PROPOSED TRAILSEDGE PHASE 4
ORLEANS, OTTAWA
RICHCRAFT HOMES

TRANSPORTATION IMPACT ASSESSMENT

Presented to:

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Project 7224

CASTLEGLENN CONSULTANTS LTD.

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Yours truly,

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TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

1.0 EXISTING AND PLANNED CONDITIONS

1.1 PROPOSED DEVELOPMENT

Exhibit 1-1 illustrates the location of the proposed subdivision located in Orleans, Ontario. The site is located within the future East Urban Community (EUC) Phase 3 lands and is part of the Richcraft Trailsedge development initiatives.

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

- 142 singles, 167 townhouses and 116 back-to-back townhouses located south of Brian Coburn Boulevard (Excludes blocks 193 and 194);
- A commercial area located in Block 198, located in the southwest quadrant of the Brian Coburn Boulevard/Mer Bleue Road intersection which would provide for approximately 181 jobs; and
- A mixed-use use composed of 352 apartment units and 296 commercial/office jobs are envisioned in the mixed-use block situated between the Hydro corridor and Brian Coburn Boulevard

The proposed developed 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 Impact Study is in support of a Major Zoning By-Law Amendment application and an application for Draft Plan of Subdivision Approval.

Exhibit 1-1: Site Location Context

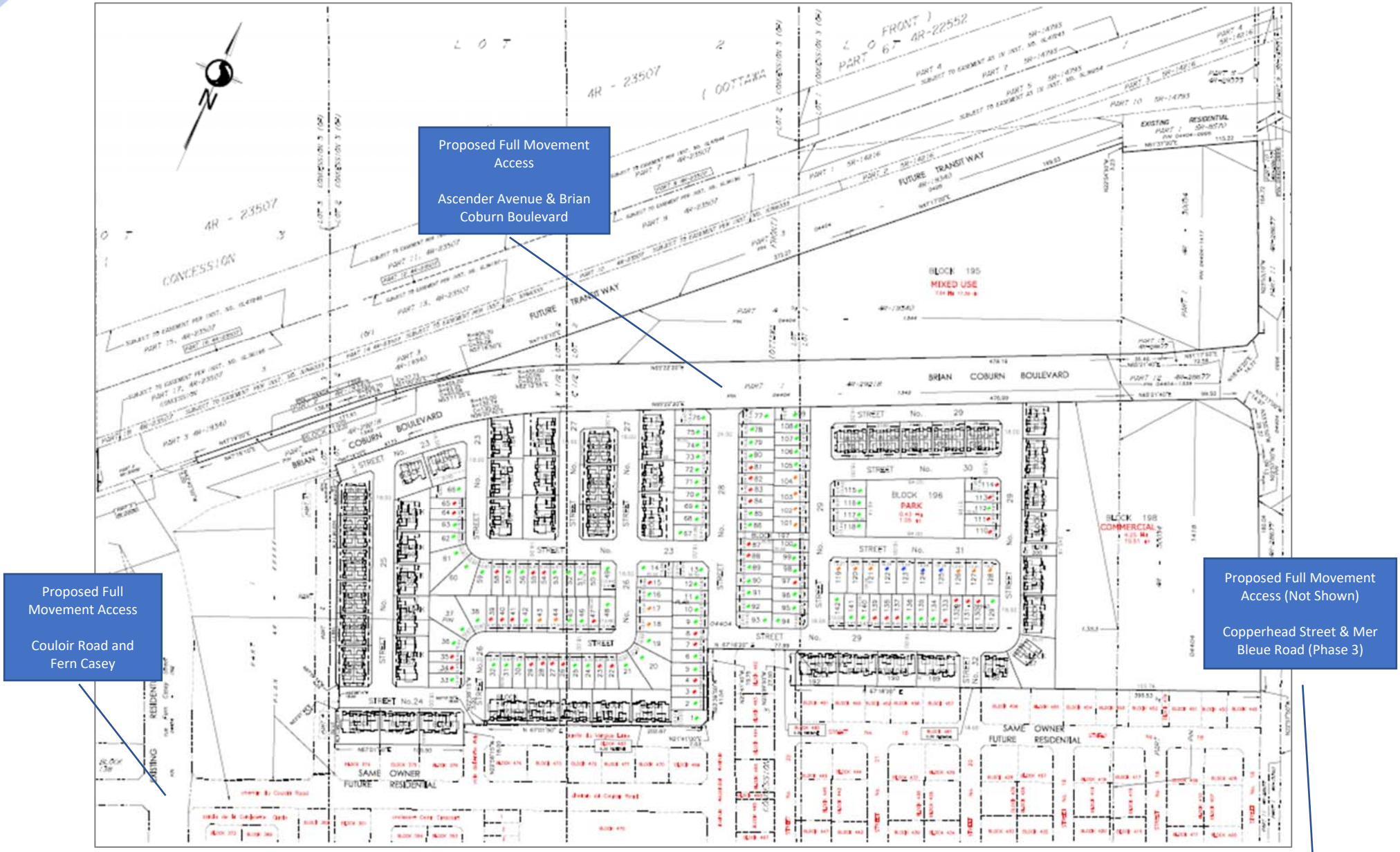


Exhibit 1-2: Draft Plan of Subdivision – Trailsedge Phase 4 (July 28th, 2020)

As illustrated within Exhibit 1-2, the proposed development would be accessed by way of three locations:

- A full movement access at the Fern Casey Street/Couloir Road intersection located to the west of the existing development. This access is currently in place to serve Trailsedge Phase 3 and the 6429 Renaud Road development (Blocks 193 & 194). It is located approximately 240m south of the Brian Coburn Blvd corridor;
- A full movement access at the Mer Bleue Road / Copperhead Street intersection located along the eastern boundary of the proposed development and approximately 430m south of the Brian Coburn Boulevard corridor. This intersection is anticipated to be in place at the completion of Trailsedge Phase 3; and
- A full movement access at the Brian Coburn Boulevard/Ascender Avenue intersection, located approximately 500m west of the existing Brian Coburn Boulevard / Mer Bleue Road intersection. This intersection is anticipated to be in place after the full build-out of the Phase 4 residential dwelling units south of Brian Coburn Boulevard.

The Trailsedge Phase 4 development would proceed from west to east, and is anticipated to involve the follow development characteristics:

- Phase 4-1 would involve 93 single units, 114 townhouse units and 76 back-to-back townhouse units;
- Phase 4-2 would involve 49 single units, 53 townhouse units and 40 back-to-back townhouse units. This phase is also intended to develop Block 198 as a commercial development with approximately 181 jobs (4.25 hectares, 15% of area is R.O.W, 50 jobs/hectare);
- Phase 4-3 represents the Block 195 lands which are to be developed as a mixed-use land use, located north of Brian Coburn Boulevard and south of the Hydro corridor. The mixed use-lands are anticipated to involve 352 apartment units and 296 jobs (70% office, 30% commercial).

1.2 EXISTING CONDITIONS

Study Area Roadways

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

- **Brian Coburn Boulevard** is an existing 2-lane east-west undivided two-lane arterial roadway (posted speed 60 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 currently 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 roadway1 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 community to the south. 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 are available west of Fern Casey Street ((north sidewalks) and west of Compass Street (South Sidewalks).
- **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 Traffic Management

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

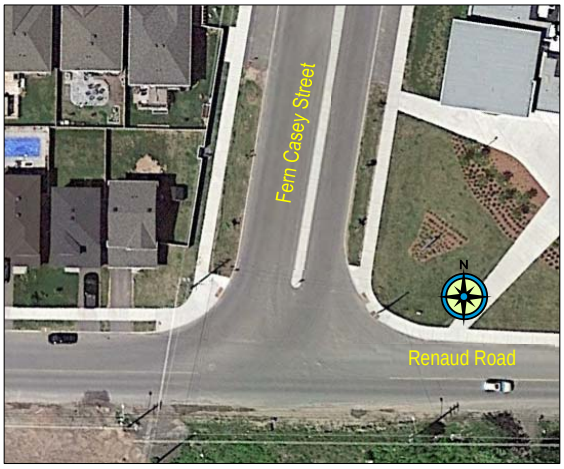
Study Area Intersections

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 (Navan Road) provides for a short NB-RT taper and channelized island from Navan Road to Renaud Road eastbound. The eastbound approach affords a dedicated EB-RT auxiliary lane anda pocket bike lane.

1 Map 6, City of Ottawa Transportation Master Plan, Road Network - Urban

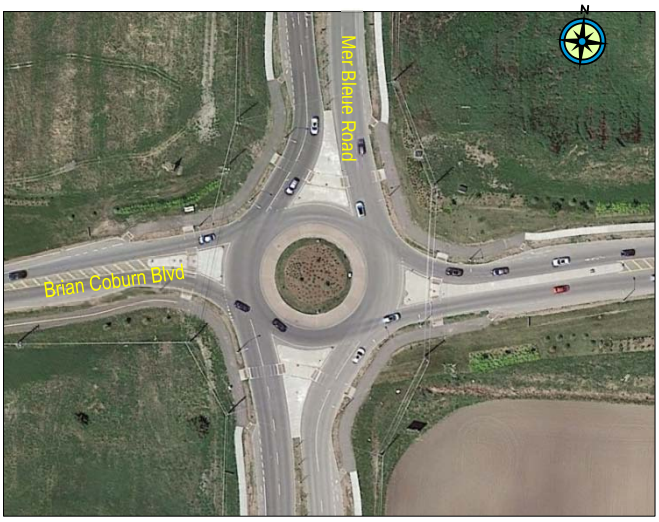
Brian Coburn Boulevard/Fern Casey Street: This intersection is a 3-leg roundabout with single lane approaches. In the future, Fern Casey Street is to be extended northward and form a fourth leg to the intersection;

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



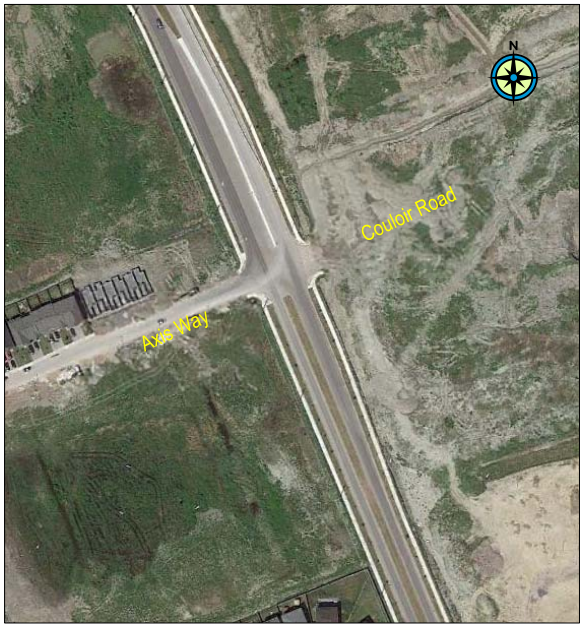
Renaud Road/Fern Casey Street: This "T" intersection is currently STOP-controlled on the north leg. An EB-LT auxiliary lane is provided from Renaud Road with single-lane thru movements on each approach.

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 eastbound approach. 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 and an auxiliary SB-RT bay. Cycle lanes are provided north of the intersection, along Fern Casey Street between Brian Coburn Boulevard and Axis Way.



Existing Cycling Facilities

A review of 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

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

A review of the study area 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 and the Chapel Hill Park-and-Ride facility located nearest the Brian Coburn Boulevard/Navan Road intersection, west of the proposed site. The Chapel Hill Park and Ride is accessed from Brian Coburn Boulevard and Navan Road. The access on Brian Coburn Boulevard is a signalized right-in-right-out while the the passenger vehicle access on Navan Road is a signalized all-direction access.

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

- **Route 225** would likely be 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 Thursday September 24th 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.
- **Route 30** connects Millennium Park & Ride in the east to Blair Station via Brian Coburn Boulevard and Mer Bleue Road. A review of the schedule indicated a 10-minute headway in the peak direction during the peak period, and 15-30 minute headways outside of the peak period.

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 study 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);
- 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);
- Navan Road/Renaud Road (City Count: March 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 study area intersections. The collision information provides:

- the year, date and approximate time of each collision;
- the types of vehicle involved (i.e. passenger vehicles, vans, trucks, etc.);
- the weather conditions (i.e. clear, rain, snow etc.)
- the type of collision (i.e. angle collision, rear-end);
- the level of damage (i.e. property damage only, injury, fatality) involved;
- collision details (type of collision, movements of vehicles at time of collision, etc.); and
- pedestrian involvement (in the collision).

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

- **Brian Coburn Boulevard/Mer Bleue Road:** A total of 9 collisions occurred at this intersection in the past 5 years with 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

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

1.3 PLANNED CONDITIONS

The following section describes the planned network changes and adjacent developments within the study area. The planned development roadway network, pedestrian linkages and cycling elements are described within Section 7.1. The following sections pertain to the transportation network surrounding the proposed development.

Planned Transportation Network Changes

A review of the City of Ottawa's documents[2] 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 Deceour Drive and Renaud Road. The Mer Bleue/Renaud 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;
- The Blackburn Hamlet Bypass Extension between Navan Road and Orleans Boulevard is scheduled to occur before 2024;
- Brian Coburn Boulevard would be upgraded with transit signal priority (Isolated Measures) between Blackburn Hamlet Bypass and Tenth Line Road, in order to improve transit service between Orleans South and the Inner Area in lieu of other BRT measures such as the Cumberland Transitway; 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.

2. 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 "*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)".

A review of the City of Ottawa's Transportation Master Plan Map 4 (Rapid Transit and Transit Priority Network – 2031 Conceptual Network) indicated that the Cumberland Transitway / Blackburn Hamlet By-Pass Extension would be located north of the proposed development, within the Hydro corridor. It is believed that the extension of the Transitway is anticipated to occur beyond the 2031 Official Plan horizon and therefore would be considered for the 2036 horizon analysis. Map 10 "*Road Network – 2031 Network Concept"* was reviewed which indicated future widening of Brian Coburn Boulevard, Renaud Road and Mer Bleue Road. These potential widenings will be considered when the build-out analysis is undertaken.

Other Adjacent Development Initiatives

A review of adjacent developments planned within the immediate study area was undertaken as part of this study. As the proposed Trailsedge Phase 4 development is located within the East Urban Community Phase 3 lands, this TIA 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 lands north of the Hydro Corridor, identified as Trailsedge North, are anticipated to begin development subsequent to the completion of Trailsedge Stage 4, therefore no background traffic growth has been assigned to the majority of the EUC Phase III areas;
- ***Richcraft Blocks 193 and 194 (6429 Renaud Road)****:* This residential development is located in the southeast quadrant of the Brian Coburn Boulevard / Fern Casey Street roundabout and would provide for 90 back-to-back townhouse units and 96 mid-rise terrace dwellings. It is anticipated that this development would be complete by 2024;
- ***Richcraft Trailsedge East: Stage 3:*** The Trailsedge East development is located immediately south of the proposed Stage 4 development. The Stage 3 development is bounded by Fern Casey in the west, Mer Bleue in the east, Renaud Road in the south and the Couloi Road-Copperhead Street corridor in the north. Stage 3 of the development is currently proceeding from west-to-east and would involve approximately 753 residential 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 study area, as of Fall 2019, proposed an additional 256 townhomes and 180 single homes. The existing Mer Bleue Road/Decoeur Drive "T" intersection will be modified to provide for a fourth (west) leg that would provide access the future Trailsedge Phase 3 and Phase 4 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

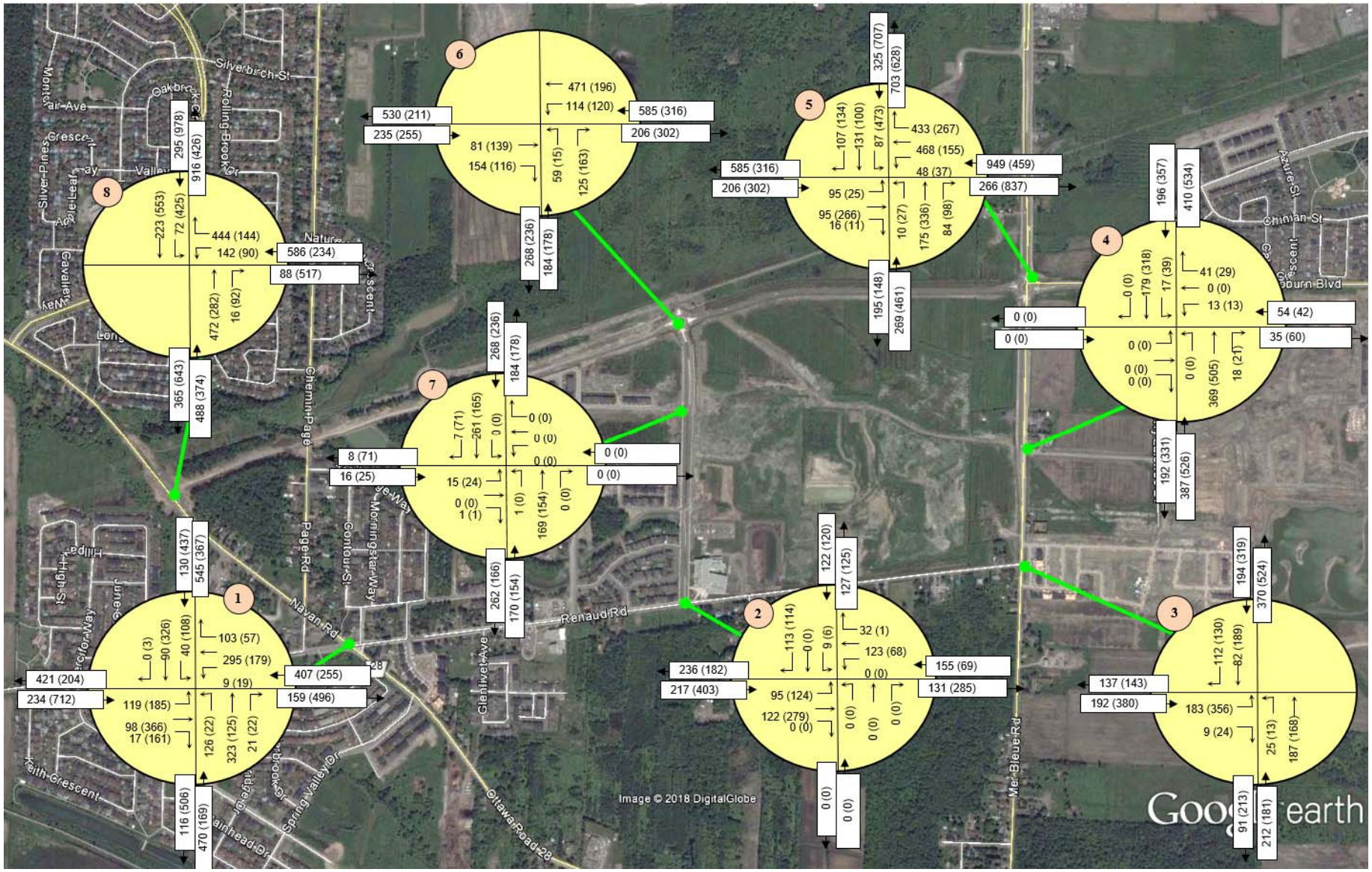


Exhibit 1-4: Existing (2020) Traffic Volumes: Vehicles-Per-Hour

2.0 STUDY AREA AND TIME PERIODS

2.1 STUDY AREA

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

The study 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 study would 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[3]).;
- 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

2.2 TIME PERIODS

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

2.3 HORIZON YEARS

For analysis purposes, the traffic study proposes to analyze two horizons years:

- A 2031 horizon that correspond with the City of Ottawa TMP planning horizon and the estimated build-out of Phase 4-1; and
- A 2036 horizon that corresponds with the full build-out of the Trailsedge Phase 4 lands.

3 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 of the traffic study.

It is requested that the City of Ottawa provide exemptions for Elements 4.1.2, 4.2, 4.6 and 4.8 as indicated within the table. An exemption from Phase 4.5 is also requested as the Phase 4-1 development does not involve students, employees or multi-family/condo dwelling units. The future Phase 4-2 and Phase 4-3 will require site plan submission which will consider appropriate TDM.

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	Yes
4.2 Parking	4.2.1 Parking Supply	Required for site plan.	No
	4.2.2 Spillover Parking	Parking supply not anticipated to exceed minimum	No
Network Impact Component			
4.5 Transportation Demand Management	All elements	Phase 4-1 is not anticipated to have employees, students or multi-family/condo development TDM Measures will be considered within future site plan submissions for Phase 4-2 and Phase 4-3	No
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	The development trips are not anticipated to exceed ATM thresholds for Fern Casey Street (Major Collector) or Copperhead Street (Collector) within the study area.	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 Trailsedge Phase 4 development is situated outside the Greenbelt in a predominately suburban area. The development has a residential, commercial, and mixed-use component to be developed over three phases.

This report presents a 2031 and 2036 forecast horizon that correspond to the build-out of Phase 4-1 and to the full build-out of the proposed development, respectively. The following sections describe the trip generation, distribution and assignment process for each phase of the Trailsedge Phase 4 development.

4.1.1 Auto Trip Generation

Table 4-1 summarizes the auto trip generation rates that were used for each land use. The vehicle trip generation rates and directional splits for the residential portions of all phases were referenced from Table 6.3 of the TRANS Trip Generation Residential Trip Rates Study (2009). The vehicle trip generation rates and directional splits for the commercial/office portion of the development were referenced from the ITE Trip Generation Manual, 10th Edition.

This study assumes that the Cumberland Transitway would be completed by build-out of the Trailsedge Phase 4 community to support transit in the area. Therefore, alternate trip generation rates were selected that reflect the closer proximity to rapid transit, according to the TRANS Trip Generation Study.

Table 4-2 summarizes the auto trip generation for each phase of the Trailsedge Phase 4 development.

Table 4-1: Trip Generation Rates - Trailsedge Phase 4

Land Use	*Source*	*Independent Variable*	*Morning Peak Hour*			*Afternoon Peak Hour*		
			Rate	*In*	*Out*	*Rate*	*In*	*Out*
Phase 4-1								
Single-Detached Dwellings	TRANS*	Dwelling Units	0.70	29%	71%	0.90	62%	38%
Semi-Detached Dwellings, Townhouses, Rowhouses	TRANS*	Dwelling Units	0.54	37%	63%	0.71	53%	47%
Phase 4-2								
Single-Detached Dwellings	TRANS*	Dwelling Units	0.49	29%	71%	0.63	62%	38%
Semi-Detached Dwellings, Townhouses, Rowhouses	TRANS*	Dwelling Units	0.39	37%	63%	0.51	53%	47%
Commercial (Shopping Centre)	ITE Land Use 820	Employees	0.55	64%	36%	1.62	50%	50%
Phase 4-3								
Mid-Rise Apartment	TRANS	Dwelling Units	0.29	24%	76%	0.37	62%	38%
Commercial (Shopping Centre)	ITE Land Use 820	Employees	0.55	64%	36%	1.62	50%	50%
General Office Building	ITE Land Use 710	Employees	0.37	83%	17%	0.40	20%	80%

Source: TRANS (Table 6.2, 6.3)

Table 4-2: Auto Trips Generated - Trailsedge Phase 4

(Vehicles-per-Hour)

Land Use	*Source*	*Size*	*Morning Peak Hour*			*Afternoon Peak Hour*		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Phase 4-1: Residential								
Single-Detached Dwellings	TRANS*	93 Dwelling Units	19	46	65	52	32	84
Semi-Detached Dwellings, Townhouses, Rowhouses	TRANS*	190 Dwelling Units	38	65	103	71	64	135
Phase 4-1 Total Auto Trips/Hour			57	111	168	123	96	219
Phase 4-2: Residential and Commercial								
Single-Detached Dwellings	TRANS*	49 Dwelling Units	7	17	24	19	12	31
Semi-Detached Dwellings, Townhouses, Rowhouses	TRANS*	93 Dwelling Units	13	23	36	25	22	47
Commercial (Shopping Centre)	ITE Land Use 820	181 Employees	64	36	100	147	146	293
Phase 4-2 Total Auto Trips/Hour			84	76	160	191	180	371
Phase 4-3: High Density Residential, Commercial and Office								
Mid-Rise Apartment	TRANS	352 Dwelling Units	24	78	102	81	49	130
Commercial (Shopping Centre)	ITE Land Use 820	89 Employees	31	18	49	72	72	144
General Office Building	ITE Land Use 710	207 Employees	64	13	77	17	66	83
Phase 4-3 Total Auto Trips/Hour			119	109	228	170	187	357
Total Auto Trips/Hour			260	296	556	484	463	947

Source: TRANS (Table 6.2, 6.3)

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. Applicable mode shares from Table 3.13 of the TRANS Trip Generation Study were referenced for the single-detached dwellings, townhouses and apartment residential units. Table 4-3, Table 4-4 and Table 4-5 serve to summarize the inherent mode shares for each residential unit type.

Table 4-3: Single Detached Dwellings: Mode Share and Person-Trips/Hour

Travel Mode	*Mode Share*	*Morning Peak Hour (person trips/hr)*			*Mode Share*	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
2031 Horizon (Phase 4-1)								
Auto Driver	55%	19	46	65	64%	52	32	84
Auto Passenger	11%	4	9	13	11%	9	5	14
Transit	25%	9	21	30	19%	15	10	25
Non-Motorized	9%	3	8	11	6%	5	3	8
Total (2031)	100%	35	84	119	100%	81	50	131
2036 Horizon (Phase 4-2)								
Auto Driver	55%	7	17	24	64%	19	12	31
Auto Passenger	11%	2	3	5	11%	3	2	5
Transit	25%	3	8	11	19%	6	4	9
Non-Motorized	9%	1	3	4	6%	2	1	3
Total (2036)	100%	13	31	44	100%	30	19	48
Total (Build-Out)		48	115	163		111	69	179

Source: (TRANS Trip Table 3.13)

Table 4-4: Townhouses: Mode Share and Person-Trips/Hour

Travel Mode	*Mode Share*	*Morning Peak Hour (person trips/hr)*			*Mode Share*	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
2031 Horizon (Phase 4-1)								
Auto Driver	55%	38	65	103	61%	71	64	135
Auto Passenger	10%	7	12	19	11%	12	12	24
Transit	27%	19	32	51	22%	26	23	49
Non-Motorized	8%	5	9	14	6%	7	6	13
Total (2031)	100%	69	118	187	100%	116	105	221
2036 Horizon (Phase 4-2)								
Auto Driver	55%	13	23	36	61%	25	22	47
Auto Passenger	10%	2	4	6	11%	5	4	9
Transit	27%	6	12	18	22%	9	8	17
Non-Motorized	8%	2	3	5	6%	2	2	4
Total (2036)	100%	23	42	65	100%	41	36	77
Total (Build-Out)		92	160	252		157	141	298

Source: (TRANS Trip Table 3.13)

Table 4-5: Mid-Rise Apartment: Mode Share and Person-Trips/Hour
Person Trips-per-Hour

Travel Mode	*Mode Share*	*Morning Peak Hour*			*Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
2036 Horizon (Phase 4-3)								
Auto Driver	44%	24	78	102	44%	81	49	130
Auto Passenger	9%	5	16	21	14%	25	15	40
Transit	34%	19	60	79	33%	61	37	98
Non-Motorized	13%	7	23	30	9%	17	10	27
Total	100%	55	177	232	100%	184	111	295

Source: (TRANS Trip Table 3.13)

ITE Trip Generation rates for the commercial and office portions of the development were converted to an equivalent number of person-trips by assuming a 10% non-auto mode share and average vehicle occupancy of 1.15 as per the *City of Ottawa TIA Guidelines*.

Table 4-6 summarizes the anticipated number of person-trips attributed to the commercial/office portion component of the proposed development, separated by land use and phase.

Table 4-6: Office / Commercial Land Uses – Person Trips/hr
Person Trips-per-Hour

Land Use	*Trip Conversion*	*Morning Peak Hour*			*Afternoon Peak Hour*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Phase 4-2							
Commercial (Shopping Centre)	Auto Trips	64	36	100	147	146	293
	Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
	Person Trips	82	46	128	188	187	375
Phase 4-3							
Commercial (Shopping Centre)	Auto Trips	31	18	49	72	72	144
	Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
	Person Trips	40	23	63	92	92	184
General Office Building	Auto Trips	64	13	77	17	66	83
	Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28
	Person Trips	82	17	99	22	84	106
Subtotal (Phase 4-2)	Auto Trips	95	31	126	89	138	227
	Person Trips	122	40	162	114	176	290
Total	Auto Trips	159	67	226	236	284	520
	Person Trips	204	86	290	302	363	665

4.1.3 Existing and Future Mode Shares

Table 4-7 summarizes the existing and future mode shares adopted for the proposed development, as well as a rationale for the future mode shares. The existing and future mode shares for the proposed development were based on the mode shares as developed and rationalized in the East Urban Community (EUC) Phase 3 Area Community Design Plan – Master Transportation Study (Castleglenn, May 2020)[4].

Table 4-7: Existing and Future Mode Shares

Land Use	*Travel Mode*	*Peak Existing Mode Shares*		*Forecast (2031)*	*Forecast (2036)*	*Rationale*
		AM	*PM*	*AM & PM*	*AM & PM*	
Residential	Auto Driver	55%	65%	60%	55%	Auto mode assumed to be similar to existing mode share, reduced in 2036 due to Cumberland Transitway
	Auto Passenger	20%	20%	15%	10%	
	Transit	15%	10%	20%	30%	Increase in Transit due to Trim Rd. Extension, isolated transit improvements, Cumberland Transitway (2036)
	Non-Motorized	10%	5%	5%	5%	
Commercial/Office	Auto Driver	55%	65%	60%	55%	Auto mode assumed to be similar to existing mode share, reduced in 2036 due to Cumberland Transitway
	Auto Passenger	20%	20%	15%	10%	
	Transit	15%	10%	20%	30%	Increase in Transit due to Trim Rd. Extension, isolated transit improvements, Cumberland Transitway
	Non-Motorized	10%	5%	5%	5%	

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

- Planned isolated transit improvements along Innes Road and Brian Coburn Boulevard;
- Extension of the LRT to east of Jeanne d'Arc Blvd; and;
- the assumption that the Cumberland Transitway would not be in place by 2031, but would be in place by 2036. The Cumberland Transitway would be expected to result in a substantial shift of existing auto drivers and auto passengers once constructed.

The Chapel Hill Park and Ride would have a limited impact on the Trailsedge Phase 4 community transit ridership. The existing Route 225 and Route 34 that utilize the Chapel Hill Park and Ride also circulate nearest the Trailsedge Phase 4 community along Mer Bleue Road, Brian Coburn Boulevard and Fern Casey Street. It would be likely that boardings and alightings would occur nearest the development, rather than requiring an auto trip followed by a transit trip, which would occur when transit users transfer at the Chapel Hill Park and Ride.

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

Given it is uncertain how transit routes would connect between the proposed development, the Chapel Hill Park and Ride, and the future LRT extension to Trim Road (2024), it is difficult to ascertain if a substantial number of peak-direction residential-based transit trips from Trailsedge Phase 4 would utilize the Chapel Hill Park and Ride. Therefore, the proposed auto driver and auto passenger mode shares are believed to encompass the nominal number of auto and passenger trips to and from the Chapel Hill Park and Ride. These trips would primarily impact the Brian Coburn Boulevard corridor.

4.1.4 Projected Development Traffic by Mode

Table 4-8 summarizes the forecast 2031 traffic demand generated by the proposed Phase 4-1 residential development.

Table 4-8: Summary of Trip Generation - Trailsedge Phase 4-1: 2031 Horizon
(Person Trips-per-Hour)

A: Residential Component - Single Detached Dwellings								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	60%	21	50	71	60%	49	30	79
Auto Passenger	15%	5	13	18	15%	12	7	19
Transit	20%	7	17	24	20%	16	10	26
Non-Motorized	5%	2	4	6	5%	4	3	7
Total Person Trips/Hour	100%	35	84	119	100%	81	50	131
B: Residential Component – Townhouses								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	60%	41	71	112	60%	70	63	133
Auto Passenger	15%	10	18	28	15%	12	7	19
Transit	20%	14	23	37	20%	16	10	26
Non-Motorized	5%	4	6	10	5%	4	3	7
Total Person Trips/Hour	100%	69	118	187	100%	117	105	221
A+B: Total - Summary of Trip Generation by all Modes								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	60%	62	121	183	60%	119	93	212
Auto Passenger	15%	15	31	46	15%	30	23	52
Transit	20%	21	40	61	20%	39	31	70
Non-Motorized	5%	6	10	16	5%	10	8	18
Total Phase 4-1		104	202	306	100%	198	155	352

A review of the table indicated the following for Phase 4-1:

- Total vehicle trips are not anticipated to exceed 190 veh/h in the morning peak hour, and approximately 230 veh/h in the afternoon peak hour; and
- An increase of 50 to 60 transit person-trips/hr would be expected to use north-south bus routes to access the LRT extension to Trim Rd.

Table 4-9 summarizes the forecast 2036 person-trip attributed to the Phase 4-2 development for both residential and commercial components.

Table 4-9: Summary of Trip Generation - Trailsedge Phase 4-2: 2036 Horizon
(Person Trips-per-Hour)

A: Residential Component								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	20	40	60	55%	40	29	69
Auto Passenger	10%	3	7	10	10%	7	6	13
Transit	30%	11	22	33	30%	21	17	37
Non-Motorized	5%	2	4	6	5%	3	3	6
Total Person Trips/Hour	100%	36	73	109	100%	71	55	125
B: Commercial Component – Shopping Centre								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	45	25	70	55%	104	103	207
Auto Passenger	10%	8	5	13	10%	19	19	38
Transit	30%	25	14	39	30%	56	56	112
Non-Motorized	5%	4	2	6	5%	9	9	18
Total Person Trips/Hour	100%	82	46	128	100%	188	187	375
A+B: Total - Summary of Trip Generation by all Modes								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	65	65	130	55%	144	132	276
Auto Passenger	10%	11	12	23	10%	26	25	51
Transit	30%	36	36	72	30%	77	73	149
Non-Motorized	5%	6	6	12	5%	12	12	24
Total Phase 4-2		118	119	237	100%	118	242	500

Table 4-10 summarizes the forecast person trips generated by the Phase 4-3 mixed use development.

Table 4-10: Summary of Trip Generation: Trailsedge Phase 4-3: 2036 Horizon
(Person Trips-per-Hour)

A: Residential Component - Mid-Rise Apartments								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	30	97	127	55%	101	61	162
Auto Passenger	10%	5	18	23	10%	18	11	29
Transit	30%	17	53	70	30%	56	33	89
Non-Motorized	5%	3	9	12	5%	9	6	15
Sub-Total	100%	55	177	232	100%	184	111	295
B: Commercial Component – Shopping Centre								
Travel Mode	*AM Mode Share*	*Morning Peak Hour*			*PM Mode Share*	*Afternoon Peak Hour*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	22	13	35	55%	51	51	102
Auto Passenger	10%	4	2	6	10%	9	9	18
Transit	30%	12	7	19	30%	27	27	54
Non-Motorized	5%	2	1	3	5%	5	5	10
Sub- Total	100%	40	23	63	100%	92	92	184
C: Office Component - General Office Building								
Travel Mode	*AM Mode Share*	*Morning Peak Hour (person trips/hr)*			*PM Mode Share*	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	45	9	54	55%	12	46	58
Auto Passenger	10%	8	2	10	10%	2	8	11
Transit	30%	25	5	30	30%	7	25	32
Non-Motorized	5%	4	1	5	5%	1	5	5
Total Person Trips/Hour	100%	82	17	99	100%	22	84	106
A+B+C - Summary of Trip Generation by all Modes – Phase 4-3								
Travel Mode	*AM Mode Share*	*Morning Peak Hour (person trips/hr)*			*PM Mode Share*	*Afternoon Peak Hour (person trips/hr)*		
		In	*Out*	*Total*		*In*	*Out*	*Total*
Auto Driver	55%	97	119	216	55%	164	158	322
Auto Passenger	10%	17	22	39	10%	29	28	58
Transit	30%	54	65	119	30%	90	85	175
Non-Motorized	5%	9	11	20	5%	15	16	30
Total Phase 4-3		177	217	394		100%	287	585

Table 4-11 summarizes the forecast trips generated by the full build-out of the Trailsedge East Phase 4 development.

Table 4-11: Summary of Trip Generation: Trailsedge Phase 4 (All Phases)
(Person Trips-per-Hour)

Travel Mode	*Morning Peak Hour*			*Afternoon Peak Hour*		
	In	*Out*	*Total*	*In*	*Out*	*Total*
Auto Driver	224	305	529	427	383	810
Auto Passenger	43	65	108	85	76	161
Transit	111	141	252	206	189	395
Non-Motorized	21	27	48	37	36	72
Total	399	538	937	755	684	1,438

4.1.5 Trip Reduction Factors

The following trip reductions were considered for the Trailsedge Phase 4 development:

- **Internal Traffic** results in traffic remaining internal to the community and accounts for the interaction between the commercial, office and residential land uses within the development. An internal trip is a trip that does not use the external road network to access the proposed site. The commercial/office component and residential component were assumed to be reduced by a conservative 10% internalisation rate. The 10% was considered to be a reasonable assumption based on the published internalization rates from the Trip Generation Handbook 3rd Edition and NCHRP Report 684[5].
    - The internal trip rate calculations were based on the Trip Generation Handbook procedure6. An unconstrained internal trip rate was determined based on 10% of the total residential, office and commercial trips of Phase 4-3. Then the inbound and outbound internal capture trips between each land use were balanced to reflect the minimum internal trip value. A detailed site plan for Phase 4-3 is not yet available therefore proximity adjustment factors could not be reasonably determined. The trip capture balancing procedure first considered Residential to/from Commercial trips then the remaining Residential/Commercial trips to/from Office trips in the computation.
- **Pass-by Traffic** considers motorists who make an intermediate stop between their original origin and intended destination. A pass-by trip rate of 34% of auto trips for the shopping centre land use was adopted from the *ITE Trip Generation Manual* (Table E.9) for commercial traffic. This reduction was applied in the afternoon peak hours of travel demand as traffic volumes along Brian Coburn Boulevard would most likely pass by during the afternoon peak but not the morning peak on the way to work. Pass-by trips were considered for the commercial component of Phase 4-2 and the mixed-use component of Phase 4-3.

5 National Academies of Sciences, Engineering and Medicine, 2011, *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments.* Washington, D.C: The National Academies Press

6 Institute of Transportation Engineers, September 2017, *Trip Generation Handbook, 3rd Edition.* Chapter 6: Trip Generation for Mixed Use Developments

These trip reduction factors were used to reduce the number of auto trips generated by the proposed development to the external roadway network. Table 4-12 summarizes the trip reduction calculations and the total net new external auto trips produced by the proposed development for Phase 4-2 and Phase 4-3.

Table 4-12: Trip Reductions – Trailsedge Phase 4

Land Use	*Trip Conversion*		*Morning Peak Hour*			*Afternoon Peak Hour*		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Phase 4-1								
Residential Single-Detached & Townhouses	Auto Trips		62	121	183	119	93	212
Phase 4-2								
Residential Single-Detached & Townhouses	Auto Trips		20	40	60	40	29	69
Commercial (Shopping Centre)	Auto Trips		64	36	100	147	146	293
	Pass-By Reduction	34%	0	0	0	50	50	100
	Net New Auto Trips		64	36	100	97	96	193
Phase 4-3								
Residential Mid-Rise Apartments	Auto Trips		30	97	127	101	61	162
	Internalization	10%	2	8	10	7	6	13
	Net New Auto Trips		28	89	117	94	55	149
Commercial (Shopping Centre)	Auto Trips		22	13	35	51	51	102
	Internalization	10%	2	1	4	5	5	10
	Pass-By Reduction	34%	0	0	0	16	16	31
	Net New Auto Trips		20	12	32	30	30	61
General Office Building	Auto Trips		64	13	77	17	66	83
	Internalization	10%	6	1	8	1	2	3
	Net New Auto Trips		58	12	69	16	64	80
Total	Auto Trips		262	320	582	475	446	921
	Pass-By Reduction		0	0	0	65	65	131
	Internalization		4	9	14	12	11	23
	Net New Auto Trips		258	311	569	397	369	767

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 4-13 summarizes the traffic distribution adopted for the proposed site.

Table 4-13: Traffic Distribution

To/From	*Residential Traffic Distribution*	*Commercial/Office Traffic Distribution*
North	34%	35%
East	17%	35%
South	5%	10%
West	44%	20%

4.1.7 Trip Assignment

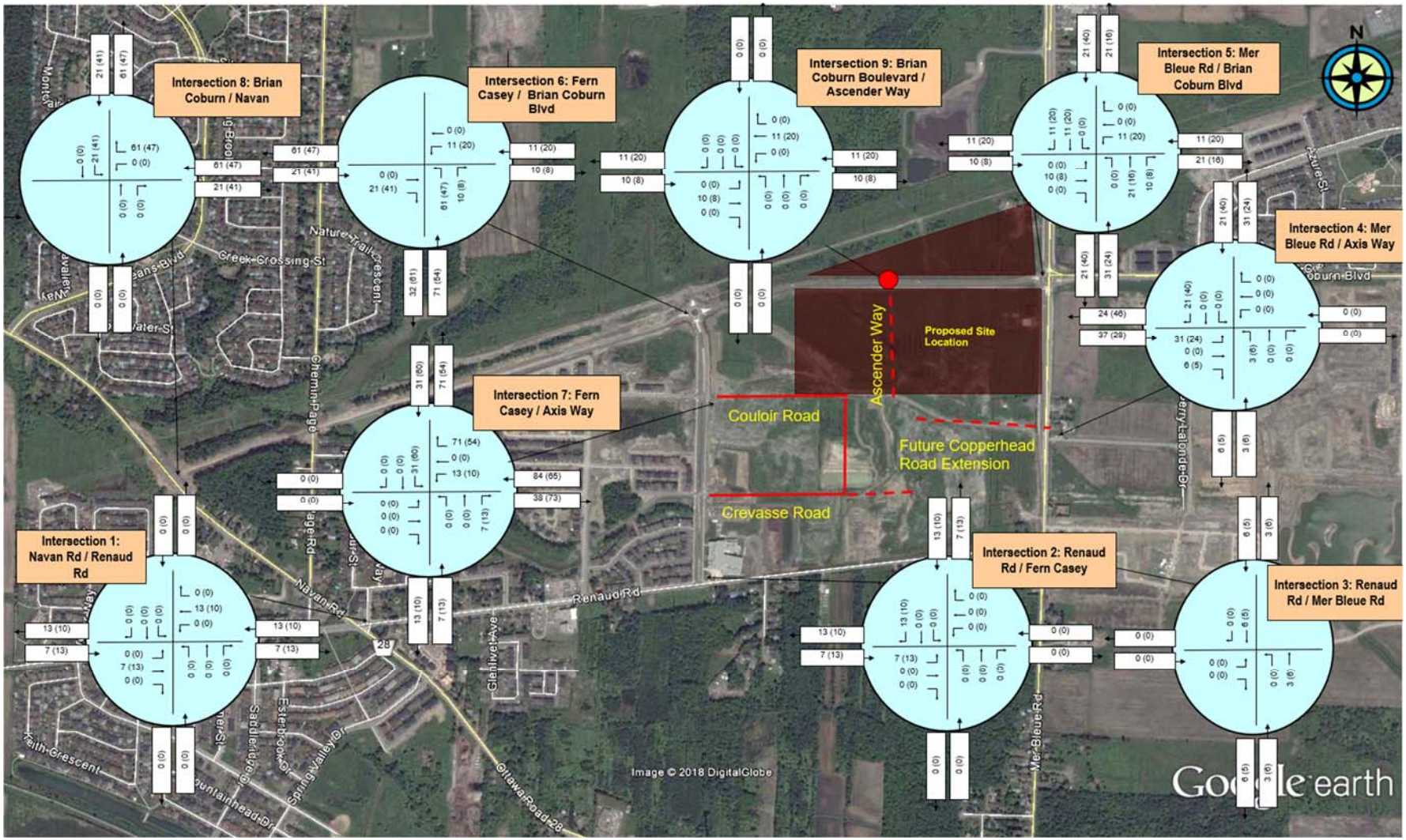
A "shortest path" principle was adopted to assign auto traffic generated by the development to the surrounding network.

The following network assumptions were made during the assignment:

- The Renaud Road / Navan Road intersection remains open in 2031 and 2036 with full access to Renaud Road;
- The Brian Coburn Boulevard / Navan Road intersection remains as 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 2036 horizon;
- The Copperhead Street connection from Trailsedge Phase 3 would be in place by 2031 to form a 4-leg intersection with Mer Bleue and Decoeur Drive;
- The Ascender Avenue connection would be in place by 2036 to form a 4-leg intersection with Brian Coburn Boulevard. This intersection is envisioned to serve as the primary access to and from the triangular lands south of the Hydro Corridor while providing a secondary access to the north for the residential lands south of Brian Coburn Boulevard. Should a right-in right-out configuration be preferred, additional demand would be shifted from Brian Coburn Boulevard, a primary arterial corridor, interior to the local roadways within the Trailsedge Phase 4 development;
- The commercial Block 198 would be afforded a right-in right-out access along Brian Coburn Boulevard and a full movement access along Mer Bleue Road. The exact location and function of these accesses are anticipated to be determined during a future site plan control submission. A right-in right-out access would also remain viable along Mer Bleue Road, given the future Mer Bleue Road / Copperhead Street intersection provides for a roundabout could provide U-turn opportunities; and
- The mixed-use Block 195 would be afforded a right-in right-out access along Mer Bleue Road and a full movement access at the intersection of Brian Coburn Blvd / Ascender Avenue. The exact location and function of the right-in right-out, and any other potential access locations to the Block 195 development, are anticipated to be determined during a future site plan control submission.

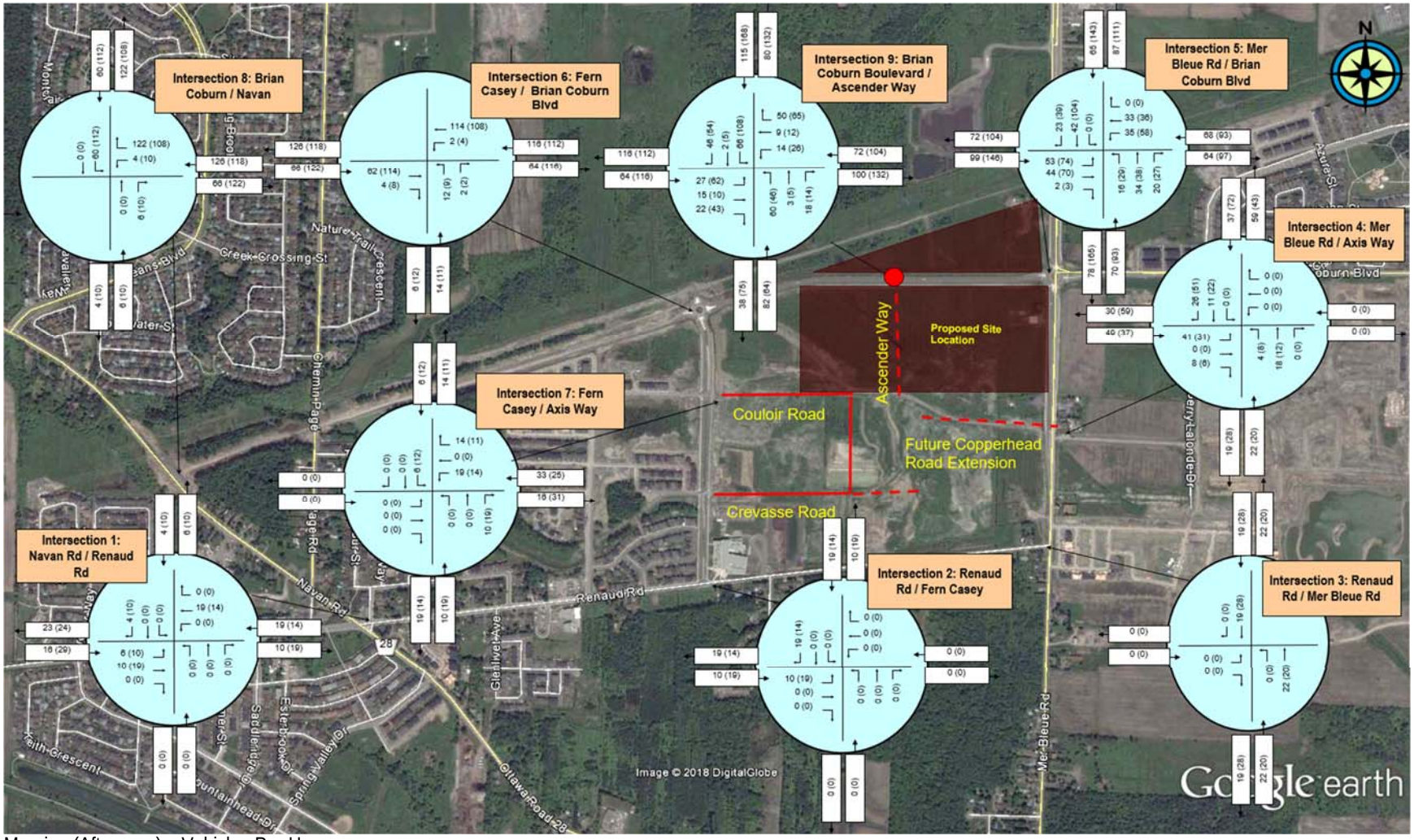
4.1.8 Site Traffic Volumes

Exhibit 4-1 and Exhibit 4-2 illustrate the 2031 Phase 4-1 site traffic volumes and the 2036 full build-out traffic generated by the proposed Trailsedge Phase 4 development, respectively.



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 4-1: Phase 4-1 (2031) Site Traffic Volumes



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 4-2: Full Buildout (2036) Site Traffic Volumes

5.0 BACKGROUND NETWORK TRAFFIC

5.1 HISTORICAL BACKGROUND GROWTH RATE

The traffic study carries significant adjacent development land use assumptions that was presumed to accommodate sufficient background growth in the study area. Therefore, no additional background growth was calculated beyond that described below.

5.2 SURROUNDING DEVELOPMENT TRAFFIC GENERATION

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

No development is anticipated to take place north of the Hydro Corridor within the EUC Phase III Lands before the 2036 horizon year.

5.2.1 Richcraft Trailsedge East: Stage 3

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

Table 5-1 summarizes the 2029 Trailsedge Phase 3 cumulative residential dwelling unit forecasts and associated trip generation rates adopted for this study. The 2029 horizon year represents full build out of Trailsedge East Phase 3.

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

Land Use	*Independent Variable*	*Horizon Year*	*Morning Peak Hour*			*Afternoon Peak Hour*		
		2029	*Rate*	*In*	*Out*	*Rate*	*In*	*Out*
Single-Detached Dwellings	Dwelling Units	343	0.7	29%	71%	0.9	62%	38%
Townhouses	Dwelling Units	712	0.54	37%	63%	0.71	53%	47%

Source: TRANS (Table 6.2, 6.3)

5.2.2 Richcraft's Trailsedge Blocks 193 and 194

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

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

Castleglenn Consultants has produced two technical letters, in addition to addendum letter reports for Avalon West Stage 5 (August, 2016) and Stage 6 (November, 2017), on behalf of Minto Communities Canada. These technical reports included "*Minto Avalon Network Analysis – Impacts of Delay in Completion of Brian Coburn Boulevard / Jerome Jodoin Drive Roundabout"* (October, 2019) and "*Minto Avalon Network Analysis – Mer Bleue Road & Decoeur Rd Improvements"* (October, 2019). A review of these reports has indicated 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);

5.2.4 Orleans Family Health Hub – EUC Phase 3

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

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

The *Summerside West Phase 4-6 TIA Strategy Report* (Parsons, September 2018) was reviewed to determine the traffic impact of the Mer Bleue Expansion Area that is expected to be developed by the build-out year and build-out plus 5-year time horizons. In Phase 4 of this proposed development, 145 single family homes, and 100 dwelling units of townhomes are anticipated. In Phase 5-6, 257 single family homes and 236 dwelling units of townhomes are anticipated. Phase 4 and Phase 5-6 were assumed to be in place by 2031. The adjacent Summerside Phase 1-3 development traffic volumes from the Summerside Phase 4-6 TIA were also incorporated into the background traffic volumes.

5.2.6 East Urban Community, Phase 2 Lands

The *"Draft Gloucester East Urban Community Phase II Community Transportation Study"* (Delcan, 2013) and the EUC Phase 3 MTS (Castleglenn, 2020) were reviewed to determine the relevant traffic generation and distribution for this area. In following with the EUC Phase 3 MTS, it was assumed that 50% of the EUC Phase 2 lands (146 singles, 126 townhouses) are occupied by 2031 while 70% of the EUC Phase 2 lands (291 singles, 252 townhouses) are occupied by 2036. The south leg of the Renaud Road / Fern Casey Street intersection was assumed operational by 2031.

6.0 DEMAND RATIONALIZATION

This section rationalizes the assumed future travel demands for the study area to determine if there are any auto capacity limitations of the transportation network. This section includes an intersection capacity analysis of existing conditions, 2031 background conditions and 2036 background conditions to identify future transportation network constraints.

The proposed development is anticipated to be completed by 2036 and generate between 600-and-800 auto trips during the morning and afternoon peak hours of travel demand.

6.1 REVIEW OF EXISTING NETWORK CONSTRAINTS

Table 6-1 summarizes the existing (2020) intersection capacity analysis undertaken with Synchro™ 10 traffic software for signal control and STOP-control intersections and with SIDRA™ Intersections for roundabout intersections. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines. Table 6-1 indicates that no capacity constraints are evident within the existing network. All intersections are anticipated to operate with 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: Summary of Critical Movement

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*	28	C	0.80	24.3 (16.4)	B (B)	0.69 (0.63)
	(SB-Th/RT)	(17)	(B)	(0.62)			
STOP-Controlled							
Fern Casey & Axis Way "T" intersection	*EB-LT*	12	B	0.04	-	-	-
	(EB-LT)	(12)	(B)	(0.05)			
Renaud Rd & Fern Casey	*SB-LT*	10	B	0.16	-	-	-
	(SB-LT)	(9)	(A)	(0.15)			
Mer Bleue Rd & Renaud Rd	*EB-LT*	11	B	0.31	-	-	-
	(EB-LT)	(19)	(C)	(0.65)			
Mer Bleue Rd & Deceour "T" intersection	*WB-LT*	11	B	0.31	-	-	-
	(WB-LT)	(13)	(B)	(0.10)			
Roundabout							
Brian Coburn Boulevard & Mer Bleue	*WB Approach*	21.1	C	0.98	14.5 (7.8)	B (A)	0.98 (0.56)
	(SB Approach)	(9.0)	(A)	(0.42)			
Brian Coburn Blvd & Fern Casey "T" intersection	*NB Approach*	6.3	A	0.15	5.7 (5.7)	A (A)	0.44 (0.22)
	(WB Approach)	(6.5)	(A)	(0.22)			
Brian Coburn Blvd & Navan Road	*WB Approach*	14.1	B	0.79	9.5 (8.3)	A (A)	0.79 (0.81)
	(NB Approach)	(8.7)	(A)	(0.52)			

6.2 REVIEW OF FUTURE NETWORK CONSTRAINTS

6.2.1 Phase 4-1 (2031) Background Traffic Analysis

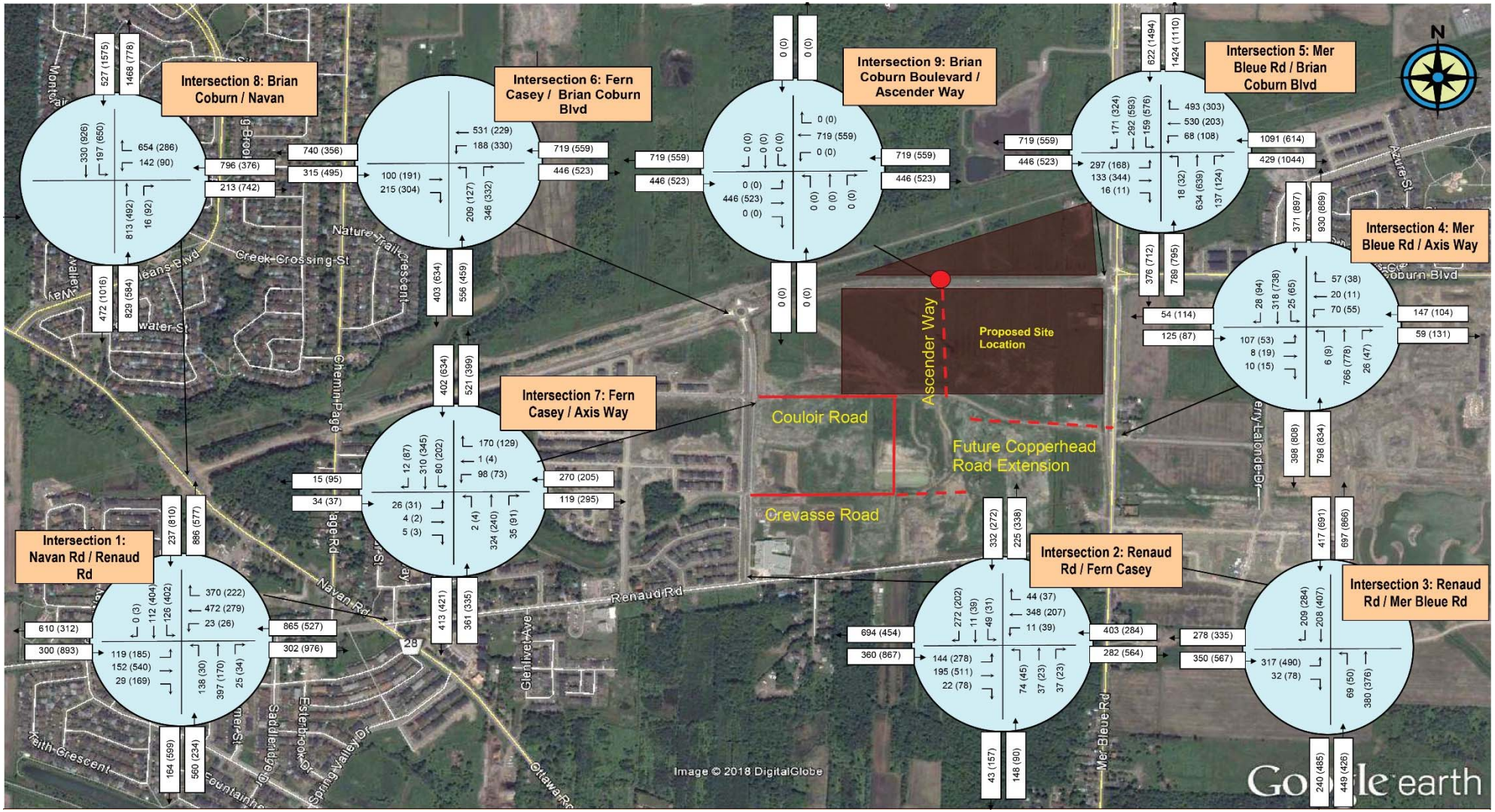
Table 6-2 summarizes the intersection capacity analysis assuming the 2031 background traffic (Exhibit 6-1) undertaken with Synchro™ 10 traffic software for signal control and STOP-control intersections and with SIDRA™ Intersections for roundabout intersections. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines.

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

- The **Navan Road and Renaud Road** traffic signal controlled intersection operated with a LOS "F" in the morning peak hour;
- The **Brian Coburn Boulevard / Mer Bleue Road** roundabout intersection operated 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 study area; and
- The **Brian Coburn Boulevard / Navan Road** roundabout intersection operated with a poor LOS "F" in both the afternoon and morning peak periods of travel demand;

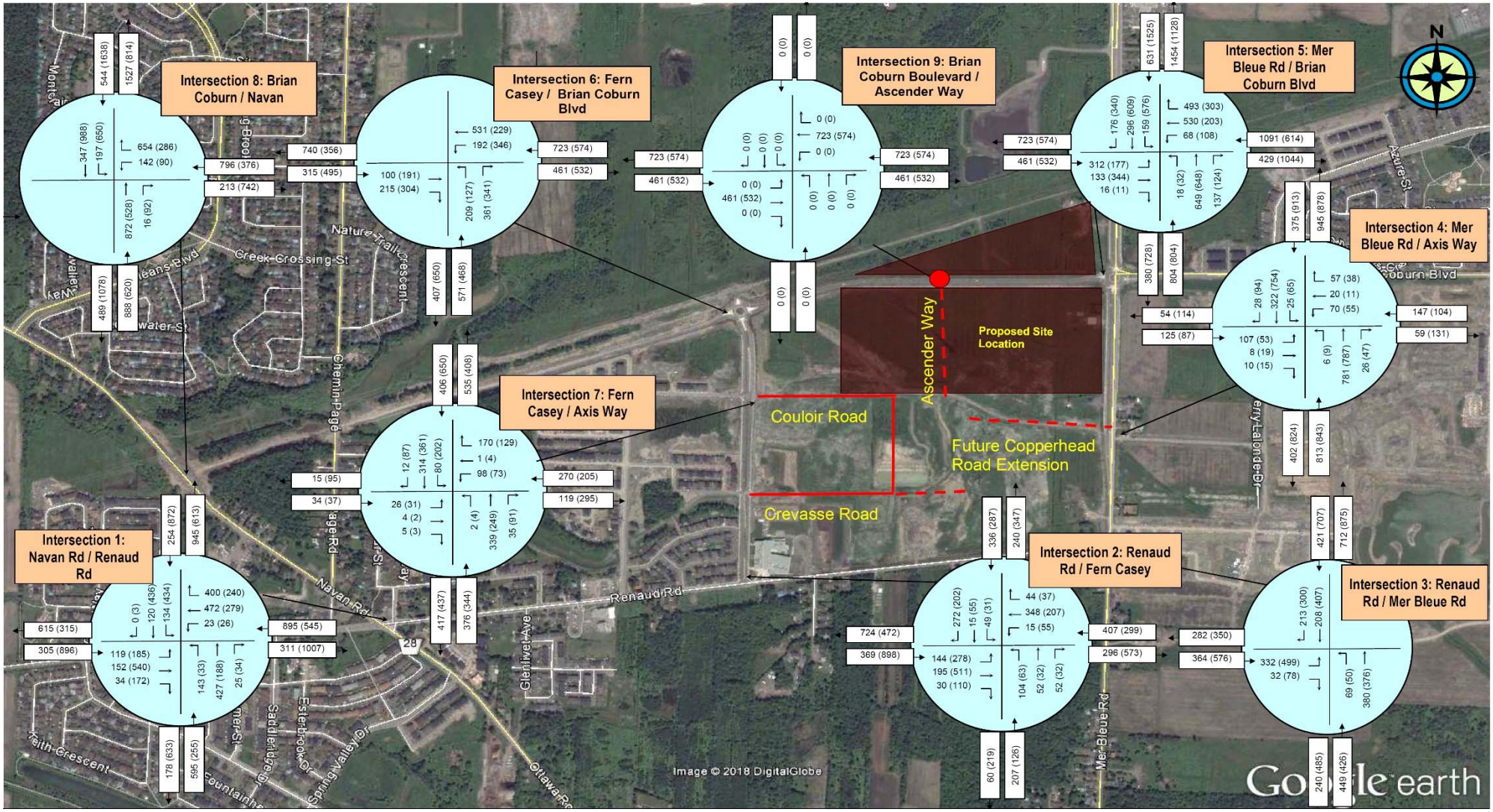
Table 6-2: 2031 Background Intersection Capacity Analysis – Critical Movement Summary

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Signalized							
Renaud Rd & Fern Casey "4-leg" intersection	*WB-Th/RT*	14	A	0.50	16 (17)	A (A)	0.40 (0.48)
	(EB-Th/RT)	(17)	(B)	(0.70)			
Mer Bleue Rd & Renaud Rd	*EB-LT*	18	C	0.74	11 (15)	A (B)	0.52 (0.64)
	(EB-LT)	(20)	(D)	(0.82)			
Navan Road & Renaud Road	*WB-Th/RT*	99	F	1.11	68 (36)	F (D)	1.01 (0.89)
	(WB-Th/RT)	(60)	(E)	(0.94)			
STOP-Controlled							
Fern Casey & Axis Way "4-Leg" intersection	*EB-LT/Th/RT*	25	D	0.16	-	-	-
	(EB-LT)	(42)	(E)	(0.27)			
Roundabout							
Brian Coburn Boulevard & Mer Bleue	*WB Approach*	231.4	F	1.49	90.3 (10.8)	F (E)	1.49 (0.92)
	(EB Approach)	(19.0)	(E)	(0.92)			
Brian Coburn Blvd & Fern Casey "T" intersection	*WB Approach*	7.3	A	0.59	6.7 (7.1)	A (A)	0.59 (0.47)
	(WB Approach)	(8.2)	(A)	(0.42)			
Brian Coburn Blvd & Navan Rd	*WB Approach*	202.9	F	1.42	79.8 (51.9)	F (F)	1.42 (1.14)
	(SB Approach)	(75.7)	(F)	(1.14)			
Mer Bleue Rd & Deceour Drive / Copperhead Road	*EB Approach*	10.6	A	0.12	6.0 (5.6)	A (B)	0.59 (0.61)
	(EB Approach)	(10.2)	(A)	0.12)			



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 6-1: 2031 Background Traffic – Without the Proposed Development



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 6-2: 2036 Background Traffic – Without the Proposed Development

6.2.2 Build-Out (2036) Background Traffic Analysis

Table 6-3 summarizes the intersection capacity analysis assuming the 2036 background traffic (Exhibit 6-2) undertaken with Synchro™ 10 traffic software for signal control and STOP-control intersections and with SIDRA™ Intersections for roundabout intersections. The level of service for the traffic signal control intersections are based on Section 6.1 of the City of Ottawa MMLOS Guidelines.

The 2036 background traffic assumes that Brian Coburn Boulevard has been widened to 4-lanes to achieve satisfactory levels-of-service within the study area. Overall, inspection of the table indicates a small decline in traffic operations due to background traffic growth originating from the EUC Phase II lands south of the study area.

Table 6-3: 2036 Background Intersection Capacity Analysis – Critical Movement Summary

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Signalized							
Renaud Rd & Fern Casey "4-leg" intersection	*WB-Th/RT*	14	A	0.50	17 (18)	A (A)	0.47 (0.51)
	(EB-Th/RT)	(18)	(C)	(0.73)			
Mer Bleue Rd & Renaud Rd	*EB-LT*	19	C	0.75	11 (15)	A (B)	0.53 (0.65)
	(EB-LT)	(20)	(D)	(0.82)			
Navan Road & Renaud Road	*WB-Th/RT*	107	F	1.13	77 (41)	F (E)	1.09 (0.94)
	(WB-Th/RT)	(72)	(E)	(0.99)			
STOP-Controlled							
Fern Casey & Axis Way "4-Leg" intersection	*WB-LT/Th/RT*	26	D	0.63	-	-	-
	(EB-LT/Th/RT)	(43)	(E)	(0.28)			
Roundabout							
Brian Coburn Boulevard & Mer Bleue	*EB Approach*	9.5	A	0.28	7.8 (8.3)	B (B)	0.65 (0.66)
	(EB Approach)	(9.0)	(A)	(0.40)			
Brian Coburn Blvd & Fern Casey "T" intersection	*NB Approach*	6.7	A	0.22	6.3 (6.8)	A (A)	0.30 (0.27)
	(WB Approach)	(8.0)	(A)	(0.26)			
Brian Coburn Blvd & Navan Rd	*WB Approach*	10.5	B	0.63	8.3(7.7)	C (B)	0.71 (0.63)
	(NB Approach)	(9.1)	(B)	(0.63)			
Mer Bleue Rd & Deceour Drive / Copperhead Road	*EB Approach*	10.6	A	0.12	6.0 (5.6)	A (B)	0.60 (0.62)
	(EB Approach)	(10.3)	(A)	(0.12)			

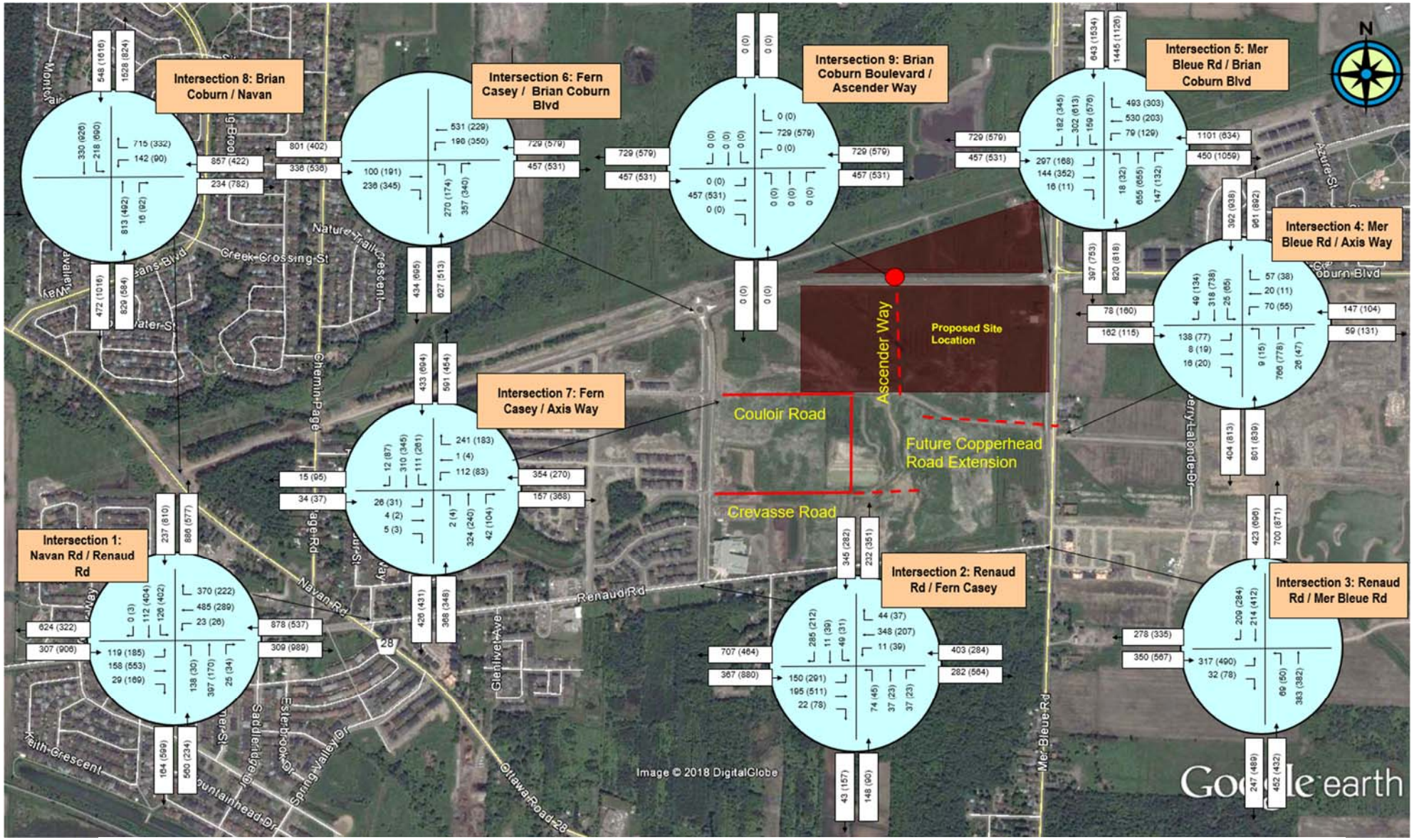
6.3 REDUCTION IN FUTURE DEMAND

Exhibit 6-3 and Exhibit 6-4 illustrate the combined background and site traffic for the 2031 and 2036 horizon years, respectively. Inspection of the exhibits indicated that Brian Coburn Boulevard could experience an increase of up to 60-to-130 vehicles-per-hour in the westbound direction during the morning peak hour. Inspection of the 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. The additional site traffic would likely exacerbate any forecast traffic operational constraints identified with the background traffic growth.

The following reductions in travel demand would be incorporated:

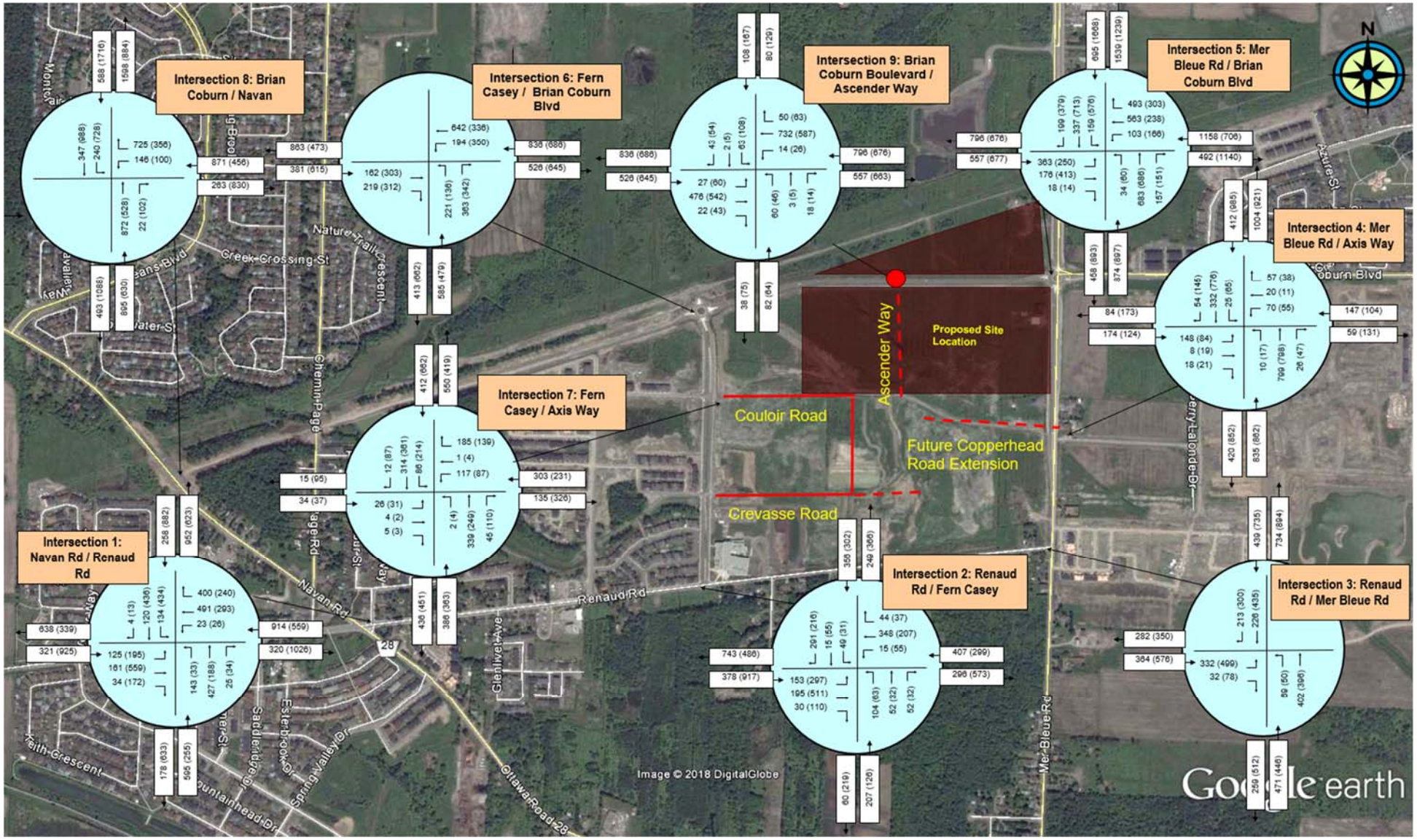
- *Reduction in Auto Modal Share – 2031 horizon year:* The advent of the LRT extension to Trim by 2024 would likely involve an increased transit share for the Orleans community. A 5% auto reduction to background traffic is proposed to account for a shift from the auto mode share to a transit mode share of background traffic; and
- *Reduction in Auto Modal Share – 2036 horizon year:* A greater transit share could be warranted once the advent of the Brian Coburn/Cumberland Transitway dedicated facilities has been realized. Therefore, an additional 5% reduction (for a total of 10%) is proposed to be applied to account for the shift to a transit mode share in the area.

While additional shifts could be prudent, at this phase of planning the above reductions are considered conservative to determine the required roadway infrastructure to support all modes of transportation.



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 6-3: 2031 Design Traffic Volumes (With Phase 4-1) – No Demand Rationalization



Morning (Afternoon) – Vehicles-Per-Hour

Exhibit 6-4: 2036 Design Traffic Volumes (Full Development Build-Out) – No Demand Rationalization

7.0 ANALYSIS

7.1 DEVELOPMENT DESIGN

The following section provides a review of the transportation network elements within the vicinity of the proposed development to ensure the surrounding roadways will remain capable of providing safe, efficient and effective access to/from the development and impacts to the traffic operations will be mitigated.

7.1.1 Design for Sustainable Modes

Appendix "H" provides the completed TDM-supportive Development Design and Infrastructure Checklist based on the current proposed plan of subdivision and supporting MTS Cycling and Pedestrian Linkage Plan. The Trailsedge Phase 4 development south of Brian Coburn Boulevard was found to have excellent pedestrian linkages throughout the subdivision's road system and is supported by a multi-use pathway (MUP) along Brian Coburn Boulevard and Ascender Avenue.

During detailed subdivision design, it is recommended that local roadways be designed to a 30 km/hr design/posted speed as per the new Strategic Road Safety Action Plan.

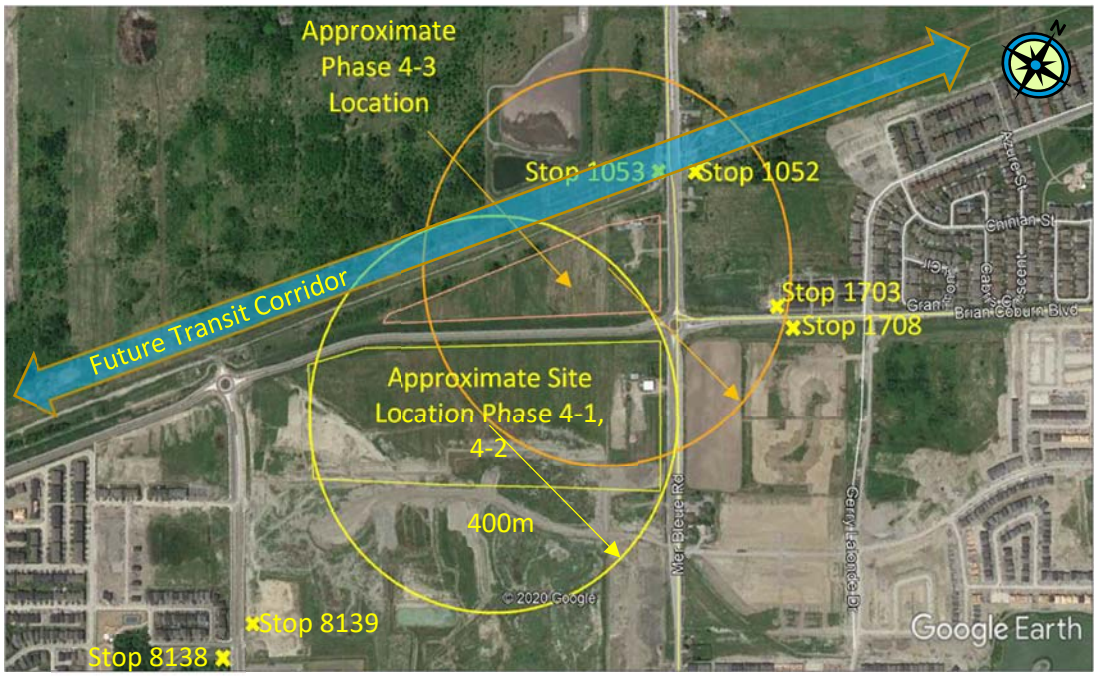


Exhibit 7-1: Transit Stops within 400m

Exhibit 7-1 illustrates the proposed Trailsedge Phase 4 development relative to nearby OC Transpo Stops and illustrates 400m radii originating from the centre of the development. These radii represent the

acceptable walking distance from the development to transit service. Transit Stops 1053 and 1708 (Route 30 SB-EB), and Transit Stop 1703 and 1052 (Route 30 WB-NB) were all found to be within an acceptable walking distance. However, by the time of the initial phases of the Trailsedge Phase 4 development, the Trailsedge East development to the south is anticipated to be at, or near, completion. It is understood that a future transit route would offer local service along the Couloir Road-Ascender Avenue-Copperhead Street corridor within Trailsedge East. This would offer improved transit services to the residential areas of Trailsedge Phases 4-1 and 4-2 ahead of the Cumberland Transitway.

Long term plans transit plans[7] provide for future BRT Stations located at the Brian Coburn Boulevard / Fern Casey Street and Brian Coburn Boulevard / Mer Bleue intersections.

In the short-term before the implementation of the Cumberland Transitway, the following transit stops are recommended for consideration to serve the Trailsedge Phase 4 development:

- A transit stop located at the Brian Coburn Blvd/ Fern Casey Street intersection. This would also serve the future Blocks 193 and 194 (6429 Renaud Road) and the preliminary stages of the Trailsedge North (North of the Hydro Corridor) residential development;
- Transit stops within the Trailsedge Phase 3 subdivision to the south of the development:
  - Nearest the intersection of Couloir Road and Ascender Avenue;
  - Nearest the intersection of Ascender Avenue and Copperhead Street; and
  - West of the Mer Bleue Road / Copperhead Street intersection, likely east of the intersection of Copperhead Street and Alpenstock Avenue (Street No. 32, Trailsedge Phase Plan)

However, these proposed transit stops remain to be determined through the detailed subdivision design of Trailsedge East, Phase 3-2 and 3-3. The Trailsedge Phase 4 development offers sidewalks along Streets No. 29 and 32 to connect to the future local transit routes along Couloir Road, Ascender Avenue and Copperhead Street.

7.1.2 New Street Networks

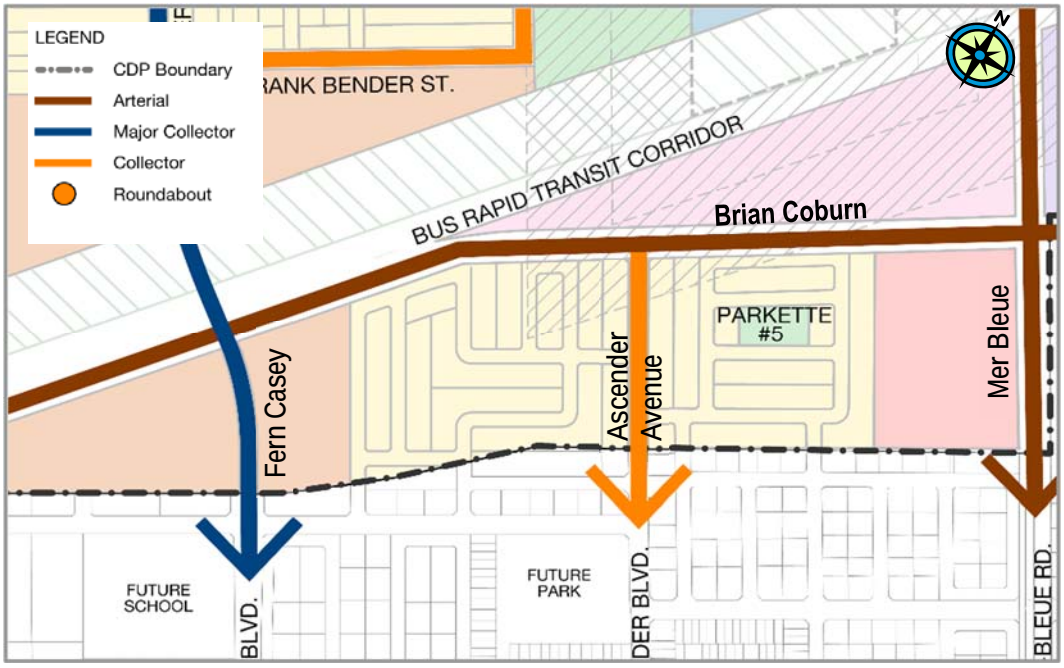
The planned network street design is consistent with the principles and objectives defined within the City of Ottawa's Urban Design Guidelines for Greenfield Neighborhoods. The Trailsedge Phase 4 development design accomplishes the following design objectives:

- Locating highest density developments nearest future transit stations;
- Connecting to future developments such as Trailsedge North (by way of Fern Casey Street) and the Minto Avalon development to the east (through the Copperhead Street/Mer Bleue Road intersection); and
- Connecting the development to boundary collector streets, such as Fern Casey Street and Ascender Boulevard, which are continuous and serve as primary corridors for the development.

7 "*Cumberland Transitway-West of Navan Road to East of Tenth Line Road*" – Preliminary Design Contract ISF12-6000, Oct 8, 2013

The detailed design of the local street network must accommodate a 30 km/hr operating/design speed according to the new Strategic Road Safety Action Plan Update.

Exhibit 7-2 and Exhibit 7-3 illustrate the street classification system and the pedestrian/cyclist linkages respectively, as envisioned in the *East Urban Community Phase III Community Development Plan*. The Trailsedge Phase 4 network design is consistent with the road classifications and anticipated usage laid out within the CDP document.

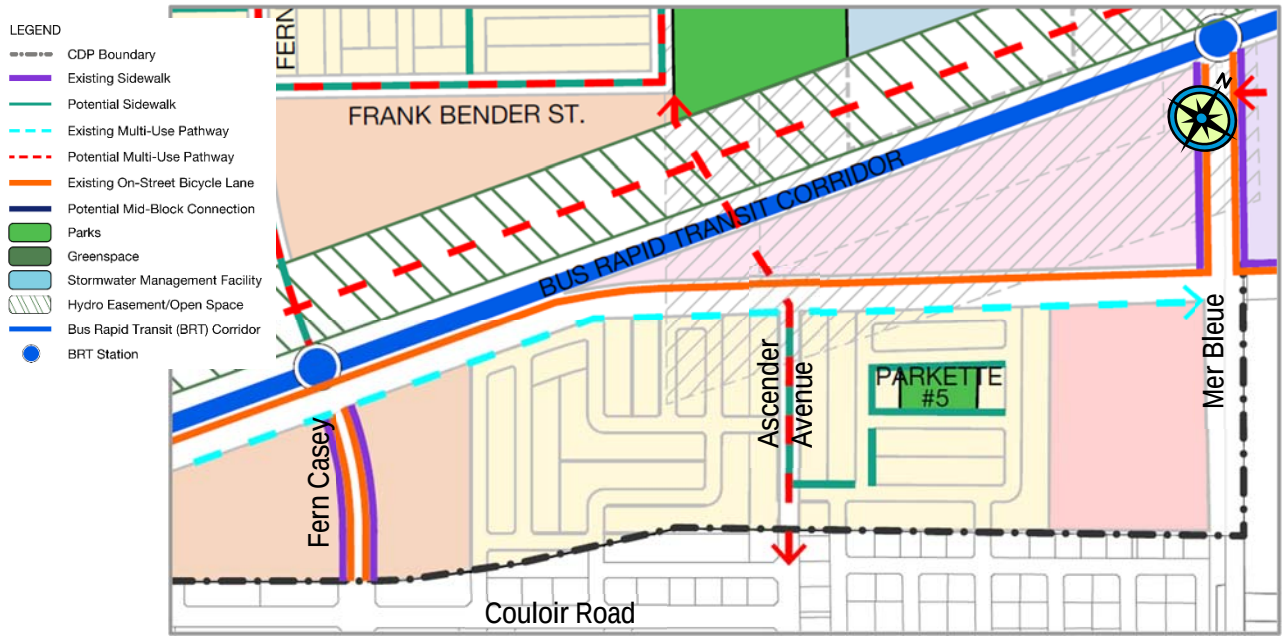


[Source: EUC Phase III CDP, Street Hierarchy Plan]

Exhibit 7-2: Trailsedge Phase 4: Network Street Classification

The Trailsedge Phase 4 would involve the implementation of Ascender Avenue from north of Brian Coburn Boulevard to Couloir Road (Trailsedge East) as a collector roadway. Ascender Avenue would afford 2-lanes of auto travel, a 24.0m ROW width suitable for transit, a MUP and a boulevard and sidewalk arrangement. The MUP arrangement would be suitable to connect cyclists from Phase 4-1 and Phase 4-2 to Brian Coburn Boulevard to the north and to Trailsedge East south of the development.

Exhibit 7-4 illustrates the proposed typical cross-sections for the Major Collector and Collector roadways within the Trailsedge North community, extracted from the EUC Phase III MTS. Collector Roadways provide for a boulevard and sidewalk arrangement along one side of the roadway and a MUP and boulevard along the other side.



[Source: EUC Phase III CDP, Pedestrian and Cyclist Plan]

Exhibit 7-4: Trailsedge Phase 4: Cycling and Pedestrian Linkages

Exhibit 7-5 illustrates the typical cross-section proposed for local roadways within the Trailsedge North community. The local cross-section would include sidewalks on key local roadways to provide connections to the major collector pathways and local transit routes.

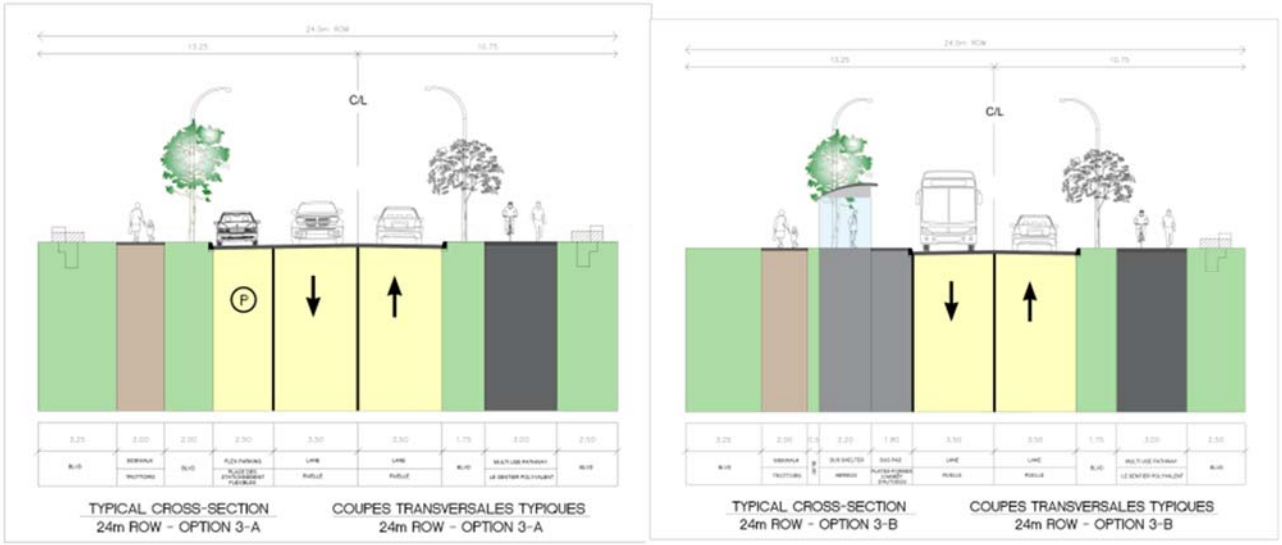
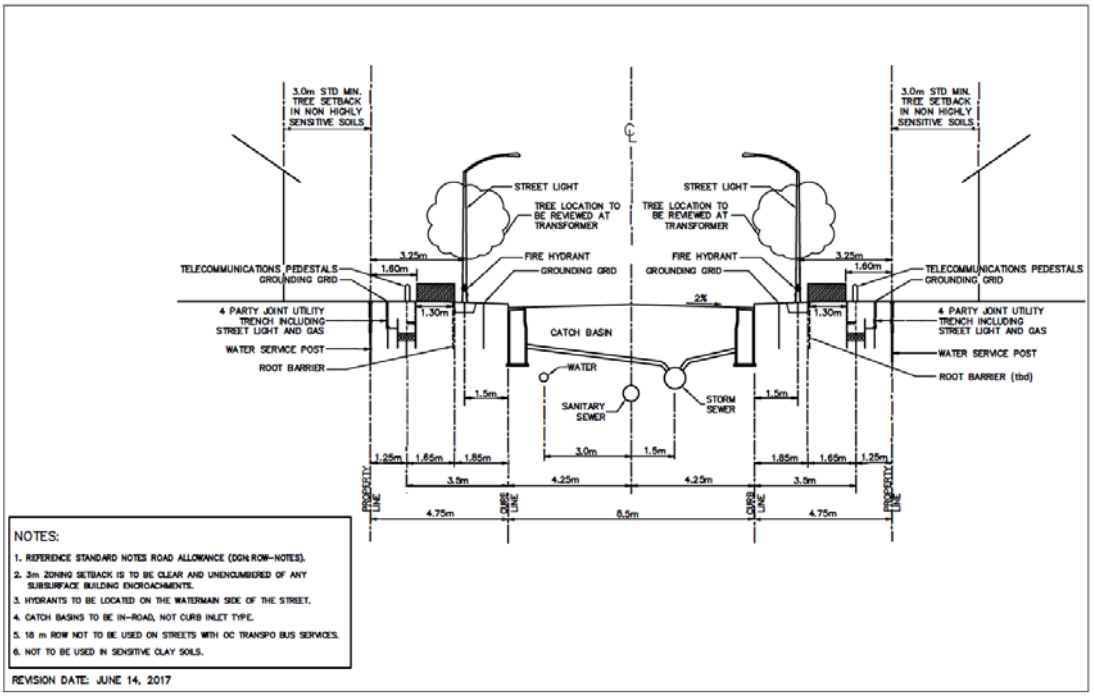
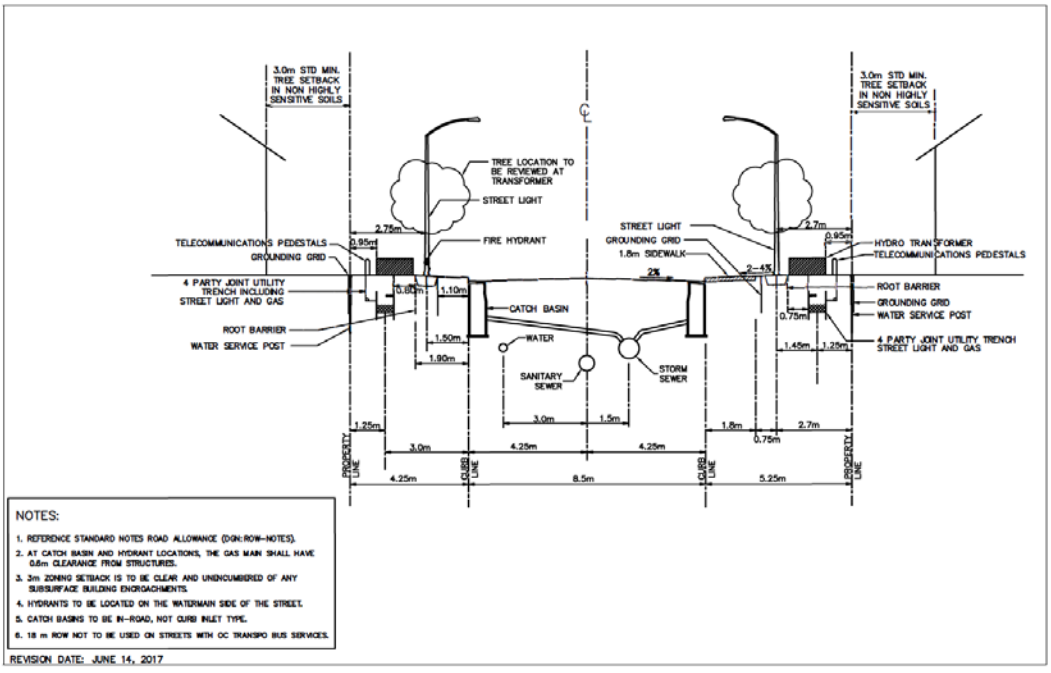


Exhibit 7-3: Typical Collector Cross Section Without (Left) and With (Right) Transit Stops
Exhibit 8.5a and 8.5b, EUC Phase III MTS



RESIDENTIAL ROAD 18m ROAD ALLOWANCE
4 PARTY JOINT USE TRENCH



RESIDENTIAL ROAD 18m ROAD ALLOWANCE
4 PARTY JOINT USE TRENCH

Exhibit 7-5: Typical 18.0m Right of Way for Local Streets – Without (top) and with (bottom) sidewalk
Exhibit 8.6a and 8.6b, EUC Phase III MTS

7.2 BOUNDARY STREET DESIGN

7.2.1 Mobility – Segment MMLOS Analysis

The Multi-Modal Level-of-Service (MMLOS) guidelines were used to evaluate the segment level of service for all modes of 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 Couloir Road (fronting the subdivision, including the north sidewalk and the MUP facility);
- Brian Coburn Boulevard (fronting the subdivision); and
- Mer Bleue Road.

The MMLOS Analysis adopted the following assumptions:

- The target MMLOS has been referenced from Exhibit 22 from the City of Ottawa's "*Multi Modal Level of Service Guidelines*" (September 2015). The MMLOS targets are based on the "Mixed-Use Centre Official Plan Designation" as the proposed development is located within the Mer Bleue Mixed-Use Area;
- The proposed development does not propose significant roadway widenings or changes to the sidewalk/boulevard arrangements within the study area; and
- For the pedestrian and bike LOS analysis, the operating speed has been assumed to be 10 km/hr greater than the roadway posted speed[8].

Table 7-1 summarizes the segment MMLOS analysis fronting the proposed development assuming the existing configurations of Fern Casey Street, Chemin de Couloir Road, and Brian Coburn Boulevard. The table indicates the following deficiencies and their possible mitigation measures for consideration:

Pedestrian LOS (PLOS)

- The Brian Coburn Boulevard analysis found to indicate a PLOS of "E", which was found to be deficient of the target PLOS "C". The PLOS "D is directly attributable to the operating speed of 80 km/hr along Brian Coburn Boulevard and the traffic volumes forecasted to occur by 2036. A reduction in the speed limit to from 70 km/hr to 50 km/hr would result in a PLOS which meets the MMLOS target for this segment. However, the planned future widening of Brian Coburn Boulevard which would be triggered by further urbanization of the corridor would address this forecast deficiency;
- The Mer Bleue Road corridor provides for a sidewalk separated from the curb lane by a cycle lane. The elevated operating speed results in a poor PLOS "D". To improve the PLOS, a combination of a lower speed limit (including traffic calming measures) and on-street parking could serve to improve the PLOS. However, these measures are likely unsuitable for the Mer Bleue Road corridor;

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

- The Fern Casey Street analysis indicated a PLOS of "F", which was found to be deficient of the target PLOS "C". The PLOS "F is directly attributable to the operating speed of 70 km/hr along Fern Casey Street and the traffic volumes forecasted to occur by 2036. A reduction in the speed limit to from 60 km/hr to 40 km/hr would result in a PLOS which meets the MMLOS target for this segment. The lower sped limit would also be also be appropriate for the school zone located at the corner of Fern Casey Street and Renaud Road.

Bicycle LOS (BLOS)

- The Fern Casey Street analysis indicated a BLOS "E", which was found to be deficient of 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. A reduction in the speed limit to 40 km/hr would result in a BLOS "A" which would exceed the MMLOS target for this segment;
- To achieve a satisfactory BLOS "B", the detailed design of the Couloir Road corridor is recommended to incorporate a posted speed limit of 40 km/hr, a mixed-auto/cycling traffic arrangement and no marked centerline.
- The Mer Bleue Road corridor presents a BLOS "E" due to the 70 km/hr operating speed of the roadway. To achieve the BLOS target, either physically separated bikeways provides or a reduction in speed limit to 50 km/hr would be required. These measures are likely unsuitable for the corridor.

The ***Fern Casey Street*** corridor is classified a major collector with a right-of-way of approximately 41m west of the proposed site. Traffic calming measures must recognize the right-of-way and road design of Fern Casey Street is more suited to that of a suburban arterial road than a collector roadway with a school zone. To achieve a reduce design/operation speed, the following could be considered:

- Information signage and speed display devices to advise traffic on their speeds;
- An assessment of the feasibility of cyclist provisions along Fern Casey Street in the form of dedicated north-south cycling lanes or mixed traffic accommodations. These measures could serve to narrow the north-south travel lanes south of Couloir Road by way of paint and seasonal vertical measures;
- Interspaced horizon deflection measures in the form of seasonal vertical signage;
- Raised intersection crosswalks, or the provision of high vis striping, to ensure vehicles are aware of their speed across the various residential access roads;
- Provisions of vertical landscaping features along the center median that could add the additional sense of a narrow corridor; and
- A mid-block pedestrian crossing between Couloir Road and Chemin de la Crevasse Road, which could involve limited lane narrowing. This improvement should not be implemented in isolation, and would require an investigation to assure traffic speeds are minimized in advanced of the crossing.

The above measures are considered appropriate for a major collector roadway aiming achieve the PLOS and BLOS targets as defined with the City of Ottawa's MMLOS guidelines.

Table 7-1: Segment MMLOS for Boundary Streets at Build-Out (2036)

Performance Measure	*Roadway Segments Adjacent to the Development*			
	Northbound Fern Casey Street	Westbound Couloir Road	Eastbound/Westbound Brian Coburn Blvd.	Southbound Mer Bleue Road
Pedestrian LOS (PLOS)				
Sidewalk Width (m)	1.8	>2.0	3.7	2.5
Boulevard Width (m)	>3m	0	2.5	>2m
Average Daily Curb Lane Traffic Volume	3,800	2,300	4,300	4,000
Presence of On-Street Parking	No	Yes	No	No
Operating Speed (km/h) Posted +10 km/hr	70	50	80	70
Segment PLOS	F	B	D	D
Target PLOS	C	C	C	C
Bicycle LOS (BLOS)				
Bikeway Type	Bike Lanes	Physically Separated Bikeway (Multi-Use Path)	Physically Separated Bikeway (Multi-Use Path)	Bike Lanes
Travel Lanes	2	N/A	N/A	2
Bike Lane Width (m)	>2m	N/A	N/A	2m
Operating Speed (km/h) Posted +10 km/hr	70	N/A	N/A	70
Bike Lane Blockage	N/A	N/A	N/A	N/A
Segment BLOS	E	A	A	E
Target BLOS	B	D	D	D
Transit LOS (TLOS)				
Facility Type	Mixed Traffic	N/A	Mixed Traffic	Mixed Traffic
Level/Exposure to Parking/Driveway Friction	Limited		Limited	Limited
Posted Speed Limit (km/h)	60		70	60
Segment TLOS	D		D	D
Target TLOS	N/A		D	D
Truck LOS (TkLOS)				
Number of lanes (in each direction)	N/A	N/A	1	2
Curb Lane Width (m)	N/A	N/A	~3.5	~3.6
Segment TkLOS	N/A	N/A	C	A
Target TkLOS	N/A	N/A	D	D

7.3 ACCESS INTERSECTIONS DESIGN

7.3.1 Location and Design of Site Access

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

- **Fern Casey Street / Couloir Road Full Movement Access**: This access would ultimately be traffic signal controlled by the time full build-out of Trailsedge Phase 4 is achieved. The interim configuration remains consistent with the existing layout that includes STOP-controlled signage

facing the minor leg approaches. The centerline of the access is located approximately 230m south of the Brian Coburn Boulevard / Fern Casey Street intersection;

- **Mer Bleue Road / Copperhead Street Full Movement Access**: This access would be a single-lane roundabout with YIELD condition on all approaches and single lane approaches. The centreline of the access is located approximately 200m south of the Mer Bleue Road / Brian Coburn Boulevard intersection; and
- **Brian Coburn Boulevard / Ascender Avenue Full Movement Access**: This access is envisioned to provide for a double-lane roundabout with YIELD condition on all approaches. The centreline of the access is located approximately 320m west of the Brian Coburn Boulevard / Fern Casey Street intersection and 300m east of the Mer Bleue Road / Brian Coburn Boulevard intersection. This assumes a worst-case scenario in terms of property consumption. Alternative, right-in-right-out access could be provided to the lands on either side of Brian Coburn Boulevard given the adjacent roundabouts provide for u-turn opportunities. The Brian Coburn Boulevard approaches would likely provide for two approach lanes while the minor north-south approaches would afford a single lane with perhaps an auxiliary lane. The north leg of the intersection is dependent on the future configuration of the Phase 4-3 mixed-use lands situated between Brian Coburn Boulevard, Mer Bleue Road and the Hydro Corridor. It is recognized that suitable land triangles would need to be provided by the proponent, to be determined during detailed design of Phases 4-1 and 4-2 as well as future site plan submissions for Phases 4-3.

7.3.2 Intersection Control

As indicated in Section 7.3.1:

- The **Fern Casey Street / Couloir Road** access would be STOP-controlled on the minor leg with free-flow conditions along Fern Casey Street in the interim. Sometime before, or during, the development of the Trailsedge Phase 4 residential development the intersection is anticipated to receive traffic signal improvements;
- The **Mer Bleue Road / Copperhead Street** access intersection would be a two-lane roundabout with YIELD control on all approaches; and
- The **Brian Coburn Boulevard / Ascender Avenue** access intersection was anticipated to open as a 2-lane roundabout with YIELD control on all approaches, and a single shared LT/Th/RT lane on the minor legs. However, staging opportunities may arise with the intersection initially constructed as a "T" intersection with the south leg providing access to the Trailsedge North Phase 4 development south of Brian Coburn Boulevard.

7.3.3 Intersection Design

Table 7-2 summarizes a Synchro™ analysis of the three proposed site accesses assuming 2036 forecast traffic. For this analysis, a LOS "E" or a v/c ratio greater than 0.90 was considered unacceptable. Table 7-2 indicates satisfactory LOS "B-or-better" traffic operations at the proposed access locations.

Exhibit 7-6 illustrates the recommended configuration for the Fern Casey Street/Axis Way-Couloir Road intersection extracted from the 2-Lane *Belcourt Road Extension (from Renaud Road to Brian Coburn Boulevard)*

Preliminary Design (March, 2012). The design was previously developed in consultation with City staff to provide for a double SB-LT lane and a 2-lane Fern Casey Street corridor.

Table 7-2: Summary of Traffic Operations – Proposed Site Accesses (2036)

Intersection and Control	*Weekday Morning Peak Hour (Afternoon Peak Hour)*			
	Critical Movement			
	Approach / Movement	Delay (seconds)	LOS	v/c
Brian Coburn Blvd. & Ascender Avenue 2-Lane Roundabout	*NB Approach*	9.1	B	0.68
	(SB Approach)	(8.7)	(A)	(0.27)
Mer Bleue Road & Copperhead Street Access 2-Lane Roundabout	*EB Approach*	10.5	A	0.15
	(EB Approach)	(10.7)	(A)	(0.15)
Fern Casey & Couloir Road/Axis Way "4-Leg" intersection Double SB-LT	*NB-Th/RT*	14	A	0.60
	(NB-Th/RT)	(13)	(B)	(0.64)
Fern Casey & Couloir Road/Axis Way "4-Leg" intersection Single SB-LT	*NB-Th/RT*	18	A	0.50
	(NB-Th/RT)	(16)	(A)	(0.48)

A sensitivity analysis was undertaken assuming a single SB-LT in place at the Fern Casey Street/Axis Way-Couloir Road intersection. The analysis was found to indicate similar levels of service and delay to the double SB-LT lane configuration. Given the recent design and development of the east leg of the intersection, provisions for double SB-LT lanes are unlikely to occur given.

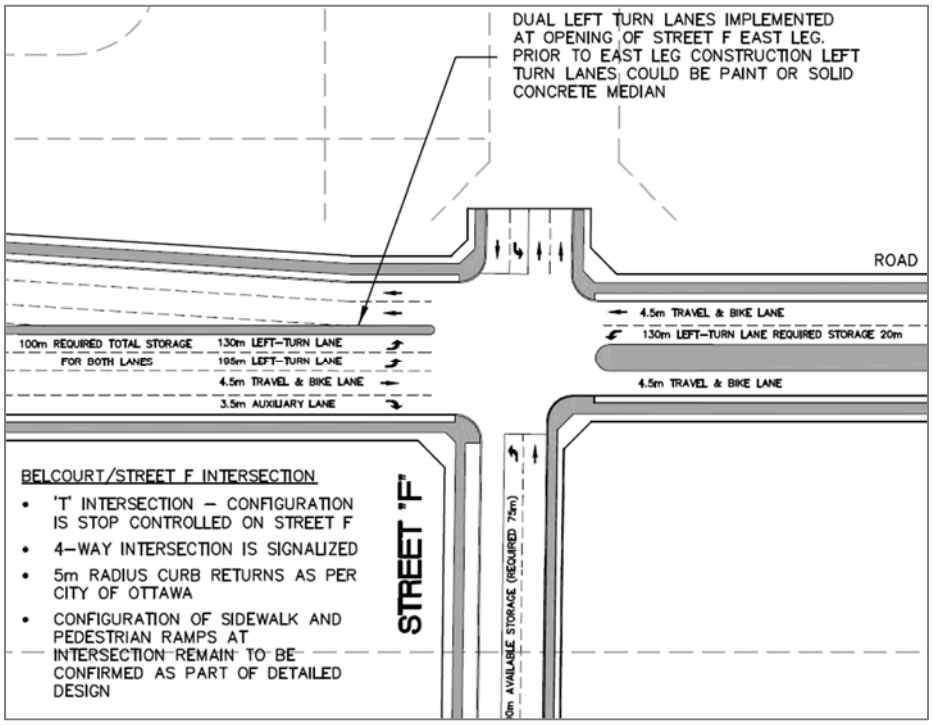


Exhibit 7-6: Preliminary Fern Casey Street & Axis Way/Couloir Road Intersection Arrangement (March 2012)

Table 7-3 summarizes the result of a multi-modal level of service (MMLOS) analysis that was undertaken assuming the potential configuration of the Fern Casey Street / Axis Way-Couloir Road traffic signal controlled intersection (Figure 7-6). The analysis assumed a double SB-LT is in place.

The following sections review each mode of transportation at the intersection:

Pedestrian Level of Service (PLOS): The PETSI analysis indicated that the intersection PLOS for the Fern Casey Street/Axis Way-Couloir Road intersection was below the target PLOS of "C" for the north and south legs.

- The north and south legs both exhibit a PLOS "F" due to the crossing distance provided along Fern Casey Street. To achieve a PLOS "C", the crossing distance would need to be significantly reduced to a width equivalent to 5 total travel lanes.
- A single SB-LT would result in a decrease in the PLOS for the east and west legs of the intersection to a PLOS "D", as the conflicting left turn would no longer necessitate full protection phasing.

To achieve the PLOS target of "C", significant intersection changes would be required, including the reduction in number and width of the existing travel lanes. However, these improvements may not be fully supported given the relatively recent construction of the Fern Casey Street corridor.

Bicycle Level of Service (BLOS): The overall BLOS analysis indicated an "F", which is below the target BLOS of "B/D" for the intersection. To achieve the target BLOS "B" on the north-south approaches, the following improvements to the north-south cycling facilities would be required:

- In the northbound direction, achieve a 40 km/hr posted speed (50 km/hr operating speed) along Fern Casey Street and provide a two-stage left turn bike box; and
- In the southbound direction, achieve a 40 km/hr posted speed (50 km/hr operating speed) along Fern Casey Street, removal of the double SB-LT and provisions of a two-stage left-turn bike box.

These improvements can only be considered as potential future measures to meet LOS targets that can only be implemented in concert with considerable upgrades to the surrounding roadway network.

Transit Level of Service (TLOS): Overall intersection delays were found to be less than 20 seconds on the northbound, southbound and westbound approaches. These delays are suitable for a local transit route along both Fern Casey Street and Couloir Road.

Truck Level of Service (TkLOS): The overall TkLOS was determined to be an "E" given the single travel lanes and moderate corner radii. No target for Fern Casey Street is available for TkLOS as the corridor would likely have infrequent truck usage.

Table 7-3: MMLOS of Future Fern Casey Street/Couloir Road Traffic Signal

	Fern Casey Street/Axis Way-Couloir Road assumes Double SB-LT			
Performance Measure	West Leg – Axis Way	East Leg – Couloir Road	North Leg – Fern Casey Street	South Leg - Fern Casey Street
Pedestrian LOS (PLOS)				
Leg PLOS	C	C	F	F
Intersection PLOS	F			
Target PLOS	C			
Bicycle LOS (BLOS)				
Leg BLOS	D	D	F	F
Intersection BLOS	D		F	
Target BLOS	D		B	
Transit LOS (TLOS)				
Intersection TLOS	N/A	C	B	B
Target TLOS	N/A	N/A	N/A	N/A
Truck LOS (TkLOS)				
Leg TkLOS	E	E	E	E
Intersection TkLOS	E		E	
Target TkLOS	N/A	N/A	N/A	N/A

7.4 TRANSIT

7.4.1 Route Capacity

The study adopted a transit mode share of 30% for the proposed development by the 2036 horizon. The total forecast transit trips for the proposed development in 2036 were found to be:

- 111 inbound trips and 141 outbound trips in the morning peak hour; and
- 206 inbound trips and 189 outbound trips in the afternoon peak hour.

The future Bus Rapid Transit corridor located north of the study area would likely accommodate all transit trips to and from the development. However, as the detailed design and operations regarding the Cumberland Transitway facility remains to be determined, the transit headway and capacity is unknown.

However, adopting a 10-minute headway for the peak direction of travel, the route capacity of the transitway would be between 240-to-420 persons-per-hour[9] Therefore, under these circumstances:

- During the morning peak hour, in the outbound direction, the development transit trips would occupy between 33%-to-58% of available route capacity; and

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

- During the afternoon peak hour, in the inbound direction, the development transit trips would occupy between 49%-to-88% of the available route capacity.

However, it is more than likely that additional routes would be available along Brian Coburn Boulevard and internal to the development (Couloir Road-Ascender Avenue-Copperhead Street) that would form the interim transit arrangement and eventually support the future Cumberland transitway, thus reducing the onus on the transitway to solely accommodate the development.

7.4.2 Transit Priority

The proposed development would likely be supported by the Cumberland Transitway to the north. A design of this corridor, and its future stations, remains uncertain at this time. However, a bus rapid transit station is anticipated near the Brian Coburn Boulevard / Mer Bleue Road intersection and a stop at Fern Casey intended to serve the East Urban Community Phase III lands.

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

7.5.1 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 at the time of the study and not included as an access intersection (See Section 7.3 for Fern Casey St/Couloir Rd Analysis). The configuration of Fern Casey Street / Renaud Road remains to be determined.

For the purposes of this analysis and staging report, it has been assumed that the 2-lane Navan Road/Renaud Road intersection would remain in its current 4-leg traffic signal-controlled configuration for the foreseeable future. Appendix "G" provides detailed calculations for the MMLOS analysis for the intersection.

Table 7-4 summarizes the intersection MMLOS results for the 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 2036 delay results from the Synchro™ analysis;
- the bicycle level of service is based on the critical left-turn maneuvers; and
- the truck level of service analysis is based on existing geometry and the number of receiving lanes.

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".

- 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; and
- 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 Navan Road corridor.

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 could see an improvement to BLOS "C". These improvements can only be considered as potential future measures to meet LOS targets that can only be implemented in concert with considerable upgrades to surrounding roadway network.

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/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 indicated:

- The west and south legs of the intersection were found to operate with TLOS "C", with control delay below 30 seconds;
- The north leg of the intersection operated with TLOS "D" with control delay at 30 seconds in the AM peak hour; and
- The east leg of the intersection operated 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 indicated:

- Renaud Road operated at TkLOS "E", due to the presence of a single receiving lane and modest turning radii; and

- Navan Road operated 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 be accommodated north of the Navan Road / Renaud Road intersection at the intersection of Navan Road / Page Road.

Table 7-4: 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	D	C
Target TLOS	N/A	N/A	N/A	N/A
Truck LOS (TkLOS)				
Leg TkLOS	E	E	F	E
Intersection TkLOS	E		F	
Target TkLOS	E	E	D	D

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 further to the north and designed as a roundabout with the east leg of the roundabout connecting to Contour Street. The existing east leg of Renaud Road is ultimately be terminated from the Navan Road/Renaud Road intersection and connect directly to the Trailsedge Way subdivision at Trailsedge Way. These significant modifications are anticipated to address the above modal deficiencies.

7.5.2 2031 Forecast Auto Capacity Analysis

Table 7-5 summarizes the intersection capacity analysis for the 2031 morning and afternoon peak hours of travel demand, when the Phase 4-1 residential component is anticipated to be built-out. 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.

Table 7-5: 2031 Forecast Traffic Analysis – Design Traffic Volumes

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Signalized							
Renaud Rd & Fern Casey "4-leg" intersection	*WB-Th/RT*	21	B	0.68	16 (17)	A (A)	0.41 (0.47)
	(EB-Th/RT)	(22)	(C)	(0.77)			
Mer Bleue Rd & Renaud Rd	*EB-LT*	19	B	0.65	11 (15)	A (B)	0.50 (0.62)
	(EB-LT)	(21)	(C)	(0.77)			
Navan Road & Renaud Road	*WB-Th/RT*	66	F	1.01	55 (33)	E (D)	0.95 (0.86)
	(WB-Th/RT)	(45)	(D)	(0.87)			
STOP-Controlled							
Fern Casey & Couloir Road/Axis Way "4-Leg" intersection	*EB-LT/Th/RT*	36	E	0.21	-	-	-
	(EB-LT/Th/RT)	(59)	(F)	(0.34)			
Roundabout							
Brian Coburn Boulevard & Mer Bleue	*WB Approach*	195	F	1.41	76 (10)	F (D)	1.41 (0.86)
	(EB Approach)	(16)	(D)	(0.86)			
Brian Coburn Blvd & Fern Casey "T" intersection	*WB Approach*	8	A	0.60	7 (7)	A (A)	0.60 (0.49)
	(WB Approach)	(9)	(A)	(0.44)			
Brian Coburn Blvd & Navan Rd	*WB Approach*	185	F	1.38	76 (42)	F (F)	1.38 (1.11)
	(SB Approach)	(61)	(F)	(1.11)			
Mer Bleue Rd & Deceour Drive / Copperhead Street	*EB Approach*	11	A	0.15	6 (6)	A (B)	0.58 (0.61)
	(EB Approach)	(11)	(A)	(0.15)			

Table 7-5 indicates that the following intersections would not meet the City of Ottawa's MMLOS Guideline target auto LOS of "D" for overall intersection operations within the "General Urban Area":

- The **Navan Road / Renaud Road** signal-controlled intersection operated with an overall poor level-of-service during the morning peak hour of travel demand. The most critical movement was found to be the WB-Th/RT movement which operated with a LOS "F". The future configuration of this intersection remains to be determined which could remedy capacity concerns;
- The EB approach of the **Fern Casey / Axis Way-Couloir Road** stop-controlled intersection operated at LOS "F" during the PM peak hour due to the increase in development on either side of Fern Casey Street. Given the poor levels of service experienced at this intersection, it is anticipated that traffic signal control improvements would be warranted by the build-out of Phase 4-1. The traffic signal configuration was carried forward to the 2036 forecast analysis; and
- Despite the reduction in background travel demand along Brian Coburn Boulevard, the **Brian Coburn Boulevard / Mer Bleue Road** roundabout intersection operated at a LOS "F" during the AM peak hour and the **Brian Coburn Boulevard / Navan Road** roundabout intersection operated at LOS "F" during the AM and PM peak hour.

7.5.3 2036 Forecast Auto Capacity Analysis

Table 7-6 summarizes the intersection capacity analysis for the 2036 morning and afternoon peak hours of travel demand, when the development is expected to be built-out.

A comparison of Table 7-5 to Table 7-6 indicates a general decrease in service levels between 2031 and 2036. The **Navan Road/Renaud Road** traffic signal-controlled intersection was found not toe satisfy the City of Ottawa's MMLOS Guideline target auto LOS of "D" for overall intersection operations within the "General Urban Area":

The **Navan Road/Renaud Road** intersection assuming the existing 2-land 4-leg traffic signal-controlled configuration is anticipated to continue to provide 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 timing of the ultimate desired roundabout configuration for this intersection remains to be confirmed.

The **Fern Casey Street/Axis Way-Couloir Road** intersection was found to operate with acceptable operations with, and without, the double SB-LT configuration. The traffic signal control improvements are considered to be required beyond the build-out of Phase 4-1.

Table 7-6: 2036 Forecast Traffic Analysis – Design Traffic Volumes

Intersection	*Weekday AM Peak (PM Peak)*						
	Critical Movement				*Overall Intersection*		
	Approach / Movement	Delay (seconds)	LOS	v/c	Delay (seconds)	LOS	v/c
Signalized							
Renaud Rd & Fern Casey "4-leg" intersection	*WB-Th/RT*	14	A	0.47	16 (17)	A (A)	0.41 (0.47)
	(EB-Th/RT)	(17)	(B)	(0.68)			
Mer Bleue Rd & Renaud Rd	*EB-LT*	19	C	0.73	10 (14)	A (B)	0.49 (0.61)
	(EB-LT)	(19)	(C)	(0.80)			
Navan Road & Renaud Road	*WB-Th/RT*	69	F	1.02	56 (33)	E (D)	0.94 (0.86)
	(WB-Th/RT)	(54)	(E)	(0.91)			
Fern Casey & Couloir Road/Axis Way "4-Leg" intersection Double SB-LT	*NB-Th/RT*	18	A	0.50	18 (16)	B (A)	0.42 (0.42)
	(NB-Th/RT)	(16)	(A)	(0.48)			
Fern Casey & Couloir Road/Axis Way "4-Leg" intersection Single SB-LT	*NB-Th/RT*	7	A	0.35	10 (9)	A (A)	0.35 (0.34)
	(NB-Th/RT)	(8)	(A)	(0.37)			
Roundabout							
Brian Coburn Boulevard & Mer Bleue	*EB Approach*	9	A	0.30	8 (9)	B (B)	0.63 (0.70)
	(EB Approach)	(10)	(A)	(0.48)			
Brian Coburn Blvd & Fern Casey "T" intersection	*NB Approach*	7	A	0.21	6 (7)	A (A)	0.32 (0.26)
	(WB Approach)	(8)	(A)	(0.24)			
Brian Coburn Blvd & Navan Rd	*WB Approach*	10	B	0.62	8 (8)	B (A)	0.67 (0.60)
	(NB Approach)	(9)	(A)	(0.58)			
Brian Coburn Blvd & Ascender Avenue	*SB Approach*	9	A	0.19	5 (6)	A (A)	0.27 (0.26)
	(SB Approach)	(9)	(A)	(0.26)			
Mer Bleue Rd & Decoeur Drive / Copperhead Street	*EB Approach*	11	A	0.15	6 (6)	A (B)	0.58 (0.61)
	(EB Approach)	(11)	(A)	(0.15)			

8.0 TIA STRATEGY

The following transportation infrastructure improvements are recommended:

- A lower speed limit along Fern Casey Street of 40 km/hr remains worthy of consideration as it is consistent with the school zone nearest the Renaud Road corridor and the desire to achieve elevated PLOS and BLOS targets surrounding the future rapid transit corridor. This would serve to meet both the pedestrian and cyclist multi-modal level of service targets for the study area. To accomplish this design speed, traffic calming measures would likely be required along the corridor. It is recommended that information signage, speed display messages, pedestrian markings and additional landscaping features be identified as potential preliminary traffic calming measures;
- The Renaud Road/Fern Casey Street intersection is anticipated to require traffic signal control improvements at the time when the south leg opens to traffic. This improvement is directly related to the EUC Phase II lands south of the Renaud Road corridor;
- The Fern Casey Street/Couloir Road intersection is anticipated to require traffic signals which was anticipated as part of the Belcourt Preliminary Design effort. The trigger for this improvement was determined to be by the time of completion of the Phase 4-1 residential component of the proposed development which has been estimated to correspond with a 2031 horizon year;
- The Mer Bleue Road/Renaud Road intersection is anticipated to require traffic signal control improvements within the next 5-to-10 years. This is thought likely to occur in advance of any Mer Bleue widening that would take place in the area;
- Intersection improvements to the Mer Bleue Road/Copperhead Street-Decoeur Drive intersection are anticipated to be required given the advent of the west leg of the intersection into the proposed development. A roundabout configuration would be suitable at this intersection provided sufficient right-of-way exists to accommodate such a design proposal;
- The four-lane widening of the Brian Coburn Boulevard corridor was found to be required within the next 10-to-15-years to meet the demands of the existing and proposed developments within, and external to, the study area; and
- Improvement to the Navan Road corridor and the Navan Road/Renaud Road intersection (realignment and roundabout configuration) are currently warranted in terms of current levels of service deficiencies.

8.1 CONCLUSION

The Trailsedge Phase 4 development is anticipated to develop:

- 142 singles, 167 townhouses and 116 back-to-back townhouses located south of Brian Coburn Boulevard (Excludes blocks 193 and 194) during Phases 4-1 and 4-2;
- A commercial area located in Block 198, located in the southwest quadrant of the Brian Coburn Boulevard/Mer Bleue Road intersection which would provide for approximately 181 jobs during Phase 4-2; and
- A mixed-use use development composed of 352 apartment units and 296 commercial/office jobs situated between the Hydro corridor and Brian Coburn Boulevard, which is considered Phase 4-3.

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.

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
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Télécopieur: 613-560-6006

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

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,
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Tel: 613-731-4052

City of Ottawa 2017 TIA Guidelines Screening Form

Mike Giampa, P.Eng. December 3rd, 2018
Project Manager, Infrastructure Approvals
Planning, Infrastructure and Economic Development
City of Ottawa, 110 Laurier Avenue West, Ottawa, ON K1P 1J1

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

1. Description of Proposed Development

Municipal Address	Unknown
Description of Location	The proposed site is bordered by Brian Coburn Blvd. to the north (with mixed-use north of Brian Coburn), Mer Bleue Road to the east, Fern Casey Blvd. to the west and Trails Edge East to the south.
Land Use Classification	Townhomes / Single Unit / Mixed-Use / Commercial
Development Size (units)	~ 715 units / Mixed Use & Commercial Block (4.25 ha)
Development Size (m^2)	NA
Number of Accesses and Locations	Main access points to the subdivision: - Fern Casey Blvd. and Brian Coburn Other access points through the Trails Edge subdivision include: Mer Bleue Road (commercial future access) and Renaud Road.
Phase of Development	Unknown at this stage
Buildout Year	Unknown

2. Trip Generation Trigger

The development will consist of about 715 units; **therefore, <u>the Trip Generation Trigger is satisfied.</u>**

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

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Engineers, Project Managers & Planners

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Ottawa, Ontario, K1B 4S5
Tel: 613-731-4052

3. Location Triggers

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

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

Trails Edge North is a component of the entire Trails Edge community, which would include accesses from Mer Bleue Road (Bike Route), Renaud Road and Brian Coburn Blvd (transit priority). Therefore, **the Location Trigger is satisfied.**

4. Safety Triggers

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

The access from Fern Casey and Brian Coburn Blvd. are over 150m from the roundabouts at Fern Casey / Brian Coburn and Brian Coburn / Mer Bleue, therefore, **the Safety Trigger is assumed not to be satisfied.**

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5. Summary

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

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

Yours Truly,

Arman Matti

Arman Matti, P.Eng.
Transportation Engineer
Castleglenn Consultants Inc.

APPENDIX C: EXISTING TRAFFIC VOLUMES AND COLLISIONS

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

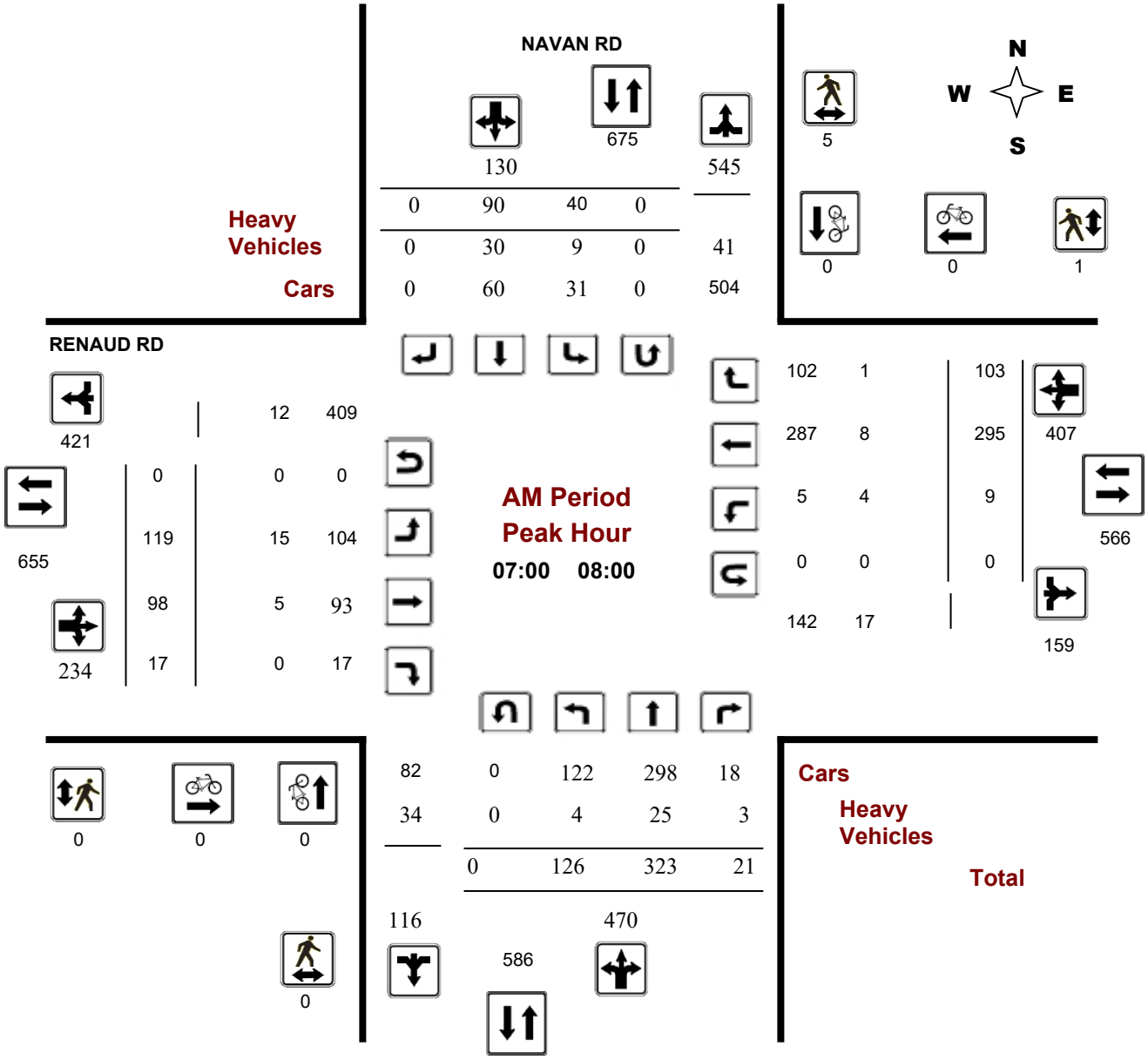
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018 **WO No:** 37596

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



Comments

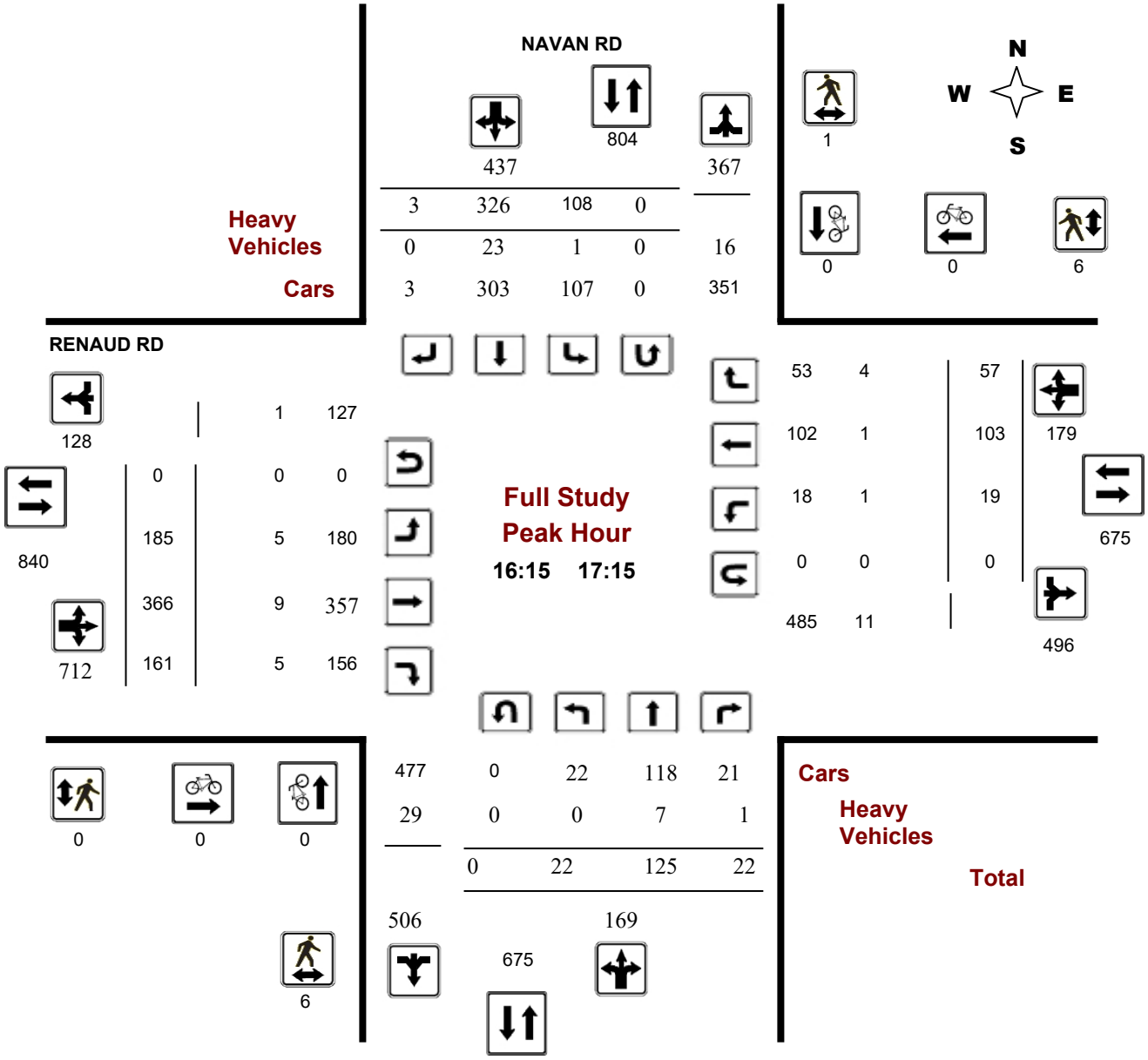
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018 **WO No:** 37596

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



Comments

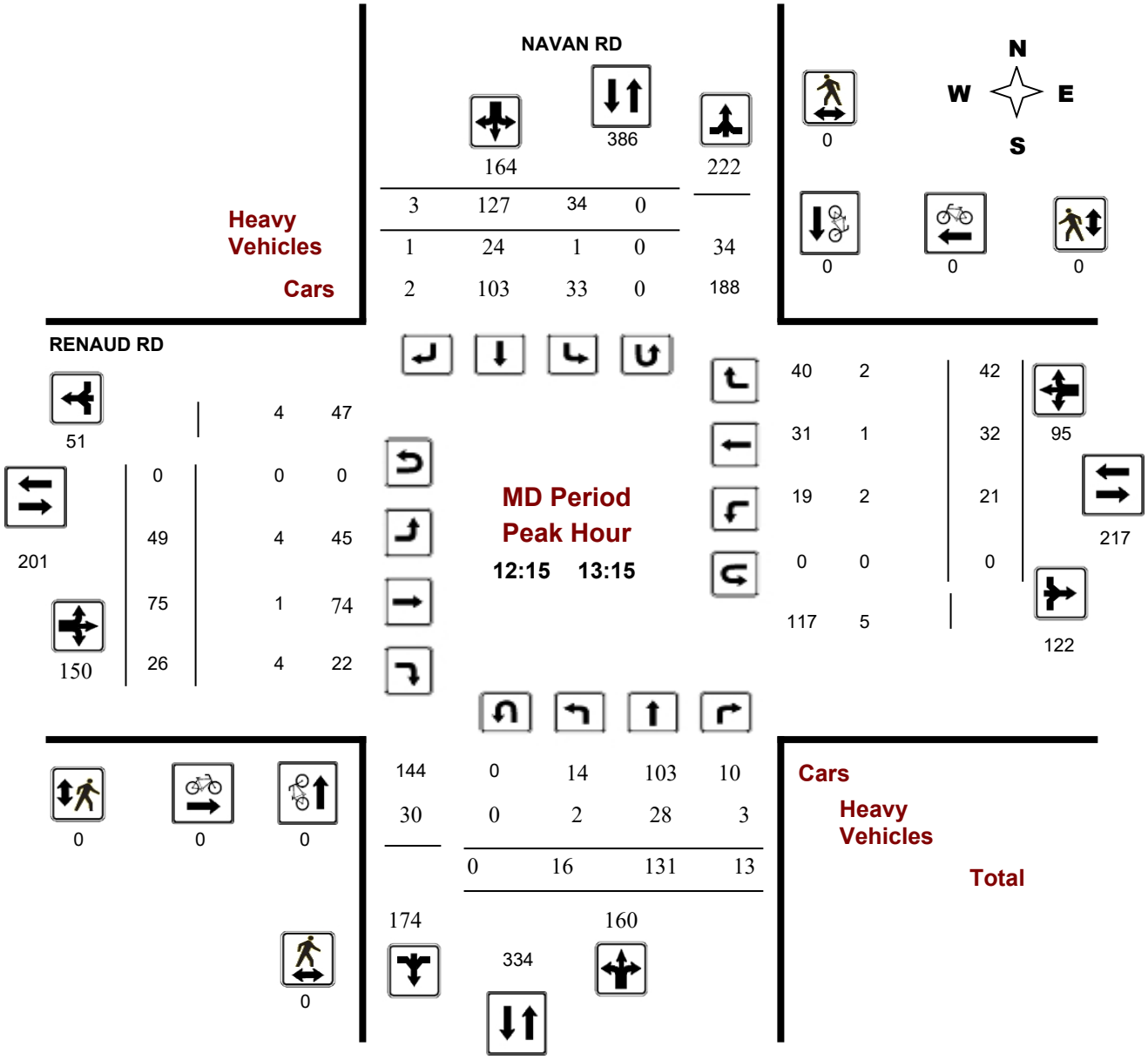
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018 **WO No:** 37596

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



Comments

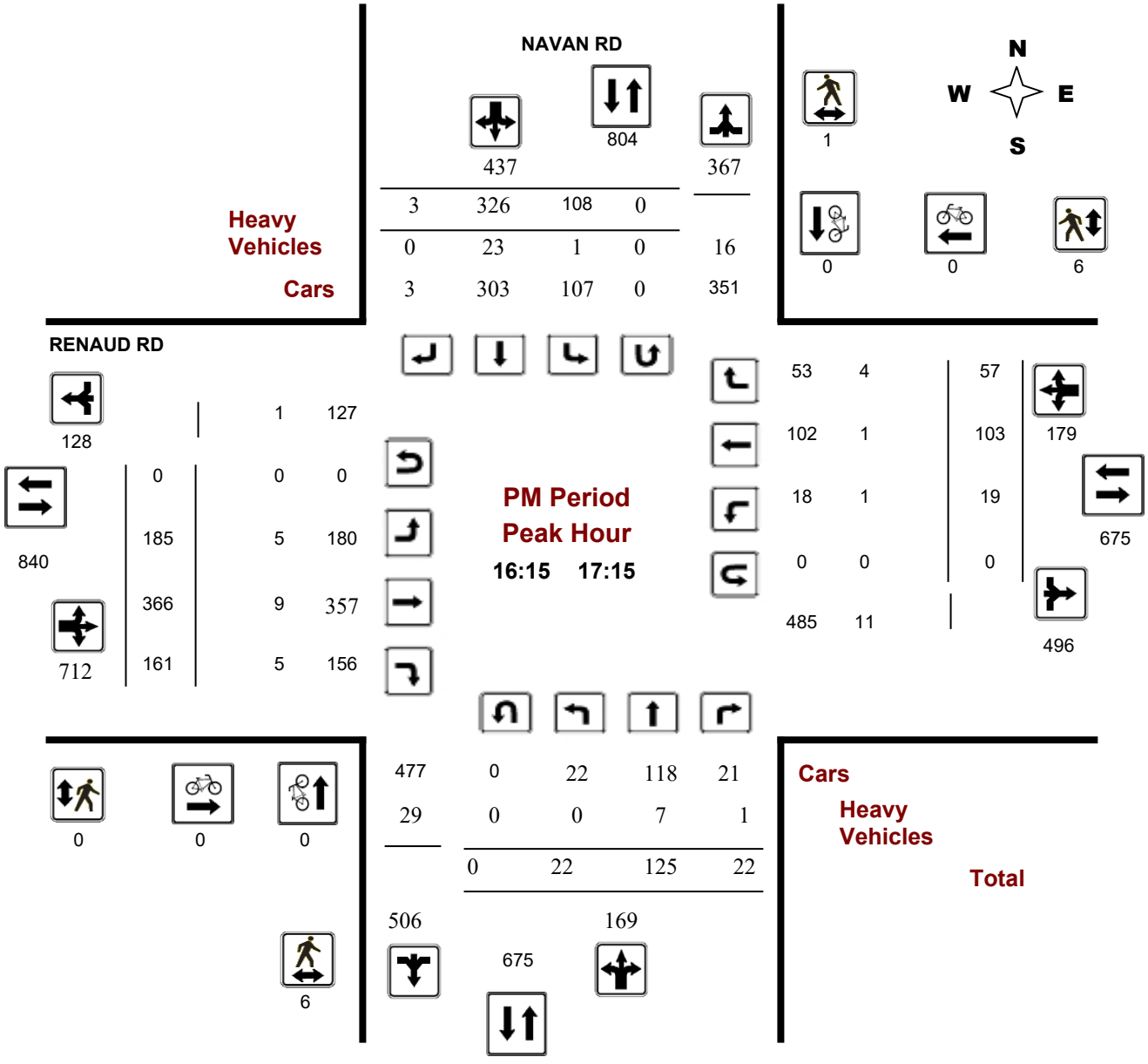
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018 **WO No:** 37596

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



Comments

Transportation Services - Traffic Services

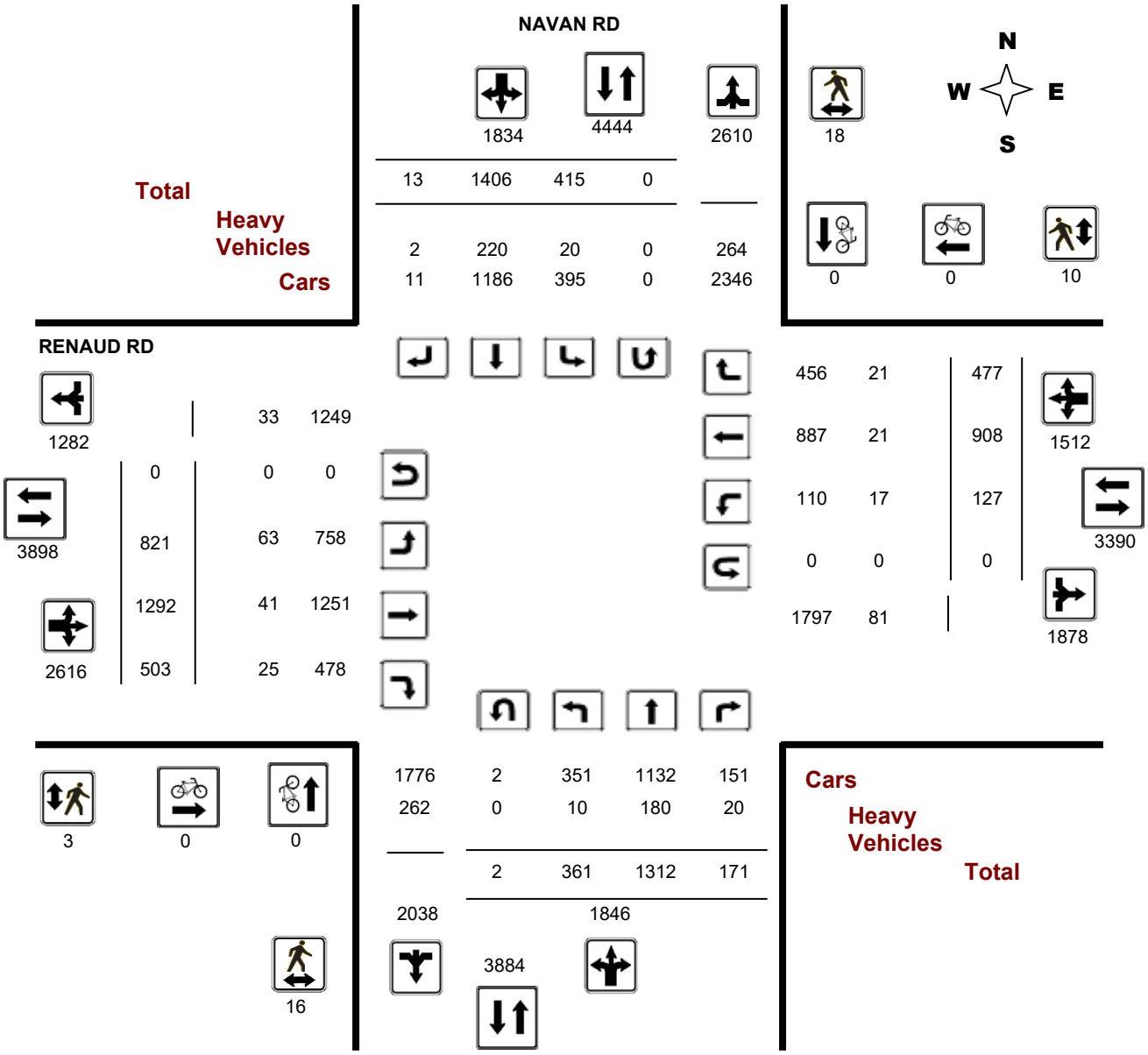
Turning Movement Count - Full Study Diagram

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018

WO#: 37596

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 37596

Turning Movement Count - Full Study Summary Report

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018

Total Observed U-Turns

Northbound: 2 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor 1.00

Full Study

	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	126	323	21	**470**	40	90	0	**130**	**600**	119	98	17	**234**	9	295	103	**407**	**641**	**1241**
08:00 09:00	90	211	25	**326**	19	94	3	**116**	**442**	95	128	24	**247**	14	185	75	**274**	**521**	**963**
09:00 10:00	42	165	25	**232**	23	129	2	**154**	**386**	52	84	15	**151**	12	64	52	**128**	**279**	**665**
11:30 12:30	19	131	21	**171**	32	115	2	**149**	**320**	54	62	26	**142**	16	32	38	**86**	**228**	**548**
12:30 13:30	14	118	14	**146**	31	134	2	**167**	**313**	44	73	28	**145**	16	40	37	**93**	**238**	**551**
15:00 16:00	21	132	20	**173**	77	237	1	**315**	**488**	142	228	104	**474**	17	93	55	**165**	**639**	**1127**
16:00 17:00	19	117	20	**156**	95	341	2	**438**	**594**	180	353	157	**690**	20	101	48	**169**	**859**	**1453**
17:00 18:00	30	115	25	**170**	98	266	1	**365**	**535**	135	266	132	**533**	23	98	69	**190**	**723**	**1258**
Sub Total	361	1312	171	**1844**	415	1406	13	**1834**	**3678**	821	1292	503	**2616**	127	908	477	**1512**	**4128**	**7806**
U Turns				**2**				**0**	**2**				**0**				**0**	**0**	**2**
Total	361	1312	171	**1846**	415	1406	13	**1834**	**3680**	821	1292	503	**2616**	127	908	477	**1512**	**4128**	**7808**
EQ 12Hr	502	1824	238	**2566**	577	1954	18	**2549**	**5115**	1141	1796	699	**3636**	177	1262	663	**2102**	**5738**	**10853**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	502	1824	238	**2566**	577	1954	18	**2549**	**5115**	1141	1796	699	**3636**	177	1262	663	**2102**	**5738**	**10853**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**1.00**						
AVG 24Hr	657	2389	311	**3361**	756	2560	24	**3340**	**6701**	1495	2353	916	**4763**	231	1653	869	**2753**	**7516**	**14217**
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. 37596

Turning Movement Count - 15 Minute Summary Report

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018

Total Observed U-Turns

Northbound: 2 Southbound: 0

Eastbound: 0 Westbound: 0

		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	33	82	4	**119**	9	20	0	**29**	**148**	23	20	4	**47**	2	73	25	**100**	**147**	**295**
07:15	07:30	43	83	7	**133**	10	23	0	**33**	**166**	21	20	5	**46**	1	90	33	**124**	**170**	**336**
07:30	07:45	21	82	6	**109**	9	27	0	**36**	**145**	40	32	3	**75**	3	71	24	**98**	**173**	**318**
07:45	08:00	29	76	4	**109**	12	20	0	**32**	**141**	35	26	5	**66**	3	61	21	**85**	**151**	**292**
08:00	08:15	25	51	11	**87**	5	15	1	**21**	**108**	26	40	3	**69**	0	60	18	**78**	**147**	**255**
08:15	08:30	30	62	7	**99**	6	30	2	**38**	**137**	26	31	7	**64**	6	44	16	**66**	**130**	**267**
08:30	08:45	21	49	6	**76**	2	23	0	**25**	**101**	21	33	6	**60**	6	52	20	**78**	**138**	**239**
08:45	09:00	14	49	1	**64**	6	26	0	**32**	**96**	22	24	8	**54**	2	29	21	**52**	**106**	**202**
09:00	09:15	10	50	4	**64**	6	33	1	**40**	**104**	23	27	4	**54**	4	15	19	**38**	**92**	**196**
09:15	09:30	17	39	11	**67**	7	29	1	**37**	**104**	13	27	5	**45**	4	14	14	**32**	**77**	**181**
09:30	09:45	6	39	4	**49**	5	43	0	**48**	**97**	10	17	4	**31**	4	16	6	**26**	**57**	**154**
09:45	10:00	9	37	6	**52**	5	24	0	**29**	**81**	6	13	2	**21**	0	19	13	**32**	**53**	**134**
11:30	11:45	6	40	9	**55**	3	23	0	**26**	**81**	10	14	7	**31**	1	7	8	**16**	**47**	**128**
11:45	12:00	6	31	2	**39**	11	24	0	**35**	**74**	17	17	6	**40**	1	12	12	**25**	**65**	**139**
12:00	12:15	3	23	6	**32**	8	34	0	**42**	**74**	11	13	5	**29**	8	7	6	**21**	**50**	**124**
12:15	12:30	4	37	4	**45**	10	34	2	**46**	**91**	16	18	8	**42**	6	6	12	**24**	**66**	**157**
12:30	12:45	7	34	4	**45**	9	22	1	**32**	**77**	16	24	2	**42**	7	10	8	**25**	**67**	**144**
12:45	13:00	2	31	2	**35**	7	34	0	**41**	**76**	7	18	8	**33**	3	7	8	**18**	**51**	**127**
13:00	13:15	3	29	3	**35**	8	37	0	**45**	**80**	10	15	8	**33**	5	9	14	**28**	**61**	**141**
13:15	13:30	2	24	5	**31**	7	41	1	**49**	**80**	11	16	10	**37**	1	14	7	**22**	**59**	**139**
15:00	15:15	4	31	5	**40**	13	42	0	**55**	**95**	25	33	18	**76**	3	21	11	**35**	**111**	**206**
15:15	15:30	7	40	5	**52**	19	62	0	**81**	**133**	45	60	23	**128**	6	19	15	**40**	**168**	**301**
15:30	15:45	8	31	6	**45**	24	59	1	**84**	**129**	40	59	26	**125**	3	22	18	**43**	**168**	**297**
15:45	16:00	2	30	4	**36**	21	74	0	**95**	**131**	32	76	37	**145**	5	31	11	**47**	**192**	**323**
16:00	16:15	5	26	8	**39**	18	98	0	**116**	**155**	35	68	42	**145**	7	25	13	**45**	**190**	**345**
16:15	16:30	9	33	5	**47**	21	71	2	**94**	**141**	43	97	42	**182**	5	26	17	**48**	**230**	**371**
16:30	16:45	3	29	5	**37**	29	86	0	**115**	**152**	51	109	37	**197**	6	29	10	**45**	**242**	**394**
16:45	17:00	2	29	2	**33**	27	86	0	**113**	**146**	51	79	36	**166**	2	21	8	**31**	**197**	**343**
17:00	17:15	8	34	10	**52**	31	83	1	**115**	**167**	40	81	46	**167**	6	27	22	**55**	**222**	**389**
17:15	17:30	8	31	7	**47**	28	74	0	**102**	**149**	36	77	42	**155**	3	27	20	**50**	**205**	**354**
17:30	17:45	6	32	4	**43**	22	56	0	**78**	**121**	29	55	23	**107**	6	21	19	**46**	**153**	**274**
17:45	18:00	8	18	4	**30**	17	53	0	**70**	**100**	30	53	21	**104**	8	23	8	**39**	**143**	**243**
TOTAL:		361	1312	171	**1846**	415	1406	13	**1834**	**3680**	821	1292	503	**2616**	127	908	477	**1512**	**4128**	**7808**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
37596

RENAUD RD @ NAVAN RD

Count Date: Thursday, March 08, 2018

Start Time: 07:00

	NAVAN 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. 37596

Turning Movement Count - Heavy Vehicle Report

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 2018

		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	08:00	4	25	3	**32**	9	30	0	**39**	**71**	15	5	0	**20**	4	8	1	**13**	**33**	**104**
08:00	09:00	4	28	2	**34**	2	34	0	**36**	**70**	13	7	4	**24**	1	4	3	**8**	**32**	**102**
09:00	10:00	0	26	3	**29**	1	47	1	**49**	**78**	7	3	4	**14**	4	1	3	**8**	**22**	**100**
11:30	12:30	0	26	4	**30**	2	25	1	**28**	**58**	4	3	3	**10**	3	1	0	**4**	**14**	**72**
12:30	13:30	2	25	3	**30**	2	23	0	**25**	**55**	4	0	2	**6**	1	1	2	**4**	**10**	**65**
15:00	16:00	0	30	4	**34**	3	24	0	**27**	**61**	9	5	4	**18**	2	4	5	**11**	**29**	**90**
16:00	17:00	0	12	1	**13**	1	32	0	**33**	**46**	9	10	5	**24**	2	1	4	**7**	**31**	**77**
17:00	18:00	0	8	0	**8**	0	5	0	**5**	**13**	2	8	3	**13**	0	1	3	**4**	**17**	**30**
Sub Total		10	180	20	**210**	20	220	2	**242**	**452**	63	41	25	**129**	17	21	21	**59**	**188**	**640**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		10	180	20	**0**	20	220	2	**242**	**452**	63	41	25	**129**	17	21	21	**59**	**188**	**640**

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
37596

Turning Movement Count - Pedestrian Volume Report

RENAUD RD @ NAVAN RD

Count Date: Thursday, March 08, 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	4	4	0	1	1	5
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	5	5	0	1	1	6
08:00 08:15	0	1	1	0	0	0	1
08:15 08:30	0	1	1	0	0	0	1
08:30 08:45	0	1	1	0	0	0	1
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	1	1	0	0	0	1
09:00 10:00	0	1	1	0	0	0	1
11:30 11:45	1	0	1	0	0	0	1
11:45 12:00	0	1	1	0	0	0	1
12:00 12:15	2	2	4	0	1	1	5
12:15 12:30	0	0	0	0	0	0	0
11:30 12:30	3	3	6	0	1	1	7
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	3	0	3	1	1	2	5
15:30 15:45	0	0	0	1	0	1	1
15:45 16:00	0	0	0	0	0	0	0
15:00 16:00	3	0	3	2	1	3	6
16:00 16:15	2	4	6	1	1	2	8
16:15 16:30	3	0	3	0	4	4	7
16:30 16:45	0	0	0	0	0	0	0
16:45 17:00	3	0	3	0	2	2	5
16:00 17:00	8	4	12	1	7	8	20
17:00 17:15	0	1	1	0	0	0	1
17:15 17:30	0	1	1	0	0	0	1
17:30 17:45	0	0	0	0	0	0	0
17:45 18:00	2	0	2	0	0	0	2
17:00 18:00	2	2	4	0	0	0	4
Total	16	18	34	3	10	13	47

Comment:

Transportation Services - Traffic Services

Work Order
37596

Turning Movement Count - 15 Min U-Turn Total Report

RENAUD RD @ NAVAN RD

Survey Date: Thursday, March 08, 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	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	1	0	0	0	1
17:30	17:45	1	0	0	0	1
17:45	18:00	0	0	0	0	0
Total		2	0	0	0	2

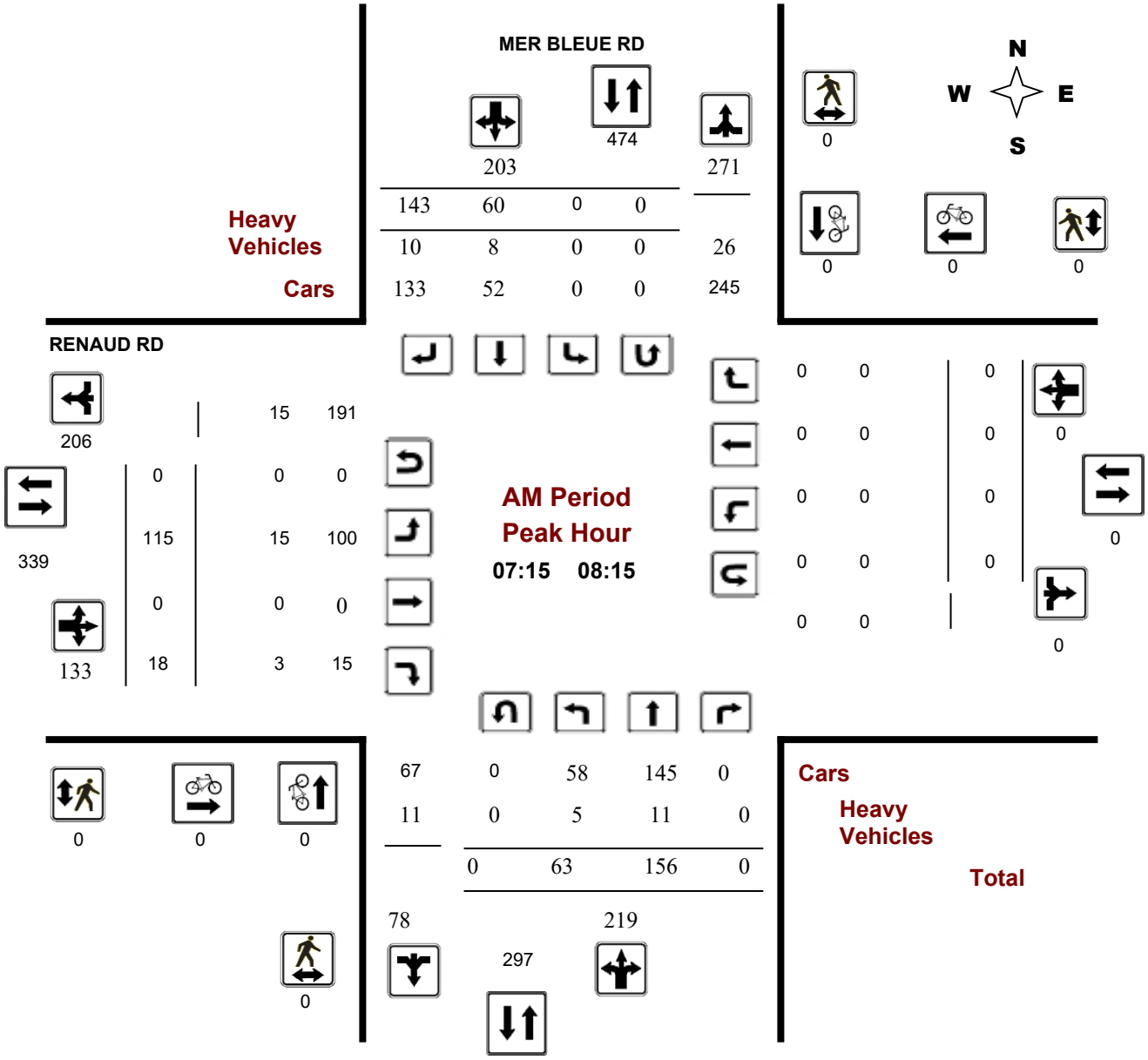
Transportation Services - Traffic Services

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

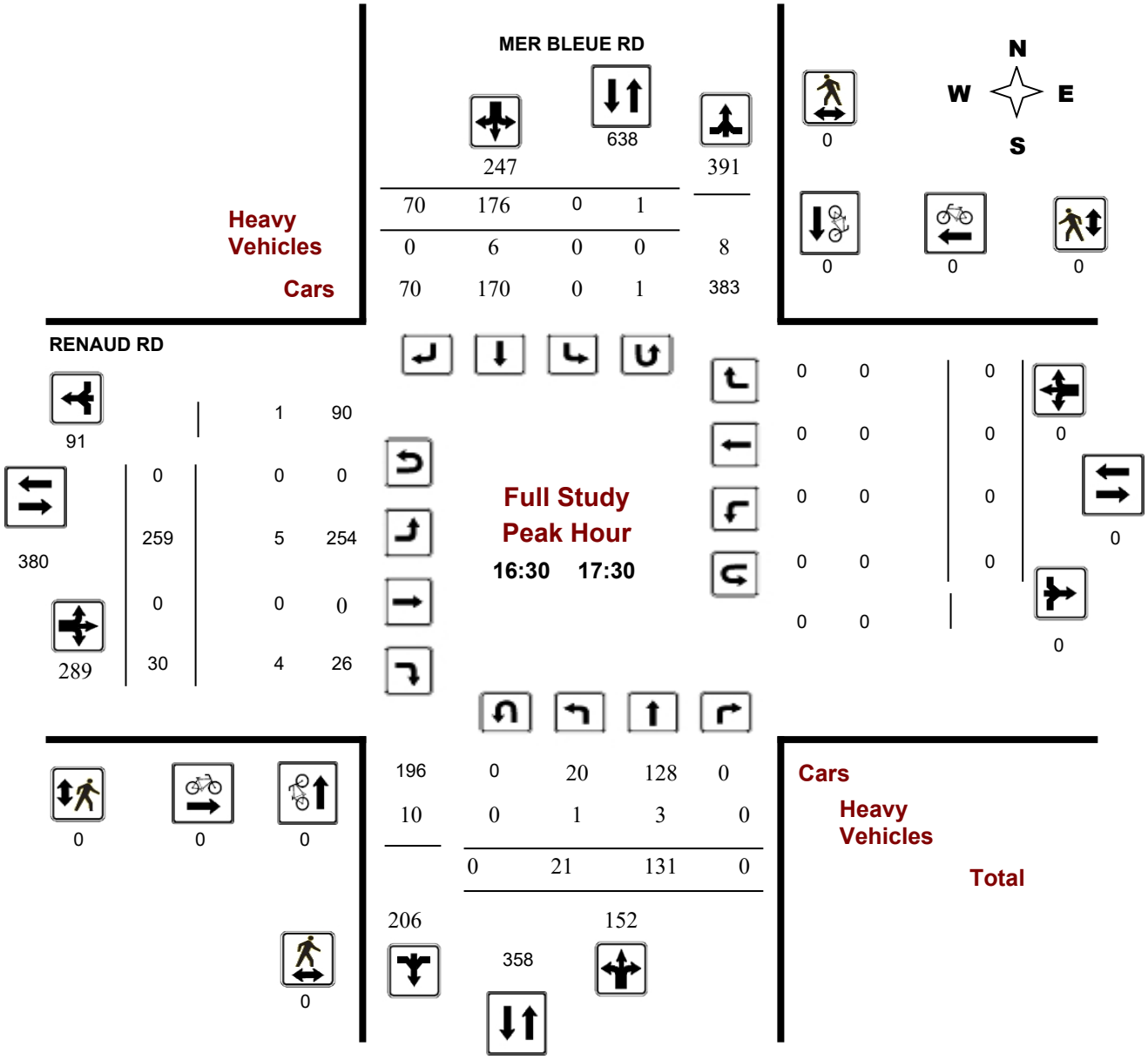
Transportation Services - Traffic Services

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

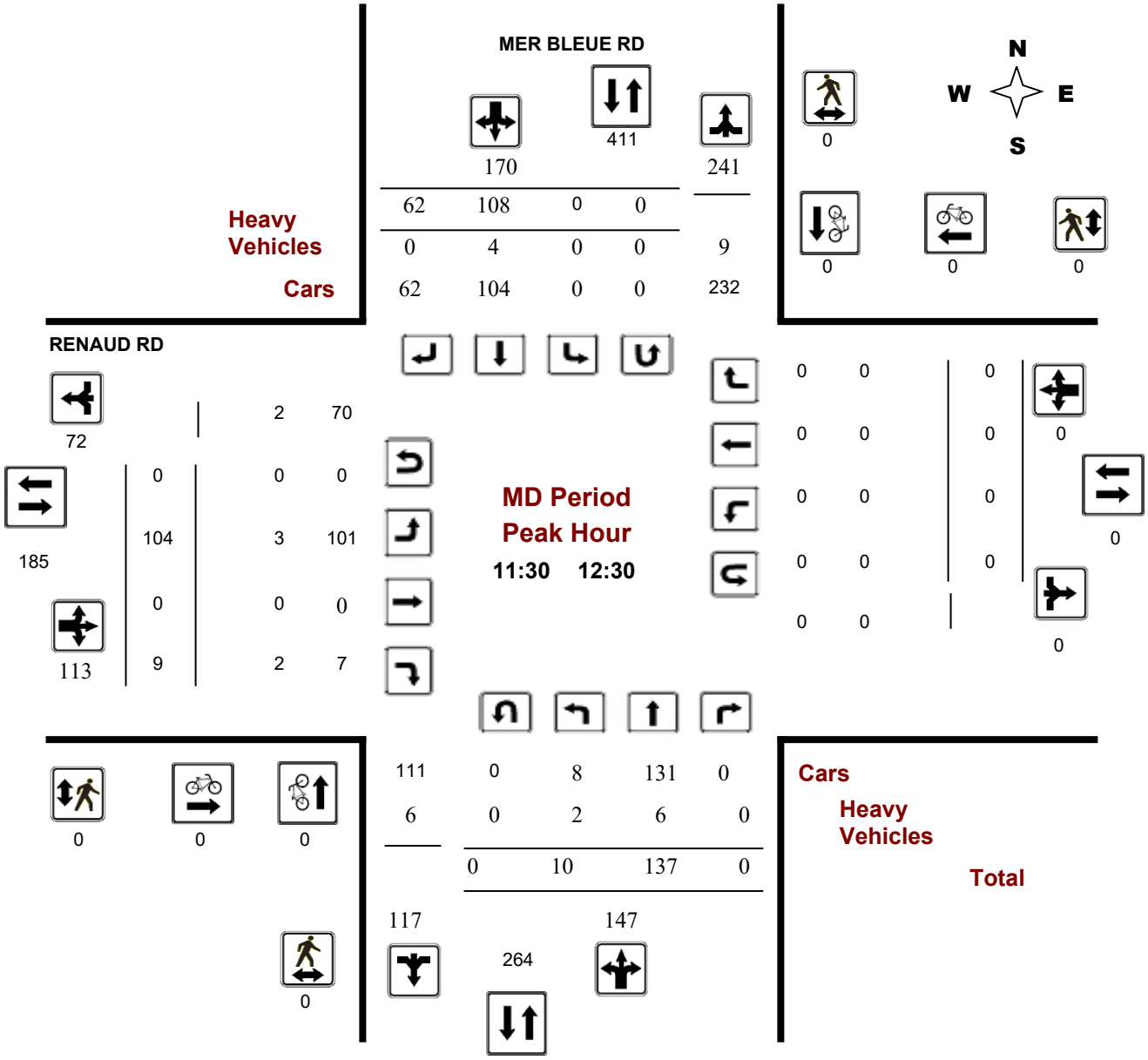
Transportation Services - Traffic Services

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

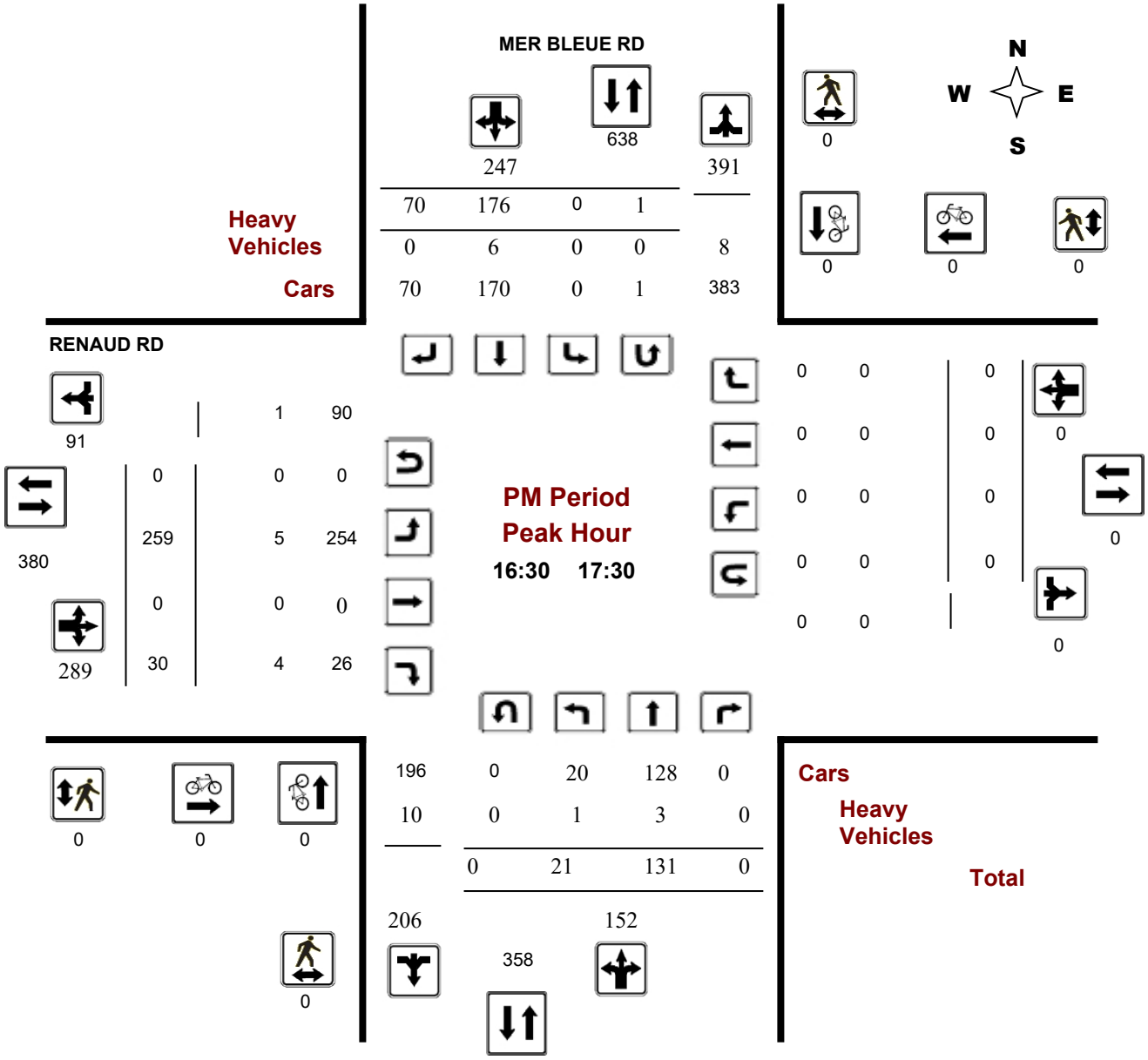
Transportation Services - Traffic Services

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

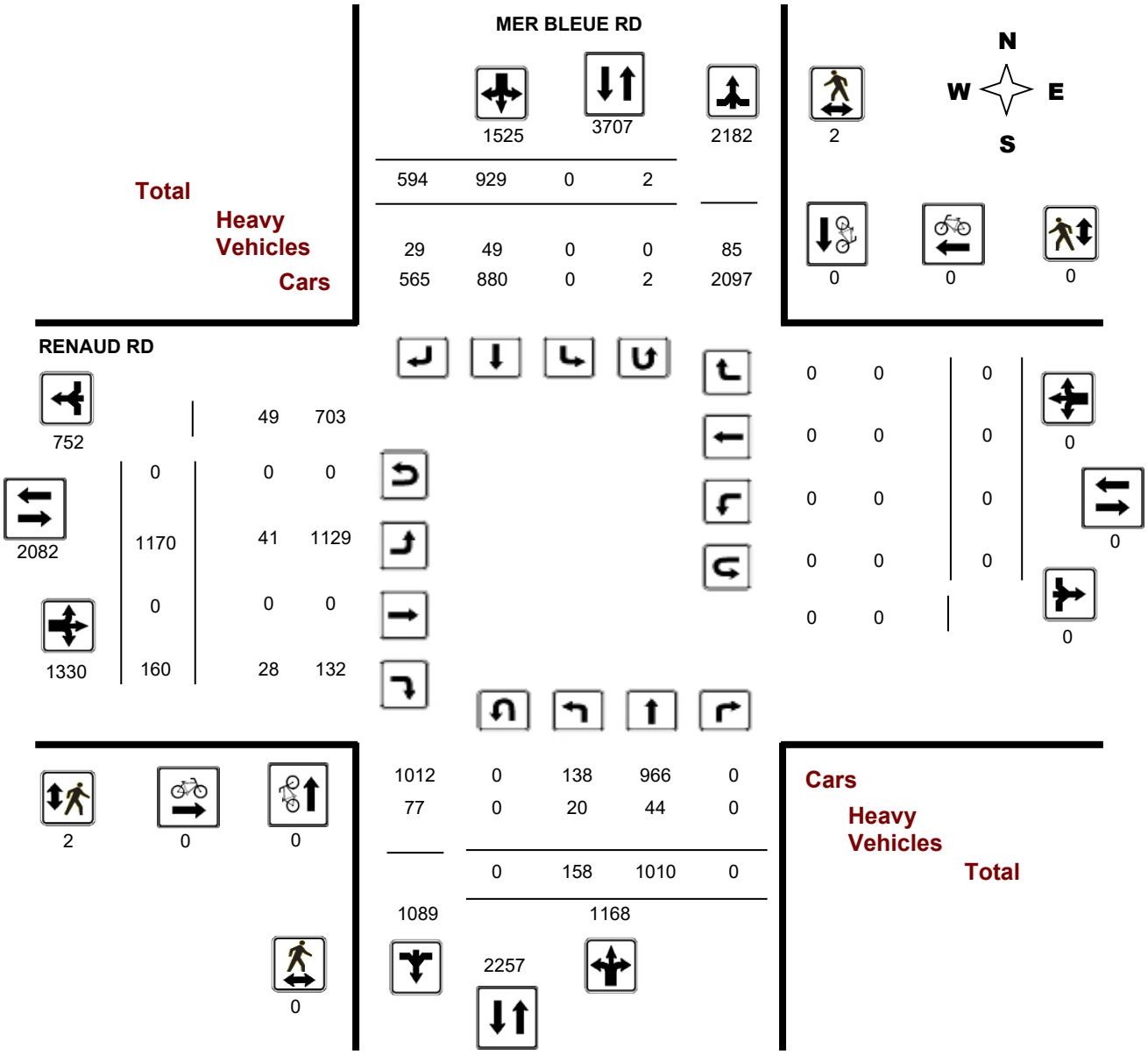
Turning Movement Count - Full Study Diagram

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**						
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**						
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

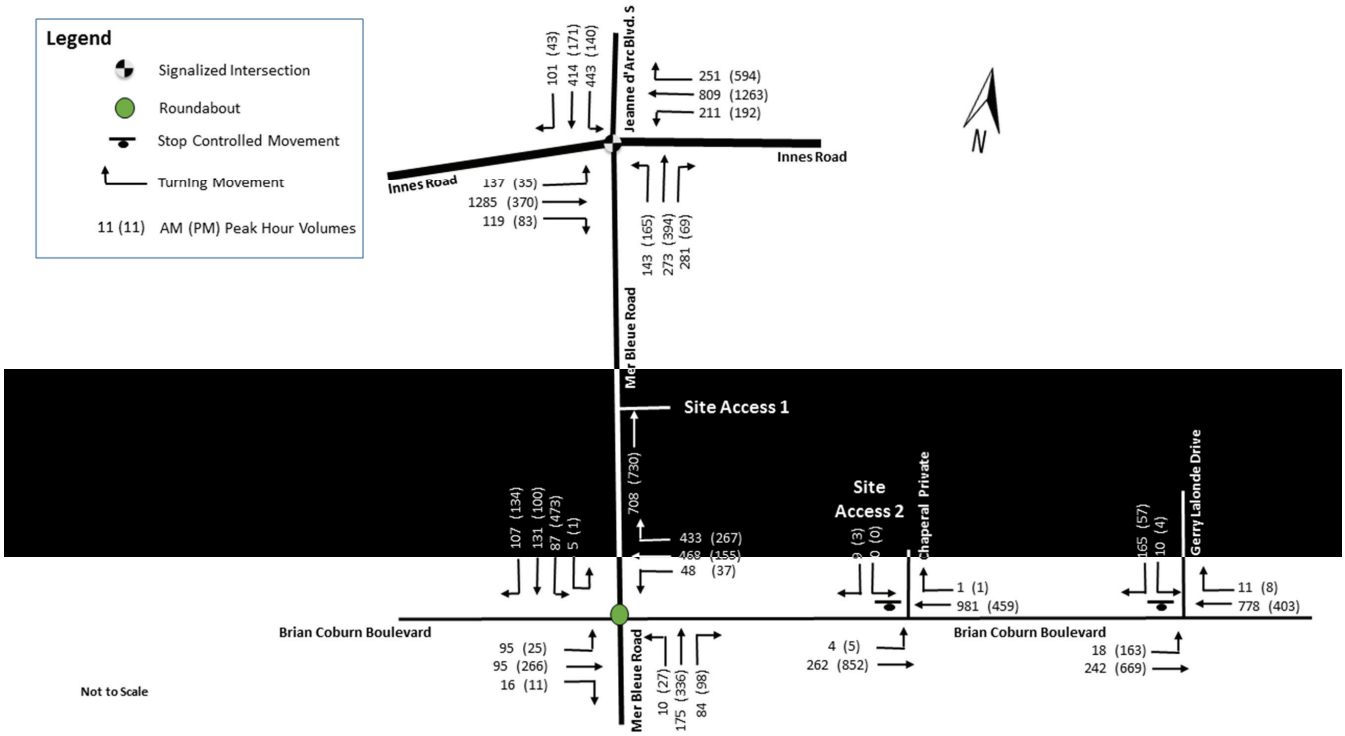


Exhibit 6: Existing 2017 Traffic Volumes

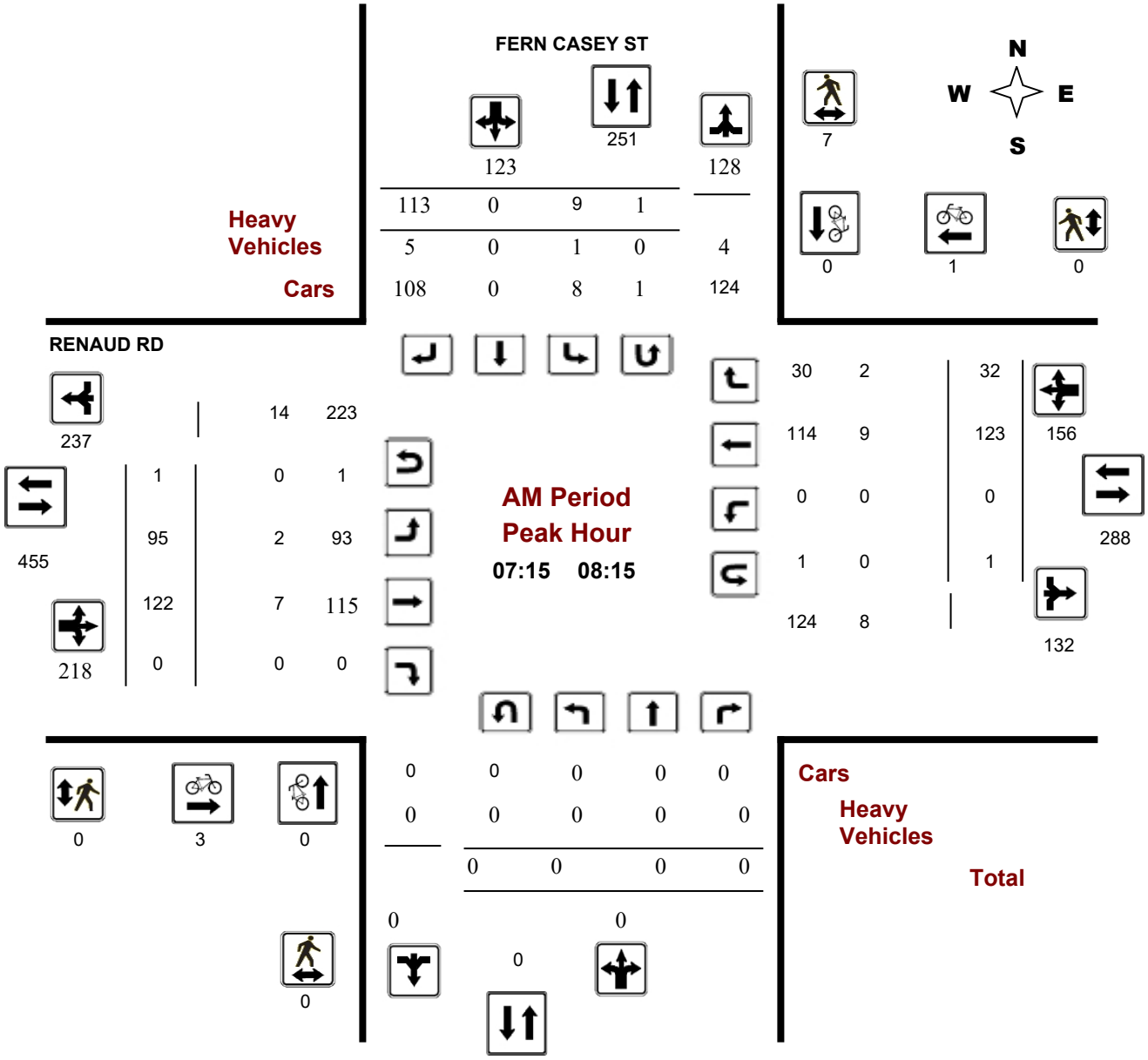
Transportation Services - Traffic Services

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

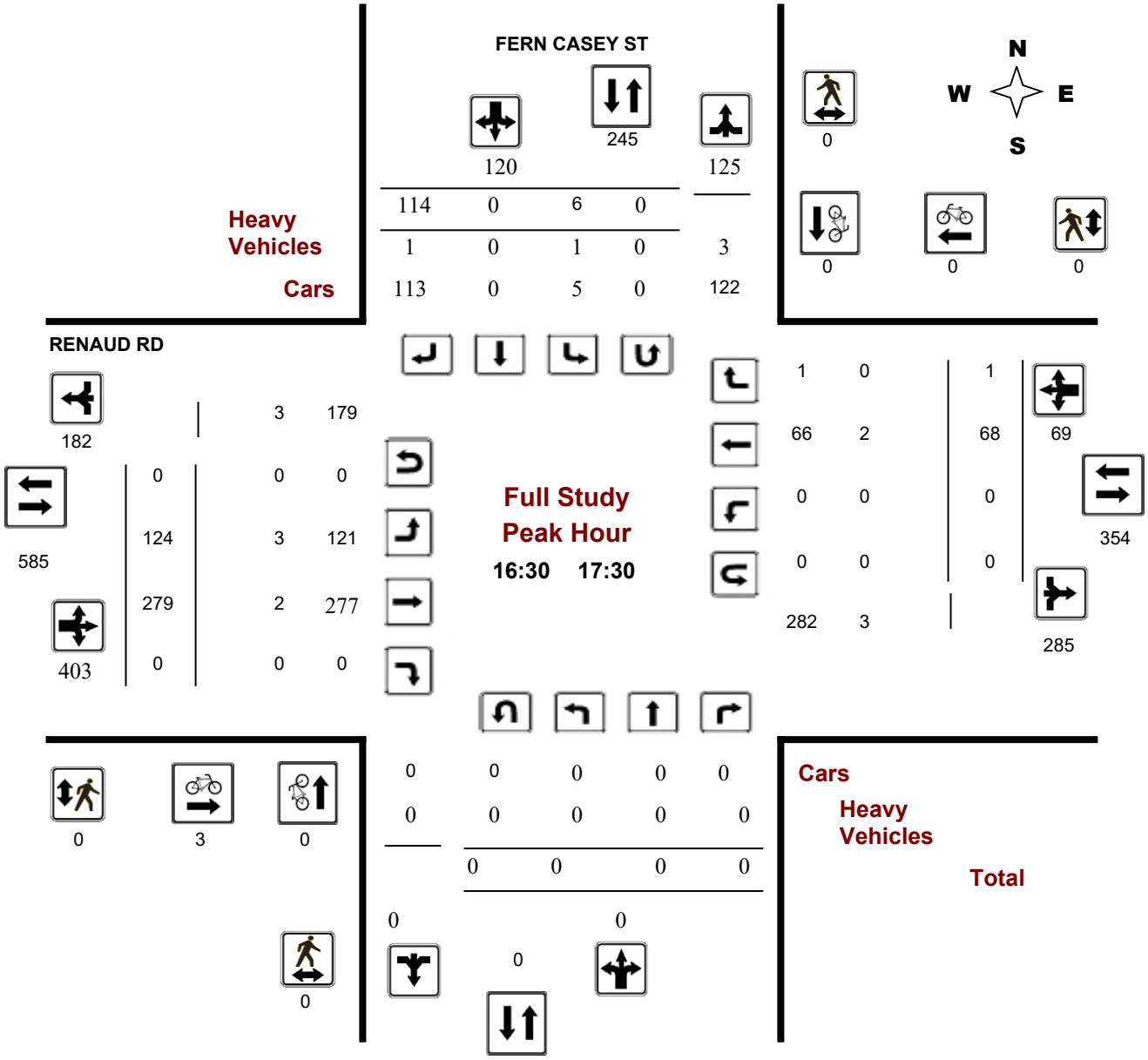
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

FERN CASEY ST @ RENAUD RD

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

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



Comments

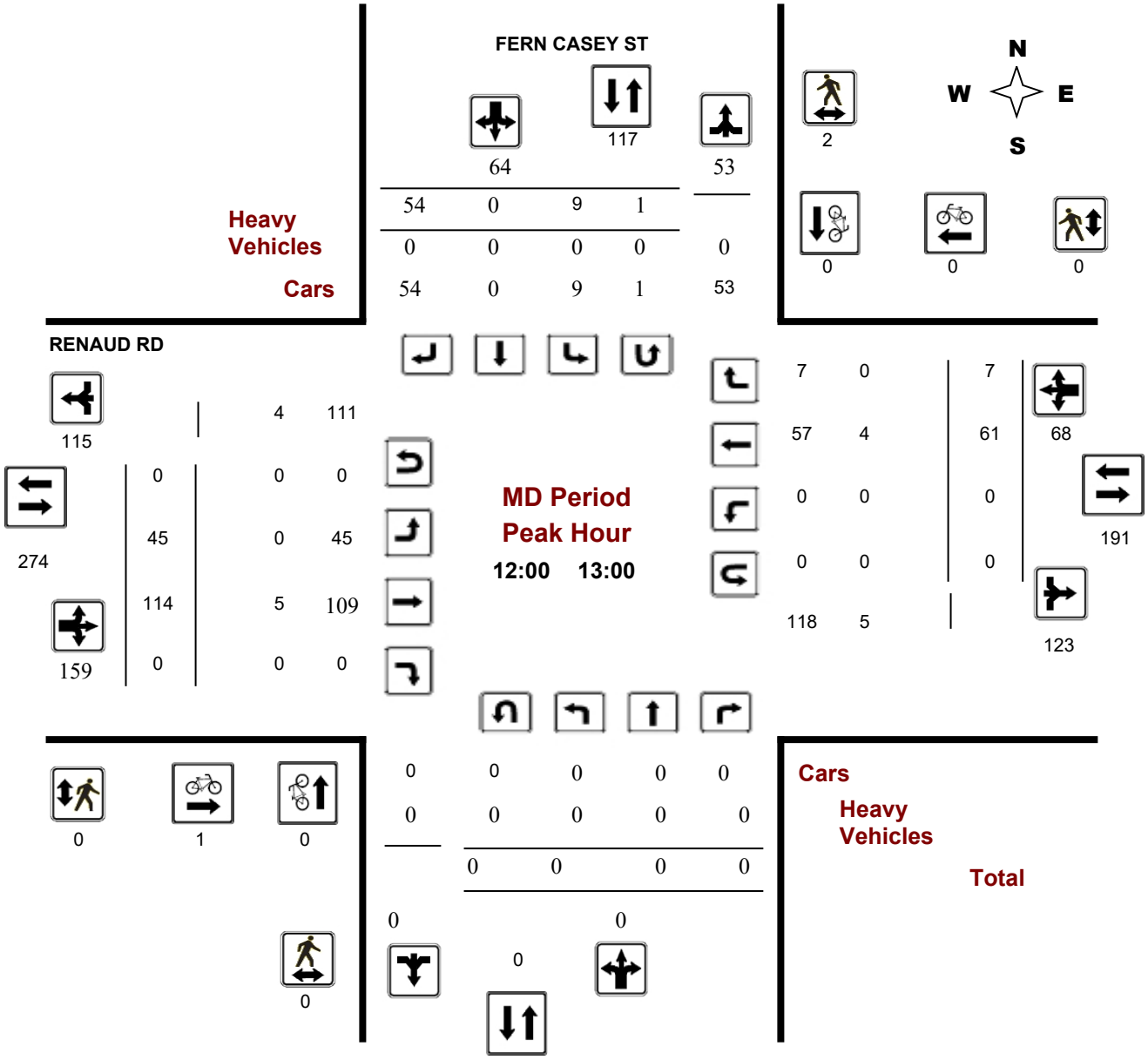
Transportation Services - Traffic Services

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

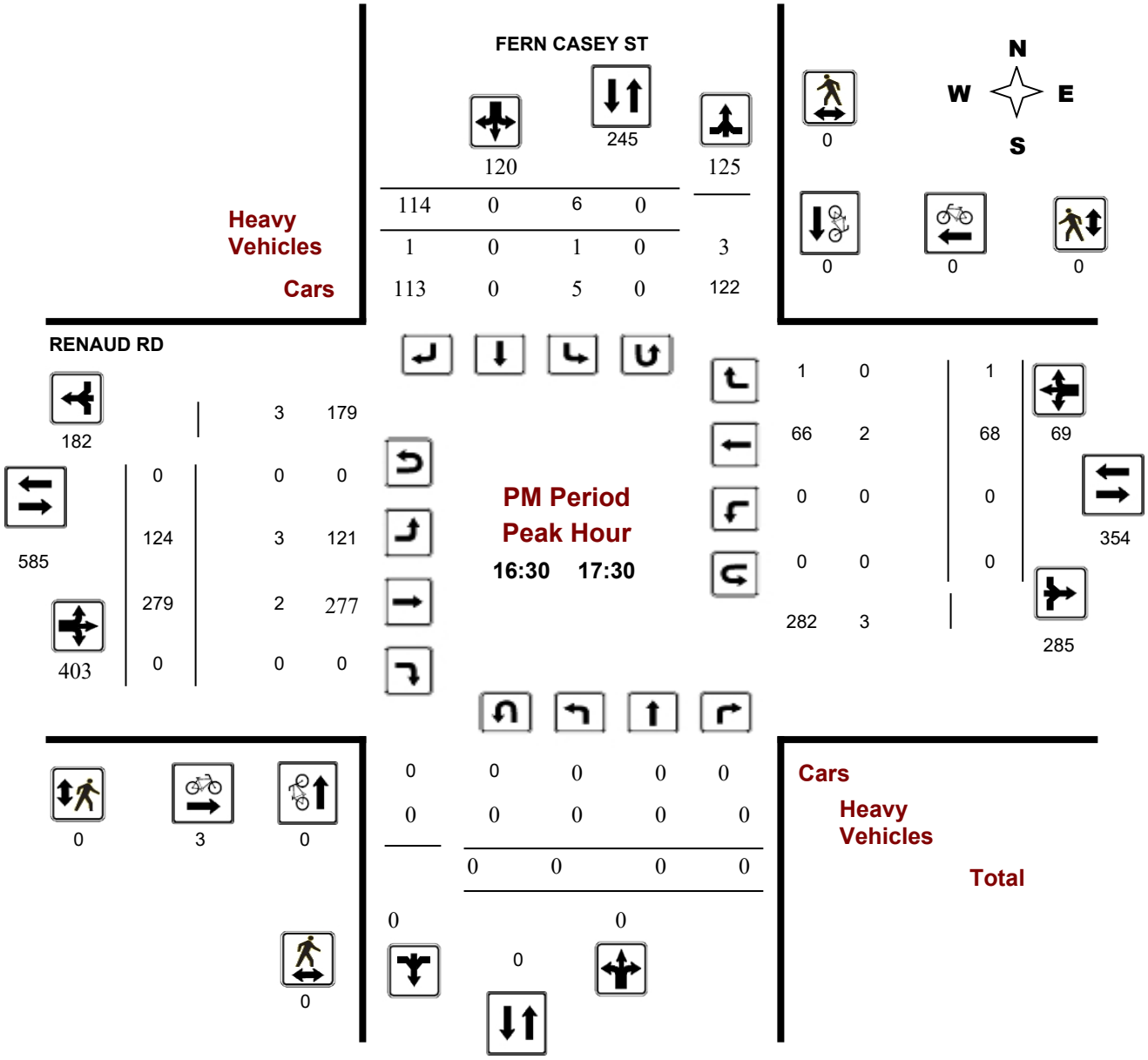
Transportation Services - Traffic Services

Turning Movement Count - 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

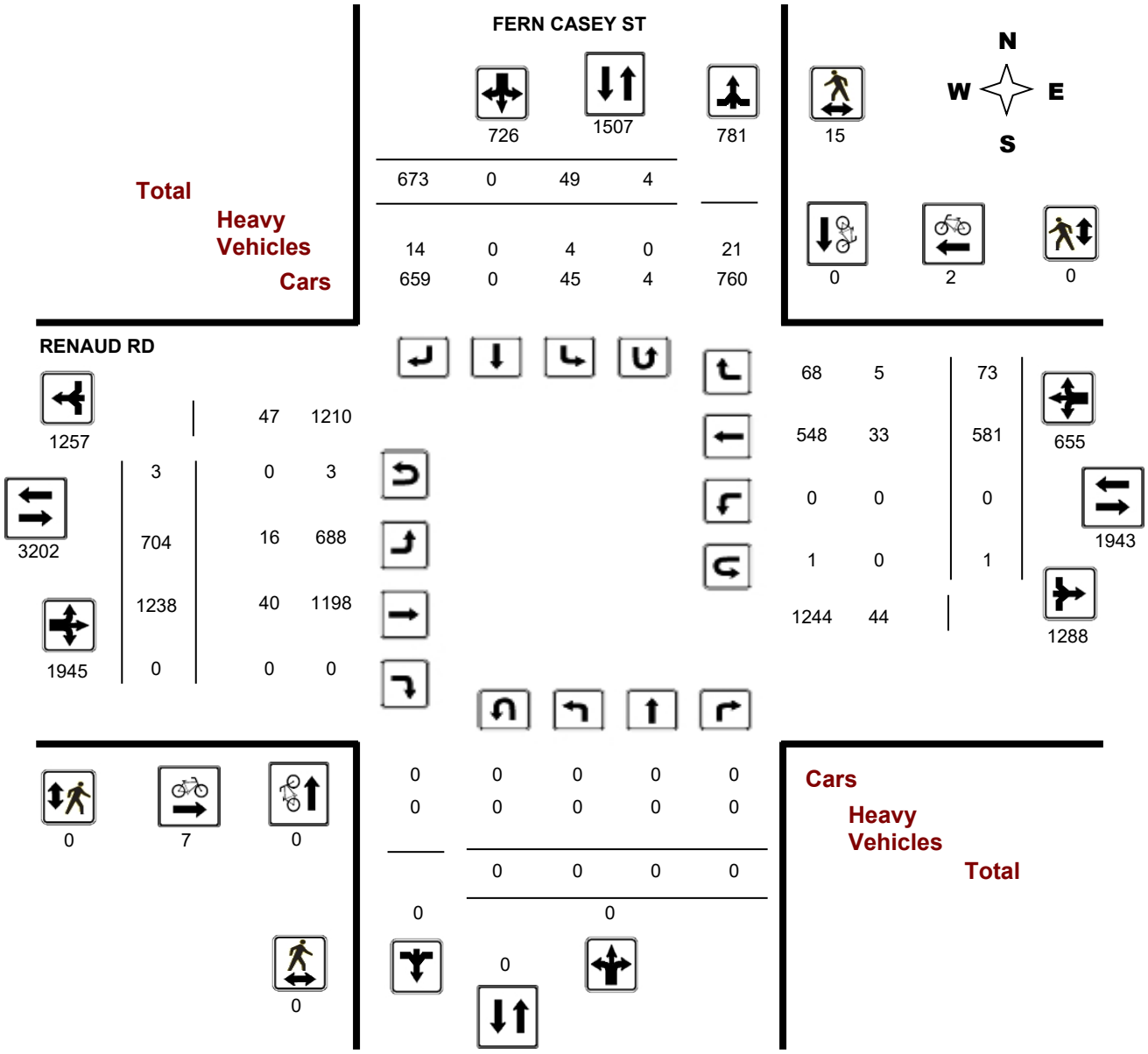
Turning Movement Count - Full Study Diagram

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**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	0	0	0	**0**	61	0	842	**908**	**908**	881	1549	0	**2433**	0	727	91	**819**	**3252**	**4160**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	0	0	0	**0**	80	0	1103	**1190**	**1190**	1154	2029	0	**3187**	0	952	120	**1073**	**4260**	**5450**
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

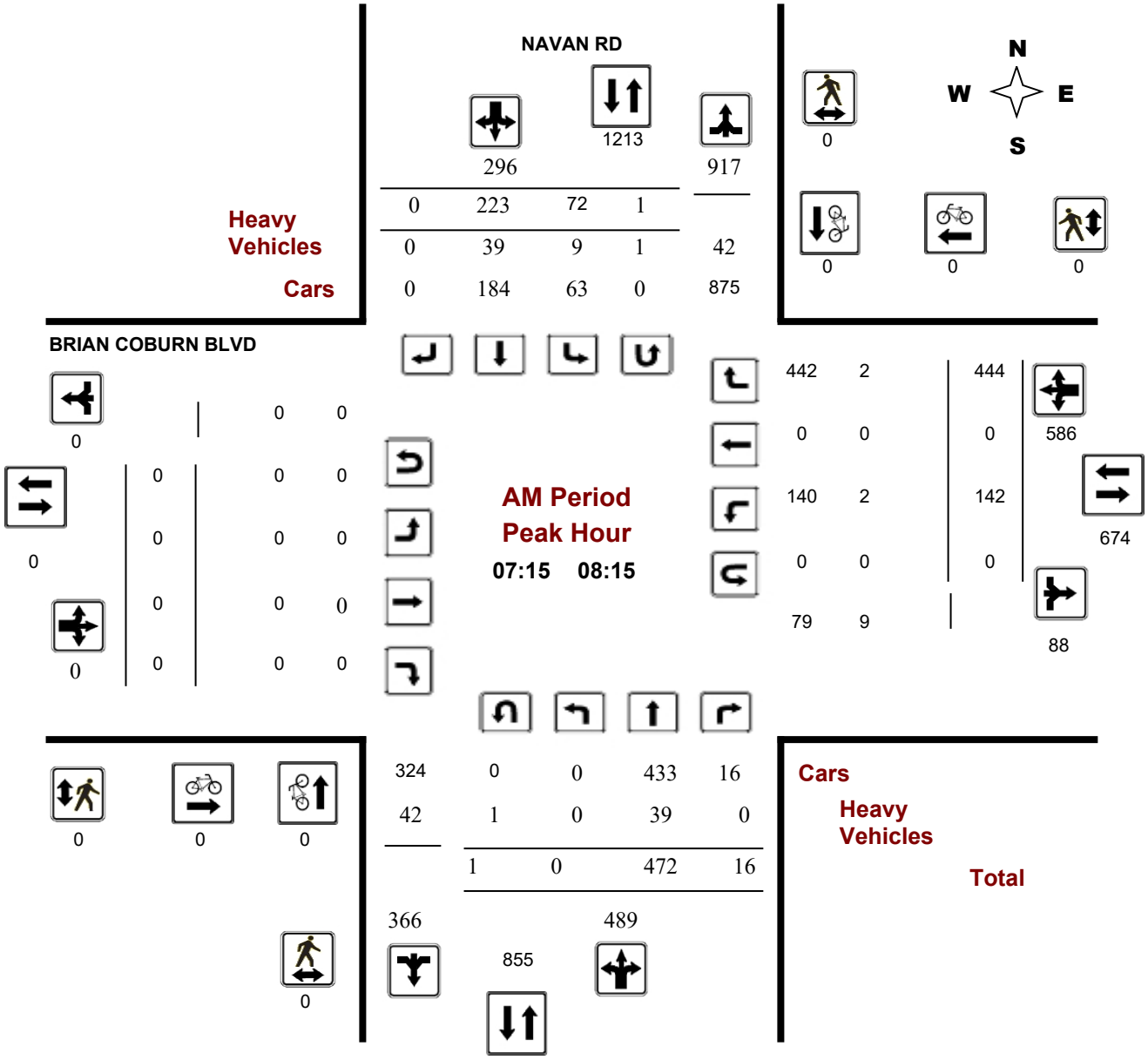
Transportation Services - Traffic Services

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

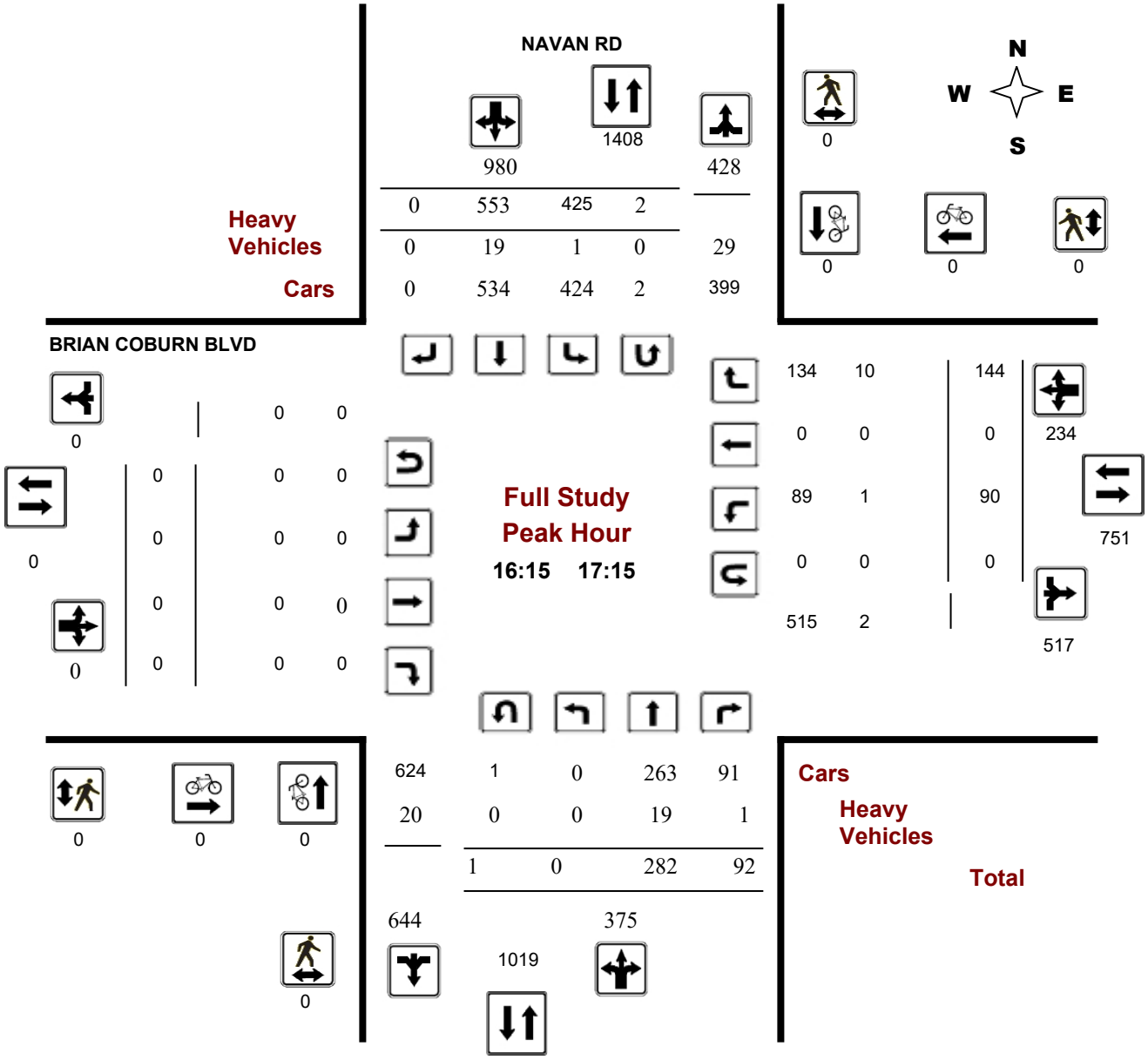
Transportation Services - Traffic Services

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

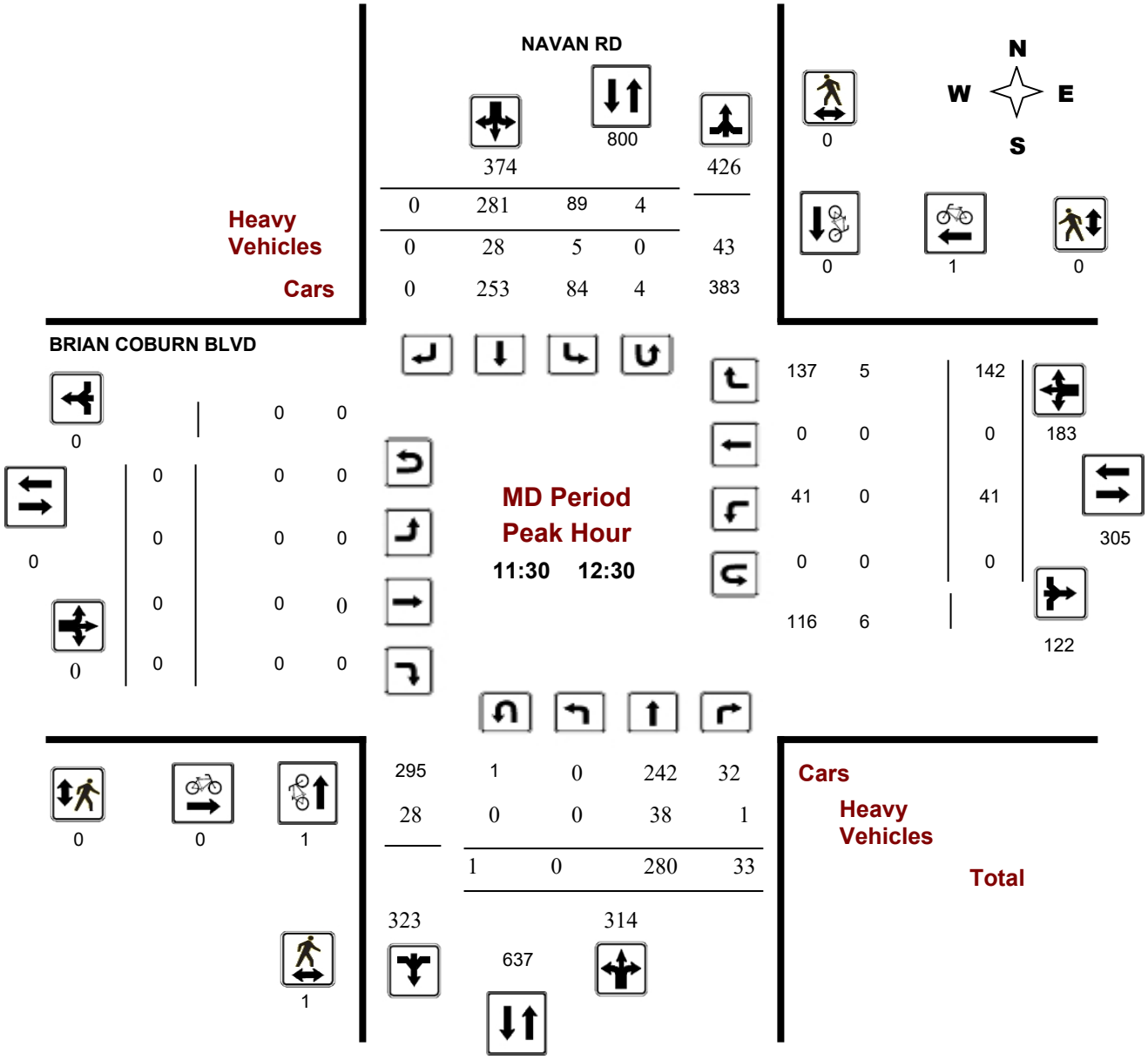
Transportation Services - Traffic Services

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

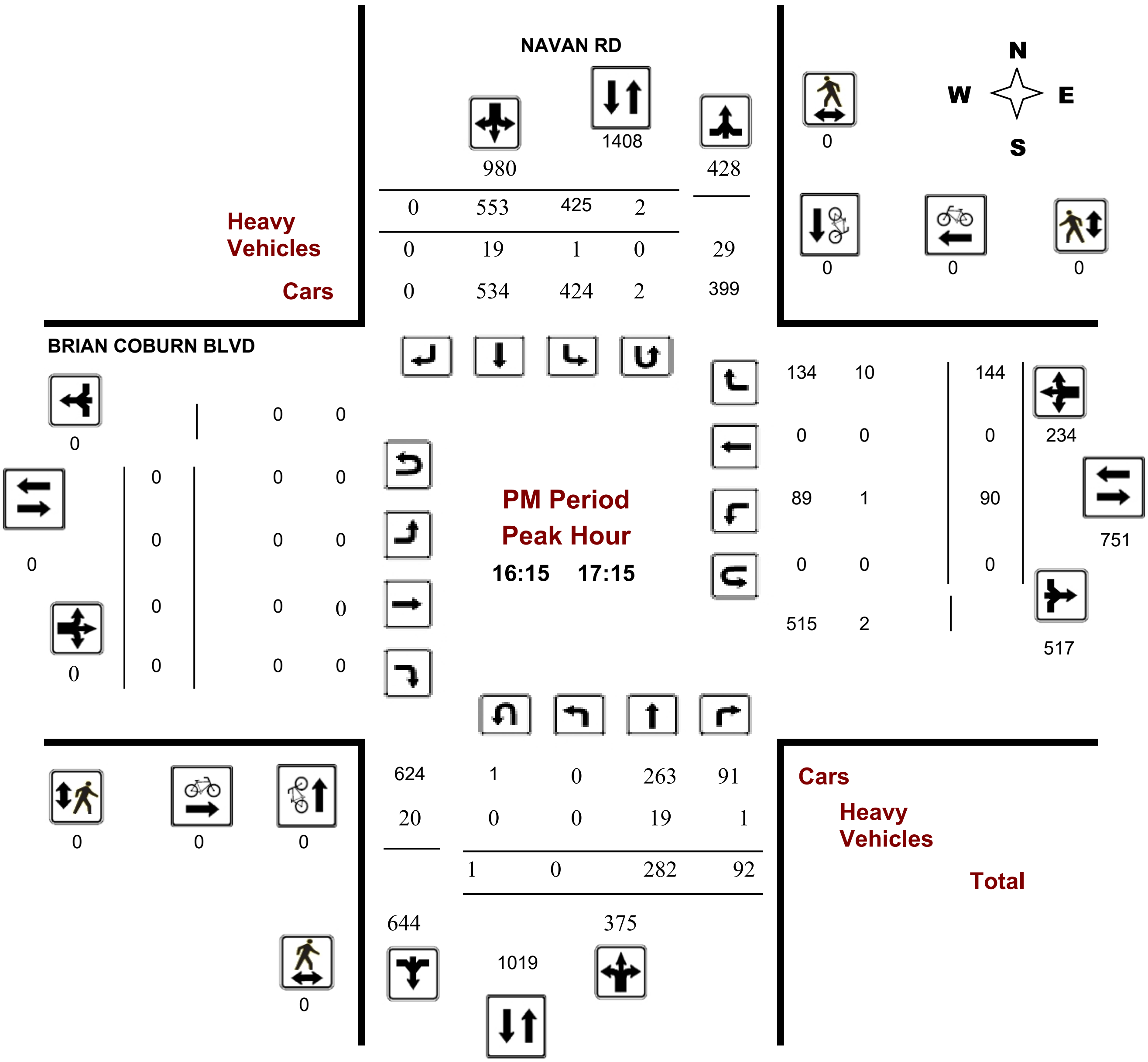
Transportation Services - Traffic Services

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

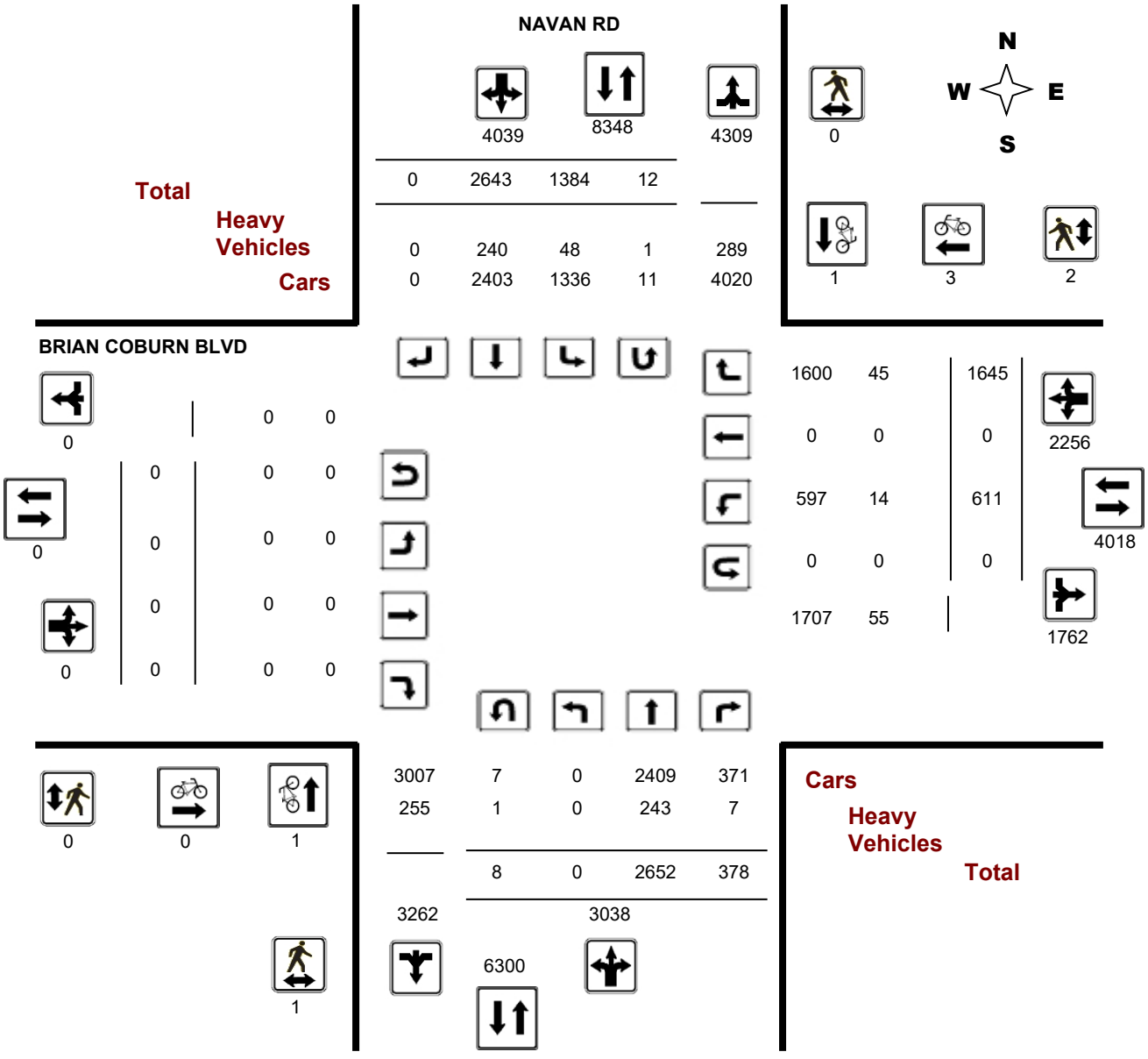
Turning Movement Count - Full Study Diagram

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.

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.

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

Work Order
38030

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:

Transportation Services - Traffic Services

Work Order
38030

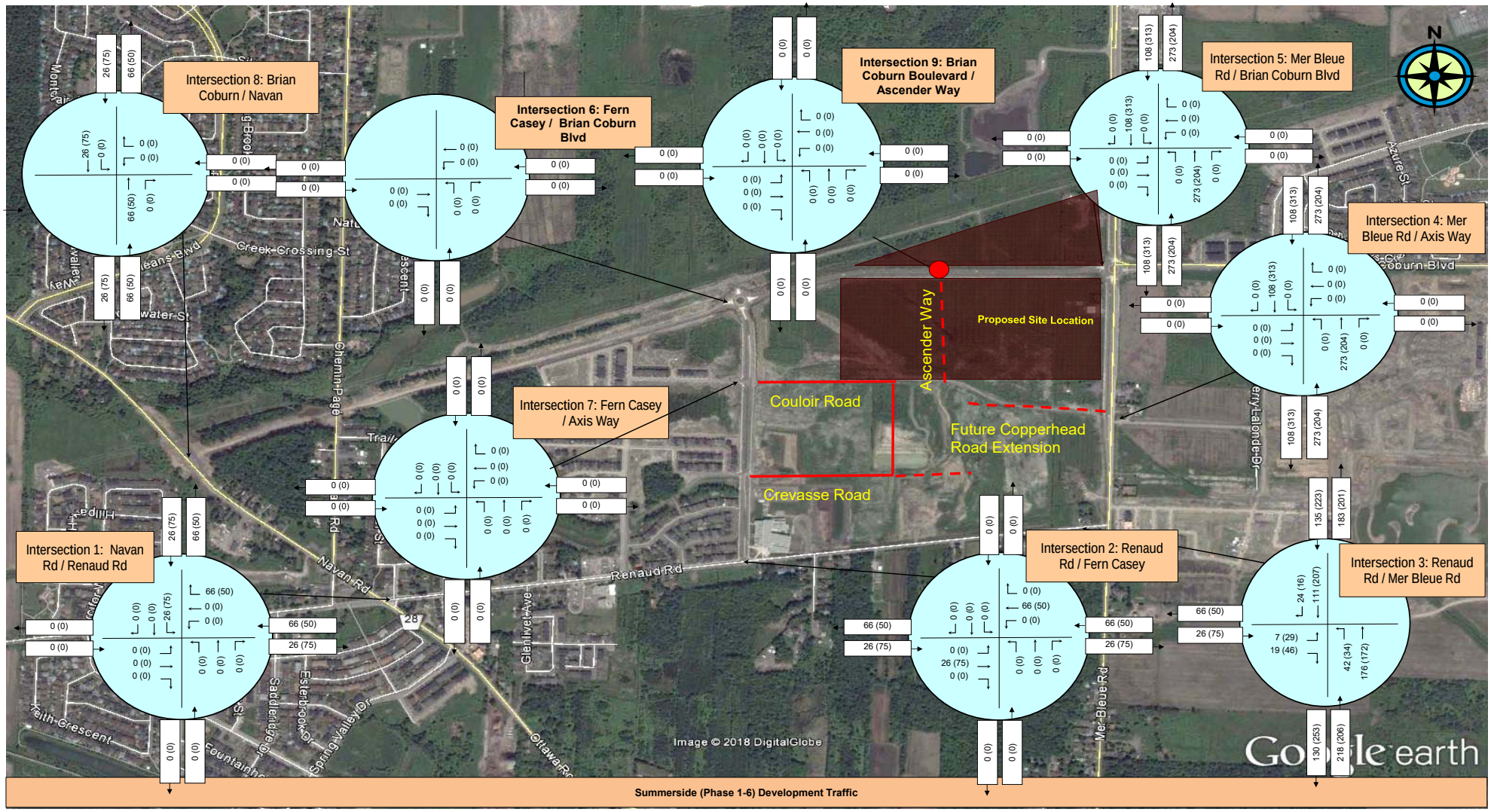
Turning Movement Count - 15 Min U-Turn Total Report

BRIAN COBURN BLVD @ NAVAN RD

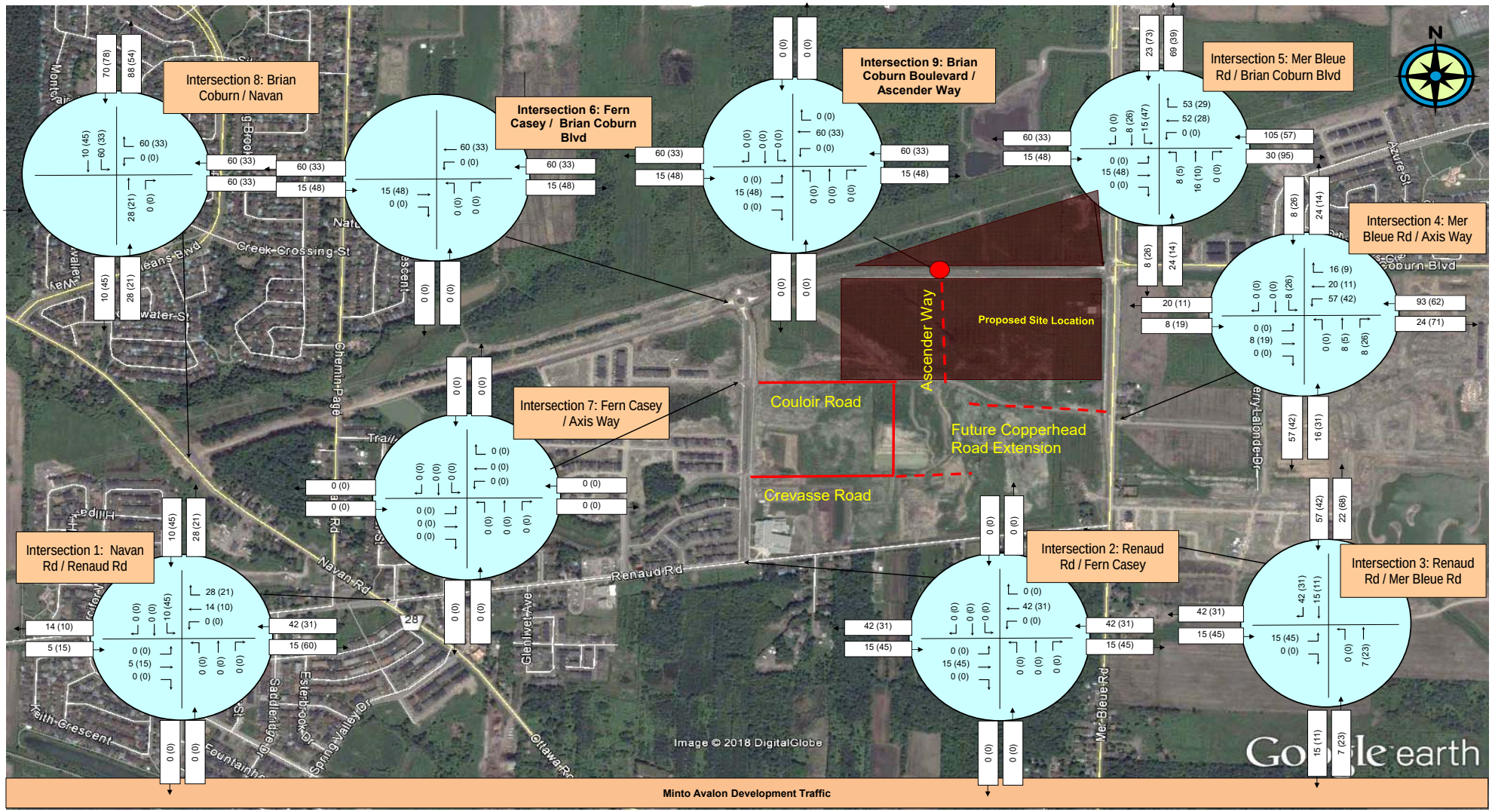
Survey Date: Thursday, July 19, 2018

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

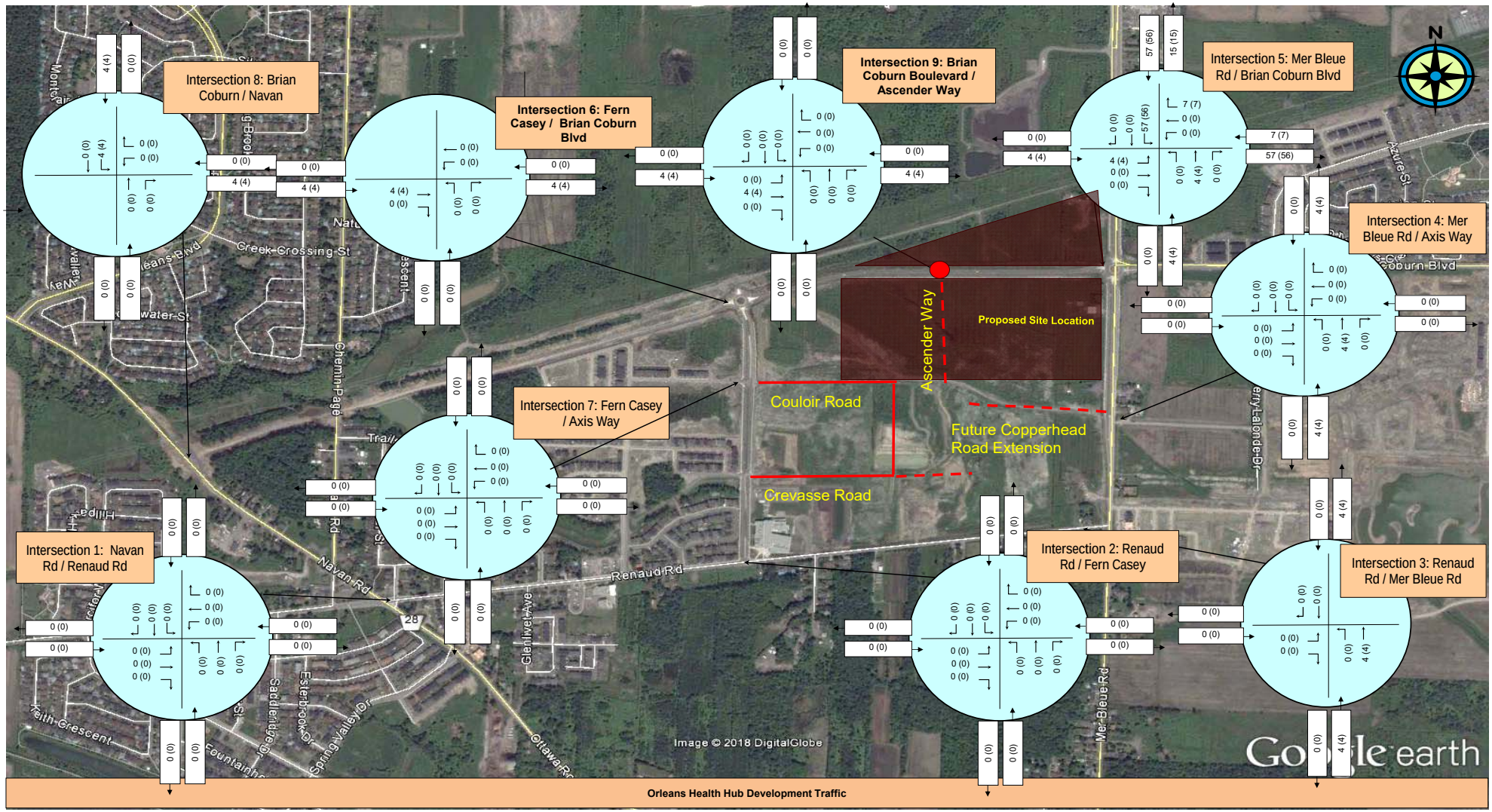
APPENDIX D: ADJACENT DEVELOPMENT TRAFFIC VOLUME EXHIBITS AND EXTRACTS



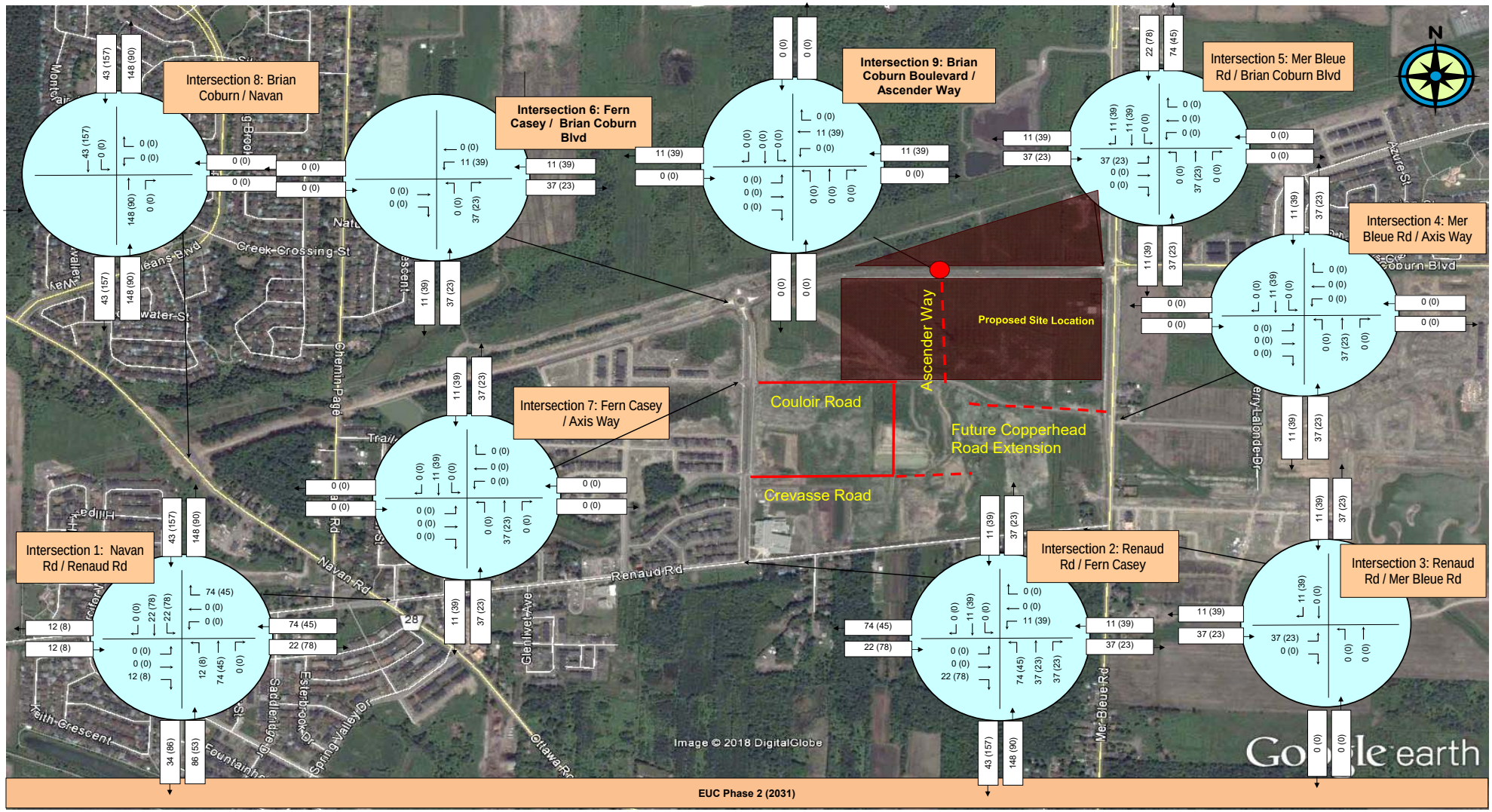
Summerside (Phase 1-6) Development Traffic

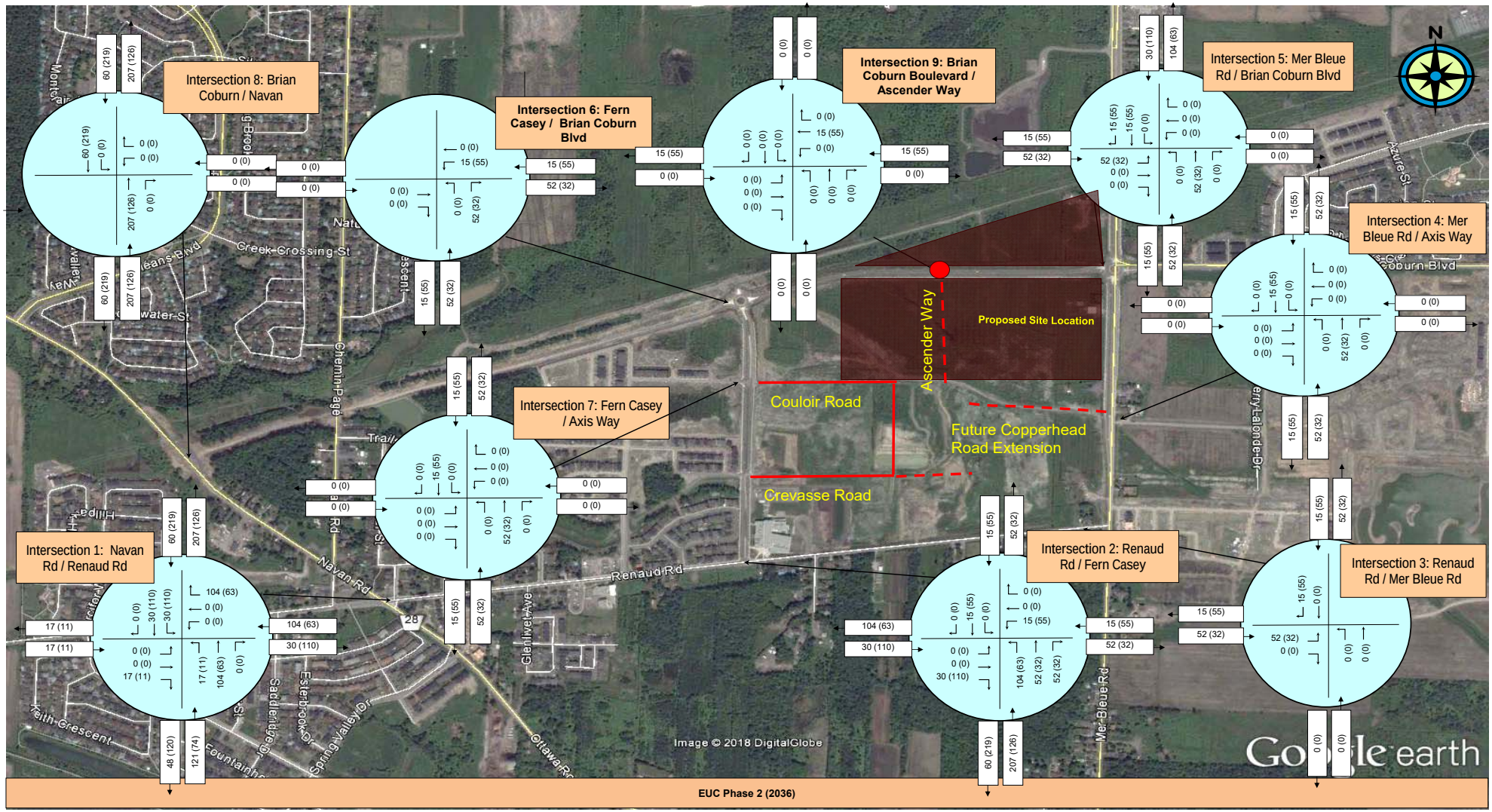


Minto Avalon Development Traffic



Orleans Health Hub Development Traffic


Intersection 8: Brian Coburn / Navan
Intersection 6: Fern Casey / Brian Coburn Blvd
Intersection 9: Brian Coburn Boulevard / Ascender Way
Intersection 5: Mer Bleue Rd / Brian Coburn Blvd
Intersection 4: Mer Bleue Rd / Axis Way
Intersection 7: Fern Casey / Axis Way
Intersection 1: Navan Rd / Renaud Rd
Intersection 2: Renaud Rd / Fern Casey
Intersection 3: Renaud Rd / Mer Bleue Rd
Proposed Site Location
Ascender Way
Couloir Road
Future Copperhead Road Extension
Crevasse Road
Renaud Rd
Navan Rd
Chemin Page
Greek Crossing St
Mer Bleue Rd
Image © 2018 DigitalGlobe
Google earth
EUC Phase 2 (2031)


Intersection 8: Brian Coburn / Navan
Intersection 6: Fern Casey / Brian Coburn Blvd
Intersection 9: Brian Coburn Boulevard / Ascender Way
Intersection 5: Mer Bleue Rd / Brian Coburn Blvd
Intersection 4: Mer Bleue Rd / Axis Way
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Proposed Site Location
Ascender Way
Couloir Road
Future Copperhead Road Extension
Crevasse Road
Renaud Rd
Navan Rd
Chemin Page
Greek Crossing St
Mer Bleue Rd
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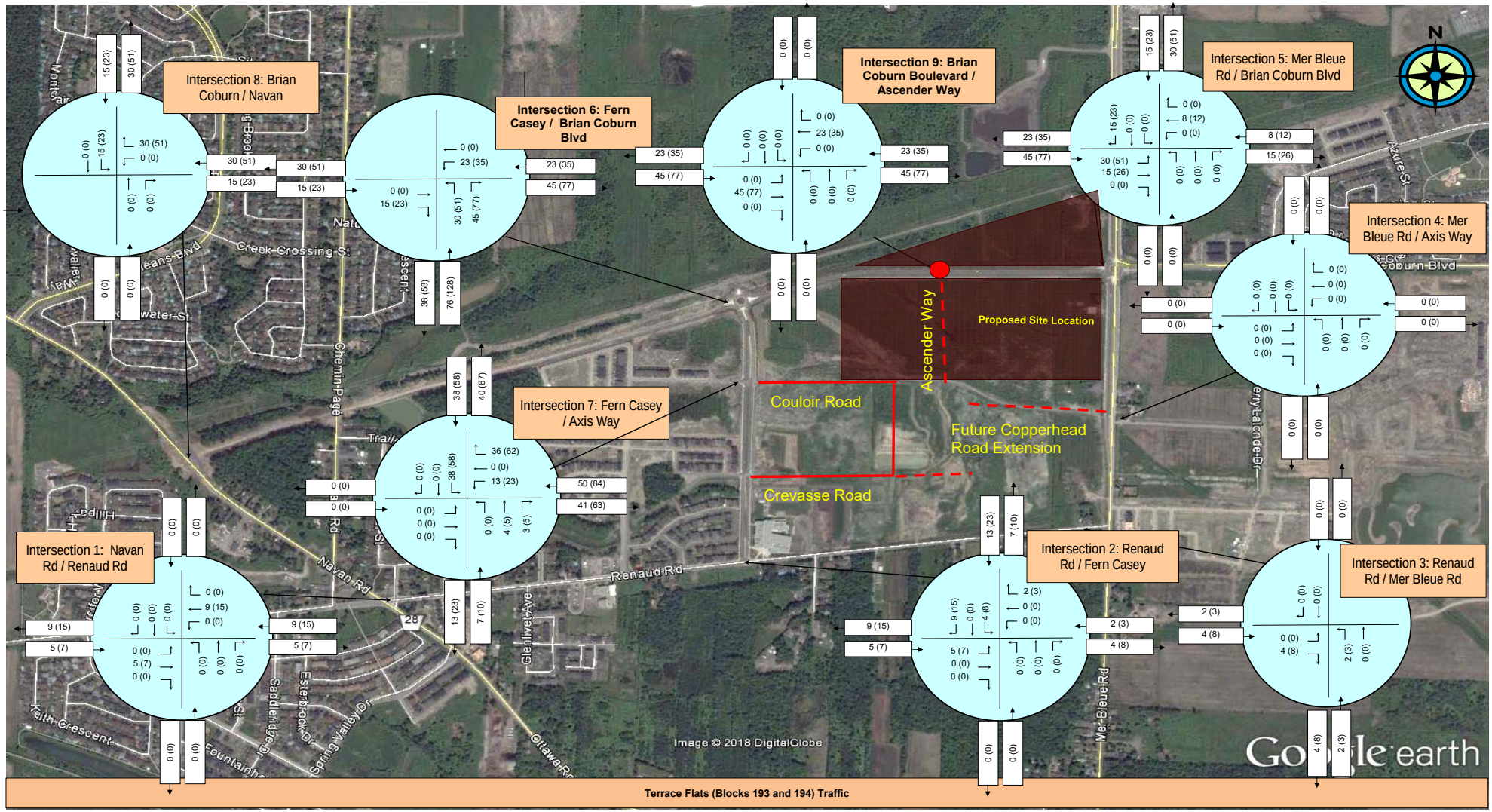
EUC Phase 2 (2036)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Intersection 6: Fern Casey / Brian Coburn Blvd
Intersection 9: Brian Coburn Boulevard / Ascender Way
Intersection 5: Mer Bleue Rd / Brian Coburn Blvd
Intersection 4: Mer Bleue Rd / Axis Way
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Proposed Site Location
Ascender Way
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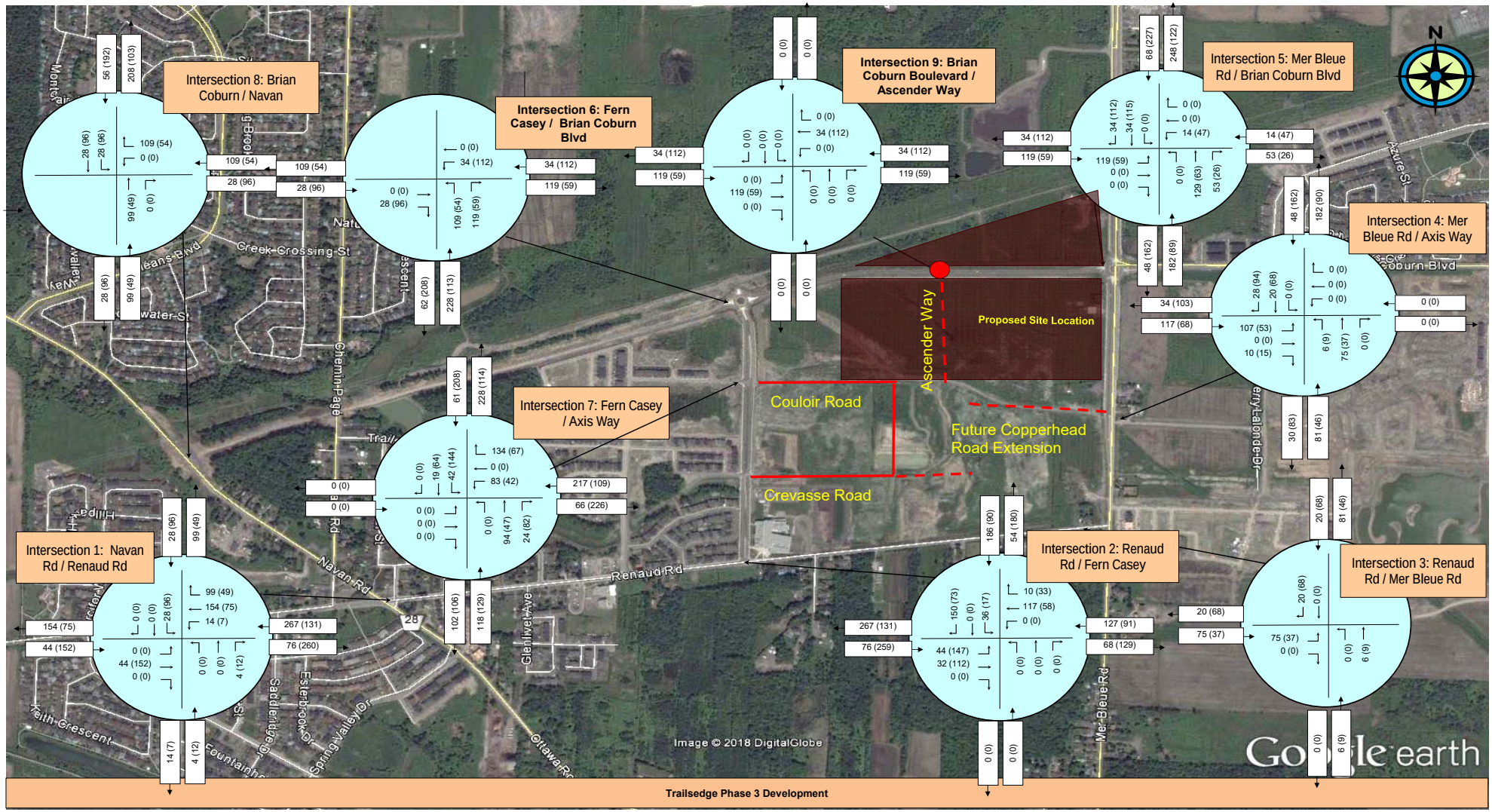
Future Copperhead Road Extension
Crevasse Road
Renaud Rd
Navan Rd
Chemin Page
Greek Crossing St
Mer Bleue Rd
Image © 2018 DigitalGlobe
Google earth
Terrace Flats (Blocks 193 and 194) Traffic


Intersection 8: Brian Coburn / Navan
Intersection 6: Fern Casey / Brian Coburn Blvd
Intersection 9: Brian Coburn Boulevard / Ascender Way
Intersection 5: Mer Bleue Rd / Brian Coburn Blvd
Intersection 4: Mer Bleue Rd / Axis Way
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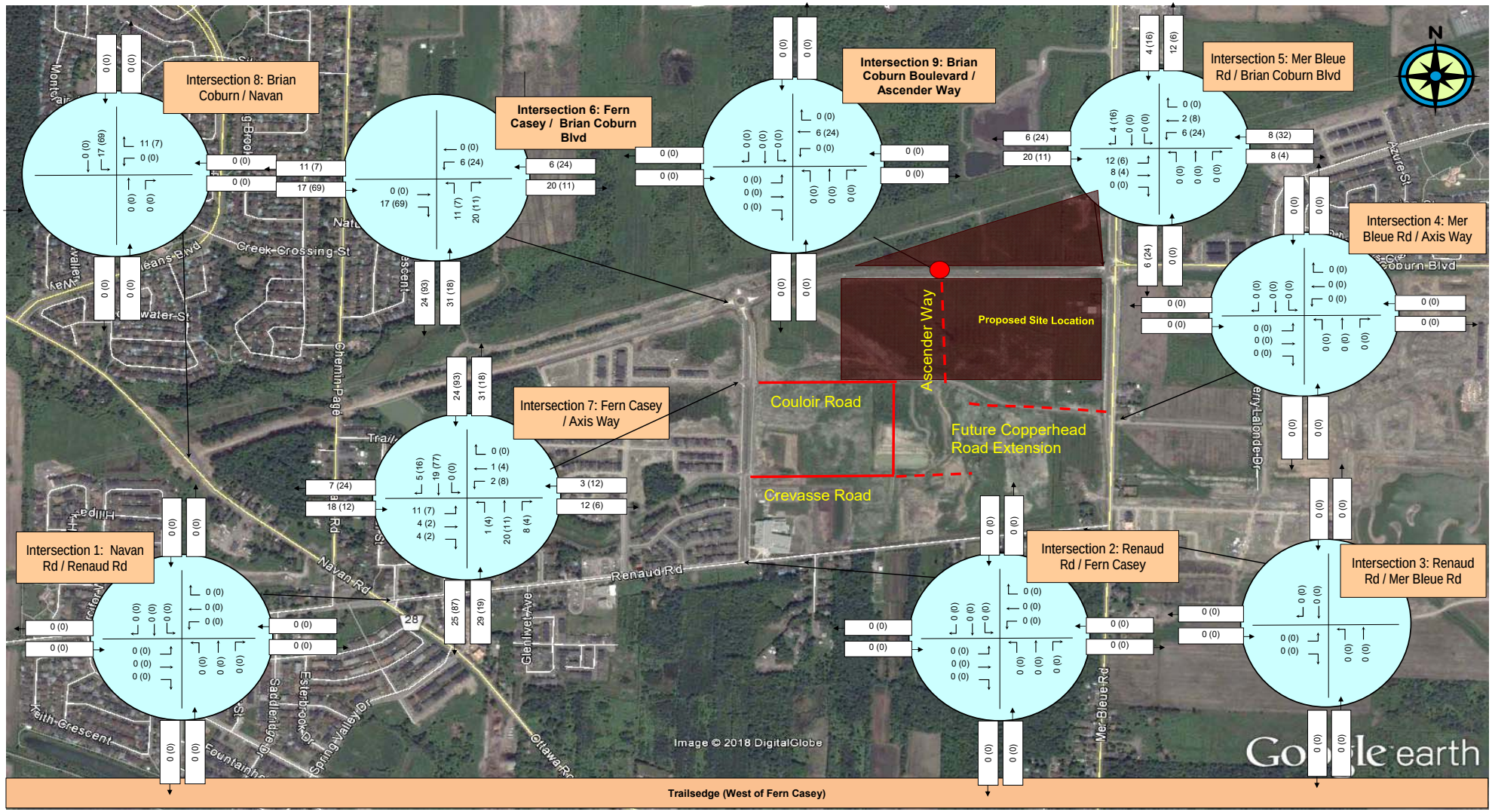
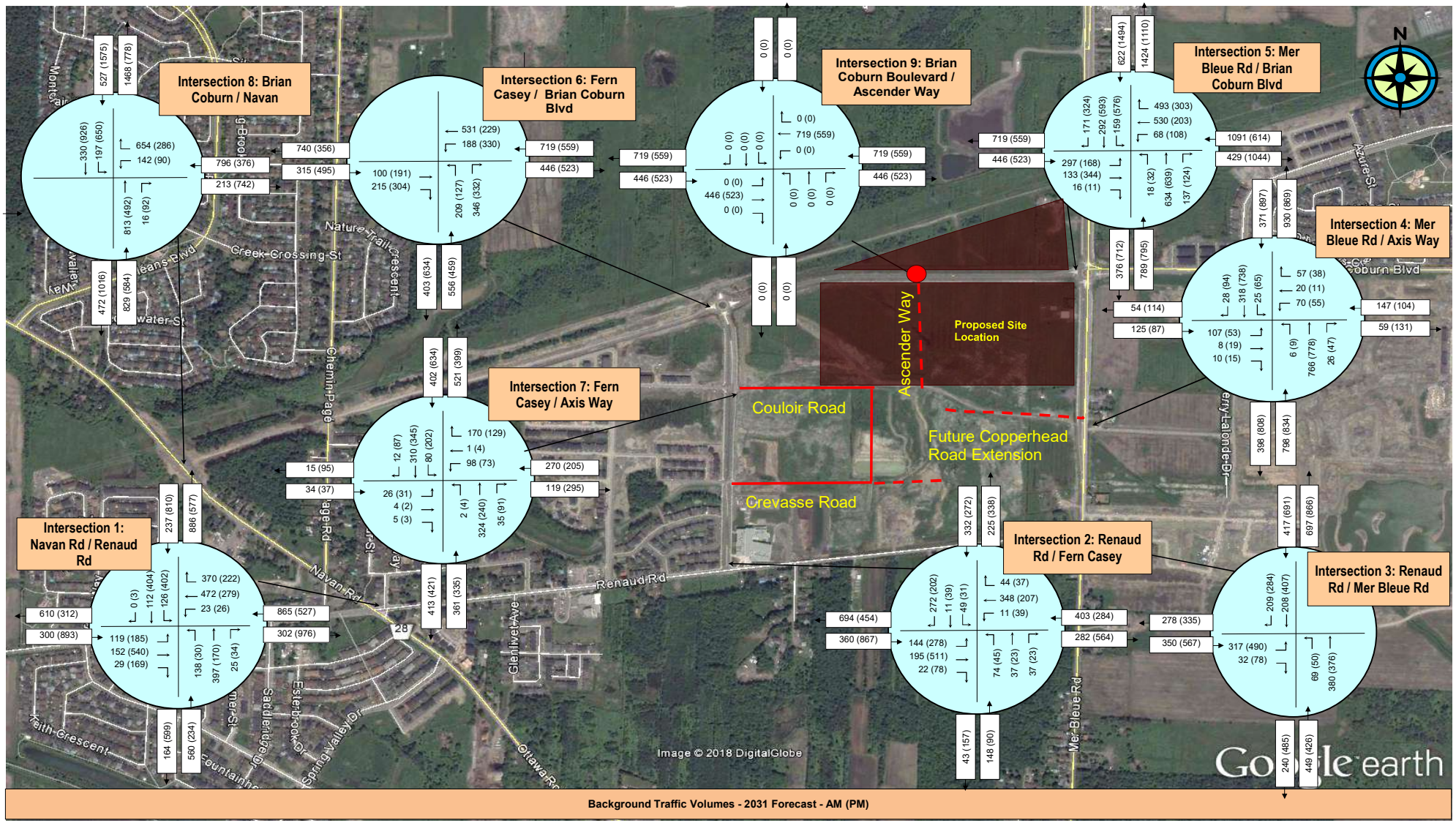
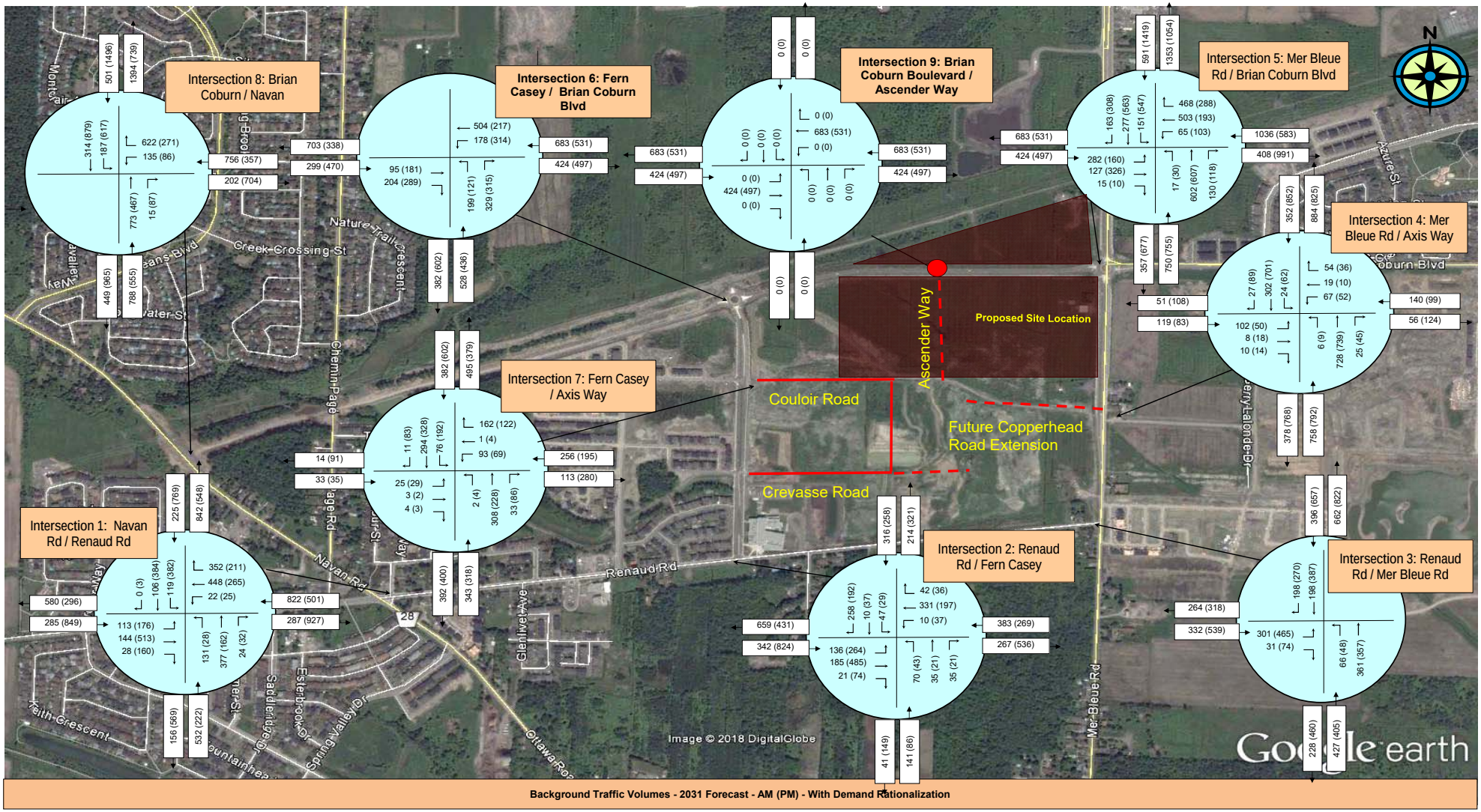
Intersection 1: Navan Rd / Renaud Rd
Intersection 2: Renaud Rd / Fern Casey
Intersection 3: Renaud Rd / Mer Bleue Rd
Proposed Site Location
Ascender Way
Couloir Road
Future Copperhead Road Extension
Crevasse Road
Renaud Rd
Navan Rd
Chemin Page
Greek Crossing St
Glenlivet Ave
Mer Bleue Rd
Image © 2018 DigitalGlobe
Google earth
Trailsedge Phase 3 Development

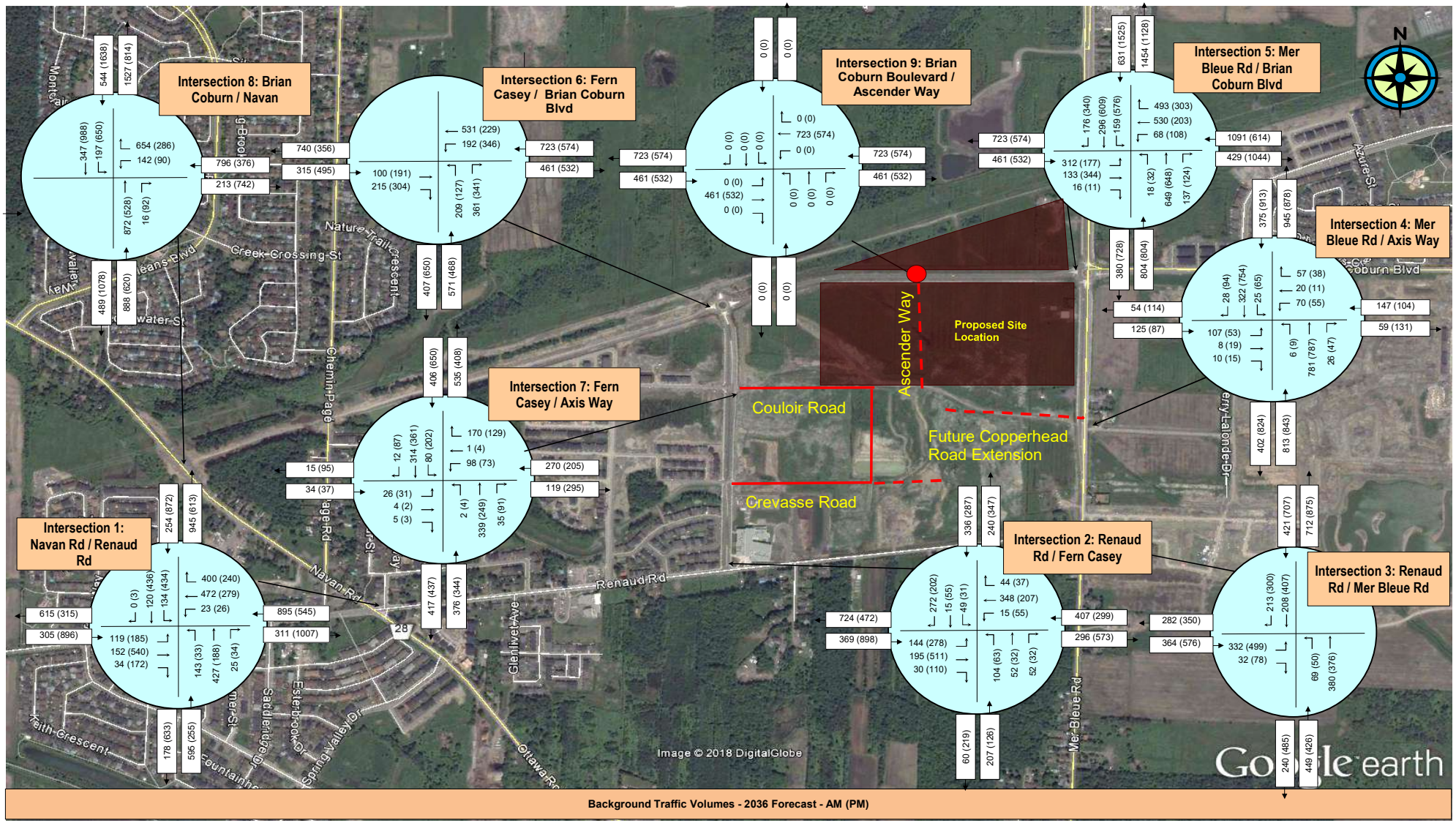

Intersection 8: Brian Coburn / Navan
Intersection 6: Fern Casey / Brian Coburn Blvd
Intersection 9: Brian Coburn Boulevard / Ascender Way
Intersection 5: Mer Bleue Rd / Brian Coburn Blvd
Intersection 4: Mer Bleue Rd / Axis Way
Intersection 7: Fern Casey / Axis Way
Intersection 1: Navan Rd / Renaud Rd
Intersection 2: Renaud Rd / Fern Casey
Intersection 3: Renaud Rd / Mer Bleue Rd
Proposed Site Location
Ascender Way
Couloir Road
Future Copperhead Road Extension
Crevasse Road
Renaud Rd
Navan Rd
Chemin Page
Greek Crossing St
Mer Bleue Rd
Image © 2018 DigitalGlobe
Google earth
Trailsedge (West of Fern Casey)



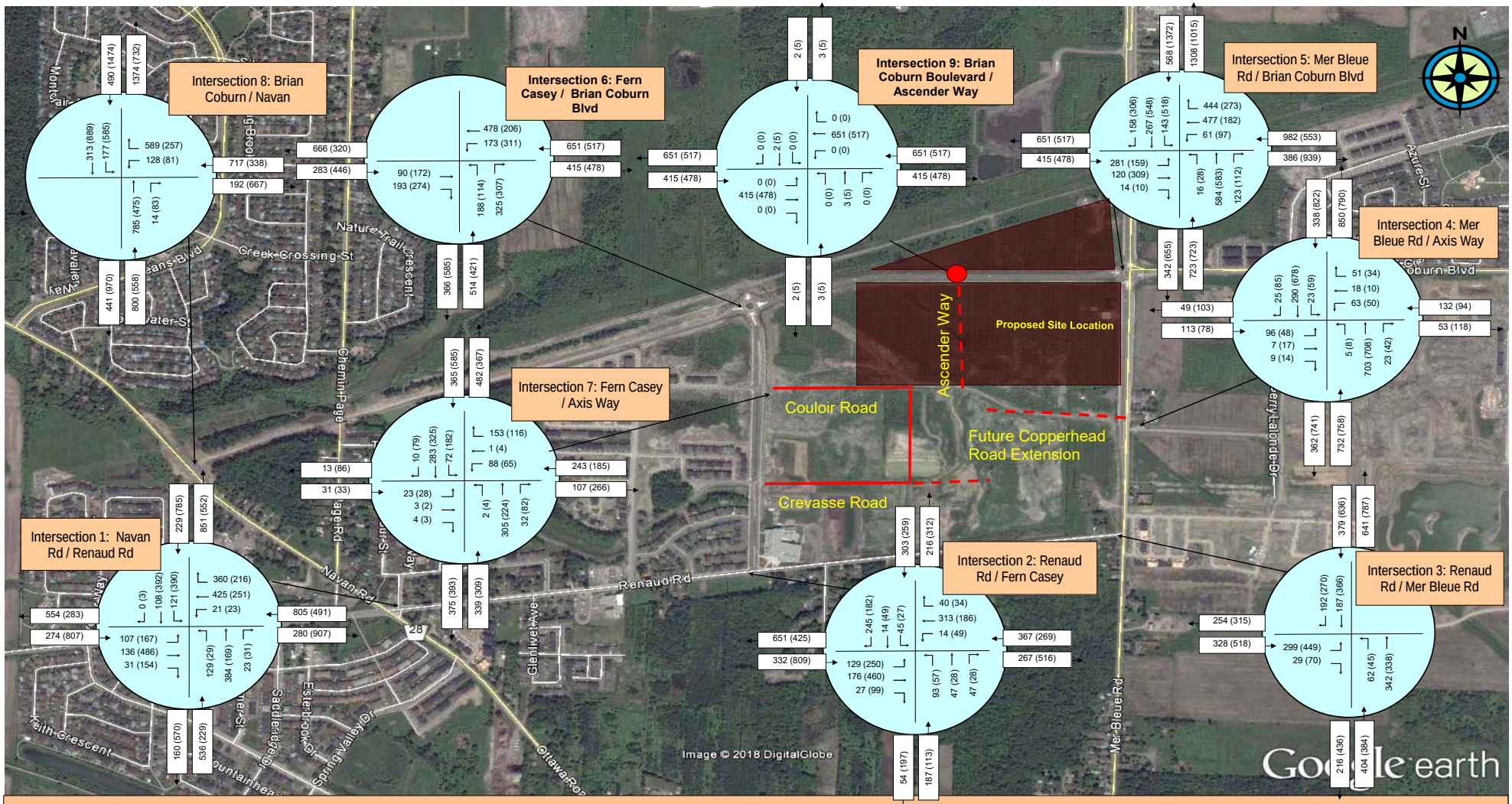
Background Traffic Volumes - 2031 Forecast - AM (PM)



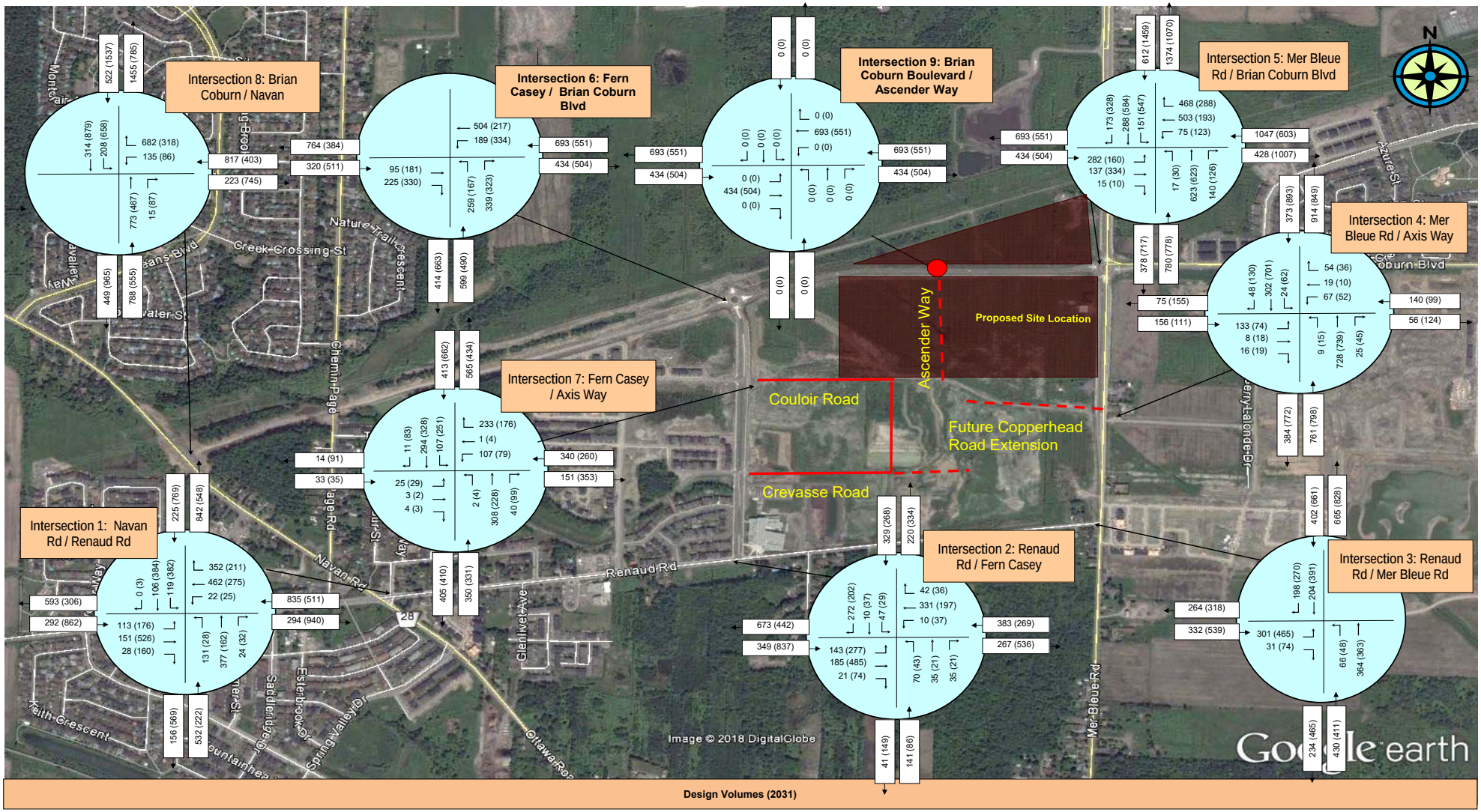
Background Traffic Volumes - 2031 Forecast - AM (PM) - With Demand Rationalization



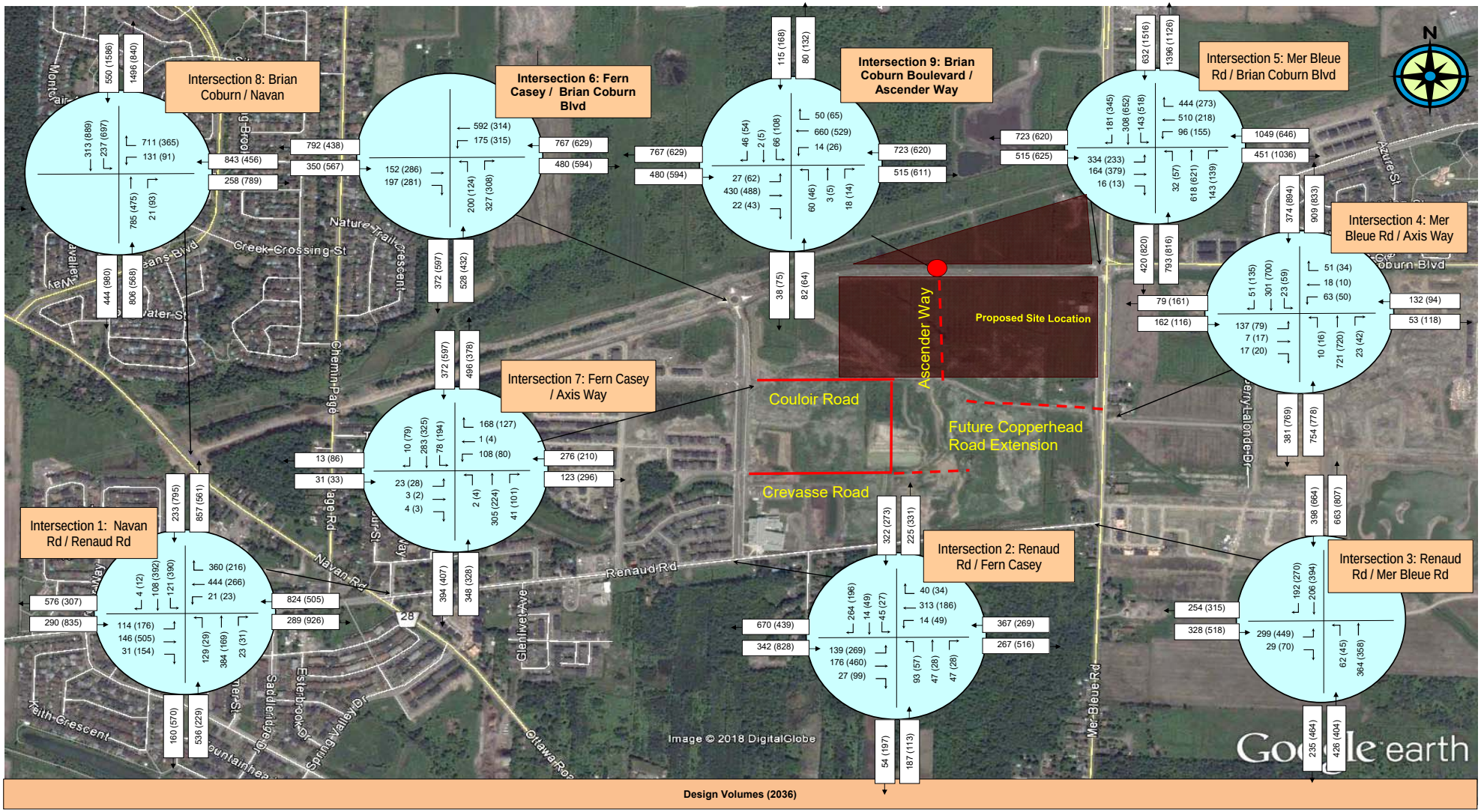
Background Traffic Volumes - 2036 Forecast - AM (PM)



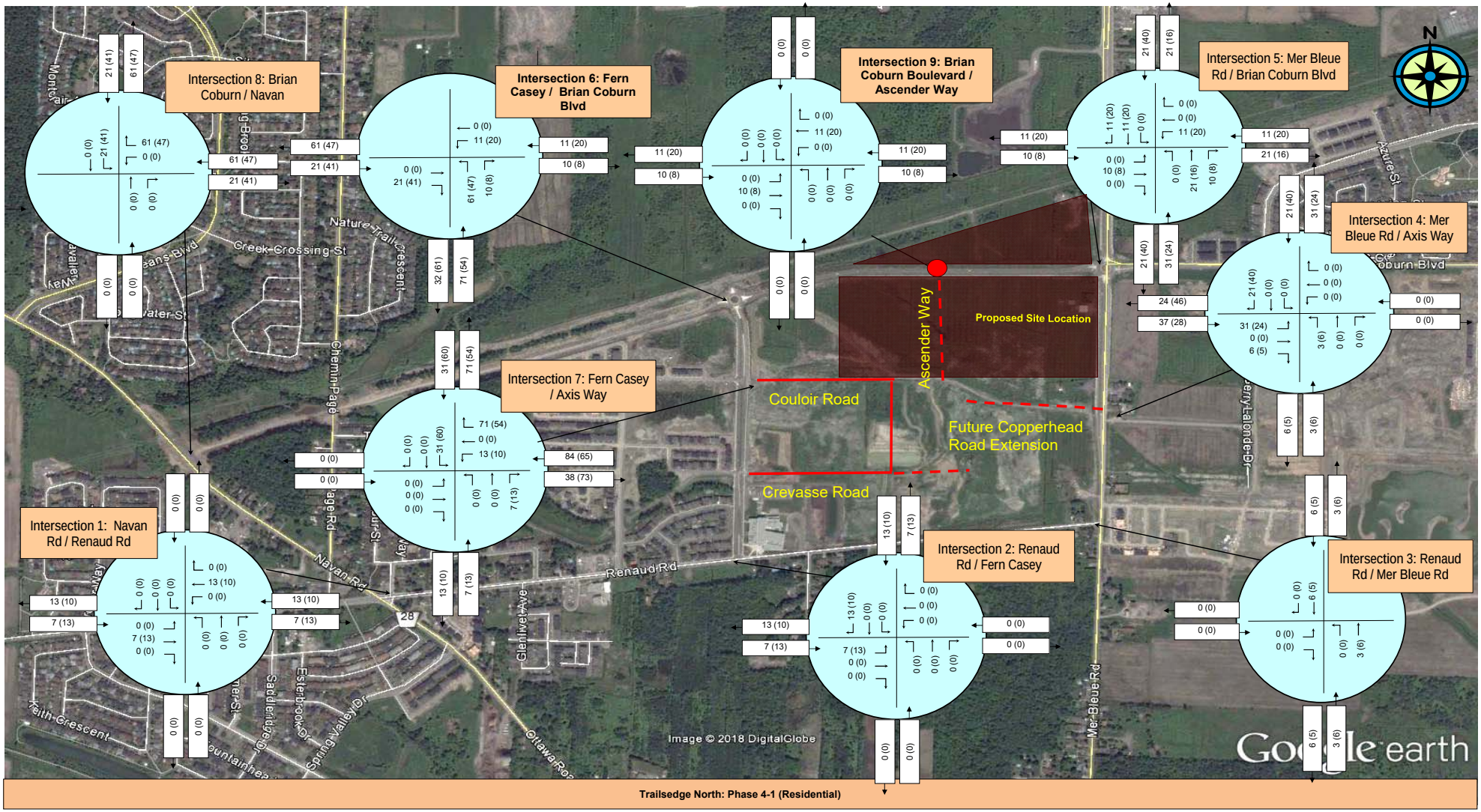
Background Traffic Volumes - 2036 Forecast - AM (PM) - With Demand Rationalization



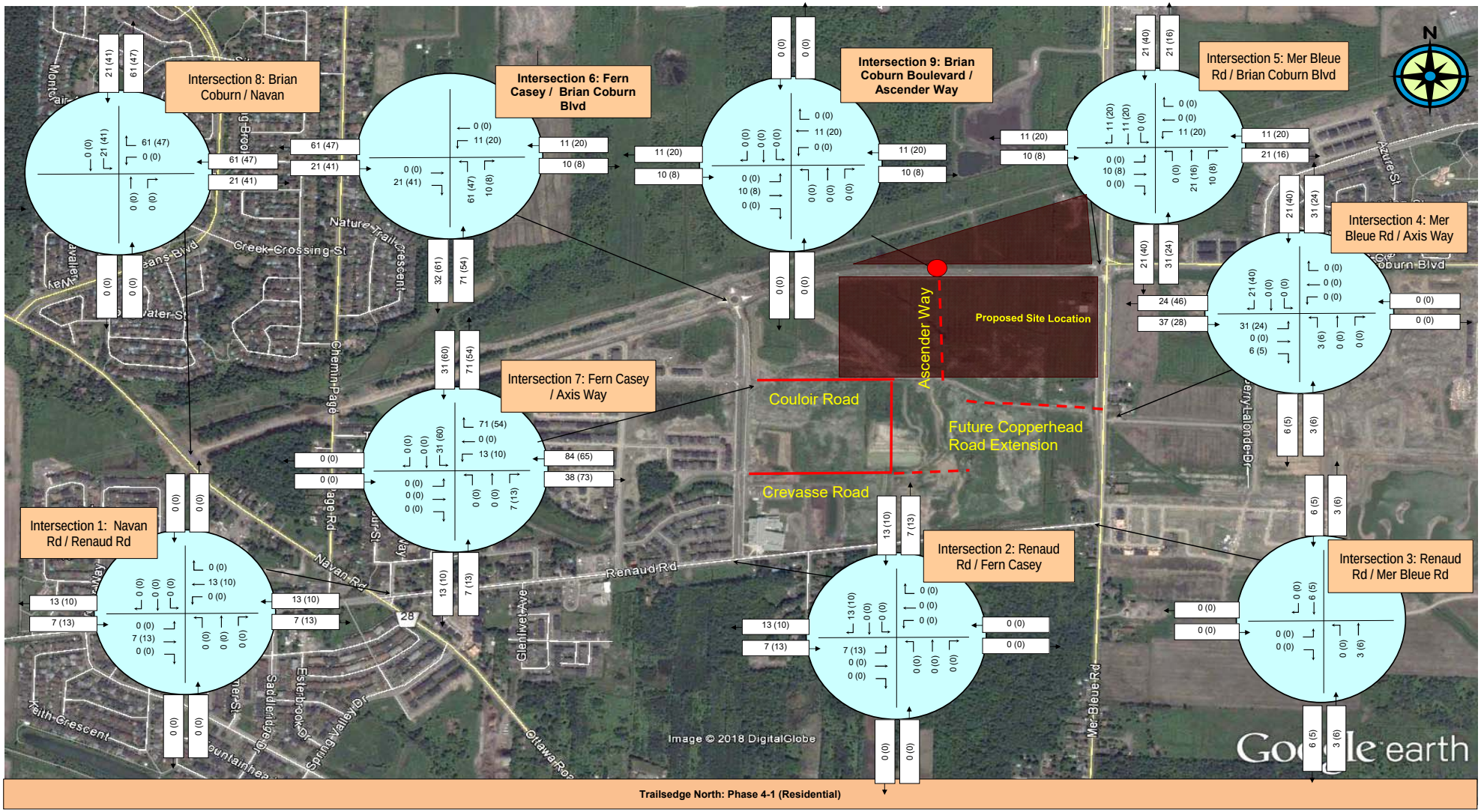
Design Volumes (2031)



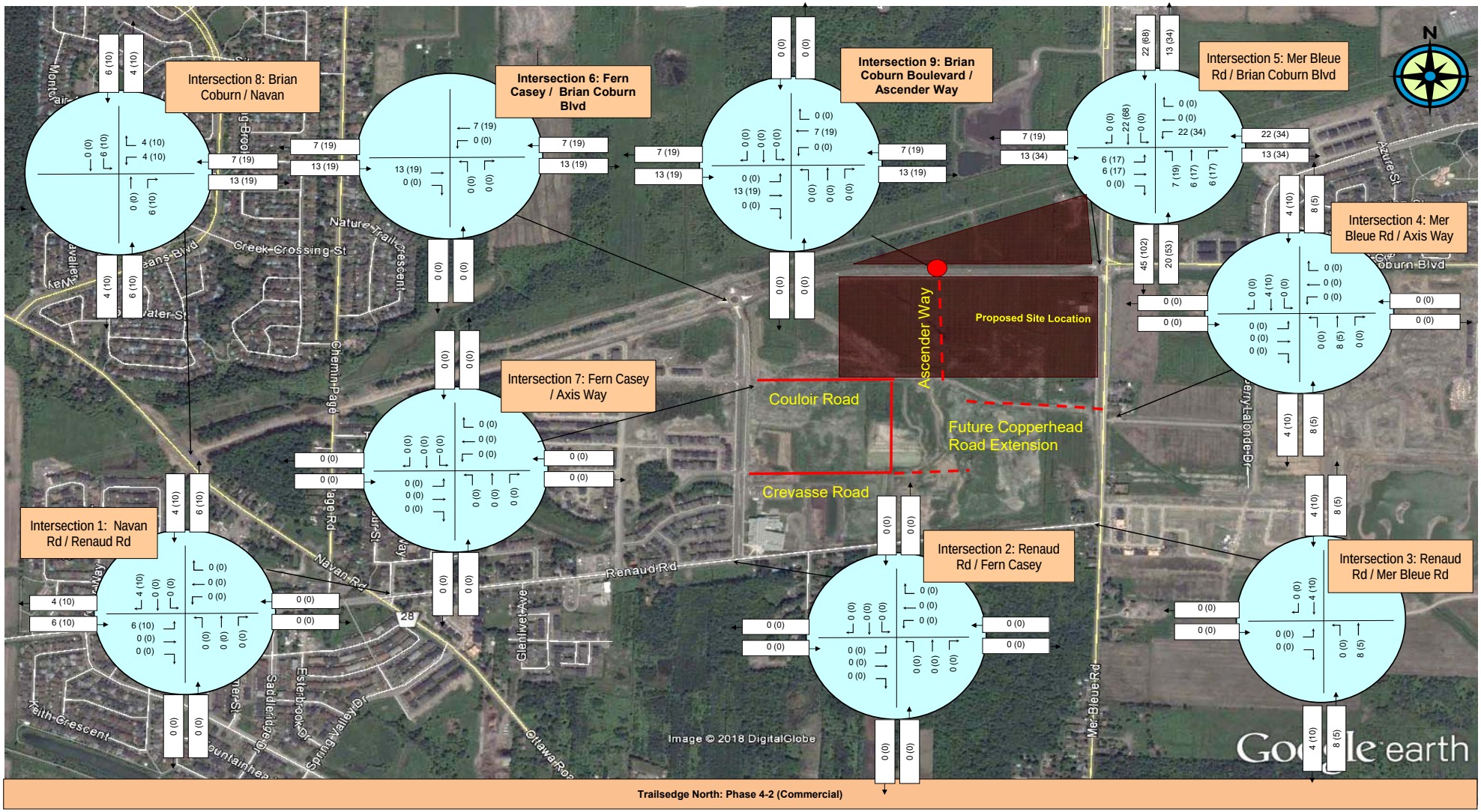
Design Volumes (2036)



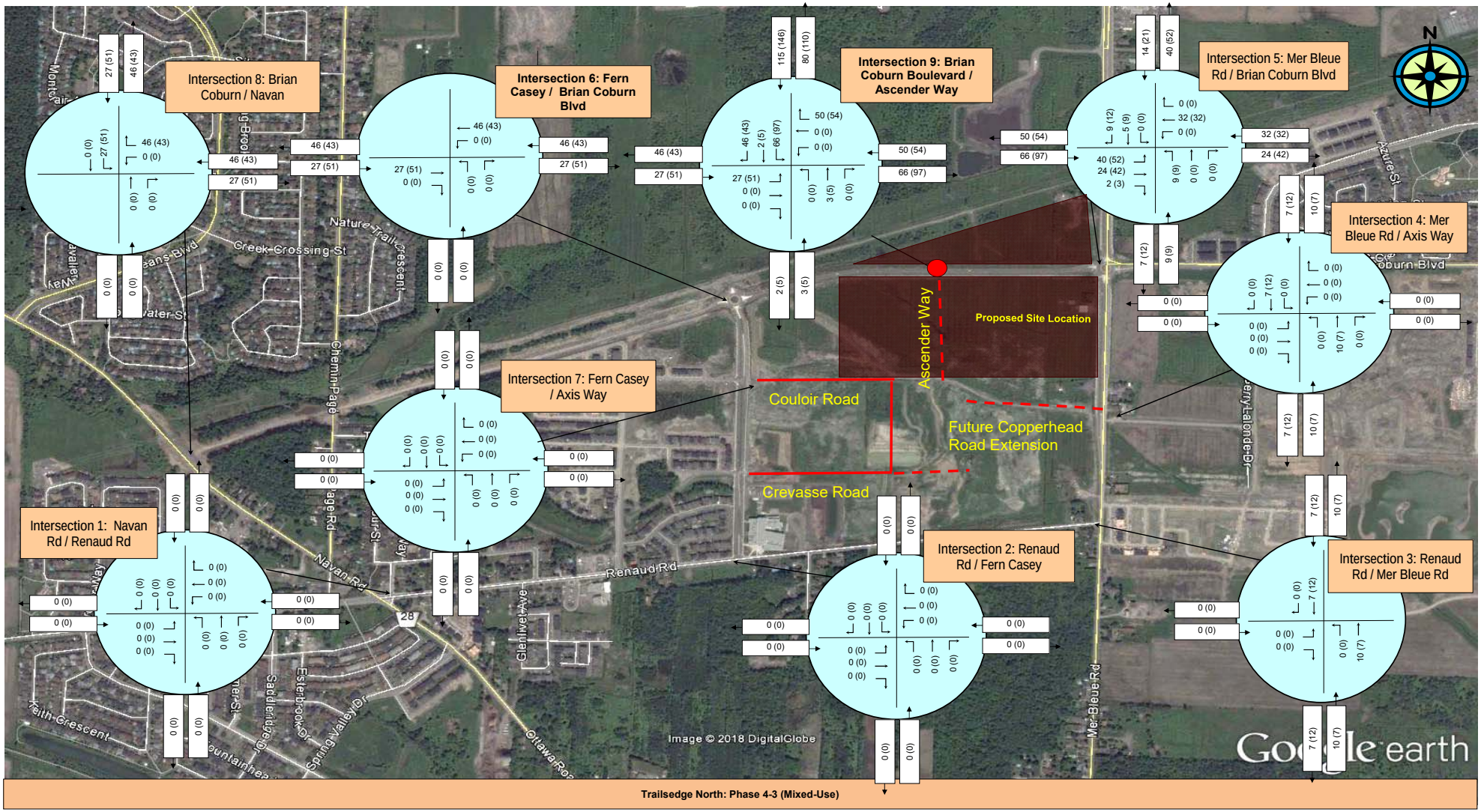
Trailsedge North: Phase 4-1 (Residential)



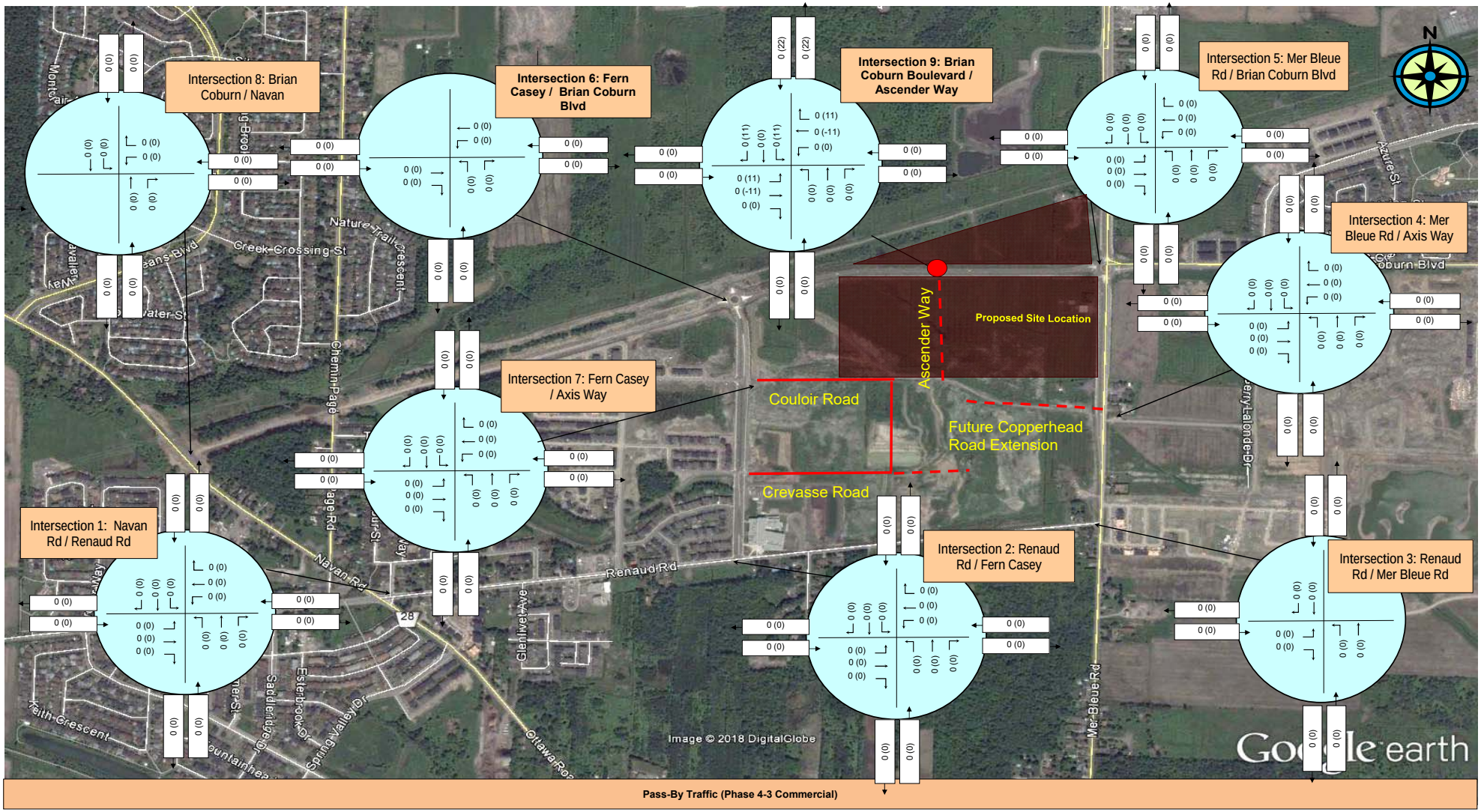
Trailsedge North: Phase 4-1 (Residential)



Trailsedge North: Phase 4-2 (Commercial)



Trailsedge North: Phase 4-3 (Mixed-Use)



Pass-By Traffic (Phase 4-3 Commercial)

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

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	95	122	123	32	9	113
Future Vol, veh/h	95	122	123	32	9	113
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	450	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	106	136	137	36	10	126

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	173	0	-	0	503	155
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	348	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1404	-	-	-	528	891
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	715	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1404	-	-	-	488	891
Mov Cap-2 Maneuver	-	-	-	-	488	-
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	715	-

Approach	EB	WB	SB
HCM Control Delay, s	3.4	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1404	-	-	-	840
HCM Lane V/C Ratio	0.075	-	-	-	0.161
HCM Control Delay (s)	7.8	-	-	-	10.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.6

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	0	1	0	0	0	1	169	0	0	261	7
Future Vol, veh/h	15	0	1	0	0	0	1	169	0	0	261	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	0	1	0	0	0	1	188	0	0	290	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	484	484	294	485	488	188	298	0	0	188	0	0
Stage 1	294	294	-	190	190	-	-	-	-	-	-	-
Stage 2	190	190	-	295	298	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	493	483	745	492	480	854	1263	-	-	1386	-	-
Stage 1	714	670	-	812	743	-	-	-	-	-	-	-
Stage 2	812	743	-	713	667	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	493	483	745	491	480	854	1263	-	-	1386	-	-
Mov Cap-2 Maneuver	493	483	-	491	480	-	-	-	-	-	-	-
Stage 1	713	670	-	811	742	-	-	-	-	-	-	-
Stage 2	811	742	-	712	667	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.4	0	0	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1263	-	-	504	-	1386	-	-
HCM Lane V/C Ratio	0.001	-	-	0.035	-	-	-	-
HCM Control Delay (s)	7.9	-	-	12.4	0	0	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	0	-	-

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	183	9	25	187	82	112
Future Vol, veh/h	183	9	25	187	82	112
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	3	2	2	5	2	2
Mvmt Flow	203	10	28	208	91	124
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.4	10	9.1
HCM LOS	B	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	12%	95%	0%
Vol Thru, %	88%	0%	42%
Vol Right, %	0%	5%	58%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	212	192	194
LT Vol	25	183	0
Through Vol	187	0	82
RT Vol	0	9	112
Lane Flow Rate	236	213	216
Geometry Grp	1	1	1
Degree of Util (X)	0.312	0.304	0.266
Departure Headway (Hd)	4.766	5.128	4.437
Convergence, Y/N	Yes	Yes	Yes
Cap	751	698	806
Service Time	2.814	3.188	2.485
HCM Lane V/C Ratio	0.314	0.305	0.268
HCM Control Delay	10	10.4	9.1
HCM Lane LOS	A	B	A
HCM 95th-tile Q	1.3	1.3	1.1

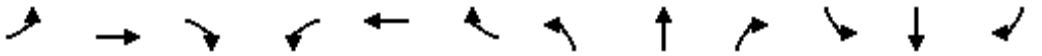
Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	41	369	18	17	179
Future Vol, veh/h	13	41	369	18	17	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	46	410	20	19	199

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	558	215	0	0	430	0
Stage 1	420	-	-	-	-	-
Stage 2	138	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	460	790	-	-	1126	-
Stage 1	631	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	451	790	-	-	1126	-
Mov Cap-2 Maneuver	451	-	-	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	857	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	669	1126	-
HCM Lane V/C Ratio	-	-	0.09	0.017	-
HCM Control Delay (s)	-	-	10.9	8.3	0.1
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	119	98	17	9	295	103	126	323	21	40	90	0
Future Volume (veh/h)	119	98	17	9	295	103	126	323	21	40	90	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1632	1730	1800	1238	1772	1772	1758	1688	1688	396	1379	1379
Adj Flow Rate, veh/h	132	109	19	10	328	114	140	359	0	44	100	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
Percent Heavy Veh, %	12	5	0	40	2	2	3	8	8	100	30	30
Cap, veh/h	271	788	694	366	411	143	534	679		133	555	0
Arrive On Green	0.07	0.46	0.46	0.33	0.33	0.33	0.40	0.40	0.00	0.40	0.40	0.00
Sat Flow, veh/h	1554	1730	1525	882	1257	437	1285	1688	0	229	1379	0
Grp Volume(v), veh/h	132	109	19	10	0	442	140	359	0	44	100	0
Grp Sat Flow(s),veh/h/ln	1554	1730	1525	882	0	1693	1285	1688	0	229	1379	0
Q Serve(g_s), s	5.0	3.4	0.6	0.7	0.0	22.0	7.3	15.0	0.0	16.8	4.3	0.0
Cycle Q Clear(g_c), s	5.0	3.4	0.6	0.7	0.0	22.0	11.6	15.0	0.0	31.7	4.3	0.0
Prop In Lane	1.00		1.00	1.00		0.26	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	271	788	694	366	0	554	534	679		133	555	0
V/C Ratio(X)	0.49	0.14	0.03	0.03	0.00	0.80	0.26	0.53		0.33	0.18	0.00
Avail Cap(c_a), veh/h	323	1036	914	463	0	740	854	1098		190	897	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.5	14.7	13.9	21.2	0.0	28.4	21.6	21.0	0.0	33.1	17.8	0.0
Incr Delay (d2), s/veh	1.4	0.1	0.0	0.0	0.0	4.5	0.3	0.6	0.0	1.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	1.5	0.3	0.2	0.0	10.4	2.4	6.4	0.0	1.0	1.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.9	14.7	13.9	21.2	0.0	32.9	21.9	21.7	0.0	34.5	18.0	0.0
LnGrp LOS	C	B	B	C	A	C	C	C		C	B	A
Approach Vol, veh/h		260			452			499	A		144	
Approach Delay, s/veh		18.3			32.6			21.7			23.0	
Approach LOS		B			C			C			C	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		44.0		48.7		44.0	11.9	36.8				
Change Period (Y+Rc), s		* 6.7		6.5		* 6.7	5.0	6.5				
Max Green Setting (Gmax), s		* 60		55.5		* 60	10.0	40.5				
Max Q Clear Time (g_c+I1), s		17.0		5.4		33.7	7.0	24.0				
Green Ext Time (p_c), s		8.0		2.1		3.5	0.2	6.3				

Intersection Summary		
HCM 6th Ctrl Delay	24.8	
HCM 6th LOS	C	

Notes

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

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

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	124	279	68	1	6	114
Future Vol, veh/h	124	279	68	1	6	114
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	450	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	138	310	76	1	7	127

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	77	0	-	0	663	77
Stage 1	-	-	-	-	77	-
Stage 2	-	-	-	-	586	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1522	-	-	-	426	984
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	556	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1522	-	-	-	387	984
Mov Cap-2 Maneuver	-	-	-	-	387	-
Stage 1	-	-	-	-	860	-
Stage 2	-	-	-	-	556	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1522	-	-	-	914
HCM Lane V/C Ratio	0.091	-	-	-	0.146
HCM Control Delay (s)	7.6	-	-	-	9.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.3	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	0	1	0	0	0	0	154	0	0	165	71
Future Vol, veh/h	24	0	1	0	0	0	0	154	0	0	165	71
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	0	1	0	0	0	0	171	0	0	183	79

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	394	394	223	394	433	171	262	0	0	171	0	0
Stage 1	223	223	-	171	171	-	-	-	-	-	-	-
Stage 2	171	171	-	223	262	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	566	542	817	566	516	873	1302	-	-	1406	-	-
Stage 1	780	719	-	831	757	-	-	-	-	-	-	-
Stage 2	831	757	-	780	691	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	566	542	817	565	516	873	1302	-	-	1406	-	-
Mov Cap-2 Maneuver	566	542	-	565	516	-	-	-	-	-	-	-
Stage 1	780	719	-	831	757	-	-	-	-	-	-	-
Stage 2	831	757	-	779	691	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.6	0	0	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1302	-	-	573	-	1406	-	-
HCM Lane V/C Ratio	-	-	-	0.048	-	-	-	-
HCM Control Delay (s)	0	-	-	11.6	0	0	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	-	0	-	-

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	356	24	13	168	189	130
Future Vol, veh/h	356	24	13	168	189	130
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	3	2	2	5	2	2
Mvmt Flow	396	27	14	187	210	144
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	18.7	11.6	14
HCM LOS	C	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	7%	94%	0%
Vol Thru, %	93%	0%	59%
Vol Right, %	0%	6%	41%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	181	380	319
LT Vol	13	356	0
Through Vol	168	0	189
RT Vol	0	24	130
Lane Flow Rate	201	422	354
Geometry Grp	1	1	1
Degree of Util (X)	0.322	0.656	0.521
Departure Headway (Hd)	5.77	5.596	5.292
Convergence, Y/N	Yes	Yes	Yes
Cap	621	646	681
Service Time	3.823	3.635	3.338
HCM Lane V/C Ratio	0.324	0.653	0.52
HCM Control Delay	11.6	18.7	14
HCM Lane LOS	B	C	B
HCM 95th-tile Q	1.4	4.9	3

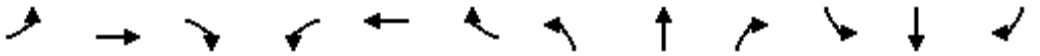
Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	29	505	21	39	318
Future Vol, veh/h	13	29	505	21	39	318
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	32	561	23	43	353

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	836	292	0	0	584	0
Stage 1	573	-	-	-	-	-
Stage 2	263	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	306	704	-	-	987	-
Stage 1	527	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	289	704	-	-	987	-
Mov Cap-2 Maneuver	289	-	-	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	716	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	487	987	-
HCM Lane V/C Ratio	-	-	0.096	0.044	-
HCM Control Delay (s)	-	-	13.2	8.8	0.2
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	185	366	151	19	179	57	22	125	22	108	326	3
Future Volume (veh/h)	185	366	151	19	179	57	22	125	22	108	326	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1758	1772	1758	1730	1786	1786	1800	1716	1716	1786	1716	1716
Adj Flow Rate, veh/h	206	407	168	21	199	63	24	139	0	120	362	3
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
Percent Heavy Veh, %	3	2	3	5	1	1	0	6	6	1	6	6
Cap, veh/h	436	789	664	318	321	102	285	586		473	580	5
Arrive On Green	0.12	0.45	0.45	0.25	0.25	0.25	0.34	0.34	0.00	0.34	0.34	0.34
Sat Flow, veh/h	1674	1772	1490	818	1300	412	1033	1716	0	1260	1699	14
Grp Volume(v), veh/h	206	407	168	21	0	262	24	139	0	120	0	365
Grp Sat Flow(s),veh/h/ln	1674	1772	1490	818	0	1712	1033	1716	0	1260	0	1713
Q Serve(g_s), s	5.2	10.2	4.4	1.2	0.0	8.4	1.2	3.6	0.0	4.7	0.0	11.0
Cycle Q Clear(g_c), s	5.2	10.2	4.4	1.2	0.0	8.4	12.3	3.6	0.0	8.3	0.0	11.0
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	436	789	664	318	0	423	285	586		473	0	585
V/C Ratio(X)	0.47	0.52	0.25	0.07	0.00	0.62	0.08	0.24		0.25	0.00	0.62
Avail Cap(c_a), veh/h	510	1589	1336	652	0	1120	938	1671		1270	0	1669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.9	12.4	10.7	18.0	0.0	20.7	22.2	14.6	0.0	17.6	0.0	17.1
Incr Delay (d2), s/veh	0.8	0.5	0.2	0.1	0.0	1.5	0.1	0.2	0.0	0.3	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	4.5	1.6	0.3	0.0	3.8	0.3	1.5	0.0	1.5	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.7	12.9	10.9	18.1	0.0	22.2	22.3	14.8	0.0	17.9	0.0	18.2
LnGrp LOS	B	B	B	B	A	C	C	B		B	A	B
Approach Vol, veh/h		781			283			163	A		485	
Approach Delay, s/veh		12.9			21.9			15.9			18.1	
Approach LOS		B			C			B			B	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		27.8		34.1		27.8	12.3	21.8				
Change Period (Y+Rc), s		* 6.7		6.5		* 6.7	5.0	6.5				
Max Green Setting (Gmax), s		* 60		55.5		* 60	10.0	40.5				
Max Q Clear Time (g_c+I1), s		14.3		12.2		13.0	7.2	10.4				
Green Ext Time (p_c), s		2.6		9.9		8.1	0.3	4.9				

Intersection Summary												
HCM 6th Ctrl Delay			16.2									
HCM 6th LOS			B									

Notes

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	195	22	11	348	44	74	37	37	49	11	272
Future Volume (veh/h)	144	195	22	11	348	44	74	37	37	49	11	272
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	144	195	22	11	348	44	74	37	37	49	11	272
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	335	626	71	478	618	78	291	143	117	647	26	647
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	992	1564	176	1164	1542	195	467	321	263	1326	59	1452
Grp Volume(v), veh/h	144	0	217	11	0	392	148	0	0	49	0	283
Grp Sat Flow(s),veh/h/ln	992	0	1740	1164	0	1737	1051	0	0	1326	0	1511
Q Serve(g_s), s	8.6	0.0	5.6	0.4	0.0	11.4	2.7	0.0	0.0	0.0	0.0	8.3
Cycle Q Clear(g_c), s	19.9	0.0	5.6	6.0	0.0	11.4	11.0	0.0	0.0	1.8	0.0	8.3
Prop In Lane	1.00		0.10	1.00		0.11	0.50		0.25	1.00		0.96
Lane Grp Cap(c), veh/h	335	0	697	478	0	696	552	0	0	647	0	673
V/C Ratio(X)	0.43	0.00	0.31	0.02	0.00	0.56	0.27	0.00	0.00	0.08	0.00	0.42
Avail Cap(c_a), veh/h	563	0	1097	745	0	1095	552	0	0	647	0	673
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.8	0.0	13.4	15.4	0.0	15.1	13.0	0.0	0.0	10.5	0.0	12.3
Incr Delay (d2), s/veh	0.9	0.0	0.3	0.0	0.0	0.7	1.2	0.0	0.0	0.2	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	1.6	0.1	0.0	3.4	1.1	0.0	0.0	0.3	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.7	0.0	13.6	15.4	0.0	15.8	14.2	0.0	0.0	10.7	0.0	14.2
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	B
Approach Vol, veh/h		361			403			148			332	
Approach Delay, s/veh		17.6			15.8			14.2			13.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		34.0		31.1		34.0		31.1				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		29.0		41.0		29.0		41.0				
Max Q Clear Time (g_c+I1), s		13.0		21.9		10.3		13.4				
Green Ext Time (p_c), s		1.8		4.1		4.5		7.2				

Intersection Summary												
HCM 6th Ctrl Delay			15.6									
HCM 6th LOS			B									

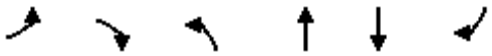
Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	26	4	5	98	1	170	2	324	35	80	310	12
Future Vol, veh/h	26	4	5	98	1	170	2	324	35	80	310	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	4	5	98	1	170	2	324	35	80	310	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	907	839	316	827	828	342	322	0	0	359	0	0
Stage 1	476	476	-	346	346	-	-	-	-	-	-	-
Stage 2	431	363	-	481	482	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	257	302	724	291	306	701	1238	-	-	1200	-	-
Stage 1	570	557	-	670	635	-	-	-	-	-	-	-
Stage 2	603	625	-	566	553	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	184	281	724	271	285	701	1238	-	-	1200	-	-
Mov Cap-2 Maneuver	184	281	-	271	285	-	-	-	-	-	-	-
Stage 1	569	520	-	669	634	-	-	-	-	-	-	-
Stage 2	455	624	-	521	516	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25	24.9	0	1.6
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1238	-	-	215	443	1200	-	-
HCM Lane V/C Ratio	0.002	-	-	0.163	0.607	0.067	-	-
HCM Control Delay (s)	7.9	-	-	25	24.9	8.2	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.6	3.9	0.2	-	-



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	317	32	69	380	208	209
Future Volume (veh/h)	317	32	69	380	208	209
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1758	1772	1772	1730	1772	1772
Adj Flow Rate, veh/h	317	32	69	380	208	209
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	2	2	5	2	2
Cap, veh/h	428	384	592	894	916	776
Arrive On Green	0.26	0.26	0.52	0.52	0.52	0.52
Sat Flow, veh/h	1674	1502	969	1730	1772	1502
Grp Volume(v), veh/h	317	32	69	380	208	209
Grp Sat Flow(s),veh/h/ln	1674	1502	969	1730	1772	1502
Q Serve(g_s), s	8.2	0.8	2.0	6.4	3.0	3.7
Cycle Q Clear(g_c), s	8.2	0.8	5.0	6.4	3.0	3.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	428	384	592	894	916	776
V/C Ratio(X)	0.74	0.08	0.12	0.43	0.23	0.27
Avail Cap(c_a), veh/h	1068	958	592	894	916	776
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.1	13.3	7.6	7.0	6.2	6.4
Incr Delay (d2), s/veh	2.5	0.1	0.4	1.5	0.6	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.2	0.3	1.3	0.4	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.6	13.4	8.0	8.5	6.8	7.2
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	349			449	417	
Approach Delay, s/veh	18.1			8.4	7.0	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		29.8		17.2		29.8
Change Period (Y+Rc), s		5.5		5.2		5.5
Max Green Setting (Gmax), s		24.3		30.0		24.3
Max Q Clear Time (g_c+I1), s		8.4		10.2		5.7
Green Ext Time (p_c), s		5.5		2.0		3.9

Intersection Summary		
HCM 6th Ctrl Delay		10.7
HCM 6th LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	107	8	10	70	20	57	5	766	26	25	318	28
Future Volume (veh/h)	107	8	10	70	20	57	5	766	26	25	318	28
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	107	8	10	70	20	57	5	766	26	25	318	28
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	377	150	187	434	85	242	708	1933	66	468	1822	159
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.58	0.58	0.58	0.58	0.58	0.58
Sat Flow, veh/h	1322	716	895	1395	406	1157	1035	3322	113	685	3132	274
Grp Volume(v), veh/h	107	0	18	70	0	77	5	388	404	25	170	176
Grp Sat Flow(s),veh/h/ln	1322	0	1611	1395	0	1564	1035	1683	1752	685	1683	1723
Q Serve(g_s), s	3.4	0.0	0.4	2.0	0.0	1.9	0.1	5.8	5.8	1.0	2.2	2.2
Cycle Q Clear(g_c), s	5.3	0.0	0.4	2.4	0.0	1.9	2.3	5.8	5.8	6.8	2.2	2.2
Prop In Lane	1.00		0.56	1.00		0.74	1.00		0.06	1.00		0.16
Lane Grp Cap(c), veh/h	377	0	337	434	0	327	708	980	1019	468	980	1002
V/C Ratio(X)	0.28	0.00	0.05	0.16	0.00	0.24	0.01	0.40	0.40	0.05	0.17	0.18
Avail Cap(c_a), veh/h	1224	0	1368	1327	0	1328	1018	1484	1544	673	1484	1518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	0.0	14.7	15.6	0.0	15.3	5.1	5.3	5.3	7.1	4.5	4.5
Incr Delay (d2), s/veh	0.4	0.0	0.1	0.2	0.0	0.4	0.0	0.3	0.3	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.1	0.5	0.0	0.5	0.0	0.7	0.7	0.1	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.9	0.0	14.7	15.8	0.0	15.6	5.1	5.5	5.5	7.2	4.6	4.6
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		125			147			797			371	
Approach Delay, s/veh		17.4			15.7			5.5			4.8	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	32.1	14.3	32.1	14.3
Change Period (Y+Rc), s	* 5.1	4.6	* 5.1	4.6
Max Green Setting (Gmax), s	* 41	39.4	* 41	39.4
Max Q Clear Time (g_c+I1), s	7.8	7.3	8.8	4.4
Green Ext Time (p_c), s	16.3	0.9	6.7	1.6

Intersection Summary	
HCM 6th Ctrl Delay	7.4
HCM 6th LOS	A

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	119	152	29	23	472	370	138	397	25	126	112	0
Future Volume (veh/h)	119	152	29	23	472	370	138	397	25	126	112	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	119	152	29	23	472	370	138	397	0	126	112	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	142	988	837	621	430	337	390	458		161	592	0
Arrive On Green	0.05	0.56	0.56	0.47	0.47	0.47	0.26	0.26	0.00	0.03	0.33	0.00
Sat Flow, veh/h	1688	1772	1502	1203	920	722	1281	1772	0	1688	1772	0
Grp Volume(v), veh/h	119	152	29	23	0	842	138	397	0	126	112	0
Grp Sat Flow(s),veh/h/ln	1688	1772	1502	1203	0	1642	1281	1772	0	1688	1772	0
Q Serve(g_s), s	4.3	5.1	1.1	1.3	0.0	57.0	10.9	26.1	0.0	4.2	5.5	0.0
Cycle Q Clear(g_c), s	4.3	5.1	1.1	1.3	0.0	57.0	10.9	26.1	0.0	4.2	5.5	0.0
Prop In Lane	1.00		1.00	1.00		0.44	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	142	988	837	621	0	768	390	458		161	592	0
V/C Ratio(X)	0.84	0.15	0.03	0.04	0.00	1.10	0.35	0.87		0.78	0.19	0.00
Avail Cap(c_a), veh/h	142	988	837	621	0	768	435	520		161	636	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.6	13.1	12.2	17.6	0.0	32.5	37.6	43.2	0.0	43.6	28.9	0.0
Incr Delay (d2), s/veh	33.4	0.1	0.0	0.0	0.0	62.3	0.5	13.1	0.0	21.5	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	1.8	0.3	0.3	0.0	32.9	3.2	11.9	0.0	2.6	2.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.0	13.1	12.2	17.7	0.0	94.7	38.1	56.3	0.0	65.1	29.0	0.0
LnGrp LOS	E	B	B	B	A	F	D	E		E	C	A
Approach Vol, veh/h		300			865			535	A		238	
Approach Delay, s/veh		32.4			92.7			51.6			48.1	
Approach LOS		C			F			D			D	

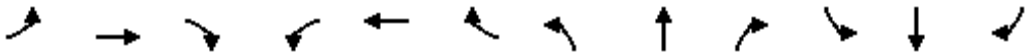
Timer - Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	9.2	38.2		74.5		47.4	11.0	63.5
Change Period (Y+Rc), s	5.0	* 6.7		6.5		* 6.7	5.0	6.5
Max Green Setting (Gmax), s	4.2	* 36		68.0		* 44	6.0	57.0
Max Q Clear Time (g_c+I1), s	6.3	28.1		7.1		7.5	6.3	59.0
Green Ext Time (p_c), s	0.0	3.4		3.1		1.7	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay	66.5	
HCM 6th LOS	E	

Notes

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	271	511	59	39	207	37	45	23	23	31	39	202
Future Volume (veh/h)	271	511	59	39	207	37	45	23	23	31	39	202
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	271	511	59	39	207	37	45	23	23	31	39	202
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	518	714	82	263	670	120	269	135	111	614	100	521
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1136	1559	180	842	1463	262	481	335	276	1360	249	1290
Grp Volume(v), veh/h	271	0	570	39	0	244	91	0	0	31	0	241
Grp Sat Flow(s),veh/h/ln	1136	0	1740	842	0	1725	1093	0	0	1360	0	1540
Q Serve(g_s), s	14.2	0.0	19.0	2.8	0.0	6.4	0.9	0.0	0.0	0.0	0.0	8.0
Cycle Q Clear(g_c), s	20.7	0.0	19.0	21.8	0.0	6.4	8.9	0.0	0.0	1.3	0.0	8.0
Prop In Lane	1.00		0.10	1.00		0.15	0.49		0.25	1.00		0.84
Lane Grp Cap(c), veh/h	518	0	796	263	0	789	516	0	0	614	0	621
V/C Ratio(X)	0.52	0.00	0.72	0.15	0.00	0.31	0.18	0.00	0.00	0.05	0.00	0.39
Avail Cap(c_a), veh/h	646	0	992	358	0	984	516	0	0	614	0	621
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.8	0.0	15.7	24.5	0.0	12.3	14.4	0.0	0.0	13.2	0.0	15.2
Incr Delay (d2), s/veh	0.8	0.0	1.9	0.3	0.0	0.2	0.7	0.0	0.0	0.2	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	5.8	0.5	0.0	1.9	0.8	0.0	0.0	0.3	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	0.0	17.6	24.8	0.0	12.5	15.1	0.0	0.0	13.3	0.0	17.0
LnGrp LOS	B	A	B	C	A	B	B	A	A	B	A	B
Approach Vol, veh/h		841			283			91			272	
Approach Delay, s/veh		18.3			14.2			15.1			16.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		34.0		37.9		34.0		37.9				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		29.0		41.0		29.0		41.0				
Max Q Clear Time (g_c+I1), s		10.9		22.7		10.0		23.8				
Green Ext Time (p_c), s		1.0		10.2		3.7		3.6				

Intersection Summary												
HCM 6th Ctrl Delay			17.0									
HCM 6th LOS			B									

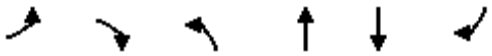
Intersection	
Int Delay, s/veh	8.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑		↰	↑	
Traffic Vol, veh/h	31	2	3	73	4	129	4	240	91	202	345	87
Future Vol, veh/h	31	2	3	73	4	129	4	240	91	202	345	87
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	31	2	3	73	4	129	4	240	91	202	345	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1153	1132	389	1089	1130	286	432	0	0	331	0	0
Stage 1	793	793	-	294	294	-	-	-	-	-	-	-
Stage 2	360	339	-	795	836	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	174	203	659	193	204	753	1128	-	-	1228	-	-
Stage 1	382	400	-	714	670	-	-	-	-	-	-	-
Stage 2	658	640	-	381	382	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	124	169	659	166	170	753	1128	-	-	1228	-	-
Mov Cap-2 Maneuver	124	169	-	166	170	-	-	-	-	-	-	-
Stage 1	380	334	-	711	667	-	-	-	-	-	-	-
Stage 2	540	637	-	315	319	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	41.1	33.4	0.1	2.7
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1128	-	-	135	325	1228	-	-
HCM Lane V/C Ratio	0.004	-	-	0.267	0.634	0.164	-	-
HCM Control Delay (s)	8.2	-	-	41.1	33.4	8.5	-	-
HCM Lane LOS	A	-	-	E	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1	4.1	0.6	-	-



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	484	70	47	367	407	275
Future Volume (veh/h)	484	70	47	367	407	275
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1758	1772	1772	1730	1772	1772
Adj Flow Rate, veh/h	484	70	47	367	407	275
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	2	2	5	2	2
Cap, veh/h	593	532	348	776	795	673
Arrive On Green	0.35	0.35	0.45	0.45	0.45	0.45
Sat Flow, veh/h	1674	1502	759	1730	1772	1502
Grp Volume(v), veh/h	484	70	47	367	407	275
Grp Sat Flow(s),veh/h/ln	1674	1502	759	1730	1772	1502
Q Serve(g_s), s	14.2	1.7	2.6	8.0	8.9	6.7
Cycle Q Clear(g_c), s	14.2	1.7	11.5	8.0	8.9	6.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	593	532	348	776	795	673
V/C Ratio(X)	0.82	0.13	0.13	0.47	0.51	0.41
Avail Cap(c_a), veh/h	927	831	348	776	795	673
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.9	11.9	14.8	10.5	10.7	10.1
Incr Delay (d2), s/veh	3.3	0.1	0.8	2.1	2.4	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	0.4	0.4	2.2	2.2	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.2	12.0	15.6	12.5	13.1	11.9
LnGrp LOS	B	B	B	B	B	B
Approach Vol, veh/h	554			414	682	
Approach Delay, s/veh	18.3			12.9	12.6	
Approach LOS	B			B	B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		29.8		24.4		29.8
Change Period (Y+Rc), s		5.5		5.2		5.5
Max Green Setting (Gmax), s		24.3		30.0		24.3
Max Q Clear Time (g_c+I1), s		13.5		16.2		10.9
Green Ext Time (p_c), s		4.1		3.0		6.0

Intersection Summary		
HCM 6th Ctrl Delay		14.6
HCM 6th LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	19	15	55	11	38	9	778	47	65	738	94
Future Volume (veh/h)	53	19	15	55	11	38	9	778	47	65	738	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	53	19	15	55	11	38	9	778	47	65	738	94
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	384	180	142	400	68	236	461	1923	116	465	1791	228
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.60	0.60	0.60	0.60	0.60	0.60
Sat Flow, veh/h	1356	917	724	1375	349	1206	660	3225	195	664	3004	382
Grp Volume(v), veh/h	53	0	34	55	0	49	9	406	419	65	413	419
Grp Sat Flow(s),veh/h/ln	1356	0	1642	1375	0	1555	660	1683	1737	664	1683	1703
Q Serve(g_s), s	1.6	0.0	0.8	1.6	0.0	1.2	0.3	6.0	6.0	2.7	6.1	6.1
Cycle Q Clear(g_c), s	2.8	0.0	0.8	2.4	0.0	1.2	6.5	6.0	6.0	8.7	6.1	6.1
Prop In Lane	1.00		0.44	1.00		0.78	1.00		0.11	1.00		0.22
Lane Grp Cap(c), veh/h	384	0	322	400	0	305	461	1004	1036	465	1004	1016
V/C Ratio(X)	0.14	0.00	0.11	0.14	0.00	0.16	0.02	0.40	0.40	0.14	0.41	0.41
Avail Cap(c_a), veh/h	1262	0	1384	1290	0	1311	645	1473	1520	650	1473	1491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.8	0.0	15.4	16.4	0.0	15.6	6.8	5.0	5.0	7.3	5.0	5.0
Incr Delay (d2), s/veh	0.2	0.0	0.1	0.2	0.0	0.2	0.0	0.3	0.3	0.1	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.2	0.4	0.0	0.3	0.0	0.6	0.6	0.2	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.9	0.0	15.6	16.6	0.0	15.8	6.8	5.3	5.3	7.5	5.3	5.3
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		87			104			834			897	
Approach Delay, s/veh		16.4			16.2			5.3			5.5	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.0	13.8	33.0	13.8
Change Period (Y+Rc), s	* 5.1	4.6	* 5.1	4.6
Max Green Setting (Gmax), s	* 41	39.4	* 41	39.4
Max Q Clear Time (g_c+I1), s	8.5	4.8	10.7	4.4
Green Ext Time (p_c), s	16.9	0.7	17.2	1.0

Intersection Summary	
HCM 6th Ctrl Delay	6.5
HCM 6th LOS	A

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	185	540	169	26	279	222	22	170	34	402	404	3
Future Volume (veh/h)	185	540	169	26	279	222	22	170	34	402	404	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	185	540	169	26	279	222	22	170	0	402	404	3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	233	805	683	226	296	236	312	749		506	743	6
Arrive On Green	0.08	0.45	0.45	0.32	0.32	0.32	0.42	0.42	0.00	0.42	0.42	0.42
Sat Flow, veh/h	1688	1772	1502	740	914	727	978	1772	0	1215	1757	13
Grp Volume(v), veh/h	185	540	169	26	0	501	22	170	0	402	0	407
Grp Sat Flow(s),veh/h/ln	1688	1772	1502	740	0	1641	978	1772	0	1215	0	1770
Q Serve(g_s), s	7.6	25.7	7.4	3.1	0.0	31.9	1.9	6.6	0.0	34.0	0.0	18.5
Cycle Q Clear(g_c), s	7.6	25.7	7.4	14.8	0.0	31.9	20.4	6.6	0.0	40.5	0.0	18.5
Prop In Lane	1.00		1.00	1.00		0.44	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	233	805	683	226	0	532	312	749		506	0	748
V/C Ratio(X)	0.79	0.67	0.25	0.11	0.00	0.94	0.07	0.23		0.79	0.00	0.54
Avail Cap(c_a), veh/h	233	815	691	230	0	542	328	779		527	0	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.0	23.0	18.0	34.3	0.0	35.3	30.9	19.8	0.0	32.8	0.0	23.3
Incr Delay (d2), s/veh	17.1	2.1	0.2	0.2	0.0	24.7	0.1	0.2	0.0	7.9	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	9.7	2.3	0.5	0.0	15.0	0.4	2.3	0.0	9.5	0.0	6.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	25.1	18.2	34.5	0.0	60.1	31.0	20.0	0.0	40.7	0.0	24.0
LnGrp LOS	D	C	B	C	A	E	C	B		D	A	C
Approach Vol, veh/h		894			527			192	A		809	
Approach Delay, s/veh		27.6			58.8			21.2			32.3	
Approach LOS		C			E			C			C	

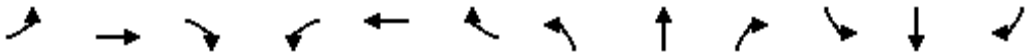
Timer - Assigned Phs	2	4	6	7	8
Phs Duration (G+Y+Rc), s	52.2	55.4	52.2	14.0	41.4
Change Period (Y+Rc), s	* 6.7	6.5	* 6.7	5.0	6.5
Max Green Setting (Gmax), s	* 47	49.5	* 47	9.0	35.5
Max Q Clear Time (g_c+I1), s	22.4	27.7	42.5	9.6	33.9
Green Ext Time (p_c), s	2.6	10.0	2.9	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	35.4
HCM 6th LOS	D

Notes

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	195	30	15	348	44	104	52	52	49	15	272
Future Volume (veh/h)	144	195	30	15	348	44	104	52	52	49	15	272
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	144	195	30	15	348	44	104	52	52	49	15	272
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	336	602	93	471	619	78	289	142	116	613	35	638
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.44	0.44	0.44	0.44	0.44	0.44
Sat Flow, veh/h	992	1500	231	1156	1542	195	463	319	261	1290	79	1435
Grp Volume(v), veh/h	144	0	225	15	0	392	208	0	0	49	0	287
Grp Sat Flow(s),veh/h/ln	992	0	1730	1156	0	1737	1042	0	0	1290	0	1514
Q Serve(g_s), s	8.6	0.0	5.8	0.6	0.0	11.4	5.4	0.0	0.0	0.0	0.0	8.5
Cycle Q Clear(g_c), s	19.9	0.0	5.8	6.4	0.0	11.4	13.8	0.0	0.0	2.0	0.0	8.5
Prop In Lane	1.00		0.13	1.00		0.11	0.50		0.25	1.00		0.95
Lane Grp Cap(c), veh/h	336	0	695	471	0	698	546	0	0	613	0	673
V/C Ratio(X)	0.43	0.00	0.32	0.03	0.00	0.56	0.38	0.00	0.00	0.08	0.00	0.43
Avail Cap(c_a), veh/h	561	0	1088	734	0	1092	546	0	0	613	0	673
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.8	0.0	13.4	15.6	0.0	15.1	14.6	0.0	0.0	10.6	0.0	12.4
Incr Delay (d2), s/veh	0.9	0.0	0.3	0.0	0.0	0.7	2.0	0.0	0.0	0.3	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	1.7	0.1	0.0	3.4	2.1	0.0	0.0	0.3	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.6	0.0	13.7	15.6	0.0	15.8	16.6	0.0	0.0	10.8	0.0	14.4
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	B
Approach Vol, veh/h		369			407			208			336	
Approach Delay, s/veh		17.6			15.8			16.6			13.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		34.0		31.2		34.0		31.2				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		29.0		41.0		29.0		41.0				
Max Q Clear Time (g_c+I1), s		15.8		21.9		10.5		13.4				
Green Ext Time (p_c), s		2.4		4.3		4.5		7.2				

Intersection Summary												
HCM 6th Ctrl Delay			15.9									
HCM 6th LOS			B									

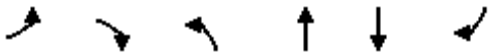
Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	26	4	5	98	1	170	2	339	35	80	314	12
Future Vol, veh/h	26	4	5	98	1	170	2	339	35	80	314	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	4	5	98	1	170	2	339	35	80	314	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	926	858	320	846	847	357	326	0	0	374	0	0
Stage 1	480	480	-	361	361	-	-	-	-	-	-	-
Stage 2	446	378	-	485	486	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	249	294	721	282	299	687	1234	-	-	1184	-	-
Stage 1	567	554	-	657	626	-	-	-	-	-	-	-
Stage 2	591	615	-	563	551	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	177	273	721	262	278	687	1234	-	-	1184	-	-
Mov Cap-2 Maneuver	177	273	-	262	278	-	-	-	-	-	-	-
Stage 1	566	516	-	656	625	-	-	-	-	-	-	-
Stage 2	443	614	-	517	514	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.8	26.4	0	1.6
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1234	-	-	208	430	1184	-	-
HCM Lane V/C Ratio	0.002	-	-	0.168	0.626	0.068	-	-
HCM Control Delay (s)	7.9	-	-	25.8	26.4	8.3	-	-
HCM Lane LOS	A	-	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.6	4.2	0.2	-	-



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	332	32	69	380	208	213
Future Volume (veh/h)	332	32	69	380	208	213
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1758	1772	1772	1730	1772	1772
Adj Flow Rate, veh/h	332	32	69	380	208	213
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	2	2	5	2	2
Cap, veh/h	443	398	581	883	904	766
Arrive On Green	0.26	0.26	0.51	0.51	0.51	0.51
Sat Flow, veh/h	1674	1502	966	1730	1772	1502
Grp Volume(v), veh/h	332	32	69	380	208	213
Grp Sat Flow(s),veh/h/ln	1674	1502	966	1730	1772	1502
Q Serve(g_s), s	8.7	0.8	2.0	6.6	3.1	3.9
Cycle Q Clear(g_c), s	8.7	0.8	5.1	6.6	3.1	3.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	443	398	581	883	904	766
V/C Ratio(X)	0.75	0.08	0.12	0.43	0.23	0.28
Avail Cap(c_a), veh/h	1055	946	581	883	904	766
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.0	13.1	7.9	7.3	6.5	6.6
Incr Delay (d2), s/veh	2.6	0.1	0.4	1.5	0.6	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.2	0.3	1.4	0.5	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.6	13.2	8.3	8.8	7.1	7.5
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	364			449	421	
Approach Delay, s/veh	18.1			8.8	7.3	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		29.8		17.8		29.8
Change Period (Y+Rc), s		5.5		5.2		5.5
Max Green Setting (Gmax), s		24.3		30.0		24.3
Max Q Clear Time (g_c+I1), s		8.6		10.7		5.9
Green Ext Time (p_c), s		5.5		2.1		3.9

Intersection Summary		
HCM 6th Ctrl Delay		11.0
HCM 6th LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	107	8	10	70	20	57	5	766	26	25	318	28
Future Volume (veh/h)	107	8	10	70	20	57	5	766	26	25	318	28
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	107	8	10	70	20	57	5	766	26	25	318	28
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	377	150	187	434	85	242	708	1933	66	468	1822	159
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.58	0.58	0.58	0.58	0.58	0.58
Sat Flow, veh/h	1322	716	895	1395	406	1157	1035	3322	113	685	3132	274
Grp Volume(v), veh/h	107	0	18	70	0	77	5	388	404	25	170	176
Grp Sat Flow(s),veh/h/ln	1322	0	1611	1395	0	1564	1035	1683	1752	685	1683	1723
Q Serve(g_s), s	3.4	0.0	0.4	2.0	0.0	1.9	0.1	5.8	5.8	1.0	2.2	2.2
Cycle Q Clear(g_c), s	5.3	0.0	0.4	2.4	0.0	1.9	2.3	5.8	5.8	6.8	2.2	2.2
Prop In Lane	1.00		0.56	1.00		0.74	1.00		0.06	1.00		0.16
Lane Grp Cap(c), veh/h	377	0	337	434	0	327	708	980	1019	468	980	1002
V/C Ratio(X)	0.28	0.00	0.05	0.16	0.00	0.24	0.01	0.40	0.40	0.05	0.17	0.18
Avail Cap(c_a), veh/h	1224	0	1368	1327	0	1328	1018	1484	1544	673	1484	1518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	0.0	14.7	15.6	0.0	15.3	5.1	5.3	5.3	7.1	4.5	4.5
Incr Delay (d2), s/veh	0.4	0.0	0.1	0.2	0.0	0.4	0.0	0.3	0.3	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.1	0.5	0.0	0.5	0.0	0.7	0.7	0.1	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.9	0.0	14.7	15.8	0.0	15.6	5.1	5.5	5.5	7.2	4.6	4.6
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		125			147			797			371	
Approach Delay, s/veh		17.4			15.7			5.5			4.8	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	32.1	14.3	32.1	14.3
Change Period (Y+Rc), s	* 5.1	4.6	* 5.1	4.6
Max Green Setting (Gmax), s	* 41	39.4	* 41	39.4
Max Q Clear Time (g_c+I1), s	7.8	7.3	8.8	4.4
Green Ext Time (p_c), s	16.3	0.9	6.7	1.6

Intersection Summary	
HCM 6th Ctrl Delay	7.4
HCM 6th LOS	A

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	119	147	34	23	472	400	143	427	26	134	120	0
Future Volume (veh/h)	119	147	34	23	472	400	143	427	26	134	120	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	119	147	34	23	472	400	143	427	0	134	120	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	983	833	629	422	357	401	479		147	605	0
Arrive On Green	0.04	0.55	0.55	0.48	0.48	0.48	0.27	0.27	0.00	0.03	0.34	0.00
Sat Flow, veh/h	1688	1772	1502	1203	886	751	1272	1772	0	1688	1772	0
Grp Volume(v), veh/h	119	147	34	23	0	872	143	427	0	134	120	0
Grp Sat Flow(s),veh/h/ln	1688	1772	1502	1203	0	1637	1272	1772	0	1688	1772	0
Q Serve(g_s), s	4.7	5.1	1.3	1.3	0.0	60.5	11.7	29.4	0.0	4.0	6.1	0.0
Cycle Q Clear(g_c), s	4.7	5.1	1.3	1.3	0.0	60.5	11.7	29.4	0.0	4.0	6.1	0.0
Prop In Lane	1.00		1.00	1.00		0.46	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	123	983	833	629	0	779	401	479		147	605	0
V/C Ratio(X)	0.97	0.15	0.04	0.04	0.00	1.12	0.36	0.89		0.91	0.20	0.00
Avail Cap(c_a), veh/h	123	983	833	629	0	779	430	520		147	646	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.4	13.7	12.9	17.8	0.0	33.3	38.1	44.5	0.0	47.6	29.6	0.0
Incr Delay (d2), s/veh	70.6	0.1	0.0	0.0	0.0	70.1	0.5	16.5	0.0	48.5	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	1.8	0.4	0.3	0.0	36.1	3.4	13.8	0.0	4.2	2.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	102.0	13.8	12.9	17.8	0.0	103.4	38.6	61.0	0.0	96.2	29.7	0.0
LnGrp LOS	F	B	B	B	A	F	D	E		F	C	A
Approach Vol, veh/h		300			895			570	A		254	
Approach Delay, s/veh		48.7			101.2			55.4			64.8	
Approach LOS		D			F			E			E	

Timer - Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	9.0	41.1		77.0		50.1	10.0	67.0
Change Period (Y+Rc), s	5.0	* 6.7		6.5		* 6.7	5.0	6.5
Max Green Setting (Gmax), s	4.0	* 37		70.5		* 46	5.0	60.5
Max Q Clear Time (g_c+I1), s	6.0	31.4		7.1		8.1	6.7	62.5
Green Ext Time (p_c), s	0.0	2.9		3.0		1.9	0.0	0.0

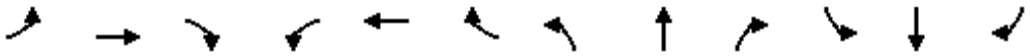
Intersection Summary	
HCM 6th Ctrl Delay	75.9
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	278	511	110	55	207	37	53	32	32	31	55	202
Future Volume (veh/h)	278	511	110	55	207	37	53	32	32	31	55	202
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	278	511	110	55	207	37	53	32	32	31	55	202
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	532	663	143	234	687	123	239	142	117	572	131	481
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1136	1413	304	803	1463	262	426	359	295	1338	332	1220
Grp Volume(v), veh/h	278	0	621	55	0	244	117	0	0	31	0	257
Grp Sat Flow(s),veh/h/ln	1136	0	1717	803	0	1725	1080	0	0	1338	0	1552
Q Serve(g_s), s	14.7	0.0	22.1	4.5	0.0	6.4	1.8	0.0	0.0	0.0	0.0	8.8
Cycle Q Clear(g_c), s	21.1	0.0	22.1	26.6	0.0	6.4	10.6	0.0	0.0	1.5	0.0	8.8
Prop In Lane	1.00		0.18	1.00		0.15	0.45		0.27	1.00		0.79
Lane Grp Cap(c), veh/h	532	0	806	234	0	810	497	0	0	572	0	612
V/C Ratio(X)	0.52	0.00	0.77	0.24	0.00	0.30	0.24	0.00	0.00	0.05	0.00	0.42
Avail Cap(c_a), veh/h	632	0	958	304	0	962	497	0	0	572	0	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.6	0.0	16.2	27.3	0.0	12.0	16.0	0.0	0.0	13.9	0.0	16.2
Incr Delay (d2), s/veh	0.8	0.0	3.3	0.5	0.0	0.2	1.1	0.0	0.0	0.2	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	6.9	0.8	0.0	1.9	1.2	0.0	0.0	0.3	0.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.4	0.0	19.5	27.8	0.0	12.3	17.1	0.0	0.0	14.1	0.0	18.3
LnGrp LOS	B	A	B	C	A	B	B	A	A	B	A	B
Approach Vol, veh/h		899			299			117			288	
Approach Delay, s/veh		19.4			15.1			17.1			17.8	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		34.0		39.5		34.0		39.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		29.0		41.0		29.0		41.0				
Max Q Clear Time (g_c+I1), s		12.6		24.1		10.8		28.6				
Green Ext Time (p_c), s		1.4		10.4		3.8		3.0				

Intersection Summary												
HCM 6th Ctrl Delay			18.2									
HCM 6th LOS			B									

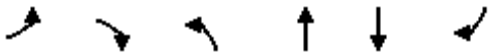
Intersection	
Int Delay, s/veh	8.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	2	3	73	4	129	4	243	91	202	361	87
Future Vol, veh/h	31	2	3	73	4	129	4	243	91	202	361	87
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	31	2	3	73	4	129	4	243	91	202	361	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1172	1151	405	1108	1149	289	448	0	0	334	0	0
Stage 1	809	809	-	297	297	-	-	-	-	-	-	-
Stage 2	363	342	-	811	852	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	169	198	646	187	198	750	1112	-	-	1225	-	-
Stage 1	374	394	-	712	668	-	-	-	-	-	-	-
Stage 2	656	638	-	373	376	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	120	165	646	161	165	750	1112	-	-	1225	-	-
Mov Cap-2 Maneuver	120	165	-	161	165	-	-	-	-	-	-	-
Stage 1	373	329	-	709	665	-	-	-	-	-	-	-
Stage 2	538	635	-	308	314	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	42.6	35.2	0.1	2.6
HCM LOS	E	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1112	-	-	131	317	1225	-	-
HCM Lane V/C Ratio	0.004	-	-	0.275	0.65	0.165	-	-
HCM Control Delay (s)	8.2	-	-	42.6	35.2	8.5	-	-
HCM Lane LOS	A	-	-	E	E	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1	4.3	0.6	-	-



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	499	78	50	376	407	300
Future Volume (veh/h)	499	78	50	376	407	300
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1758	1772	1772	1730	1772	1772
Adj Flow Rate, veh/h	499	78	50	376	407	300
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	2	2	5	2	2
Cap, veh/h	607	544	336	766	784	665
Arrive On Green	0.36	0.36	0.44	0.44	0.44	0.44
Sat Flow, veh/h	1674	1502	741	1730	1772	1502
Grp Volume(v), veh/h	499	78	50	376	407	300
Grp Sat Flow(s),veh/h/ln	1674	1502	741	1730	1772	1502
Q Serve(g_s), s	14.9	1.9	2.9	8.5	9.1	7.6
Cycle Q Clear(g_c), s	14.9	1.9	12.0	8.5	9.1	7.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	607	544	336	766	784	665
V/C Ratio(X)	0.82	0.14	0.15	0.49	0.52	0.45
Avail Cap(c_a), veh/h	915	821	336	766	784	665
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.9	11.8	15.4	10.9	11.1	10.7
Incr Delay (d2), s/veh	3.8	0.1	0.9	2.2	2.4	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.5	0.4	2.4	2.3	1.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.7	11.9	16.3	13.1	13.5	12.9
LnGrp LOS	B	B	B	B	B	B
Approach Vol, veh/h	577			426	707	
Approach Delay, s/veh	18.6			13.5	13.2	
Approach LOS	B			B	B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		29.8		25.1		29.8
Change Period (Y+Rc), s		5.5		5.2		5.5
Max Green Setting (Gmax), s		24.3		30.0		24.3
Max Q Clear Time (g_c+I1), s		14.0		16.9		11.1
Green Ext Time (p_c), s		4.0		3.0		6.0

Intersection Summary	
HCM 6th Ctrl Delay	15.1
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	19	15	55	11	38	9	787	47	65	754	94
Future Volume (veh/h)	53	19	15	55	11	38	9	787	47	65	754	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	53	19	15	55	11	38	9	787	47	65	754	94
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	381	179	141	397	68	235	455	1935	116	462	1806	225
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.60	0.60	0.60	0.60	0.60	0.60
Sat Flow, veh/h	1356	917	724	1375	349	1206	650	3228	193	658	3012	375
Grp Volume(v), veh/h	53	0	34	55	0	49	9	410	424	65	421	427
Grp Sat Flow(s),veh/h/ln	1356	0	1642	1375	0	1555	650	1683	1737	658	1683	1704
Q Serve(g_s), s	1.6	0.0	0.8	1.6	0.0	1.2	0.4	6.1	6.1	2.7	6.3	6.3
Cycle Q Clear(g_c), s	2.8	0.0	0.8	2.4	0.0	1.2	6.7	6.1	6.1	8.8	6.3	6.3
Prop In Lane	1.00		0.44	1.00		0.78	1.00		0.11	1.00		0.22
Lane Grp Cap(c), veh/h	381	0	320	397	0	303	455	1009	1042	462	1009	1022
V/C Ratio(X)	0.14	0.00	0.11	0.14	0.00	0.16	0.02	0.41	0.41	0.14	0.42	0.42
Avail Cap(c_a), veh/h	1250	0	1372	1278	0	1299	629	1460	1507	639	1460	1478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.0	0.0	15.6	16.6	0.0	15.8	6.8	5.0	5.0	7.3	5.0	5.0
Incr Delay (d2), s/veh	0.2	0.0	0.1	0.2	0.0	0.2	0.0	0.3	0.3	0.1	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.2	0.4	0.0	0.3	0.0	0.6	0.6	0.2	0.7	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.1	0.0	15.8	16.8	0.0	16.0	6.8	5.3	5.3	7.5	5.3	5.3
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		87			104			843			913	
Approach Delay, s/veh		16.6			16.4			5.3			5.5	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	13.8	33.4	13.8
Change Period (Y+Rc), s	* 5.1	4.6	* 5.1	4.6
Max Green Setting (Gmax), s	* 41	39.4	* 41	39.4
Max Q Clear Time (g_c+I1), s	8.7	4.8	10.8	4.4
Green Ext Time (p_c), s	17.1	0.7	17.4	1.0

Intersection Summary	
HCM 6th Ctrl Delay	6.5
HCM 6th LOS	A

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	185	540	172	26	279	240	22	188	34	434	436	3
Future Volume (veh/h)	185	540	172	26	279	240	22	188	34	434	436	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	185	540	172	26	279	240	22	188	0	434	436	3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	211	797	676	220	284	244	295	762		499	756	5
Arrive On Green	0.08	0.45	0.45	0.32	0.32	0.32	0.43	0.43	0.00	0.43	0.43	0.43
Sat Flow, veh/h	1688	1772	1502	738	879	756	950	1772	0	1195	1758	12
Grp Volume(v), veh/h	185	540	172	26	0	519	22	188	0	434	0	439
Grp Sat Flow(s),veh/h/ln	1688	1772	1502	738	0	1636	950	1772	0	1195	0	1770
Q Serve(g_s), s	7.8	26.5	7.8	3.2	0.0	34.6	2.0	7.4	0.0	39.9	0.0	20.7
Cycle Q Clear(g_c), s	7.8	26.5	7.8	15.7	0.0	34.6	22.7	7.4	0.0	47.3	0.0	20.7
Prop In Lane	1.00		1.00	1.00		0.46	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	211	797	676	220	0	528	295	762		499	0	761
V/C Ratio(X)	0.88	0.68	0.25	0.12	0.00	0.98	0.07	0.25		0.87	0.00	0.58
Avail Cap(c_a), veh/h	211	797	676	220	0	528	295	762		499	0	761
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.0	23.9	18.8	35.7	0.0	37.0	32.4	20.0	0.0	35.1	0.0	23.8
Incr Delay (d2), s/veh	31.7	2.3	0.2	0.2	0.0	34.7	0.1	0.2	0.0	15.3	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	10.1	2.4	0.5	0.0	17.4	0.4	2.6	0.0	12.0	0.0	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.7	26.2	19.0	35.9	0.0	71.7	32.5	20.2	0.0	50.4	0.0	24.8
LnGrp LOS	E	C	B	D	A	E	C	C		D	A	C
Approach Vol, veh/h		897			545			210	A		873	
Approach Delay, s/veh		31.5			70.0			21.4			37.6	
Approach LOS		C			E			C			D	

Timer - Assigned Phs	2	4	6	7	8
Phs Duration (G+Y+Rc), s	54.0	56.0	54.0	14.0	42.0
Change Period (Y+Rc), s	* 6.7	6.5	* 6.7	5.0	6.5
Max Green Setting (Gmax), s	* 47	49.5	* 47	9.0	35.5
Max Q Clear Time (g_c+I1), s	24.7	28.5	49.3	9.8	36.6
Green Ext Time (p_c), s	2.8	9.8	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	41.1
HCM 6th LOS	D

Notes

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

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

MOVEMENT SUMMARY

Site: 2031 Background AM - 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	1	3.0	0.588	10.9	LOS B	5.5	42.9	0.57	0.48	58.5
8	T1	766	3.0	0.588	5.1	LOS A	5.5	42.9	0.57	0.48	58.4
18	R2	26	3.0	0.588	4.9	LOS A	5.5	42.9	0.57	0.48	56.6
Approach		793	3.0	0.588	5.1	LOS A	5.5	42.9	0.57	0.48	58.3
East: RoadName											
1	L2	70	3.0	0.205	12.7	LOS B	0.9	7.0	0.69	0.83	56.6
6	T1	20	3.0	0.205	6.9	LOS A	0.9	7.0	0.69	0.83	56.5
16	R2	57	3.0	0.205	6.8	LOS A	0.9	7.0	0.69	0.83	54.9
Approach		147	3.0	0.205	9.6	LOS A	0.9	7.0	0.69	0.83	55.9
North: RoadName											
7	L2	25	3.0	0.269	10.3	LOS B	1.8	14.1	0.32	0.44	59.7
4	T1	318	3.0	0.269	4.5	LOS A	1.8	14.1	0.32	0.44	59.6
14	R2	28	3.0	0.269	4.4	LOS A	1.8	14.1	0.32	0.44	57.8
Approach		371	3.0	0.269	4.9	LOS A	1.8	14.1	0.32	0.44	59.5
West: RoadName											
5	L2	107	3.0	0.121	11.4	LOS B	0.5	4.1	0.49	0.72	55.6
2	T1	8	3.0	0.121	5.6	LOS A	0.5	4.1	0.49	0.72	55.5
12	R2	10	3.0	0.121	5.5	LOS A	0.5	4.1	0.49	0.72	54.0
Approach		125	3.0	0.121	10.6	LOS B	0.5	4.1	0.49	0.72	55.5
All Vehicles		1436	3.0	0.588	6.0	LOS A	5.5	42.9	0.51	0.53	58.1

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

MOVEMENT SUMMARY

Site: 2031 Background AM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	179	2.0	0.352	10.1	LOS B	2.4	18.7	0.35	0.56	55.9
18	R2	301	2.0	0.352	4.7	LOS A	2.4	18.7	0.35	0.56	57.4
Approach		480	2.0	0.352	6.7	LOS A	2.4	18.7	0.35	0.56	56.9
East: Brian Coburn											
1	L2	165	2.0	0.551	10.8	LOS B	4.5	35.0	0.58	0.57	57.7
6	T1	531	2.0	0.551	5.7	LOS A	4.5	35.0	0.58	0.57	59.0
Approach		696	2.0	0.551	6.9	LOS A	4.5	35.0	0.58	0.57	58.7
West: Brian Coburn											
2	T1	100	2.0	0.246	5.3	LOS A	1.5	11.2	0.41	0.52	60.6
12	R2	199	2.0	0.246	5.0	LOS A	1.5	11.2	0.41	0.52	55.2
Approach		299	2.0	0.246	5.1	LOS A	1.5	11.2	0.41	0.52	57.7
All Vehicles		1475	2.0	0.551	6.5	LOS A	4.5	35.0	0.47	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: 2031 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	18	2.0	0.388	12.0	LOS B	1.8	14.0	0.60	0.58	60.0
8	T1	634	2.0	0.388	5.8	LOS A	1.8	14.2	0.59	0.57	58.2
18	R2	137	2.0	0.388	5.5	LOS A	1.8	14.2	0.58	0.55	56.6
Approach		789	2.0	0.388	5.9	LOS A	1.8	14.2	0.59	0.57	58.0
East: Brian Coburn											
1	L2	68	2.0	1.454	221.6	LOS F	116.6	900.8	1.00	5.34	13.2
6	T1	522	2.0	1.454	215.7	LOS F	116.6	900.8	1.00	5.34	17.6
16	R2	493	2.0	1.454	215.6	LOS F	116.6	900.8	1.00	5.34	13.6
Approach		1083	2.0	1.454	216.0	LOS F	116.6	900.8	1.00	5.34	15.6
North: Mer Bleue											
7	L2	159	2.0	0.296	11.4	LOS B	1.5	11.3	0.58	0.69	56.9
4	T1	292	2.0	0.296	5.3	LOS A	1.5	11.8	0.57	0.60	57.7
14	R2	156	2.0	0.296	5.1	LOS A	1.5	11.8	0.56	0.53	59.1
Approach		607	2.0	0.296	6.8	LOS A	1.5	11.8	0.57	0.60	58.0
West: Brian Coburn											
5	L2	267	2.0	0.439	12.2	LOS B	2.2	17.2	0.61	0.80	58.4
2	T1	118	2.0	0.439	6.3	LOS A	2.2	17.2	0.61	0.80	58.3
12	R2	16	2.0	0.439	6.2	LOS A	2.2	17.2	0.61	0.80	56.7
Approach		401	2.0	0.439	10.2	LOS B	2.2	17.2	0.61	0.80	58.3
All Vehicles		2880	2.0	1.454	85.7	LOS F	116.6	900.8	0.74	2.40	28.1

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: 2031 Background AM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	813	3.0	0.702	7.3	LOS A	8.0	62.7	0.78	0.68	55.4
18	R2	16	3.0	0.702	6.9	LOS A	8.0	62.7	0.78	0.68	54.2
Approach		829	3.0	0.702	7.3	LOS A	8.0	62.7	0.78	0.68	55.4
East: Brian Coburn											
1	L2	142	3.0	1.344	174.7	LOS F	72.9	567.7	1.00	3.69	16.0
16	R2	624	3.0	1.344	170.4	LOS F	72.9	567.7	1.00	3.69	16.0
Approach		766	3.0	1.344	171.2	LOS F	72.9	567.7	1.00	3.69	16.0
North: Navan											
7	L2	181	3.0	0.409	9.6	LOS A	3.4	26.4	0.45	0.56	55.7
4	T1	330	3.0	0.409	5.7	LOS A	3.4	26.4	0.45	0.56	56.1
Approach		511	3.0	0.409	7.1	LOS A	3.4	26.4	0.45	0.56	56.0
All Vehicles		2106	3.0	1.344	66.9	LOS E	72.9	567.7	0.78	1.75	29.3

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: 2031 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	1	3.0	0.607	10.9	LOS B	5.8	45.5	0.58	0.48	58.5
8	T1	778	3.0	0.607	5.1	LOS A	5.8	45.5	0.58	0.48	58.3
18	R2	47	3.0	0.607	5.0	LOS A	5.8	45.5	0.58	0.48	56.6
Approach		826	3.0	0.607	5.1	LOS A	5.8	45.5	0.58	0.48	58.2
East: RoadName											
1	L2	55	3.0	0.143	12.5	LOS B	0.6	4.8	0.66	0.83	56.5
6	T1	11	3.0	0.143	6.7	LOS A	0.6	4.8	0.66	0.83	56.4
16	R2	38	3.0	0.143	6.6	LOS A	0.6	4.8	0.66	0.83	54.8
Approach		104	3.0	0.143	9.7	LOS A	0.6	4.8	0.66	0.83	55.9
North: RoadName											
7	L2	65	3.0	0.602	10.4	LOS B	7.1	55.2	0.46	0.44	58.9
4	T1	738	3.0	0.602	4.6	LOS A	7.1	55.2	0.46	0.44	58.8
14	R2	94	3.0	0.602	4.5	LOS A	7.1	55.2	0.46	0.44	57.1
Approach		897	3.0	0.602	5.0	LOS A	7.1	55.2	0.46	0.44	58.6
West: RoadName											
5	L2	53	3.0	0.117	12.5	LOS B	0.5	3.8	0.64	0.81	56.1
2	T1	19	3.0	0.117	6.7	LOS A	0.5	3.8	0.64	0.81	56.0
12	R2	15	3.0	0.117	6.6	LOS A	0.5	3.8	0.64	0.81	54.4
Approach		87	3.0	0.117	10.2	LOS B	0.5	3.8	0.64	0.81	55.8
All Vehicles		1914	3.0	0.607	5.5	LOS A	7.1	55.2	0.53	0.50	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: 2031 Background 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	76	2.0	0.279	10.5	LOS B	1.7	12.9	0.45	0.60	56.2
18	R2	255	2.0	0.279	5.1	LOS A	1.7	12.9	0.45	0.60	57.6
Approach		331	2.0	0.279	6.4	LOS A	1.7	12.9	0.45	0.60	57.4
East: Brian Coburn											
1	L2	295	2.0	0.369	10.0	LOS B	2.7	20.9	0.31	0.56	57.7
6	T1	229	2.0	0.369	4.9	LOS A	2.7	20.9	0.31	0.56	59.0
Approach		524	2.0	0.369	7.8	LOS A	2.7	20.9	0.31	0.56	58.3
West: Brian Coburn											
2	T1	191	2.0	0.428	6.1	LOS A	2.6	20.4	0.58	0.63	60.0
12	R2	281	2.0	0.428	5.8	LOS A	2.6	20.4	0.58	0.63	54.2
Approach		472	2.0	0.428	5.9	LOS A	2.6	20.4	0.58	0.63	57.3
All Vehicles		1327	2.0	0.428	6.8	LOS A	2.7	20.9	0.44	0.59	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: 2031 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	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	32	2.0	0.505	13.9	LOS B	2.4	18.4	0.73	0.80	59.2
8	T1	639	2.0	0.505	7.3	LOS A	2.5	19.7	0.73	0.75	57.3
18	R2	124	2.0	0.505	6.6	LOS A	2.5	19.7	0.73	0.70	55.7
Approach		795	2.0	0.505	7.4	LOS A	2.5	19.7	0.73	0.74	57.1
East: Brian Coburn											
1	L2	108	2.0	0.792	16.7	LOS B	6.3	48.7	0.90	1.09	54.6
6	T1	191	2.0	0.792	10.7	LOS B	6.3	48.7	0.90	1.09	57.6
16	R2	303	2.0	0.792	10.6	LOS B	6.3	48.7	0.90	1.09	53.5
Approach		602	2.0	0.792	11.7	LOS B	6.3	48.7	0.90	1.09	55.2
North: Mer Bleue											
7	L2	576	2.0	0.646	12.6	LOS B	5.5	42.7	0.75	0.84	55.0
4	T1	593	2.0	0.646	6.1	LOS A	5.7	44.1	0.75	0.68	57.0
14	R2	301	2.0	0.646	6.0	LOS A	5.7	44.1	0.75	0.64	58.4
Approach		1470	2.0	0.646	8.6	LOS A	5.7	44.1	0.75	0.73	56.6
West: Brian Coburn											
5	L2	117	2.0	0.771	17.1	LOS B	4.5	35.1	0.89	1.06	57.2
2	T1	318	2.0	0.771	11.1	LOS B	4.5	35.1	0.89	1.06	57.1
12	R2	11	2.0	0.771	11.0	LOS B	4.5	35.1	0.89	1.06	55.5
Approach		446	2.0	0.771	12.7	LOS B	4.5	35.1	0.89	1.06	57.1
All Vehicles		3313	2.0	0.792	9.4	LOS A	6.3	48.7	0.79	0.84	56.5

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

MOVEMENT SUMMARY

Site: 2031 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	492	3.0	0.822	14.7	LOS B	9.2	71.9	1.00	1.19	51.3
18	R2	92	3.0	0.822	14.3	LOS B	9.2	71.9	1.00	1.19	50.3
Approach		584	3.0	0.822	14.7	LOS B	9.2	71.9	1.00	1.19	51.1
East: Brian Coburn											
1	L2	90	3.0	0.429	12.0	LOS B	2.6	20.6	0.75	0.90	55.3
16	R2	238	3.0	0.429	7.7	LOS A	2.6	20.6	0.75	0.90	54.5
Approach		328	3.0	0.429	8.9	LOS A	2.6	20.6	0.75	0.90	54.7
North: Navan											
7	L2	626	3.0	1.123	70.2	LOS F	116.5	908.0	1.00	1.12	29.5
4	T1	926	3.0	1.123	66.3	LOS F	116.5	908.0	1.00	1.12	29.6
Approach		1552	3.0	1.123	67.9	LOS E	116.5	908.0	1.00	1.12	29.6
All Vehicles		2464	3.0	1.123	47.4	LOS D	116.5	908.0	0.97	1.11	35.2

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: 2036 Background AM - Brian Coburn / Fern Casey

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Belcourt											
3	L2	179	2.0	0.187	10.0	LOS A	0.9	6.6	0.24	0.61	54.2
18	R2	316	2.0	0.187	4.7	LOS A	0.9	6.6	0.24	0.52	58.3
Approach		495	2.0	0.187	6.6	LOS A	0.9	6.6	0.24	0.55	57.1
East: Brian Coburn											
1	L2	169	2.0	0.282	10.3	LOS B	1.3	10.2	0.35	0.60	57.8
6	T1	531	2.0	0.282	5.1	LOS A	1.3	10.3	0.34	0.51	60.0
Approach		700	2.0	0.282	6.4	LOS A	1.3	10.3	0.34	0.53	59.5
West: Brian Coburn											
2	T1	100	2.0	0.098	5.2	LOS A	0.4	3.0	0.31	0.47	60.6
12	R2	199	2.0	0.159	5.0	LOS A	0.7	5.3	0.30	0.53	55.6
Approach		299	2.0	0.159	5.0	LOS A	0.7	5.3	0.30	0.51	57.9
All Vehicles		1494	2.0	0.282	6.2	LOS A	1.3	10.3	0.30	0.54	58.6

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

MOVEMENT SUMMARY

Site: 2036 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	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	18	2.0	0.390	12.1	LOS B	1.8	13.6	0.59	0.59	60.1
8	T1	649	2.0	0.390	5.8	LOS A	1.8	13.8	0.58	0.58	58.3
18	R2	137	2.0	0.390	5.5	LOS A	1.8	13.8	0.57	0.56	56.6
Approach		804	2.0	0.390	5.9	LOS A	1.8	13.8	0.58	0.57	58.1
East: Brian Coburn											
1	L2	68	2.0	0.636	14.8	LOS B	3.5	27.4	0.77	0.92	56.2
6	T1	522	2.0	0.636	8.5	LOS A	3.8	29.4	0.77	0.91	59.1
16	R2	493	2.0	0.636	7.6	LOS A	3.8	29.4	0.77	0.90	56.3
Approach		1083	2.0	0.636	8.5	LOS A	3.8	29.4	0.77	0.91	57.8
North: Mer Bleue											
7	L2	159	2.0	0.323	11.9	LOS B	1.4	10.9	0.61	0.74	56.8
4	T1	296	2.0	0.323	5.7	LOS A	1.5	11.4	0.60	0.64	57.6
14	R2	160	2.0	0.323	5.4	LOS A	1.5	11.4	0.59	0.57	59.0
Approach		615	2.0	0.323	7.2	LOS A	1.5	11.4	0.60	0.64	57.8
West: Brian Coburn											
5	L2	282	2.0	0.253	11.2	LOS B	1.1	8.3	0.51	0.75	57.4
2	T1	118	2.0	0.159	5.8	LOS A	0.6	4.6	0.51	0.55	60.6
12	R2	16	2.0	0.159	5.9	LOS A	0.6	4.6	0.51	0.55	58.9
Approach		416	2.0	0.253	9.5	LOS A	1.1	8.3	0.51	0.69	58.3
All Vehicles		2918	2.0	0.636	7.7	LOS A	3.8	29.4	0.65	0.73	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: 2036 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	872	3.0	0.701	6.7	LOS A	6.8	53.1	0.67	0.64	55.9
18	R2	16	3.0	0.023	6.4	LOS A	0.1	0.6	0.34	0.58	56.3
Approach		888	3.0	0.701	6.7	LOS A	6.8	53.1	0.66	0.64	55.9
East: Brian Coburn											
1	L2	142	3.0	0.602	13.8	LOS B	3.3	25.7	0.80	0.99	53.3
16	R2	624	3.0	0.602	9.4	LOS A	3.4	26.7	0.81	0.98	53.4
Approach		766	3.0	0.602	10.2	LOS B	3.4	26.7	0.81	0.98	53.4
North: Navan											
7	L2	181	3.0	0.225	9.5	LOS A	1.2	9.1	0.35	0.63	55.2
4	T1	347	3.0	0.225	5.6	LOS A	1.2	9.1	0.34	0.54	57.0
Approach		528	3.0	0.225	7.0	LOS A	1.2	9.1	0.34	0.57	56.4
All Vehicles		2182	3.0	0.701	8.0	LOS A	6.8	53.1	0.64	0.74	55.1

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: 2036 Background AM - 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	1	3.0	0.599	10.9	LOS B	5.7	44.5	0.58	0.48	58.4
8	T1	781	3.0	0.599	5.1	LOS A	5.7	44.5	0.58	0.48	58.3
18	R2	26	3.0	0.599	5.0	LOS A	5.7	44.5	0.58	0.48	56.6
Approach		808	3.0	0.599	5.1	LOS A	5.7	44.5	0.58	0.48	58.2
East: RoadName											
1	L2	70	3.0	0.208	12.7	LOS B	0.9	7.1	0.69	0.84	56.6
6	T1	20	3.0	0.208	6.9	LOS A	0.9	7.1	0.69	0.84	56.5
16	R2	57	3.0	0.208	6.8	LOS A	0.9	7.1	0.69	0.84	54.8
Approach		147	3.0	0.208	9.6	LOS A	0.9	7.1	0.69	0.84	55.9
North: RoadName											
7	L2	25	3.0	0.272	10.3	LOS B	1.8	14.3	0.32	0.44	59.7
4	T1	322	3.0	0.272	4.5	LOS A	1.8	14.3	0.32	0.44	59.6
14	R2	28	3.0	0.272	4.4	LOS A	1.8	14.3	0.32	0.44	57.8
Approach		375	3.0	0.272	4.9	LOS A	1.8	14.3	0.32	0.44	59.5
West: RoadName											
5	L2	107	3.0	0.122	11.5	LOS B	0.5	4.2	0.49	0.72	55.6
2	T1	8	3.0	0.122	5.7	LOS A	0.5	4.2	0.49	0.72	55.5
12	R2	10	3.0	0.122	5.5	LOS A	0.5	4.2	0.49	0.72	54.0
Approach		125	3.0	0.122	10.6	LOS B	0.5	4.2	0.49	0.72	55.5
All Vehicles		1455	3.0	0.599	6.0	LOS A	5.7	44.5	0.52	0.53	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: 2036 Background 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	76	2.0	0.142	10.2	LOS B	0.6	4.6	0.32	0.61	55.4
18	R2	264	2.0	0.142	5.0	LOS A	0.6	4.6	0.32	0.56	58.0
Approach		340	2.0	0.142	6.2	LOS A	0.6	4.6	0.32	0.57	57.5
East: Brian Coburn											
1	L2	311	2.0	0.219	9.8	LOS A	1.1	8.3	0.21	0.63	56.4
6	T1	229	2.0	0.182	4.8	LOS A	0.8	6.5	0.21	0.42	61.0
Approach		540	2.0	0.219	7.7	LOS A	1.1	8.3	0.21	0.54	58.5
West: Brian Coburn											
2	T1	191	2.0	0.189	5.6	LOS A	0.7	5.7	0.41	0.53	60.2
12	R2	281	2.0	0.242	5.4	LOS A	1.0	7.8	0.41	0.61	55.1
Approach		472	2.0	0.242	5.5	LOS A	1.0	7.8	0.41	0.58	57.8
All Vehicles		1352	2.0	0.242	6.5	LOS A	1.1	8.3	0.31	0.56	58.1

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

MOVEMENT SUMMARY

Site: 2036 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	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	32	2.0	0.494	13.8	LOS B	2.3	17.5	0.72	0.80	59.3
8	T1	648	2.0	0.494	7.3	LOS A	2.4	18.6	0.71	0.75	57.4
18	R2	124	2.0	0.494	6.6	LOS A	2.4	18.6	0.71	0.70	55.8
Approach		804	2.0	0.494	7.4	LOS A	2.4	18.6	0.71	0.74	57.3
East: Brian Coburn											
1	L2	108	2.0	0.346	12.5	LOS B	1.5	11.2	0.64	0.74	56.2
6	T1	191	2.0	0.346	6.4	LOS A	1.5	11.7	0.64	0.73	59.1
16	R2	303	2.0	0.346	5.9	LOS A	1.5	11.7	0.63	0.66	57.0
Approach		602	2.0	0.346	7.3	LOS A	1.5	11.7	0.64	0.70	57.7
North: Mer Bleue											
7	L2	576	2.0	0.644	12.6	LOS B	5.3	40.9	0.72	0.83	55.2
4	T1	609	2.0	0.644	6.1	LOS A	5.4	41.9	0.71	0.68	57.2
14	R2	317	2.0	0.644	6.0	LOS A	5.4	41.9	0.71	0.64	58.5
Approach		1502	2.0	0.644	8.6	LOS A	5.4	41.9	0.71	0.73	56.8
West: Brian Coburn											
5	L2	126	2.0	0.336	13.5	LOS B	1.3	9.9	0.73	0.87	57.7
2	T1	318	2.0	0.336	6.5	LOS A	1.4	10.6	0.70	0.65	59.3
12	R2	11	2.0	0.336	6.3	LOS A	1.4	10.6	0.70	0.60	58.0
Approach		455	2.0	0.336	8.4	LOS A	1.4	10.6	0.71	0.71	58.8
All Vehicles		3363	2.0	0.644	8.0	LOS A	5.4	41.9	0.70	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: 2036 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	528	3.0	0.618	8.8	LOS A	4.0	31.0	0.76	0.90	55.4
18	R2	92	3.0	0.201	9.5	LOS A	0.7	5.5	0.61	0.83	53.8
Approach		620	3.0	0.618	8.9	LOS A	4.0	31.0	0.74	0.89	55.2
East: Brian Coburn											
1	L2	90	3.0	0.196	10.7	LOS B	0.8	6.4	0.56	0.80	54.9
16	R2	238	3.0	0.196	6.7	LOS A	0.8	6.5	0.56	0.76	55.1
Approach		328	3.0	0.196	7.8	LOS A	0.8	6.5	0.56	0.77	55.1
North: Navan											
7	L2	626	3.0	0.610	9.6	LOS A	5.6	43.8	0.46	0.61	54.5
4	T1	988	3.0	0.610	5.6	LOS A	5.7	44.7	0.46	0.52	56.6
Approach		1614	3.0	0.610	7.2	LOS A	5.7	44.7	0.46	0.55	55.7
All Vehicles		2562	3.0	0.618	7.7	LOS A	5.7	44.7	0.54	0.66	55.5

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 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	1	3.0	0.614	10.9	LOS B	6.0	46.5	0.58	0.49	58.4
8	T1	787	3.0	0.614	5.1	LOS A	6.0	46.5	0.58	0.49	58.3
18	R2	47	3.0	0.614	5.0	LOS A	6.0	46.5	0.58	0.49	56.6
Approach		835	3.0	0.614	5.1	LOS A	6.0	46.5	0.58	0.49	58.2
East: RoadName											
1	L2	55	3.0	0.144	12.5	LOS B	0.6	4.9	0.67	0.83	56.5
6	T1	11	3.0	0.144	6.7	LOS A	0.6	4.9	0.67	0.83	56.4
16	R2	38	3.0	0.144	6.6	LOS A	0.6	4.9	0.67	0.83	54.8
Approach		104	3.0	0.144	9.7	LOS A	0.6	4.9	0.67	0.83	55.9
North: RoadName											
7	L2	65	3.0	0.612	10.4	LOS B	7.4	57.4	0.47	0.44	58.9
4	T1	754	3.0	0.612	4.6	LOS A	7.4	57.4	0.47	0.44	58.8
14	R2	94	3.0	0.612	4.5	LOS A	7.4	57.4	0.47	0.44	57.0
Approach		913	3.0	0.612	5.0	LOS A	7.4	57.4	0.47	0.44	58.6
West: RoadName											
5	L2	53	3.0	0.119	12.6	LOS B	0.5	3.8	0.65	0.82	56.1
2	T1	19	3.0	0.119	6.8	LOS A	0.5	3.8	0.65	0.82	56.0
12	R2	15	3.0	0.119	6.6	LOS A	0.5	3.8	0.65	0.82	54.4
Approach		87	3.0	0.119	10.3	LOS B	0.5	3.8	0.65	0.82	55.8
All Vehicles		1939	3.0	0.614	5.5	LOS A	7.4	57.4	0.54	0.50	58.1

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

Appendix F: Intersection Capacity Analysis
2031 Design, 2036 Design

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	176	27	14	313	40	93	47	47	45	14	264
Future Volume (vph)	139	176	27	14	313	40	93	47	47	45	14	264
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98			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	1749		1695	1754			1682		1695	1530	
Flt Permitted	0.39	1.00		0.63	1.00			0.76		0.64	1.00	
Satd. Flow (perm)	698	1749		1125	1754			1303		1141	1530	
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	176	27	14	313	40	93	47	47	45	14	264
RTOR Reduction (vph)	0	10	0	0	9	0	0	11	0	0	124	0
Lane Group Flow (vph)	139	193	0	14	344	0	0	176	0	45	154	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)	15.8	15.8		15.8	15.8			29.2		29.2	29.2	
Effective Green, g (s)	15.8	15.8		15.8	15.8			29.2		29.2	29.2	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.53		0.53	0.53	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	200	502		323	503			691		605	812	
v/s Ratio Prot		0.11			0.20						0.10	
v/s Ratio Perm	c0.20			0.01				c0.13		0.04		
v/c Ratio	0.69	0.38		0.04	0.68			0.25		0.07	0.19	
Uniform Delay, d1	17.5	15.7		14.1	17.4			7.0		6.3	6.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	10.0	0.5		0.1	3.8			0.9		0.2	0.5	
Delay (s)	27.5	16.2		14.2	21.2			7.9		6.5	7.2	
Level of Service	C	B		B	C			A		A	A	
Approach Delay (s)		20.8			21.0			7.9			7.1	
Approach LOS		C			C			A			A	

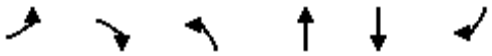
Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	3	4	107	1	233	2	308	40	107	294	11
Future Volume (Veh/h)	25	3	4	107	1	233	2	308	40	107	294	11
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)	25	3	4	107	1	233	2	308	40	107	294	11
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	1059	866	300	846	851	328	305			348		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1059	866	300	846	851	328	305			348		
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 %	80	99	99	59	100	67	100			91		
cM capacity (veh/h)	126	265	740	259	270	713	1256			1211		

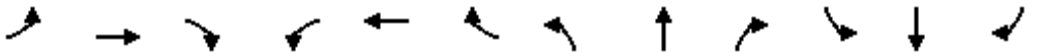
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	32	341	2	348	107	305
Volume Left	25	107	2	0	107	0
Volume Right	4	233	0	40	0	11
cSH	149	459	1256	1700	1211	1700
Volume to Capacity	0.21	0.74	0.00	0.20	0.09	0.18
Queue Length 95th (m)	5.9	46.5	0.0	0.0	2.2	0.0
Control Delay (s)	35.6	32.2	7.9	0.0	8.3	0.0
Lane LOS	E	D	A		A	
Approach Delay (s)	35.6	32.2	0.0		2.1	
Approach LOS	E	D				

Intersection Summary				
Average Delay	11.5			
Intersection Capacity Utilization	56.5%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	301	31	66	364	204	198
Future Volume (vph)	301	31	66	364	204	198
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	0.63	1.00	1.00	1.00
Satd. Flow (perm)	1679	1517	1124	1733	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	301	31	66	364	204	198
RTOR Reduction (vph)	0	22	0	0	0	97
Lane Group Flow (vph)	301	9	66	364	204	101
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)	13.9	13.9	25.5	25.5	25.5	25.5
Effective Green, g (s)	13.9	13.9	25.5	25.5	25.5	25.5
Actuated g/C Ratio	0.28	0.28	0.51	0.51	0.51	0.51
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)	465	420	572	882	908	772
v/s Ratio Prot	c0.18			c0.21	0.11	
v/s Ratio Perm		0.01	0.06			0.07
v/c Ratio	0.65	0.02	0.12	0.41	0.22	0.13
Uniform Delay, d1	15.9	13.2	6.4	7.6	6.8	6.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.0	0.4	1.4	0.6	0.3
Delay (s)	19.0	13.2	6.8	9.1	7.4	6.8
Level of Service	B	B	A	A	A	A
Approach Delay (s)	18.5			8.7	7.1	
Approach LOS	B			A	A	

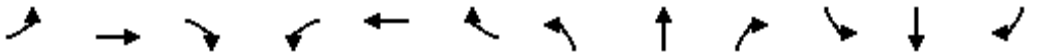
Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	50.1	Sum of lost time (s)	10.7
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	8	16	67	19	54	9	728	25	244	302	48
Future Volume (vph)	133	8	16	67	19	54	9	728	25	244	302	48
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1606		1695	1586		1695	3373		1695	3320	
Flt Permitted	0.71	1.00		0.74	1.00		0.54	1.00		0.36	1.00	
Satd. Flow (perm)	1266	1606		1323	1586		967	3373		645	3320	
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)	133	8	16	67	19	54	9	728	25	244	302	48
RTOR Reduction (vph)	0	13	0	0	45	0	0	2	0	0	8	0
Lane Group Flow (vph)	133	11	0	67	28	0	9	751	0	244	342	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)	10.3	10.3		10.3	10.3		44.1	44.1		44.1	44.1	
Effective Green, g (s)	10.3	10.3		10.3	10.3		44.1	44.1		44.1	44.1	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.69	0.69		0.69	0.69	
Clearance Time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	258		212	254		665	2320		443	2284	
v/s Ratio Prot		0.01			0.02			0.22			0.10	
v/s Ratio Perm	c0.11			0.05			0.01			c0.38		
v/c Ratio	0.66	0.04		0.32	0.11		0.01	0.32		0.55	0.15	
Uniform Delay, d1	25.2	22.7		23.8	23.0		3.1	4.0		5.0	3.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.4	0.1		0.9	0.2		0.0	0.1		1.5	0.0	
Delay (s)	32.6	22.8		24.6	23.2		3.2	4.1		6.5	3.5	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		31.1			23.9			4.1			4.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	9.7
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

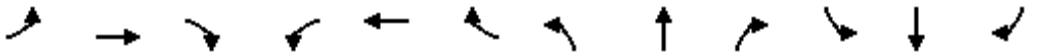
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	151	28	22	462	352	131	377	24	119	106	0
Future Volume (vph)	113	151	28	22	462	352	131	377	24	119	106	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		5.0	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	1669		1695	1768		1695	1784	
Flt Permitted	0.06	1.00	1.00	0.66	1.00		0.69	1.00		0.17	1.00	
Satd. Flow (perm)	115	1784	1517	1179	1669		1229	1768		310	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)	113	151	28	22	462	352	131	377	24	119	106	0
RTOR Reduction (vph)	0	0	12	0	21	0	0	2	0	0	0	0
Lane Group Flow (vph)	113	151	16	22	793	0	131	399	0	119	106	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	68.1	68.1	68.1	57.1	57.1		31.2	31.2		40.4	40.4	
Effective Green, g (s)	68.1	68.1	68.1	57.1	57.1		31.2	31.2		40.4	40.4	
Actuated g/C Ratio	0.56	0.56	0.56	0.47	0.47		0.26	0.26		0.33	0.33	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		5.0	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)	142	998	848	553	783		315	453		150	592	
v/s Ratio Prot	c0.04	0.08			c0.48			c0.23		c0.03	0.06	
v/s Ratio Perm	0.41		0.01	0.02			0.11			0.23		
v/c Ratio	0.80	0.15	0.02	0.04	1.01		0.42	0.88		0.79	0.18	
Uniform Delay, d1	25.8	12.9	11.9	17.5	32.3		37.7	43.5		38.0	28.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.7	0.1	0.0	0.0	35.3		0.9	17.8		24.3	0.1	
Delay (s)	51.5	13.0	11.9	17.5	67.6		38.6	61.2		62.3	29.0	
Level of Service	D	B	B	B	E		D	E		E	C	
Approach Delay (s)		27.8			66.3			55.6			46.6	
Approach LOS		C			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	55.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	121.7	Sum of lost time (s)	23.2
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	277	485	74	37	197	36	43	21	21	29	37	202
Future Volume (vph)	277	485	74	37	197	36	43	21	21	29	37	202
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98			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	1749		1695	1743			1682		1695	1558	
Flt Permitted	0.59	1.00		0.24	1.00			0.81		0.70	1.00	
Satd. Flow (perm)	1060	1749		434	1743			1389		1252	1558	
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)	277	485	74	37	197	36	43	21	21	29	37	202
RTOR Reduction (vph)	0	8	0	0	10	0	0	12	0	0	113	0
Lane Group Flow (vph)	277	551	0	37	223	0	0	73	0	29	126	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)	27.5	27.5		27.5	27.5			29.5		29.5	29.5	
Effective Green, g (s)	27.5	27.5		27.5	27.5			29.5		29.5	29.5	
Actuated g/C Ratio	0.41	0.41		0.41	0.41			0.44		0.44	0.44	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	435	717		178	715			611		551	685	
v/s Ratio Prot		c0.31			0.13						c0.08	
v/s Ratio Perm	0.26			0.09				0.05		0.02		
v/c Ratio	0.64	0.77		0.21	0.31			0.12		0.05	0.18	
Uniform Delay, d1	15.8	17.0		12.7	13.4			11.1		10.7	11.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	3.0	5.0		0.6	0.3			0.4		0.2	0.6	
Delay (s)	18.8	22.0		13.3	13.6			11.5		10.9	12.0	
Level of Service	B	C		B	B			B		B	B	
Approach Delay (s)		20.9			13.6			11.5			11.9	
Approach LOS		C			B			B			B	

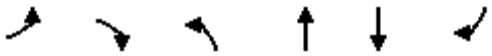
Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	2	3	79	4	176	4	228	99	251	328	83
Future Volume (Veh/h)	29	2	3	79	4	176	4	228	99	251	328	83
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)	29	2	3	79	4	176	4	228	99	251	328	83
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	1286	1206	370	1120	1198	278	411			327		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1286	1206	370	1120	1198	278	411			327		
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 %	68	99	100	48	97	77	100			80		
cM capacity (veh/h)	90	146	676	152	147	761	1148			1233		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	34	259	4	327	251	411
Volume Left	29	79	4	0	251	0
Volume Right	3	176	0	99	0	83
cSH	99	333	1148	1700	1233	1700
Volume to Capacity	0.34	0.78	0.00	0.19	0.20	0.24
Queue Length 95th (m)	10.2	47.5	0.1	0.0	5.8	0.0
Control Delay (s)	58.9	44.9	8.1	0.0	8.7	0.0
Lane LOS	F	E	A		A	
Approach Delay (s)	58.9	44.9	0.1		3.3	
Approach LOS	F	E				

Intersection Summary				
Average Delay	12.3			
Intersection Capacity Utilization	59.0%	ICU Level of Service	B	
Analysis Period (min)	15			



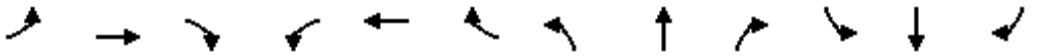
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	465	74	48	363	391	270
Future Volume (vph)	465	74	48	363	391	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2	5.5	5.5	5.5	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	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	0.47	1.00	1.00	1.00
Satd. Flow (perm)	1679	1517	831	1733	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	465	74	48	363	391	270
RTOR Reduction (vph)	0	47	0	0	0	150
Lane Group Flow (vph)	465	27	48	363	391	120
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)	20.0	20.0	24.6	24.6	24.6	24.6
Effective Green, g (s)	20.0	20.0	24.6	24.6	24.6	24.6
Actuated g/C Ratio	0.36	0.36	0.44	0.44	0.44	0.44
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)	607	548	369	770	793	674
v/s Ratio Prot	c0.28			0.21	c0.22	
v/s Ratio Perm		0.02	0.06			0.08
v/c Ratio	0.77	0.05	0.13	0.47	0.49	0.18
Uniform Delay, d1	15.6	11.5	9.0	10.8	10.9	9.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.7	0.0	0.7	2.1	2.2	0.6
Delay (s)	21.3	11.5	9.8	12.8	13.1	9.8
Level of Service	C	B	A	B	B	A
Approach Delay (s)	20.0			12.5	11.8	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	55.3	Sum of lost time (s)	10.7
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	18	19	52	10	36	15	739	45	62	701	130
Future Volume (vph)	74	18	19	52	10	36	15	739	45	62	701	130
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.88		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1647		1695	1575		1695	3361		1695	3311	
Flt Permitted	0.73	1.00		0.73	1.00		0.34	1.00		0.35	1.00	
Satd. Flow (perm)	1297	1647		1308	1575		605	3361		633	3311	
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)	74	18	19	52	10	36	15	739	45	62	701	130
RTOR Reduction (vph)	0	17	0	0	31	0	0	3	0	0	10	0
Lane Group Flow (vph)	74	20	0	52	15	0	15	781	0	62	821	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)	5.9	5.9		5.9	5.9		30.5	30.5		30.5	30.5	
Effective Green, g (s)	5.9	5.9		5.9	5.9		30.5	30.5		30.5	30.5	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.66	0.66		0.66	0.66	
Clearance Time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	165	210		167	201		400	2223		418	2190	
v/s Ratio Prot		0.01			0.01			0.23			c0.25	
v/s Ratio Perm	c0.06			0.04			0.02			0.10		
v/c Ratio	0.45	0.10		0.31	0.07		0.04	0.35		0.15	0.37	
Uniform Delay, d1	18.6	17.7		18.3	17.7		2.7	3.4		2.9	3.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.2		1.1	0.2		0.0	0.1		0.2	0.1	
Delay (s)	20.5	18.0		19.3	17.8		2.7	3.5		3.1	3.6	
Level of Service	C	B		B	B		A	A		A	A	
Approach Delay (s)		19.7			18.6			3.5			3.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	46.1	Sum of lost time (s)	9.7
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

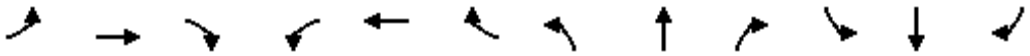
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	526	160	25	275	211	28	162	32	382	384	3
Future Volume (vph)	176	526	160	25	275	211	28	162	32	382	384	3
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	0.98		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	1668		1695	1740		1695	1782	
Flt Permitted	0.18	1.00	1.00	0.46	1.00		0.40	1.00		0.63	1.00	
Satd. Flow (perm)	314	1784	1517	828	1668		720	1740		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)	176	526	160	25	275	211	28	162	32	382	384	3
RTOR Reduction (vph)	0	0	73	0	25	0	0	7	0	0	0	0
Lane Group Flow (vph)	176	526	87	25	461	0	28	187	0	382	387	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)	44.6	44.6	44.6	30.4	30.4		37.7	37.7		37.7	37.7	
Effective Green, g (s)	44.6	44.6	44.6	30.4	30.4		37.7	37.7		37.7	37.7	
Actuated g/C Ratio	0.47	0.47	0.47	0.32	0.32		0.39	0.39		0.39	0.39	
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)	279	833	708	263	530		284	686		444	703	
v/s Ratio Prot	0.06	c0.29			c0.28			0.11			0.22	
v/s Ratio Perm	0.23		0.06	0.03			0.04			c0.34		
v/c Ratio	0.63	0.63	0.12	0.10	0.87		0.10	0.27		0.86	0.55	
Uniform Delay, d1	18.5	19.2	14.4	22.9	30.7		18.2	19.6		26.5	22.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	1.6	0.1	0.2	14.1		0.2	0.2		15.5	0.9	
Delay (s)	23.1	20.8	14.5	23.0	44.8		18.4	19.8		42.0	23.3	
Level of Service	C	C	B	C	D		B	B		D	C	
Approach Delay (s)		20.1			43.8			19.6			32.6	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	95.5	Sum of lost time (s)	18.2
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

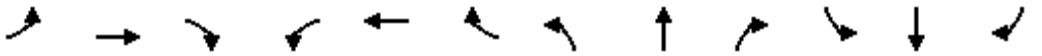
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	176	27	14	313	40	93	47	47	45	14	264
Future Volume (vph)	139	176	27	14	313	40	93	47	47	45	14	264
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98			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	1749		1695	1754			1682		1695	1530	
Flt Permitted	0.39	1.00		0.63	1.00			0.76		0.64	1.00	
Satd. Flow (perm)	698	1749		1125	1754			1303		1141	1530	
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	176	27	14	313	40	93	47	47	45	14	264
RTOR Reduction (vph)	0	10	0	0	9	0	0	11	0	0	124	0
Lane Group Flow (vph)	139	193	0	14	344	0	0	176	0	45	154	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)	15.8	15.8		15.8	15.8			29.2		29.2	29.2	
Effective Green, g (s)	15.8	15.8		15.8	15.8			29.2		29.2	29.2	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.53		0.53	0.53	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	200	502		323	503			691		605	812	
v/s Ratio Prot		0.11			0.20						0.10	
v/s Ratio Perm	c0.20			0.01				c0.13		0.04		
v/c Ratio	0.69	0.38		0.04	0.68			0.25		0.07	0.19	
Uniform Delay, d1	17.5	15.7		14.1	17.4			7.0		6.3	6.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	10.0	0.5		0.1	3.8			0.9		0.2	0.5	
Delay (s)	27.5	16.2		14.2	21.2			7.9		6.5	7.2	
Level of Service	C	B		B	C			A		A	A	
Approach Delay (s)		20.8			21.0			7.9			7.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

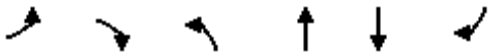
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	3	4	108	1	168	2	305	41	78	283	10
Future Volume (vph)	23	3	4	108	1	168	2	305	41	78	283	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2		5.2	5.2		5.9	6.2		5.9	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.97	1.00	1.00
Frt	1.00	0.91		1.00	0.85		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1695	1631		1695	1518		1695	1753		3288	1784	1517
Flt Permitted	0.65	1.00		0.75	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1160	1631		1344	1518		1695	1753		3288	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	3	4	108	1	168	2	305	41	78	283	10
RTOR Reduction (vph)	0	3	0	0	128	0	0	7	0	0	0	5
Lane Group Flow (vph)	23	4	0	108	41	0	2	339	0	78	283	5
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	15.4	15.4		15.4	15.4		2.2	25.1		6.7	29.6	29.6
Effective Green, g (s)	15.4	15.4		15.4	15.4		2.2	25.1		6.7	29.6	29.6
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.03	0.39		0.10	0.46	0.46
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	6.2		5.9	6.2	6.2
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)	276	389		320	362		57	682		341	818	696
v/s Ratio Prot		0.00			0.03		0.00	c0.19		c0.02	c0.16	
v/s Ratio Perm	0.02			c0.08								0.00
v/c Ratio	0.08	0.01		0.34	0.11		0.04	0.50		0.23	0.35	0.01
Uniform Delay, d1	19.1	18.7		20.3	19.2		30.1	14.9		26.5	11.2	9.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		0.6	0.1		0.3	2.6		0.3	1.2	0.0
Delay (s)	19.2	18.7		21.0	19.3		30.4	17.5		26.9	12.4	9.5
Level of Service	B	B		C	B		C	B		C	B	A
Approach Delay (s)		19.1			20.0			17.6			15.4	
Approach LOS		B			B			B			B	

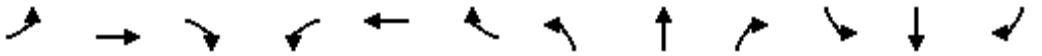
Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	17.3
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	299	29	62	366	207	192
Future Volume (vph)	299	29	62	366	207	192
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	0.63	1.00	1.00	1.00
Satd. Flow (perm)	1679	1517	1121	1733	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	299	29	62	366	207	192
RTOR Reduction (vph)	0	21	0	0	0	94
Lane Group Flow (vph)	299	8	62	366	207	98
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)	13.9	13.9	25.6	25.6	25.6	25.6
Effective Green, g (s)	13.9	13.9	25.6	25.6	25.6	25.6
Actuated g/C Ratio	0.28	0.28	0.51	0.51	0.51	0.51
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)	464	420	571	883	909	773
v/s Ratio Prot	c0.18			c0.21	0.12	
v/s Ratio Perm		0.01	0.06			0.06
v/c Ratio	0.64	0.02	0.11	0.41	0.23	0.13
Uniform Delay, d1	16.0	13.2	6.4	7.6	6.8	6.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.0	0.4	1.4	0.6	0.3
Delay (s)	19.0	13.2	6.8	9.1	7.4	6.8
Level of Service	B	B	A	A	A	A
Approach Delay (s)	18.5			8.7	7.1	
Approach LOS	B			A	A	

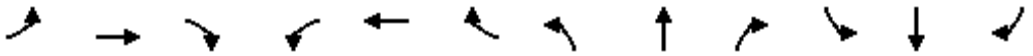
Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	10.7
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	7	17	63	18	51	10	722	23	23	301	51
Future Volume (vph)	137	7	17	63	18	51	10	722	23	23	301	51
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.89		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1595		1695	1586		1695	3374		1695	3317	
Flt Permitted	0.71	1.00		0.74	1.00		0.54	1.00		0.37	1.00	
Satd. Flow (perm)	1271	1595		1323	1586		965	3374		654	3317	
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)	137	7	17	63	18	51	10	722	23	23	301	51
RTOR Reduction (vph)	0	14	0	0	41	0	0	2	0	0	11	0
Lane Group Flow (vph)	137	10	0	63	28	0	10	743	0	23	341	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)	9.3	9.3		9.3	9.3		30.1	30.1		30.1	30.1	
Effective Green, g (s)	9.3	9.3		9.3	9.3		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.61	0.61		0.61	0.61	
Clearance Time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	302		250	300		591	2068		400	2033	
v/s Ratio Prot		0.01			0.02			c0.22			0.10	
v/s Ratio Perm	c0.11			0.05			0.01			0.04		
v/c Ratio	0.57	0.03		0.25	0.09		0.02	0.36		0.06	0.17	
Uniform Delay, d1	18.1	16.2		16.9	16.4		3.7	4.7		3.8	4.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	0.0		0.5	0.1		0.0	0.1		0.1	0.0	
Delay (s)	21.3	16.3		17.5	16.6		3.7	4.8		3.9	4.1	
Level of Service	C	B		B	B		A	A		A	A	
Approach Delay (s)		20.6			17.0			4.8			4.1	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	9.7
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

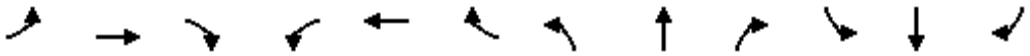
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	146	31	21	444	360	129	384	23	121	108	4
Future Volume (vph)	114	146	31	21	444	360	129	384	23	121	108	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		5.0	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	0.99		1.00	0.99	
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	1664		1695	1769		1695	1775	
Flt Permitted	0.08	1.00	1.00	0.66	1.00		0.68	1.00		0.17	1.00	
Satd. Flow (perm)	147	1784	1517	1185	1664		1222	1769		299	1775	
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)	114	146	31	21	444	360	129	384	23	121	108	4
RTOR Reduction (vph)	0	0	14	0	22	0	0	1	0	0	1	0
Lane Group Flow (vph)	114	146	17	21	782	0	129	406	0	121	111	0
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	70.6	70.6	70.6	60.6	60.6		32.4	32.4		41.4	41.4	
Effective Green, g (s)	70.6	70.6	70.6	60.6	60.6		32.4	32.4		41.4	41.4	
Actuated g/C Ratio	0.56	0.56	0.56	0.48	0.48		0.26	0.26		0.33	0.33	
Clearance Time (s)	5.0	6.5	6.5	6.5	6.5		6.7	6.7		5.0	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)	144	1005	855	573	805		316	457		143	586	
v/s Ratio Prot	c0.03	0.08			c0.47			0.23		c0.03	0.06	
v/s Ratio Perm	0.41		0.01	0.02			0.11			c0.25		
v/c Ratio	0.79	0.15	0.02	0.04	0.97		0.41	0.89		0.85	0.19	
Uniform Delay, d1	25.2	13.0	12.0	17.0	31.5		38.5	44.6		40.9	29.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.0	0.1	0.0	0.0	24.8		0.9	18.4		34.4	0.2	
Delay (s)	50.2	13.0	12.1	17.0	56.3		39.3	63.0		75.3	30.1	
Level of Service	D	B	B	B	E		D	E		E	C	
Approach Delay (s)		27.5			55.3			57.3			53.5	
Approach LOS		C			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	51.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	125.2	Sum of lost time (s)	23.2
Intersection Capacity Utilization	103.8%	ICU Level of Service	G
Analysis Period (min)	15		

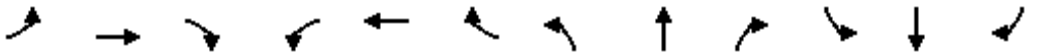
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	460	99	49	186	34	57	28	28	27	49	196
Future Volume (vph)	270	460	99	49	186	34	57	28	28	27	49	196
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98			0.97		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1695	1737		1695	1743			1682		1695	1570	
Flt Permitted	0.61	1.00		0.24	1.00			0.79		0.68	1.00	
Satd. Flow (perm)	1088	1737		434	1743			1355		1221	1570	
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)	270	460	99	49	186	34	57	28	28	27	49	196
RTOR Reduction (vph)	0	12	0	0	10	0	0	13	0	0	110	0
Lane Group Flow (vph)	270	547	0	49	210	0	0	100	0	27	135	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)	27.5	27.5		27.5	27.5			29.5		29.5	29.5	
Effective Green, g (s)	27.5	27.5		27.5	27.5			29.5		29.5	29.5	
Actuated g/C Ratio	0.41	0.41		0.41	0.41			0.44		0.44	0.44	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	446	712		178	715			596		537	691	
v/s Ratio Prot		c0.32			0.12						c0.09	
v/s Ratio Perm	0.25			0.11				0.07		0.02		
v/c Ratio	0.61	0.77		0.28	0.29			0.17		0.05	0.20	
Uniform Delay, d1	15.5	17.0		13.1	13.2			11.3		10.7	11.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	2.3	5.0		0.8	0.2			0.6		0.2	0.6	
Delay (s)	17.8	22.0		14.0	13.5			11.9		10.9	12.1	
Level of Service	B	C		B	B			B		B	B	
Approach Delay (s)		20.6			13.6			11.9			12.0	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

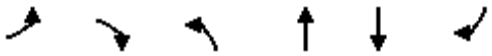
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	2	3	80	4	127	4	224	102	194	325	79
Future Volume (vph)	28	2	3	80	4	127	4	224	102	194	325	79
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2		5.1	5.1		5.9	6.2		5.9	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.97	1.00	1.00
Frt	1.00	0.91		1.00	0.85		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1695	1624		1695	1525		1695	1701		3288	1784	1517
Flt Permitted	0.67	1.00		0.75	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1201	1624		1346	1525		1695	1701		3288	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	28	2	3	80	4	127	4	224	102	194	325	79
RTOR Reduction (vph)	0	2	0	0	105	0	0	22	0	0	0	36
Lane Group Flow (vph)	28	3	0	80	26	0	4	304	0	194	325	43
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	11.8	11.8		11.9	11.9		2.4	27.7		12.0	37.3	37.3
Effective Green, g (s)	11.8	11.8		11.9	11.9		2.4	27.7		12.0	37.3	37.3
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.03	0.40		0.17	0.54	0.54
Clearance Time (s)	5.2	5.2		5.1	5.1		5.9	6.2		5.9	6.2	6.2
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)	205	278		232	263		59	684		573	967	822
v/s Ratio Prot		0.00			0.02		0.00	c0.18		c0.06	c0.18	
v/s Ratio Perm	0.02			c0.06								0.03
v/c Ratio	0.14	0.01		0.34	0.10		0.07	0.45		0.34	0.34	0.05
Uniform Delay, d1	24.2	23.6		25.0	23.9		32.1	15.0		24.9	8.8	7.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.3	0.0		0.9	0.2		0.5	2.1		0.4	0.9	0.1
Delay (s)	24.5	23.7		25.9	24.1		32.6	17.1		25.3	9.8	7.5
Level of Service	C	C		C	C		C	B		C	A	A
Approach Delay (s)		24.4			24.8			17.2			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	17.3
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



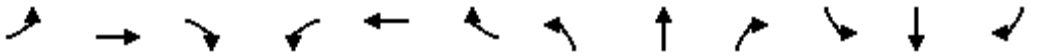
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	449	70	45	358	394	270
Future Volume (vph)	449	70	45	358	394	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2	5.5	5.5	5.5	5.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	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	0.47	1.00	1.00	1.00
Satd. Flow (perm)	1679	1517	831	1733	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	449	70	45	358	394	270
RTOR Reduction (vph)	0	45	0	0	0	149
Lane Group Flow (vph)	449	25	45	358	394	121
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)	19.5	19.5	24.6	24.6	24.6	24.6
Effective Green, g (s)	19.5	19.5	24.6	24.6	24.6	24.6
Actuated g/C Ratio	0.36	0.36	0.45	0.45	0.45	0.45
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)	597	539	373	777	800	680
v/s Ratio Prot	c0.27			0.21	c0.22	
v/s Ratio Perm		0.02	0.05			0.08
v/c Ratio	0.75	0.05	0.12	0.46	0.49	0.18
Uniform Delay, d1	15.5	11.6	8.8	10.5	10.7	9.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.3	0.0	0.7	2.0	2.2	0.6
Delay (s)	20.8	11.6	9.5	12.5	12.8	9.6
Level of Service	C	B	A	B	B	A
Approach Delay (s)	19.6			12.1	11.5	
Approach LOS	B			B	B	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	54.8	Sum of lost time (s)	10.7
Intersection Capacity Utilization	65.0%	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)	79	17	20	50	10	34	16	720	42	59	700	135
Future Volume (vph)	79	17	20	50	10	34	16	720	42	59	700	135
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.88		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1695	1640		1695	1577		1695	3362		1695	3308	
Flt Permitted	0.73	1.00		0.73	1.00		0.33	1.00		0.36	1.00	
Satd. Flow (perm)	1300	1640		1308	1577		587	3362		645	3308	
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)	79	17	20	50	10	34	16	720	42	59	700	135
RTOR Reduction (vph)	0	17	0	0	28	0	0	3	0	0	12	0
Lane Group Flow (vph)	79	20	0	50	16	0	16	759	0	59	823	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)	8.4	8.4		8.4	8.4		30.0	30.0		30.0	30.0	
Effective Green, g (s)	8.4	8.4		8.4	8.4		30.0	30.0		30.0	30.0	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.62	0.62		0.62	0.62	
Clearance Time (s)	4.6	4.6		4.6	4.6		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	227	286		228	275		366	2096		402	2063	
v/s Ratio Prot		0.01			0.01			0.23			c0.25	
v/s Ratio Perm	c0.06			0.04			0.03			0.09		
v/c Ratio	0.35	0.07		0.22	0.06		0.04	0.36		0.15	0.40	
Uniform Delay, d1	17.4	16.6		17.0	16.6		3.5	4.4		3.7	4.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.1		0.5	0.1		0.0	0.1		0.2	0.1	
Delay (s)	18.4	16.7		17.5	16.6		3.6	4.5		3.9	4.7	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		17.8			17.1			4.5			4.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	48.1	Sum of lost time (s)	9.7
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

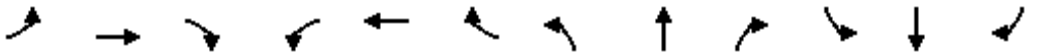
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	505	154	23	266	216	29	169	31	390	392	12
Future Volume (vph)	176	505	154	23	266	216	29	169	31	390	392	12
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	0.98		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	1664		1695	1743		1695	1776	
Flt Permitted	0.18	1.00	1.00	0.48	1.00		0.39	1.00		0.62	1.00	
Satd. Flow (perm)	312	1784	1517	853	1664		694	1743		1113	1776	
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)	176	505	154	23	266	216	29	169	31	390	392	12
RTOR Reduction (vph)	0	0	74	0	27	0	0	7	0	0	1	0
Lane Group Flow (vph)	176	505	80	23	455	0	29	193	0	390	403	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)	44.6	44.6	44.6	30.4	30.4		38.8	38.8		38.8	38.8	
Effective Green, g (s)	44.6	44.6	44.6	30.4	30.4		38.8	38.8		38.8	38.8	
Actuated g/C Ratio	0.46	0.46	0.46	0.31	0.31		0.40	0.40		0.40	0.40	
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)	275	823	700	268	523		278	700		447	713	
v/s Ratio Prot	0.06	c0.28			c0.27			0.11			0.23	
v/s Ratio Perm	0.23		0.05	0.03			0.04			c0.35		
v/c Ratio	0.64	0.61	0.11	0.09	0.87		0.10	0.28		0.87	0.56	
Uniform Delay, d1	19.0	19.5	14.8	23.3	31.2		18.0	19.5		26.6	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.0	1.4	0.1	0.1	14.6		0.2	0.2		16.9	1.0	
Delay (s)	24.0	20.9	14.8	23.5	45.9		18.2	19.7		43.5	23.4	
Level of Service	C	C	B	C	D		B	B		D	C	
Approach Delay (s)		20.4			44.9			19.5			33.3	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	96.6	Sum of lost time (s)	18.2
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		

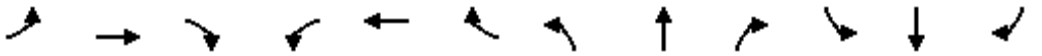
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	3	4	108	1	168	2	305	41	78	283	10
Future Volume (vph)	23	3	4	108	1	168	2	305	41	78	283	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2		5.2	5.2		6.2	6.2		6.2	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.85		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1695	1631		1695	1518		1695	1753		1695	1784	1517
Flt Permitted	0.65	1.00		0.75	1.00		0.59	1.00		0.55	1.00	1.00
Satd. Flow (perm)	1160	1631		1344	1518		1046	1753		987	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	3	4	108	1	168	2	305	41	78	283	10
RTOR Reduction (vph)	0	3	0	0	130	0	0	5	0	0	0	4
Lane Group Flow (vph)	23	4	0	108	39	0	2	341	0	78	283	6
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	11.8	11.8		11.8	11.8		29.3	29.3		29.3	29.3	29.3
Effective Green, g (s)	11.8	11.8		11.8	11.8		29.3	29.3		29.3	29.3	29.3
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.56	0.56		0.56	0.56	0.56
Clearance Time (s)	5.2	5.2		5.2	5.2		6.2	6.2		6.2	6.2	6.2
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)	260	366		302	341		583	978		550	995	846
v/s Ratio Prot		0.00			0.03			c0.19			0.16	
v/s Ratio Perm	0.02			c0.08			0.00			0.08		0.00
v/c Ratio	0.09	0.01		0.36	0.11		0.00	0.35		0.14	0.28	0.01
Uniform Delay, d1	16.1	15.8		17.2	16.2		5.1	6.4		5.6	6.1	5.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		0.7	0.1		0.0	1.0		0.5	0.7	0.0
Delay (s)	16.2	15.8		17.9	16.3		5.1	7.3		6.1	6.8	5.2
Level of Service	B	B		B	B		A	A		A	A	A
Approach Delay (s)		16.1			16.9			7.3			6.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	52.5	Sum of lost time (s)	11.4
Intersection Capacity Utilization	69.4%	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)	28	2	3	80	4	127	4	224	102	194	325	79
Future Volume (vph)	28	2	3	80	4	127	4	224	102	194	325	79
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.2	5.2		5.1	5.1		6.2	6.2		6.2	6.2	6.2
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.85		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1695	1624		1695	1525		1695	1701		1695	1784	1517
Flt Permitted	0.67	1.00		0.75	1.00		0.56	1.00		0.56	1.00	1.00
Satd. Flow (perm)	1201	1624		1346	1525		1006	1701		1005	1784	1517
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	28	2	3	80	4	127	4	224	102	194	325	79
RTOR Reduction (vph)	0	2	0	0	94	0	0	21	0	0	0	40
Lane Group Flow (vph)	28	3	0	80	37	0	4	305	0	194	325	39
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	11.7	11.7		11.8	11.8		22.8	22.8		22.8	22.8	22.8
Effective Green, g (s)	11.7	11.7		11.8	11.8		22.8	22.8		22.8	22.8	22.8
Actuated g/C Ratio	0.25	0.25		0.26	0.26		0.50	0.50		0.50	0.50	0.50
Clearance Time (s)	5.2	5.2		5.1	5.1		6.2	6.2		6.2	6.2	6.2
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)	306	413		346	392		499	844		499	886	753
v/s Ratio Prot		0.00			0.02			0.18			0.18	
v/s Ratio Perm	0.02			c0.06			0.00			c0.19		0.03
v/c Ratio	0.09	0.01		0.23	0.09		0.01	0.36		0.39	0.37	0.05
Uniform Delay, d1	13.0	12.8		13.5	13.0		5.8	7.1		7.2	7.1	6.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		0.3	0.1		0.0	0.3		0.5	0.3	0.0
Delay (s)	13.2	12.8		13.8	13.1		5.8	7.3		7.7	7.4	6.0
Level of Service	B	B		B	B		A	A		A	A	A
Approach Delay (s)		13.1			13.4			7.3			7.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	45.9	Sum of lost time (s)	11.4
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: 2031 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	259	2.0	0.431	10.1	LOS B	3.4	26.1	0.38	0.56	55.4
18	R2	339	2.0	0.431	4.7	LOS A	3.4	26.1	0.38	0.56	57.0
Approach		598	2.0	0.431	7.1	LOS A	3.4	26.1	0.38	0.56	56.5
East: Brian Coburn											
1	L2	189	2.0	0.598	11.7	LOS B	5.1	39.6	0.70	0.68	57.1
6	T1	504	2.0	0.598	6.6	LOS A	5.1	39.6	0.70	0.68	58.4
Approach		693	2.0	0.598	8.0	LOS A	5.1	39.6	0.70	0.68	58.1
West: Brian Coburn											
2	T1	95	2.0	0.271	5.4	LOS A	1.7	12.8	0.45	0.55	60.5
12	R2	225	2.0	0.271	5.1	LOS A	1.7	12.8	0.45	0.55	55.0
Approach		320	2.0	0.271	5.2	LOS A	1.7	12.8	0.45	0.55	57.3
All Vehicles		1611	2.0	0.598	7.1	LOS A	5.1	39.6	0.53	0.61	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: 2031 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	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	0.392	12.1	LOS B	1.8	14.2	0.61	0.59	60.0
8	T1	623	2.0	0.392	5.9	LOS A	1.9	14.5	0.61	0.58	58.1
18	R2	140	2.0	0.392	5.5	LOS A	1.9	14.5	0.60	0.56	56.5
Approach		780	2.0	0.392	5.9	LOS A	1.9	14.5	0.60	0.58	57.9
East: Brian Coburn											
1	L2	75	2.0	1.408	201.0	LOS F	105.4	814.7	1.00	5.04	14.3
6	T1	503	2.0	1.408	195.1	LOS F	105.4	814.7	1.00	5.04	18.9
16	R2	468	2.0	1.408	195.0	LOS F	105.4	814.7	1.00	5.04	14.7
Approach		1046	2.0	1.408	195.5	LOS F	105.4	814.7	1.00	5.04	16.8
North: Mer Bleue											
7	L2	151	2.0	0.300	11.4	LOS B	1.5	11.5	0.58	0.68	57.0
4	T1	288	2.0	0.300	5.3	LOS A	1.5	12.0	0.57	0.60	57.7
14	R2	173	2.0	0.300	5.1	LOS A	1.5	12.0	0.57	0.54	59.2
Approach		612	2.0	0.300	6.8	LOS A	1.5	12.0	0.57	0.60	58.0
West: Brian Coburn											
5	L2	282	2.0	0.473	12.4	LOS B	2.5	19.6	0.63	0.82	58.4
2	T1	137	2.0	0.473	6.4	LOS A	2.5	19.6	0.63	0.82	58.3
12	R2	15	2.0	0.473	6.4	LOS A	2.5	19.6	0.63	0.82	56.7
Approach		434	2.0	0.473	10.3	LOS B	2.5	19.6	0.63	0.82	58.3
All Vehicles		2872	2.0	1.408	75.8	LOS E	105.4	814.7	0.75	2.24	30.1

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: 2031 Design AM - Brian Coburn / Navan

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Navan											
8	T1	773	3.0	0.691	7.7	LOS A	7.7	59.9	0.79	0.72	55.4
18	R2	15	3.0	0.691	7.4	LOS A	7.7	59.9	0.79	0.72	54.2
Approach		788	3.0	0.691	7.7	LOS A	7.7	59.9	0.79	0.72	55.3
East: Brian Coburn											
1	L2	135	3.0	1.378	189.5	LOS F	82.2	640.4	1.00	3.92	15.0
16	R2	682	3.0	1.378	185.2	LOS F	82.2	640.4	1.00	3.92	15.0
Approach		817	3.0	1.378	185.9	LOS F	82.2	640.4	1.00	3.92	15.0
North: Navan											
7	L2	208	3.0	0.411	9.6	LOS A	3.5	27.1	0.44	0.56	55.7
4	T1	314	3.0	0.411	5.7	LOS A	3.5	27.1	0.44	0.56	56.0
Approach		522	3.0	0.411	7.2	LOS A	3.5	27.1	0.44	0.56	55.9
All Vehicles		2127	3.0	1.378	76.1	LOS E	82.2	640.4	0.78	1.91	27.4

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: 2031 Design AM - 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	9	3.0	0.583	11.0	LOS B	5.2	40.7	0.60	0.50	58.3
8	T1	728	3.0	0.583	5.2	LOS A	5.2	40.7	0.60	0.50	58.1
18	R2	25	3.0	0.583	5.1	LOS A	5.2	40.7	0.60	0.50	56.4
Approach		762	3.0	0.583	5.3	LOS A	5.2	40.7	0.60	0.50	58.1
East: RoadName											
1	L2	67	3.0	0.196	12.7	LOS B	0.9	6.7	0.68	0.83	56.6
6	T1	19	3.0	0.196	6.9	LOS A	0.9	6.7	0.68	0.83	56.5
16	R2	54	3.0	0.196	6.7	LOS A	0.9	6.7	0.68	0.83	54.9
Approach		140	3.0	0.196	9.6	LOS A	0.9	6.7	0.68	0.83	55.9
North: RoadName											
7	L2	24	3.0	0.272	10.3	LOS B	1.8	14.0	0.33	0.45	59.7
4	T1	302	3.0	0.272	4.5	LOS A	1.8	14.0	0.33	0.45	59.6
14	R2	48	3.0	0.272	4.4	LOS A	1.8	14.0	0.33	0.45	57.8
Approach		374	3.0	0.272	4.9	LOS A	1.8	14.0	0.33	0.45	59.4
West: RoadName											
5	L2	133	3.0	0.150	11.4	LOS B	0.7	5.3	0.49	0.72	55.7
2	T1	8	3.0	0.150	5.6	LOS A	0.7	5.3	0.49	0.72	55.6
12	R2	16	3.0	0.150	5.5	LOS A	0.7	5.3	0.49	0.72	54.0
Approach		157	3.0	0.150	10.5	LOS B	0.7	5.3	0.49	0.72	55.5
All Vehicles		1433	3.0	0.583	6.2	LOS A	5.2	40.7	0.53	0.54	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: 2031 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	167	2.0	0.402	10.6	LOS B	2.9	22.0	0.51	0.62	55.4
18	R2	323	2.0	0.402	5.2	LOS A	2.9	22.0	0.51	0.62	57.0
Approach		490	2.0	0.402	7.0	LOS A	2.9	22.0	0.51	0.62	56.6
East: Brian Coburn											
1	L2	334	2.0	0.439	10.6	LOS B	3.2	24.8	0.50	0.62	56.9
6	T1	217	2.0	0.439	5.4	LOS A	3.2	24.8	0.50	0.62	58.3
Approach		551	2.0	0.439	8.5	LOS A	3.2	24.8	0.50	0.62	57.5
West: Brian Coburn											
2	T1	181	2.0	0.487	6.5	LOS A	3.3	25.3	0.66	0.69	59.7
12	R2	330	2.0	0.487	6.2	LOS A	3.3	25.3	0.66	0.69	53.8
Approach		511	2.0	0.487	6.3	LOS A	3.3	25.3	0.66	0.69	56.6
All Vehicles		1552	2.0	0.487	7.3	LOS A	3.3	25.3	0.56	0.64	57.0

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

MOVEMENT SUMMARY

Site: 2031 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	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	0.504	13.9	LOS B	2.4	18.2	0.74	0.80	59.2
8	T1	623	2.0	0.504	7.3	LOS A	2.5	19.5	0.74	0.75	57.3
18	R2	126	2.0	0.504	6.7	LOS A	2.5	19.5	0.73	0.71	55.7
Approach		779	2.0	0.504	7.5	LOS A	2.5	19.5	0.74	0.75	57.1
East: Brian Coburn											
1	L2	123	2.0	0.801	16.9	LOS B	6.4	49.6	0.90	1.10	54.3
6	T1	193	2.0	0.801	11.0	LOS B	6.4	49.6	0.90	1.10	57.3
16	R2	288	2.0	0.801	10.9	LOS B	6.4	49.6	0.90	1.10	53.2
Approach		604	2.0	0.801	12.2	LOS B	6.4	49.6	0.90	1.10	55.0
North: Mer Bleue											
7	L2	547	2.0	0.650	12.7	LOS B	5.6	43.0	0.77	0.85	55.1
4	T1	584	2.0	0.650	6.3	LOS A	5.7	44.4	0.76	0.70	56.9
14	R2	328	2.0	0.650	6.1	LOS A	5.7	44.4	0.76	0.66	58.3
Approach		1459	2.0	0.650	8.6	LOS A	5.7	44.4	0.76	0.75	56.6
West: Brian Coburn											
5	L2	160	2.0	0.864	19.8	LOS B	6.2	47.8	0.93	1.17	55.4
2	T1	334	2.0	0.864	13.8	LOS B	6.2	47.8	0.93	1.17	55.3
12	R2	10	2.0	0.864	13.8	LOS B	6.2	47.8	0.93	1.17	53.7
Approach		504	2.0	0.864	15.7	LOS B	6.2	47.8	0.93	1.17	55.3
All Vehicles		3346	2.0	0.864	10.1	LOS B	6.4	49.6	0.81	0.87	56.2

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

MOVEMENT SUMMARY

Site: 2031 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	467	3.0	0.813	14.6	LOS B	8.6	66.9	1.00	1.18	51.3
18	R2	87	3.0	0.813	14.3	LOS B	8.6	66.9	1.00	1.18	50.3
Approach		554	3.0	0.813	14.6	LOS B	8.6	66.9	1.00	1.18	51.2
East: Brian Coburn											
1	L2	86	3.0	0.514	12.5	LOS B	3.6	28.2	0.79	0.94	55.1
16	R2	318	3.0	0.514	8.3	LOS A	3.6	28.2	0.79	0.94	54.3
Approach		404	3.0	0.514	9.2	LOS A	3.6	28.2	0.79	0.94	54.4
North: Navan											
7	L2	658	3.0	1.106	62.8	LOS F	111.7	870.6	1.00	1.02	31.3
4	T1	879	3.0	1.106	58.9	LOS F	111.7	870.6	1.00	1.02	31.4
Approach		1537	3.0	1.106	60.6	LOS E	111.7	870.6	1.00	1.02	31.4
All Vehicles		2495	3.0	1.106	42.1	LOS D	111.7	870.6	0.97	1.04	37.1

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: 2031 Design 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	15	3.0	0.601	11.0	LOS B	5.6	43.8	0.60	0.50	58.3
8	T1	739	3.0	0.601	5.2	LOS A	5.6	43.8	0.60	0.50	58.1
18	R2	45	3.0	0.601	5.1	LOS A	5.6	43.8	0.60	0.50	56.4
Approach		799	3.0	0.601	5.3	LOS A	5.6	43.8	0.60	0.50	58.0
East: RoadName											
1	L2	52	3.0	0.135	12.5	LOS B	0.6	4.5	0.66	0.82	56.5
6	T1	10	3.0	0.135	6.7	LOS A	0.6	4.5	0.66	0.82	56.4
16	R2	36	3.0	0.135	6.5	LOS A	0.6	4.5	0.66	0.82	54.8
Approach		98	3.0	0.135	9.7	LOS A	0.6	4.5	0.66	0.82	55.9
North: RoadName											
7	L2	62	3.0	0.607	10.5	LOS B	6.9	53.4	0.48	0.45	58.9
4	T1	701	3.0	0.607	4.7	LOS A	6.9	53.4	0.48	0.45	58.8
14	R2	130	3.0	0.607	4.5	LOS A	6.9	53.4	0.48	0.45	57.0
Approach		893	3.0	0.607	5.1	LOS A	6.9	53.4	0.48	0.45	58.5
West: RoadName											
5	L2	74	3.0	0.146	12.5	LOS B	0.6	4.8	0.65	0.83	55.9
2	T1	18	3.0	0.146	6.7	LOS A	0.6	4.8	0.65	0.83	55.8
12	R2	19	3.0	0.146	6.5	LOS A	0.6	4.8	0.65	0.83	54.2
Approach		111	3.0	0.146	10.5	LOS B	0.6	4.8	0.65	0.83	55.6
All Vehicles		1901	3.0	0.607	5.7	LOS A	6.9	53.4	0.55	0.51	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: 2036 Design AM - Brian Coburn / Ascender Way

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: Ascender Way											
3	L2	60	2.0	0.095	9.2	LOS A	0.3	2.5	0.46	0.70	51.0
8	T1	3	3.0	0.095	4.2	LOS A	0.3	2.5	0.46	0.70	45.4
18	R2	18	2.0	0.095	4.4	LOS A	0.3	2.5	0.46	0.70	47.6
Approach		81	2.0	0.095	7.9	LOS A	0.3	2.5	0.46	0.70	50.0
East: Brian Coburn											
1	L2	14	2.0	0.268	10.1	LOS B	1.4	10.4	0.25	0.44	54.9
6	T1	660	2.0	0.268	4.7	LOS A	1.4	10.6	0.25	0.44	59.4
16	R2	50	3.0	0.268	4.7	LOS A	1.4	10.6	0.24	0.43	51.2
Approach		724	2.1	0.268	4.8	LOS A	1.4	10.6	0.25	0.44	58.6
North: Ascender Way											
7	L2	66	3.0	0.192	10.9	LOS B	0.6	5.0	0.56	0.79	48.8
4	T1	2	3.0	0.192	5.7	LOS A	0.6	5.0	0.56	0.79	45.2
14	R2	46	3.0	0.192	5.8	LOS A	0.6	5.0	0.56	0.79	49.3
Approach		114	3.0	0.192	8.7	LOS A	0.6	5.0	0.56	0.79	48.9
West: Brian Coburn											
5	L2	27	3.0	0.179	9.9	LOS A	0.9	6.6	0.23	0.46	53.9
2	T1	430	2.0	0.179	4.7	LOS A	0.9	6.7	0.22	0.44	58.8
12	R2	22	2.0	0.179	4.7	LOS A	0.9	6.7	0.22	0.43	53.0
Approach		479	2.1	0.179	5.0	LOS A	0.9	6.7	0.22	0.44	58.2
All Vehicles		1398	2.1	0.268	5.4	LOS A	1.4	10.6	0.28	0.48	57.1

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

MOVEMENT SUMMARY

Site: 2036 Design AM - 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	10	3.0	0.579	11.1	LOS B	5.1	40.0	0.60	0.50	58.3
8	T1	721	3.0	0.579	5.3	LOS A	5.1	40.0	0.60	0.50	58.1
18	R2	23	3.0	0.579	5.1	LOS A	5.1	40.0	0.60	0.50	56.4
Approach		754	3.0	0.579	5.3	LOS A	5.1	40.0	0.60	0.50	58.1
East: RoadName											
1	L2	63	3.0	0.184	12.7	LOS B	0.8	6.2	0.68	0.83	56.6
6	T1	18	3.0	0.184	6.9	LOS A	0.8	6.2	0.68	0.83	56.5
16	R2	51	3.0	0.184	6.7	LOS A	0.8	6.2	0.68	0.83	54.9
Approach		132	3.0	0.184	9.6	LOS A	0.8	6.2	0.68	0.83	55.9
North: RoadName											
7	L2	23	3.0	0.271	10.3	LOS B	1.8	13.9	0.32	0.44	59.8
4	T1	300	3.0	0.271	4.5	LOS A	1.8	13.9	0.32	0.44	59.7
14	R2	51	3.0	0.271	4.4	LOS A	1.8	13.9	0.32	0.44	57.9
Approach		374	3.0	0.271	4.9	LOS A	1.8	13.9	0.32	0.44	59.4
West: RoadName											
5	L2	137	3.0	0.153	11.4	LOS B	0.7	5.4	0.49	0.72	55.7
2	T1	7	3.0	0.153	5.6	LOS A	0.7	5.4	0.49	0.72	55.5
12	R2	17	3.0	0.153	5.5	LOS A	0.7	5.4	0.49	0.72	54.0
Approach		161	3.0	0.153	10.5	LOS B	0.7	5.4	0.49	0.72	55.5
All Vehicles		1421	3.0	0.579	6.2	LOS A	5.1	40.0	0.52	0.54	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: 2036 Design AM - Brian Coburn (4-lane) / 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	200	2.0	0.210	10.2	LOS B	0.9	7.3	0.30	0.63	53.8
18	R2	327	2.0	0.210	4.9	LOS A	1.0	7.3	0.30	0.55	55.1
Approach		527	2.0	0.210	6.9	LOS A	1.0	7.3	0.30	0.58	54.6
East: Brian Coburn											
1	L2	175	2.0	0.315	10.4	LOS B	1.5	11.9	0.38	0.60	54.7
6	T1	592	2.0	0.315	5.2	LOS A	1.6	12.0	0.38	0.52	58.1
Approach		767	2.0	0.315	6.4	LOS A	1.6	12.0	0.38	0.54	57.5
West: Brian Coburn											
2	T1	152	2.0	0.134	5.1	LOS A	0.6	4.3	0.31	0.48	59.1
12	R2	197	2.0	0.158	5.0	LOS A	0.7	5.3	0.31	0.53	55.6
Approach		349	2.0	0.158	5.0	LOS A	0.7	5.3	0.31	0.51	57.3
All Vehicles		1643	2.0	0.315	6.3	LOS A	1.6	12.0	0.34	0.55	56.6

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

MOVEMENT SUMMARY

Site: 2036 Design AM - Mer Bleue / Brian Coburn (4-lane)

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

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	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	32	2.0	0.404	12.4	LOS B	1.8	14.3	0.62	0.64	57.0
8	T1	618	2.0	0.404	6.1	LOS A	1.9	14.6	0.61	0.62	58.0
18	R2	143	2.0	0.404	5.7	LOS A	1.9	14.6	0.60	0.59	56.5
Approach		793	2.0	0.404	6.3	LOS A	1.9	14.6	0.61	0.61	57.7
East: Brian Coburn											
1	L2	96	2.0	0.627	14.8	LOS B	3.4	26.3	0.77	0.92	55.9
6	T1	510	2.0	0.627	8.4	LOS A	3.6	28.2	0.77	0.91	56.2
16	R2	444	2.0	0.627	7.6	LOS A	3.6	28.2	0.77	0.88	56.2
Approach		1050	2.0	0.627	8.6	LOS A	3.6	28.2	0.77	0.90	56.2
North: Mer Bleue											
7	L2	143	2.0	0.337	12.0	LOS B	1.5	11.4	0.62	0.73	57.0
4	T1	308	2.0	0.337	5.8	LOS A	1.5	11.9	0.61	0.65	57.5
14	R2	181	2.0	0.337	5.5	LOS A	1.5	11.9	0.61	0.58	56.2
Approach		632	2.0	0.337	7.1	LOS A	1.5	11.9	0.61	0.65	57.0
West: Brian Coburn											
5	L2	334	2.0	0.302	11.3	LOS B	1.3	10.2	0.54	0.76	54.1
2	T1	164	2.0	0.210	5.9	LOS A	0.8	6.3	0.53	0.56	58.3
12	R2	16	2.0	0.210	6.0	LOS A	0.8	6.3	0.53	0.56	55.8
Approach		514	2.0	0.302	9.4	LOS A	1.3	10.2	0.54	0.69	55.4
All Vehicles		2989	2.0	0.627	7.8	LOS A	3.6	28.2	0.65	0.73	56.6

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

MOVEMENT SUMMARY

Site: 2036 Design AM - Brian Coburn (4-lane) / 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	785	3.0	0.669	7.1	LOS A	5.9	46.1	0.67	0.70	55.9
18	R2	21	3.0	0.032	6.8	LOS A	0.1	0.9	0.39	0.61	56.0
Approach		806	3.0	0.669	7.1	LOS A	5.9	46.1	0.67	0.70	55.9
East: Brian Coburn											
1	L2	131	3.0	0.616	13.7	LOS B	3.6	28.0	0.81	0.99	53.6
16	R2	711	3.0	0.616	9.4	LOS A	3.7	28.9	0.81	0.98	53.5
Approach		842	3.0	0.616	10.0	LOS B	3.7	28.9	0.81	0.98	53.5
North: Navan											
7	L2	237	3.0	0.231	9.5	LOS A	1.2	9.5	0.34	0.64	54.7
4	T1	313	3.0	0.231	5.6	LOS A	1.2	9.5	0.33	0.52	57.2
Approach		550	3.0	0.231	7.3	LOS A	1.2	9.5	0.33	0.57	56.1
All Vehicles		2198	3.0	0.669	8.3	LOS A	5.9	46.1	0.64	0.78	55.0

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: 2036 Design PM - Brian Coburn / Ascender Way

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: Ascender Way											
3	L2	46	2.0	0.082	9.5	LOS A	0.3	2.1	0.49	0.73	50.9
8	T1	5	3.0	0.082	4.6	LOS A	0.3	2.1	0.49	0.73	45.4
18	R2	14	2.0	0.082	4.7	LOS A	0.3	2.1	0.49	0.73	47.5
Approach		65	2.1	0.082	8.1	LOS A	0.3	2.1	0.49	0.73	49.8
East: Brian Coburn											
1	L2	26	2.0	0.236	10.2	LOS B	1.1	8.4	0.26	0.46	54.6
6	T1	529	2.0	0.236	4.7	LOS A	1.1	8.5	0.26	0.46	59.2
16	R2	65	3.0	0.236	4.8	LOS A	1.1	8.5	0.26	0.45	51.1
Approach		620	2.1	0.236	5.0	LOS A	1.1	8.5	0.26	0.46	58.1
North: Ascender Way											
7	L2	108	3.0	0.260	10.6	LOS B	0.9	7.3	0.56	0.80	48.7
4	T1	5	3.0	0.260	5.4	LOS A	0.9	7.3	0.56	0.80	45.2
14	R2	54	3.0	0.260	5.4	LOS A	0.9	7.3	0.56	0.80	49.3
Approach		167	3.0	0.260	8.8	LOS A	0.9	7.3	0.56	0.80	48.8
West: Brian Coburn											
5	L2	62	3.0	0.235	10.2	LOS B	1.1	8.9	0.32	0.52	53.2
2	T1	488	2.0	0.235	5.0	LOS A	1.2	8.8	0.31	0.49	58.2
12	R2	43	2.0	0.235	4.9	LOS A	1.2	8.8	0.30	0.47	52.6
Approach		593	2.1	0.235	5.5	LOS A	1.2	8.9	0.31	0.49	57.2
All Vehicles		1445	2.2	0.260	5.8	LOS A	1.2	8.9	0.33	0.52	56.1

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: 2036 Design 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	0.587	11.0	LOS B	5.4	41.8	0.59	0.50	58.3
8	T1	720	3.0	0.587	5.2	LOS A	5.4	41.8	0.59	0.50	58.2
18	R2	42	3.0	0.587	5.0	LOS A	5.4	41.8	0.59	0.50	56.5
Approach		778	3.0	0.587	5.3	LOS A	5.4	41.8	0.59	0.50	58.1
East: RoadName											
1	L2	50	3.0	0.127	12.5	LOS B	0.5	4.3	0.65	0.82	56.6
6	T1	10	3.0	0.127	6.7	LOS A	0.5	4.3	0.65	0.82	56.4
16	R2	34	3.0	0.127	6.5	LOS A	0.5	4.3	0.65	0.82	54.8
Approach		94	3.0	0.127	9.7	LOS A	0.5	4.3	0.65	0.82	55.9
North: RoadName											
7	L2	59	3.0	0.607	10.5	LOS B	6.8	53.2	0.47	0.45	58.9
4	T1	700	3.0	0.607	4.7	LOS A	6.8	53.2	0.47	0.45	58.8
14	R2	135	3.0	0.607	4.5	LOS A	6.8	53.2	0.47	0.45	57.0
Approach		894	3.0	0.607	5.0	LOS A	6.8	53.2	0.47	0.45	58.5
West: RoadName											
5	L2	79	3.0	0.152	12.5	LOS B	0.6	5.0	0.65	0.83	55.9
2	T1	17	3.0	0.152	6.7	LOS A	0.6	5.0	0.65	0.83	55.8
12	R2	20	3.0	0.152	6.5	LOS A	0.6	5.0	0.65	0.83	54.2
Approach		116	3.0	0.152	10.6	LOS B	0.6	5.0	0.65	0.83	55.6
All Vehicles		1882	3.0	0.607	5.7	LOS A	6.8	53.2	0.54	0.51	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: 2036 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	124	2.0	0.193	10.6	LOS B	0.8	6.3	0.40	0.67	54.3
18	R2	308	2.0	0.193	5.3	LOS A	0.8	6.3	0.40	0.62	54.5
Approach		432	2.0	0.193	6.8	LOS A	0.8	6.3	0.40	0.63	54.4
East: Brian Coburn											
1	L2	315	2.0	0.243	10.0	LOS B	1.2	9.3	0.29	0.63	52.8
6	T1	314	2.0	0.243	4.9	LOS A	1.2	9.3	0.29	0.46	59.0
Approach		629	2.0	0.243	7.5	LOS A	1.2	9.3	0.29	0.55	56.1
West: Brian Coburn											
2	T1	286	2.0	0.255	5.6	LOS A	1.1	8.5	0.43	0.53	58.5
12	R2	281	2.0	0.255	5.4	LOS A	1.1	8.5	0.42	0.61	55.0
Approach		567	2.0	0.255	5.5	LOS A	1.1	8.5	0.43	0.57	57.0
All Vehicles		1628	2.0	0.255	6.6	LOS A	1.2	9.3	0.37	0.58	56.0

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

MOVEMENT SUMMARY

Site: 2036 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	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mer Bleue											
3	L2	57	2.0	0.523	14.3	LOS B	2.4	18.5	0.74	0.85	55.7
8	T1	621	2.0	0.523	7.6	LOS A	2.6	19.8	0.73	0.79	57.1
18	R2	139	2.0	0.523	6.9	LOS A	2.6	19.8	0.73	0.73	55.8
Approach		817	2.0	0.523	7.9	LOS A	2.6	19.8	0.73	0.78	56.8
East: Brian Coburn											
1	L2	155	2.0	0.388	13.0	LOS B	1.7	12.9	0.67	0.82	55.5
6	T1	218	2.0	0.388	6.6	LOS A	1.7	13.5	0.67	0.76	56.4
16	R2	273	2.0	0.388	6.2	LOS A	1.7	13.5	0.66	0.69	56.7
Approach		646	2.0	0.388	8.0	LOS A	1.7	13.5	0.67	0.74	56.3
North: Mer Bleue											
7	L2	518	2.0	0.696	13.7	LOS B	6.0	46.1	0.80	0.93	55.0
4	T1	652	2.0	0.696	7.1	LOS A	6.2	47.9	0.79	0.81	56.6
14	R2	345	2.0	0.696	6.9	LOS A	6.2	47.9	0.79	0.77	55.1
Approach		1515	2.0	0.696	9.3	LOS A	6.2	47.9	0.80	0.85	55.7
West: Brian Coburn											
5	L2	233	2.0	0.482	14.3	LOS B	2.1	15.9	0.79	0.96	53.1
2	T1	379	2.0	0.482	6.9	LOS A	2.2	17.3	0.76	0.69	56.5
12	R2	13	2.0	0.482	6.9	LOS A	2.2	17.3	0.76	0.67	54.3
Approach		625	2.0	0.482	9.7	LOS A	2.2	17.3	0.77	0.79	55.1
All Vehicles		3603	2.0	0.696	8.8	LOS A	6.2	47.9	0.75	0.80	56.0

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

MOVEMENT SUMMARY

Site: 2036 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	475	3.0	0.580	8.7	LOS A	3.4	26.5	0.75	0.88	55.5
18	R2	93	3.0	0.214	9.8	LOS A	0.7	5.8	0.62	0.83	53.5
Approach		568	3.0	0.580	8.9	LOS A	3.4	26.5	0.73	0.87	55.2
East: Brian Coburn											
1	L2	91	3.0	0.260	10.7	LOS B	1.2	9.0	0.57	0.79	55.4
16	R2	365	3.0	0.260	6.7	LOS A	1.2	9.1	0.56	0.75	55.2
Approach		456	3.0	0.260	7.5	LOS A	1.2	9.1	0.56	0.76	55.2
North: Navan											
7	L2	697	3.0	0.601	9.6	LOS A	5.4	42.3	0.46	0.62	54.2
4	T1	889	3.0	0.601	5.6	LOS A	5.5	43.1	0.45	0.51	56.7
Approach		1586	3.0	0.601	7.4	LOS A	5.5	43.1	0.45	0.56	55.6
All Vehicles		2610	3.0	0.601	7.7	LOS A	5.5	43.1	0.53	0.66	55.4

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.

Appendix G: Multi-Modal Level of Service Analysis Detail

Table 1: 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

Table 2: Multi-Modal Level of Service - Fern Casey Street and Axis Way-Couloir Road Double SB-LT

	Intersection Leg			
Performance Measure	West Leg - Axis Wat	East Leg - Couloir Road	North Leg - Fern Casey Street	South Leg - Fern Casey Street
Pedestrian LOS (PLOS)				
Total Travel Lanes	4	4	9	7
Median > 2.4m	No	No	No	No
Island Refuge	No	No	No	No
Left Turn Type	Permissive	Permissive	Protected	Protected
Right Turn Type	Permissive	Permissive	Permissive	Permissive
Right Turns on Red	Allowed	Allowed	Allowed	Allowed
Leading Pedestrian Interval	No	No	No	No
Corner Radius	10 to 15m	10 to 15m	10 to 15m	10 to 15m
Right Turn Channel	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)	No Right Turn Channel (-4)
Crosswalk Treatment	Standard Transverse	Standard Transverse	Standard Transverse	Standard Transverse
PETSI Points	65	65	-23	8
Intersection PLOS	C	C	F	F
Target PLOS	C	C	C	C
PETSI Points Single SB-LT, Markings. Fern Casey Island Refuge	62 (C)	47 (D)	-11 (F)	17 (F)
Bicycle LOS (BLOS)				
Bikeway Type	Mixed traffic	Mixed Traffic	Bike Lane	Mixed Traffic
Left Turn Lane Configuration of Approach	One lane crossed	One lane crossed	Double SB LT	One lane crossed
Right Turn Lane Configuration of Approach	Shared Th/RT	Shared Th/RT	Exclusive RT, Left of Bike Lane	Shared Th/RT
Length of Right Turn Lane	N/A	N/A	>50m	N/A
Turning Speed of Right Turning Vehicles	< 25	< 25	< 25	< 25
Operating Speed (km/h)	50	50	70	70
Intersection BLOS	D	D	F	F
Target BLOS	D	D	B	B
Transit LOS (TLOS)				
Delay (2029 Development + Background)	N/A	WB Approach (AM: 17s) (PM: 13s)	<10 (SB-Th, AM & PM)	<10 (NB-Th/RT, AM & PM)
Intersection TLOS	N/A	C	B	B
Target TLOS	N/A	N/A	N/A	N/A
Truck LOS (TkLOS)				
Effective Corner Radius (m)	10 to 15m	10 to 15m	10 to 15m	10 to 15m
Number of Receiving Lanes on Departing Leg	1	1	1	1
Intersection TkLOS	E	E	E	E
Target TkLOS	No Target	No Target	No Target	No Target

APPENDIX H: TDM CHECKLIST (SUBDIVISION)

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	☐ N/A
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☐ N/A
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☐ N/A
	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)*	☒ Ascender Avenue provides a north-south sidewalk and MUP connecting to Brian Coburn Boulevard and the long term Cumberland Transitway stations at Fern Casey and Mer Bleue. A Sidewalk is proposed proposed along Street No. 29 to connect with Ascender
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 weather protection through canopies, colonnades, and	☐ N/A

TDM-supportive design & infrastructure measures: *Residential developments*			Check if completed & add descriptions, explanations or plan/drawing references
		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)*	☒ Noted for detailed design
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)*	☒ Block 196 park connected with sidewalks to Ascender Avenue. Noted that St. No. 29 should connected paths to Brian Coburn Blvd.
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	☒ Sidewalks/MUP provided along Ascender Avenue
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	☒ Noted for detailed design
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 GRDD and detailed design
	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	☒ Noted for detailed design
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)	☐ N/A

		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)*	☐ N/A
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)*	☐ N/A
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)*	☐ N/A
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	☐ N/A
	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)*	☐ N/A
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multi-family residential developments	☐ N/A
	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)	☐ N/A
	3.	**TRANSIT**	
	3.1	**Customer amenities**	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	☒ Noted for detailed design
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	☒ Noted for detailed design
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	☐ N/A

		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	☐ N/A
	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)*	☐ N/A
	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	☐ N/A
	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	☐ N/A
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	☐ N/A
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)*	☐ N/A
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)*	☐ N/A
	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)	☐ N/A