3288 & 3300 Borrisokane Road, 4205, 4345 & 4375 McKenna Casey Drive

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report (Revision 1)

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1 Screening

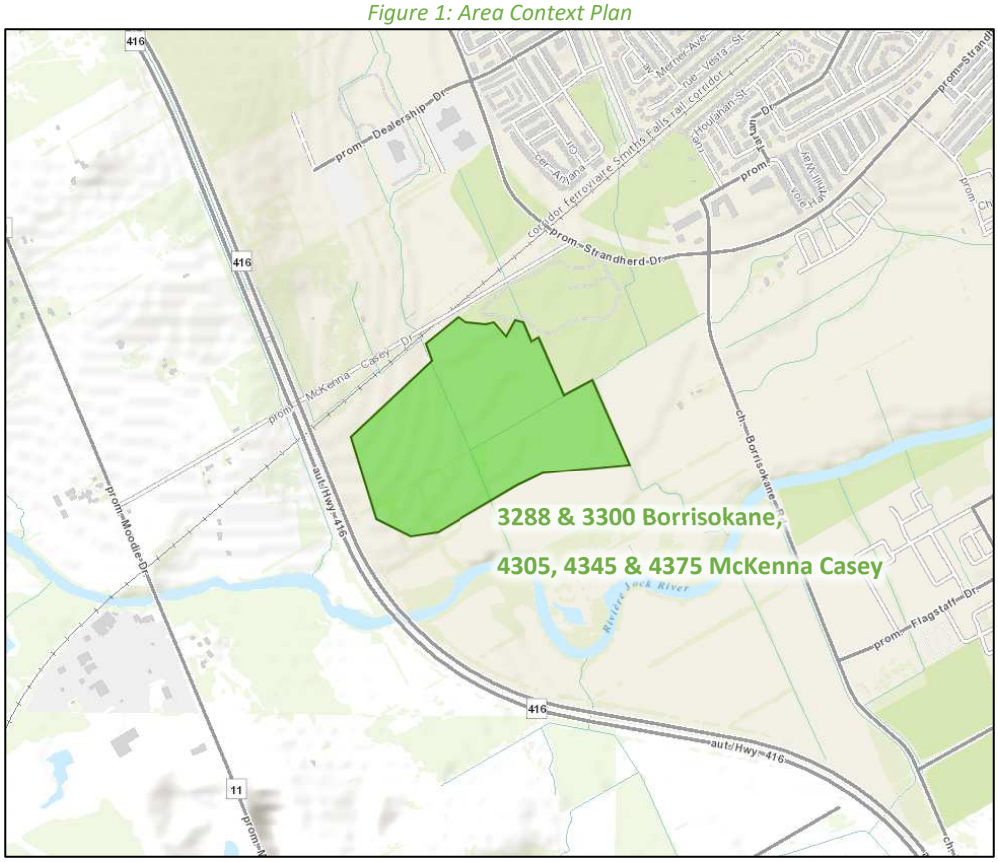
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required including the Design Review component and the Network Impact Component. This TIA will support a zoning bylaw amendment and a plan of subdivision application. The first submission was completed in October 2021 and City comments were received in the spring/summer of 2022.

2 Existing and Planned Conditions

2.1 Proposed Development

The proposed development, located at 3288 and 3300 Borrisokane Road and 4305, 4345 and 4375 McKenna Casey Drive, is zoned as Development Reserve Zone (DR). The proposed development consists of a mix of residential product types, totalling approximately 499 townhomes and 462 single detached homes. The collector roads located within the East Phase will connect the West Phase to the boundary street network on Borrisokane Road. The anticipated full build-out and occupancy horizon is 2030 with construction occurring in a single phase. The site is located within the Nepean South 10 Secondary Plan area. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 7, 2022

Figure 2: Concept Plan

2.2 Existing Conditions

2.2.1 Area Road Network

Borrisokane Road: Borrisokane Road is a City of Ottawa arterial road with a two-lane rural cross-section including gravel shoulders and an 80 km/h posted speed limit along the frontage of the site. South Cambrian Road, Borrisokane Road becomes a collector road, the cross section does not change. The City-protected right-of-way is 37.5 metres rights through the subject site.

Strandherd Drive: Strandherd Drive is a City of Ottawa arterial road with a two-lane rural cross-section including paved shoulders. The posted speed limit is 80 km/h, and the City-protected right-of-way is 44.5 metres. No sidewalks are provided along the section of Strandherd Drive within the study area.

Kennevale Drive: Kennevale Road is a City of Ottawa collector road with an urban two-lane cross-section permitting parking on both sides of the roadway. Sidewalks are provided on both sides of the road and the posted speed limit is 40 km/h. The existing right-of-way is 20.0 metres.

Dealership Way: Dealership Way is a City of Ottawa collector road with an urban two-lane cross-section permitting parking on both sides of the roadway. Sidewalks are provided on both sides of the road and the posted speed limit is 40 km/h. The existing right-of-way is 24.0 metres.

Tartan Drive: Tartan Drive is a City of Ottawa collector road with a two-lane rural cross-section including gravel shoulders and a 40 km/h posted speed limit, near Strandherd Drive. The existing right-of-way is 26.0 metres.

McKenna Casey Drive: McKenna Casey Drive is a City of Ottawa local road with a two-lane rural cross-section including gravel shoulders. The posted speed limit changed from 60 km/h to 80 km/h at approximately 70 metres west of the Strandherd Drive at McKenna Casey Drive intersection. The existing right-of-way is 20.0 metres.

2.2.2 Existing Intersections

The existing signalized area intersections within approximately one kilometre of the site have been summarized below:

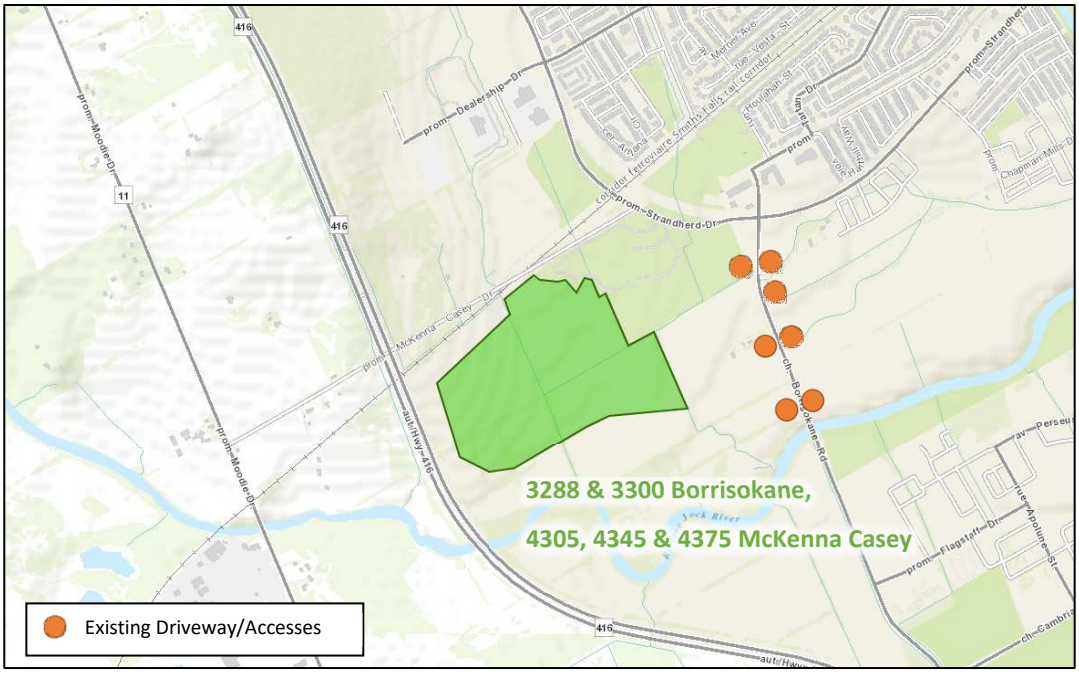
Strandherd Drive at Kennevale Drive/Dealership Way	The intersection of Strandherd Dive and Kennevale Drive/Dealership Way is a signalized intersection. The northbound, southbound, and eastbound approaches consist of an auxiliary left-turn lane, a through lane, and an auxiliary right-turn lane. The westbound approach consists of an auxiliary left-turn lane and a shared through/right-turn lane. Bike pockets are provided on the north and south bound approaches. No turn restrictions were noted.
Strandherd Drive at Borrisokane Road/Tartan Drive	The intersection of Strandherd Drive at Borrisokane Road/Tartan Drive is a signalized intersection with left-turn auxiliary lanes on all approaches. Crosswalks are present on each leg of the intersection; however, these do not connect to sidewalks. West of the intersection an at grade cycling lane is provided alongside an auxiliary right-turn lane into an adjacent development. Further east and west of the intersection paved shoulders are provided. No turn restrictions were noted.

Strandherd Drive at McKenna Casey Drive	The intersection of Strandherd Drive at *McKenna Casey Drive* is an unsignalized intersection. The eastbound approach consists of a shared through/right-turn lane, the westbound approach consists of a shared through/left-turn lane, and the northbound approaches consist of a shared left-turn/right-turn lane. No turn restrictions were noted.

2.2.3 Existing Driveways

Within 200 metres of the future collector road intersections on Borrisokane Road, construction accesses are located at the future intersection locations, field accesses to the south adjacent to the Jock River, a driveway to an existing residential property, and a construction access for the Strandherd Drive widening project. None of the driveways within the area of consideration are significant traffic generators. Figure 3 illustrates the existing driveways.

Figure 3: Existing Driveways



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 7, 2022

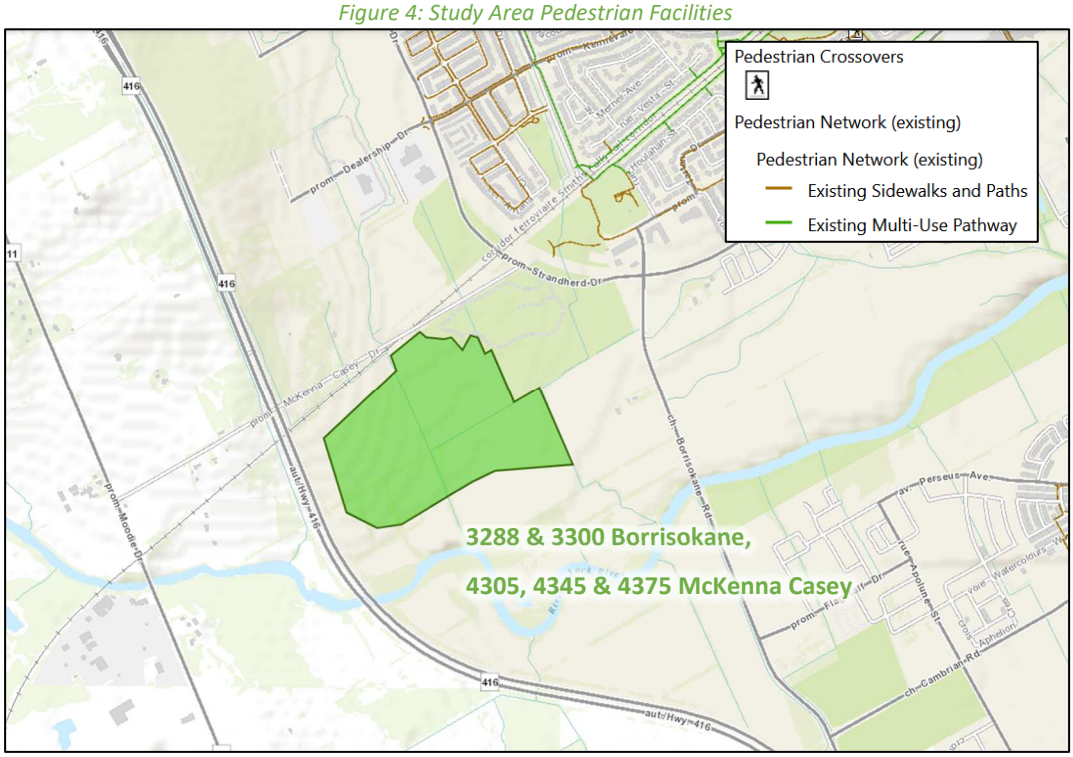
2.2.4 Cycling and Pedestrian Facilities

Figure 4 illustrates the pedestrian facilities in the study area and Figure 5 illustrates the cycling facilities.

Strandherd Drive and McKenna Casey Drive is noted on the City of Ottawa's Existing Cycling Network as a "Paved Shoulder". No pedestrian facilities are provided along either Strandherd Drive or Borrisokane Road. Both networks are developing in the area and will include sidewalks and cycling tracks along Strandherd Drive, and future pathways are planned along the Jock River and Chapman Mills BRT corridor.

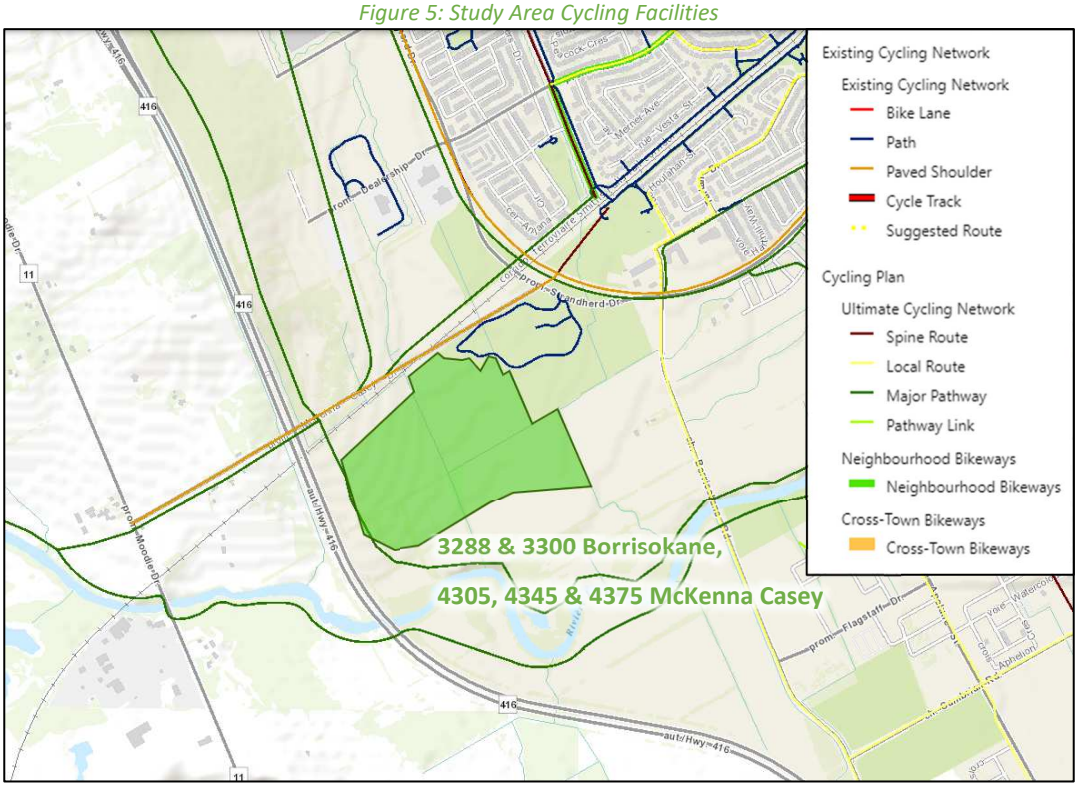
Strandherd Drive is spine route, and Borrisokane Road and McKenna Casey Drive are local routes. Major pathways are provided along rail, Strandherd Drive, Jock River and Highway 416.

Figure 4: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 7, 2022

Figure 5: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 7, 2022

Pedestrian and cyclist volumes included in study area intersection counts, presented in Section 2.2.7, have been compiled and are illustrated in Figure 6 and Figure 7, respectively. Only the intersections of Kennevale at Strandherd, and Borrisokane at Strandherd had pedestrian and cyclist volumes available.

Figure 6: Existing Pedestrian Volumes

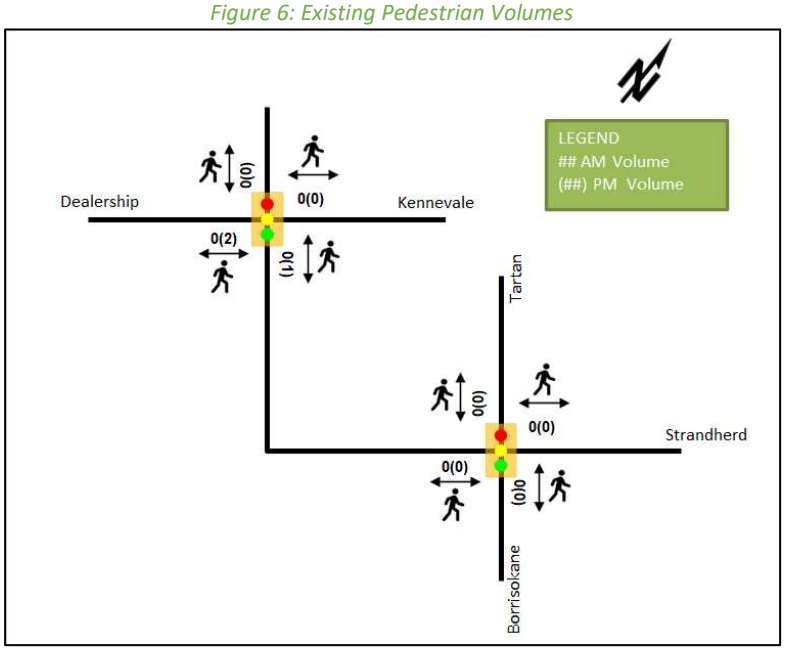
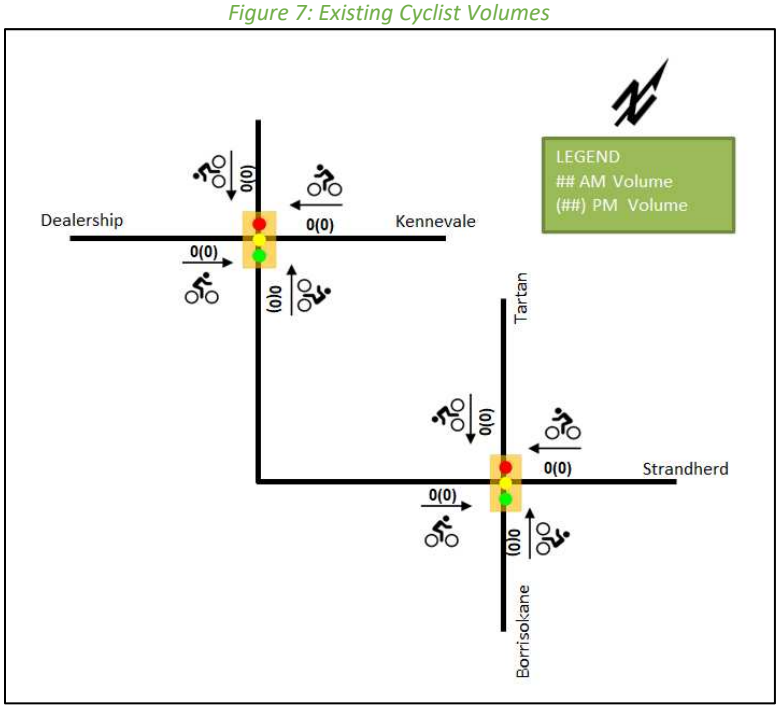


Figure 7: Existing Cyclist Volumes



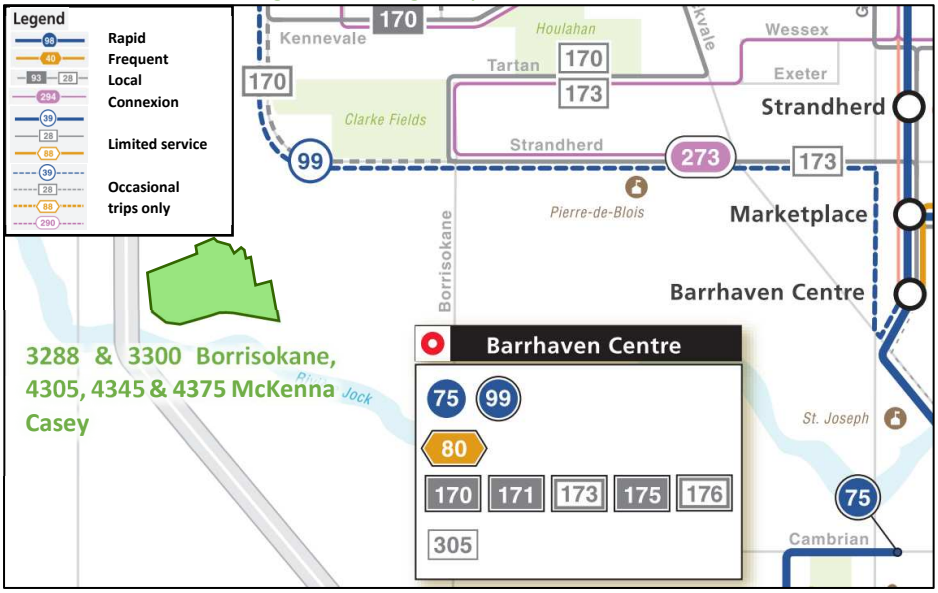
2.2.5 Existing Transit

Figure 8 illustrates the transit system map in the study area and Figure 9 illustrates nearby transit stops. All transit information is from November 7, 2022 and is included for general information purposes and context to the surrounding area.

Within the study area, the routes #170, 173 and 273 provide service within 800 metres of the proposed site. Primary stops are located on Tartan Dive north of Strandherd Drive. The frequency of these routes within proximity of the proposed site based on November 7, 2022 service levels are:

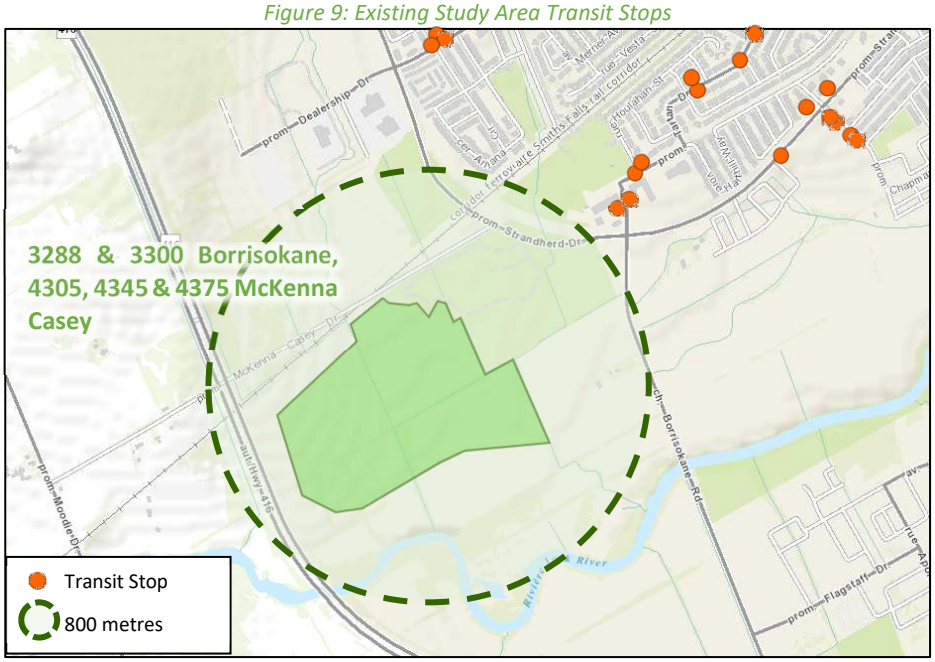
- Route #170 – 30-minute service during evenings and weekdays
- Route #173 – 1-hour service during the day (assumed reduced service from typical 30-minute service during peak hour)
- Route #273 – Peak hour service only, with trips starting at 6:00 to 8:35 AM every 20-30 minutes to downtown, returned 3:30 to 6:25 PM to Strandherd Drive and Jockvale Road

Figure 8: Existing Study Area Transit Service



Source: http://www.octranspo.com/ Accessed: November 7, 2022

Figure 9: Existing Study Area Transit Stops



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: November 7, 2022

2.2.6 Existing Area Traffic Management Measures

There are no existing area traffic management measures within the Study Area.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing Study Area intersection. The intersections were also balanced, and the adjacent developments completed, such as Minto Harmony and Caivan Conservancy Phase 1, have been included to account for additional volumes along Strandherd Drive. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date
Kennevale Drive at Strandherd Drive	January 18, 2018
Borrisokane Road at Strandherd Drive	January 18, 2018

Figure 10 illustrates the existing traffic counts and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on volume to capacity ratio (v/c) calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.

Figure 10: Existing Traffic Counts

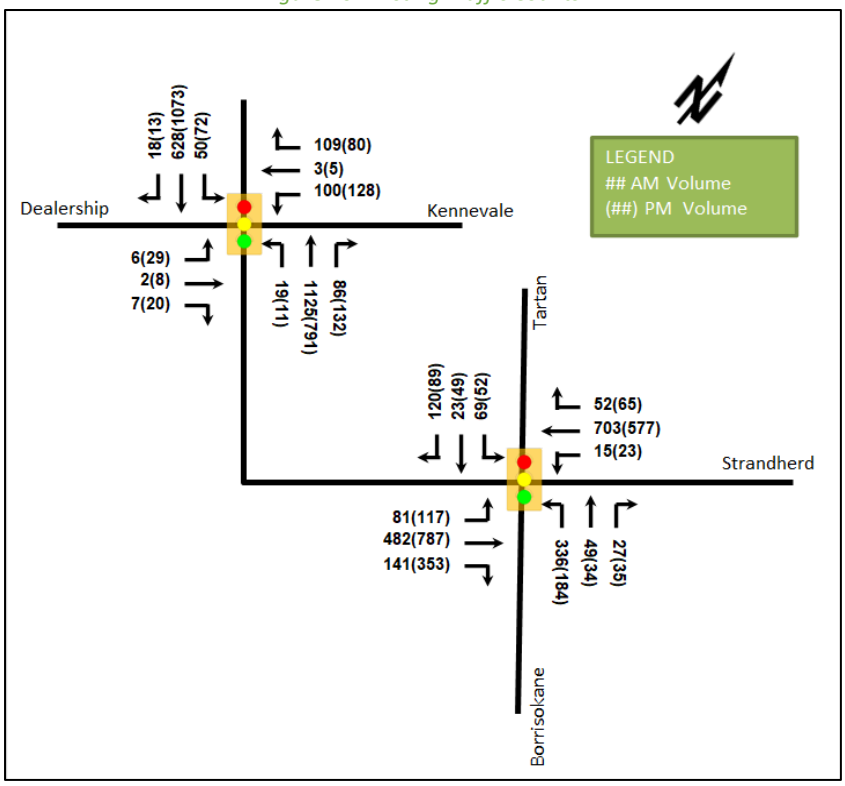


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Dealership Way/Kennevale Drive *Signalized*	EBL	A	0.06	43.5	5.5	A	0.17	42.9	14.6
	EBT	A	0.01	41.5	2.7	A	0.03	39.0	6.0
	EBR	A	0.03	0.1	0.0	A	0.07	0.5	0.0
	WBL	B	0.66	66.8	41.2	C	0.74	70.0	50.3
	WBT/R	A	0.42	12.7	16.4	A	0.32	12.3	14.7
	NBL	A	0.05	10.1	5.8	A	0.11	15.1	5.1
	NBT	**F**	**1.10**	**80.9**	**#447.0**	D	0.82	26.9	**#275.3**
	NBR	A	0.10	2.7	7.5	A	0.16	4.8	14.5
	SBL	A	0.41	20.6	13.8	A	0.29	8.2	11.1
	SBT	A	0.57	9.1	108.2	E	0.96	33.6	**#377.2**
	SBR	A	0.02	0.9	1.3	A	0.01	0.5	0.7
	Overall	**F**	**1.03**	**49.5**	-	**E**	**0.98**	**29.8**	-
Strandherd Drive & Borrisokane Road/Tartan Drive *Signalized*	EBL	E	0.92	**99.9**	**#46.0**	A	0.47	18.8	34.3
	EBT	B	0.63	20.8	102.4	D	0.85	25.9	**#230.3**
	EBR	A	0.20	2.8	9.0	A	0.38	2.4	12.8
	WBL	A	0.06	12.6	4.9	A	0.15	12.6	7.5
	WBT/R	E	0.97	47.3	**#228.5**	C	0.71	18.4	**#154.0**
	NBL	E	0.96	69.3	**#120.8**	C	0.77	47.7	52.2
	NBT/R	A	0.14	15.1	16.3	A	0.19	14.4	13.9
	SBL	A	0.18	22.8	20.0	A	0.21	25.4	16.1
	SBT/R	A	0.26	6.9	15.9	A	0.34	11.8	19.8
	Overall	**E**	**0.96**	**38.8**	-	**D**	**0.82**	**20.4**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 0.90
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, the study area intersections are subject to queuing issues generally and capacity issues on various movements.

At the intersection of Strandherd Drive & Dealership Way/Kennevale Drive, the northbound through movement during AM peak hour is over theoretical capacity and may subject to high delays and extended queues. Extended queues may be exhibited on the northbound through and southbound through movements during PM peak hour.

The intersection of Strandherd Drive & Borrisokane Road/Tartan Drive may subject to extended queues on the westbound shared through/right-turn movement, northbound shared through/right-turn movement, and both extended queues and high delay on the eastbound left-turn movement during the AM peak hour. It may also be subject to extended queues on the eastbound through movement and westbound shared through/right-turn movement during PM peak hour.

2.2.8 Collision Analysis

Collision data have been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study are road network. Table 3 summarizes the collisions types and conditions in the study area, Figure 11 illustrates the intersections and segments analyzed, and Table 4 summarizes the total collisions for each of these locations. Collision data are included in Appendix D.

Table 3: Study Area Collision Summary, 2016-2020

		Number	%
Total Collisions		**74**	100%
Classification	Fatality	0	0%
	Non-Fatal Injury	16	22%
	Property Damage Only	58	78%
Initial Impact Type	Angled	4	5%
	Rear end	37	50%
	Sideswipe	4	5%
	Turning Movement	7	9%
	SMV Other	21	28%
	Other	1	1%
Road Surface Condition	Dry	47	64%
	Wet	16	22%
	Loose Snow	4	5%
	Packed Snow	2	3%
	Ice	5	7%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

Figure 11: Study Area Collision Records – Representation of 2015-2019

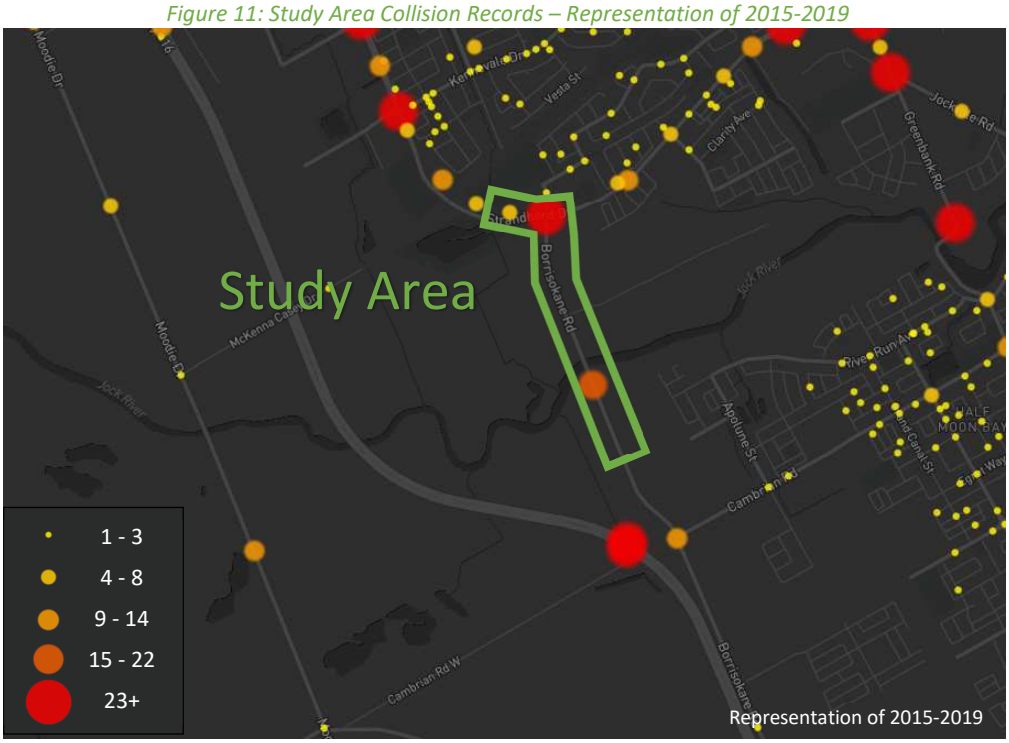


Table 4: Summary of Collision Locations, 2016-2020

	Number	%
Intersections / Segments	**74**	**100%**
Borrisokane Rd/Tartan Dr @ Strandherd Dr	47	64%
Strandherd Dr Btwn Cedarview Rd & Mckenna Casey Dr	4	5%
Borrisokane Rd Btwn Cambrian Rd & Strandherd Dr	23	31%

Within the study area, the intersection of Borrisokane Road/Tartan Drive at Strandherd Drive and Borrisokane Road Between Cambrian Road & Strandherd Drive are noted to have experienced higher collisions than other locations. Table 5 and Table 6 summarize the collision types and conditions for these locations.

Table 5: Borrisokane Road/Tartan Drive at Strandherd Drive Collision Summary

		Number	%
Total Collisions		**47**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	9	19%
	Property Damage Only	38	81%
Initial Impact Type	**Angle**	4	9%
	Rear end	31	66%
	Sideswipe	3	6%
	Turning Movement	7	15%
	SMV Other	2	4%
Road Surface Condition	**Dry**	29	62%
	Wet	13	28%
	Loose Snow	1	2%
	Packed Snow	2	4%
	Ice	2	4%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The Strandherd Drive and Borrisokane Road intersection had a total of 47 collisions during the 2016-2020 time period, with 38 involving property damage only and the remaining nine having non-fatal injuries. The collision types are most represented by rear end with 31 collisions, turning movement with seven collisions, angle with four collisions, sideswipe with three collisions, and the remaining SMV Other two collisions. The rear end collisions are typical of congested conditions. Weather conditions do not influence collisions at this location. No further collision review is required as part of this study.

Table 6: Borrisokane Road Between Cambrian Road and Strandherd Drive Collision Summary

		Number	%
Total Collisions		**23**	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	5	22%
	Property Damage Only	18	78%
Initial Impact Type	**Rear end**	3	13%
	SMV Other	19	83%
	Other	1	4%
Road Surface Condition	**Dry**	15	65%
	Wet	2	9%
	Loose Snow	3	13%
	Ice	3	13%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The segment of Borrisokane Road between Cambrian Road and Strandherd Drive had a total of 23 collisions during the 2016-2020 time period, with 18 property damage only and five non-fatal injuries. The collision types are most represented by SMV Other with 19 collisions, rear end with three collisions, and a single collision for other. The rural nature of the roadway may be the cause of these collisions, from running off the road or animal strikes. Weather conditions do not influence collisions at this location. No further collision review is required as part of this study.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

Strandherd Drive Widening (Maravista Drive to Jockvale Road)

The widening of Strandherd Drive is underway from two to four lanes is currently underway. It is anticipated that this will be completed by 2022 and include the reconstruction of the Borrisokane Road at Strandherd Drive intersection. The McKenna Casey Drive connection to Strandherd Drive will be removed and it will end to the west of the CN rail line and Gregory Casey stormwater pond.

Chapman Mills Drive Extension

While beyond the study area, the environmental assessment study was completed in 2016 for the Chapman Mills Drive Extensions and Bus Rapid Transit corridor between Strandherd Drive and Longfields Drive, with the BRT corridor continuing separately to Borrisokane Road. As part of the development in the area, Chapman Mills Drive has been completed on the north-south section from Strandherd to Canoe Street, with an interim road east to the Kennedy-Burnett Stormwater Pond. The roadway is included within the Affordable Network for 2031 and the BRT portion is anticipated to be constructed post 2031. It is understood that the design will be initiated for 2023 with construction subsequent to this in an interim configuration.

Greenbank Road Re-Alignment

While not within the study area, Greenbank Road is planned to be re-aligned from near the existing Jockvale Road intersection with a new bridge crossing to the north of the existing Jock River crossing, and loop around Mattamy's Half Moon Bay North development and connect to Cambrian Road approximately 1.1km to the west of the existing alignment. The construction for Greenbank Road has been delayed as to advance the Strandherd Drive widening, likely to beyond 2031.

Barnsdale Road Highway 416 Interchange

A new interchange at Barnsdale Road to Highway 416 is currently being planned by the City with the Ministry of Transportation Ontario to support the existing and future growth within Barrhaven, specifically south of the Jock River and adjacent to the Fallowfield Drive interchange. The interchange is anticipated to be completed post 2031.

2.3.2 Other Study Area Developments

3195 Jockvale Road

The development is proposed to be a mix of 210 stacked townhome units and approximately 200,000 sq. ft. of retail space, located between the Barrhaven Towncentre and the On The Green golf range. The development will extend Jockvale Road south of the Barrhaven Towncentre and include a new signalized intersection on Greenbank Road. It is estimated that the development will be constructed by 2026.

Harmony Phase 5 – 3232 Jockvale Road

This development is proposed to include a total of 310 apartment units and 602 townhome units and is located on the west side of Greenbank Road, north of the future Chapman Mills Drive corridor. It is estimated that the development will be constructed by 2025.

3201 Greenbank Road

Recently constructed, approximately 11,000 ft2 of retail and an 8,000 ft2 restaurant space will be incorporated into the existing retail development of the Loblaws and Home Sense.

3288 Greenbank Road

The development is proposed to be a mix of 310 apartment units and 602 townhome units, located between the future Chapman Mills Drive alignment on the north and the Claridge development (3370 Greenbank Road) to the south. It is estimated that the development will be constructed by 2025.

3370 Greenbank Road

This development is proposed to include 177 townhomes in Phase 1, 70 townhomes in Phase 2 and 720 condo units in Phase 3. Originally proposed to be completed by 2020, the plan of subdivision application is currently pending, and the Official Plan and Zoning By-Law Amendment have been adopted.

Riversbend – 3311 Greenbank Road

A residential subdivision is under construction south of St Joseph High School, in conjunction with the City of Ottawa. A total of 144 townhome units (25 within City lands), and 64 mid-rise units (City) will ultimately be constructed within the proposed lands.

Half Moon Bay South Phase 5

The Mattamy Development of Half Moon Bay South Phase 5 is located east of Re-Aligned Greenbank Road and south of Dundonald Drive and is expected to be built-out during 2020. The development will consist of 164 single detached home units and 97 townhouse units. (CGH 2019)

Half Moon Bay West

The Mattamy Development of Half Moon Bay West is located north of Cambrian Road and east of Borrisokane Road and is expected to be built-out during 2024. This development will include 552 single family homes and 464 townhomes. (Stantec 2016)

Half Moon Bay North Phase 9- 2444 Watercolours Way
North of the proposed development is the Half Moon Bay North Phase 9 development which is expected to be built-out during 2019. This development will consist of 60 stacked townhouses. (Stantec 2018)

Quinn's Pointe 2- 3882 Barnsdale and 3960 Greenbank Road
The Minto Development of Quinn's Pointe 2 is located west of Greenbank Road and north of Barnsdale Road. This development will include 536 single-family dwelling units, 493 townhomes, 100 apartment units, and two elementary schools, anticipated over 2 phases of construction for the horizon year of 2024. (Stantec 2018)

The Meadows Phase 5-6
Phase 5-6 (termed Phase 4 during the file circulation) of the Meadows Tamarack Development was expected to be built out during 2019 and is located south of Cambrian Road on the east side of Re-Aligned Greenbank Road. Phase 4 will have 136 townhouse units and 50 single family units. (IBI 2018)

The Meadows Phase 7-8
Phases 7-8 (termed Phase 5 during the file circulation) of the Meadows Tamarack Development is located south of Cambrian Road on the west side of Re-Aligned Greenbank Road. The concept plan considers a total of 221 townhouses and 125 single family units. The full build-out and occupancy of Phase 7 is now assumed to be 2023 and Phase 8 by 2025. (IBI, 2018)

3387 Borrisokane Road
North of Cambrian Road is the Glenview Development of 3387 Borrisokane Road which is expected to be built-out during 2022. The development is expected to have 179 single family units and 109 townhouses. (Stantec 2016)

Citi-Gate Development
North of the proposed development is the Citi Gate Corporate Campus. This development will include 32,516 square metres allocated towards a shopping centre, 165,600 square metres allocated towards business parks and 105,000 square metres allocated towards car dealerships. The full build-out year is 2029. (Novatech 2012)

The new phase of CitiGate has not been incorporated as it will address the issues north of Kennevale Drive to the Highway 416 interchange as part of its scope.

4401 Fallowfield Road Development
This development will not have shared accesses or traffic cross-over but will impact the Study Area intersections. The site trips generated by this site will be accounted for in the traffic projections using the 3285 Borrisokane Road TIS for Phase 1 of the Conservancy Development documenting the 4401 Fallowfield Road traffic volumes.

Harmony Development – 4025 Strandherd Drive
The Minto Communities development of 4025 Strandherd Drive has been constructed and the traffic for this site has been included within the existing conditions.

Conservancy Phase 1 – 3285 Borrisokane Road
On the south side of the Chapman Mills Drive corridor is 3285 Borrisokane Road which is expected to be built-out during 2020. This development will include 125 single family homes and 75 townhouses. (Parsons 2018)

The Ridge/Brazeau – 3809 Borrisokane Road
The proposed development includes 590 residential units, split between townhouse units and detached home units. The site is located on the west side of Re-Aligned Greenbank Road. (CGH 2019)

Drummond Subdivision – 3713 Borrisokane Road
Located west of Re-Aligned Greenbank Road is the proposed residential development of 3713 Borrisokane Road. The development will include approximately 123 detached homes and 439 townhouses and is expected to be built-out during 2024. (CGH 2020)

ABIC Manufacturing – 3713 Borrisokane Road
A light industrial parcel will be developed at 3713 Borrisokane Road along Borrisokane Road and include approximately 3,250 square metres of general office space and 9,385 square metres of industrial buildings and is expected to be built-out during 2022. (CGH 2020)

Conservancy East – 3285, 3288 & 3305 Borrisokane Road
The proposed residential development includes approximately 1,300 units. The anticipated full build-out and occupancy horizon is 2029. An update to Phase 5, on the west side of Borrisokane Road, is planned and will be accounted for in the unit counts and forecasted traffic used within this study. (CGH 2021 & 2022).

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersection will include:

- Strandherd Drive
  - Dealership Way/Kennevale Drive
  - Tartan Road/Borrisokane Road
- Borrisokane Road
  - Conservancy Way
  - New Collector

No boundary roads are located adjacent to the development. No screenlines are present near the proposed site and any screenline analysis would need extend across Barrhaven to capture each of the north/south or east-west corridors. Therefore, no screenline analysis is included within this TIA study

3.2 Time Periods

As the proposed development is composed entirely of residential units the AM and PM peak hours will be examined.

3.3 Horizon Years

The anticipated build-out year is 2030. As a result, the full build-out plus five years horizon year is 2035.

4 Exemption Review

Table 7 summarizes the exemptions for this TIA.

Table 7: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Exempt
	4.2.3 New Street Networks	Only required for plans of subdivision	Required

Module	Element	Explanation	Exempt/Required
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Exempt
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
rk Impact Component			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Required
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Required
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning	Required

5 Development-Generated Travel Demand

5.1 Mode Shares

Examining the mode shares recommended in the TRANS Trip Generation Manual (2020) for the subject district, derived from the most recent National Capital Region Origin-Destination survey (OD Survey), the existing average district mode shares by land use for South Nepean have been summarized in Table 8.

Table 8: TRANS Trip Generation Person Trip Rates – South Nepean

Travel Mode	Single Detached		Multi-Unit (Low-Rise)	
	AM	PM	AM	PM
Auto Driver	51%	53%	49%	49%
Auto Passenger	14%	19%	13%	13%
Transit	25%	18%	26%	24%
Cycling	1%	1%	2%	2%
Walking	9%	10%	9%	12%
Total	**100%**	**100%**	**100%**	**100%**

The widening of Strandherd Drive and the construction of Chapman Mills Drive are scheduled to be constructed within the Study Area by the future horizons of this TIA. The BRT lanes within Chapman Mills Drive are not included in the Affordable Network (2031) and no bus facilities are proposed along Strandherd Drive. Beyond the 2031 horizon, the Chapman Mills BRT is assumed to be in place and the terminus station located on the southwest corner of the Strandherd Drive and Borrisokane Road intersection. As transit will be located in proximity to the proposed subdivision, an increase in transit trips is proposed for the development as a whole. The modified mode share targets are proposed for the development and are summarized in Table 9.

Table 9: Proposed Development Mode Shares

Travel Mode	Single-Detached		Multi-Unit (Low-Rise)	
	AM	PM	AM	PM
Auto Driver	41%	43%	39%	39%
Auto Passenger	14%	19%	13%	13%
Transit	35%	28%	36%	34%
Cycling	1%	1%	2%	2%
Walking	9%	10%	9%	12%
Total	**100%**	**100%**	**100%**	**100%**

5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the residential dwellings using the TRANS Trip Generation Manual (2020). Table 10 summarizes the person trip rates for the proposed residential land uses for each peak period.

Table 10: Generation Person Trip Rates by Peak Period

Land Use	Land Use Code	Peak Period	Person Trip Rates
Single-Detached	210 (TRANS)	AM	2.05
		PM	2.48
Multi-Unit (Low-Rise)	220 (TRANS)	AM	1.35
		PM	1.58

Using the above person trip rates, the total person trip generation has been estimated. Table 11 summarizes the total person trip generation for the residential land uses.

Table 11: Total Residential Person Trip Generation by Peak Period

Land Use	Units	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
Single-Detached	462	284	663	947	711	435	1146
Multi-Unit (Low-Rise)	499	202	472	674	441	347	788

Using the above mode share targets for a BRT area, the person trip rates, the person trips by mode have been projected. Table 12 summarizes the trip generation by mode and peak hour using the residential peak hour adjustment factor.

Table 12: Trip Generation by Mode

Travel Mode		AM Peak Hour				PM Peak Hour			
		Mode Share	In	Out	Total	Mode Share	In	Out	Total
Single-Detached	Auto Driver	**41%**	56	131	187	**43%**	135	82	217
	Auto Passenger	**14%**	19	45	64	**19%**	59	37	96
	Transit	**35%**	54	128	182	**28%**	94	57	151
	Cycling	**1%**	2	4	6	**1%**	3	2	5
	Walking	**9%**	15	35	50	**10%**	37	23	60
	Total	**100%**	**146**	**343**	**489**	**100%**	**328**	**201**	**529**
Multi-Unit (Low-Rise)	Auto Driver	**39%**	38	88	126	**39%**	76	59	135
	Auto Passenger	**13%**	12	29	41	**13%**	25	20	45
	Transit	**36%**	40	94	134	**34%**	71	55	126
	Cycling	**2%**	2	5	7	**2%**	4	3	7
	Walking	**9%**	10	24	34	**12%**	28	22	50
	Total	**100%**	**102**	**240**	**342**	**100%**	**204**	**159**	**363**

Travel Mode		AM Peak Hour				PM Peak Hour			
		Mode Share	In	Out	Total	Mode Share	In	Out	Total
Total	Auto Driver	-	94	219	313	-	211	141	352
	Auto Passenger	-	31	74	105	-	84	57	141
	Transit	-	94	222	316	-	165	112	277
	Cycling	-	4	9	13	-	7	5	12
	Walking	-	25	59	84	-	65	45	110
	Total	-	**248**	**583**	**831**	-	**532**	**360**	**892**

As shown above, a total of 313 AM and 352 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.3 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the travel for the residential component patterns were applied based on the build-out of South Nepean. Table 13 below summarizes the distributions.

Table 13: OD Survey Distribution – South Nepean

To/From	Residential % of Trips
North	80%
South	5%
East	10%
West	5%
Total	100%

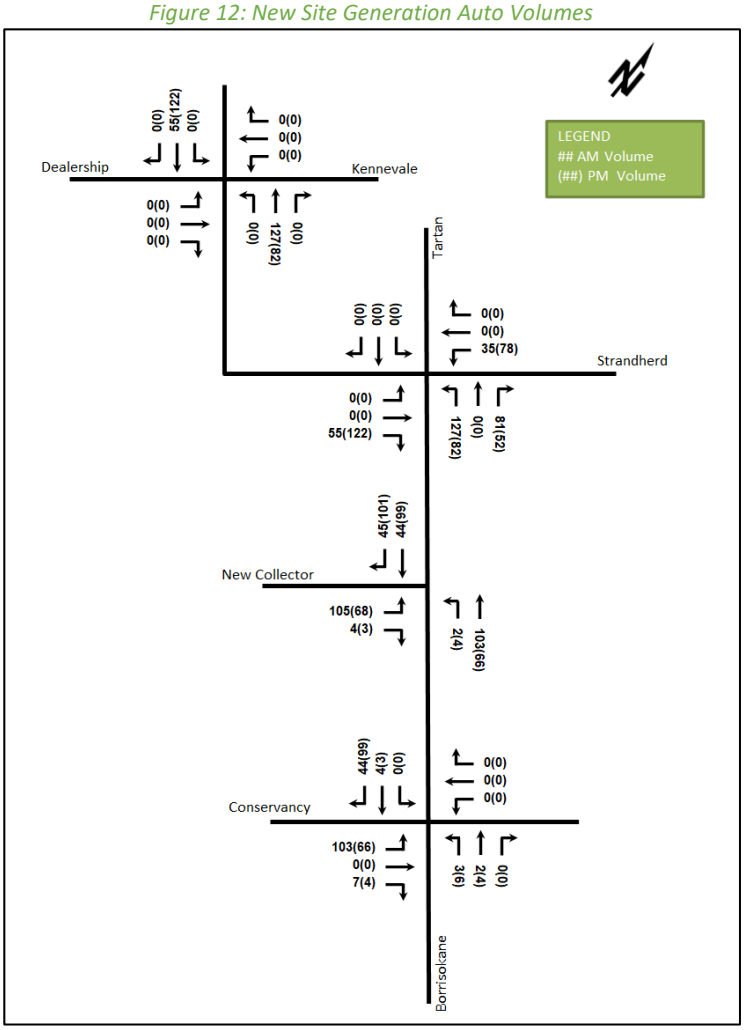
5.4 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the study area road network. Table 14 summarizes the proportional assignment to the study area roadways. Figure 12 illustrates the new site generated volumes.

Table 14: Trip Assignment

To/From	Via
North	27% Strandherd (E), 53% Strandherd (N)
South	5% Borrisokane (S)
East	10% Strandherd (E)
West	5% Strandherd (N)
Total	**100%**

Figure 12: New Site Generation Auto Volumes



6 Background Network Travel Demands

6.1 Transportation Network Plans

The study area transportation network plans were discussed in Section 2.3.1.

For the future horizons, the Strandherd Drive widening and Chapman Mills Drive extension have been assumed in all horizons and is assumed within the traffic model and background development volumes/assignment. As Re-Aligned Greenbank Road has an undetermined construction date, it has not been explicitly included in the analysis. Should it be completed, it will have minimal impact on the study area intersections as it occurs south of Chapman Mills Drive.

6.2 Background Growth

A large amount of background traffic has been accounted for through the other developments that have been documented in Section 2.3.2. This is particularly important for volumes along Borrisokane Road, where most of the developments being built or planned must travel to access Barrhaven or the Highway 416 interchange. This growth around results in over 11% annual growth along Borrisokane Road, or 320% of the existing volumes. Therefore, a nominal amount of additional background growth has been accounted for along Strandherd Drive, Borrisokane Road and Cambrian Road. To account for background growth along this corridor a 1.5%/annum

background growth rate has been applied for the primary intersection movements. The 2030 and 2035 background growth are illustrated in Figure 13 and Figure 14, respectively

Figure 13: 2030 Background Growth

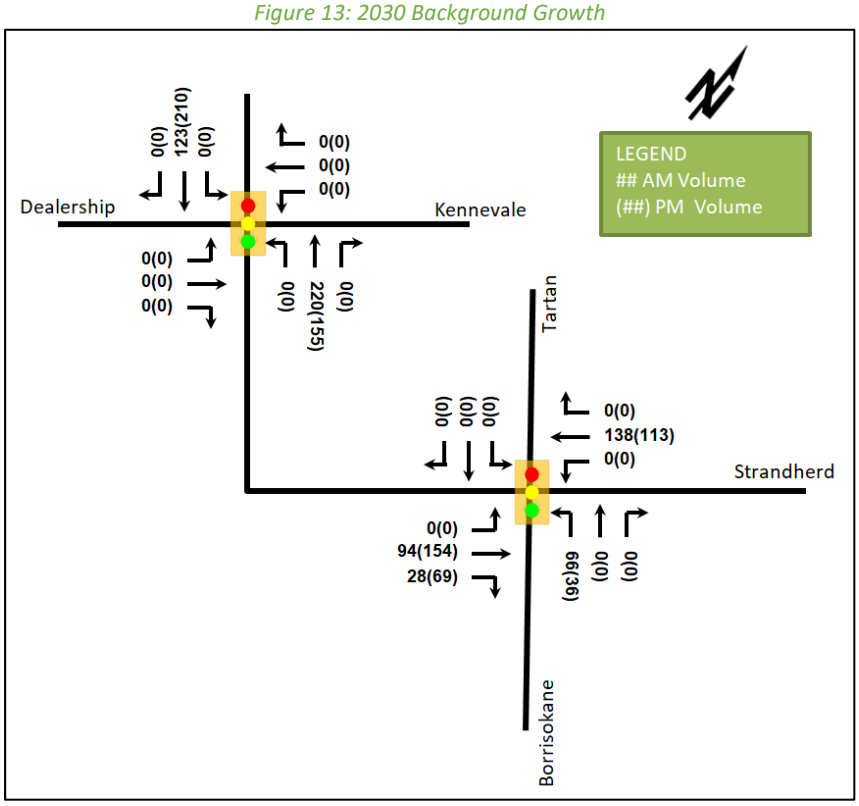
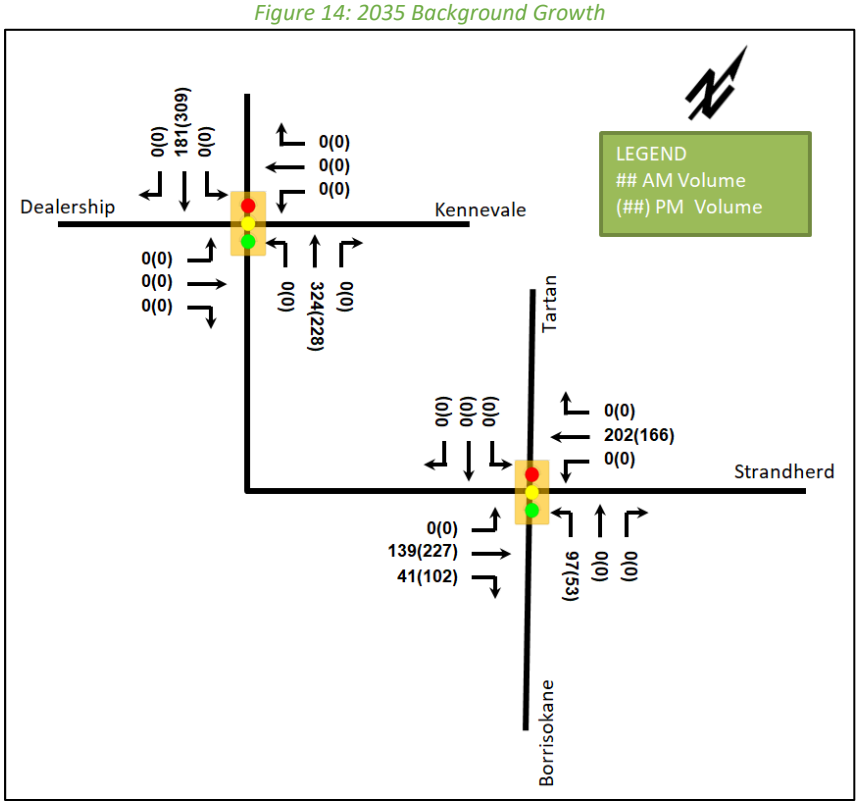


Figure 14: 2035 Background Growth



6.3 Other Developments

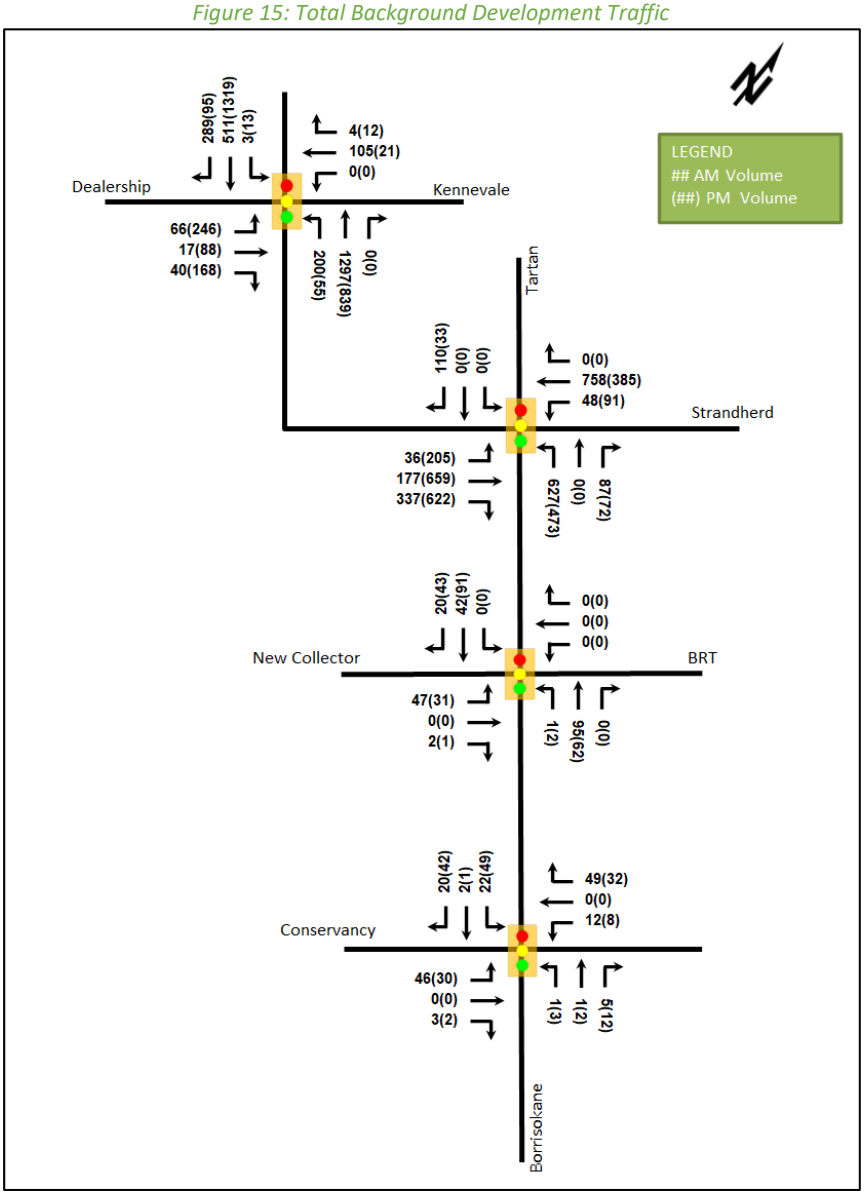
As detailed in Section 2.3.2, the following developments have been included in the background traffic forecast:

- 3195 Jockvale Road
- Harmony Phase 5 – 3232 Jockvale Road
- 3201 Greenbank Road
- 3288 Greenbank Road
- 3370 Greenbank Road
- Riversbend – 3311 Greenbank Road
- Half Moon Bay South Phase 5
- Half Moon Bay West
- Half Moon Bay North Phase 9
- Quinn's Pointe 2
- The Meadows Phase 5/6
- The Meadows Phase 7/8
- 3387 Borrisokane Road
- Citi-Gate Development
- 4401 Fallowfield Road Development
- Harmony Development – 4025 Strandherd Drive
- Conservancy Phase 1 – 3285 Borrisokane Road
- The Ridge/Brazeau – 3809 Borrisokane Road
- Drummond Subdivision – 3713 Borrisokane Road
- ABIC Manufacturing – 3713 Borrisokane Road
- Conservancy East – Phases 2-5 (per 2022 update)

A review of the TRANS Trip Generation Manual (2020) has illustrated that the prior methodologies for trip generation over estimated trips within the Ottawa context. Specifically for Barrhaven South and within Barrhaven/Nepean, these trips could be between 49% to 89% of the previously generated auto volumes. As such, an overall reduction in forecasted trips has been applied to the subject developments.

Figure 15 illustrates the total background development volumes for the study area, adjusted for the changes in the transportation network and trip generation adjustment.

Figure 15: Total Background Development Traffic



7 Demand Rationalization

7.1 2030 Future Background Operations

The study area intersections have been modified to include the following improvements previously noted in Section 2.3.1 and the new intersections along Borrisokane Road have been included as proposed in the East Phase of Conservancy. All signalized intersections optimized for new lane arrangements, as approximations of future signal coordination and sequencing.

Figure 16 illustrates the 2030 background volumes and Table 15 summarizes the 2030 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2030 future background horizon are provided in Appendix E.

Figure 16: 2030 Future Background Volumes

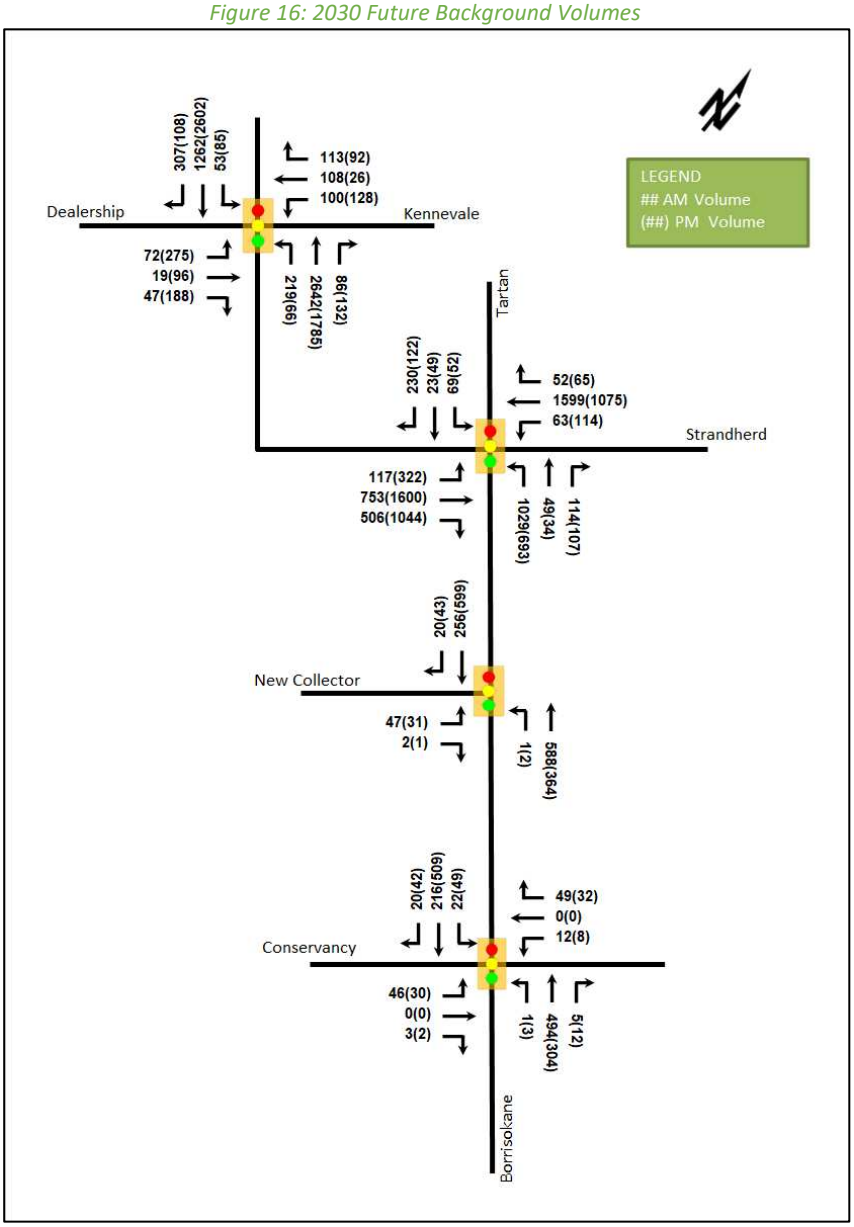


Table 15: 2030 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Dealership Way/Kennevale Drive ***Signalized***	EBL	A	0.58	60.0	28.6	D	0.90	72.9	**#101.1**
	EBT	A	0.08	35.6	9.1	A	0.21	34.0	29.9
	EBR	A	0.16	37.4	17.6	A	0.49	41.0	56.8
	WBL	A	0.39	43.8	33.2	A	0.43	40.3	41.3
	WBT/R	C	0.79	64.3	70.2	A	0.31	36.2	36.4
	NBL	B	0.66	66.9	m15.9	A	0.43	72.2	m7.4
	NBT/R	**F**	**1.47**	**230.0**	**m#255.5**	**F**	**1.22**	**120.0**	**m#248.8**
	SBL	A	0.50	69.4	**#32.4**	C	0.71	**87.3**	**#55.1**
	SBT	C	0.78	28.9	**#174.4**	**F**	**1.49**	**247.3**	**#497.9**
	SBR	A	0.42	21.5	73.9	A	0.14	16.4	23.8
	Overall	**F**	**1.28**	**142.0**	**-**	**F**	**1.31**	**166.2**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Borrisokane Road/Tartan Drive *Signalized*	EBL	E	0.95	**126.1**	**m#56.0**	**F**	**1.58**	**305.9**	**m#72.1**
	EBT	B	0.67	21.2	58.5	**F**	**1.11**	**69.4**	**m48.3**
	EBR	**F**	**1.05**	**75.6**	**#191.6**	**F**	**1.63**	**306.3**	**m#210.7**
	WBL	B	0.69	**92.5**	**#42.7**	**F**	**1.03**	**148.6**	**#67.2**
	WBT	**F**	**1.47**	**247.8**	**#310.1**	D	0.87	42.7	148.5
	WBR	A	0.11	28.2	17.4	A	0.12	24.5	19.1
	NBL	**F**	**2.06**	**509.9**	**#233.1**	**F**	**1.83**	**415.6**	**#161.4**
	NBT	A	0.10	31.9	17.7	A	0.09	38.2	14.9
	NBR	A	0.26	34.4	35.7	A	0.35	43.4	38.1
	SBL	A	0.54	68.3	30.3	B	0.67	**94.2**	**#31.7**
	SBT/R	D	0.86	72.2	**#92.0**	D	0.85	**84.5**	**#74.4**
	Overall	**F**	**1.38**	**222.8**	-	**F**	**1.59**	**171.9**	-
Borrisokane Road & Conservancy Way *Signalized*	EBL	A	0.25	34.7	13.7	A	0.16	32.5	9.9
	EBT	A	0.01	28.0	2.3	A	0.01	28.0	1.8
	WBL	A	0.06	29.6	5.3	A	0.04	29.0	4.0
	WBT	A	0.23	33.8	14.1	A	0.15	32.0	10.3
	NBL	A	0.01	40.0	1.7	A	0.03	40.7	3.2
	NBT/R	A	0.39	11.2	102.6	A	0.26	11.4	61.2
	SBL	A	0.20	44.0	10.9	A	0.37	42.4	20.4
	SBT	A	0.16	7.5	39.1	A	0.38	10.6	79.4
	SBR	A	0.02	8.8	5.9	A	0.04	11.5	11.6
	Overall	**A**	**0.44**	**13.9**	-	**A**	**0.45**	**14.1**	-
Borrisokane Road & New Collector *Signalized*	EBL	A	0.21	35.2	14.6	A	0.14	33.0	10.7
	EBR	A	0.01	30.0	2.0	A	0.00	29.0	1.3
	NBL	A	0.00	6.0	0.7	A	0.00	3.5	m0.3
	NBT	A	0.42	6.8	89.0	A	0.26	2.9	17.6
	SBT	A	0.18	4.9	32.1	A	0.42	5.8	81.5
	SBR	A	0.02	5.3	4.1	A	0.04	4.2	6.3
	Overall	**A**	**0.44**	**7.7**	-	**A**	**0.42**	**5.5**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2030 future background operations summarized above identify significant capacity constraints along Strandherd Drive. High delays and extended queueing are noted for the entire corridor, both along the mainline of Strandherd Drive and on turning movements from that side streets. The volumes illustrated in Figure 16 outline an unconstrained demand for 2-3 lanes in each direction between Borrisokane Road and Greenbank Road, and 4 lanes from Borrisokane Road to Kennevale Road. As this is not a feasible option for Strandherd Drive and accepted City arterial road policies, alternative solutions for Barrhaven will need to be examined by the City.

A number of solutions have been presented in previous TIA studies and will continue to be reviewed as part of the City's new Transportation Master Plan. No mitigation will be proposed as part of this TIA as it is beyond the scope of a specific TIA development and requires a regional solution.

7.2 2035 Future Background Operations

Figure 17 illustrates the 2035 background volumes and Table 16 summarizes the 2035 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2035 future background horizon are provided in Appendix F.

Figure 17: 2035 Future Background Volumes

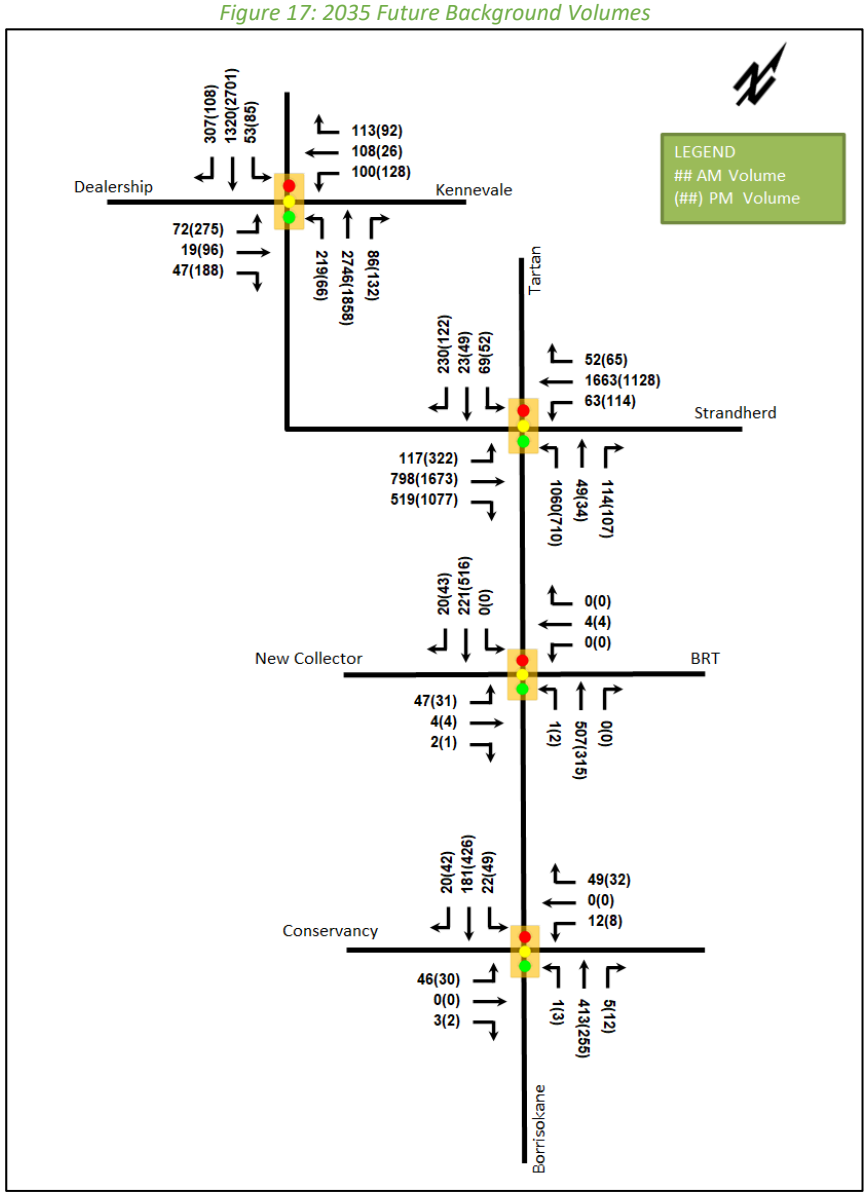


Table 16: 2035 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Dealership Way/Kennevale Drive *Signalized*	EBL	A	0.58	60.0	28.6	E	0.93	79.9	**#108.3**
	EBT	A	0.08	35.6	9.1	A	0.22	35.6	31.1
	EBR	A	0.16	37.4	17.6	A	0.51	42.9	59.0
	WBL	A	0.39	43.8	33.2	A	0.45	42.3	42.9
	WBT/R	C	0.79	64.3	70.2	A	0.32	37.8	37.9
	NBL	B	0.66	66.8	m15.5	A	0.46	74.3	m6.9
	NBT/R	**F**	**1.52**	**255.1**	**m#258.6**	**F**	**1.22**	**117.5**	**m#218.2**
	SBL	A	0.50	69.4	**#32.4**	D	0.85	**113.1**	**#55.1**
	SBT	D	0.82	30.5	**#196.3**	**F**	**1.51**	**257.6**	**#511.7**
	SBR	A	0.42	21.4	73.5	A	0.14	15.1	22.4
	Overall	**F**	**1.32**	**156.7**	**-**	**F**	**1.35**	**171.8**	**-**
Strandherd Drive & Borrisokane Road/Tartan Drive *Signalized*	EBL	E	0.95	**124.1**	**m#52.9**	**F**	**1.33**	**200.4**	**m#83.8**
	EBT	C	0.71	22.3	66.6	**F**	**1.27**	**147.3**	**m94.2**
	EBR	**F**	**1.08**	**83.6**	**m#192.1**	**F**	**1.85**	**404.9**	**m#232.0**
	WBL	B	0.69	**92.5**	**#42.7**	B	0.64	70.2	**#73.8**
	WBT	**F**	**1.53**	**273.0**	**#326.4**	E	0.97	57.1	**#179.0**
	WBR	A	0.11	28.2	17.4	A	0.12	26.3	19.9
	NBL	**F**	**2.12**	**536.9**	**#241.1**	**F**	**2.34**	**635.7**	**#175.2**
	NBT	A	0.10	31.9	17.7	A	0.09	39.1	14.5
	NBR	A	0.26	34.4	35.7	A	0.39	45.8	37.0
	SBL	A	0.54	68.3	30.3	A	0.48	67.2	24.4
	SBT/R	D	0.86	72.2	**#92.0**	C	0.72	64.5	57.2
	Overall	**F**	**1.42**	**238.5**	**-**	**F**	**1.66**	**237.2**	**-**
Borrisokane Road & Conservancy Way *Signalized*	EBL	A	0.25	34.7	13.7	A	0.16	32.5	9.9
	EBT	A	0.01	28.0	2.3	A	0.01	28.0	1.8
	WBL	A	0.06	29.6	5.3	A	0.04	29.0	4.0
	WBT	A	0.23	33.8	14.1	A	0.15	32.0	10.3
	NBL	A	0.01	40.0	1.7	A	0.03	40.3	3.2
	NBT/R	A	0.33	10.6	83.3	A	0.22	11.1	51.1
	SBL	A	0.19	43.2	12.1	A	0.37	43.4	20.6
	SBT	A	0.14	6.4	21.0	A	0.32	9.7	61.6
	SBR	A	0.02	8.2	4.4	A	0.04	11.1	10.4
	Overall	**A**	**0.38**	**13.9**	**-**	**A**	**0.39**	**14.1**	**-**
Borrisokane Road & New Collector/BRT *Signalized*	EBL	A	0.26	35.8	14.5	A	0.17	33.7	10.7
	EBT	A	0.02	29.2	2.9	A	0.02	29.5	2.9
	EBR	A	0.01	29.0	1.9	A	0.00	28.0	1.3
	WB	A	0.02	29.5	2.9	A	0.02	29.5	2.9
	NBL	A	0.00	5.0	m0.1	A	0.00	4.5	m0.4
	NBT	A	0.37	4.3	32.7	A	0.23	3.9	21.0
	SBL/T	A	0.16	4.9	27.7	A	0.37	6.4	74.0
	SBR	A	0.02	5.5	4.1	A	0.04	5.2	7.1
	Overall	**A**	**0.39**	**6.6**	**-**	**A**	**0.38**	**6.6**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The 2035 background operations are expected to be similar to the 2030 background operations at most study area intersections. The Strandherd Drive intersections at Kennevale Drive and at Borrisokane Road will continue

to have significant capacity constraints, delay, and queuing concerns for many of the movements and will see incremental decrease in operations due to the background growth.

7.3 Demand Rationalization Conclusions

Through the TIA process, the City requires transportation demand measures be considered for each development to ease the burden on the road network. These measures will be included in this development, such as transit ridership, active mode connectivity and supporting programs within the community.

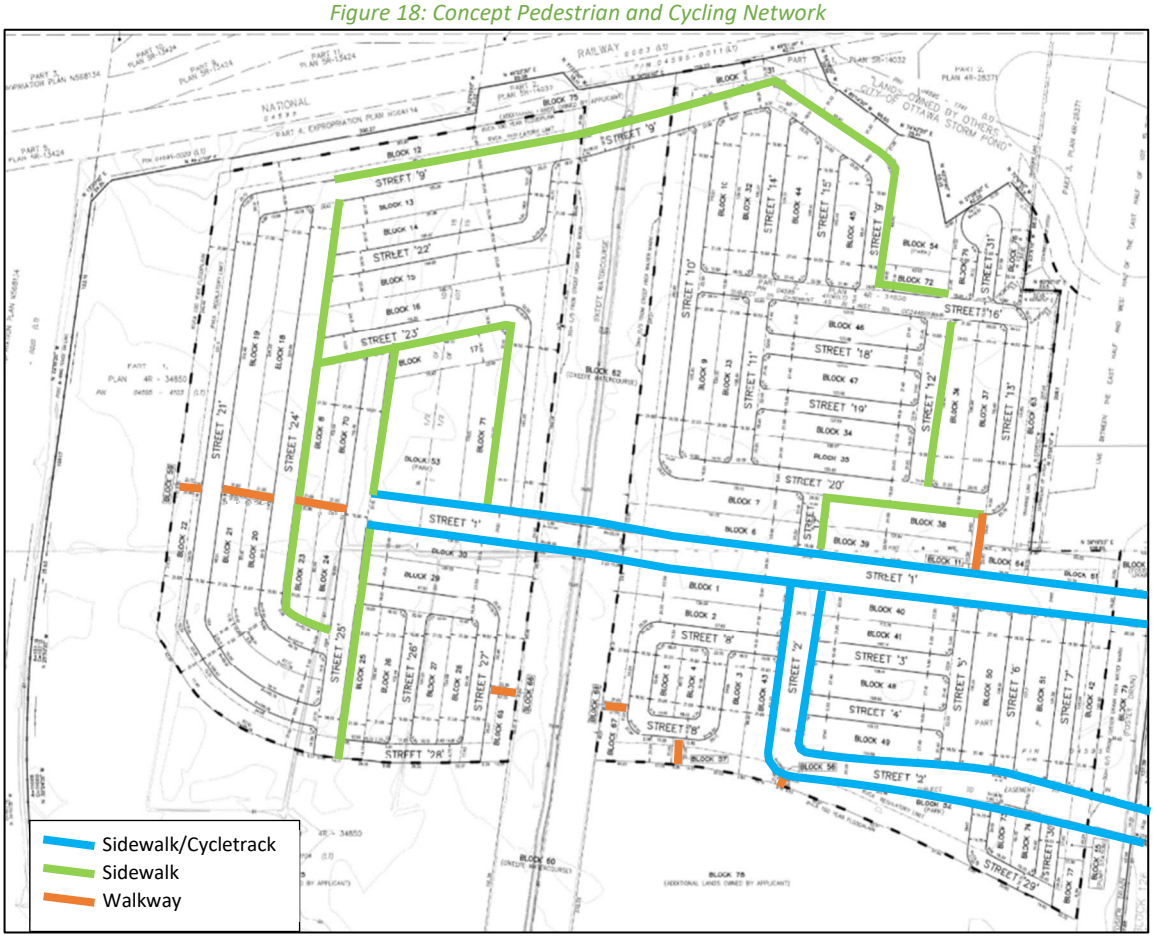
To address the systemic issues noted in the existing and background conditions, the deferral of planned infrastructure, such as the Re-Aligned Greenbank Road corridor being shifted to beyond 2031, will need to be reassessed and additional regional TDM programs or infrastructure will be needed from the City of Ottawa. The minimum needs have been highlighted above with the Chapman Mills BRT corridor, new Barnsdale Road Interchange (which the planning appears to be underway) and transit corridor to Barrhaven South.

8 Development Design

8.1 Design for Sustainable Modes

The proposed development is a residential subdivision, and the auto parking and bicycle parking will be located at each of the individual units. Figure 18 illustrates the conceptual pedestrian and cycling network. The plan incorporates the adjacent developments and planned routes on geoOttawa. Street 1 and 2 will include cycle tracks.

Figure 18: Concept Pedestrian and Cycling Network



The active mode network will also connect to Borrisokane Road and the future park and ride at the corner of Strandherd Drive and Borrisokane Road through the East Phase of Conservancy. The park and ride is approximately a 1.35km walking distance from the western limits of the subdivision, and similarly, the maximum walking distance from the western limits of the subdivision to the Street 1 at Street 2 intersection is approximately 670m if a local route stop is placed at this location. OC Transpo will need to indicate the preferred transit stop locations should local service be extended into the subdivision.

8.2 New Street Networks

The new streets proposed as part of the plan of subdivision include 14.75 window streets, 16.5 and 18.0 metre local roads and 24.0 metre collector roads. Figure 19 illustrates the conceptual traffic calming elements to be incorporated into the future geometric road design with limited applications within the internal local road intersections. Vertical measures will be explored on the future local roadways, although due to site servicing constraints, cost implications for future City maintenance of underground infrastructure and locations of street elements, such as driveways, fire hydrants, etc., the feasibility of implementation may be restricted.

Figure 19: Concept Pedestrian and Cycling Network

Within the subdivision, no turn lanes are proposed for the intersections and will be controlled by minor stop control.

Once the internal road network is finalized, including input from all disciplines involved in plan of subdivision approvals, include urban planning and parks, a geometric road design drawing will be prepared to outline the above traffic calming measures. The City should endeavour to confirm all input from the various departments is discussed holistically to reduce competing design commentary when preparing the geometric road design.

9 Boundary Street Design

No roadways are located at the boundary of the proposed subdivision. All MMLOS analysis is included in Section 15.2.3.

10 Access Intersections Design

10.1 Location and Design of Access

The residential accesses will connect via new collector roads to Borrisokane Road. The intersections along Borrisokane Road have been proposed as signalized during the East Phase TIA and this assumption has been maintained. The signalization of these intersections is based on the BRT corridor requirements at the northern intersection and need for interconnectivity of active modes across Borrisokane Road. Operational sensitivity was conducted in the East Phase TIA, noting high delays with a minor-stop control may lead to unsafe turning movements as residents attempt to exit the community.

10.2 Intersection Control

No changes in the area intersection control. Future control under construction, proposed as City DC upgrades or within adjacent development applications also remain the same.

10.3 Access Intersection Design

The subdivision will use the adjacent development to access Borrisokane Road. Section 15 includes the analysis of the network intersection operations.

Similar to Section 9, the network intersection MMLOS analysis is provided in Section 15.2.3.

11 Transportation Demand Management

11.1 Context for TDM

The mode shares used within the TIA represent this area of the City and typical mode shares for BRT areas. The modal shares are likely to be achieved.

Total bedrooms within the development are subject to the final unit count and product styles selected by purchasers. No age restrictions are noted.

11.2 Need and Opportunity

The subject site has been assumed to rely on a higher transit modal share than typically found within Nepean, requiring increase transit service and rapid adoption of transit ridership. These assumptions have been carried through the analysis. The opportunity for the City to extend transit infrastructure elsewhere within Barrhaven and Barrhaven South exists and will help encourage this modal shift to greater areas of Barrhaven than the localized targets for this development. The development can provide the internal connectivity to transit and adjacent non-auto infrastructure, although this will be underutilized until other City infrastructure is constructed to support the development potential in Barrhaven.

11.3 TDM Program

The “suite of post occupancy TDM measures” has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix G. The key TDM measures recommended include:

- Enhanced connectivity of pedestrians and cyclists to the adjacent network
- Posting of pedestrian and cycling wayfinding signage within the community

- Organize community cycling course for new residents
- Early service agreement with OC Transpo to support higher adoption of transit ridership
- Inclusion of a 6-month Presto card for first time new townhome purchase, with a set time frame for this offer (e.g., 6-months) from the initial offering of the site
- Conduct semi-annual community surveys for 2 years to collect travel pattern and behaviour data (in conjunction with City TDM coordinator)

12 Neighbourhood Traffic Management

The proposed development will connect to the arterial road network at Borrisokane Road through the collector roads proposed as part of the East Phase of Conservancy. The two collector roads were forecasted to convey between 110-120 two-way vehicle trips as part of the East Phase and an additional 300-360 vehicles trips from the West Phase. The total 410-480 vehicle trips are within the capacity range of two minor collector roads. While noted to be low, these volumes meet the threshold of 300 two-way vehicles during a peak hour outlined within the City of Ottawa TIA Guidelines. No change to the adjacent neighbourhood roadways is required to support the West Phase of Conservancy.

13 Transit

13.1 Route Capacity

In Section 5.1 the trip generation by mode was estimated, including an estimate of the number of transit trips that will be generated by the proposed development. Table 17 summarizes the transit trip generation.

Table 17: Trip Generation by Transit Mode

Travel Mode	Mode Share	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Transit	Varies	94	222	316	165	112	277

The proposed development is anticipated to generate an additional 316 AM and 277 PM peak hour two-way transit trips. From the trip distribution found in section 5.3, these values can be further broken down. Table 18 summarizes forecasted site-generated transit ridership trips by direction and the equivalent bus loads.

Table 18: Forecasted Site-Generated Transit Ridership

Direction	AM Peak Hour		PM Peak Hour		Service Type	Approximate Equivalent Peak Hour/Direction Bus Loads
	In	Out	In	Out		
North	75	178	132	90	Bus/BRT	Three to Four standard buses
South	5	11	8	5	Bus/BRT	One-fifth of a standard bus
East	9	22	17	12	Bus/BRT	One-third of a standard bus
West	5	11	8	5	Bus/BRT	One-fifth of a standard bus

13.2 Transit Priority

A transit signal will need to be incorporated into the signalized intersection of the New Collector and BRT once the BRT is extended to Borrisokane Road. The corridor improvements are currently being reviewed as part of the Conservancy East subdivision phases/draft conditions. It is anticipated that the closely spaced intersection at Conservancy Way will require balancing of the design requirements, and tie-ins with the newly upgraded intersection at Strandherd Drive.

14 Network Concept

The existing and background volumes forecasted along Strandherd Drive and accessing Strandherd Drive from the south, are exceeding the existing lane capacities and will continue to do so once the widening is completed. Extensive infrastructure projects have been planned for Barrhaven, and overall, a minimum number of these projects have been implemented and many continue to be pushed farther into the future. As identified previously, the following projects are required to support Barrhaven as a whole, and additional projects that would begin to bring the transportation network to the level of other suburban areas of Ottawa are also listed and support the growth potential of Barrhaven:

- Currently required projects:
  - Barnsdale-Highway 417 interchange (interim)
  - Chapman Mills BRT extension to Borrisokane Road
  - Re-Aligned Greenbank Road BRT Corridor, Towncentre to Kilbirnie Drive
- Barrhaven supportive projects:
  - Re-Aligned Greenbank Road, to Cambrian Road and Barnsdale Road
  - LRT extension to the Towncentre

15 Network Intersection Design

15.1 Network Intersection Control

The study area intersections are all assumed to be signalized, through the Strandherd Drive widening, extension of Chapman Mills Drive and the BRT corridor, and development related improvements along Borrisokane Road. These changes have been noted in Section 7.1.

Updated signal warrants for the Borrisokane Road intersections are provided in Appendix H. Based on the East Phase of Conservancy, signalized intersections of Borrisokane Road at Conservancy Way and Borrisokane Road at New Collector intersections have been proposed. Although both intersections do not meet signal warrant at all study horizons, both intersections are required to be signalized.

15.2 Network Intersection Design

15.2.1 2030 Future Total Network Intersection Operations

Figure 20 illustrates the 2030 future total volumes, and the 2030 future total network intersection operations are summarized below in Table 19. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix I.

Figure 20: 2030 Future Total Volumes

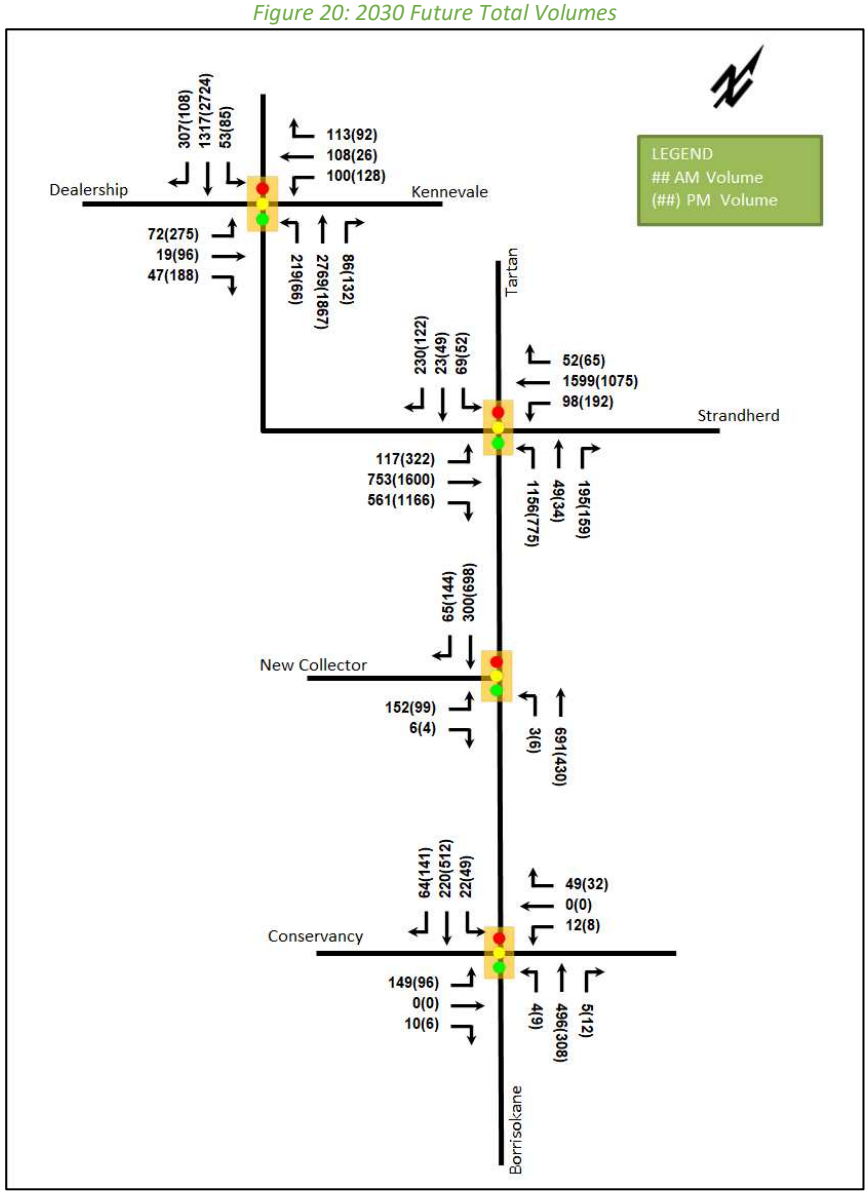


Table 19: 2030 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Dealership Way/Kennevale Drive *Signalized*	EBL	A	0.58	60.0	28.6	D	0.90	72.9	**#101.1**
	EBT	A	0.08	35.6	9.1	A	0.21	34.0	29.9
	EBR	A	0.16	37.4	17.6	A	0.49	41.0	56.8
	WBL	A	0.39	43.8	33.2	A	0.43	40.3	41.3
	WBT/R	C	0.79	64.3	70.2	A	0.31	36.2	36.4
	NBL	B	0.66	66.8	m15.4	A	0.43	72.0	m7.3
	NBT/R	**F**	**1.54**	**260.2**	**m#256.5**	**F**	**1.28**	**144.4**	**m#248.0**
	SBL	A	0.50	69.4	**#32.4**	C	0.71	**87.3**	**#55.1**
	SBT	D	0.81	30.4	**#197.1**	**F**	**1.56**	**277.9**	**#528.2**
	SBR	A	0.42	21.5	73.9	A	0.14	16.4	23.8
	Overall	**F**	**1.33**	**159.9**	**-**	**F**	**1.35**	**190.1**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Borrisokane Road/Tartan Drive *Signalized*	EBL	E	0.95	**124.2**	**m#52.8**	**F**	**1.58**	**305.9**	**m#67.6**
	EBT	B	0.69	22.1	58.1	**F**	**1.11**	**69.2**	**m41.6**
	EBR	**F**	**1.20**	**129.3**	**m#217.1**	**F**	**1.82**	**391.5**	**m#237.7**
	WBL	E	0.92	**125.0**	**#64.9**	**F**	**1.73**	**397.8**	**#113.7**
	WBT	**F**	**1.47**	**247.8**	**#310.1**	D	0.87	42.7	148.5
	WBR	A	0.11	28.2	17.4	A	0.12	24.5	19.1
	NBL	**F**	**2.31**	**620.8**	**#265.6**	**F**	**2.05**	**509.2**	**#182.8**
	NBT	A	0.10	31.9	17.7	A	0.09	38.2	14.9
	NBR	A	0.44	38.3	59.3	A	0.52	48.2	55.3
	SBL	A	0.54	68.3	30.3	B	0.67	**94.2**	**#31.7**
	SBT/R	D	0.86	72.2	**#92.0**	D	0.85	**84.5**	**#74.4**
	Overall	**F**	**1.43**	**257.7**	-	**F**	**1.74**	**216.1**	-
Borrisokane Road & Conservancy Way *Signalized*	EBL	B	0.64	44.6	36.8	A	0.47	39.7	24.7
	EBT	A	0.04	25.8	4.8	A	0.03	27.0	3.4
	WBL	A	0.05	26.2	5.3	A	0.04	27.4	4.0
	WBT	A	0.18	29.2	14.1	A	0.13	30.2	10.3
	NBL	A	0.04	40.8	3.9	A	0.09	41.9	6.1
	NBT/R	A	0.48	15.1	103.4	A	0.29	13.0	62.0
	SBL	A	0.20	44.0	10.9	A	0.37	40.5	m17.4
	SBT	A	0.20	9.8	39.8	A	0.42	12.6	85.6
	SBR	A	0.07	9.8	13.8	A	0.14	11.6	30.3
	Overall	**A**	**0.55**	**19.5**	-	**A**	**0.52**	**16.9**	-
Borrisokane Road & New Collector *Signalized*	EBL	A	0.57	42.7	38.3	A	0.41	38.7	26.2
	EBR	A	0.03	28.5	3.7	A	0.02	29.0	3.0
	NBL	A	0.00	6.7	1.3	A	0.01	5.2	m1.2
	NBT	A	0.59	11.3	115.9	A	0.32	5.5	34.1
	SBT	A	0.26	7.0	37.9	A	0.53	7.9	104.9
	SBR	A	0.07	6.2	9.6	A	0.13	4.6	16.9
	Overall	**A**	**0.59**	**14.0**	-	**A**	**0.54**	**9.1**	-

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The study area network intersections operate with similar capacity constraints, delays, and queuing as the 2030 future background conditions.

As noted in the background conditions, a commitment from the City is required to advance new infrastructure within Barrhaven and continue to look for continual mode shifting to further reduce the auto dependency currently observed.

15.2.2 2035 Future Total Network Intersection Operations

Figure 21 illustrates the 2035 future total volumes, and the 2035 future total network intersection operations are summarized below in Table 20. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets have been provided in Appendix J.

Figure 21: 2035 Future Total Volumes

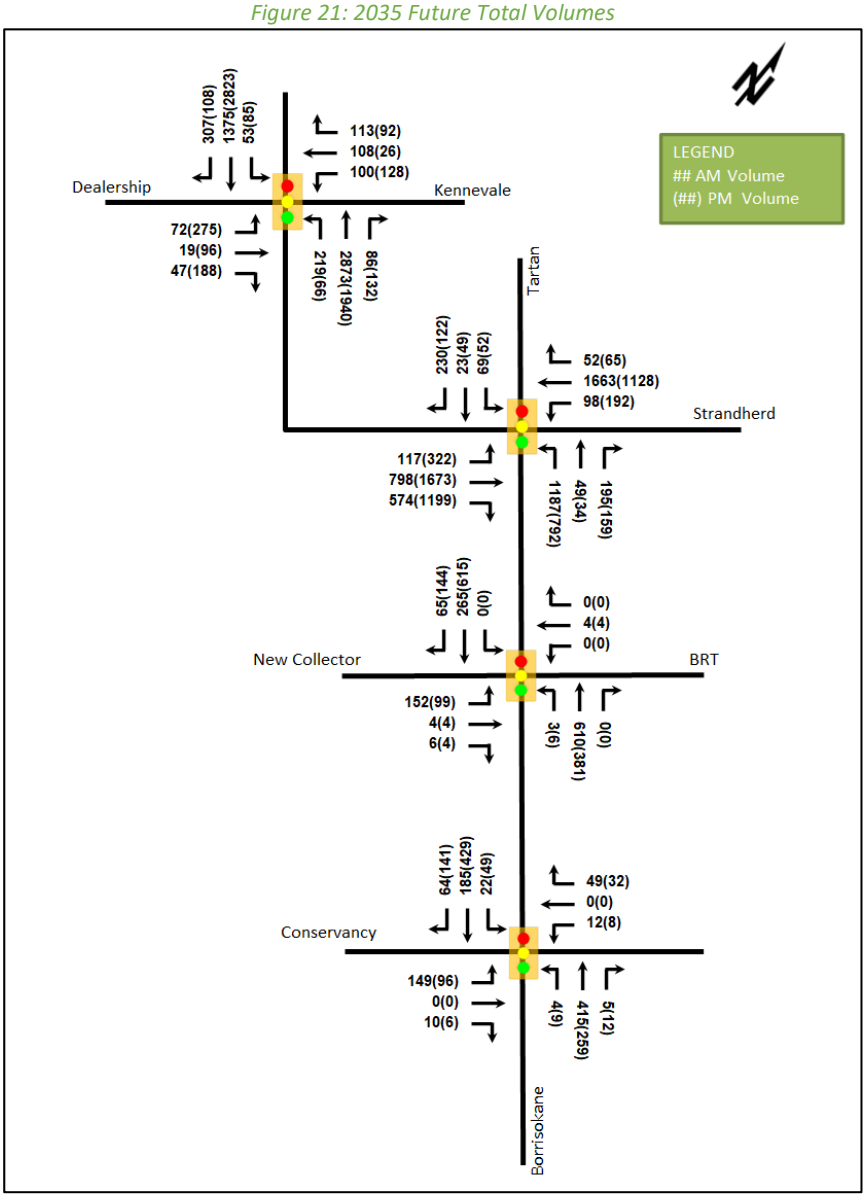


Table 20: 2035 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Dealership Way/Kennevale Drive ***Signalized***	EBL	A	0.58	60.0	28.6	E	0.93	79.9	**#108.3**
	EBT	A	0.08	35.6	9.1	A	0.22	35.6	31.1
	EBR	A	0.16	37.4	17.6	A	0.51	42.9	59.0
	WBL	A	0.39	43.8	33.2	A	0.45	42.3	42.9
	WBT/R	C	0.79	64.3	70.2	A	0.32	37.8	37.9
	NBL	B	0.66	66.7	m15.0	A	0.46	73.8	m6.7
	NBT/R	**F**	**1.59**	**284.8**	**m#259.8**	**F**	**1.27**	**140.0**	**m#218.6**
	SBL	A	0.50	69.4	**#32.4**	D	0.85	**113.1**	**#55.1**
	SBT	D	0.85	32.4	**#210.5**	**F**	**1.58**	**287.6**	**#542.2**
	SBR	A	0.42	21.4	73.5	A	0.14	15.1	22.4
	Overall	**F**	**1.37**	**174.5**	**-**	**F**	**1.39**	**194.9**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Borrisokane Road/Tartan Drive *Signalized*	EBL	E	0.95	**122.1**	**m#50.2**	**F**	**1.33**	**200.5**	**m#78.7**
	EBT	C	0.73	22.9	m64.6	**F**	**1.27**	**147.2**	**m84.5**
	EBR	**F**	**1.23**	**139.8**	**m#211.8**	**F**	**2.06**	**497.9**	**m#257.7**
	WBL	E	0.92	**125.0**	**#64.9**	**F**	**1.08**	**142.3**	**#120.2**
	WBT	**F**	**1.53**	**273.0**	**#326.4**	E	0.97	57.1	**#179.0**
	WBR	A	0.11	28.2	17.4	A	0.12	26.3	19.9
	NBL	**F**	**2.37**	**648.0**	**#273.3**	**F**	**2.61**	**754.0**	**#196.5**
	NBT	A	0.10	31.9	17.7	A	0.09	39.1	14.5
	NBR	A	0.44	38.3	59.3	A	0.58	52.3	53.8
	SBL	A	0.54	68.3	30.3	A	0.48	67.2	24.4
	SBT/R	D	0.86	72.2	**#92.0**	C	0.72	64.5	57.2
	Overall	**F**	**1.47**	**273.4**	**-**	**F**	**1.81**	**280.4**	**-**
Borrisokane Road & Conservancy Way *Signalized*	EBL	B	0.64	44.6	36.8	A	0.47	39.7	24.7
	EBT	A	0.04	25.8	4.8	A	0.03	27.0	3.4
	WBL	A	0.05	26.2	5.3	A	0.04	27.4	4.0
	WBT	A	0.18	29.2	14.1	A	0.13	30.2	10.3
	NBL	A	0.04	40.8	3.8	A	0.09	41.7	6.0
	NBT/R	A	0.41	14.1	83.8	A	0.25	12.6	52.0
	SBL	A	0.19	43.2	11.8	A	0.37	41.0	m19.2
	SBT	A	0.17	8.4	21.8	A	0.35	11.8	68.7
	SBR	A	0.07	8.8	9.7	A	0.14	11.5	28.3
	Overall	**A**	**0.49**	**19.5**	**-**	**A**	**0.46**	**17.0**	**-**
Borrisokane Road & New Collector/BRT *Signalized*	EBL	B	0.65	46.4	39.2	A	0.49	41.5	26.7
	EBT	A	0.01	26.5	2.9	A	0.01	28.0	2.9
	EBR	A	0.02	26.8	3.6	A	0.02	28.0	2.9
	WB	A	0.01	26.5	2.9	A	0.02	28.0	2.9
	NBL	A	0.00	7.0	m0.6	A	0.01	6.8	m1.6
	NBT	A	0.54	9.7	56.6	A	0.30	6.9	37.5
	SBL/T	A	0.23	7.5	33.4	A	0.48	8.9	96.0
	SBR	A	0.07	6.8	9.7	A	0.13	6.0	19.1
	Overall	**A**	**0.56**	**14.2**	**-**	**A**	**0.52**	**10.7**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
Queue is measured in metres
Peak Hour Factor = 1.00
Delay = average vehicle delay in seconds
m = metered queue
# = volume for the 95th %ile cycle exceeds capacity

The operations noted are similar to the 2030 future total conditions with a slight decrease in network operations due to background growth. The need for the City to provide wider Barrhaven improvements continues to be the major constraint to decrease the impact on Strandherd Drive.

15.2.3 Network Intersection MMLOS

Table 21 summarizes the MMLOS analysis for the network intersections. The existing and future conditions for both intersections will be the same and are considered in one row. The intersection analysis is based on the policy area of employment area (Kennevale), developing community (existing Borrisokane) and within 600m of a rapid transit station. The MMLOS worksheets has been provided in Appendix K.

Table 21: Study Area Intersection MMLOS Analysis

Intersection	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Strandherd Drive & Kennevale Drive/Dealership Way (existing)	F	C	E	C	F	D	E	B	E	D
Strandherd Drive & Kennevale Drive/Dealership Way (future)	F	C	E	C	F	D	E	B	F	D
Strandherd Drive & Borrisokane Road/Tartan Drive (existing)	F	C	F	C	E	D	E	D	E	D
Strandherd Drive & Borrisokane Road/Tartan Drive (future)	F	A	A	C	F	A	E	D	F	E
Borrisokane Road & Conservancy Way	E	A	A	B	E	A	-	N/A	A	E
Borrisokane Road & New Collector/BRT	D	A	A	B	D	A	-	N/A	A	E

The MMLOS targets for the pedestrian and transit LOS are currently note met and will continue to not meet the targets at the network intersections. The pedestrian level of service would require a maximum of four lanes at a crossing to meet a LOS C or two lanes to achieve a level of service A. This is a limitation of the MMLOS framework. For example, the protected intersections proposed for the Strandherd Drive widening will be comfortable for pedestrians but still result in a level of service F. Due to the traffic congestion in Barrhaven, the intersection delays cannot be reduced to increase the transit level of service. It is assumed that the BRT will pre-empt the signal timing to allow transit to proceed and would operate closer to the targets. It is noted that transit LOS A requires zero seconds average delay for the approach, which is not achievable. A LOS B with less than 10 seconds delay may be a more realistic target for the Chapman Mills Drive corridor.

The bicycle LOS will not meet targets along Strandherd Drive due to the side street geometry having mixed use operations and lacking separated crossings for left turns. The incorporation of bike boxes or protected crossings at the intersections would improve the operations and meet the targets. It is assumed that the City conducted a MMLOS assessment of the Strandherd Drive widening and is providing a balanced solution weighing the trade-offs on all the intersections.

The truck LOS will not be met on Borrisokane Road from Strandherd Drive due to a single receiving lane, as typical of the MMLOS framework but is not considered a cause for mitigation.

The auto level of service will not be met along Strandherd Drive as the area congestion will have high-capacity constraints. The signal timing will require a corridor study along the widened Strandherd Drive to balance the demands of the mainline, turning movements at Borrisokane Road, and side street operations.

Overall, the study area network intersections highlight limitations in the MMLOS framework that require no mitigation as part of this plan of subdivision, illustrate that transit services along Strandherd Drive will result in poor service times, and high congestion is anticipated and reflected in the capacity constraints. The auto level of service will require investment in Barrhaven, beyond the transit and interchange options already assumed to be

in place, to mitigate the demands on the network, and BRT corridors and park and rides will be required to remove the need for transit to operate on Strandherd Drive.

15.2.4 Recommended Design Elements

No study area intersection design elements are proposed as part of this study.

16 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

Proposed Site and Screening

- The proposed development consists of a mix of residential product types, totalling approximately 499 townhomes and 462 single detached homes
- The anticipated full build-out and occupancy horizon is 2030 with construction occurring in a single phase
- The trip generation trigger was met for the TIA Screening

Existing Conditions

- Borrisokane Road and Strandherd Drive are arterial roads, and Kennevale Road and Dealership Way are collector roads within the study area
- None of the driveways within the area of consideration are significant traffic generators
- Sidewalks and cycling tracks will be along Strandherd Drive, and future pathways are planned along the Jock River and Chapman Mills BRT corridor
- Strandherd Drive is spine route, and Borrisokane Road and McKenna Casey Drive are local routes. Major pathways are provided along rail, Strandherd Drive, Jock River and Highway 416
- At the intersection of Strandherd Drive & Dealership Way/Kennevale Drive, the northbound through movement during AM peak hour is over theoretical capacity and may subject to high delays and extended queues
- The study area intersections are subject to queuing issues generally on various movements
- The high volumes roadways have produced a high number of collisions at the study area intersections, primarily at Strandherd Drive and Borrisokane Road intersection, which has 64% of the collisions (47 of 74) within the study area
- The collisions are predominantly rear end collisions due to the congestion along Strandherd Drive, and no further collision review is required as part of this study

Development Generated Travel Demand

- The proposed development is forecasted produce 831 two-way people trips during the AM peak hour and 892 two-way people trips during the PM peak hour
- Of the forecasted people trips, 313 two-way trips will be vehicle trips during the AM peak hour and 352 two-way trips will be vehicle trips during the PM peak hour
- Of the forecasted trips, 80% are anticipated to travel north, 5% to the south, 10 % to the east, and 5 % to the west

Background and Total Conditions

- A 1.5%/annum background growth rate has been applied for the primary intersection movements
- Significant capacity constraints are noted along Strandherd Drive, and high delays and extended queueing are noted for the entire corridor, both along the mainline of Strandherd Drive and on turning movements from that side streets

- Alternative solutions for Barrhaven will need to be examined by the City
- No mitigation will be proposed as part of this TIA as it is beyond the scope of a specific TIA development and requires a regional solution

Development Design

- The plan of subdivision includes Street 1 and Street 2 as 24.0 metre collector roads, with the remaining roadways set at 16.5 or 18.0 metres for the local roads and 14.75 metres for window streets
- Sidewalks will be provided in primary corridors to bisect the community and connect to adjacent open space, and cycletracks will be provided along Street 1 and Street 2
- Traffic calming elements are conceptually identified throughout the community with intersection narrowings at intersections and speed humps on longer uninterrupted stretches of the road network
- It is noted that this traffic calming measure are conceptual and will need to be implemented in conjunction with other subdivision elements, such as lotting, driveway locations, utilities, etc.

Boundary Street Design

- No roadways are located at the boundary of the proposed subdivision

Access Intersections Design

- The residential accesses will connect via new collector roads to Borrisokane Road
- The intersections along Borrisokane Road have been proposed as signalized during the East Phase TIA and this assumption has been maintained
- Operational sensitivity was conducted in the East Phase TIA, noting high delays with a minor-stop control may lead to unsafe turning movements as residents attempt to exit the community

TDM

- Supportive TDM measures to be included within the proposed development should include:
    - Enhanced connectivity of pedestrians and cyclists to the adjacent network
    - Posting of pedestrian and cycling wayfinding signage within the community
    - Organize community cycling course for new residents
    - Early service agreement with OC Transpo to support higher adoption of transit ridership
    - Inclusion of a 6-month Presto card for first time new townhome purchase, with a set time frame for this offer (e.g., 6-months) from the initial offering of the site
    - Conduct semi-annual community surveys for 2 years to collect travel pattern and behaviour data (in conjunction with City TDM coordinator)

NTM

- The proposed development will connect to the arterial road network at Borrisokane Road through the collector roads proposed as part of the East Phase of Conservancy
- No change to the adjacent neighbourhood roadways is required to support the West Phase of Conservancy

Transit

- The forecasted transit trips will include 316 two-way trips during the AM peak and 277 two-way trips during the PM peak

- Peak hour increases in transit ridership resulting from the site equate to three to four double standard buses load northerly of the site, One-fifth of a standard bus load southerly and westerly of the site, and One-third of a standard bus load easterly of the site
- A transit signal will need to be incorporated into the signalized intersection of the New Collector and BRT once the BRT is extended to Borrisokane Road

Network Concept

- The existing and background volumes forecasted along Strandherd Drive and accessing Strandherd Drive from the south, are exceeding the existing lane capacities and will continue to do so once the widening is completed
- A minimum number of these projects have been implemented and many continue to be pushed farther into the future

Network Intersection Design

- The study area network intersections operate with similar capacity constraints, delays, and queuing as the future background conditions
- As noted in the background conditions, the need for the City to provide wider Barrhaven improvements continues to be the major constraint to decrease the impact on Strandherd Drive
- The MMLOS targets for the pedestrian and transit LOS are currently not met and will continue to not meet the targets at the network intersections
- The pedestrian level of service would require a maximum of four lanes at a crossing to meet a LOS C or two lanes to achieve a level of service A, and this is a limitation of the MMLOS framework
- BRT is assumed to pre-empt the signal timing to allow transit to proceed and would operate closer to the transit targets
- It is assumed that the City conducted a MMLOS assessment of the Strandherd Drive widening and is providing a balanced solution weighing the trade-offs on all the intersections
- Overall, the study area network intersections highlight limitations in the MMLOS framework that require no mitigation as part of this plan of subdivision

17 Conclusion

It is recommended that, from a transportation perspective, the proposed development applications proceed.

Prepared By:

Andrew Harte, P.Eng.
Senior Transportation Engineer

Reviewed By:

Christopher Gordon, P.Eng.
Senior Transportation Engineer

Appendix A

TIA Screening Form and PM Certification Form

6 Plaza Court
Ottawa ON K2H 7W1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 30-Sep-21
Project Number: 2021-115
Project Reference: Caivan Conservancy West

1.1 Description of Proposed Development	
Municipal Address	3288 & 3300 Borrisokane, 4205, 4345 & 4375 McKenna Casey.
Description of Location	Vacant farm fields
Land Use Classification	Development Reserve (DR)
Development Size	1036 residential units total; 702 townhomes and 334 single detached homes
Accesses	Two new intersections with Borrisokane, part of previous East Phase
Phase of Development	TBD - Zoning and Draft Plan only
Buildout Year	TBD
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Townhomes or apartments	
Development Size	1036	Units
Trip Generation Trigger	Yes	

1.3 Location Triggers		
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?	No	Access through previous phase .
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	No	Located within 800 metres of BRT
Location Trigger	No	

1.4. Safety Triggers	
Are posted speed limits on a boundary street 80 km/hr or greater?	No
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	No
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)?	No
Is the proposed driveway within auxiliary lanes of an intersection?	No
Does the proposed driveway make use of an existing median break that serves an existing site?	No
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	No
Does the development include a drive-thru facility?	No
Safety Trigger	No

TIA Plan Reports

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

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

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

CERTIFICATION

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

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

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

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

Dated at ___Ottawa_____ this __20__ day of _____September_____, 2018.
(City)

Name: _____Andrew Harte_____
(Please Print)

Professional Title: _____Professional Engineer_____

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

Office Contact Information (Please Print)
Address: 6 Plaza Court
City / Postal Code: Ottawa / K2H 7W1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com

Appendix B

Turning Movement Counts

Transportation Services - Traffic Services

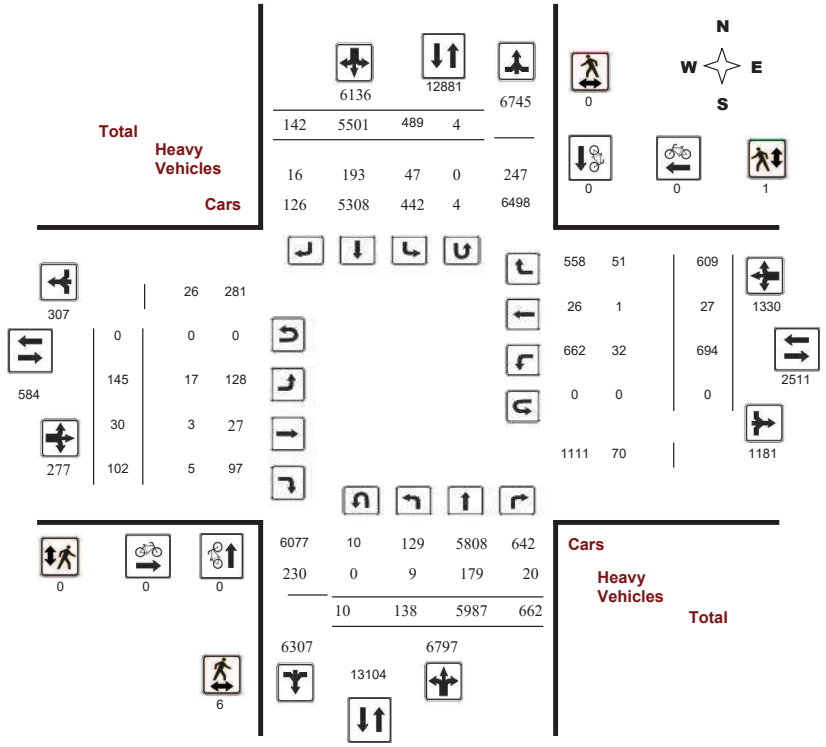
Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study Diagram



Transportation Services - Traffic Services

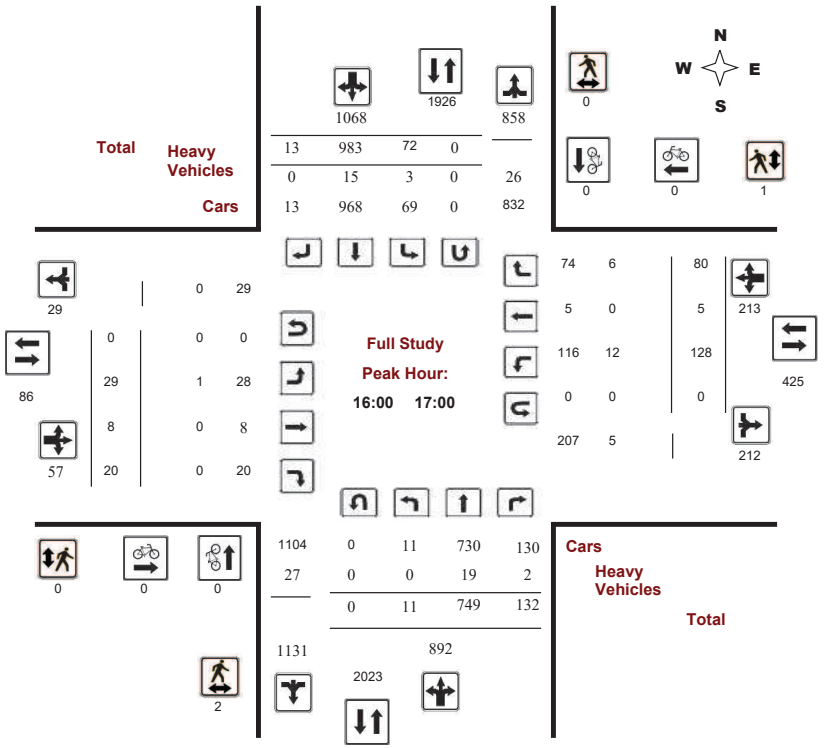
Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study Peak Hour Diagram



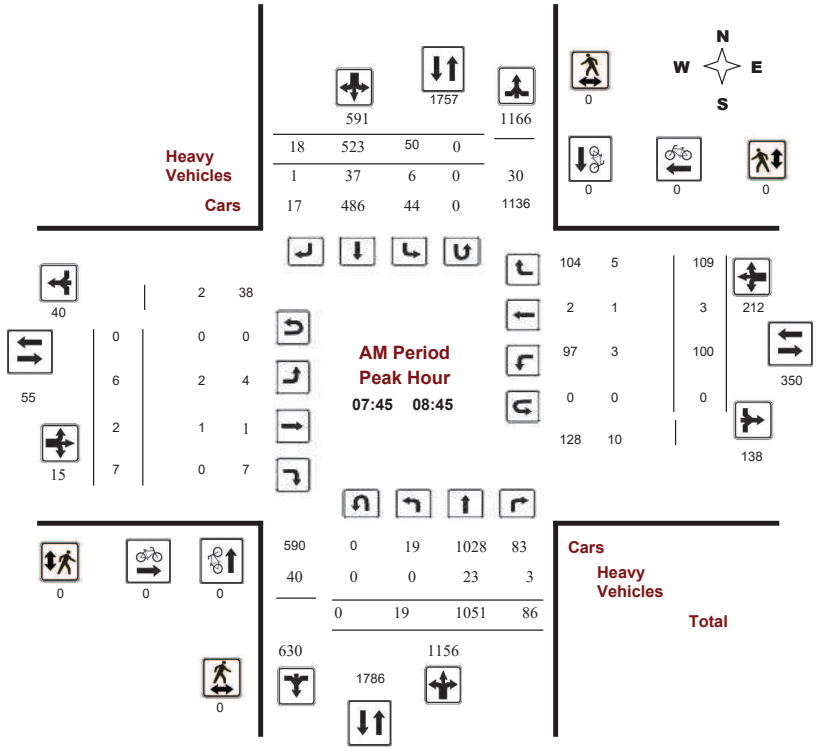
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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



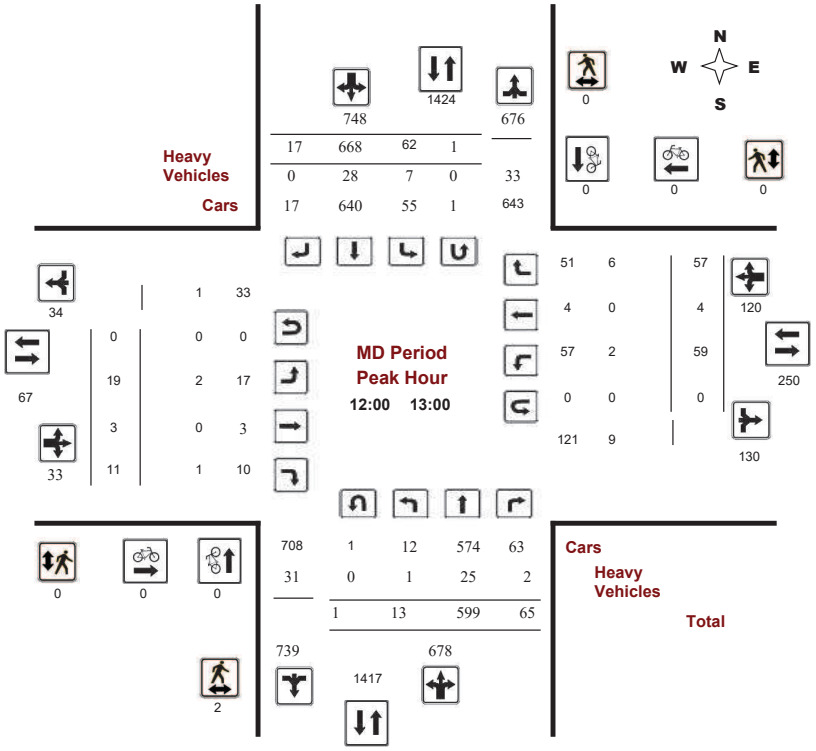
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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



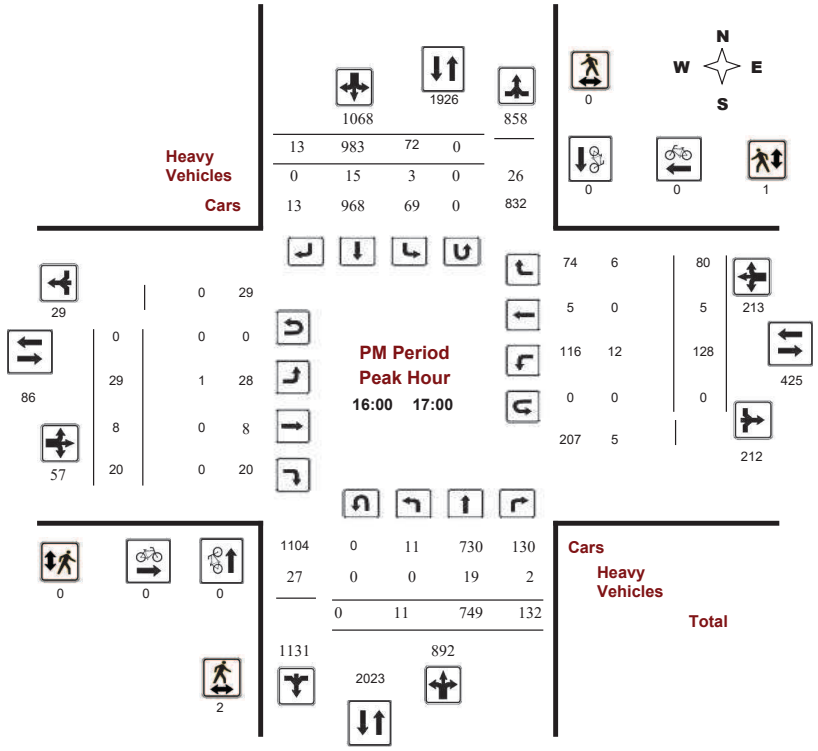
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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



Comments

Transportation Services - Traffic Services

Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study Summary (8 HR Standard)

Survey Date: Thursday, January 18, 2018

Total Observed U-Turns

Northbound: 10 Southbound: 4

Eastbound: 0 Westbound: 0

AADT Factor 1.39

	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	14	945	57	**1016**	35	466	19	**520**	**1536**	4	1	6	**11**	80	3	100	**183**	**194**	**1730**
08:00 09:00	23	1039	93	**1155**	53	477	23	**553**	**1708**	8	2	8	**18**	96	2	105	**203**	**221**	**1929**
09:00 10:00	28	696	65	**789**	47	448	14	**509**	**1298**	17	4	10	**31**	52	1	56	**109**	**140**	**1438**
11:30 12:30	14	603	57	**674**	69	589	21	**679**	**1353**	22	5	15	**42**	61	5	60	**126**	**168**	**1521**
12:30 13:30	16	567	60	**643**	60	683	18	**761**	**1404**	23	0	6	**29**	60	1	63	**124**	**153**	**1557**
15:00 16:00	20	670	100	**790**	83	866	23	**972**	**1762**	25	7	20	**52**	111	5	74	**190**	**242**	**2004**
16:00 17:00	11	749	132	**892**	72	983	13	**1068**	**1960**	29	8	20	**57**	128	5	80	**213**	**270**	**2230**
17:00 18:00	12	718	98	**828**	70	989	11	**1070**	**1898**	17	3	17	**37**	106	5	71	**182**	**219**	**2117**
Sub Total	138	5987	662	**6787**	489	5501	142	**6132**	**12919**	145	30	102	**277**	694	27	609	**1330**	**1607**	**14526**
U Turns				**10**				**4**	**14**				**0**				**0**	**0**	**14**
Total	138	5987	662	**6797**	489	5501	142	**6136**	**12933**	145	30	102	**277**	694	27	609	**1330**	**1607**	**14540**
EQ 12Hr	192	8322	920	**9448**	680	7646	197	**8529**	**17977**	202	42	142	**385**	965	38	847	**1849**	**2234**	**20211**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	192	8322	920	**9448**	680	7646	197	**8529**	**17977**	202	42	142	**385**	965	38	847	**1849**	**2234**	**20211**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**1**					
AVG 24Hr	251	10902	1205	**12377**	890	10017	259	**11173**	**23550**	264	55	186	**504**	1264	49	1109	**2422**	**2926**	**26476**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

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

Transportation Services - Traffic Services

Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study 15 Minute Increments

		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	1	193	7	201	7	86	3	96	614	1	1	1	3	12	1	24	37	614	337
07:15	07:30	3	231	17	251	6	131	6	143	803	1	0	1	2	27	1	18	46	803	442
07:30	07:45	4	250	15	270	11	96	4	111	780	2	0	2	4	19	0	29	48	780	433
07:45	08:00	6	271	18	295	11	153	6	170	942	0	0	2	2	22	1	29	52	942	519
08:00	08:15	7	240	21	268	23	136	6	165	871	1	0	2	3	29	1	30	60	871	496
08:15	08:30	1	276	23	300	7	130	2	139	895	2	1	3	6	21	1	24	46	895	491
08:30	08:45	5	264	24	293	9	104	4	117	835	3	1	0	4	28	0	26	54	835	468
08:45	09:00	10	259	25	294	14	107	11	132	840	2	0	3	5	18	0	25	43	840	474
09:00	09:15	8	173	17	199	8	92	2	102	605	2	1	5	8	17	1	14	32	605	341
09:15	09:30	6	209	17	234	11	130	5	146	744	4	1	0	5	8	0	11	19	744	404
09:30	09:45	10	164	14	189	15	119	2	136	657	8	2	2	12	18	0	20	38	657	375
09:45	10:00	4	150	17	171	13	107	5	125	579	3	0	3	6	9	0	11	20	579	322
11:30	11:45	3	161	16	181	10	134	4	148	672	7	1	4	12	18	2	18	38	672	379
11:45	12:00	5	128	13	146	20	149	5	174	634	5	1	1	7	14	0	17	31	634	358
12:00	12:15	2	155	12	169	16	160	3	179	696	4	2	6	12	8	0	15	23	696	383
12:15	12:30	4	159	16	180	23	146	9	178	705	6	1	4	11	21	3	10	34	705	403
12:30	12:45	2	140	21	163	12	166	4	182	689	4	0	1	5	17	1	16	34	689	384
12:45	13:00	5	145	16	166	11	196	1	209	751	5	0	0	5	13	0	16	29	751	409
13:00	13:15	5	136	12	153	21	154	6	181	672	7	0	2	9	18	0	21	39	672	382
13:15	13:30	4	146	11	161	16	167	7	190	696	7	0	3	10	12	0	10	22	696	383
15:00	15:15	5	176	18	200	21	202	6	230	859	7	3	5	15	16	2	21	39	859	484
15:15	15:30	3	192	18	215	24	225	8	257	948	4	3	4	11	28	1	21	50	948	533
15:30	15:45	9	154	29	192	18	225	5	248	873	13	0	4	17	24	0	13	37	873	494
15:45	16:00	3	148	35	186	20	214	4	238	856	1	1	7	9	43	2	19	64	856	497
16:00	16:15	1	203	37	241	15	256	1	272	1026	4	1	4	9	24	1	22	47	1026	569
16:15	16:30	5	175	24	204	19	251	4	274	973	5	3	7	15	38	1	19	58	973	551
16:30	16:45	2	187	36	225	19	252	6	277	1001	12	2	3	17	30	2	15	47	1001	566
16:45	17:00	3	184	35	222	19	224	2	245	949	8	2	6	16	36	1	24	61	949	544
17:00	17:15	3	156	29	188	19	248	2	269	920	9	0	7	16	24	1	19	44	920	517
17:15	17:30	1	177	21	199	18	252	2	274	952	2	1	2	5	31	3	13	47	952	525
17:30	17:45	2	196	23	221	21	261	2	284	1017	5	1	6	12	21	0	23	44	1017	561
17:45	18:00	6	189	25	220	12	228	5	245	931	1	1	2	4	30	1	16	47	931	516
Total:		138	5987	662	6797	489	5501	142	6136	25985	145	30	102	277	694	27	609	1330	25985	14,540

Note: U-Turns are included in Totals.

Transportation Services - Traffic Services

Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study Cyclist Volume

Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00	07:15	0	0	0	0	0	0	0
07:15	07:30	0	0	0	0	0	0	0
07:30	07:45	0	0	0	0	0	0	0
07:45	08:00	0	0	0	0	0	0	0
08:00	08:15	0	0	0	0	0	0	0
08:15	08:30	0	0	0	0	0	0	0
08:30	08:45	0	0	0	0	0	0	0
08:45	09:00	0	0	0	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
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
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
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
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
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
Total		0	0	**0**	0	0	0	0

Transportation Services - Traffic Services

Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study Pedestrian Volume

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**
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	1	0	**1**	0	0	**0**	**1**
09:00 09:15	0	0	**0**	0	0	**0**	**0**
09:15 09:30	0	0	**0**	0	0	**0**	**0**
09:30 09:45	0	0	**0**	0	0	**0**	**0**
09:45 10:00	0	0	**0**	0	0	**0**	**0**
11:30 11:45	0	0	**0**	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**
12:30 12:45	0	0	**0**	0	0	**0**	**0**
12:45 13:00	2	0	**2**	0	0	**0**	**2**
13:00 13:15	0	0	**0**	0	0	**0**	**0**
13:15 13:30	0	0	**0**	0	0	**0**	**0**
15:00 15:15	0	0	**0**	0	0	**0**	**0**
15:15 15:30	0	0	**0**	0	0	**0**	**0**
15:30 15:45	0	0	**0**	0	0	**0**	**0**
15:45 16:00	1	0	**1**	0	0	**0**	**1**
16:00 16:15	0	0	**0**	0	0	**0**	**0**
16:15 16:30	1	0	**1**	0	0	**0**	**1**
16:30 16:45	1	0	**1**	0	1	**1**	**2**
16:45 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	0	**0**	0	0	**0**	**0**
Total	6	0	**6**	0	1	**1**	**7**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study Heavy Vehicles

		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	1	2	1	**12**	1	8	0	**12**	**24**	0	0	0	**1**	0	0	1	**3**	**4**	**14**
07:15	07:30	0	4	1	**12**	2	7	0	**14**	**26**	1	0	0	**1**	0	0	0	**3**	**4**	**15**
07:30	07:45	2	3	0	**11**	0	5	0	**9**	**20**	1	0	0	**3**	1	0	0	**1**	**4**	**12**
07:45	08:00	0	4	0	**13**	1	9	0	**15**	**28**	0	0	0	**0**	0	0	1	**2**	**2**	**15**
08:00	08:15	0	6	2	**15**	4	7	0	**20**	**35**	1	0	0	**1**	0	0	2	**8**	**9**	**22**
08:15	08:30	0	8	0	**19**	1	8	0	**19**	**38**	0	1	0	**2**	3	1	2	**8**	**10**	**24**
08:30	08:45	0	5	1	**19**	0	13	1	**20**	**39**	1	0	0	**2**	0	0	0	**1**	**3**	**21**
08:45	09:00	0	10	4	**19**	3	5	1	**24**	**43**	1	0	0	**2**	0	0	4	**11**	**13**	**28**
09:00	09:15	1	8	1	**18**	1	5	2	**18**	**36**	0	0	1	**4**	2	0	2	**6**	**10**	**23**
09:15	09:30	1	8	0	**22**	1	13	1	**25**	**47**	1	0	0	**3**	0	0	1	**2**	**5**	**26**
09:30	09:45	1	7	0	**19**	2	11	1	**27**	**46**	4	1	0	**7**	0	0	2	**5**	**12**	**29**
09:45	10:00	0	12	0	**16**	2	4	1	**21**	**37**	0	0	0	**1**	0	0	2	**4**	**5**	**21**
11:30	11:45	0	8	1	**17**	3	7	1	**24**	**41**	1	0	1	**3**	0	0	4	**8**	**11**	**26**
11:45	12:00	0	6	0	**14**	3	7	2	**22**	**36**	1	1	0	**4**	1	0	3	**8**	**12**	**24**
12:00	12:15	1	6	0	**16**	1	9	0	**17**	**33**	1	0	0	**2**	0	0	0	**1**	**3**	**18**
12:15	12:30	0	8	1	**15**	3	4	0	**19**	**34**	0	0	1	**1**	1	0	4	**9**	**10**	**22**
12:30	12:45	0	7	1	**15**	1	6	0	**15**	**30**	0	0	0	**0**	1	0	1	**4**	**4**	**17**
12:45	13:00	0	4	0	**13**	2	9	0	**17**	**30**	1	0	0	**1**	0	0	1	**3**	**4**	**17**
13:00	13:15	1	7	1	**15**	1	5	1	**20**	**35**	1	0	0	**3**	1	0	5	**8**	**11**	**23**
13:15	13:30	1	2	1	**14**	3	7	1	**14**	**28**	1	0	2	**5**	1	0	0	**5**	**10**	**19**
15:00	15:15	0	8	0	**18**	2	6	1	**18**	**36**	0	0	0	**1**	4	0	1	**7**	**8**	**22**
15:15	15:30	0	5	0	**12**	2	4	1	**15**	**27**	0	0	0	**1**	3	0	3	**8**	**9**	**18**
15:30	15:45	0	7	3	**14**	0	3	0	**10**	**24**	0	0	0	**0**	1	0	0	**4**	**4**	**14**
15:45	16:00	0	3	0	**11**	3	7	2	**18**	**29**	0	0	0	**2**	1	0	3	**7**	**9**	**19**
16:00	16:15	0	6	1	**21**	1	7	0	**17**	**38**	0	0	0	**0**	7	0	3	**12**	**12**	**25**
16:15	16:30	0	5	0	**11**	0	3	0	**10**	**21**	0	0	0	**0**	3	0	2	**5**	**5**	**13**
16:30	16:45	0	2	1	**6**	2	2	0	**7**	**13**	1	0	0	**1**	1	0	0	**4**	**5**	**9**
16:45	17:00	0	6	0	**10**	0	3	0	**10**	**20**	0	0	0	**0**	1	0	1	**2**	**2**	**11**
17:00	17:15	0	3	0	**5**	1	2	0	**6**	**11**	0	0	0	**0**	0	0	0	**1**	**1**	**6**
17:15	17:30	0	3	0	**6**	0	3	0	**7**	**13**	0	0	0	**0**	0	0	1	**1**	**1**	**7**
17:30	17:45	0	3	0	**6**	1	3	0	**7**	**13**	0	0	0	**0**	0	0	0	**1**	**1**	**7**
17:45	18:00	0	3	0	**4**	0	1	0	**6**	**10**	0	0	0	**0**	0	0	2	**2**	**2**	**6**
Total:	None	9	179	20	**438**	47	193	16	**503**	**941**	17	3	5	**51**	32	1	51	**154**	**205**	**573**

Transportation Services - Traffic Services

Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37427

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

Full Study 15 Minute U-Turn Total

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	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	1	0	0	0	1
09:15	09:30	2	0	0	0	2
09:30	09:45	1	0	0	0	1
09:45	10:00	0	0	0	0	0
11:30	11:45	1	0	0	0	1
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	1	0	0	0	1
12:30	12:45	0	0	0	0	0
12:45	13:00	0	1	0	0	1
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	1	1	0	0	2
15:15	15:30	2	0	0	0	2
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	2	0	0	2
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		10	4	0	0	14

Transportation Services - Traffic Services W.O. 37540

Turning Movement Count - 15 Minute Summary Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 2 Westbound: 0

		CEDARVIEW RD/TARTAN DR								STRANDHERD DR										
		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	89	1	3	**93**	9	2	22	**33**	**126**	5	78	23	**106**	1	124	3	**128**	**234**	**360**
07:15	07:30	81	6	6	**93**	1	1	15	**17**	**110**	14	133	24	**171**	3	146	4	**153**	**324**	**434**
07:30	07:45	80	3	5	**88**	11	6	27	**44**	**132**	18	108	22	**148**	1	203	7	**211**	**359**	**491**
07:45	08:00	104	12	7	**123**	9	4	26	**39**	**162**	15	139	25	**179**	2	148	10	**160**	**339**	**501**
08:00	08:15	85	9	3	**97**	12	3	26	**41**	**138**	22	125	34	**181**	0	187	16	**203**	**384**	**522**
08:15	08:30	100	27	3	**130**	37	10	41	**88**	**218**	26	111	33	**170**	1	192	19	**212**	**382**	**600**
08:30	08:45	98	13	4	**115**	10	3	25	**38**	**153**	12	96	28	**136**	0	184	12	**196**	**332**	**485**
08:45	09:00	82	8	4	**94**	15	8	21	**44**	**138**	19	100	20	**139**	2	182	12	**196**	**335**	**473**
09:00	09:15	71	10	5	**86**	6	4	15	**25**	**111**	9	93	25	**127**	2	155	15	**172**	**299**	**410**
09:15	09:30	69	6	1	**76**	6	3	17	**26**	**102**	17	114	20	**151**	0	140	20	**160**	**311**	**413**
09:30	09:45	47	2	6	**55**	8	2	12	**22**	**77**	21	109	20	**150**	5	127	14	**146**	**296**	**373**
09:45	10:00	47	6	2	**55**	14	3	13	**30**	**85**	16	100	18	**134**	4	133	21	**158**	**292**	**377**
11:30	11:45	39	2	3	**44**	17	1	20	**38**	**82**	15	113	36	**165**	1	126	20	**147**	**312**	**394**
11:45	12:00	35	2	0	**37**	7	3	13	**23**	**60**	22	120	35	**177**	0	106	15	**121**	**298**	**358**
12:00	12:15	38	2	2	**42**	14	5	16	**35**	**77**	19	127	35	**181**	1	128	8	**137**	**318**	**395**
12:15	12:30	32	4	3	**39**	11	2	16	**29**	**68**	14	133	29	**176**	2	136	11	**149**	**325**	**393**
12:30	12:45	40	2	3	**45**	12	2	11	**25**	**70**	18	142	30	**190**	4	124	14	**142**	**332**	**402**
12:45	13:00	38	0	5	**43**	13	2	17	**32**	**75**	18	162	43	**223**	0	112	18	**130**	**353**	**428**
13:00	13:15	29	2	1	**32**	17	2	11	**30**	**62**	21	129	37	**187**	4	129	12	**145**	**332**	**394**
13:15	13:30	35	4	3	**42**	14	1	14	**29**	**71**	16	124	42	**182**	2	113	7	**122**	**304**	**375**
15:00	15:15	33	5	1	**39**	13	7	17	**37**	**76**	39	141	57	**237**	2	149	25	**176**	**413**	**489**
15:15	15:30	48	11	2	**61**	28	17	30	**75**	**136**	21	167	66	**254**	4	160	20	**184**	**438**	**574**
15:30	15:45	36	6	2	**44**	22	5	32	**59**	**103**	25	173	71	**269**	2	145	15	**162**	**431**	**534**
15:45	16:00	54	3	3	**60**	15	7	14	**36**	**96**	32	168	76	**276**	2	136	19	**157**	**433**	**529**
16:00	16:15	48	9	5	**62**	11	14	25	**50**	**112**	26	184	79	**289**	8	169	13	**190**	**479**	**591**
16:15	16:30	47	9	7	**63**	14	13	21	**48**	**111**	36	197	93	**327**	3	174	19	**196**	**523**	**634**
16:30	16:45	53	5	5	**63**	13	13	23	**49**	**112**	32	170	87	**289**	3	144	15	**162**	**451**	**563**
16:45	17:00	50	11	7	**68**	14	9	20	**43**	**111**	22	173	99	**294**	3	161	18	**182**	**476**	**587**
17:00	17:15	38	6	3	**47**	21	11	18	**50**	**97**	28	169	87	**284**	4	156	15	**175**	**459**	**556**
17:15	17:30	41	11	6	**58**	17	7	11	**35**	**93**	22	180	100	**302**	5	145	9	**159**	**461**	**554**
17:30	17:45	46	3	2	**51**	19	9	14	**42**	**93**	28	182	92	**302**	1	148	16	**165**	**467**	**560**
17:45	18:00	45	4	1	**50**	10	8	12	**30**	**80**	24	180	87	**291**	3	162	19	**184**	**475**	**555**
TOTAL:		1778	204	113	**2095**	440	187	615	**1242**	**3337**	672	4440	1573	**6687**	75	4744	461	**5280**	**11967**	**15304**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 37540

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Count Date: Thursday, January 18, 2018 **Start Time:** 07:00

	CEDARVIEW RD/TARTAN DR			STRANDHERD DR			
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.

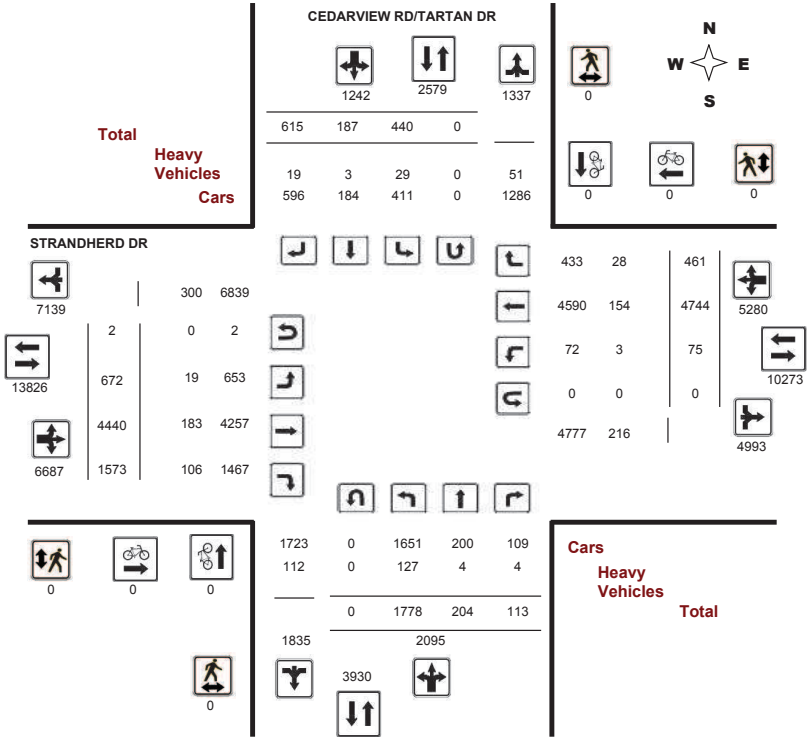
Transportation Services - Traffic Services

Turning Movement Count - Full Study Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018 **WO#:** 37540

Device: Miovision



Comments

Transportation Services - Traffic Services

W.O. 37540

Turning Movement Count - Heavy Vehicle Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018

		CEDARVIEW RD/TARTAN DR									STRANDHERD DR									
		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	1	0	**7**	3	0	1	**4**	**11**	3	30	14	**47**	0	18	8	**26**	**73**	**84**
08:00	09:00	20	2	0	**22**	2	1	5	**8**	**30**	1	32	15	**48**	1	25	3	**29**	**77**	**107**
09:00	10:00	27	0	0	**27**	4	0	1	**5**	**32**	2	32	16	**50**	1	29	4	**34**	**84**	**116**
11:30	12:30	22	0	1	**23**	4	1	3	**8**	**31**	1	24	16	**41**	0	25	3	**28**	**69**	**100**
12:30	13:30	17	0	0	**17**	3	0	1	**4**	**21**	1	33	18	**52**	0	14	2	**16**	**68**	**89**
15:00	16:00	16	1	0	**17**	3	0	2	**5**	**22**	7	10	13	**30**	1	16	4	**21**	**51**	**73**
16:00	17:00	15	0	3	**18**	5	0	6	**11**	**29**	4	13	12	**29**	0	21	2	**23**	**52**	**81**
17:00	18:00	4	0	0	**4**	5	1	0	**6**	**10**	0	9	2	**11**	0	6	2	**8**	**19**	**29**
Sub Total		127	4	4	**135**	29	3	19	**51**	**186**	19	183	106	**308**	3	154	28	**185**	**493**	**679**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		127	4	4	**0**	29	3	19	**51**	**186**	19	183	106	**308**	3	154	28	**185**	**493**	**679**

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 37540

Turning Movement Count - Pedestrian Volume Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Count Date: Thursday, January 18, 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	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	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	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	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:

Transportation Services - Traffic Services

Work Order 37540

Turning Movement Count - Full Study Summary Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 2 Westbound: 0

AADT Factor 1.00

Full Study

	CEDARVIEW RD/TARTAN DR									STRANDHERD DR									
	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	354	22	21	**397**	30	13	90	**133**	**530**	52	458	94	**604**	7	621	24	**652**	**1256**	**1786**
08:00 09:00	365	57	14	**436**	74	24	113	**211**	**647**	79	432	115	**626**	3	745	59	**807**	**1433**	**2080**
09:00 10:00	234	24	14	**272**	34	12	57	**103**	**375**	63	416	83	**562**	11	555	70	**636**	**1198**	**1573**
11:30 12:30	144	10	8	**162**	49	11	65	**125**	**287**	70	493	135	**698**	4	496	54	**554**	**1252**	**1539**
12:30 13:30	142	8	12	**162**	56	7	53	**116**	**278**	73	557	152	**782**	10	478	51	**539**	**1321**	**1599**
15:00 16:00	171	25	8	**204**	78	36	93	**207**	**411**	117	649	270	**1036**	10	590	79	**679**	**1715**	**2126**
16:00 17:00	198	34	24	**256**	52	49	89	**190**	**446**	116	724	358	**1198**	17	648	65	**730**	**1928**	**2374**
17:00 18:00	170	24	12	**206**	67	35	55	**157**	**363**	102	711	366	**1179**	13	611	59	**683**	**1862**	**2225**
Sub Total	1778	204	113	**2095**	440	187	615	**1242**	**3337**	672	4440	1573	**6685**	75	4744	461	**5280**	**11965**	**15302**
U Turns				**0**				**0**	**0**				**2**				**0**	**2**	**2**
Total	1778	204	113	**2095**	440	187	615	**1242**	**3337**	672	4440	1573	**6687**	75	4744	461	**5280**	**11967**	**15304**
EQ 12Hr	2471	284	157	**2912**	612	260	855	**1726**	**4638**	934	6172	2186	**9295**	104	6594	641	**7339**	**16634**	**21272**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	2471	284	157	**2912**	612	260	855	**1726**	**4638**	934	6172	2186	**9295**	104	6594	641	**7339**	**16634**	**21272**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**1.00**						
AVG 24Hr	3238	371	206	**3815**	801	341	1120	**2262**	**6077**	1224	8085	2864	**12176**	137	8638	839	**9614**	**21790**	**27867**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

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

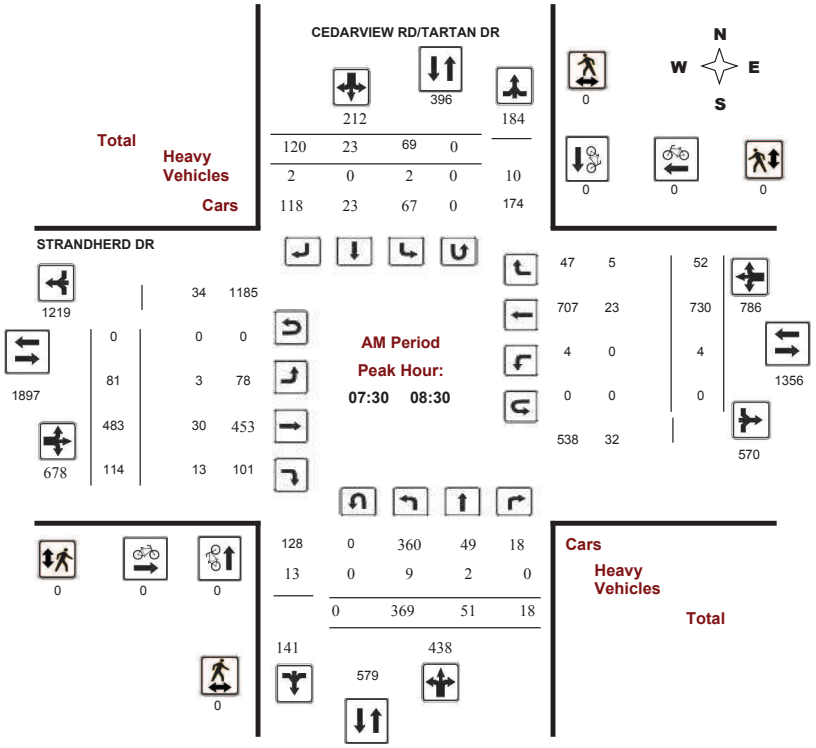
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37540

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



Comments

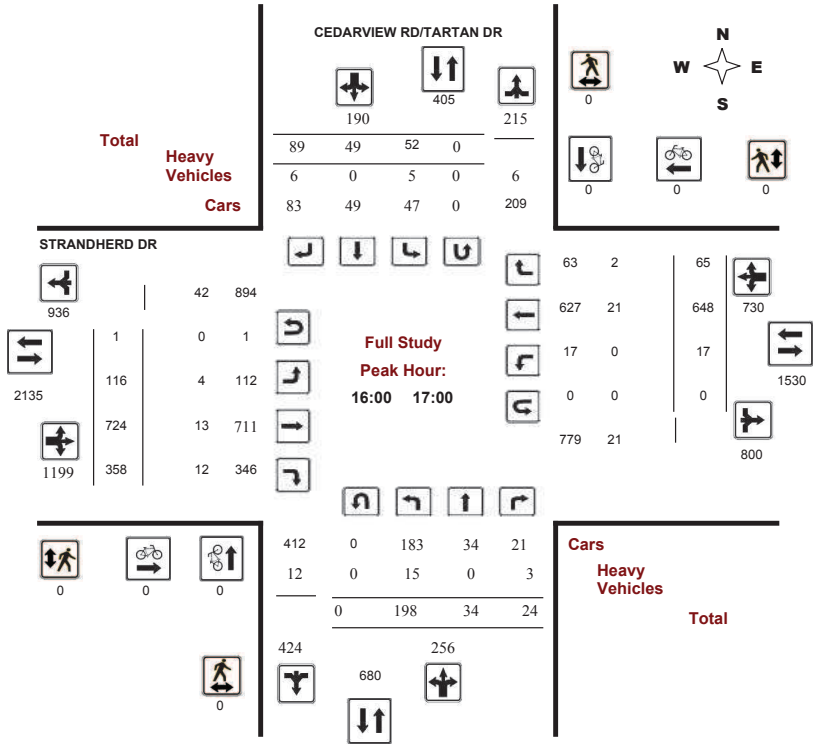
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37540

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



Comments

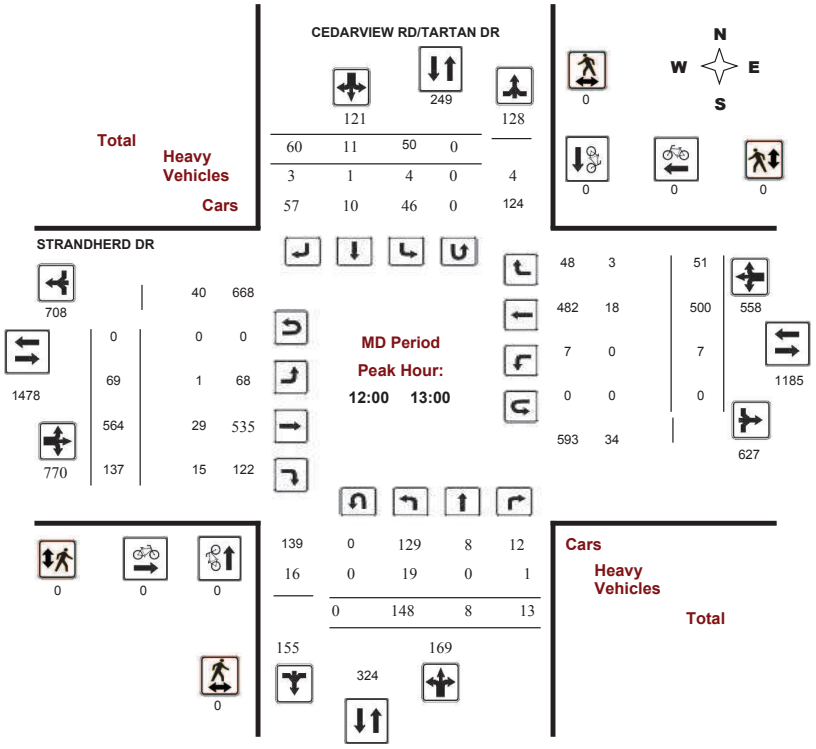
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37540

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



Comments

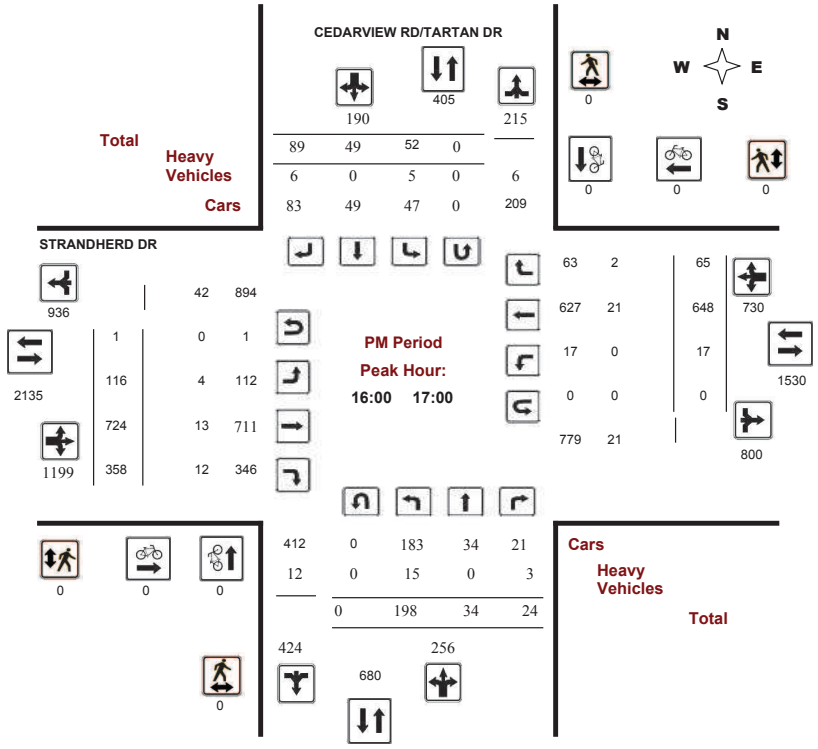
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37540

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



Comments

Transportation Services - Traffic Services

Work Order 37540

Turning Movement Count - 15 Min U-Turn Total Report

STRANDHERD DR @ CEDARVIEW RD/TARTAN DR

Survey Date: Thursday, January 18, 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	1	0	1
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	1	0	1
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	2	0	2

Appendix C

Synchro Intersection Worksheets – Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	2	7	100	3	109	19	1125	86	50	628	18
Future Volume (vph)	6	2	7	100	3	109	19	1125	86	50	628	18
Satd. Flow (prot)	1243	1160	1450	1589	1406	0	1621	1706	1409	1476	1626	1395
Flt Permitted	0.631			0.757			0.400			0.047		
Satd. Flow (perm)	826	1160	1450	1267	1406	0	682	1706	1409	73	1626	1395
Satd. Flow (RTOR)			89		121				91			33
Lane Group Flow (vph)	7	2	8	111	124	0	21	1250	96	56	698	20
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Detector Phase	4	4	4	8	8		2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	32.6	32.6	32.6	32.6	32.6		30.4	30.4	30.4	11.4	30.4	30.4
Total Split (s)	33.0	33.0	33.0	33.0	33.0		75.0	75.0	75.0	12.0	87.0	87.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	27.5%		62.5%	62.5%	62.5%	10.0%	72.5%	72.5%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3		1.8	1.8	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None		C-Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	16.0	16.0	16.0	16.0	16.0		80.0	80.0	80.0	91.0	91.0	91.0
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13		0.67	0.67	0.67	0.76	0.76	0.76
v/c Ratio	0.06	0.01	0.03	0.66	0.42		0.05	1.10	0.10	0.41	0.57	0.02
Control Delay	43.5	41.5	0.1	66.8	12.7		10.1	80.9	2.7	20.6	9.1	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.5	41.5	0.1	66.8	12.7		10.1	80.9	2.7	20.6	9.1	0.9
LOS	D	D	A	E	B		B	F	A	C	A	A
Approach Delay		22.9			38.2			74.3			9.7	
Approach LOS		C			D			E			A	
Queue Length 50th (m)	1.4	0.4	0.0	24.9	0.6		1.6	~335.6	0.4	2.8	58.1	0.0
Queue Length 95th (m)	5.5	2.7	0.0	41.2	16.4		5.8	#447.0	7.5	13.8	108.2	1.3
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0		60.0	180.0		60.0
Base Capacity (vph)	181	255	388	278	403		454	1137	969	136	1232	1065
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.01	0.02	0.40	0.31		0.05	1.10	0.10	0.41	0.57	0.02

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 105 (88%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.10
Intersection Signal Delay: 49.5 Intersection LOS: D
Intersection Capacity Utilization 85.8% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

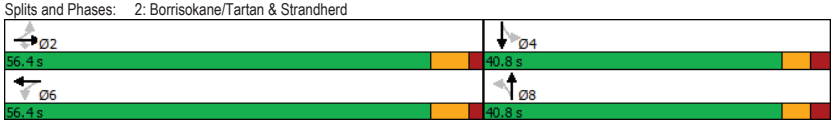
Splits and Phases: 1: Strandherd & Dealership/Kennevale

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	482	141	15	703	52	336	49	27	69	23	120
Future Volume (vph)	81	482	141	15	703	52	336	49	27	69	23	120
Satd. Flow (prot)	1589	1642	1332	1621	1665	0	1605	1594	0	1605	1493	0
Flt Permitted	0.113			0.342			0.652			0.702		
Satd. Flow (perm)	189	1642	1332	583	1665	0	1101	1594	0	1186	1493	0
Satd. Flow (RTOR)			157		6			30			133	
Lane Group Flow (vph)	90	536	157	17	839	0	373	84	0	77	159	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	56.4	56.4	56.4	56.4	56.4		23.8	23.8		23.8	23.8	
Total Split (s)	56.4	56.4	56.4	56.4	56.4		40.8	40.8		40.8	40.8	
Total Split (%)	58.0%	58.0%	58.0%	58.0%	58.0%		42.0%	42.0%		42.0%	42.0%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8		2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4		5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		None	None		None	None	
Act Effct Green (s)	50.0	50.0	50.0	50.0	50.0		33.9	33.9		33.9	33.9	
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.35	0.35		0.35	0.35	
v/c Ratio	0.92	0.63	0.20	0.06	0.97		0.96	0.14		0.18	0.26	
Control Delay	99.9	20.8	2.8	12.6	47.3		69.3	15.1		22.8	6.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	99.9	20.8	2.8	12.6	47.3		69.3	15.1		22.8	6.9	
LOS	F	C	A	B	D		E	B		C	A	
Approach Delay		26.3			46.6			59.3			12.1	
Approach LOS		C			D			E			B	
Queue Length 50th (m)	14.8	68.3	0.0	1.5	144.1		66.1	6.6		9.7	3.1	
Queue Length 95th (m)	#46.0	102.4	9.0	4.9	#228.5		#120.8	16.3		20.0	15.9	
Internal Link Dist (m)		1040.6			357.0			275.6			103.1	
Turn Bay Length (m)	140.0		175.0	150.0			70.0			38.0		
Base Capacity (vph)	98	854	768	302	869		400	599		432	628	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.92	0.63	0.20	0.06	0.97		0.93	0.14		0.18	0.25	

Intersection Summary
Cycle Length: 97.2
Actuated Cycle Length: 96.2
Natural Cycle: 95
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97

Intersection Signal Delay: 38.8 — Intersection LOS: D
Intersection Capacity Utilization 99.8% — ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



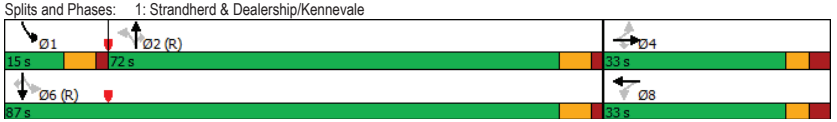
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	8	20	128	5	80	11	791	132	72	1073	13
Future Volume (vph)	29	8	20	128	5	80	11	791	132	72	1073	13
Satd. Flow (prot)	1605	1706	1450	1517	1389	0	1621	1689	1450	1589	1706	1450
Flt Permitted	0.695			0.752			0.104			0.161		
Satd. Flow (perm)	1174	1706	1414	1195	1389	0	177	1689	1417	269	1706	1450
Satd. Flow (RTOR)			89		89				100			33
Lane Group Flow (vph)	32	9	22	142	95	0	12	879	147	80	1192	14
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2		2	6		6
Detector Phase	4	4	4	8	8		2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	32.6	32.6	32.6	32.6	32.6		30.4	30.4	30.4	11.4	30.4	30.4
Total Split (s)	33.0	33.0	33.0	33.0	33.0		72.0	72.0	72.0	15.0	87.0	87.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	27.5%		60.0%	60.0%	60.0%	12.5%	72.5%	72.5%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3		1.8	1.8	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None		C-Max	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	19.2	19.2	19.2	19.2	19.2		76.6	76.6	76.6	87.8	87.8	87.8
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16		0.64	0.64	0.64	0.73	0.73	0.73
v/c Ratio	0.17	0.03	0.07	0.74	0.32		0.11	0.82	0.16	0.29	0.96	0.01
Control Delay	42.9	39.0	0.5	70.0	12.3		15.1	26.9	4.8	8.2	33.6	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.9	39.0	0.5	70.0	12.3		15.1	26.9	4.8	8.2	33.6	0.5
LOS	D	D	A	E	B		B	C	A	A	C	A
Approach Delay		27.5			46.8			23.7			31.7	
Approach LOS		C			D			C			C	
Queue Length 50th (m)	6.5	1.8	0.0	31.7	1.2		1.1	153.2	4.1	4.7	218.9	0.0
Queue Length 95th (m)	14.6	6.0	0.0	50.3	14.7		5.1	#275.3	14.5	11.1	#377.2	0.7
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0		60.0	180.0		60.0
Base Capacity (vph)	258	375	380	262	375		113	1078	941	291	1248	1069
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.02	0.06	0.54	0.25		0.11	0.82	0.16	0.27	0.96	0.01

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 57 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96
Intersection Signal Delay: 29.8 — Intersection LOS: C
Intersection Capacity Utilization 93.5% — ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Strandherd & Dealership/Kennevale

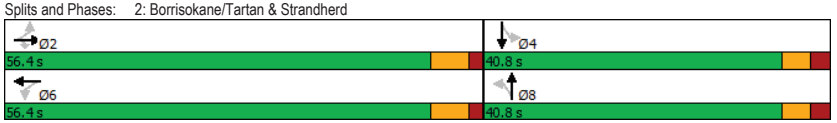


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	787	353	23	577	65	184	34	35	52	49	89
Future Volume (vph)	117	787	353	23	577	65	184	34	35	52	49	89
Satd. Flow (prot)	1605	1706	1436	1621	1664	0	1531	1495	0	1503	1493	0
Flt Permitted	0.274			0.171			0.659			0.707		
Satd. Flow (perm)	463	1706	1436	292	1664	0	1062	1495	0	1118	1493	0
Satd. Flow (RTOR)			392		9			39			99	
Lane Group Flow (vph)	130	874	392	26	713	0	204	77	0	58	153	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	56.4	56.4	56.4	56.4	56.4		23.8	23.8		23.8	23.8	
Total Split (s)	56.4	56.4	56.4	56.4	56.4		40.8	40.8		40.8	40.8	
Total Split (%)	58.0%	58.0%	58.0%	58.0%	58.0%		42.0%	42.0%		42.0%	42.0%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8		2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.4	6.4	6.4	6.4		5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		None	None		None	None	
Act Effct Green (s)	50.3	50.3	50.3	50.3	50.3		21.0	21.0		21.0	21.0	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60		0.25	0.25		0.25	0.25	
v/c Ratio	0.47	0.85	0.38	0.15	0.71		0.77	0.19		0.21	0.34	
Control Delay	18.8	25.9	2.4	12.6	18.4		47.7	14.4		25.4	11.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.8	25.9	2.4	12.6	18.4		47.7	14.4		25.4	11.8	
LOS	B	C	A	B	B		D	B		C	B	
Approach Delay		18.6			18.2			38.6			15.5	
Approach LOS		B			B			D			B	
Queue Length 50th (m)	10.2	101.0	0.0	1.6	69.3		29.6	4.6		7.2	6.6	
Queue Length 95th (m)	34.3	#230.3	12.8	7.5	#154.0		52.2	13.9		16.1	19.8	
Internal Link Dist (m)		1040.6			354.9			275.6			103.1	
Turn Bay Length (m)	140.0		175.0	150.0			70.0			38.0		
Base Capacity (vph)	278	1027	1020	175	1005		447	652		471	686	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.47	0.85	0.38	0.15	0.71		0.46	0.12		0.12	0.22	

Intersection Summary
Cycle Length: 97.2
Actuated Cycle Length: 83.6
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85

Intersection Signal Delay: 20.4 — Intersection LOS: C
Intersection Capacity Utilization 91.6% — ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



Appendix D

Collision Data

CGH TRANSPORTATION

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition	# Vehicles	# Motorcycles	# Bicycles	# Pedestrians
10/16/2016	2016	11:45	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
10/17/2016	2016	20:18	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
12/2/2016	2016	13:33	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	00 - Unknown	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2/6/2016	2016	17:26	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
5/8/2016	2016	20:00	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
1/15/2016	2016	12:02	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
8/4/2016	2016	13:20	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
8/2/2016	2016	20:57	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
9/19/2016	2016	22:30	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
11/25/2017	2017	14:07	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
12/8/2017	2017	1:22	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
6/12/2017	2017	13:03	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
7/21/2017	2017	9:22	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	01 - Dry	2	0	0	0
8/12/2017	2017	19:16	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	02 - Rain	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
1/21/2017	2017	15:01	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
10/11/2018	2018	16:22	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
10/17/2018	2018	7:45	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	02 - Wet	2	0	0	0
10/22/2018	2018	11:58	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	05 - Turning movement	01 - Dry	2	0	0	0
12/30/2018	2018	18:56	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
12/25/2018	2018	8:03	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
4/7/2018	2018	17:29	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
4/2/2018	2018	18:22	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	05 - Dusk	01 - Traffic signal	00 - Unknown	03 - P.D. only	03 - Rear end	01 - Dry	3	0	0	0
7/12/2018	2018	10:08	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
7/5/2018	2018	11:00	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
9/21/2019	2019	19:05	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
1/21/2019	2019	15:46	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	05 - Drifting Snow	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	05 - Packed snow	2	0	0	0
11/11/2019	2019	22:27	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	03 - Snow	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	05 - Packed snow	2	0	0	0
11/11/2019	2019	15:35	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	03 - Snow	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	03 - Loose snow	2	0	0	0
12/1/2019	2019	12:15	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	3	0	0	0
12/11/2019	2019	19:00	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	03 - Snow	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
12/23/2019	2019	14:11	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2/4/2019	2019	22:10	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	04 - Freezing Rain	07 - Dark	01 - Traffic signal	00 - Unknown	03 - P.D. only	07 - SMV other	06 - Ice	1	0	0	0
4/1/2019	2019	12:10	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
3/22/2019	2019	19:20	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	03 - Snow	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
3/25/2019	2019	7:20	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	06 - Ice	2	0	0	0
4/29/2019	2019	9:22	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
4/26/2019	2019	17:30	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	02 - Rain	01 - Daylight	01 - Traffic signal	00 - Unknown	03 - P.D. only	04 - Sideswipe	02 - Wet	2	0	0	0
5/17/2019	2019	12:00	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
7/11/2019	2019	16:38	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	3	0	0	0
7/5/2019	2019	13:50	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	00 - Unknown	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
7/3/2019	2019	10:43	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
7/29/2019	2019	16:50	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	02 - Wet	2	0	0	0
8/12/2019	2019	13:22	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
6/11/2020	2020	16:30	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
7/9/2020	2020	14:23	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
7/11/2020	2020	19:20	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	1	0	0
9/16/2020	2020	10:37	BORRISOKANE RD/TARTAN DR @ STRANDHERD DR (0010634)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	4	0	0	0
11/26/2016	2016	14:39	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASEY DR (__3OIZPQ)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
12/22/2017	2017	16:50	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASEY DR (__3OIZPQ)	01 - Clear	05 - Dusk	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
8/4/2018	2018	14:19	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASEY DR (__3OIZPQ)	02 - Rain	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
5/30/2019	2019	20:24	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASEY DR (__3OIZPQ)	01 - Clear	05 - Dusk	10 - No control	0	02 - Non-fatal injury	03 - Rear end	01 - Dry	4	0	0	0
9/28/2016	2016	13:17	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	0
10/7/2017	2017	10:28	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	02 - Rain	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	02 - Wet	1	0	0	0
12/6/2017	2017	8:10	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	0
2/6/2017	2017	20:11	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	03 - Snow	07 - Dark	10 - No control	0	03 - P.D. only	07 - SMV other	03 - Loose snow	1	0	0	0
2/10/2017	2017	22:39	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	04 - Freezing Rain	07 - Dark	10 - No control	0	03 - P.D. only	07 - SMV other	06 - Ice	1	0	0	0
5/23/2017	2017	14:40	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	99 - Other	01 - Dry	2	0	0	0
9/23/2017	2017	21:27	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
10/8/2018	2018	13:45	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	02 - Rain	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	02 - Wet	1	0	0	0
12/1/2018	2018	22:45	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
12/27/2018	2018	12:27	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	06 - Ice	2	0	0	0
3/7/2018	2018	8:37	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	03 - Snow	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	03 - Loose snow	1	0	0	0
5/15/2018	2018	8:26	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	0
8/2/2018	2018	16:36	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
8/15/2018	2018	11:11	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
8/24/2018	2018	17:17	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	0
9/15/2018	2018	17:30	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
10/15/2019	2019	16:11	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
12/30/2019	2019	23:15	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	04 - Freezing Rain	07 - Dark	10 - No control	0	03 - P.D. only	07 - SMV other	06 - Ice	1	0	0	0
6/4/2019	2019	5:14	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	03 - Dawn	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
2/22/2020	2020	23:49	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	07 - SMV other	01 - Dry	1	0	0	0
2/18/2020	2020	8:55	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	03 - Snow	01 - Daylight	10 - No control	0	03 - P.D. only	07 - SMV other	03 - Loose snow	1	0	0	0
8/23/2020	2020	1:03	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	07 - Dark	10 - No control	0	02 - Non-fatal injury	07 - SMV other	01 - Dry	1	0	0	0
11/21/2020	2020	20:43	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD DR (__3ZA1CC)	01 - Clear	07 - Dark	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0

Appendix E

Synchro Intersection Worksheets – 2030 Future Background Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	19	47	100	108	113	219	2642	86	53	1262	307
Future Volume (vph)	72	19	47	100	108	113	219	2642	86	53	1262	307
Satd. Flow (prot)	1243	1160	1450	1589	1353	0	3144	3219	0	1476	3090	1395
Flt Permitted	0.460			0.745			0.950			0.950		
Satd. Flow (perm)	602	1160	1431	1245	1353	0	3144	3219	0	1476	3090	1395
Satd. Flow (RTOR)												
Lane Group Flow (vph)	72	19	47	100	221	0	219	2728	0	53	1262	307
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	41.0	41.0	41.0	41.0	41.0		17.8	66.6		12.4	61.2	61.2
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%		14.8%	55.5%		10.3%	51.0%	51.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	24.8	24.8	24.8	24.8	24.8		12.7	69.3		8.8	62.8	62.8
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.11	0.58		0.07	0.52	0.52
v/c Ratio	0.58	0.08	0.16	0.39	0.79		0.66	1.47		0.50	0.78	0.42
Control Delay	60.0	35.6	37.4	43.8	64.3		66.9	230.0		69.4	28.9	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.0	35.6	37.4	43.8	64.3		66.9	230.0		69.4	28.9	21.5
LOS	E	D	D	D	E		E	F		E	C	C
Approach Delay		49.0			57.9			217.9			28.8	
Approach LOS		D			E			F			C	
Queue Length 50th (m)	15.2	3.6	9.0	20.2	49.1		25.2	~485.6		11.9	122.6	43.0
Queue Length 95th (m)	28.6	9.1	17.6	33.2	70.2		m15.9	m#255.5		#32.4	#174.4	73.9
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	171	329	406	353	384		338	1858		107	1618	730
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.42	0.06	0.12	0.28	0.58		0.65	1.47		0.50	0.78	0.42

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.47

Intersection Signal Delay: 142.0	Intersection LOS: F
Intersection Capacity Utilization 127.9%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Strandherd & Dealership/Kennevale

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	753	506	63	1599	52	1029	49	114	69	23	230
Future Volume (vph)	117	753	506	63	1599	52	1029	49	114	69	23	230
Satd. Flow (prot)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	117	753	506	63	1599	52	1029	49	114	69	253	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	33.7	33.7	11.7	33.7	
Total Split (s)	13.0	48.7	48.7	11.6	47.3	47.3	26.0	41.8	41.8	17.9	33.7	
Total Split (%)	10.8%	40.6%	40.6%	9.7%	39.4%	39.4%	21.7%	34.8%	34.8%	14.9%	28.1%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.3	43.2	43.2	6.8	40.7	40.7	19.3	36.4	36.4	9.6	24.1	
Actuated g/C Ratio	0.08	0.36	0.36	0.06	0.34	0.34	0.16	0.30	0.30	0.08	0.20	
v/c Ratio	0.95	0.67	1.05	0.69	1.47	0.11	2.06	0.10	0.26	0.54	0.86	
Control Delay	126.1	21.2	75.6	92.5	247.8	28.2	509.9	31.9	34.4	68.3	72.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	126.1	21.2	75.6	92.5	247.8	28.2	509.9	31.9	34.4	68.3	72.2	
LOS	F	C	E	F	F	C	F	C	C	E	E	
Approach Delay		50.1			235.4			444.8			71.4	
Approach LOS		D			F			F			E	
Queue Length 50th (m)	~33.4	49.3	~133.0	14.8	~268.4	8.3	~194.0	8.3	20.4	15.5	55.9	
Queue Length 95th (m)	m#56.0	58.5	#191.6	#42.7	#310.1	17.4	#233.1	17.7	35.7	30.3	#92.0	
Internal Link Dist (m)		1040.6			387.1			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	123	1124	480	91	1088	456	500	512	444	149	331	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.95	0.67	1.05	0.69	1.47	0.11	2.06	0.10	0.26	0.46	0.76	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

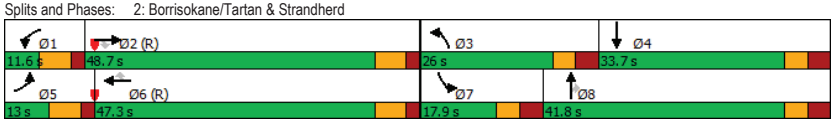
Maximum v/c Ratio: 2.06
Intersection Signal Delay: 222.8 — Intersection LOS: F
Intersection Capacity Utilization 122.9% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



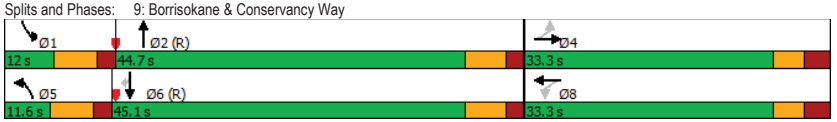
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	0	3	12	0	49	1	494	5	22	216	20
Future Volume (vph)	46	0	3	12	0	49	1	494	5	22	216	20
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1702	0	1621	1706	1450
Flt Permitted	0.725			0.756			0.950			0.950		
Satd. Flow (perm)	1237	1450	0	1290	1450	0	1621	1702	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	46	3	0	12	49	0	1	499	0	22	216	20
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		11.6	44.7		12.0	45.1	45.1
Total Split (%)	37.0%	37.0%		37.0%	37.0%		12.9%	49.7%		13.3%	50.1%	50.1%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.5	13.5		13.5	13.5		5.4	67.6		6.2	70.5	70.5
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.06	0.75		0.07	0.78	0.78
v/c Ratio	0.25	0.01		0.06	0.23		0.01	0.39		0.20	0.16	0.02
Control Delay	34.7	28.0		29.6	33.8		40.0	11.2		44.0	7.5	8.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	34.7	28.0		29.6	33.8		40.0	11.2		44.0	7.5	8.8
LOS	C	C		C	C		D	B		D	A	A
Approach Delay		34.3			33.0			11.2			10.7	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	7.4	0.5		1.9	7.8		0.2	24.9		3.6	8.7	0.7
Queue Length 95th (m)	13.7	2.3		5.3	14.1		1.7	102.6		10.9	39.1	5.9
Internal Link Dist (m)		145.0			184.4			650.0			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	371	435		387	435		98	1278		111	1336	1135
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.12	0.01		0.03	0.11		0.01	0.39		0.20	0.16	0.02

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.39

Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 47.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Borrisokane & Conservancy Way



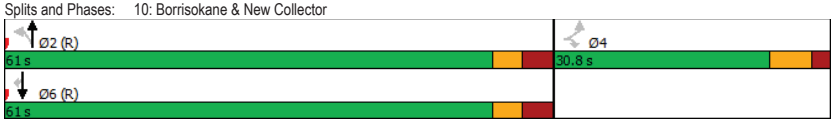
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	47	2	1	588	256	20
Future Volume (vph)	47	2	1	588	256	20
Satd. Flow (prot)	1621	1450	1621	1706	1706	1450
Flt Permitted	0.950		0.601			
Satd. Flow (perm)	1621	1450	1025	1706	1706	1450
Satd. Flow (RTOR)						
Lane Group Flow (vph)	47	2	1	588	256	20
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	31.8	31.8	31.8	31.8
Total Split (s)	30.8	30.8	61.0	61.0	61.0	61.0
Total Split (%)	33.6%	33.6%	66.4%	66.4%	66.4%	66.4%
Yellow Time (s)	4.6	4.6	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	3.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	12.8	12.8	74.8	74.8	74.8	74.8
Actuated g/C Ratio	0.14	0.14	0.81	0.81	0.81	0.81
v/c Ratio	0.21	0.01	0.00	0.42	0.18	0.02
Control Delay	35.2	30.0	6.0	6.8	4.9	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	30.0	6.0	6.8	4.9	5.3
LOS	D	C	A	A	A	A
Approach Delay	35.0			6.8	4.9	
Approach LOS	C			A	A	
Queue Length 50th (m)	7.7	0.3	0.0	33.0	11.1	0.7
Queue Length 95th (m)	14.6	2.0	0.7	89.0	32.1	4.1
Internal Link Dist (m)	113.8			273.4	275.6	
Turn Bay Length (m)	38.5		27.5			
Base Capacity (vph)	423	379	835	1391	1391	1182
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.01	0.00	0.42	0.18	0.02

Intersection Summary
Cycle Length: 91.8
Actuated Cycle Length: 91.8
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 7.7	Intersection LOS: A
Intersection Capacity Utilization 52.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Borrisokane & New Collector



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	96	188	128	26	92	66	1785	132	85	2602	108
Future Volume (vph)	275	96	188	128	26	92	66	1785	132	85	2602	108
Satd. Flow (prot)	1605	1706	1450	1517	1440	0	3144	3174	0	1589	3241	1450
Flt Permitted	0.681			0.695			0.950			0.950		
Satd. Flow (perm)	1150	1706	1431	1108	1440	0	3144	3174	0	1589	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	275	96	188	128	118	0	66	1917	0	85	2602	108
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	43.0	43.0	43.0	43.0	43.0		11.4	65.0		12.0	65.6	65.6
Total Split (%)	35.8%	35.8%	35.8%	35.8%	35.8%		9.5%	54.2%		10.0%	54.7%	54.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	32.1	32.1	32.1	32.1	32.1		5.8	59.3		9.0	64.8	64.8
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27		0.05	0.49		0.08	0.54	0.54
v/c Ratio	0.90	0.21	0.49	0.43	0.31		0.43	1.22		0.71	1.49	0.14
Control Delay	72.9	34.0	41.0	40.3	36.2		72.2	120.0		87.3	247.3	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	72.9	34.0	41.0	40.3	36.2		72.2	120.0		87.3	247.3	16.4
LOS	E	C	D	D	D		E	F		F	F	B
Approach Delay		55.5			38.3			118.4			233.5	
Approach LOS		E			D			F			F	
Queue Length 50th (m)	59.6	16.8	35.7	23.9	21.2		7.4	~300.8		20.0	~458.7	13.3
Queue Length 95th (m)	#101.1	29.9	56.8	41.3	36.4		m7.4	m#248.8		#55.1	#497.9	23.8
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	345	513	430	333	433		153	1567		119	1751	783
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.80	0.19	0.44	0.38	0.27		0.43	1.22		0.71	1.49	0.14

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.49
Intersection Signal Delay: 166.2 — Intersection LOS: F
Intersection Capacity Utilization 113.9% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

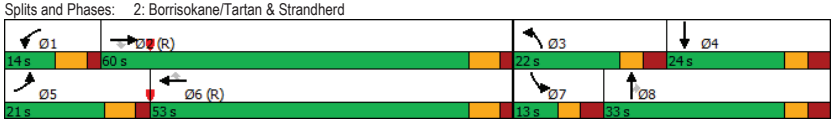
Splits and Phases: 1: Strandherd & Dealership/Kennevale

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	1600	1044	114	1075	65	693	34	107	52	49	122
Future Volume (vph)	322	1600	1044	114	1075	65	693	34	107	52	49	122
Satd. Flow (prot)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	322	1600	1044	114	1075	65	693	34	107	52	171	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	31.7	31.7	11.7	16.7	
Total Split (s)	21.0	60.0	60.0	14.0	53.0	53.0	22.0	33.0	33.0	13.0	24.0	
Total Split (%)	17.5%	50.0%	50.0%	11.7%	44.2%	44.2%	18.3%	27.5%	27.5%	10.8%	20.0%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	15.3	53.4	53.4	8.3	46.4	46.4	15.3	28.0	28.0	6.3	16.4	
Actuated g/C Ratio	0.13	0.44	0.44	0.07	0.39	0.39	0.13	0.23	0.23	0.05	0.14	
v/c Ratio	1.58	1.11	1.63	1.03	0.87	0.12	1.83	0.09	0.35	0.67	0.85	
Control Delay	305.9	69.4	306.3	148.6	42.7	24.5	415.6	38.2	43.4	94.2	84.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	305.9	69.4	306.3	148.6	42.7	24.5	415.6	38.2	43.4	94.2	84.5	
LOS	F	E	F	F	D	C	F	D	D	F	F	
Approach Delay		178.5			51.4			352.5			86.8	
Approach LOS		F			D			F			F	
Queue Length 50th (m)	~110.4	~219.2	~347.4	~31.0	119.8	9.6	~125.5	6.4	21.3	12.1	39.0	
Queue Length 95th (m)	m#72.1	m48.3	m#210.7	#67.2	148.5	19.1	#161.4	14.9	38.1	#31.7	#74.4	
Internal Link Dist (m)		1040.6			313.4			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	204	1442	639	111	1241	555	378	398	305	78	212	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.58	1.11	1.63	1.03	0.87	0.12	1.83	0.09	0.35	0.67	0.81	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.83
Intersection Signal Delay: 171.9 Intersection LOS: F
Intersection Capacity Utilization 107.0% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



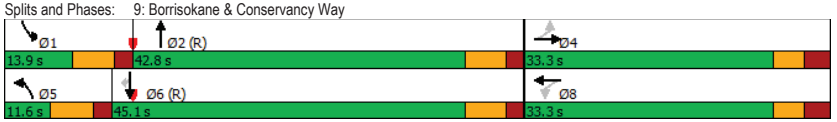
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	0	2	8	0	32	3	304	12	49	509	42
Future Volume (vph)	30	0	2	8	0	32	3	304	12	49	509	42
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1696	0	1621	1706	1450
Flt Permitted	0.736			0.757			0.950			0.950		
Satd. Flow (perm)	1256	1450	0	1291	1450	0	1621	1696	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	30	2	0	8	32	0	3	316	0	49	509	42
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		11.6	42.8		13.9	45.1	45.1
Total Split (%)	37.0%	37.0%		37.0%	37.0%		12.9%	47.6%		15.4%	50.1%	50.1%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.4	13.4		13.4	13.4		5.5	64.0		7.4	70.5	70.5
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.06	0.71		0.08	0.78	0.78
v/c Ratio	0.16	0.01		0.04	0.15		0.03	0.26		0.37	0.38	0.04
Control Delay	32.5	28.0		29.0	32.0		40.7	11.4		42.4	10.6	11.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	32.5	28.0		29.0	32.0		40.7	11.4		42.4	10.6	11.5
LOS	C	C		C	C		D	B		D	B	B
Approach Delay		32.2			31.4			11.7			13.3	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	4.7	0.3		1.3	5.1		0.5	25.6		8.0	25.7	1.5
Queue Length 95th (m)	9.9	1.8		4.0	10.3		3.2	61.2		20.4	79.4	11.6
Internal Link Dist (m)		154.2			129.4			1276.6			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	376	435		387	435		99	1205		141	1337	1136
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.08	0.00		0.02	0.07		0.03	0.26		0.35	0.38	0.04

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.38

Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 9: Borrisokane & Conservancy Way



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	31	1	2	364	599	43
Future Volume (vph)	31	1	2	364	599	43
Satd. Flow (prot)	1621	1450	1621	1706	1706	1450
Flt Permitted	0.950		0.413			
Satd. Flow (perm)	1621	1450	705	1706	1706	1450
Satd. Flow (RTOR)						
Lane Group Flow (vph)	31	1	2	364	599	43
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	28.3	23.6	23.6	23.6	23.6
Total Split (s)	29.0	29.0	61.0	61.0	61.0	61.0
Total Split (%)	32.2%	32.2%	67.8%	67.8%	67.8%	67.8%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.3	5.3	5.6	5.6	5.6	5.6
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	12.6	12.6	74.9	74.9	74.9	74.9
Actuated g/C Ratio	0.14	0.14	0.83	0.83	0.83	0.83
v/c Ratio	0.14	0.00	0.00	0.26	0.42	0.04
Control Delay	33.0	29.0	3.5	2.9	5.8	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	29.0	3.5	2.9	5.8	4.2
LOS	C	C	A	A	A	A
Approach Delay	32.9			2.9	5.7	
Approach LOS	C			A	A	
Queue Length 50th (m)	4.9	0.2	0.1	13.2	28.8	1.4
Queue Length 95th (m)	10.7	1.3	m0.3	17.6	81.5	6.3
Internal Link Dist (m)	209.1			273.4	275.6	
Turn Bay Length (m)	38.5		27.5			
Base Capacity (vph)	426	381	586	1419	1419	1206
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.00	0.00	0.26	0.42	0.04

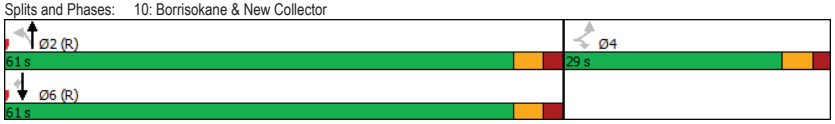
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 5.5	Intersection LOS: A
Intersection Capacity Utilization 50.7%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 10: Borrisokane & New Collector



Appendix F

Synchro Intersection Worksheets – 2035 Future Background Conditions

CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	19	47	100	108	113	219	2746	86	53	1320	307
Future Volume (vph)	72	19	47	100	108	113	219	2746	86	53	1320	307
Satd. Flow (prot)	1243	1160	1450	1589	1353	0	3144	3220	0	1476	3090	1395
Flt Permitted	0.460			0.745			0.950			0.950		
Satd. Flow (perm)	602	1160	1431	1245	1353	0	3144	3220	0	1476	3090	1395
Satd. Flow (RTOR)												
Lane Group Flow (vph)	72	19	47	100	221	0	219	2832	0	53	1320	307
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	41.0	41.0	41.0	41.0	41.0		17.4	66.6		12.4	61.6	61.6
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%		14.5%	55.5%		10.3%	51.3%	51.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	24.8	24.8	24.8	24.8	24.8		12.7	69.3		8.8	62.8	62.8
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.11	0.58		0.07	0.52	0.52
v/c Ratio	0.58	0.08	0.16	0.39	0.79		0.66	1.52		0.50	0.82	0.42
Control Delay	60.0	35.6	37.4	43.8	64.3		66.8	255.1		69.4	30.5	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.0	35.6	37.4	43.8	64.3		66.8	255.1		69.4	30.5	21.4
LOS	E	D	D	D	E		E	F		E	C	C
Approach Delay		49.0			57.9			241.6			30.1	
Approach LOS		D			E			F			C	
Queue Length 50th (m)	15.2	3.6	9.0	20.2	49.1		25.0	~512.4		11.9	132.7	43.1
Queue Length 95th (m)	28.6	9.1	17.6	33.2	70.2		m15.5	m#258.6		#32.4	#196.3	73.5
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	171	329	406	353	384		336	1859		107	1618	730
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.42	0.06	0.12	0.28	0.58		0.65	1.52		0.50	0.82	0.42

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.52

Intersection Signal Delay: 156.7	Intersection LOS: F
Intersection Capacity Utilization 131.0%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

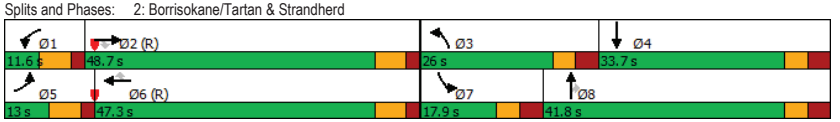
Splits and Phases: 1: Strandherd & Dealership/Kennevale

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	798	519	63	1663	52	1060	49	114	69	23	230
Future Volume (vph)	117	798	519	63	1663	52	1060	49	114	69	23	230
Satd. Flow (prot)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	117	798	519	63	1663	52	1060	49	114	69	253	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	33.7	33.7	11.7	33.7	
Total Split (s)	13.0	48.7	48.7	11.6	47.3	47.3	26.0	41.8	41.8	17.9	33.7	
Total Split (%)	10.8%	40.6%	40.6%	9.7%	39.4%	39.4%	21.7%	34.8%	34.8%	14.9%	28.1%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.3	43.2	43.2	6.8	40.7	40.7	19.3	36.4	36.4	9.6	24.1	
Actuated g/C Ratio	0.08	0.36	0.36	0.06	0.34	0.34	0.16	0.30	0.30	0.08	0.20	
v/c Ratio	0.95	0.71	1.08	0.69	1.53	0.11	2.12	0.10	0.26	0.54	0.86	
Control Delay	124.1	22.3	83.6	92.5	273.0	28.2	536.9	31.9	34.4	68.3	72.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	124.1	22.3	83.6	92.5	273.0	28.2	536.9	31.9	34.4	68.3	72.2	
LOS	F	C	F	F	F	C	F	C	C	E	E	
Approach Delay		52.8			259.5			469.8			71.4	
Approach LOS		D			F			F			E	
Queue Length 50th (m)	~33.7	50.8	~139.2	14.8	~284.6	8.3	~201.8	8.3	20.4	15.5	55.9	
Queue Length 95th (m)	m#52.9	66.6	m#192.1	#42.7	#326.4	17.4	#241.1	17.7	35.7	30.3	#92.0	
Internal Link Dist (m)		1040.6			387.1			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	123	1124	480	91	1088	456	500	512	444	149	331	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.95	0.71	1.08	0.69	1.53	0.11	2.12	0.10	0.26	0.46	0.76	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.12
Intersection Signal Delay: 238.5 Intersection LOS: F
Intersection Capacity Utilization 125.7% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



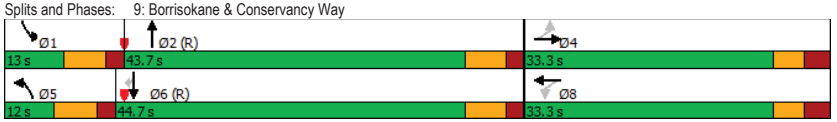
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	0	3	12	0	49	1	413	5	22	181	20
Future Volume (vph)	46	0	3	12	0	49	1	413	5	22	181	20
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1702	0	1621	1706	1450
Flt Permitted	0.725			0.756			0.950			0.950		
Satd. Flow (perm)	1237	1450	0	1290	1450	0	1621	1702	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	46	3	0	12	49	0	1	418	0	22	181	20
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		12.0	43.7		13.0	44.7	44.7
Total Split (%)	37.0%	37.0%		37.0%	37.0%		13.3%	48.6%		14.4%	49.7%	49.7%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.5	13.5		13.5	13.5		5.5	67.4		6.4	70.4	70.4
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.06	0.75		0.07	0.78	0.78
v/c Ratio	0.25	0.01		0.06	0.23		0.01	0.33		0.19	0.14	0.02
Control Delay	34.7	28.0		29.6	33.8		40.0	10.6		43.2	6.4	8.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	34.7	28.0		29.6	33.8		40.0	10.6		43.2	6.4	8.2
LOS	C	C		C	C		D	B		D	A	A
Approach Delay		34.3			33.0			10.7			10.2	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	7.4	0.5		1.9	7.8		0.2	19.6		3.6	7.2	0.7
Queue Length 95th (m)	13.7	2.3		5.3	14.1		1.7	83.3		12.1	21.0	4.4
Internal Link Dist (m)		145.0			184.4			650.0			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	371	435		387	435		99	1274		120	1334	1134
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.12	0.01		0.03	0.11		0.01	0.33		0.18	0.14	0.02

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.33

Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 43.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Borrisokane & Conservancy Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	4	2	0	4	0	1	507	0	0	221	20
Future Volume (vph)	47	4	2	0	4	0	1	507	0	0	221	20
Satd. Flow (prot)	1621	1706	1450	0	1706	0	1621	1706	0	0	1706	1450
Flt Permitted	0.755						0.620					
Satd. Flow (perm)	1288	1706	1450	0	1706	0	1058	1706	0	0	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	47	4	2	0	4	0	1	507	0	0	221	20
Turn Type	Perm	NA	Perm		NA		Perm	NA			NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	5.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	31.8	31.8	31.8	31.8	31.8		31.8	31.8		31.8	31.8	31.8
Total Split (s)	33.0	33.0	33.0	33.0	33.0		57.0	57.0		57.0	57.0	57.0
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%		63.3%	63.3%		63.3%	63.3%	63.3%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8		6.8		6.8	6.8			6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	12.8	12.8	12.8		11.0		73.0	73.0			73.0	73.0
Actuated g/C Ratio	0.14	0.14	0.14		0.12		0.81	0.81			0.81	0.81
v/c Ratio	0.26	0.02	0.01		0.02		0.00	0.37			0.16	0.02
Control Delay	35.8	29.2	29.0		29.5		5.0	4.3			4.9	5.5
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay	35.8	29.2	29.0		29.5		5.0	4.3			4.9	5.5
LOS	D	C	C		C		A	A			A	A
Approach Delay		35.1			29.5			4.3			5.0	
Approach LOS		D			C			A			A	
Queue Length 50th (m)	7.5	0.6	0.3		0.6		0.0	25.1			9.3	0.7
Queue Length 95th (m)	14.5	2.9	1.9		2.9		m0.1	32.7			27.7	4.1
Internal Link Dist (m)		113.8			68.5			273.4			275.6	
Turn Bay Length (m)	38.5						27.5					
Base Capacity (vph)	374	496	422		496		858	1383			1383	1176
Starvation Cap Reductn	0	0	0		0		0	0			0	0
Spillback Cap Reductn	0	0	0		0		0	0			0	0
Storage Cap Reductn	0	0	0		0		0	0			0	0
Reduced v/c Ratio	0.13	0.01	0.00		0.01		0.00	0.37			0.16	0.02

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.37
Intersection Signal Delay: 6.6 Intersection LOS: A
Intersection Capacity Utilization 57.7% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Borrisokane & New Collector/BRT

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	96	188	128	26	92	66	1858	132	85	2701	108
Future Volume (vph)	275	96	188	128	26	92	66	1858	132	85	2701	108
Satd. Flow (prot)	1605	1706	1450	1517	1440	0	3144	3174	0	1589	3241	1450
Flt Permitted	0.681			0.695			0.950			0.950		
Satd. Flow (perm)	1150	1706	1431	1108	1440	0	3144	3174	0	1589	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	275	96	188	128	118	0	66	1990	0	85	2701	108
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	39.9	39.9	39.9	39.9	39.9		11.4	68.1		12.0	68.7	68.7
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%		9.5%	56.8%		10.0%	57.3%	57.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	31.0	31.0	31.0	31.0	31.0		5.5	61.7		7.6	66.2	66.2
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.26		0.05	0.51		0.06	0.55	0.55
v/c Ratio	0.93	0.22	0.51	0.45	0.32		0.46	1.22		0.85	1.51	0.14
Control Delay	79.9	35.6	42.9	42.3	37.8		74.3	117.5		113.1	257.6	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	79.9	35.6	42.9	42.3	37.8		74.3	117.5		113.1	257.6	15.1
LOS	E	D	D	D	D		E	F		F	F	B
Approach Delay		59.8			40.1			116.1			244.3	
Approach LOS		E			D			F			F	
Queue Length 50th (m)	61.0	17.2	36.5	24.4	21.7		7.4	~304.2		~23.2	~473.2	12.6
Queue Length 95th (m)	#108.3	31.1	59.0	42.9	37.9		m6.9	m#218.2		#55.1	#511.7	22.4
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	316	469	393	304	396		143	1631		100	1788	800
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.87	0.20	0.48	0.42	0.30		0.46	1.22		0.85	1.51	0.14

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.51
Intersection Signal Delay: 171.8 — Intersection LOS: F
Intersection Capacity Utilization 116.8% — ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

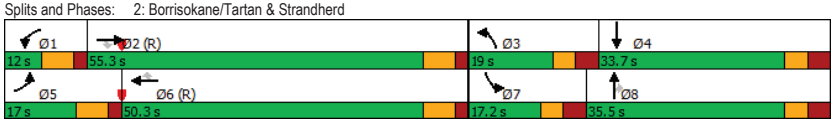
Splits and Phases: 1: Strandherd & Dealership/Kennevale

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	1673	1077	114	1128	65	710	34	107	52	49	122
Future Volume (vph)	322	1673	1077	114	1128	65	710	34	107	52	49	122
Satd. Flow (prot)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	322	1673	1077	114	1128	65	710	34	107	52	171	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	34.0	34.0	11.7	33.7	
Total Split (s)	17.0	55.3	55.3	12.0	50.3	50.3	19.0	35.5	35.5	17.2	33.7	
Total Split (%)	14.2%	46.1%	46.1%	10.0%	41.9%	41.9%	15.8%	29.6%	29.6%	14.3%	28.1%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	18.1	48.7	48.7	13.1	43.7	43.7	12.3	25.2	25.2	8.8	19.3	
Actuated g/C Ratio	0.15	0.41	0.41	0.11	0.36	0.36	0.10	0.21	0.21	0.07	0.16	
v/c Ratio	1.33	1.27	1.85	0.64	0.97	0.12	2.34	0.09	0.39	0.48	0.72	
Control Delay	200.4	147.3	404.9	70.2	57.1	26.3	635.7	39.1	45.8	67.2	64.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	200.4	147.3	404.9	70.2	57.1	26.3	635.7	39.1	45.8	67.2	64.5	
LOS	F	F	F	E	E	C	F	D	D	E	E	
Approach Delay		243.2			56.7			537.7			65.1	
Approach LOS		F			E			F			E	
Queue Length 50th (m)	~98.1	~255.0	~377.9	25.8	134.1	10.0	~139.0	6.7	22.3	11.7	38.2	
Queue Length 95th (m)	m#83.8	m94.2	m#232.0	#73.8	#179.0	19.9	#175.2	14.5	37.0	24.4	57.2	
Internal Link Dist (m)		1040.6			371.1			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	242	1315	582	177	1168	522	304	415	318	131	331	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.33	1.27	1.85	0.64	0.97	0.12	2.34	0.08	0.34	0.40	0.52	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.34
Intersection Signal Delay: 237.2 — Intersection LOS: F
Intersection Capacity Utilization 109.7% — ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



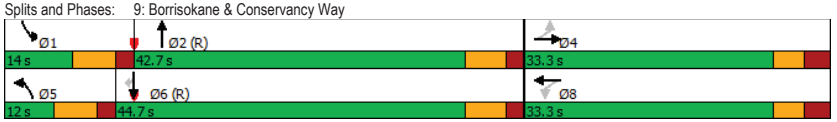
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	0	2	8	0	32	3	255	12	49	426	42
Future Volume (vph)	30	0	2	8	0	32	3	255	12	49	426	42
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1694	0	1621	1706	1450
Flt Permitted	0.736			0.757			0.950			0.950		
Satd. Flow (perm)	1256	1450	0	1291	1450	0	1621	1694	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	30	2	0	8	32	0	3	267	0	49	426	42
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		12.0	42.7		14.0	44.7	44.7
Total Split (%)	37.0%	37.0%		37.0%	37.0%		13.3%	47.4%		15.6%	49.7%	49.7%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.4	13.4		13.4	13.4		5.6	63.9		7.4	70.5	70.5
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.06	0.71		0.08	0.78	0.78
v/c Ratio	0.16	0.01		0.04	0.15		0.03	0.22		0.37	0.32	0.04
Control Delay	32.5	28.0		29.0	32.0		40.3	11.1		43.4	9.7	11.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	32.5	28.0		29.0	32.0		40.3	11.1		43.4	9.7	11.1
LOS	C	C		C	C		D	B		D	A	B
Approach Delay		32.2			31.4			11.4			13.0	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	4.7	0.3		1.3	5.1		0.5	20.9		8.0	20.1	1.5
Queue Length 95th (m)	9.9	1.8		4.0	10.3		3.2	51.1		20.6	61.6	10.4
Internal Link Dist (m)		154.2			129.4			1276.6			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	376	435		387	435		100	1203		142	1335	1135
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.08	0.00		0.02	0.07		0.03	0.22		0.35	0.32	0.04

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.37

Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 52.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Borrisokane & Conservancy Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	4	1	0	4	0	2	315	0	0	516	43
Future Volume (vph)	31	4	1	0	4	0	2	315	0	0	516	43
Satd. Flow (prot)	1621	1706	1450	0	1706	0	1621	1706	0	0	1706	1450
Flt Permitted	0.755						0.458					
Satd. Flow (perm)	1288	1706	1450	0	1706	0	781	1706	0	0	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	31	4	1	0	4	0	2	315	0	0	516	43
Turn Type	Perm	NA	Perm		NA		Perm	NA			NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	5.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	30.8	30.8	30.8		31.8	31.8		31.8	31.8	31.8
Total Split (s)	32.0	32.0	32.0	32.0	32.0		58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%	35.6%	35.6%	35.6%		64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8		6.8		6.8	6.8			6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	12.8	12.8	12.8		11.0		73.0	73.0			73.0	73.0
Actuated g/C Ratio	0.14	0.14	0.14		0.12		0.81	0.81			0.81	0.81
v/c Ratio	0.17	0.02	0.00		0.02		0.00	0.23			0.37	0.04
Control Delay	33.7	29.5	28.0		29.5		4.5	3.9			6.4	5.2
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay	33.7	29.5	28.0		29.5		4.5	3.9			6.4	5.2
LOS	C	C	C		C		A	A			A	A
Approach Delay		33.1			29.5			3.9			6.3	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	4.9	0.6	0.2		0.6		0.1	15.0			27.1	1.6
Queue Length 95th (m)	10.7	2.9	1.3		2.9		m0.4	21.0			74.0	7.1
Internal Link Dist (m)		209.1			112.8			273.4			275.6	
Turn Bay Length (m)	38.5						27.5					
Base Capacity (vph)	360	477	406		477		634	1384			1384	1176
Starvation Cap Reductn	0	0	0		0		0	0			0	0
Spillback Cap Reductn	0	0	0		0		0	0			0	0
Storage Cap Reductn	0	0	0		0		0	0			0	0
Reduced v/c Ratio	0.09	0.01	0.00		0.01		0.00	0.23			0.37	0.04

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.37
Intersection Signal Delay: 6.6 Intersection LOS: A
Intersection Capacity Utilization 58.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Borrisokane & New Collector/BRT

Appendix G

TDM Checklist

CGH TRANSPORTATION

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

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

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

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

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

Appendix H

Justification 7 Signal Warrants

CGH TRANSPORTATION

Conservancy Way @ Borrisokane Road
FB 2030

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	465	97%	38%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	46	38%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	419	87%	48%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	24	48%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Conservancy Way @ Borrisokane Road
FB 2035

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	403	84%	38%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	46	38%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	357	74%	48%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	24	48%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Conservancy Way @ Borrisokane Road
FT 2030

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	551	115%	75%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	91	75%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	461	96%	96%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	66	133%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Conservancy Way @ Borrisokane Road
FT 2035

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	489	102%	75%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	91	75%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	399	83%	83%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	66	133%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

New Collector @ Borrisokane
FB 2030

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	489	102%	25%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	30	25%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	468	98%	39%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	20	39%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

New Collector @ Borrisokane
FB 2035

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	431	90%	30%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	36	30%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	406	85%	43%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	22	43%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

New Collector @ Borrisokane
FT 2030

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	650	135%	82%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	98	82%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	584	122%	122%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	63	126%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

New Collector @ Borrisokane
FT 2035

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	592	123%	87%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	104	87%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	522	109%	109%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	65	130%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Appendix I

Synchro Intersection Worksheets – 2030 Future Total Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	19	47	100	108	113	219	2769	86	53	1317	307
Future Volume (vph)	72	19	47	100	108	113	219	2769	86	53	1317	307
Satd. Flow (prot)	1243	1160	1450	1589	1353	0	3144	3220	0	1476	3090	1395
Flt Permitted	0.460			0.745			0.950			0.950		
Satd. Flow (perm)	602	1160	1431	1245	1353	0	3144	3220	0	1476	3090	1395
Satd. Flow (RTOR)												
Lane Group Flow (vph)	72	19	47	100	221	0	219	2855	0	53	1317	307
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	41.0	41.0	41.0	41.0	41.0		17.8	66.6		12.4	61.2	61.2
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%		14.8%	55.5%		10.3%	51.0%	51.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	24.8	24.8	24.8	24.8	24.8		12.7	69.3		8.8	62.8	62.8
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.11	0.58		0.07	0.52	0.52
v/c Ratio	0.58	0.08	0.16	0.39	0.79		0.66	1.54		0.50	0.81	0.42
Control Delay	60.0	35.6	37.4	43.8	64.3		66.8	260.2		69.4	30.4	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.0	35.6	37.4	43.8	64.3		66.8	260.2		69.4	30.4	21.5
LOS	E	D	D	D	E		E	F		E	C	C
Approach Delay		49.0			57.9			246.4			30.0	
Approach LOS		D			E			F			C	
Queue Length 50th (m)	15.2	3.6	9.0	20.2	49.1		25.2	~519.0		11.9	131.8	43.0
Queue Length 95th (m)	28.6	9.1	17.6	33.2	70.2		m15.4	m#256.5		#32.4	#197.1	73.9
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	171	329	406	353	384		338	1859		107	1618	730
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.42	0.06	0.12	0.28	0.58		0.65	1.54		0.50	0.81	0.42

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.54
Intersection Signal Delay: 159.9 — Intersection LOS: F
Intersection Capacity Utilization 131.7% — ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Strandherd & Dealership/Kennevale

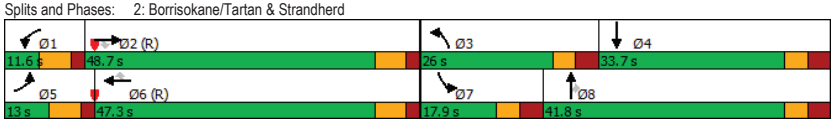
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	753	561	98	1599	52	1156	49	195	69	23	230
Future Volume (vph)	117	753	561	98	1599	52	1156	49	195	69	23	230
Satd. Flow (prot)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	117	753	561	98	1599	52	1156	49	195	69	253	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	33.7	33.7	11.7	33.7	
Total Split (s)	13.0	48.7	48.7	11.6	47.3	47.3	26.0	41.8	41.8	17.9	33.7	
Total Split (%)	10.8%	40.6%	40.6%	9.7%	39.4%	39.4%	21.7%	34.8%	34.8%	14.9%	28.1%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.3	42.1	42.1	7.9	40.7	40.7	19.3	36.4	36.4	9.6	24.1	
Actuated g/C Ratio	0.08	0.35	0.35	0.07	0.34	0.34	0.16	0.30	0.30	0.08	0.20	
v/c Ratio	0.95	0.69	1.20	0.92	1.47	0.11	2.31	0.10	0.44	0.54	0.86	
Control Delay	124.2	22.1	129.3	125.0	247.8	28.2	620.8	31.9	38.3	68.3	72.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	124.2	22.1	129.3	125.0	247.8	28.2	620.8	31.9	38.3	68.3	72.2	
LOS	F	C	F	F	F	C	F	C	D	E	E	
Approach Delay		72.5			234.4			519.1			71.4	
Approach LOS		E			F			F			E	
Queue Length 50th (m)	~33.3	46.4	~160.0	~28.8	~268.4	8.3	~225.7	8.3	37.0	15.5	55.9	
Queue Length 95th (m)	m#52.8	58.1	m#217.1	#64.9	#310.1	17.4	#265.6	17.7	59.3	30.3	#92.0	
Internal Link Dist (m)		1040.6			387.1			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	123	1094	467	106	1088	456	500	512	444	149	331	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.95	0.69	1.20	0.92	1.47	0.11	2.31	0.10	0.44	0.46	0.76	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.31
Intersection Signal Delay: 257.7 Intersection LOS: F
Intersection Capacity Utilization 126.8% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd

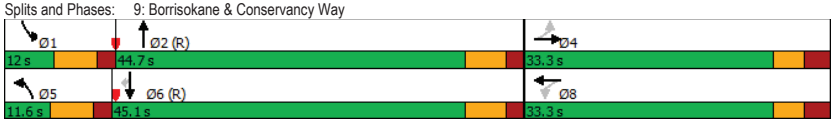


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	0	10	12	0	49	4	496	5	22	220	64
Future Volume (vph)	149	0	10	12	0	49	4	496	5	22	220	64
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1704	0	1621	1706	1450
Flt Permitted	0.725			0.751			0.950			0.950		
Satd. Flow (perm)	1237	1450	0	1281	1450	0	1621	1704	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	149	10	0	12	49	0	4	501	0	22	220	64
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		11.6	44.7		12.0	45.1	45.1
Total Split (%)	37.0%	37.0%		37.0%	37.0%		12.9%	49.7%		13.3%	50.1%	50.1%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	17.1	17.1		17.1	17.1		5.5	54.8		6.2	57.7	57.7
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.06	0.61		0.07	0.64	0.64
v/c Ratio	0.64	0.04		0.05	0.18		0.04	0.48		0.20	0.20	0.07
Control Delay	44.6	25.8		26.2	29.2		40.8	15.1		44.0	9.8	9.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	44.6	25.8		26.2	29.2		40.8	15.1		44.0	9.8	9.8
LOS	D	C		C	C		D	B		D	A	A
Approach Delay		43.4			28.6			15.3			12.2	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	24.0	1.4		1.7	7.2		0.7	34.0		3.6	12.1	3.2
Queue Length 95th (m)	36.8	4.8		5.3	14.1		3.9	103.4		10.9	39.8	13.8
Internal Link Dist (m)		145.0			184.4			650.0			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	371	435		384	435		100	1037		111	1093	929
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.40	0.02		0.03	0.11		0.04	0.48		0.20	0.20	0.07

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64
Intersection Signal Delay: 19.5 — Intersection LOS: B
Intersection Capacity Utilization 54.0% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: Borrisokane & Conservancy Way



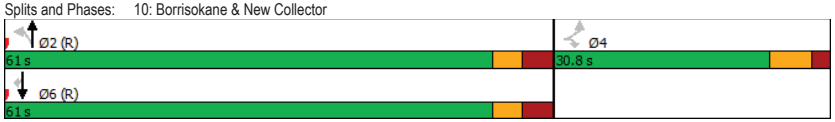
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	152	6	3	691	300	65
Future Volume (vph)	152	6	3	691	300	65
Satd. Flow (prot)	1621	1450	1621	1706	1706	1450
Flt Permitted	0.950		0.577			
Satd. Flow (perm)	1621	1450	984	1706	1706	1450
Satd. Flow (RTOR)						
Lane Group Flow (vph)	152	6	3	691	300	65
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	31.8	31.8	31.8	31.8
Total Split (s)	30.8	30.8	61.0	61.0	61.0	61.0
Total Split (%)	33.6%	33.6%	66.4%	66.4%	66.4%	66.4%
Yellow Time (s)	4.6	4.6	3.3	3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	3.5	3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	15.1	15.1	63.1	63.1	63.1	63.1
Actuated g/C Ratio	0.16	0.16	0.69	0.69	0.69	0.69
v/c Ratio	0.57	0.03	0.00	0.59	0.26	0.07
Control Delay	42.7	28.5	6.7	11.3	7.0	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	28.5	6.7	11.3	7.0	6.2
LOS	D	C	A	B	A	A
Approach Delay	42.2			11.3	6.9	
Approach LOS	D			B	A	
Queue Length 50th (m)	25.1	0.9	0.2	52.2	16.4	3.1
Queue Length 95th (m)	38.3	3.7	1.3	115.9	37.9	9.6
Internal Link Dist (m)	113.8			273.4	275.6	
Turn Bay Length (m)	38.5		27.5			
Base Capacity (vph)	423	379	675	1171	1171	996
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.02	0.00	0.59	0.26	0.07

Intersection Summary

Cycle Length: 91.8
Actuated Cycle Length: 91.8
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59
Intersection Signal Delay: 14.0 Intersection LOS: B
Intersection Capacity Utilization 58.6% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 10: Borrisokane & New Collector



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	96	188	128	26	92	66	1867	132	85	2724	108
Future Volume (vph)	275	96	188	128	26	92	66	1867	132	85	2724	108
Satd. Flow (prot)	1605	1706	1450	1517	1440	0	3144	3174	0	1589	3241	1450
Flt Permitted	0.681			0.695			0.950			0.950		
Satd. Flow (perm)	1150	1706	1431	1108	1440	0	3144	3174	0	1589	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	275	96	188	128	118	0	66	1999	0	85	2724	108
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	43.0	43.0	43.0	43.0	43.0		11.4	65.0		12.0	65.6	65.6
Total Split (%)	35.8%	35.8%	35.8%	35.8%	35.8%		9.5%	54.2%		10.0%	54.7%	54.7%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	32.1	32.1	32.1	32.1	32.1		5.8	59.3		9.0	64.8	64.8
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27		0.05	0.49		0.08	0.54	0.54
v/c Ratio	0.90	0.21	0.49	0.43	0.31		0.43	1.28		0.71	1.56	0.14
Control Delay	72.9	34.0	41.0	40.3	36.2		72.0	144.4		87.3	277.9	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	72.9	34.0	41.0	40.3	36.2		72.0	144.4		87.3	277.9	16.4
LOS	E	C	D	D	D		E	F		F	F	B
Approach Delay		55.5			38.3			142.1			262.7	
Approach LOS		E			D			F			F	
Queue Length 50th (m)	59.6	16.8	35.7	23.9	21.2		7.4	~322.4		20.0	~489.7	13.3
Queue Length 95th (m)	#101.1	29.9	56.8	41.3	36.4		m7.3	m#248.0		#55.1	#528.2	23.8
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	345	513	430	333	433		153	1567		119	1751	783
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.80	0.19	0.44	0.38	0.27		0.43	1.28		0.71	1.56	0.14

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.56
Intersection Signal Delay: 190.1 — Intersection LOS: F
Intersection Capacity Utilization 117.5% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Strandherd & Dealership/Kennevale

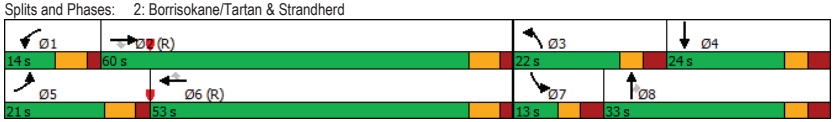
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	1600	1166	192	1075	65	775	34	159	52	49	122
Future Volume (vph)	322	1600	1166	192	1075	65	775	34	159	52	49	122
Satd. Flow (prot)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	322	1600	1166	192	1075	65	775	34	159	52	171	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	31.7	31.7	11.7	16.7	
Total Split (s)	21.0	60.0	60.0	14.0	53.0	53.0	22.0	33.0	33.0	13.0	24.0	
Total Split (%)	17.5%	50.0%	50.0%	11.7%	44.2%	44.2%	18.3%	27.5%	27.5%	10.8%	20.0%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	15.3	53.4	53.4	8.3	46.4	46.4	15.3	28.0	28.0	6.3	16.4	
Actuated g/C Ratio	0.13	0.44	0.44	0.07	0.39	0.39	0.13	0.23	0.23	0.05	0.14	
v/c Ratio	1.58	1.11	1.82	1.73	0.87	0.12	2.05	0.09	0.52	0.67	0.85	
Control Delay	305.9	69.2	391.5	397.8	42.7	24.5	509.2	38.2	48.2	94.2	84.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	305.9	69.2	391.5	397.8	42.7	24.5	509.2	38.2	48.2	94.2	84.5	
LOS	F	E	F	F	D	C	F	D	D	F	F	
Approach Delay		215.6			93.0			416.9			86.8	
Approach LOS		F			F			F			F	
Queue Length 50th (m)	~110.4	~219.2	~406.3	~68.7	119.8	9.6	~145.9	6.4	33.1	12.1	39.0	
Queue Length 95th (m)	m#67.6	m41.6	m#237.7	#113.7	148.5	19.1	#182.8	14.9	55.3	#31.7	#74.4	
Internal Link Dist (m)		1040.6			313.4			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	204	1442	639	111	1241	555	378	398	305	78	212	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.58	1.11	1.82	1.73	0.87	0.12	2.05	0.09	0.52	0.67	0.81	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.05
Intersection Signal Delay: 216.1 Intersection LOS: F
Intersection Capacity Utilization 114.7% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	0	6	8	0	32	9	308	12	49	512	141
Future Volume (vph)	96	0	6	8	0	32	9	308	12	49	512	141
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1696	0	1621	1706	1450
Flt Permitted	0.736			0.754			0.950			0.950		
Satd. Flow (perm)	1256	1450	0	1286	1450	0	1621	1696	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	96	6	0	8	32	0	9	320	0	49	512	141
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		11.6	42.8		13.9	45.1	45.1
Total Split (%)	37.0%	37.0%		37.0%	37.0%		12.9%	47.6%		15.4%	50.1%	50.1%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	14.8	14.8		14.8	14.8		5.7	58.0		7.4	64.6	64.6
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.06	0.64		0.08	0.72	0.72
v/c Ratio	0.47	0.03		0.04	0.13		0.09	0.29		0.37	0.42	0.14
Control Delay	39.7	27.0		27.4	30.2		41.9	13.0		40.5	12.6	11.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.7	27.0		27.4	30.2		41.9	13.0		40.5	12.6	11.6
LOS	D	C		C	C		D	B		D	B	B
Approach Delay		39.0			29.6			13.8			14.4	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	15.6	0.9		1.2	4.9		1.5	27.8		8.0	29.2	6.2
Queue Length 95th (m)	24.7	3.4		4.0	10.3		6.1	62.0		m17.4	85.6	30.3
Internal Link Dist (m)		154.2			129.4			1276.6			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	376	435		385	435		102	1093		141	1224	1040
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.26	0.01		0.02	0.07		0.09	0.29		0.35	0.42	0.14

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47
Intersection Signal Delay: 16.9 Intersection LOS: B
Intersection Capacity Utilization 61.1% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Borrisokane & Conservancy Way

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	99	4	6	430	698	144
Future Volume (vph)	99	4	6	430	698	144
Satd. Flow (prot)	1621	1450	1621	1706	1706	1450
Flt Permitted	0.950		0.350			
Satd. Flow (perm)	1621	1450	597	1706	1706	1450
Satd. Flow (RTOR)						
Lane Group Flow (vph)	99	4	6	430	698	144
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	28.3	23.6	23.6	23.6	23.6
Total Split (s)	29.0	29.0	61.0	61.0	61.0	61.0
Total Split (%)	32.2%	32.2%	67.8%	67.8%	67.8%	67.8%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.0	2.0	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.3	5.3	5.6	5.6	5.6	5.6
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	13.3	13.3	70.0	70.0	70.0	70.0
Actuated g/C Ratio	0.15	0.15	0.78	0.78	0.78	0.78
v/c Ratio	0.41	0.02	0.01	0.32	0.53	0.13
Control Delay	38.7	29.0	5.2	5.5	7.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	29.0	5.2	5.5	7.9	4.6
LOS	D	C	A	A	A	A
Approach Delay	38.4			5.5	7.3	
Approach LOS	D			A	A	
Queue Length 50th (m)	16.1	0.6	0.3	25.2	38.8	5.2
Queue Length 95th (m)	26.2	3.0	m1.2	34.1	104.9	16.9
Internal Link Dist (m)	209.1			273.4	275.6	
Turn Bay Length (m)	38.5		27.5			
Base Capacity (vph)	426	381	464	1326	1326	1127
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.01	0.01	0.32	0.53	0.13

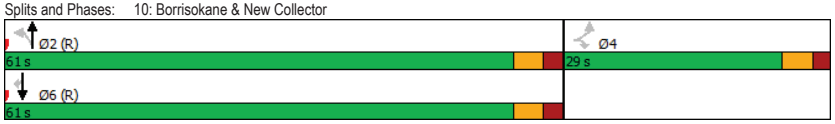
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.53

Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 56.2%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 10: Borrisokane & New Collector



Appendix J

Synchro Intersection Worksheets – 2035 Future Total Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	19	47	100	108	113	219	2873	86	53	1375	307
Future Volume (vph)	72	19	47	100	108	113	219	2873	86	53	1375	307
Satd. Flow (prot)	1243	1160	1450	1589	1353	0	3144	3223	0	1476	3090	1395
Flt Permitted	0.460			0.745			0.950			0.950		
Satd. Flow (perm)	602	1160	1431	1245	1353	0	3144	3223	0	1476	3090	1395
Satd. Flow (RTOR)												
Lane Group Flow (vph)	72	19	47	100	221	0	219	2959	0	53	1375	307
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	41.0	41.0	41.0	41.0	41.0		17.4	66.6		12.4	61.6	61.6
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%		14.5%	55.5%		10.3%	51.3%	51.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	24.8	24.8	24.8	24.8	24.8		12.7	69.3		8.8	62.8	62.8
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21		0.11	0.58		0.07	0.52	0.52
v/c Ratio	0.58	0.08	0.16	0.39	0.79		0.66	1.59		0.50	0.85	0.42
Control Delay	60.0	35.6	37.4	43.8	64.3		66.7	284.8		69.4	32.4	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.0	35.6	37.4	43.8	64.3		66.7	284.8		69.4	32.4	21.4
LOS	E	D	D	D	E		E	F		E	C	C
Approach Delay		49.0			57.9			269.8			31.6	
Approach LOS		D			E			F			C	
Queue Length 50th (m)	15.2	3.6	9.0	20.2	49.1		25.1	~545.5		11.9	142.8	43.1
Queue Length 95th (m)	28.6	9.1	17.6	33.2	70.2		m15.0	m#259.8		#32.4	#210.5	73.5
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	171	329	406	353	384		336	1861		107	1618	730
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.42	0.06	0.12	0.28	0.58		0.65	1.59		0.50	0.85	0.42

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.59
Intersection Signal Delay: 174.5 — Intersection LOS: F
Intersection Capacity Utilization 134.7% — ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Strandherd & Dealership/Kennevale

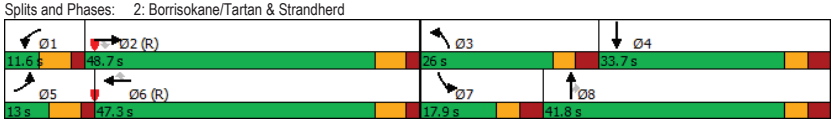
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	798	574	98	1663	52	1187	49	195	69	23	230
Future Volume (vph)	117	798	574	98	1663	52	1187	49	195	69	23	230
Satd. Flow (prot)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1589	3119	1332	1621	3210	1345	3113	1673	1450	1605	1474	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	117	798	574	98	1663	52	1187	49	195	69	253	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	33.7	33.7	11.7	33.7	
Total Split (s)	13.0	48.7	48.7	11.6	47.3	47.3	26.0	41.8	41.8	17.9	33.7	
Total Split (%)	10.8%	40.6%	40.6%	9.7%	39.4%	39.4%	21.7%	34.8%	34.8%	14.9%	28.1%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	9.3	42.1	42.1	7.9	40.7	40.7	19.3	36.4	36.4	9.6	24.1	
Actuated g/C Ratio	0.08	0.35	0.35	0.07	0.34	0.34	0.16	0.30	0.30	0.08	0.20	
v/c Ratio	0.95	0.73	1.23	0.92	1.53	0.11	2.37	0.10	0.44	0.54	0.86	
Control Delay	122.1	22.9	139.8	125.0	273.0	28.2	648.0	31.9	38.3	68.3	72.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	122.1	22.9	139.8	125.0	273.0	28.2	648.0	31.9	38.3	68.3	72.2	
LOS	F	C	F	F	F	C	F	C	D	E	E	
Approach Delay		75.8			258.0			543.8			71.4	
Approach LOS		E			F			F			E	
Queue Length 50th (m)	~33.8	47.6	~165.3	~28.8	~284.6	8.3	~233.4	8.3	37.0	15.5	55.9	
Queue Length 95th (m)	m#50.2	m64.6	m#211.8	#64.9	#326.4	17.4	#273.3	17.7	59.3	30.3	#92.0	
Internal Link Dist (m)		1040.6			387.1			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	123	1094	467	106	1088	456	500	512	444	149	331	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.95	0.73	1.23	0.92	1.53	0.11	2.37	0.10	0.44	0.46	0.76	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.37
Intersection Signal Delay: 273.4 Intersection LOS: F
Intersection Capacity Utilization 129.6% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



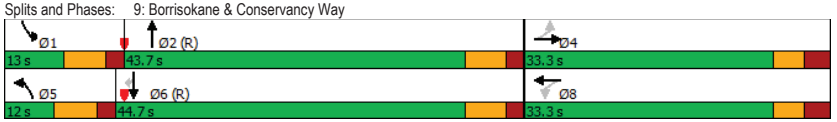
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	0	10	12	0	49	4	415	5	22	185	64
Future Volume (vph)	149	0	10	12	0	49	4	415	5	22	185	64
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1702	0	1621	1706	1450
Flt Permitted	0.725			0.751			0.950			0.950		
Satd. Flow (perm)	1237	1450	0	1281	1450	0	1621	1702	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	149	10	0	12	49	0	4	420	0	22	185	64
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		12.0	43.7		13.0	44.7	44.7
Total Split (%)	37.0%	37.0%		37.0%	37.0%		13.3%	48.6%		14.4%	49.7%	49.7%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	17.1	17.1		17.1	17.1		5.6	54.6		6.4	57.6	57.6
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.06	0.61		0.07	0.64	0.64
v/c Ratio	0.64	0.04		0.05	0.18		0.04	0.41		0.19	0.17	0.07
Control Delay	44.6	25.8		26.2	29.2		40.8	14.1		43.2	8.4	8.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	44.6	25.8		26.2	29.2		40.8	14.1		43.2	8.4	8.8
LOS	D	C		C	C		D	B		D	A	A
Approach Delay		43.4			28.6			14.4			11.3	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	24.0	1.4		1.7	7.2		0.7	26.8		3.7	9.8	3.2
Queue Length 95th (m)	36.8	4.8		5.3	14.1		3.8	83.8		11.8	21.8	9.7
Internal Link Dist (m)		145.0			184.4			650.0			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	371	435		384	435		101	1032		120	1092	928
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.40	0.02		0.03	0.11		0.04	0.41		0.18	0.17	0.07

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 19.5	Intersection LOS: B
Intersection Capacity Utilization 49.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Borrisokane & Conservancy Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	4	6	0	4	0	3	610	0	0	265	65
Future Volume (vph)	152	4	6	0	4	0	3	610	0	0	265	65
Satd. Flow (prot)	1621	1706	1450	0	1706	0	1621	1706	0	0	1706	1450
Flt Permitted	0.755						0.596					
Satd. Flow (perm)	1288	1706	1450	0	1706	0	1017	1706	0	0	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	152	4	6	0	4	0	3	610	0	0	265	65
Turn Type	Perm	NA	Perm		NA		Perm	NA			NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	5.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	31.8	31.8	31.8	31.8	31.8		31.8	31.8		31.8	31.8	31.8
Total Split (s)	33.0	33.0	33.0	33.0	33.0		57.0	57.0		57.0	57.0	57.0
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%		63.3%	63.3%		63.3%	63.3%	63.3%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8		6.8		6.8	6.8			6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	16.3	16.3	16.3		16.3		60.1	60.1			60.1	60.1
Actuated g/C Ratio	0.18	0.18	0.18		0.18		0.67	0.67			0.67	0.67
v/c Ratio	0.65	0.01	0.02		0.01		0.00	0.54			0.23	0.07
Control Delay	46.4	26.5	26.8		26.5		7.0	9.7			7.5	6.8
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay	46.4	26.5	26.8		26.5		7.0	9.7			7.5	6.8
LOS	D	C	C		C		A	A			A	A
Approach Delay		45.2			26.5			9.7			7.3	
Approach LOS		D			C			A			A	
Queue Length 50th (m)	24.5	0.6	0.9		0.6		0.2	44.4			15.4	3.3
Queue Length 95th (m)	39.2	2.9	3.6		2.9		m0.6	56.6			33.4	9.7
Internal Link Dist (m)		113.8			68.5			273.4			275.6	
Turn Bay Length (m)	38.5						27.5					
Base Capacity (vph)	374	496	422		496		678	1138			1138	967
Starvation Cap Reductn	0	0	0		0		0	0			0	0
Spillback Cap Reductn	0	0	0		0		0	0			0	0
Storage Cap Reductn	0	0	0		0		0	0			0	0
Reduced v/c Ratio	0.41	0.01	0.01		0.01		0.00	0.54			0.23	0.07

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65
Intersection Signal Delay: 14.2 Intersection LOS: B
Intersection Capacity Utilization 63.4% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Borrisokane & New Collector/BRT

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	96	188	128	26	92	66	1940	132	85	2823	108
Future Volume (vph)	275	96	188	128	26	92	66	1940	132	85	2823	108
Satd. Flow (prot)	1605	1706	1450	1517	1440	0	3144	3174	0	1589	3241	1450
Flt Permitted	0.681			0.695			0.950			0.950		
Satd. Flow (perm)	1150	1706	1431	1108	1440	0	3144	3174	0	1589	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	275	96	188	128	118	0	66	2072	0	85	2823	108
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Detector Phase	4	4	4	8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	39.9	39.9	39.9	32.9	32.9		11.4	30.4		11.4	39.4	39.4
Total Split (s)	39.9	39.9	39.9	39.9	39.9		11.4	68.1		12.0	68.7	68.7
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%		9.5%	56.8%		10.0%	57.3%	57.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.9	6.9	6.9	6.9	6.9		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	31.0	31.0	31.0	31.0	31.0		5.5	61.7		7.6	66.2	66.2
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.26		0.05	0.51		0.06	0.55	0.55
v/c Ratio	0.93	0.22	0.51	0.45	0.32		0.46	1.27		0.85	1.58	0.14
Control Delay	79.9	35.6	42.9	42.3	37.8		73.8	140.0		113.1	287.6	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	79.9	35.6	42.9	42.3	37.8		73.8	140.0		113.1	287.6	15.1
LOS	E	D	D	D	D		E	F		F	F	B
Approach Delay		59.8			40.1			137.9			272.9	
Approach LOS		E			D			F			F	
Queue Length 50th (m)	61.0	17.2	36.5	24.4	21.7		7.5	~325.9		~23.2	~504.3	12.6
Queue Length 95th (m)	#108.3	31.1	59.0	42.9	37.9		m6.7	m#218.6		#55.1	#542.2	22.4
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	316	469	393	304	396		143	1631		100	1788	800
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.87	0.20	0.48	0.42	0.30		0.46	1.27		0.85	1.58	0.14

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.58

Intersection Signal Delay: 194.9	Intersection LOS: F
Intersection Capacity Utilization 120.4%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

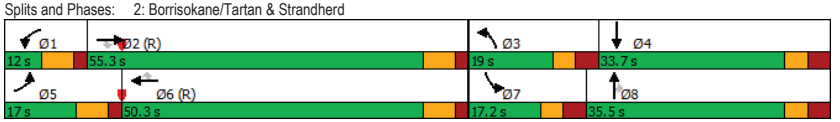
Splits and Phases: 1: Strandherd & Dealership/Kennevale

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	322	1673	1199	192	1128	65	792	34	159	52	49	122
Future Volume (vph)	322	1673	1199	192	1128	65	792	34	159	52	49	122
Satd. Flow (prot)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1605	3241	1436	1621	3210	1436	2969	1706	1309	1503	1472	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	322	1673	1199	192	1128	65	792	34	159	52	171	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.6	33.6	33.6	11.6	33.6	33.6	11.7	34.0	34.0	11.7	33.7	
Total Split (s)	17.0	55.3	55.3	12.0	50.3	50.3	19.0	35.5	35.5	17.2	33.7	
Total Split (%)	14.2%	46.1%	46.1%	10.0%	41.9%	41.9%	15.8%	29.6%	29.6%	14.3%	28.1%	
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.4	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	
Act Effct Green (s)	18.1	48.7	48.7	13.1	43.7	43.7	12.3	25.2	25.2	8.8	19.3	
Actuated g/C Ratio	0.15	0.41	0.41	0.11	0.36	0.36	0.10	0.21	0.21	0.07	0.16	
v/c Ratio	1.33	1.27	2.06	1.08	0.97	0.12	2.61	0.09	0.58	0.48	0.72	
Control Delay	200.5	147.2	497.9	142.3	57.1	26.3	754.0	39.1	52.3	67.2	64.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	200.5	147.2	497.9	142.3	57.1	26.3	754.0	39.1	52.3	67.2	64.5	
LOS	F	F	F	F	E	C	F	D	D	E	E	
Approach Delay		284.2			67.5			616.0			65.1	
Approach LOS		F			E			F			E	
Queue Length 50th (m)	~97.9	~255.0	~437.3	~49.7	134.1	10.0	~159.4	6.7	34.7	11.7	38.2	
Queue Length 95th (m)	m#78.7	m84.5	m#257.7	#120.2	#179.0	19.9	#196.5	14.5	53.8	24.4	57.2	
Internal Link Dist (m)		1040.6			371.1			275.6			103.1	
Turn Bay Length (m)	90.0		90.0	50.0		27.5	160.0		57.5	17.0		
Base Capacity (vph)	242	1315	582	177	1168	522	304	415	318	131	331	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.33	1.27	2.06	1.08	0.97	0.12	2.61	0.08	0.50	0.40	0.52	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.61
Intersection Signal Delay: 280.4 Intersection LOS: F
Intersection Capacity Utilization 116.8% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Borrisokane/Tartan & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	0	6	8	0	32	9	259	12	49	429	141
Future Volume (vph)	96	0	6	8	0	32	9	259	12	49	429	141
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1694	0	1621	1706	1450
Flt Permitted	0.736			0.754			0.950			0.950		
Satd. Flow (perm)	1256	1450	0	1286	1450	0	1621	1694	0	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	96	6	0	8	32	0	9	271	0	49	429	141
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	33.3	33.3		33.3	33.3		11.6	25.6		11.6	25.6	25.6
Total Split (s)	33.3	33.3		33.3	33.3		12.0	42.7		14.0	44.7	44.7
Total Split (%)	37.0%	37.0%		37.0%	37.0%		13.3%	47.4%		15.6%	49.7%	49.7%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3		6.3	6.3		6.6	6.6		6.6	6.6	6.6
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	14.8	14.8		14.8	14.8		5.8	58.0		7.4	64.5	64.5
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.06	0.64		0.08	0.72	0.72
v/c Ratio	0.47	0.03		0.04	0.13		0.09	0.25		0.37	0.35	0.14
Control Delay	39.7	27.0		27.4	30.2		41.7	12.6		41.0	11.8	11.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.7	27.0		27.4	30.2		41.7	12.6		41.0	11.8	11.5
LOS	D	C		C	C		D	B		D	B	B
Approach Delay		39.0			29.6			13.5			14.1	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	15.6	0.9		1.2	4.9		1.5	22.7		7.9	22.9	6.2
Queue Length 95th (m)	24.7	3.4		4.0	10.3		6.0	52.0		m19.2	68.7	28.3
Internal Link Dist (m)		154.2			129.4			1276.6			273.4	
Turn Bay Length (m)	9.3			9.3			84.0			84.5		83.0
Base Capacity (vph)	376	435		385	435		104	1091		142	1223	1039
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.26	0.01		0.02	0.07		0.09	0.25		0.35	0.35	0.14

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 56.5% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Borrisokane & Conservancy Way

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	4	4	0	4	0	6	381	0	0	615	144
Future Volume (vph)	99	4	4	0	4	0	6	381	0	0	615	144
Satd. Flow (prot)	1621	1706	1450	0	1706	0	1621	1706	0	0	1706	1450
Flt Permitted	0.755						0.388					
Satd. Flow (perm)	1288	1706	1450	0	1706	0	662	1706	0	0	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	99	4	4	0	4	0	6	381	0	0	615	144
Turn Type	Perm	NA	Perm		NA		Perm	NA			NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	5.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	30.8	30.8	30.8	30.8	30.8		31.8	31.8		31.8	31.8	31.8
Total Split (s)	32.0	32.0	32.0	32.0	32.0		58.0	58.0		58.0	58.0	58.0
Total Split (%)	35.6%	35.6%	35.6%	35.6%	35.6%		64.4%	64.4%		64.4%	64.4%	64.4%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8		6.8		6.8	6.8			6.8	6.8
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	14.1	14.1	14.1		13.2		67.0	67.0			67.0	67.0
Actuated g/C Ratio	0.16	0.16	0.16		0.15		0.74	0.74			0.74	0.74
v/c Ratio	0.49	0.01	0.02		0.02		0.01	0.30			0.48	0.13
Control Delay	41.5	28.0	28.0		28.0		6.8	6.9			8.9	6.0
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay	41.5	28.0	28.0		28.0		6.8	6.9			8.9	6.0
LOS	D	C	C		C		A	A			A	A
Approach Delay		40.5			28.0			6.9			8.4	
Approach LOS		D			C			A			A	
Queue Length 50th (m)	16.1	0.6	0.6		0.6		0.4	27.1			39.8	6.6
Queue Length 95th (m)	26.7	2.9	2.9		2.9		m1.6	37.5			96.0	19.1
Internal Link Dist (m)		209.1			112.8			273.4			275.6	
Turn Bay Length (m)	38.5						27.5					
Base Capacity (vph)	360	477	406		477		492	1269			1269	1079
Starvation Cap Reductn	0	0	0		0		0	0			0	0
Spillback Cap Reductn	0	0	0		0		0	0			0	0
Storage Cap Reductn	0	0	0		0		0	0			0	0
Reduced v/c Ratio	0.28	0.01	0.01		0.01		0.01	0.30			0.48	0.13

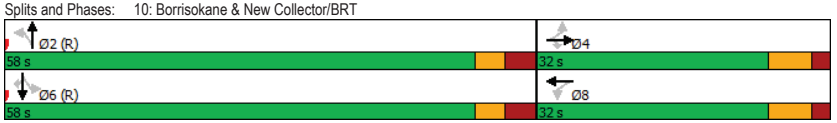
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 10.7	Intersection LOS: B
Intersection Capacity Utilization 63.7%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 10: Borrisokane & New Collector/BRT



Appendix K

MMLOS Analysis

CGH TRANSPORTATION

Consultant	**CGH Transportation**	**Project**	**Conservancy West**
Scenario	**Existing/Future**	**Date**	**7-Dec-22**
Comments			

INTERSECTIONS		Strandherd-Kennevale (Existing)				Strandherd-Kennevale (Future)			
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Pedestrian	Lanes	4	5	3	5	7	7	3	5
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive	Protected	Protected	Protected	Protected
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	5-10m	15-25m	10-15m	10-15m	15-25m	15-25m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	**53**	**37**	**71**	**35**	**18**	**12**	**76**	**43**
	Ped. Exposure to Traffic LoS	**D**	**E**	**C**	**E**	**F**	**F**	**B**	**E**
	Cycle Length	120	120	120	120	120	120	120	120
	Effective Walk Time	64	49	7	7	41	46	7	7
	Average Pedestrian Delay	**13**	**21**	**53**	**53**	**26**	**23**	**53**	**53**
	Pedestrian Delay LoS	**B**	**C**	**E**	**E**	**C**	**C**	**E**	**E**
	Level of Service	**D**	**E**	**E**	**E**	**F**	**F**	**E**	**E**
		E				**F**			
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
Bicycle	Bicycle Lane Arrangement on Approach	Pocket Bike Lane	Pocket Bike Lane	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	≤ 50 m Introduced right turn lane	> 50 m Introduced right turn lane	≤ 50 m	≤ 50 m	Not Applicable	Not Applicable	≤ 50 m	≤ 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	Not Applicable	Not Applicable	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	**B**	**D**	**D**	**D**	**Not Applicable**	**Not Applicable**	**D**	**D**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**
	Left Turn Approach	1 lane crossed	1 lane crossed	No lane crossed	One lane crossed	2-stage, LT box	2-stage, LT box	No lane crossed	One lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h
	Left Turning Cyclist	**E**	**E**	**B**	**E**	**A**	**A**	**B**	**E**
	Level of Service	**E**	**E**	**D**	**E**	**A**	**A**	**D**	**E**
		E				**E**			
Transit	Average Signal Delay	> 40 sec	> 40 sec	≤ 30 sec		> 40 sec	> 40 sec	> 40 sec	
	Level of Service	**F**	**F**	**D**	**-**	**F**	**F**	**F**	**-**
		F				**F**			
Truck	Effective Corner Radius	10 - 15 m	< 10 m		> 15 m	10 - 15 m	10 - 15 m		> 15 m
	Number of Receiving Lanes on Departure from Intersection	1	≥ 2		1	1	≥ 2		≥ 2
	Level of Service	**E**	**D**	**-**	**C**	**E**	**B**	**-**	**A**
		E				**E**			
Auto	Volume to Capacity Ratio	> 1.00				> 1.00			
	Level of Service	**F**				**F**			

Strandherd-Borrisokane (Existing)				Strandherd-Borrisokane (Future)				New Collector/BRT-Borrisokane (Future)			
NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
4	3	3	4	3	4	5	6	5	4	4	5
No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
Permissive	Permissive	Permissive	Permissive	Protected	Protected	Protected	Protected	Permissive	Permissive	Protected	Protected
Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
No	No	No	No	No	No	No	No	No	No	No	No
No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
10-15m	10-15m	5-10m	15-25m	5-10m	5-10m	10-15m	10-15m	10-15m	10-15m	10-15m	10-15m
Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
53	**70**	**71**	**51**	**79**	**62**	**45**	**28**	**37**	**53**	**61**	**45**
D	**C**	**C**	**D**	**B**	**C**	**D**	**F**	**E**	**D**	**C**	**D**
97	97	97	97	120	120	120	120	90	90	90	90
24	24	40	40	7	9	21	22	32	32	8	8
27	**27**	**17**	**17**	**53**	**51**	**41**	**40**	**19**	**19**	**37**	**37**
C	**C**	**B**	**B**	**E**	**E**	**E**	**E**	**B**	**B**	**D**	**D**
D	**C**	**C**	**D**	**E**	**E**	**E**	**F**	**E**	**D**	**D**	**D**
D				**F**				**E**			
NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
≤ 50 m	≤ 50 m	≤ 50 m	> 50 m								
≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	>25 km/h								
D	**D**	**D**	**F**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
Mixed Traffic	**Mixed Traffic**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**
One lane crossed	One lane crossed	One lane crossed	≥ 2 lanes crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box
> 50 to < 60 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h
E	**D**	**F**	**F**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
E	**D**	**F**	**F**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
F				**A**				**A**			
≤ 30 sec		> 40 sec	≤ 40 sec	> 40 sec		> 40 sec	> 40 sec	≤ 10 sec	≤ 10 sec	≤ 30 sec	≤ 30 sec
D	**-**	**F**	**E**	**F**	**-**	**F**	**F**	**B**	**B**	**D**	**D**
F				**F**				**D**			
	10 - 15 m		> 15 m		< 10 m		10 - 15 m				
	1		1		≥ 2		1				
-	**E**	**-**	**C**	**-**	**D**	**-**	**E**	**-**	**-**	**-**	**-**
E				**E**				**-**			
> 1.00				> 1.00				0.0 - 0.60			
F				**F**				**A**			

Conservancy Way-Borrisokane (Future)			
NORTH	**SOUTH**	**EAST**	**WEST**
4	4	3	3
No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	No Median - 2.4 m
Permissive	Permissive	No left turn / Prohib.	Permissive
No right turn	Permissive or yield control	No right turn	Permissive or yield control
RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR allowed
No	No	No	No
No Right Turn	No Channel	No Right Turn	No Channel
10-15m	10-15m	10-15m	10-15m
Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
62	**56**	**90**	**70**
C	**D**	**A**	**C**
90	90	90	90
26	24	7	7
23	**24**	**38**	**38**
C	**C**	**D**	**D**
C	**D**	**D**	**D**
D			
NORTH	**SOUTH**	**EAST**	**WEST**
Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
Not Applicable	**Not Applicable**	**Not Applicable**	**Not Applicable**
Separated	**Separated**	**Separated**	**Separated**
2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box
> 50 to < 60 km/h	> 50 to < 60 km/h	≥ 60 km/h	≥ 60 km/h
A	**A**	**A**	**A**
A	**A**	**A**	**A**
A			
≤ 20 sec	≤ 20 sec	≤ 40 sec	≤ 30 sec
C	**C**	**E**	**D**
E			
-	**-**	**-**	**-**
-			
0.0 - 0.60			
A			