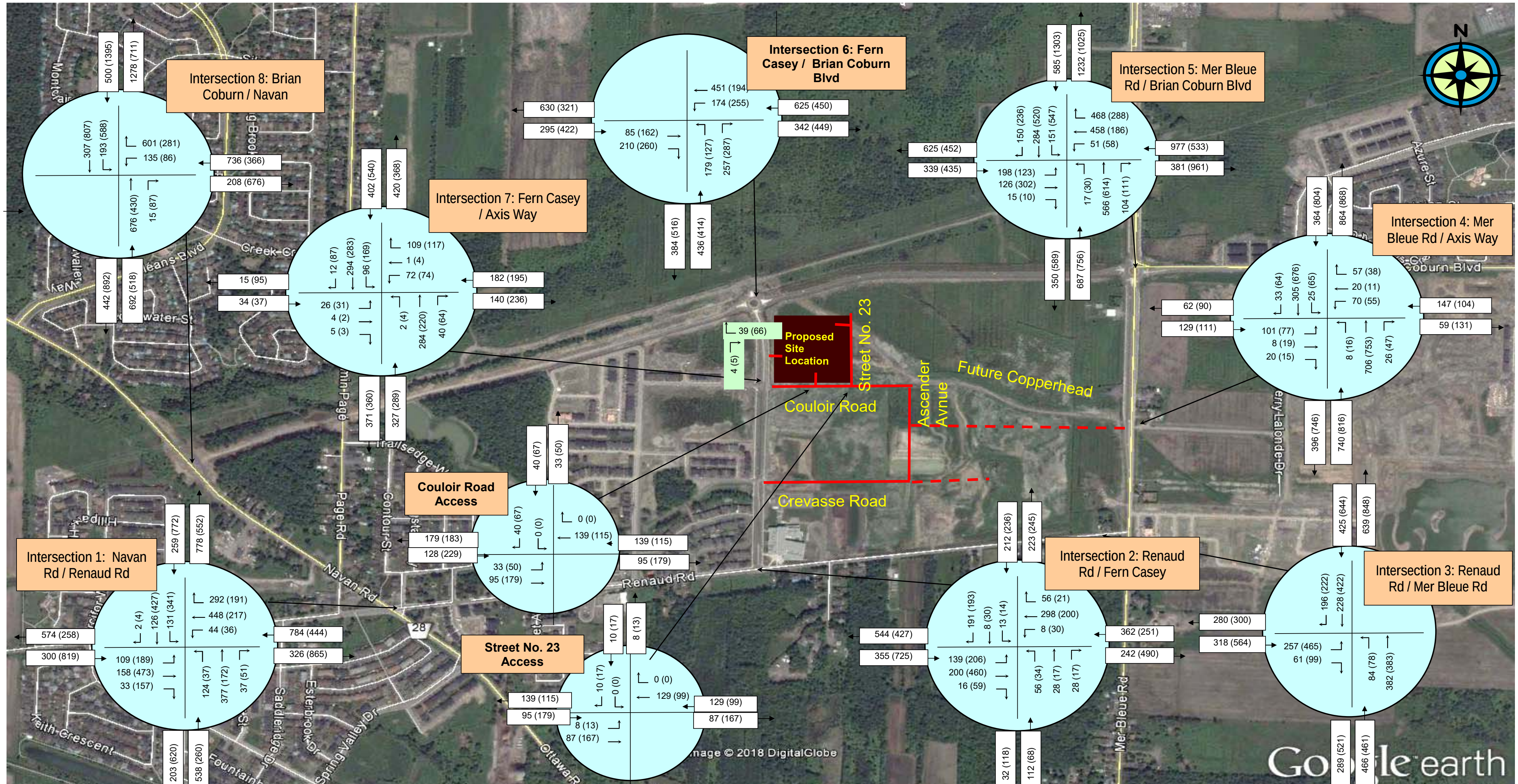
Background Traffic Volumes - 2024 Forecast - AM (PM)



Background Traffic Volumes - 2029 Forecast - AM (PM)



Design Volumes (2024)



Design Volumes (2029)

Castleglenn Consultants
Engineers, Project Managers & Planners

Appendix E: Synchro Intersection Capacity Analysis
Existing, Background 2024 Forecast, Background 2029 Forecast

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	122	123	32	9	113
Future Volume (Veh/h)	95	122	123	32	9	113
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	106	136	137	36	10	126
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	173				503	155
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	173				503	155
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				98	86
cM capacity (veh/h)	1404				488	891

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	106	136	173	136
Volume Left	106	0	0	10
Volume Right	0	0	36	126
cSH	1404	1700	1700	840
Volume to Capacity	0.08	0.08	0.10	0.16
Queue Length 95th (m)	1.9	0.0	0.0	4.4
Control Delay (s)	7.8	0.0	0.0	10.1
Lane LOS	A			B
Approach Delay (s)	3.4		0.0	10.1
Approach LOS				B

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	0	1	0	0	0	1	169	0	0	261	7
Future Volume (Veh/h)	15	0	1	0	0	0	1	169	0	0	261	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	0	1	0	0	0	1	188	0	0	290	8
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	484	484	294	481	488	188	298			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	484	484	294	481	488	188	298			188		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	100	100	100	100	100			100		
cM capacity (veh/h)	493	482	745	494	480	854	1263			1386		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	18	0	1	188	0	298
Volume Left	17	0	1	0	0	0
Volume Right	1	0	0	0	0	8
cSH	502	1700	1263	1700	1700	1700
Volume to Capacity	0.04	0.00	0.00	0.11	0.00	0.18
Queue Length 95th (m)	0.8	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	12.4	0.0	7.9	0.0	0.0	0.0
Lane LOS	B	A	A			
Approach Delay (s)	12.4	0.0	0.0		0.0	
Approach LOS	B	A				

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	183	9	25	187	82	112
Future Volume (vph)	183	9	25	187	82	112
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	203	10	28	208	91	124

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	213	236	215
Volume Left (vph)	203	28	0
Volume Right (vph)	10	0	124
Hadj (s)	0.21	0.10	-0.31
Departure Headway (s)	5.2	4.9	4.5
Degree Utilization, x	0.31	0.32	0.27
Capacity (veh/h)	648	708	757
Control Delay (s)	10.4	10.1	9.1
Approach Delay (s)	10.4	10.1	9.1
Approach LOS	B	B	A

Intersection Summary			
Delay	9.9		
Level of Service	A		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	13	41	369	18	17	179
Future Volume (Veh/h)	13	41	369	18	17	179
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	14	46	410	20	19	199
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	558	215			430	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	558	215			430	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	94			98	
cM capacity (veh/h)	452	790			1126	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	60	273	157	85	133
Volume Left	14	0	0	19	0
Volume Right	46	0	20	0	0
cSH	673	1700	1700	1126	1700
Volume to Capacity	0.09	0.16	0.09	0.02	0.08
Queue Length 95th (m)	2.2	0.0	0.0	0.4	0.0
Control Delay (s)	10.9	0.0	0.0	2.0	0.0
Lane LOS	B			A	
Approach Delay (s)	10.9	0.0		0.8	
Approach LOS	B				

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	110	33	31	337	108	124	321	31	47	110	2
Future Volume (vph)	109	110	33	31	337	108	124	321	31	47	110	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1616	1733	1547	1281	1723		1679	1663		1530	1493	
Flt Permitted	0.23	1.00	1.00	0.68	1.00		0.68	1.00		0.34	1.00	
Satd. Flow (perm)	384	1733	1547	915	1723		1197	1663		548	1493	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	121	122	37	34	374	120	138	357	34	52	122	2
RTOR Reduction (vph)	0	0	17	0	8	0	0	3	0	0	1	0
Lane Group Flow (vph)	121	122	20	34	486	0	138	388	0	52	123	0
Heavy Vehicles (%)	7%	5%	0%	35%	2%	1%	3%	7%	19%	13%	22%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	45.8	45.8	45.8	31.1	31.1		26.9	26.9		26.9	26.9	
Effective Green, g (s)	45.8	45.8	45.8	31.1	31.1		26.9	26.9		26.9	26.9	
Actuated g/C Ratio	0.53	0.53	0.53	0.36	0.36		0.31	0.31		0.31	0.31	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	343	923	824	331	623		374	520		171	467	
v/s Ratio Prot	c0.04	0.07			c0.28			c0.23			0.08	
v/s Ratio Perm	0.15		0.01	0.04			0.12			0.09		
v/c Ratio	0.35	0.13	0.02	0.10	0.78		0.37	0.75		0.30	0.26	
Uniform Delay, d1	12.6	10.1	9.5	18.2	24.4		22.9	26.4		22.4	22.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.1	0.0	0.1	6.1		0.6	5.7		1.0	0.3	
Delay (s)	13.3	10.1	9.5	18.3	30.5		23.5	32.2		23.4	22.4	
Level of Service	B	B	A	B	C		C	C		C	C	
Approach Delay (s)		11.4			29.7			29.9			22.7	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	85.9	Sum of lost time (s)	18.2
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	124	279	68	1	6	114
Future Volume (Veh/h)	124	279	68	1	6	114
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	138	310	76	1	7	127
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	77				662	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	77				662	76
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				98	87
cM capacity (veh/h)	1522				388	985

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	138	310	77	134
Volume Left	138	0	0	7
Volume Right	0	0	1	127
cSH	1522	1700	1700	911
Volume to Capacity	0.09	0.18	0.05	0.15
Queue Length 95th (m)	2.3	0.0	0.0	3.9
Control Delay (s)	7.6	0.0	0.0	9.6
Lane LOS	A			A
Approach Delay (s)	2.3		0.0	9.6
Approach LOS				A

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	0	1	0	0	0	0	154	0	0	165	71
Future Volume (Veh/h)	24	0	1	0	0	0	0	154	0	0	165	71
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	27	0	1	0	0	0	0	171	0	0	183	79
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	394	394	222	355	433	171	262			171		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	394	394	222	355	433	171	262			171		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	100	100	100	100	100			100		
cM capacity (veh/h)	566	543	817	599	516	873	1302			1406		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	28	0	0	171	0	262
Volume Left	27	0	0	0	0	0
Volume Right	1	0	0	0	0	79
cSH	572	1700	1700	1700	1700	1700
Volume to Capacity	0.05	0.00	0.00	0.10	0.00	0.15
Queue Length 95th (m)	1.2	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	11.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.6	0.0	0.0		0.0	
Approach LOS	B	A				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	23.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	356	24	13	168	189	130
Future Volume (vph)	356	24	13	168	189	130
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	396	27	14	187	210	144

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	423	201	354
Volume Left (vph)	396	14	0
Volume Right (vph)	27	0	144
Hadj (s)	0.20	0.10	-0.21
Departure Headway (s)	5.6	5.9	5.3
Degree Utilization, x	0.66	0.33	0.52
Capacity (veh/h)	615	561	638
Control Delay (s)	18.9	11.7	14.1
Approach Delay (s)	18.9	11.7	14.1
Approach LOS	C	B	B

Intersection Summary			
Delay	15.7		
Level of Service	C		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	13	29	505	21	39	318
Future Volume (Veh/h)	13	29	505	21	39	318
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	14	32	561	23	43	353
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	835	292			584	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	835	292			584	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	95			96	
cM capacity (veh/h)	293	704			987	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	46	374	210	161	235
Volume Left	14	0	0	43	0
Volume Right	32	0	23	0	0
cSH	493	1700	1700	987	1700
Volume to Capacity	0.09	0.22	0.12	0.04	0.14
Queue Length 95th (m)	2.3	0.0	0.0	1.0	0.0
Control Delay (s)	13.0	0.0	0.0	2.7	0.0
Lane LOS	B			A	
Approach Delay (s)	13.0	0.0		1.1	
Approach LOS	B				

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	39.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	383	157	26	119	54	37	138	41	104	368	4
Future Volume (vph)	189	383	157	26	119	54	37	138	41	104	368	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1679	1802	1502	1662	1701		1679	1613		1712	1684	
Flt Permitted	0.46	1.00	1.00	0.51	1.00		0.39	1.00		0.63	1.00	
Satd. Flow (perm)	821	1802	1502	900	1701		683	1613		1140	1684	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	426	174	29	132	60	41	153	46	116	409	4
RTOR Reduction (vph)	0	0	84	0	14	0	0	10	0	0	1	0
Lane Group Flow (vph)	210	426	90	29	178	0	41	189	0	116	412	0
Heavy Vehicles (%)	3%	1%	3%	4%	2%	2%	3%	11%	2%	1%	8%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	28.4	28.4	28.4	13.5	13.5		22.1	22.1		22.1	22.1	
Effective Green, g (s)	28.4	28.4	28.4	13.5	13.5		22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.45	0.45	0.45	0.21	0.21		0.35	0.35		0.35	0.35	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	499	803	669	190	360		236	559		395	584	
v/s Ratio Prot	0.07	c0.24			0.10			0.12			c0.24	
v/s Ratio Perm	0.12		0.06	0.03			0.06			0.10		
v/c Ratio	0.42	0.53	0.13	0.15	0.49		0.17	0.34		0.29	0.71	
Uniform Delay, d1	11.4	12.8	10.4	20.4	22.1		14.5	15.4		15.1	18.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.7	0.1	0.4	1.1		0.4	0.4		0.4	3.9	
Delay (s)	12.0	13.5	10.5	20.8	23.2		14.8	15.7		15.5	21.9	
Level of Service	B	B	B	C	C		B	B		B	C	
Approach Delay (s)		12.5			22.9			15.6			20.5	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	18.2
Intersection Capacity Utilization	80.6%	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 (veh/h)	115	182	11	5	164	43	37	19	19	29	5	147
Future Volume (Veh/h)	115	182	11	5	164	43	37	19	19	29	5	147
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)	115	182	11	5	164	43	37	19	19	29	5	147
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	207			193			741	634	188	636	618	186
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	207			193			741	634	188	636	618	186
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 %	92			100			85	95	98	92	99	83
cM capacity (veh/h)	1364			1380			254	362	855	342	369	857

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	115	193	5	207	75	29	152
Volume Left	115	0	5	0	37	29	0
Volume Right	0	11	0	43	19	0	147
cSH	1364	1700	1380	1700	340	342	821
Volume to Capacity	0.08	0.11	0.00	0.12	0.22	0.08	0.19
Queue Length 95th (m)	2.1	0.0	0.1	0.0	6.3	2.1	5.1
Control Delay (s)	7.9	0.0	7.6	0.0	18.5	16.5	10.4
Lane LOS	A		A		C	C	B
Approach Delay (s)	2.9		0.2		18.5	11.4	
Approach LOS					C	B	

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	4	5	30	1	36	2	239	23	29	288	12
Future Volume (Veh/h)	26	4	5	30	1	36	2	239	23	29	288	12
Sign Control		Stop			Stop			Free			Free	
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)	26	4	5	30	1	36	2	239	23	29	288	12
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	632	618	294	608	612	250	300			262		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	632	618	294	608	612	250	300			262		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	99	99	92	100	95	100			98		
cM capacity (veh/h)	368	395	745	395	398	788	1261			1302		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	35	67	2	262	29	300
Volume Left	26	30	2	0	29	0
Volume Right	5	36	0	23	0	12
cSH	400	540	1261	1700	1302	1700
Volume to Capacity	0.09	0.12	0.00	0.15	0.02	0.18
Queue Length 95th (m)	2.2	3.2	0.0	0.0	0.5	0.0
Control Delay (s)	14.9	12.6	7.9	0.0	7.8	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	14.9	12.6	0.1		0.7	
Approach LOS	B	B				

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	236	42	74	378	188	218
Future Volume (vph)	236	42	74	378	188	218
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	236	42	74	378	188	218

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	278	452	406
Volume Left (vph)	236	74	0
Volume Right (vph)	42	0	218
Hadj (s)	0.13	0.11	-0.29
Departure Headway (s)	6.2	5.6	5.3
Degree Utilization, x	0.48	0.70	0.59
Capacity (veh/h)	526	627	659
Control Delay (s)	14.9	20.4	15.6
Approach Delay (s)	14.9	20.4	15.6
Approach LOS	B	C	C

Intersection Summary			
Delay	17.3		
Level of Service	C		
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	70	57	685	26	25	297
Future Volume (Veh/h)	70	57	685	26	25	297
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	70	57	685	26	25	297
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	896	356			711	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	896	356			711	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	74	91			97	
cM capacity (veh/h)	272	641			884	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	127	457	254	25	148	148
Volume Left	70	0	0	25	0	0
Volume Right	57	0	26	0	0	0
cSH	366	1700	1700	884	1700	1700
Volume to Capacity	0.35	0.27	0.15	0.03	0.09	0.09
Queue Length 95th (m)	11.5	0.0	0.0	0.7	0.0	0.0
Control Delay (s)	19.9	0.0	0.0	9.2	0.0	0.0
Lane LOS	C			A		
Approach Delay (s)	19.9	0.0		0.7		
Approach LOS	C					

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	134	33	38	395	256	124	358	34	110	121	2
Future Volume (vph)	109	134	33	38	395	256	124	358	34	110	121	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1616	1733	1547	1695	1408		1679	1663		1530	1493	
Flt Permitted	0.19	1.00	1.00	0.67	1.00		0.68	1.00		0.30	1.00	
Satd. Flow (perm)	319	1733	1547	1198	1408		1198	1663		491	1493	
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)	109	134	33	38	395	256	124	358	34	110	121	2
RTOR Reduction (vph)	0	0	14	0	21	0	0	4	0	0	1	0
Lane Group Flow (vph)	109	134	19	38	630	0	124	388	0	110	122	0
Heavy Vehicles (%)	7%	5%	0%	2%	35%	1%	3%	7%	19%	13%	22%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	50.1	50.1	50.1	41.3	41.3		25.7	25.7		25.7	25.7	
Effective Green, g (s)	50.1	50.1	50.1	41.3	41.3		25.7	25.7		25.7	25.7	
Actuated g/C Ratio	0.56	0.56	0.56	0.46	0.46		0.29	0.29		0.29	0.29	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	234	975	870	555	653		345	480		141	431	
v/s Ratio Prot	c0.02	0.08			c0.45			c0.23			0.08	
v/s Ratio Perm	0.24		0.01	0.03			0.10			0.22		
v/c Ratio	0.47	0.14	0.02	0.07	0.96		0.36	0.81		0.78	0.28	
Uniform Delay, d1	13.4	9.2	8.6	13.2	23.1		25.1	29.4		29.1	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.1	0.0	0.1	26.5		0.6	9.7		23.8	0.4	
Delay (s)	14.9	9.3	8.6	13.3	49.6		25.8	39.1		52.9	24.9	
Level of Service	B	A	A	B	D		C	D		D	C	
Approach Delay (s)		11.4			47.6			35.9			38.1	
Approach LOS		B			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	18.2
Intersection Capacity Utilization	96.0%	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 (veh/h)	162	429	39	20	174	9	23	11	11	6	20	146
Future Volume (Veh/h)	162	429	39	20	174	9	23	11	11	6	20	146
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)	162	429	39	20	174	9	23	11	11	6	20	146
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	183			468			1142	996	448	988	1010	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	183			468			1142	996	448	988	1010	178
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 %	88			98			81	95	98	97	90	83
cM capacity (veh/h)	1392			1094			123	212	610	192	208	864

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	162	468	20	183	45	6	166
Volume Left	162	0	20	0	23	6	0
Volume Right	0	39	0	9	11	0	146
cSH	1392	1700	1094	1700	175	192	626
Volume to Capacity	0.12	0.28	0.02	0.11	0.26	0.03	0.27
Queue Length 95th (m)	3.0	0.0	0.4	0.0	7.4	0.7	8.1
Control Delay (s)	7.9	0.0	8.4	0.0	32.5	24.4	12.8
Lane LOS	A		A		D	C	B
Approach Delay (s)	2.0		0.8		32.5	13.2	
Approach LOS					D	B	

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	2	3	30	4	28	4	193	32	56	268	87
Future Volume (Veh/h)	31	2	3	30	4	28	4	193	32	56	268	87
Sign Control		Stop			Stop			Free			Free	
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)	31	2	3	30	4	28	4	193	32	56	268	87
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	654	656	312	601	684	209	355			225		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	654	656	312	601	684	209	355			225		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	99	100	92	99	97	100			96		
cM capacity (veh/h)	351	368	729	395	355	831	1204			1344		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	36	62	4	225	56	355
Volume Left	31	30	4	0	56	0
Volume Right	3	28	0	32	0	87
cSH	368	513	1204	1700	1344	1700
Volume to Capacity	0.10	0.12	0.00	0.13	0.04	0.21
Queue Length 95th (m)	2.5	3.1	0.1	0.0	1.0	0.0
Control Delay (s)	15.8	13.0	8.0	0.0	7.8	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	15.8	13.0	0.1		1.1	
Approach LOS	C	B				

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	450	81	74	378	415	204
Future Volume (vph)	450	81	74	378	415	204
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	450	81	74	378	415	204

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	531	452	619
Volume Left (vph)	450	74	0
Volume Right (vph)	81	0	204
Hadj (s)	0.13	0.11	-0.16
Departure Headway (s)	7.0	7.1	6.7
Degree Utilization, x	1.03	0.89	1.15
Capacity (veh/h)	519	504	551
Control Delay (s)	74.1	44.2	111.7
Approach Delay (s)	74.1	44.2	111.7
Approach LOS	F	E	F

Intersection Summary			
Delay	80.2		
Level of Service	F		
Intersection Capacity Utilization	103.0%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	55	38	738	47	65	658
Future Volume (Veh/h)	55	38	738	47	65	658
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	55	38	738	47	65	658
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	1220	392			785	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1220	392			785	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	65	94			92	
cM capacity (veh/h)	159	606			829	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	93	492	293	284	439
Volume Left	55	0	0	65	0
Volume Right	38	0	47	0	0
cSH	227	1700	1700	829	1700
Volume to Capacity	0.41	0.29	0.17	0.08	0.26
Queue Length 95th (m)	14.2	0.0	0.0	1.9	0.0
Control Delay (s)	31.4	0.0	0.0	2.9	0.0
Lane LOS	D			A	
Approach Delay (s)	31.4	0.0		1.1	
Approach LOS	D				

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	432	157	31	165	164	37	161	41	292	407	4
Future Volume (vph)	189	432	157	31	165	164	37	161	41	292	407	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1784	1517	1695	1651		1695	1730		1695	1782	
Flt Permitted	0.32	1.00	1.00	0.51	1.00		0.37	1.00		0.63	1.00	
Satd. Flow (perm)	563	1784	1517	912	1651		666	1730		1126	1782	
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)	189	432	157	31	165	164	37	161	41	292	407	4
RTOR Reduction (vph)	0	0	84	0	38	0	0	10	0	0	1	0
Lane Group Flow (vph)	189	432	73	31	291	0	37	192	0	292	410	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.7	33.7	33.7	18.8	18.8		25.3	25.3		25.3	25.3	
Effective Green, g (s)	33.7	33.7	33.7	18.8	18.8		25.3	25.3		25.3	25.3	
Actuated g/C Ratio	0.47	0.47	0.47	0.26	0.26		0.35	0.35		0.35	0.35	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	418	832	708	237	429		233	606		394	624	
v/s Ratio Prot	0.06	c0.24			c0.18			0.11			0.23	
v/s Ratio Perm	0.15		0.05	0.03			0.06			c0.26		
v/c Ratio	0.45	0.52	0.10	0.13	0.68		0.16	0.32		0.74	0.66	
Uniform Delay, d1	12.5	13.5	10.8	20.4	24.0		16.1	17.1		20.6	19.8	
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	0.6	0.1	0.3	4.2		0.3	0.3		7.3	2.5	
Delay (s)	13.3	14.1	10.9	20.7	28.2		16.5	17.4		27.9	22.3	
Level of Service	B	B	B	C	C		B	B		C	C	
Approach Delay (s)		13.2			27.6			17.3			24.6	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	72.2	Sum of lost time (s)	18.2
Intersection Capacity Utilization	85.5%	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 (veh/h)	134	200	16	8	298	54	56	28	28	9	8	182
Future Volume (Veh/h)	134	200	16	8	298	54	56	28	28	9	8	182
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)	134	200	16	8	298	54	56	28	28	9	8	182
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	352			216			976	844	208	851	825	325
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	352			216			976	844	208	851	825	325
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 %	89			99			63	89	97	96	97	75
cM capacity (veh/h)	1207			1354			153	265	832	227	272	716

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	134	216	8	352	112	9	190
Volume Left	134	0	8	0	56	9	0
Volume Right	0	16	0	54	28	0	182
cSH	1207	1700	1354	1700	222	227	670
Volume to Capacity	0.11	0.13	0.01	0.21	0.51	0.04	0.28
Queue Length 95th (m)	2.8	0.0	0.1	0.0	19.6	0.9	8.9
Control Delay (s)	8.4	0.0	7.7	0.0	36.7	21.5	12.5
Lane LOS	A		A		E	C	B
Approach Delay (s)	3.2		0.2		36.7	12.9	
Approach LOS					E	B	

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	4	5	58	1	73	2	280	37	58	294	12
Future Volume (Veh/h)	26	4	5	58	1	73	2	280	37	58	294	12
Sign Control		Stop			Stop			Free			Free	
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)	26	4	5	58	1	73	2	280	37	58	294	12
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	774	737	300	720	724	298	306			317		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	774	737	300	720	724	298	306			317		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	99	99	82	100	90	100			95		
cM capacity (veh/h)	274	329	740	325	335	741	1255			1243		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	35	132	2	317	58	306
Volume Left	26	58	2	0	58	0
Volume Right	5	73	0	37	0	12
cSH	307	472	1255	1700	1243	1700
Volume to Capacity	0.11	0.28	0.00	0.19	0.05	0.18
Queue Length 95th (m)	2.9	8.6	0.0	0.0	1.1	0.0
Control Delay (s)	18.2	15.6	7.9	0.0	8.0	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	18.2	15.6	0.0		1.3	
Approach LOS	C	C				

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	257	56	82	382	228	196
Future Volume (vph)	257	56	82	382	228	196
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	257	56	82	382	228	196

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	313	464	424
Volume Left (vph)	257	82	0
Volume Right (vph)	56	0	196
Hadj (s)	0.10	0.11	-0.24
Departure Headway (s)	6.4	5.8	5.5
Degree Utilization, x	0.55	0.74	0.65
Capacity (veh/h)	522	606	618
Control Delay (s)	16.9	23.6	18.1
Approach Delay (s)	16.9	23.6	18.1
Approach LOS	C	C	C

Intersection Summary			
Delay	19.9		
Level of Service	C		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	8	20	70	20	57	5	706	26	25	305	33
Future Volume (Veh/h)	101	8	20	70	20	57	5	706	26	25	305	33
Sign Control		Stop			Stop			Free			Free	
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)	101	8	20	70	20	57	5	706	26	25	305	33
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	802	1114	169	956	1117	366	338			732		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	802	1114	169	956	1117	366	338			732		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	55	96	98	64	90	91	100			97		
cM capacity (veh/h)	226	200	845	196	199	631	1218			868		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	129	70	77	358	379	178	186
Volume Left	101	70	0	5	0	25	0
Volume Right	20	0	57	0	26	0	33
cSH	252	196	404	1218	1700	868	1700
Volume to Capacity	0.51	0.36	0.19	0.00	0.22	0.03	0.11
Queue Length 95th (m)	20.3	11.5	5.3	0.1	0.0	0.7	0.0
Control Delay (s)	33.3	33.2	16.0	0.2	0.0	1.6	0.0
Lane LOS	D	D	C	A		A	
Approach Delay (s)	33.3	24.2		0.1		0.8	
Approach LOS	D	C					

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	153	33	44	439	292	124	377	37	131	126	2
Future Volume (vph)	109	153	33	44	439	292	124	377	37	131	126	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1616	1733	1547	1695	1409		1679	1661		1530	1493	
Flt Permitted	0.14	1.00	1.00	0.66	1.00		0.67	1.00		0.27	1.00	
Satd. Flow (perm)	231	1733	1547	1177	1409		1193	1661		431	1493	
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)	109	153	33	44	439	292	124	377	37	131	126	2
RTOR Reduction (vph)	0	0	14	0	21	0	0	4	0	0	1	0
Lane Group Flow (vph)	109	153	19	44	710	0	124	410	0	131	127	0
Heavy Vehicles (%)	7%	5%	0%	2%	35%	1%	3%	7%	19%	13%	22%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	59.8	59.8	59.8	49.8	49.8		31.1	31.1		31.1	31.1	
Effective Green, g (s)	59.8	59.8	59.8	49.8	49.8		31.1	31.1		31.1	31.1	
Actuated g/C Ratio	0.57	0.57	0.57	0.48	0.48		0.30	0.30		0.30	0.30	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	199	995	888	563	674		356	496		128	446	
v/s Ratio Prot	c0.03	0.09			c0.50			0.25			0.09	
v/s Ratio Perm	0.29		0.01	0.04			0.10			c0.30		
v/c Ratio	0.55	0.15	0.02	0.08	1.05		0.35	0.83		1.02	0.29	
Uniform Delay, d1	17.4	10.3	9.5	14.7	27.1		28.6	34.0		36.5	28.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.1	0.0	0.1	49.6		0.6	10.9		85.9	0.4	
Delay (s)	20.5	10.4	9.6	14.8	76.8		29.2	44.9		122.4	28.3	
Level of Service	C	B	A	B	E		C	D		F	C	
Approach Delay (s)		14.0			73.3			41.3			75.9	
Approach LOS		B			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	55.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	104.1	Sum of lost time (s)	18.2
Intersection Capacity Utilization	102.0%	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 (veh/h)	199	400	59	30	200	18	34	17	17	6	30	178
Future Volume (Veh/h)	199	400	59	30	200	18	34	17	17	6	30	178
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)	199	400	59	30	200	18	34	17	17	6	30	178
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	218			459			1280	1106	430	1092	1126	209
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218			459			1280	1106	430	1092	1126	209
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 %	85			97			60	90	97	96	82	79
cM capacity (veh/h)	1352			1102			84	175	626	150	170	831

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	199	459	30	218	68	6	208
Volume Left	199	0	30	0	34	6	0
Volume Right	0	59	0	18	17	0	178
cSH	1352	1700	1102	1700	129	150	532
Volume to Capacity	0.15	0.27	0.03	0.13	0.53	0.04	0.39
Queue Length 95th (m)	3.9	0.0	0.6	0.0	19.1	0.9	14.0
Control Delay (s)	8.1	0.0	8.4	0.0	60.4	29.9	16.0
Lane LOS	A		A		F	D	C
Approach Delay (s)	2.5		1.0		60.4	16.4	
Approach LOS					F	C	

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	2	3	51	4	55	4	229	86	111	283	87
Future Volume (Veh/h)	31	2	3	51	4	55	4	229	86	111	283	87
Sign Control		Stop			Stop			Free			Free	
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)	31	2	3	51	4	55	4	229	86	111	283	87
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	842	872	326	789	872	272	370			315		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	842	872	326	789	872	272	370			315		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	99	100	82	98	93	100			91		
cM capacity (veh/h)	242	262	715	284	262	767	1189			1245		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	36	110	4	315	111	370
Volume Left	31	51	4	0	111	0
Volume Right	3	55	0	86	0	87
cSH	257	412	1189	1700	1245	1700
Volume to Capacity	0.14	0.27	0.00	0.19	0.09	0.22
Queue Length 95th (m)	3.6	8.1	0.1	0.0	2.2	0.0
Control Delay (s)	21.3	16.9	8.0	0.0	8.2	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	21.3	16.9	0.1		1.9	
Approach LOS	C	C				

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	465	92	75	383	422	222
Future Volume (vph)	465	92	75	383	422	222
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	465	92	75	383	422	222

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	557	458	644
Volume Left (vph)	465	75	0
Volume Right (vph)	92	0	222
Hadj (s)	0.12	0.11	-0.17
Departure Headway (s)	7.0	7.1	6.7
Degree Utilization, x	1.08	0.90	1.20
Capacity (veh/h)	526	495	543
Control Delay (s)	89.5	46.1	129.4
Approach Delay (s)	89.5	46.1	129.4
Approach LOS	F	E	F

Intersection Summary			
Delay	93.0		
Level of Service	F		
Intersection Capacity Utilization	106.5%	ICU Level of Service	G
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis 6429 Renaud Rd - 2029 Background Traffic
8: Axis Way/Decoeur & Mer Bleue

PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	19	15	55	11	38	5	772	47	65	676	64
Future Volume (Veh/h)	77	19	15	55	11	38	5	772	47	65	676	64
Sign Control		Stop			Stop			Free			Free	
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)	77	19	15	55	11	38	5	772	47	65	676	64
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	1278	1667	370	1298	1676	410	740			819		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1278	1667	370	1298	1676	410	740			819		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	21	78	98	39	87	94	99			92		
cM capacity (veh/h)	97	87	627	91	86	591	862			805		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	111	104	391	433	403	402
Volume Left	77	55	5	0	65	0
Volume Right	15	38	0	47	0	64
cSH	108	130	862	1700	805	1700
Volume to Capacity	1.03	0.80	0.01	0.25	0.08	0.24
Queue Length 95th (m)	50.7	36.6	0.1	0.0	2.0	0.0
Control Delay (s)	170.5	96.8	0.2	0.0	2.4	0.0
Lane LOS	F	F	A		A	
Approach Delay (s)	170.5	96.8	0.1		1.2	
Approach LOS	F	F				

Intersection Summary			
Average Delay	16.3		
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	468	157	36	202	191	37	172	37	341	427	4
Future Volume (vph)	189	468	157	36	202	191	37	172	37	341	427	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1679	1802	1502	1695	1638		1679	1619		1712	1684	
Flt Permitted	0.25	1.00	1.00	0.49	1.00		0.36	1.00		0.63	1.00	
Satd. Flow (perm)	450	1802	1502	882	1638		635	1619		1127	1684	
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)	189	468	157	36	202	191	37	172	37	341	427	4
RTOR Reduction (vph)	0	0	82	0	33	0	0	7	0	0	1	0
Lane Group Flow (vph)	189	468	75	36	360	0	37	202	0	341	430	0
Heavy Vehicles (%)	3%	1%	3%	2%	4%	2%	3%	11%	2%	1%	8%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	38.5	38.5	38.5	24.2	24.2		32.2	32.2		32.2	32.2	
Effective Green, g (s)	38.5	38.5	38.5	24.2	24.2		32.2	32.2		32.2	32.2	
Actuated g/C Ratio	0.46	0.46	0.46	0.29	0.29		0.38	0.38		0.38	0.38	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	342	826	689	254	472		243	621		432	646	
v/s Ratio Prot	0.06	c0.26			c0.22			0.12			0.26	
v/s Ratio Perm	0.19		0.05	0.04			0.06			c0.30		
v/c Ratio	0.55	0.57	0.11	0.14	0.76		0.15	0.32		0.79	0.67	
Uniform Delay, d1	15.6	16.6	12.9	22.1	27.2		16.9	18.2		22.9	21.4	
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	0.9	0.1	0.3	7.2		0.3	0.3		9.3	2.6	
Delay (s)	17.5	17.5	13.0	22.4	34.4		17.2	18.5		32.1	24.0	
Level of Service	B	B	B	C	C		B	B		C	C	
Approach Delay (s)		16.6			33.4			18.3			27.6	
Approach LOS		B			C			B			C	

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)	83.9	Sum of lost time (s)	18.2
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX F: SIDRA INTERSECTION CAPACITY ANALYSIS
EXISTING, BACKGROUND 2024 FORECAST, BACKGROUND 2029 FORECAST

MOVEMENT SUMMARY

Site: Existing 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	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

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	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 AM - Brian Coburn / Navan

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: Navan											
8	T1	524	3.0	0.406	5.6	LOS A	3.1	24.2	0.35	0.48	57.4
18	R2	18	3.0	0.406	5.2	LOS A	3.1	24.2	0.35	0.48	56.2
Approach		542	3.0	0.406	5.6	LOS A	3.1	24.2	0.35	0.48	57.4
East: Brian Coburn											
1	L2	158	3.0	0.787	17.3	LOS B	8.6	66.9	0.95	1.16	51.3
16	R2	493	3.0	0.787	13.1	LOS B	8.6	66.9	0.95	1.16	50.6
Approach		651	3.0	0.787	14.1	LOS B	8.6	66.9	0.95	1.16	50.8
North: Navan											
7	L2	80	3.0	0.291	9.9	LOS A	1.9	15.0	0.46	0.58	55.9
4	T1	248	3.0	0.291	6.0	LOS A	1.9	15.0	0.46	0.58	56.3
Approach		328	3.0	0.291	6.9	LOS A	1.9	15.0	0.46	0.58	56.2
All Vehicles		1521	3.0	0.787	9.5	LOS A	8.6	66.9	0.63	0.79	54.1

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: Existing PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	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: 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 / Navan

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: Navan											
8	T1	313	3.0	0.524	8.8	LOS A	3.7	28.8	0.79	0.88	55.5
18	R2	102	3.0	0.524	8.4	LOS A	3.7	28.8	0.79	0.88	54.3
Approach		416	3.0	0.524	8.7	LOS A	3.7	28.8	0.79	0.88	55.2
East: Brian Coburn											
1	L2	100	3.0	0.277	10.7	LOS B	1.5	12.1	0.57	0.72	55.7
16	R2	160	3.0	0.277	6.4	LOS A	1.5	12.1	0.57	0.72	54.9
Approach		260	3.0	0.277	8.0	LOS A	1.5	12.1	0.57	0.72	55.2
North: Navan											
7	L2	472	3.0	0.811	10.4	LOS B	14.4	111.8	0.91	0.57	53.9
4	T1	614	3.0	0.811	6.5	LOS A	14.4	111.8	0.91	0.57	54.2
Approach		1087	3.0	0.811	8.2	LOS A	14.4	111.8	0.91	0.57	54.1
All Vehicles		1762	3.0	0.811	8.3	LOS A	14.4	111.8	0.83	0.67	54.5

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: 2029 Background AM - Mer Bleue/Decoeur

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: RoadName											
3	L2	8	3.0	0.546	10.8	LOS B	4.8	37.4	0.52	0.47	58.7
8	T1	706	3.0	0.546	5.0	LOS A	4.8	37.4	0.52	0.47	58.6
18	R2	26	3.0	0.546	4.8	LOS A	4.8	37.4	0.52	0.47	56.9
Approach		740	3.0	0.546	5.1	LOS A	4.8	37.4	0.52	0.47	58.5
East: RoadName											
1	L2	70	3.0	0.194	12.6	LOS B	0.8	6.6	0.66	0.82	56.7
6	T1	20	3.0	0.194	6.8	LOS A	0.8	6.6	0.66	0.82	56.6
16	R2	57	3.0	0.194	6.6	LOS A	0.8	6.6	0.66	0.82	55.0
Approach		147	3.0	0.194	9.5	LOS A	0.8	6.6	0.66	0.82	56.0
North: RoadName											
7	L2	25	3.0	0.266	10.4	LOS B	1.7	13.5	0.33	0.45	59.7
4	T1	305	3.0	0.266	4.6	LOS A	1.7	13.5	0.33	0.45	59.6
14	R2	33	3.0	0.266	4.4	LOS A	1.7	13.5	0.33	0.45	57.8
Approach		363	3.0	0.266	4.9	LOS A	1.7	13.5	0.33	0.45	59.4
West: RoadName											
5	L2	101	3.0	0.124	11.4	LOS B	0.5	4.3	0.49	0.71	56.0
2	T1	8	3.0	0.124	5.6	LOS A	0.5	4.3	0.49	0.71	55.9
12	R2	20	3.0	0.124	5.5	LOS A	0.5	4.3	0.49	0.71	54.3
Approach		129	3.0	0.124	10.1	LOS B	0.5	4.3	0.49	0.71	55.7
All Vehicles		1379	3.0	0.546	6.0	LOS A	4.8	37.4	0.48	0.53	58.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2029 Background AM - Brian Coburn (2-lane) / 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	148	2.0	0.262	10.0	LOS B	1.6	12.5	0.29	0.55	56.0
18	R2	212	2.0	0.262	4.6	LOS A	1.6	12.5	0.29	0.55	57.4
Approach		360	2.0	0.262	6.8	LOS A	1.6	12.5	0.29	0.55	56.9
East: Brian Coburn											
1	L2	151	2.0	0.462	10.5	LOS B	3.4	26.3	0.47	0.55	58.1
6	T1	451	2.0	0.462	5.4	LOS A	3.4	26.3	0.47	0.55	59.3
Approach		602	2.0	0.462	6.6	LOS A	3.4	26.3	0.47	0.55	59.1
West: Brian Coburn											
2	T1	85	2.0	0.226	5.2	LOS A	1.3	10.0	0.37	0.51	60.8
12	R2	195	2.0	0.226	4.9	LOS A	1.3	10.0	0.37	0.51	55.4
Approach		280	2.0	0.226	5.0	LOS A	1.3	10.0	0.37	0.51	57.7
All Vehicles		1242	2.0	0.462	6.3	LOS A	3.4	26.3	0.39	0.54	58.3

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: 2029 Background AM - Mer Bleue / Brian Coburn (2-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	17	2.0	0.312	11.5	LOS B	1.4	10.6	0.51	0.53	60.4
8	T1	566	2.0	0.312	5.4	LOS A	1.4	10.8	0.50	0.52	58.7
18	R2	104	2.0	0.312	5.1	LOS A	1.4	10.8	0.49	0.51	57.0
Approach		687	2.0	0.312	5.5	LOS A	1.4	10.8	0.50	0.52	58.5
East: Brian Coburn											
1	L2	51	2.0	1.187	103.9	LOS F	60.5	467.5	1.00	3.37	23.4
6	T1	450	2.0	1.187	98.0	LOS F	60.5	467.5	1.00	3.37	29.3
16	R2	468	2.0	1.187	97.9	LOS F	60.5	467.5	1.00	3.37	23.9
Approach		969	2.0	1.187	98.2	LOS F	60.5	467.5	1.00	3.37	26.5
North: Mer Bleue											
7	L2	151	2.0	0.282	11.4	LOS B	1.4	10.6	0.58	0.69	56.9
4	T1	284	2.0	0.282	5.3	LOS A	1.4	11.0	0.57	0.59	57.7
14	R2	135	2.0	0.282	5.1	LOS A	1.4	11.0	0.57	0.53	59.1
Approach		570	2.0	0.282	6.9	LOS A	1.4	11.0	0.57	0.60	57.9
West: Brian Coburn											
5	L2	167	2.0	0.317	11.7	LOS B	1.4	10.7	0.55	0.72	58.9
2	T1	111	2.0	0.317	5.8	LOS A	1.4	10.7	0.55	0.72	58.8
12	R2	15	2.0	0.317	5.7	LOS A	1.4	10.7	0.55	0.72	57.2
Approach		293	2.0	0.317	9.2	LOS A	1.4	10.7	0.55	0.72	58.8
All Vehicles		2519	2.0	1.187	41.9	LOS D	60.5	467.5	0.71	1.66	39.4

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: 2029 Background AM - Brian Coburn (2-lane) / Navan

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: Navan											
8	T1	676	3.0	0.590	6.5	LOS A	5.2	40.4	0.65	0.61	56.0
18	R2	15	3.0	0.590	6.1	LOS A	5.2	40.4	0.65	0.61	54.8
Approach		691	3.0	0.590	6.5	LOS A	5.2	40.4	0.65	0.61	56.0
East: Brian Coburn											
1	L2	135	3.0	1.034	48.7	LOS F	25.5	199.0	1.00	1.91	35.7
16	R2	571	3.0	1.034	44.5	LOS F	25.5	199.0	1.00	1.91	35.4
Approach		706	3.0	1.034	45.3	LOS D	25.5	199.0	1.00	1.91	35.4
North: Navan											
7	L2	178	3.0	0.405	9.8	LOS A	3.2	25.0	0.49	0.59	55.5
4	T1	307	3.0	0.405	5.9	LOS A	3.2	25.0	0.49	0.59	55.9
Approach		485	3.0	0.405	7.3	LOS A	3.2	25.0	0.49	0.59	55.8
All Vehicles		1882	3.0	1.034	21.3	LOS C	25.5	199.0	0.74	1.09	46.0

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: 2029 Background AM - Brian Coburn / Navan (4-lane)

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	676	3.0	0.549	6.0	LOS A	3.8	29.3	0.50	0.57	56.7
18	R2	15	3.0	0.022	6.3	LOS A	0.1	0.6	0.34	0.57	56.3
Approach		691	3.0	0.549	6.0	LOS A	3.8	29.3	0.50	0.57	56.7
East: Brian Coburn											
1	L2	135	3.0	0.450	12.1	LOS B	2.2	17.2	0.68	0.91	54.6
16	R2	571	3.0	0.450	7.9	LOS A	2.2	17.5	0.68	0.89	54.6
Approach		706	3.0	0.450	8.7	LOS A	2.2	17.5	0.68	0.90	54.6
North: Navan											
7	L2	178	3.0	0.204	9.5	LOS A	1.0	7.9	0.32	0.63	55.1
4	T1	307	3.0	0.204	5.6	LOS A	1.0	7.9	0.32	0.53	57.1
Approach		485	3.0	0.204	7.0	LOS A	1.0	7.9	0.32	0.57	56.4
All Vehicles		1882	3.0	0.549	7.3	LOS A	3.8	29.3	0.52	0.69	55.8

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: 2029 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	17	2.0	0.309	11.5	LOS B	1.3	10.2	0.50	0.53	60.5
8	T1	566	2.0	0.309	5.4	LOS A	1.3	10.4	0.49	0.52	58.8
18	R2	104	2.0	0.309	5.1	LOS A	1.3	10.4	0.48	0.51	57.1
Approach		687	2.0	0.309	5.5	LOS A	1.3	10.4	0.49	0.52	58.6
East: Brian Coburn											
1	L2	51	2.0	0.516	13.3	LOS B	2.7	20.5	0.69	0.76	56.9
6	T1	450	2.0	0.516	7.2	LOS A	2.8	21.4	0.69	0.76	59.5
16	R2	468	2.0	0.516	6.6	LOS A	2.8	21.4	0.68	0.77	56.8
Approach		969	2.0	0.516	7.3	LOS A	2.8	21.4	0.68	0.76	58.2
North: Mer Bleue											
7	L2	151	2.0	0.280	11.7	LOS B	1.2	9.4	0.55	0.71	56.9
4	T1	284	2.0	0.280	5.4	LOS A	1.3	9.7	0.54	0.61	57.9
14	R2	135	2.0	0.280	5.2	LOS A	1.3	9.7	0.54	0.54	59.2
Approach		570	2.0	0.280	7.0	LOS A	1.3	9.7	0.55	0.62	58.0
West: Brian Coburn											
5	L2	167	2.0	0.147	11.1	LOS B	0.6	4.4	0.46	0.74	57.6
2	T1	111	2.0	0.132	5.4	LOS A	0.5	3.8	0.47	0.52	60.8
12	R2	15	2.0	0.132	5.6	LOS A	0.5	3.8	0.47	0.52	59.0
Approach		293	2.0	0.147	8.7	LOS A	0.6	4.4	0.46	0.65	58.8
All Vehicles		2519	2.0	0.516	6.9	LOS A	2.8	21.4	0.57	0.65	58.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2029 Background PM - Mer Bleue/Decoeur

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: RoadName											
3	L2	16	3.0	0.618	11.1	LOS B	5.9	45.8	0.63	0.51	58.1
8	T1	753	3.0	0.618	5.3	LOS A	5.9	45.8	0.63	0.51	58.0
18	R2	47	3.0	0.618	5.1	LOS A	5.9	45.8	0.63	0.51	56.3
Approach		816	3.0	0.618	5.4	LOS A	5.9	45.8	0.63	0.51	57.9
East: RoadName											
1	L2	55	3.0	0.146	12.5	LOS B	0.6	5.0	0.67	0.83	56.5
6	T1	11	3.0	0.146	6.7	LOS A	0.6	5.0	0.67	0.83	56.4
16	R2	38	3.0	0.146	6.6	LOS A	0.6	5.0	0.67	0.83	54.8
Approach		104	3.0	0.146	9.8	LOS A	0.6	5.0	0.67	0.83	55.8
North: RoadName											
7	L2	65	3.0	0.554	10.5	LOS B	5.6	43.5	0.45	0.46	59.0
4	T1	676	3.0	0.554	4.7	LOS A	5.6	43.5	0.45	0.46	58.8
14	R2	64	3.0	0.554	4.5	LOS A	5.6	43.5	0.45	0.46	57.1
Approach		805	3.0	0.554	5.1	LOS A	5.6	43.5	0.45	0.46	58.7
West: RoadName											
5	L2	77	3.0	0.143	12.5	LOS B	0.6	4.7	0.63	0.82	55.8
2	T1	19	3.0	0.143	6.7	LOS A	0.6	4.7	0.63	0.82	55.7
12	R2	15	3.0	0.143	6.5	LOS A	0.6	4.7	0.63	0.82	54.2
Approach		111	3.0	0.143	10.7	LOS B	0.6	4.7	0.63	0.82	55.6
All Vehicles		1836	3.0	0.618	5.8	LOS A	5.9	45.8	0.55	0.52	58.0

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: 2029 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	76	2.0	0.234	10.4	LOS B	1.3	10.3	0.39	0.58	56.3
18	R2	210	2.0	0.234	5.0	LOS A	1.3	10.3	0.39	0.58	57.6
Approach		286	2.0	0.234	6.4	LOS A	1.3	10.3	0.39	0.58	57.4
East: Brian Coburn											
1	L2	221	2.0	0.295	10.0	LOS A	1.9	14.9	0.28	0.55	57.9
6	T1	194	2.0	0.295	4.8	LOS A	1.9	14.9	0.28	0.55	59.2
Approach		415	2.0	0.295	7.6	LOS A	1.9	14.9	0.28	0.55	58.6
West: Brian Coburn											
2	T1	162	2.0	0.339	5.6	LOS A	2.0	15.4	0.48	0.57	60.3
12	R2	237	2.0	0.339	5.3	LOS A	2.0	15.4	0.48	0.57	54.8
Approach		399	2.0	0.339	5.5	LOS A	2.0	15.4	0.48	0.57	57.7
All Vehicles		1100	2.0	0.339	6.5	LOS A	2.0	15.4	0.38	0.56	58.0

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: 2029 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	30	2.0	0.442	13.3	LOS B	2.0	15.4	0.68	0.73	59.5
8	T1	614	2.0	0.442	6.8	LOS A	2.1	16.2	0.68	0.69	57.6
18	R2	111	2.0	0.442	6.3	LOS A	2.1	16.2	0.67	0.65	56.0
Approach		755	2.0	0.442	7.0	LOS A	2.1	16.2	0.68	0.69	57.5
East: Brian Coburn											
1	L2	58	2.0	0.654	14.4	LOS B	4.2	32.7	0.79	0.94	56.6
6	T1	175	2.0	0.654	8.5	LOS A	4.2	32.7	0.79	0.94	59.1
16	R2	288	2.0	0.654	8.4	LOS A	4.2	32.7	0.79	0.94	55.4
Approach		521	2.0	0.654	9.1	LOS A	4.2	32.7	0.79	0.94	57.0
North: Mer Bleue											
7	L2	547	2.0	0.530	11.3	LOS B	3.5	27.4	0.60	0.73	55.2
4	T1	520	2.0	0.530	5.1	LOS A	3.7	28.3	0.59	0.52	58.1
14	R2	213	2.0	0.530	5.0	LOS A	3.7	28.3	0.59	0.50	58.9
Approach		1280	2.0	0.530	7.7	LOS A	3.7	28.3	0.59	0.61	57.0
West: Brian Coburn											
5	L2	72	2.0	0.546	14.3	LOS B	2.6	20.0	0.75	0.87	58.9
2	T1	277	2.0	0.546	8.3	LOS A	2.6	20.0	0.75	0.87	58.7
12	R2	10	2.0	0.546	8.2	LOS A	2.6	20.0	0.75	0.87	57.1
Approach		359	2.0	0.546	9.5	LOS A	2.6	20.0	0.75	0.87	58.7
All Vehicles		2915	2.0	0.654	8.0	LOS A	4.2	32.7	0.67	0.72	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: 2029 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	30	2.0	0.432	13.2	LOS B	1.9	14.7	0.67	0.73	59.5
8	T1	614	2.0	0.432	6.8	LOS A	2.0	15.4	0.66	0.69	57.7
18	R2	111	2.0	0.432	6.2	LOS A	2.0	15.4	0.65	0.65	56.1
Approach		755	2.0	0.432	6.9	LOS A	2.0	15.4	0.66	0.68	57.6
East: Brian Coburn											
1	L2	58	2.0	0.284	12.1	LOS B	1.1	8.8	0.60	0.66	57.1
6	T1	175	2.0	0.284	6.1	LOS A	1.1	8.8	0.60	0.66	59.4
16	R2	288	2.0	0.284	5.7	LOS A	1.2	9.2	0.58	0.64	57.3
Approach		521	2.0	0.284	6.6	LOS A	1.2	9.2	0.59	0.65	58.1
North: Mer Bleue											
7	L2	547	2.0	0.523	11.3	LOS B	3.3	25.8	0.57	0.72	55.3
4	T1	520	2.0	0.523	5.1	LOS A	3.4	26.6	0.56	0.52	58.3
14	R2	213	2.0	0.523	5.0	LOS A	3.4	26.6	0.56	0.50	59.1
Approach		1280	2.0	0.523	7.7	LOS A	3.4	26.6	0.57	0.61	57.2
West: Brian Coburn											
5	L2	72	2.0	0.234	12.8	LOS B	0.8	6.4	0.64	0.76	58.7
2	T1	277	2.0	0.234	6.1	LOS A	0.9	6.7	0.63	0.61	59.6
12	R2	10	2.0	0.234	6.0	LOS A	0.9	6.7	0.62	0.55	58.3
Approach		359	2.0	0.234	7.5	LOS A	0.9	6.7	0.63	0.64	59.4
All Vehicles		2915	2.0	0.523	7.3	LOS A	3.4	26.6	0.60	0.64	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: 2029 Background PM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	430	3.0	0.733	12.2	LOS B	6.8	52.7	0.96	1.10	53.2
18	R2	87	3.0	0.733	11.8	LOS B	6.8	52.7	0.96	1.10	52.1
Approach		517	3.0	0.733	12.1	LOS B	6.8	52.7	0.96	1.10	53.0
East: Brian Coburn											
1	L2	86	3.0	0.385	11.4	LOS B	2.3	17.6	0.70	0.83	55.6
16	R2	230	3.0	0.385	7.1	LOS A	2.3	17.6	0.70	0.83	54.8
Approach		316	3.0	0.385	8.3	LOS A	2.3	17.6	0.70	0.83	55.1
North: Navan											
7	L2	565	3.0	0.991	16.7	LOS B	56.4	439.2	1.00	0.60	51.2
4	T1	807	3.0	0.991	12.8	LOS B	56.4	439.2	1.00	0.60	51.5
Approach		1372	3.0	0.991	14.4	LOS B	56.4	439.2	1.00	0.60	51.4
All Vehicles		2205	3.0	0.991	13.0	LOS B	56.4	439.2	0.95	0.75	52.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2029 Background PM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	430	3.0	0.476	7.7	LOS A	2.5	19.4	0.65	0.75	56.0
18	R2	87	3.0	0.178	9.1	LOS A	0.6	4.8	0.58	0.81	54.1
Approach		517	3.0	0.476	7.9	LOS A	2.5	19.4	0.64	0.76	55.6
East: Brian Coburn											
1	L2	86	3.0	0.171	10.4	LOS B	0.7	5.5	0.50	0.75	55.2
16	R2	230	3.0	0.171	6.4	LOS A	0.7	5.5	0.50	0.72	55.3
Approach		316	3.0	0.171	7.5	LOS A	0.7	5.5	0.50	0.73	55.3
North: Navan											
7	L2	565	3.0	0.518	9.5	LOS A	4.0	31.0	0.38	0.61	54.6
4	T1	807	3.0	0.518	5.5	LOS A	4.0	31.4	0.37	0.51	57.0
Approach		1372	3.0	0.518	7.2	LOS A	4.0	31.4	0.37	0.55	56.0
All Vehicles		2205	3.0	0.518	7.4	LOS A	4.0	31.4	0.45	0.63	55.8

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: 2024 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	107	2.0	0.210	10.0	LOS A	1.2	9.3	0.27	0.55	56.3
18	R2	179	2.0	0.210	4.6	LOS A	1.2	9.3	0.27	0.55	57.6
Approach		286	2.0	0.210	6.6	LOS A	1.2	9.3	0.27	0.55	57.2
East: Brian Coburn											
1	L2	134	2.0	0.427	10.2	LOS B	3.1	24.1	0.38	0.51	58.5
6	T1	451	2.0	0.427	5.1	LOS A	3.1	24.1	0.38	0.51	59.7
Approach		585	2.0	0.427	6.3	LOS A	3.1	24.1	0.38	0.51	59.5
West: Brian Coburn											
2	T1	85	2.0	0.208	5.1	LOS A	1.2	9.0	0.34	0.50	60.9
12	R2	179	2.0	0.208	4.8	LOS A	1.2	9.0	0.34	0.50	55.6
Approach		264	2.0	0.208	4.9	LOS A	1.2	9.0	0.34	0.50	57.9
All Vehicles		1135	2.0	0.427	6.0	LOS A	3.1	24.1	0.34	0.52	58.7

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: 2024 Background AM - Brian Coburn / Navan

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: Navan											
8	T1	625	3.0	0.537	6.3	LOS A	4.5	34.7	0.58	0.59	56.3
18	R2	15	3.0	0.537	5.9	LOS A	4.5	34.7	0.58	0.59	55.1
Approach		640	3.0	0.537	6.3	LOS A	4.5	34.7	0.58	0.59	56.3
East: Brian Coburn											
1	L2	135	3.0	0.914	25.1	LOS C	13.4	104.3	1.00	1.38	46.4
16	R2	530	3.0	0.914	20.8	LOS C	13.4	104.3	1.00	1.38	45.8
Approach		665	3.0	0.914	21.7	LOS C	13.4	104.3	1.00	1.38	45.9
North: Navan											
7	L2	162	3.0	0.374	9.8	LOS A	2.8	22.1	0.48	0.59	55.6
4	T1	281	3.0	0.374	5.9	LOS A	2.8	22.1	0.48	0.59	56.0
Approach		443	3.0	0.374	7.3	LOS A	2.8	22.1	0.48	0.59	55.8
All Vehicles		1748	3.0	0.914	12.4	LOS B	13.4	104.3	0.71	0.89	51.8

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: 2024 Background AM - Mer Bleue / Brian Coburn

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

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	17	2.0	0.276	11.4	LOS B	1.2	9.1	0.48	0.52	60.6
8	T1	510	2.0	0.276	5.2	LOS A	1.2	9.2	0.47	0.51	58.9
18	R2	92	2.0	0.276	5.0	LOS A	1.2	9.2	0.46	0.50	57.2
Approach		619	2.0	0.276	5.4	LOS A	1.2	9.2	0.47	0.51	58.7
East: Brian Coburn											
1	L2	51	2.0	1.125	77.5	LOS F	48.3	373.0	1.00	2.80	28.4
6	T1	447	2.0	1.125	71.5	LOS F	48.3	373.0	1.00	2.80	34.5
16	R2	468	2.0	1.125	71.4	LOS F	48.3	373.0	1.00	2.80	28.7
Approach		966	2.0	1.125	71.8	LOS E	48.3	373.0	1.00	2.80	31.6
North: Mer Bleue											
7	L2	151	2.0	0.268	11.5	LOS B	1.3	9.9	0.58	0.71	56.7
4	T1	260	2.0	0.268	5.3	LOS A	1.3	10.3	0.57	0.59	57.7
14	R2	122	2.0	0.268	5.1	LOS A	1.3	10.3	0.57	0.53	59.1
Approach		533	2.0	0.268	7.0	LOS A	1.3	10.3	0.57	0.61	57.8
West: Brian Coburn											
5	L2	141	2.0	0.280	11.6	LOS B	1.2	9.2	0.52	0.70	59.1
2	T1	106	2.0	0.280	5.7	LOS A	1.2	9.2	0.52	0.70	59.0
12	R2	15	2.0	0.280	5.6	LOS A	1.2	9.2	0.52	0.70	57.4
Approach		262	2.0	0.280	8.9	LOS A	1.2	9.2	0.52	0.70	59.0
All Vehicles		2380	2.0	1.125	33.1	LOS C	48.3	373.0	0.71	1.48	43.0

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: 2024 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	49	2.0	0.197	10.3	LOS B	1.1	8.2	0.37	0.56	56.7
18	R2	190	2.0	0.197	4.9	LOS A	1.1	8.2	0.37	0.56	57.9
Approach		239	2.0	0.197	6.0	LOS A	1.1	8.2	0.37	0.56	57.8
East: Brian Coburn											
1	L2	184	2.0	0.258	9.8	LOS A	1.6	12.7	0.21	0.53	58.3
6	T1	194	2.0	0.258	4.7	LOS A	1.6	12.7	0.21	0.53	59.6
Approach		378	2.0	0.258	7.2	LOS A	1.6	12.7	0.21	0.53	59.0
West: Brian Coburn											
2	T1	162	2.0	0.300	5.4	LOS A	1.7	13.2	0.42	0.53	60.5
12	R2	206	2.0	0.300	5.1	LOS A	1.7	13.2	0.42	0.53	55.1
Approach		368	2.0	0.300	5.2	LOS A	1.7	13.2	0.42	0.53	58.2
All Vehicles		985	2.0	0.300	6.2	LOS A	1.7	13.2	0.33	0.54	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: 2024 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	30	2.0	0.407	13.0	LOS B	1.8	13.7	0.66	0.71	59.6
8	T1	573	2.0	0.407	6.6	LOS A	1.8	14.3	0.66	0.67	57.7
18	R2	102	2.0	0.407	6.1	LOS A	1.8	14.3	0.65	0.63	56.1
Approach		705	2.0	0.407	6.8	LOS A	1.8	14.3	0.66	0.66	57.6
East: Brian Coburn											
1	L2	58	2.0	0.625	14.0	LOS B	4.0	30.7	0.77	0.91	57.0
6	T1	169	2.0	0.625	8.1	LOS A	4.0	30.7	0.77	0.91	59.4
16	R2	288	2.0	0.625	8.0	LOS A	4.0	30.7	0.77	0.91	55.6
Approach		515	2.0	0.625	8.7	LOS A	4.0	30.7	0.77	0.91	57.2
North: Mer Bleue											
7	L2	547	2.0	0.495	11.2	LOS B	3.1	24.3	0.57	0.73	55.0
4	T1	473	2.0	0.495	5.0	LOS A	3.3	25.2	0.55	0.50	58.5
14	R2	182	2.0	0.495	4.9	LOS A	3.3	25.2	0.55	0.49	59.1
Approach		1202	2.0	0.495	7.8	LOS A	3.3	25.2	0.56	0.60	57.0
West: Brian Coburn											
5	L2	55	2.0	0.499	13.9	LOS B	2.3	17.6	0.73	0.82	59.1
2	T1	274	2.0	0.499	8.0	LOS A	2.3	17.6	0.73	0.82	59.0
12	R2	10	2.0	0.499	7.9	LOS A	2.3	17.6	0.73	0.82	57.4
Approach		339	2.0	0.499	8.9	LOS A	2.3	17.6	0.73	0.82	59.0
All Vehicles		2761	2.0	0.625	7.8	LOS A	4.0	30.7	0.64	0.70	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: 2024 Background PM - Brian Coburn / Navan

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: Navan											
8	T1	393	3.0	0.658	10.7	LOS B	5.5	42.7	0.90	1.04	54.3
18	R2	87	3.0	0.658	10.3	LOS B	5.5	42.7	0.90	1.04	53.2
Approach		480	3.0	0.658	10.6	LOS B	5.5	42.7	0.90	1.04	54.1
East: Brian Coburn											
1	L2	86	3.0	0.335	11.1	LOS B	1.9	14.9	0.65	0.79	55.7
16	R2	202	3.0	0.335	6.8	LOS A	1.9	14.9	0.65	0.79	54.9
Approach		288	3.0	0.335	8.1	LOS A	1.9	14.9	0.65	0.79	55.2
North: Navan											
7	L2	535	3.0	0.925	10.9	LOS B	28.7	223.4	1.00	0.54	53.6
4	T1	742	3.0	0.925	7.0	LOS A	28.7	223.4	1.00	0.54	53.9
Approach		1277	3.0	0.925	8.7	LOS A	28.7	223.4	1.00	0.54	53.8
All Vehicles		2045	3.0	0.925	9.0	LOS A	28.7	223.4	0.93	0.69	54.1

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.

Appendix G: TDM Supportive Development Design and Infrastructure Checklist

TDM-Supportive Development Design and Infrastructure Checklist:
Residential Developments (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 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 adjacent to or near Fern Casey and Brian Coburn to access nearby active transportation amenities
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☐
	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)*	☒ Existing sidewalk provides access to transit stops along Fern Casey Street and to future BRT corridor to the north. Sidewalk linkages throughout interior of development
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, such as courtyards and transit stops; and providing	☒ Site walkways are provided in front of each building and between adjacent buildings. All buildings are connected to external sidewalks along Brian Coburn Blvd and Fern Casey Street

TDM-supportive design & infrastructure measures: *Residential developments*			Check if completed & add descriptions, explanations or plan/drawing references
		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)*	☒ Amenity area central and accessible to the development, bordered by sidewalks
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 provided internal to development and between residential buildings. Allows connections to Brian Coburn add Fern Casey
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 boulevard along Fern Casey Street and Brian Coburn Boulevard
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☒ Walking routes 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	☐ Noted for detailed design according to future Design Guidelines and Strategic Road Safety Action Plan Update
	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)*	☒ Indoor bicycle parking provided within Amenity area
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)*	☒ Number of spaces exceed the minimum requirements (50 provided)
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 from exterior of building, sidewalks provided to and from the amenity area
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)*	☒ All Bicycle Stalls are located within an enclosed storage area
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	☐ NA – No on-site transit stops planned
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	☐ NA – site does is not directly adjacent off-site transit stops planned
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 meets minimum required 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)	☐

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)*	☐
		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)*	☐
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	☒ Recommended at the proponents discretion
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)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☒ Recommended at the proponents discretion

		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 at the proponents discretion
		6.2 Personalized trip planning	
BETTER	★	6.2.1 Offer personalized trip planning to new residents	☐

APPENDIX H: MULTI-MODAL LEVEL OF SERVICE ANALYSIS DETAILS

Table 1: 6429 Renaud Road - Multi-Modal Level of Service - Navan Road and Renaud Road

	Intersection Leg			
Performance Measure	West Leg - Renaud Road	East Leg - Renaud Road	North Leg - Navan Road	South Leg - Navan Road
Pedestrian LOS (PLOS)				
Total Travel Lanes	8	5	5	5
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 15m	10 to 15m	3 to 5m	10 to 15m
Right Turn Channel	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)	Conventional Right Turn Channel without receiving lane (0)
Crosswalk Treatment	Standard Transverse	Standard Transverse	Standard Transverse	Standard Transverse
PETSI Points	-16	33	35	37
Existing Pedestrian Delay (s)	24	24	28	28
Intersection PLOS	F	E	E	E
Target PLOS	C	C	C	C
Bicycle LOS (BLOS)				
Bikeway Type	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic
Left Turn Lane Configuration of Approach	One lane crossed	One lane crossed	One lane crossed	One lane crossed
Right Turn Lane Configuration of Approach	Exclusive RT, right of bike lane	Shared Th/RT	Shared Th/RT	Exclusive RT
Length of Right Turn Lane	> 50	N/A	N/A	25-50
Turning Speed of Right Turning Vehicles	< 25	< 25	< 25	< 25
Operating Speed (km/h)	60	60	60	60
Intersection BLOS	E	F	F	F
Target BLOS	D	D	C	C
Transit LOS (TLOS)				
Delay (2024 Development + Background)	19.4 (EB-Th, PM)	41.0 (WB-Th/RT, AM)	28.4 (SB-Th/RT, AM) 26.1 (SB-Th/RT, PM)	19.3 (NB-Th/RT, PM)
Delay (2029 Development + Background)	25.8 (EB-Th, PM)	51.4 (WB-Th/RT, AM)	28.4 (SB-Th/RT, AM) 26.3 (SB-Th/RT, PM)	20.0 (NB-Th/RT, PM)
Intersection TLOS	C	F	C	C
Target TLOS	N/A	N/A	N/A	N/A
Truck LOS (TkLOS)				
Effective Corner Radius (m)	10 to 15m	10 to 15m	3 to 5m	10 to 15m
Number of Receiving Lanes on Departing Leg	1	1	1	1
Intersection TkLOS	E	E	F	E
Target TkLOS	No Target	No Target	D	D

Appendix I: Synchro Intersection Capacity Analysis
2024 Design Forecast, 2029 Design Forecast

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	119	182	11	5	264	45	37	19	19	9	5	156
Future Volume (Veh/h)	119	182	11	5	264	45	37	19	19	9	5	156
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)	119	182	11	5	264	45	37	19	19	9	5	156
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	309			193			858	744	188	745	728	286
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	309			193			858	744	188	745	728	286
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 %	90			100			82	94	98	97	98	79
cM capacity (veh/h)	1252			1380			201	309	855	285	316	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	119	193	5	309	75	9	161
Volume Left	119	0	5	0	37	9	0
Volume Right	0	11	0	45	19	0	156
cSH	1252	1700	1380	1700	280	285	722
Volume to Capacity	0.10	0.11	0.00	0.18	0.27	0.03	0.22
Queue Length 95th (m)	2.4	0.0	0.1	0.0	8.0	0.7	6.5
Control Delay (s)	8.2	0.0	7.6	0.0	22.5	18.1	11.4
Lane LOS	A		A		C	C	B
Approach Delay (s)	3.1		0.1		22.5	11.8	
Approach LOS					C	B	

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	4	5	44	1	73	2	243	26	69	288	12
Future Volume (Veh/h)	26	4	5	44	1	73	2	243	26	69	288	12
Sign Control		Stop			Stop			Free			Free	
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)	26	4	5	44	1	73	2	243	26	69	288	12
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	752	705	294	693	698	256	300			269		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	752	705	294	693	698	256	300			269		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	99	99	87	100	91	100			95		
cM capacity (veh/h)	283	341	745	337	344	783	1261			1295		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	35	118	2	269	69	300
Volume Left	26	44	2	0	69	0
Volume Right	5	73	0	26	0	12
cSH	317	521	1261	1700	1295	1700
Volume to Capacity	0.11	0.23	0.00	0.16	0.05	0.18
Queue Length 95th (m)	2.8	6.6	0.0	0.0	1.3	0.0
Control Delay (s)	17.8	13.9	7.9	0.0	7.9	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	17.8	13.9	0.1		1.5	
Approach LOS	C	B				

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	39	338	4	0	367
Future Volume (Veh/h)	0	39	338	4	0	367
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	39	338	4	0	367
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	707	340			342	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	707	340			342	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	402	702			1217	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	39	342	367
Volume Left	0	0	0
Volume Right	39	4	0
cSH	702	1700	1700
Volume to Capacity	0.06	0.20	0.22
Queue Length 95th (m)	1.3	0.0	0.0
Control Delay (s)	10.4	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.4	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	257	61	84	382	228	196
Future Volume (vph)	257	61	84	382	228	196
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	257	61	84	382	228	196

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	318	466	424
Volume Left (vph)	257	84	0
Volume Right (vph)	61	0	196
Hadj (s)	0.09	0.11	-0.24
Departure Headway (s)	6.4	5.8	5.5
Degree Utilization, x	0.56	0.75	0.65
Capacity (veh/h)	523	601	616
Control Delay (s)	17.2	24.1	18.3
Approach Delay (s)	17.2	24.1	18.3
Approach LOS	C	C	C

Intersection Summary			
Delay	20.3		
Level of Service	C		
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	70	57	685	297	25	297
Future Volume (Veh/h)	70	57	685	297	25	297
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	70	57	685	297	25	297
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	1032	491			982	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1032	491			982	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	68	89			96	
cM capacity (veh/h)	220	523			699	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	127	457	525	25	148	148
Volume Left	70	0	0	25	0	0
Volume Right	57	0	297	0	0	0
cSH	298	1700	1700	699	1700	1700
Volume to Capacity	0.43	0.27	0.31	0.04	0.09	0.09
Queue Length 95th (m)	15.5	0.0	0.0	0.8	0.0	0.0
Control Delay (s)	25.8	0.0	0.0	10.3	0.0	0.0
Lane LOS	D			B		
Approach Delay (s)	25.8	0.0		0.8		
Approach LOS	D					

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	44.5%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	139	33	38	404	256	124	358	34	110	121	2
Future Volume (vph)	109	139	33	38	404	256	124	358	34	110	121	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1616	1733	1547	1695	1407		1679	1663		1530	1493	
Flt Permitted	0.17	1.00	1.00	0.67	1.00		0.68	1.00		0.30	1.00	
Satd. Flow (perm)	293	1733	1547	1192	1407		1198	1663		484	1493	
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)	109	139	33	38	404	256	124	358	34	110	121	2
RTOR Reduction (vph)	0	0	14	0	21	0	0	4	0	0	1	0
Lane Group Flow (vph)	109	139	19	38	639	0	124	388	0	110	122	0
Heavy Vehicles (%)	7%	5%	0%	2%	35%	1%	3%	7%	19%	13%	22%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	51.0	51.0	51.0	41.0	41.0		25.8	25.8		25.8	25.8	
Effective Green, g (s)	51.0	51.0	51.0	41.0	41.0		25.8	25.8		25.8	25.8	
Actuated g/C Ratio	0.57	0.57	0.57	0.46	0.46		0.29	0.29		0.29	0.29	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	239	982	876	543	640		343	476		138	427	
v/s Ratio Prot	c0.03	0.08			c0.45			c0.23			0.08	
v/s Ratio Perm	0.23		0.01	0.03			0.10			0.23		
v/c Ratio	0.46	0.14	0.02	0.07	1.00		0.36	0.82		0.80	0.29	
Uniform Delay, d1	13.8	9.2	8.6	13.8	24.5		25.5	29.9		29.7	24.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.1	0.0	0.1	35.0		0.7	10.4		26.5	0.4	
Delay (s)	15.2	9.3	8.6	13.8	59.5		26.2	40.3		56.1	25.3	
Level of Service	B	A	A	B	E		C	D		E	C	
Approach Delay (s)		11.5			57.0			36.9			39.9	
Approach LOS		B			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.2
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	52	75	0	0	40
Future Volume (Veh/h)	33	52	75	0	0	40
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	33	52	75	0	0	40
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	75				193	75
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	75				193	75
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	96
cM capacity (veh/h)	1524				779	986

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	85	75	40
Volume Left	33	0	0
Volume Right	0	0	40
cSH	1524	1700	986
Volume to Capacity	0.02	0.04	0.04
Queue Length 95th (m)	0.5	0.0	1.0
Control Delay (s)	3.0	0.0	8.8
Lane LOS	A		A
Approach Delay (s)	3.0	0.0	8.8
Approach LOS			A

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	44	65	0	0	10
Future Volume (Veh/h)	8	44	65	0	0	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	44	65	0	0	10
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	65				125	65
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	65				125	65
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1537				865	999

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	52	65	10
Volume Left	8	0	0
Volume Right	0	0	10
cSH	1537	1700	999
Volume to Capacity	0.01	0.04	0.01
Queue Length 95th (m)	0.1	0.0	0.2
Control Delay (s)	1.2	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	1.2	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	19.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	124	181	11	5	296	40	37	19	19	33	5	206
Future Volume (Veh/h)	124	181	11	5	296	40	37	19	19	33	5	206
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)	124	181	11	5	296	40	37	19	19	33	5	206
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	336			192			949	780	186	784	766	316
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	336			192			949	780	186	784	766	316
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 %	90			100			76	94	98	88	98	72
cM capacity (veh/h)	1223			1381			156	292	856	266	298	724

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	124	192	5	336	75	33	211
Volume Left	124	0	5	0	37	33	0
Volume Right	0	11	0	40	19	0	206
cSH	1223	1700	1381	1700	231	266	701
Volume to Capacity	0.10	0.11	0.00	0.20	0.32	0.12	0.30
Queue Length 95th (m)	2.6	0.0	0.1	0.0	10.2	3.2	9.6
Control Delay (s)	8.3	0.0	7.6	0.0	27.8	20.4	12.3
Lane LOS	A		A		D	C	B
Approach Delay (s)	3.2		0.1		27.8	13.4	
Approach LOS					D	B	

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	4	5	62	1	135	2	271	24	69	296	12
Future Volume (Veh/h)	26	4	5	62	1	135	2	271	24	69	296	12
Sign Control		Stop			Stop			Free			Free	
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)	26	4	5	62	1	135	2	271	24	69	296	12
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	850	739	302	728	733	283	308			295		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	850	739	302	728	733	283	308			295		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	99	99	81	100	82	100			95		
cM capacity (veh/h)	220	326	738	319	328	756	1253			1266		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	35	198	2	295	69	308
Volume Left	26	62	2	0	69	0
Volume Right	5	135	0	24	0	12
cSH	255	527	1253	1700	1266	1700
Volume to Capacity	0.14	0.38	0.00	0.17	0.05	0.18
Queue Length 95th (m)	3.6	13.2	0.0	0.0	1.3	0.0
Control Delay (s)	21.4	15.9	7.9	0.0	8.0	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	21.4	15.9	0.1		1.5	
Approach LOS	C	C				

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	39	428	4	0	378
Future Volume (Veh/h)	0	39	428	4	0	378
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	39	428	4	0	378
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	808	430			432	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	808	430			432	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	350	625			1128	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	39	432	378
Volume Left	0	0	0
Volume Right	39	4	0
cSH	625	1700	1700
Volume to Capacity	0.06	0.25	0.22
Queue Length 95th (m)	1.5	0.0	0.0
Control Delay (s)	11.1	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.1	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	295	32	69	374	208	194
Future Volume (vph)	295	32	69	374	208	194
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	295	32	69	374	208	194

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	327	443	402
Volume Left (vph)	295	69	0
Volume Right (vph)	32	0	194
Hadj (s)	0.17	0.11	-0.26
Departure Headway (s)	6.3	5.8	5.5
Degree Utilization, x	0.57	0.71	0.62
Capacity (veh/h)	526	600	625
Control Delay (s)	17.5	21.8	17.0
Approach Delay (s)	17.5	21.8	17.0
Approach LOS	C	C	C

Intersection Summary			
Delay	18.9		
Level of Service	C		
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	70	57	744	26	25	311
Future Volume (Veh/h)	70	57	744	26	25	311
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	70	57	744	26	25	311
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	962	385			770	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	962	385			770	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	72	91			97	
cM capacity (veh/h)	246	613			840	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	127	496	274	25	156	156
Volume Left	70	0	0	25	0	0
Volume Right	57	0	26	0	0	0
cSH	336	1700	1700	840	1700	1700
Volume to Capacity	0.38	0.29	0.16	0.03	0.09	0.09
Queue Length 95th (m)	13.0	0.0	0.0	0.7	0.0	0.0
Control Delay (s)	22.0	0.0	0.0	9.4	0.0	0.0
Lane LOS	C			A		
Approach Delay (s)	22.0	0.0		0.7		
Approach LOS	C					

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	119	132	17	17	404	289	126	360	23	103	101	0
Future Volume (vph)	119	132	17	17	404	289	126	360	23	103	101	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1784	1517	1695	1673		1695	1768		1695	1784	
Flt Permitted	0.14	1.00	1.00	0.67	1.00		0.69	1.00		0.29	1.00	
Satd. Flow (perm)	245	1784	1517	1200	1673		1234	1768		519	1784	
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)	119	132	17	17	404	289	126	360	23	103	101	0
RTOR Reduction (vph)	0	0	7	0	23	0	0	2	0	0	0	0
Lane Group Flow (vph)	119	132	10	17	670	0	126	381	0	103	101	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	55.3	55.3	55.3	42.3	42.3		25.9	25.9		25.9	25.9	
Effective Green, g (s)	55.3	55.3	55.3	42.3	42.3		25.9	25.9		25.9	25.9	
Actuated g/C Ratio	0.59	0.59	0.59	0.45	0.45		0.27	0.27		0.27	0.27	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	266	1045	888	537	749		338	485		142	489	
v/s Ratio Prot	c0.04	0.07			c0.40			c0.22			0.06	
v/s Ratio Perm	0.22		0.01	0.01			0.10			0.20		
v/c Ratio	0.45	0.13	0.01	0.03	0.90		0.37	0.79		0.73	0.21	
Uniform Delay, d1	14.9	8.7	8.2	14.6	24.0		27.7	31.7		31.0	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.1	0.0	0.0	13.2		0.7	8.2		16.7	0.2	
Delay (s)	16.1	8.8	8.2	14.6	37.2		28.4	39.8		47.8	26.6	
Level of Service	B	A	A	B	D		C	D		D	C	
Approach Delay (s)		12.0			36.7			37.0			37.3	
Approach LOS		B			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	94.4	Sum of lost time (s)	18.2
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	52	156	0	0	40
Future Volume (Veh/h)	33	52	156	0	0	40
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	33	52	156	0	0	40
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	156				274	156
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	156				274	156
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	96
cM capacity (veh/h)	1424				699	890

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	85	156	40
Volume Left	33	0	0
Volume Right	0	0	40
cSH	1424	1700	890
Volume to Capacity	0.02	0.09	0.04
Queue Length 95th (m)	0.5	0.0	1.1
Control Delay (s)	3.1	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	3.1	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	44	146	0	0	10
Future Volume (Veh/h)	8	44	146	0	0	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	44	146	0	0	10
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	146				206	146
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	146				206	146
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1436				778	901

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	52	146	10
Volume Left	8	0	0
Volume Right	0	0	10
cSH	1436	1700	901
Volume to Capacity	0.01	0.09	0.01
Queue Length 95th (m)	0.1	0.0	0.3
Control Delay (s)	1.2	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	1.2	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	19.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	169	429	39	20	174	13	23	11	11	14	20	161
Future Volume (Veh/h)	169	429	39	20	174	13	23	11	11	14	20	161
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)	169	429	39	20	174	13	23	11	11	14	20	161
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	187			468			1172	1014	448	1004	1026	180
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	187			468			1172	1014	448	1004	1026	180
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 %	88			98			80	95	98	92	90	81
cM capacity (veh/h)	1387			1094			114	206	610	186	202	862

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	169	468	20	187	45	14	181
Volume Left	169	0	20	0	23	14	0
Volume Right	0	39	0	13	11	0	161
cSH	1387	1700	1094	1700	165	186	634
Volume to Capacity	0.12	0.28	0.02	0.11	0.27	0.08	0.29
Queue Length 95th (m)	3.2	0.0	0.4	0.0	8.0	1.8	8.9
Control Delay (s)	8.0	0.0	8.4	0.0	34.9	25.9	12.9
Lane LOS	A		A		D	D	B
Approach Delay (s)	2.1		0.8		34.9	13.9	
Approach LOS					D	B	

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	2	3	52	4	89	4	225	55	113	268	87
Future Volume (Veh/h)	31	2	3	52	4	89	4	225	55	113	268	87
Sign Control		Stop			Stop			Free			Free	
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)	31	2	3	52	4	89	4	225	55	113	268	87
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	862	826	312	758	842	252	355			280		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	862	826	312	758	842	252	355			280		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	99	100	83	99	89	100			91		
cM capacity (veh/h)	225	279	729	298	274	786	1204			1283		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	36	145	4	280	113	355
Volume Left	31	52	4	0	113	0
Volume Right	3	89	0	55	0	87
cSH	241	479	1204	1700	1283	1700
Volume to Capacity	0.15	0.30	0.00	0.16	0.09	0.21
Queue Length 95th (m)	3.9	9.6	0.1	0.0	2.2	0.0
Control Delay (s)	22.5	15.7	8.0	0.0	8.1	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	22.5	15.7	0.1		2.0	
Approach LOS	C	C				

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	42.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	66	313	5	0	468
Future Volume (Veh/h)	0	66	313	5	0	468
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	66	313	5	0	468
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	784	316			318	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	784	316			318	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	91			100	
cM capacity (veh/h)	362	725			1242	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	66	318	468
Volume Left	0	0	0
Volume Right	66	5	0
cSH	725	1700	1700
Volume to Capacity	0.09	0.19	0.28
Queue Length 95th (m)	2.3	0.0	0.0
Control Delay (s)	10.5	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.5	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	450	88	64	375	415	204
Future Volume (vph)	450	88	64	375	415	204
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	450	88	64	375	415	204

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	538	439	619
Volume Left (vph)	450	64	0
Volume Right (vph)	88	0	204
Hadj (s)	0.12	0.11	-0.16
Departure Headway (s)	6.9	7.1	6.7
Degree Utilization, x	1.04	0.86	1.15
Capacity (veh/h)	523	503	551
Control Delay (s)	76.2	40.4	109.8
Approach Delay (s)	76.2	40.4	109.8
Approach LOS	F	E	F

Intersection Summary			
Delay	79.4		
Level of Service	F		
Intersection Capacity Utilization	102.7%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	55	38	738	47	65	658
Future Volume (Veh/h)	55	38	738	47	65	658
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	55	38	738	47	65	658
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	1220	392			785	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1220	392			785	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	65	94			92	
cM capacity (veh/h)	159	606			829	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	93	492	293	65	329	329
Volume Left	55	0	0	65	0	0
Volume Right	38	0	47	0	0	0
cSH	227	1700	1700	829	1700	1700
Volume to Capacity	0.41	0.29	0.17	0.08	0.19	0.19
Queue Length 95th (m)	14.2	0.0	0.0	1.9	0.0	0.0
Control Delay (s)	31.4	0.0	0.0	9.7	0.0	0.0
Lane LOS	D			A		
Approach Delay (s)	31.4	0.0		0.9		
Approach LOS	D					

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	439	157	31	180	164	37	161	46	292	407	4
Future Volume (vph)	189	439	157	31	180	164	37	161	46	292	407	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1679	1802	1502	1695	1640		1679	1614		1712	1684	
Flt Permitted	0.30	1.00	1.00	0.51	1.00		0.37	1.00		0.63	1.00	
Satd. Flow (perm)	533	1802	1502	906	1640		655	1614		1132	1684	
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)	189	439	157	31	180	164	37	161	46	292	407	4
RTOR Reduction (vph)	0	0	83	0	34	0	0	12	0	0	1	0
Lane Group Flow (vph)	189	439	74	31	310	0	37	195	0	292	410	0
Heavy Vehicles (%)	3%	1%	3%	2%	4%	2%	3%	11%	2%	1%	8%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	34.5	34.5	34.5	19.6	19.6		25.7	25.7		25.7	25.7	
Effective Green, g (s)	34.5	34.5	34.5	19.6	19.6		25.7	25.7		25.7	25.7	
Actuated g/C Ratio	0.47	0.47	0.47	0.27	0.27		0.35	0.35		0.35	0.35	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	405	846	705	241	437		229	565		396	589	
v/s Ratio Prot	0.06	c0.24			c0.19			0.12			0.24	
v/s Ratio Perm	0.16		0.05	0.03			0.06			c0.26		
v/c Ratio	0.47	0.52	0.10	0.13	0.71		0.16	0.35		0.74	0.70	
Uniform Delay, d1	12.7	13.6	10.8	20.4	24.3		16.4	17.6		20.9	20.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.5	0.1	0.2	5.2		0.3	0.4		7.0	3.6	
Delay (s)	13.5	14.2	10.9	20.7	29.5		16.8	18.0		27.9	24.1	
Level of Service	B	B	B	C	C		B	B		C	C	
Approach Delay (s)		13.4			28.8			17.8			25.7	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	18.2
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	96	66	0	0	67
Future Volume (Veh/h)	50	96	66	0	0	67
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	96	66	0	0	67
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	66				262	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66				262	66
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	93
cM capacity (veh/h)	1536				703	998

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	146	66	67
Volume Left	50	0	0
Volume Right	0	0	67
cSH	1536	1700	998
Volume to Capacity	0.03	0.04	0.07
Queue Length 95th (m)	0.8	0.0	1.6
Control Delay (s)	2.7	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	2.7	0.0	8.9
Approach LOS			A

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	83	49	0	0	17
Future Volume (Veh/h)	13	83	49	0	0	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	83	49	0	0	17
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	49				158	49
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	49				158	49
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	98
cM capacity (veh/h)	1558				826	1020

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	96	49	17
Volume Left	13	0	0
Volume Right	0	0	17
cSH	1558	1700	1020
Volume to Capacity	0.01	0.03	0.02
Queue Length 95th (m)	0.2	0.0	0.4
Control Delay (s)	1.0	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	1.0	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	200	16	8	298	56	56	28	28	13	8	191
Future Volume (vph)	139	200	16	8	298	56	56	28	28	13	8	191
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			5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98			0.97		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1695	1764		1695	1742			1682		1695	1527	
Flt Permitted	0.40	1.00		0.62	1.00			0.81		0.68	1.00	
Satd. Flow (perm)	719	1764		1112	1742			1391		1222	1527	
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)	139	200	16	8	298	56	56	28	28	13	8	191
RTOR Reduction (vph)	0	5	0	0	12	0	0	14	0	0	93	0
Lane Group Flow (vph)	139	211	0	8	342	0	0	98	0	13	106	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)	16.2	16.2		16.2	16.2			29.4		29.4	29.4	
Effective Green, g (s)	16.2	16.2		16.2	16.2			29.4		29.4	29.4	
Actuated g/C Ratio	0.28	0.28		0.28	0.28			0.51		0.51	0.51	
Clearance Time (s)	5.7	5.7		5.7	5.7			5.8		5.8	5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	203	500		315	494			716		629	786	
v/s Ratio Prot		0.12			c0.20						0.07	
v/s Ratio Perm	0.19			0.01				c0.07		0.01		
v/c Ratio	0.68	0.42		0.03	0.69			0.14		0.02	0.14	
Uniform Delay, d1	18.2	16.6		14.8	18.2			7.2		6.8	7.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	9.2	0.6		0.0	4.2			0.4		0.1	0.4	
Delay (s)	27.4	17.2		14.8	22.4			7.6		6.9	7.6	
Level of Service	C	B		B	C			A		A	A	
Approach Delay (s)		21.2			22.2			7.6			7.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	11.5
Intersection Capacity Utilization	68.9%	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 (veh/h)	26	4	5	109	1	72	2	284	40	96	294	12
Future Volume (Veh/h)	26	4	5	109	1	72	2	284	40	96	294	12
Sign Control		Stop			Stop			Free			Free	
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)	26	4	5	109	1	72	2	284	40	96	294	12
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	852	820	300	801	806	304	306			324		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	852	820	300	801	806	304	306			324		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	89	99	99	61	100	90	100			92		
cM capacity (veh/h)	236	285	740	279	291	736	1255			1236		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	35	182	2	324	96	306
Volume Left	26	109	2	0	96	0
Volume Right	5	72	0	40	0	12
cSH	267	370	1255	1700	1236	1700
Volume to Capacity	0.13	0.49	0.00	0.19	0.08	0.18
Queue Length 95th (m)	3.4	19.8	0.0	0.0	1.9	0.0
Control Delay (s)	20.5	23.8	7.9	0.0	8.2	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	20.5	23.8	0.0		1.9	
Approach LOS	C	C				

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	257	61	84	382	228	196
Future Volume (vph)	257	61	84	382	228	196
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2	5.5	5.5	5.5	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1679	1517	1695	1733	1784	1517
Flt Permitted	0.95	1.00	0.62	1.00	1.00	1.00
Satd. Flow (perm)	1679	1517	1100	1733	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	257	61	84	382	228	196
RTOR Reduction (vph)	0	47	0	0	0	81
Lane Group Flow (vph)	257	14	84	382	228	115
Heavy Vehicles (%)	3%	2%	2%	5%	2%	2%
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	14.3	14.3	35.7	35.7	35.7	35.7
Effective Green, g (s)	14.3	14.3	35.7	35.7	35.7	35.7
Actuated g/C Ratio	0.24	0.24	0.59	0.59	0.59	0.59
Clearance Time (s)	5.2	5.2	5.5	5.5	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	395	357	646	1019	1049	892
v/s Ratio Prot	c0.15			c0.22	0.13	
v/s Ratio Perm		0.01	0.08			0.08
v/c Ratio	0.65	0.04	0.13	0.37	0.22	0.13
Uniform Delay, d1	20.9	17.9	5.6	6.6	5.9	5.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.0	0.4	1.1	0.5	0.3
Delay (s)	24.8	18.0	6.0	7.7	6.4	5.9
Level of Service	C	B	A	A	A	A
Approach Delay (s)	23.5			7.4	6.1	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	60.7	Sum of lost time (s)	10.7
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	158	33	44	448	292	37	377	124	131	126	2
Future Volume (vph)	109	158	33	44	448	292	37	377	124	131	126	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1616	1733	1547	1695	1408		1679	1594		1530	1493	
Flt Permitted	0.10	1.00	1.00	0.66	1.00		0.67	1.00		0.21	1.00	
Satd. Flow (perm)	165	1733	1547	1172	1408		1193	1594		331	1493	
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)	109	158	33	44	448	292	37	377	124	131	126	2
RTOR Reduction (vph)	0	0	15	0	21	0	0	11	0	0	1	0
Lane Group Flow (vph)	109	158	18	44	719	0	37	490	0	131	127	0
Heavy Vehicles (%)	7%	5%	0%	2%	35%	1%	3%	7%	19%	13%	22%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	59.5	59.5	59.5	49.5	49.5		37.3	37.3		37.3	37.3	
Effective Green, g (s)	59.5	59.5	59.5	49.5	49.5		37.3	37.3		37.3	37.3	
Actuated g/C Ratio	0.54	0.54	0.54	0.45	0.45		0.34	0.34		0.34	0.34	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	155	937	836	527	633		404	540		112	506	
v/s Ratio Prot	c0.03	0.09			c0.51			0.31			0.09	
v/s Ratio Perm	0.35		0.01	0.04			0.03			c0.40		
v/c Ratio	0.70	0.17	0.02	0.08	1.14		0.09	0.91		1.17	0.25	
Uniform Delay, d1	21.5	12.8	11.7	17.3	30.2		24.8	34.7		36.4	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.5	0.1	0.0	0.1	79.2		0.1	19.0		137.7	0.3	
Delay (s)	35.0	12.8	11.7	17.4	109.4		24.9	53.7		174.1	26.5	
Level of Service	C	B	B	B	F		C	D		F	C	
Approach Delay (s)		20.8			104.2			51.7			101.2	
Approach LOS		C			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	75.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.2
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	39	508	4	0	400
Future Volume (Veh/h)	0	39	508	4	0	400
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	39	508	4	0	400
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	910	510			512	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	910	510			512	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	305	563			1053	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	39	512	400
Volume Left	0	0	0
Volume Right	39	4	0
cSH	563	1700	1700
Volume to Capacity	0.07	0.30	0.24
Queue Length 95th (m)	1.7	0.0	0.0
Control Delay (s)	11.9	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.9	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	95	115	0	0	40
Future Volume (Veh/h)	33	95	115	0	0	40
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	33	95	115	0	0	40
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	115				276	115
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	115				276	115
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	96
cM capacity (veh/h)	1474				698	937

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	128	115	40
Volume Left	33	0	0
Volume Right	0	0	40
cSH	1474	1700	937
Volume to Capacity	0.02	0.07	0.04
Queue Length 95th (m)	0.5	0.0	1.0
Control Delay (s)	2.1	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	2.1	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	87	129	0	0	10
Future Volume (Veh/h)	8	87	129	0	0	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	87	129	0	0	10
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	129				232	129
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	129				232	129
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1457				752	921

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	95	129	10
Volume Left	8	0	0
Volume Right	0	0	10
cSH	1457	1700	921
Volume to Capacity	0.01	0.08	0.01
Queue Length 95th (m)	0.1	0.0	0.3
Control Delay (s)	0.7	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	206	460	59	30	200	21	34	17	17	14	30	193
Future Volume (vph)	206	460	59	30	200	21	34	17	17	14	30	193
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	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99			0.97		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1695	1754		1695	1759			1682		1695	1553	
Flt Permitted	0.62	1.00		0.40	1.00			0.76		0.71	1.00	
Satd. Flow (perm)	1107	1754		710	1759			1313		1272	1553	
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)	206	460	59	30	200	21	34	17	17	14	30	193
RTOR Reduction (vph)	0	10	0	0	8	0	0	13	0	0	145	0
Lane Group Flow (vph)	206	509	0	30	213	0	0	55	0	14	78	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)	13.3	13.3		13.3	13.3			7.0		7.0	7.0	
Effective Green, g (s)	13.3	13.3		13.3	13.3			7.0		7.0	7.0	
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.25		0.25	0.25	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	520	824		333	826			324		314	384	
v/s Ratio Prot		c0.29			0.12						c0.05	
v/s Ratio Perm	0.19			0.04				0.04		0.01		
v/c Ratio	0.40	0.62		0.09	0.26			0.17		0.04	0.20	
Uniform Delay, d1	4.9	5.6		4.2	4.5			8.4		8.1	8.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.4		0.1	0.2			0.3		0.1	0.3	
Delay (s)	5.4	7.0		4.3	4.7			8.6		8.2	8.7	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		6.5			4.6			8.6			8.7	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	28.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.3%	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 (veh/h)	31	2	3	74	4	117	4	220	64	169	283	87
Future Volume (Veh/h)	31	2	3	74	4	117	4	220	64	169	283	87
Sign Control		Stop			Stop			Free			Free	
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)	31	2	3	74	4	117	4	220	64	169	283	87
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	1012	956	326	885	968	252	370			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1012	956	326	885	968	252	370			284		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	99	100	69	98	85	100			87		
cM capacity (veh/h)	164	223	715	235	220	787	1189			1278		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	36	195	4	284	169	370
Volume Left	31	74	4	0	169	0
Volume Right	3	117	0	64	0	87
cSH	178	405	1189	1700	1278	1700
Volume to Capacity	0.20	0.48	0.00	0.17	0.13	0.22
Queue Length 95th (m)	5.5	19.3	0.1	0.0	3.5	0.0
Control Delay (s)	30.3	21.9	8.0	0.0	8.2	0.0
Lane LOS	D	C	A		A	
Approach Delay (s)	30.3	21.9	0.1		2.6	
Approach LOS	D	C				

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	66	415	5	0	540
Future Volume (Veh/h)	0	66	415	5	0	540
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	66	415	5	0	540
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	958	418			420	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	958	418			420	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			100	
cM capacity (veh/h)	286	635			1139	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	66	420	540
Volume Left	0	0	0
Volume Right	66	5	0
cSH	635	1700	1700
Volume to Capacity	0.10	0.25	0.32
Queue Length 95th (m)	2.6	0.0	0.0
Control Delay (s)	11.3	0.0	0.0
Lane LOS	B		
Approach Delay (s)	11.3	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	485	99	78	383	422	222
Future Volume (vph)	485	99	78	383	422	222
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	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1679	1517	1695	1733	1784	1517
Flt Permitted	0.95	1.00	0.43	1.00	1.00	1.00
Satd. Flow (perm)	1679	1517	773	1733	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	485	99	78	383	422	222
RTOR Reduction (vph)	0	63	0	0	0	137
Lane Group Flow (vph)	485	36	78	383	422	85
Heavy Vehicles (%)	3%	2%	2%	5%	2%	2%
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Actuated Green, G (s)	17.1	17.1	18.1	18.1	18.1	18.1
Effective Green, g (s)	17.1	17.1	18.1	18.1	18.1	18.1
Actuated g/C Ratio	0.36	0.36	0.38	0.38	0.38	0.38
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)	608	549	296	664	684	581
v/s Ratio Prot				0.22	c0.24	
v/s Ratio Perm	c0.29	0.02	0.10			0.06
v/c Ratio	0.80	0.07	0.26	0.58	0.62	0.15
Uniform Delay, d1	13.5	9.8	10.0	11.5	11.8	9.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.2	0.1	2.2	3.6	4.1	0.5
Delay (s)	20.7	9.9	12.1	15.1	15.9	10.0
Level of Service	C	A	B	B	B	B
Approach Delay (s)	18.9			14.6	13.9	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.4%	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)	189	473	157	36	217	191	37	172	51	341	427	4
Future Volume (vph)	189	473	157	36	217	191	37	172	51	341	427	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		6.7	6.7	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1679	1802	1502	1695	1642		1679	1613		1712	1684	
Flt Permitted	0.23	1.00	1.00	0.49	1.00		0.36	1.00		0.61	1.00	
Satd. Flow (perm)	410	1802	1502	878	1642		629	1613		1093	1684	
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)	189	473	157	36	217	191	37	172	51	341	427	4
RTOR Reduction (vph)	0	0	84	0	33	0	0	11	0	0	1	0
Lane Group Flow (vph)	189	473	73	36	375	0	37	212	0	341	430	0
Heavy Vehicles (%)	3%	1%	3%	2%	4%	2%	3%	11%	2%	1%	8%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	38.7	38.7	38.7	23.8	23.8		31.7	31.7		31.7	31.7	
Effective Green, g (s)	38.7	38.7	38.7	23.8	23.8		31.7	31.7		31.7	31.7	
Actuated g/C Ratio	0.46	0.46	0.46	0.28	0.28		0.38	0.38		0.38	0.38	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		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)	340	834	695	249	467		238	611		414	638	
v/s Ratio Prot	0.07	c0.26			c0.23			0.13			0.26	
v/s Ratio Perm	0.19		0.05	0.04			0.06			c0.31		
v/c Ratio	0.56	0.57	0.10	0.14	0.80		0.16	0.35		0.82	0.67	
Uniform Delay, d1	15.5	16.4	12.7	22.3	27.7		17.1	18.5		23.4	21.6	
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	0.9	0.1	0.3	9.6		0.3	0.3		12.5	2.8	
Delay (s)	17.5	17.2	12.7	22.6	37.4		17.4	18.9		35.9	24.5	
Level of Service	B	B	B	C	D		B	B		D	C	
Approach Delay (s)		16.4			36.2			18.7			29.5	
Approach LOS		B			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	83.6	Sum of lost time (s)	18.2
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	179	66	0	0	67
Future Volume (Veh/h)	50	179	66	0	0	67
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	179	66	0	0	67
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	66				345	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	66				345	66
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	93
cM capacity (veh/h)	1536				630	998

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	229	66	67
Volume Left	50	0	0
Volume Right	0	0	67
cSH	1536	1700	998
Volume to Capacity	0.03	0.04	0.07
Queue Length 95th (m)	0.8	0.0	1.6
Control Delay (s)	1.8	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	1.8	0.0	8.9
Approach LOS			A

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	167	49	0	0	17
Future Volume (Veh/h)	13	167	49	0	0	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	167	49	0	0	17
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	49				242	49
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	49				242	49
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	98
cM capacity (veh/h)	1558				740	1020

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	180	49	17
Volume Left	13	0	0
Volume Right	0	0	17
cSH	1558	1700	1020
Volume to Capacity	0.01	0.03	0.02
Queue Length 95th (m)	0.2	0.0	0.4
Control Delay (s)	0.6	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	0.6	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

City of Ottawa - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	Mer Bleue Road	Direction (EW or NS)	NS	Road Authority:	City of Ottawa
Side Street (name)	Renaud Road	Direction (EW or NS)	EW	City:	Orleans
Quadrant / Int #		Comments	2024 Analysis	Analysis Date:	Septembre 23rd, 2020
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2020 May 12, Tue
				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
Mer Bleue Road	NB		1						10,000	1			
Mer Bleue Road	SB					1			10,000	1			
Renaud Road	WB								10,000	0			
Renaud Road	EB				1				10,000	1			

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

Are the Renaud Road EB right turns significantly impeded by through movements? (y/n) n

Are the Mer Bleue Road SB right turns significantly impeded by through movements? (y/n) n

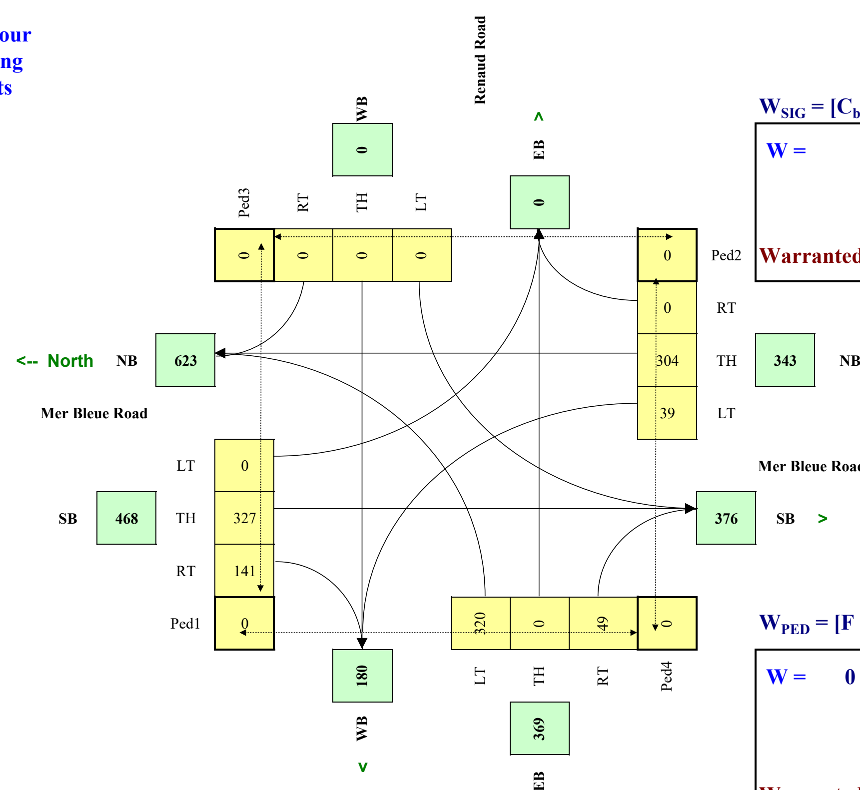
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	1,000,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Mer Bleue Road	NS	60	5.0%	n	0.0
Renaud Road	EW		5.0%	n	0.0

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	69	374	0	0	208	194	0	0	0	295	0	32				
	22	331	0	0	337	113	0	0	0	367	0	26				
	10	241	0	0	195	77	0	0	0	151	0	15				
	3	158	0	0	409	40	0	0	0	168	0	12				
	81	352	0	0	405	187	0	0	0	460	0	131				
	50	367	0	0	407	235	0	0	0	476	0	78				
Total (6-hour peak)	**235**	**1,823**	**0**	**0**	**1,961**	**846**	**0**	**0**	**0**	**1,917**	**0**	**294**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**39**	**304**	**0**	**0**	**327**	**141**	**0**	**0**	**0**	**320**	**0**	**49**	**0**	**0**	**0**	**0**
Actual Pedestrian Crossing Distance (m)																

Average 6-hour Peak Turning Movements



$W_{SIG} = [C_{bt}(X_{v-v}) / K_1 + (F (X_{v-p}) L) / K_2] \times C_i$

W = 148 148 0

Veh *Ped*

Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 0

Warranted - Complex Intersection

City of Ottawa - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	**Mer Bleue Road**	**Direction (EW or NS)**	**NS**	**Road Authority:**	**City of Ottawa**
Side Street (name)	**Renaud Road**	**Direction (EW or NS)**	**EW**	**City:**	**Orleans**
Quadrant / Int #		**Comments**	**2029 Analysis**	**Analysis Date:**	**Septembre 23rd, 2020**
for Warrant Calculation Results, please hit 'Page Down'	**CHECK SHEET**			**Count Date:**	**2020 May 12, Tue**
				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
Mer Bleue Road	NB		1						10,000	1			
Mer Bleue Road	SB					1			10,000	1			
Renaud Road	WB								10,000	0			
Renaud Road	EB				1				10,000	1			

	Saturation Flow Rates (if not default) (vphpl)	Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

	n
Are the Renaud Road EB right turns significantly impeded by through movements? (y/n)	n
Are the Mer Bleue Road SB right turns significantly impeded by through movements? (y/n)	n

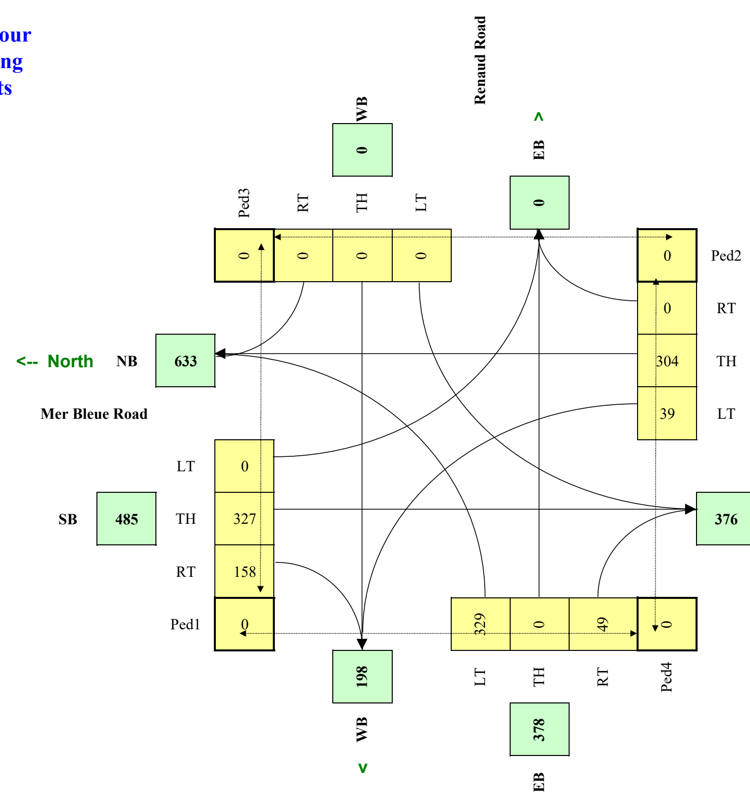
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	1,000,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Mer Bleue Road	NS	60	5.0%	n	0.0
Renaud Road	EW		5.0%	n	0.0

Set Peak Hours

Traffic Input	**NB**			**SB**			**WB**			**EB**			**Ped1** **NS**	**Ped2** **NS**	**Ped3** **EW**	**Ped4** **EW**
	LT	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**W Side**	**E Side**	**N Side**	**S Side**
press 'Set Peak Hours' Button to set the peak hour periods	69	374	0	0	208	206	0	0	0	308	0	32				
	22	331	0	0	337	121	0	0	0	383	0	26				
	10	241	0	0	195	86	0	0	0	155	0	15				
	3	158	0	0	409	43	0	0	0	175	0	12				
	81	352	0	0	405	219	0	0	0	468	0	131				
	50	367	0	0	407	275	0	0	0	484	0	78				
Total (6-hour peak)	**235**	**1,823**	**0**	**0**	**1,961**	**950**	**0**	**0**	**0**	**1,973**	**0**	**294**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**39**	**304**	**0**	**0**	**327**	**158**	**0**	**0**	**0**	**329**	**0**	**49**	**0**	**0**	**0**	**0**
Actual Pedestrian Crossing Distance (m)																

Average 6-hour Peak Turning Movements



$W_{SIG} = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\ (X_{v\text{-}p})\ L) / K_2] \times C_i$

W =	**152**	**152**	**0**
		Veh	***Ped***

Warranted

RESET SHEET

$W_{PED} = [F\ ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 0

Warranted - Complex Intersection

Appendix J: Sidra Intersection Capacity Analysis
2024 Design Forecast, 2029 Design Forecast

MOVEMENT SUMMARY

Site: 2024 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	138	2.0	0.264	10.0	LOS B	1.6	12.6	0.29	0.55	56.1
18	R2	225	2.0	0.264	4.6	LOS A	1.6	12.6	0.29	0.55	57.5
Approach		363	2.0	0.264	6.6	LOS A	1.6	12.6	0.29	0.55	57.1
East: Brian Coburn											
1	L2	157	2.0	0.461	10.4	LOS B	3.4	26.5	0.45	0.55	58.1
6	T1	451	2.0	0.461	5.3	LOS A	3.4	26.5	0.45	0.55	59.4
Approach		608	2.0	0.461	6.6	LOS A	3.4	26.5	0.45	0.55	59.1
West: Brian Coburn											
2	T1	85	2.0	0.227	5.2	LOS A	1.3	9.9	0.38	0.52	60.8
12	R2	194	2.0	0.227	4.9	LOS A	1.3	9.9	0.38	0.52	55.4
Approach		279	2.0	0.227	5.0	LOS A	1.3	9.9	0.38	0.52	57.7
All Vehicles		1250	2.0	0.461	6.3	LOS A	3.4	26.5	0.39	0.54	58.3

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: 2024 Design AM - Mer Bleue / Brian Coburn

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

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	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	17	2.0	0.284	11.5	LOS B	1.2	9.3	0.50	0.53	60.5
8	T1	510	2.0	0.284	5.4	LOS A	1.2	9.5	0.50	0.52	58.8
18	R2	92	2.0	0.284	5.1	LOS A	1.2	9.5	0.49	0.51	57.1
Approach		619	2.0	0.284	5.5	LOS A	1.2	9.5	0.50	0.52	58.6
East: Brian Coburn											
1	L2	51	2.0	1.155	90.3	LOS F	54.7	423.0	1.00	3.08	25.7
6	T1	455	2.0	1.155	84.3	LOS F	54.7	423.0	1.00	3.08	31.8
16	R2	468	2.0	1.155	84.3	LOS F	54.7	423.0	1.00	3.08	26.1
Approach		974	2.0	1.155	84.6	LOS F	54.7	423.0	1.00	3.08	29.0
North: Mer Bleue											
7	L2	151	2.0	0.274	11.5	LOS B	1.3	10.2	0.58	0.70	56.8
4	T1	260	2.0	0.274	5.3	LOS A	1.4	10.7	0.57	0.60	57.7
14	R2	137	2.0	0.274	5.1	LOS A	1.4	10.7	0.57	0.53	59.1
Approach		548	2.0	0.274	7.0	LOS A	1.4	10.7	0.57	0.61	57.9
West: Brian Coburn											
5	L2	171	2.0	0.327	11.7	LOS B	1.5	11.2	0.55	0.71	59.0
2	T1	121	2.0	0.327	5.7	LOS A	1.5	11.2	0.55	0.71	58.9
12	R2	15	2.0	0.327	5.6	LOS A	1.5	11.2	0.55	0.71	57.3
Approach		307	2.0	0.327	9.0	LOS A	1.5	11.2	0.55	0.71	58.9
All Vehicles		2448	2.0	1.155	37.7	LOS D	54.7	423.0	0.72	1.58	41.1

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: 2024 Design AM - Brian Coburn / Navan

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: Navan											
8	T1	625	3.0	0.548	6.4	LOS A	4.5	35.2	0.60	0.61	56.2
18	R2	15	3.0	0.548	6.0	LOS A	4.5	35.2	0.60	0.61	55.0
Approach		640	3.0	0.548	6.4	LOS A	4.5	35.2	0.60	0.61	56.2
East: Brian Coburn											
1	L2	135	3.0	0.963	31.5	LOS C	17.6	137.2	1.00	1.54	42.9
16	R2	561	3.0	0.963	27.2	LOS C	17.6	137.2	1.00	1.54	42.4
Approach		696	3.0	0.963	28.1	LOS C	17.6	137.2	1.00	1.54	42.5
North: Navan											
7	L2	177	3.0	0.386	9.8	LOS A	3.0	23.2	0.49	0.59	55.5
4	T1	281	3.0	0.386	5.9	LOS A	3.0	23.2	0.49	0.59	55.9
Approach		458	3.0	0.386	7.4	LOS A	3.0	23.2	0.49	0.59	55.7
All Vehicles		1794	3.0	0.963	15.1	LOS B	17.6	137.2	0.73	0.96	49.9

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: 2024 Design PM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	100	2.0	0.296	10.4	LOS B	1.8	14.0	0.42	0.58	56.1
18	R2	267	2.0	0.296	5.0	LOS A	1.8	14.0	0.42	0.58	57.5
Approach		367	2.0	0.296	6.5	LOS A	1.8	14.0	0.42	0.58	57.3
East: Brian Coburn											
1	L2	218	2.0	0.304	10.1	LOS B	2.0	15.2	0.33	0.56	57.8
6	T1	194	2.0	0.304	5.0	LOS A	2.0	15.2	0.33	0.56	59.0
Approach		412	2.0	0.304	7.7	LOS A	2.0	15.2	0.33	0.56	58.4
West: Brian Coburn											
2	T1	162	2.0	0.332	5.6	LOS A	2.0	15.2	0.47	0.56	60.3
12	R2	229	2.0	0.332	5.3	LOS A	2.0	15.2	0.47	0.56	54.8
Approach		391	2.0	0.332	5.4	LOS A	2.0	15.2	0.47	0.56	57.8
All Vehicles		1170	2.0	0.332	6.5	LOS A	2.0	15.2	0.41	0.57	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: 2024 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	30	2.0	0.418	13.3	LOS B	1.8	13.9	0.68	0.73	59.5
8	T1	573	2.0	0.418	6.8	LOS A	1.9	14.6	0.67	0.69	57.6
18	R2	102	2.0	0.418	6.2	LOS A	1.9	14.6	0.66	0.64	56.1
Approach		705	2.0	0.418	7.0	LOS A	1.9	14.6	0.67	0.68	57.5
East: Brian Coburn											
1	L2	58	2.0	0.654	14.4	LOS B	4.2	32.7	0.79	0.94	56.7
6	T1	180	2.0	0.654	8.5	LOS A	4.2	32.7	0.79	0.94	59.1
16	R2	288	2.0	0.654	8.4	LOS A	4.2	32.7	0.79	0.94	55.4
Approach		526	2.0	0.654	9.1	LOS A	4.2	32.7	0.79	0.94	57.0
North: Mer Bleue											
7	L2	547	2.0	0.510	11.3	LOS B	3.3	25.4	0.59	0.73	55.1
4	T1	473	2.0	0.510	5.0	LOS A	3.4	26.3	0.57	0.51	58.4
14	R2	205	2.0	0.510	5.0	LOS A	3.4	26.3	0.57	0.50	59.0
Approach		1225	2.0	0.510	7.8	LOS A	3.4	26.3	0.58	0.61	57.0
West: Brian Coburn											
5	L2	106	2.0	0.615	14.8	LOS B	3.2	24.6	0.78	0.93	58.5
2	T1	299	2.0	0.615	8.8	LOS A	3.2	24.6	0.78	0.93	58.4
12	R2	10	2.0	0.615	8.7	LOS A	3.2	24.6	0.78	0.93	56.8
Approach		415	2.0	0.615	10.3	LOS B	3.2	24.6	0.78	0.93	58.4
All Vehicles		2871	2.0	0.654	8.2	LOS A	4.2	32.7	0.67	0.73	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.

Organisation: CASTLEGLENN CONSULTANTS | Processed: Monday, December 07, 2020 3:06:56 PM
Project: R:\CastleGlenn\Projects\Ontario Projects\Ottawa\7252 - Terrace Flats - Richcraft TE TIA\Traffic\Sidra\2024 Development\08-Terrace Flats 2024 Design PM Analysis - Dec 7 2020.sip6

MOVEMENT SUMMARY

Site: 2024 Design PM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	393	3.0	0.675	11.1	LOS B	5.7	44.2	0.92	1.05	54.0
18	R2	87	3.0	0.675	10.7	LOS B	5.7	44.2	0.92	1.05	52.9
Approach		480	3.0	0.675	11.0	LOS B	5.7	44.2	0.92	1.05	53.8
East: Brian Coburn											
1	L2	86	3.0	0.395	11.2	LOS B	2.4	18.5	0.69	0.81	55.8
16	R2	253	3.0	0.395	7.0	LOS A	2.4	18.5	0.69	0.81	55.0
Approach		339	3.0	0.395	8.0	LOS A	2.4	18.5	0.69	0.81	55.2
North: Navan											
7	L2	558	3.0	0.942	11.1	LOS B	32.2	251.3	1.00	0.54	53.6
4	T1	742	3.0	0.942	7.2	LOS A	32.2	251.3	1.00	0.54	53.9
Approach		1300	3.0	0.942	8.9	LOS A	32.2	251.3	1.00	0.54	53.8
All Vehicles		2119	3.0	0.942	9.2	LOS A	32.2	251.3	0.93	0.70	54.0

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: 2029 Development AM - Mer Bleue/Decoeur

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: Mer Bleue											
3	L2	8	3.0	0.546	10.8	LOS B	4.8	37.4	0.52	0.47	58.7
8	T1	706	3.0	0.546	5.0	LOS A	4.8	37.4	0.52	0.47	58.6
18	R2	26	3.0	0.546	4.8	LOS A	4.8	37.4	0.52	0.47	56.9
Approach		740	3.0	0.546	5.1	LOS A	4.8	37.4	0.52	0.47	58.5
East: Decoeur											
1	L2	70	3.0	0.194	12.6	LOS B	0.8	6.6	0.66	0.82	56.7
6	T1	20	3.0	0.194	6.8	LOS A	0.8	6.6	0.66	0.82	56.6
16	R2	57	3.0	0.194	6.6	LOS A	0.8	6.6	0.66	0.82	55.0
Approach		147	3.0	0.194	9.5	LOS A	0.8	6.6	0.66	0.82	56.0
North: Mer Bleue											
7	L2	25	3.0	0.266	10.4	LOS B	1.7	13.5	0.33	0.45	59.7
4	T1	305	3.0	0.266	4.6	LOS A	1.7	13.5	0.33	0.45	59.6
14	R2	33	3.0	0.266	4.4	LOS A	1.7	13.5	0.33	0.45	57.8
Approach		363	3.0	0.266	4.9	LOS A	1.7	13.5	0.33	0.45	59.4
West: Axis Way											
5	L2	101	3.0	0.124	11.4	LOS B	0.5	4.3	0.49	0.71	56.0
2	T1	8	3.0	0.124	5.6	LOS A	0.5	4.3	0.49	0.71	55.9
12	R2	20	3.0	0.124	5.5	LOS A	0.5	4.3	0.49	0.71	54.3
Approach		129	3.0	0.124	10.1	LOS B	0.5	4.3	0.49	0.71	55.7
All Vehicles		1379	3.0	0.546	6.0	LOS A	4.8	37.4	0.48	0.53	58.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2029 Development AM - Brian Coburn / Fern Casey (2-lane)

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	179	2.0	0.314	10.0	LOS B	2.1	16.2	0.31	0.55	55.9
18	R2	257	2.0	0.314	4.6	LOS A	2.1	16.2	0.31	0.55	57.3
Approach		436	2.0	0.314	6.8	LOS A	2.1	16.2	0.31	0.55	56.9
East: Brian Coburn											
1	L2	174	2.0	0.496	10.7	LOS B	3.7	28.8	0.53	0.58	57.7
6	T1	451	2.0	0.496	5.6	LOS A	3.7	28.8	0.53	0.58	59.0
Approach		625	2.0	0.496	7.0	LOS A	3.7	28.8	0.53	0.58	58.7
West: Brian Coburn											
2	T1	85	2.0	0.245	5.3	LOS A	1.4	11.0	0.41	0.53	60.7
12	R2	210	2.0	0.245	5.0	LOS A	1.4	11.0	0.41	0.53	55.2
Approach		295	2.0	0.245	5.1	LOS A	1.4	11.0	0.41	0.53	57.4
All Vehicles		1356	2.0	0.496	6.5	LOS A	3.7	28.8	0.43	0.56	58.0

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: 2029 Development AM - Brian Coburn / Fern Casey (4-lane BCB)

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	179	2.0	0.163	9.9	LOS A	0.7	5.6	0.22	0.62	53.9
18	R2	257	2.0	0.163	4.7	LOS A	0.7	5.7	0.21	0.51	58.5
Approach		436	2.0	0.163	6.8	LOS A	0.7	5.7	0.21	0.55	56.9
East: Brian Coburn											
1	L2	174	2.0	0.253	10.3	LOS B	1.1	8.8	0.33	0.61	57.6
6	T1	451	2.0	0.253	5.1	LOS A	1.1	8.9	0.33	0.51	60.1
Approach		625	2.0	0.253	6.5	LOS A	1.1	8.9	0.33	0.54	59.4
West: Brian Coburn											
2	T1	85	2.0	0.089	5.3	LOS A	0.3	2.7	0.32	0.48	60.6
12	R2	210	2.0	0.168	5.0	LOS A	0.7	5.6	0.31	0.53	55.6
Approach		295	2.0	0.168	5.1	LOS A	0.7	5.6	0.31	0.52	57.6
All Vehicles		1356	2.0	0.253	6.3	LOS A	1.1	8.9	0.29	0.54	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: 2029 Development AM - Mer Bleue / Brian Coburn (2-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	17	2.0	0.323	11.6	LOS B	1.4	10.9	0.54	0.54	60.3
8	T1	566	2.0	0.323	5.5	LOS A	1.4	11.2	0.53	0.53	58.6
18	R2	104	2.0	0.323	5.2	LOS A	1.4	11.2	0.52	0.52	56.9
Approach		687	2.0	0.323	5.6	LOS A	1.4	11.2	0.53	0.53	58.4
East: Brian Coburn											
1	L2	51	2.0	1.219	117.9	LOS F	67.1	518.6	1.00	3.65	21.4
6	T1	458	2.0	1.219	111.9	LOS F	67.1	518.6	1.00	3.65	27.2
16	R2	468	2.0	1.219	111.8	LOS F	67.1	518.6	1.00	3.65	21.9
Approach		977	2.0	1.219	112.2	LOS F	67.1	518.6	1.00	3.65	24.5
North: Mer Bleue											
7	L2	151	2.0	0.288	11.4	LOS B	1.4	10.9	0.58	0.69	56.9
4	T1	284	2.0	0.288	5.3	LOS A	1.5	11.4	0.57	0.60	57.7
14	R2	150	2.0	0.288	5.1	LOS A	1.5	11.4	0.57	0.53	59.1
Approach		585	2.0	0.288	6.8	LOS A	1.5	11.4	0.57	0.60	58.0
West: Brian Coburn											
5	L2	198	2.0	0.369	11.8	LOS B	1.7	13.0	0.57	0.73	58.8
2	T1	128	2.0	0.369	5.9	LOS A	1.7	13.0	0.57	0.73	58.7
12	R2	15	2.0	0.369	5.8	LOS A	1.7	13.0	0.57	0.73	57.1
Approach		341	2.0	0.369	9.3	LOS A	1.7	13.0	0.57	0.73	58.7
All Vehicles		2590	2.0	1.219	46.6	LOS D	67.1	518.6	0.72	1.75	37.8

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: 2029 Development AM - Brian Coburn / Navan (2-lane)

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: Navan											
8	T1	676	3.0	0.601	6.6	LOS A	5.3	40.9	0.67	0.63	55.9
18	R2	15	3.0	0.601	6.3	LOS A	5.3	40.9	0.67	0.63	54.7
Approach		691	3.0	0.601	6.6	LOS A	5.3	40.9	0.67	0.63	55.9
East: Brian Coburn											
1	L2	135	3.0	1.086	66.3	LOS F	34.1	265.6	1.00	2.25	30.5
16	R2	601	3.0	1.086	62.0	LOS F	34.1	265.6	1.00	2.25	30.2
Approach		736	3.0	1.086	62.8	LOS E	34.1	265.6	1.00	2.25	30.3
North: Navan											
7	L2	193	3.0	0.413	9.8	LOS A	3.3	26.0	0.49	0.58	55.5
4	T1	307	3.0	0.413	5.9	LOS A	3.3	26.0	0.49	0.58	55.9
Approach		500	3.0	0.413	7.4	LOS A	3.3	26.0	0.49	0.58	55.7
All Vehicles		1927	3.0	1.086	28.3	LOS C	34.1	265.6	0.75	1.24	42.3

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: 2029 Development AM - Brian Coburn / Navan (4-lane)

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: Navan											
8	T1	676	3.0	0.557	6.1	LOS A	3.8	29.7	0.52	0.58	56.6
18	R2	15	3.0	0.022	6.5	LOS A	0.1	0.6	0.35	0.58	56.3
Approach		691	3.0	0.557	6.1	LOS A	3.8	29.7	0.52	0.58	56.5
East: Brian Coburn											
1	L2	135	3.0	0.472	12.2	LOS B	2.4	18.6	0.70	0.92	54.6
16	R2	601	3.0	0.472	8.1	LOS A	2.4	18.9	0.69	0.90	54.5
Approach		736	3.0	0.472	8.8	LOS A	2.4	18.9	0.69	0.91	54.5
North: Navan											
7	L2	193	3.0	0.211	9.5	LOS A	1.1	8.2	0.32	0.63	55.0
4	T1	307	3.0	0.211	5.6	LOS A	1.1	8.3	0.32	0.53	57.1
Approach		500	3.0	0.211	7.1	LOS A	1.1	8.3	0.32	0.57	56.3
All Vehicles		1927	3.0	0.557	7.4	LOS A	3.8	29.7	0.54	0.70	55.7

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: 2029 Development 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	17	2.0	0.317	11.6	LOS B	1.3	10.4	0.52	0.54	60.4
8	T1	566	2.0	0.317	5.5	LOS A	1.4	10.6	0.51	0.53	58.7
18	R2	104	2.0	0.317	5.2	LOS A	1.4	10.6	0.50	0.52	57.0
Approach		687	2.0	0.317	5.6	LOS A	1.4	10.6	0.51	0.53	58.5
East: Brian Coburn											
1	L2	51	2.0	0.529	13.5	LOS B	2.7	21.1	0.70	0.78	56.8
6	T1	458	2.0	0.529	7.4	LOS A	2.9	22.1	0.70	0.78	59.4
16	R2	468	2.0	0.529	6.7	LOS A	2.9	22.1	0.69	0.78	56.7
Approach		977	2.0	0.529	7.4	LOS A	2.9	22.1	0.69	0.78	58.2
North: Mer Bleue											
7	L2	151	2.0	0.290	11.7	LOS B	1.3	9.7	0.56	0.71	57.0
4	T1	284	2.0	0.290	5.5	LOS A	1.3	10.1	0.55	0.62	57.8
14	R2	150	2.0	0.290	5.3	LOS A	1.3	10.1	0.55	0.55	59.2
Approach		585	2.0	0.290	7.0	LOS A	1.3	10.1	0.55	0.62	58.0
West: Brian Coburn											
5	L2	198	2.0	0.174	11.1	LOS B	0.7	5.4	0.47	0.74	57.6
2	T1	126	2.0	0.149	5.5	LOS A	0.6	4.4	0.48	0.52	60.7
12	R2	15	2.0	0.149	5.6	LOS A	0.6	4.4	0.48	0.52	59.0
Approach		339	2.0	0.174	8.8	LOS A	0.7	5.4	0.47	0.65	58.7
All Vehicles		2588	2.0	0.529	7.0	LOS A	2.9	22.1	0.58	0.66	58.3

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: 2029 Development PM - Brian Coburn / Fern Casey (2-lane)

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	0.333	10.4	LOS B	2.2	16.6	0.44	0.59	55.9
18	R2	287	2.0	0.333	5.0	LOS A	2.2	16.6	0.44	0.59	57.3
Approach		414	2.0	0.333	6.7	LOS A	2.2	16.6	0.44	0.59	57.0
East: Brian Coburn											
1	L2	255	2.0	0.343	10.3	LOS B	2.3	17.6	0.39	0.59	57.4
6	T1	194	2.0	0.343	5.1	LOS A	2.3	17.6	0.39	0.59	58.7
Approach		449	2.0	0.343	8.0	LOS A	2.3	17.6	0.39	0.59	58.0
West: Brian Coburn											
2	T1	162	2.0	0.372	5.8	LOS A	2.3	17.5	0.53	0.60	60.2
12	R2	260	2.0	0.372	5.5	LOS A	2.3	17.5	0.53	0.60	54.5
Approach		422	2.0	0.372	5.7	LOS A	2.3	17.5	0.53	0.60	57.4
All Vehicles		1285	2.0	0.372	6.8	LOS A	2.3	17.6	0.45	0.59	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: 2029 Development PM - Mer Bleue / Brian Coburn (2-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	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	2.0	0.455	13.5	LOS B	2.0	15.7	0.70	0.76	59.4
8	T1	614	2.0	0.455	7.0	LOS A	2.1	16.6	0.69	0.71	57.5
18	R2	111	2.0	0.455	6.4	LOS A	2.1	16.6	0.69	0.67	56.0
Approach		755	2.0	0.455	7.2	LOS A	2.1	16.6	0.69	0.71	57.4
East: Brian Coburn											
1	L2	58	2.0	0.685	14.9	LOS B	4.5	34.9	0.82	0.97	56.3
6	T1	186	2.0	0.685	8.9	LOS A	4.5	34.9	0.82	0.97	58.9
16	R2	288	2.0	0.685	8.9	LOS A	4.5	34.9	0.82	0.97	55.1
Approach		532	2.0	0.685	9.6	LOS A	4.5	34.9	0.82	0.97	56.8
North: Mer Bleue											
7	L2	547	2.0	0.545	11.5	LOS B	3.8	29.3	0.62	0.74	55.2
4	T1	520	2.0	0.545	5.2	LOS A	3.8	29.6	0.61	0.54	57.9
14	R2	236	2.0	0.545	5.0	LOS A	3.8	29.6	0.61	0.51	58.9
Approach		1303	2.0	0.545	7.8	LOS A	3.8	29.6	0.61	0.62	57.0
West: Brian Coburn											
5	L2	123	2.0	0.667	15.3	LOS B	3.6	28.0	0.81	0.98	58.2
2	T1	302	2.0	0.667	9.4	LOS A	3.6	28.0	0.81	0.98	58.1
12	R2	10	2.0	0.667	9.3	LOS A	3.6	28.0	0.81	0.98	56.5
Approach		435	2.0	0.667	11.1	LOS B	3.6	28.0	0.81	0.98	58.1
All Vehicles		3025	2.0	0.685	8.4	LOS A	4.5	34.9	0.70	0.76	57.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2029 Development PM - Brian Coburn / Navan (2-lane)

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	430	3.0	0.749	12.6	LOS B	7.0	54.4	0.97	1.12	52.8
18	R2	87	3.0	0.749	12.3	LOS B	7.0	54.4	0.97	1.12	51.7
Approach		517	3.0	0.749	12.6	LOS B	7.0	54.4	0.97	1.12	52.6
East: Brian Coburn											
1	L2	86	3.0	0.447	11.8	LOS B	2.9	22.4	0.74	0.86	55.6
16	R2	281	3.0	0.447	7.5	LOS A	2.9	22.4	0.74	0.86	54.8
Approach		367	3.0	0.447	8.5	LOS A	2.9	22.4	0.74	0.86	55.0
North: Navan											
7	L2	588	3.0	1.008	21.7	LOS F	66.7	519.5	1.00	0.65	47.9
4	T1	807	3.0	1.008	17.8	LOS F	66.7	519.5	1.00	0.65	48.1
Approach		1395	3.0	1.008	19.5	LOS B	66.7	519.5	1.00	0.65	48.0
All Vehicles		2279	3.0	1.008	16.1	LOS B	66.7	519.5	0.95	0.79	50.0

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: 2029 Development PM - Mer Bleue/Decoeur (2-lane)

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: Mer Bleue											
3	L2	16	3.0	0.618	11.1	LOS B	5.9	45.8	0.63	0.51	58.1
8	T1	753	3.0	0.618	5.3	LOS A	5.9	45.8	0.63	0.51	58.0
18	R2	47	3.0	0.618	5.1	LOS A	5.9	45.8	0.63	0.51	56.3
Approach		816	3.0	0.618	5.4	LOS A	5.9	45.8	0.63	0.51	57.9
East: Decoeur											
1	L2	55	3.0	0.146	12.5	LOS B	0.6	5.0	0.67	0.83	56.5
6	T1	11	3.0	0.146	6.7	LOS A	0.6	5.0	0.67	0.83	56.4
16	R2	38	3.0	0.146	6.6	LOS A	0.6	5.0	0.67	0.83	54.8
Approach		104	3.0	0.146	9.8	LOS A	0.6	5.0	0.67	0.83	55.8
North: Mer Bleue											
7	L2	65	3.0	0.554	10.5	LOS B	5.6	43.5	0.45	0.46	59.0
4	T1	676	3.0	0.554	4.7	LOS A	5.6	43.5	0.45	0.46	58.8
14	R2	64	3.0	0.554	4.5	LOS A	5.6	43.5	0.45	0.46	57.1
Approach		805	3.0	0.554	5.1	LOS A	5.6	43.5	0.45	0.46	58.7
West: Axis Way											
5	L2	77	3.0	0.143	12.5	LOS B	0.6	4.7	0.63	0.82	55.8
2	T1	19	3.0	0.143	6.7	LOS A	0.6	4.7	0.63	0.82	55.7
12	R2	15	3.0	0.143	6.5	LOS A	0.6	4.7	0.63	0.82	54.2
Approach		111	3.0	0.143	10.7	LOS B	0.6	4.7	0.63	0.82	55.6
All Vehicles		1836	3.0	0.618	5.8	LOS A	5.9	45.8	0.55	0.52	58.0

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: 2029 Development PM - Brian Coburn / Fern Casey (4-lane)

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	0.168	10.2	LOS B	0.7	5.7	0.31	0.62	54.6
18	R2	287	2.0	0.168	5.0	LOS A	0.7	5.7	0.30	0.55	58.0
Approach		414	2.0	0.168	6.5	LOS A	0.7	5.7	0.30	0.57	57.2
East: Brian Coburn											
1	L2	255	2.0	0.193	10.0	LOS B	0.9	6.7	0.27	0.64	56.2
6	T1	194	2.0	0.163	4.9	LOS A	0.7	5.4	0.27	0.45	60.8
Approach		449	2.0	0.193	7.8	LOS A	0.9	6.7	0.27	0.56	58.3
West: Brian Coburn											
2	T1	162	2.0	0.158	5.5	LOS A	0.6	4.8	0.37	0.51	60.3
12	R2	260	2.0	0.218	5.2	LOS A	0.9	7.2	0.37	0.58	55.3
Approach		422	2.0	0.218	5.3	LOS A	0.9	7.2	0.37	0.55	57.9
All Vehicles		1285	2.0	0.218	6.6	LOS A	0.9	7.2	0.31	0.56	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: 2029 Development PM - 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	30	2.0	0.442	13.5	LOS B	1.9	14.9	0.68	0.75	59.5
8	T1	614	2.0	0.442	6.9	LOS A	2.0	15.6	0.67	0.71	57.6
18	R2	111	2.0	0.442	6.4	LOS A	2.0	15.6	0.66	0.66	56.1
Approach		755	2.0	0.442	7.1	LOS A	2.0	15.6	0.67	0.70	57.5
East: Brian Coburn											
1	L2	58	2.0	0.297	12.2	LOS B	1.2	9.1	0.61	0.66	57.0
6	T1	186	2.0	0.297	6.2	LOS A	1.2	9.5	0.61	0.66	59.4
16	R2	288	2.0	0.297	5.8	LOS A	1.2	9.5	0.60	0.65	57.2
Approach		532	2.0	0.297	6.6	LOS A	1.2	9.5	0.60	0.66	58.1
North: Mer Bleue											
7	L2	547	2.0	0.537	11.4	LOS B	3.5	27.3	0.59	0.74	55.3
4	T1	520	2.0	0.537	5.1	LOS A	3.6	27.6	0.58	0.54	58.1
14	R2	236	2.0	0.537	5.0	LOS A	3.6	27.6	0.58	0.51	59.0
Approach		1303	2.0	0.537	7.8	LOS A	3.6	27.6	0.58	0.62	57.1
West: Brian Coburn											
5	L2	123	2.0	0.285	12.9	LOS B	1.0	8.1	0.66	0.83	58.1
2	T1	302	2.0	0.285	6.1	LOS A	1.1	8.5	0.65	0.61	59.5
12	R2	10	2.0	0.285	6.1	LOS A	1.1	8.5	0.64	0.56	58.2
Approach		435	2.0	0.285	8.1	LOS A	1.1	8.5	0.65	0.67	59.1
All Vehicles		3025	2.0	0.537	7.4	LOS A	3.6	27.6	0.62	0.65	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: 2029 Development PM - Brian Coburn / Navan (4-lane)

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: Navan											
8	T1	430	3.0	0.484	7.8	LOS A	2.5	19.8	0.66	0.77	55.9
18	R2	87	3.0	0.181	9.2	LOS A	0.6	4.9	0.58	0.82	54.0
Approach		517	3.0	0.484	8.0	LOS A	2.5	19.8	0.65	0.77	55.6
East: Brian Coburn											
1	L2	86	3.0	0.199	10.5	LOS B	0.8	6.5	0.51	0.76	55.4
16	R2	281	3.0	0.199	6.5	LOS A	0.8	6.6	0.51	0.73	55.3
Approach		367	3.0	0.199	7.4	LOS A	0.8	6.6	0.51	0.74	55.3
North: Navan											
7	L2	588	3.0	0.527	9.5	LOS A	4.1	32.0	0.38	0.62	54.6
4	T1	807	3.0	0.527	5.5	LOS A	4.2	32.5	0.38	0.50	57.0
Approach		1395	3.0	0.527	7.2	LOS A	4.2	32.5	0.38	0.55	55.9
All Vehicles		2279	3.0	0.527	7.4	LOS A	4.2	32.5	0.46	0.63	55.8

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.