3285, 3288 & 3305 Borrisokane Road

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report (revised)

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1 Screening

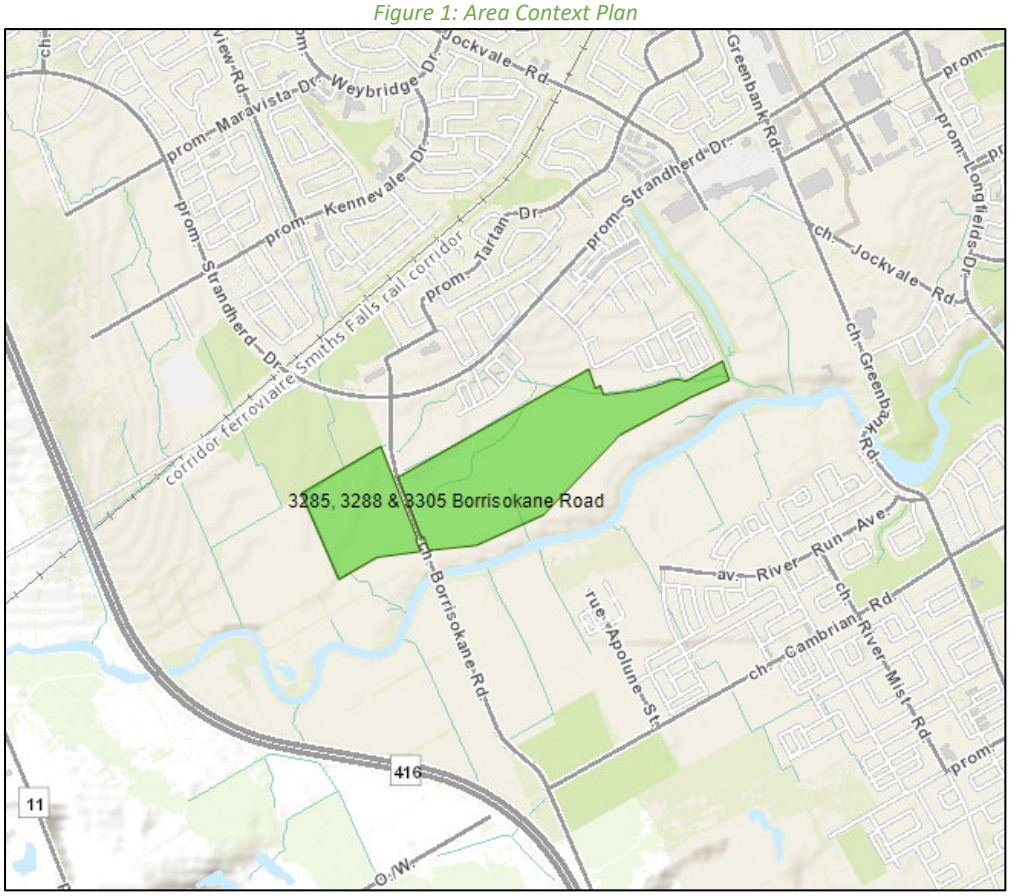
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required. As this is a zoning bylaw amendment and draft plan of subdivision application, the Design Review and Network Impact Components will be completed.

2 Existing and Planned Conditions

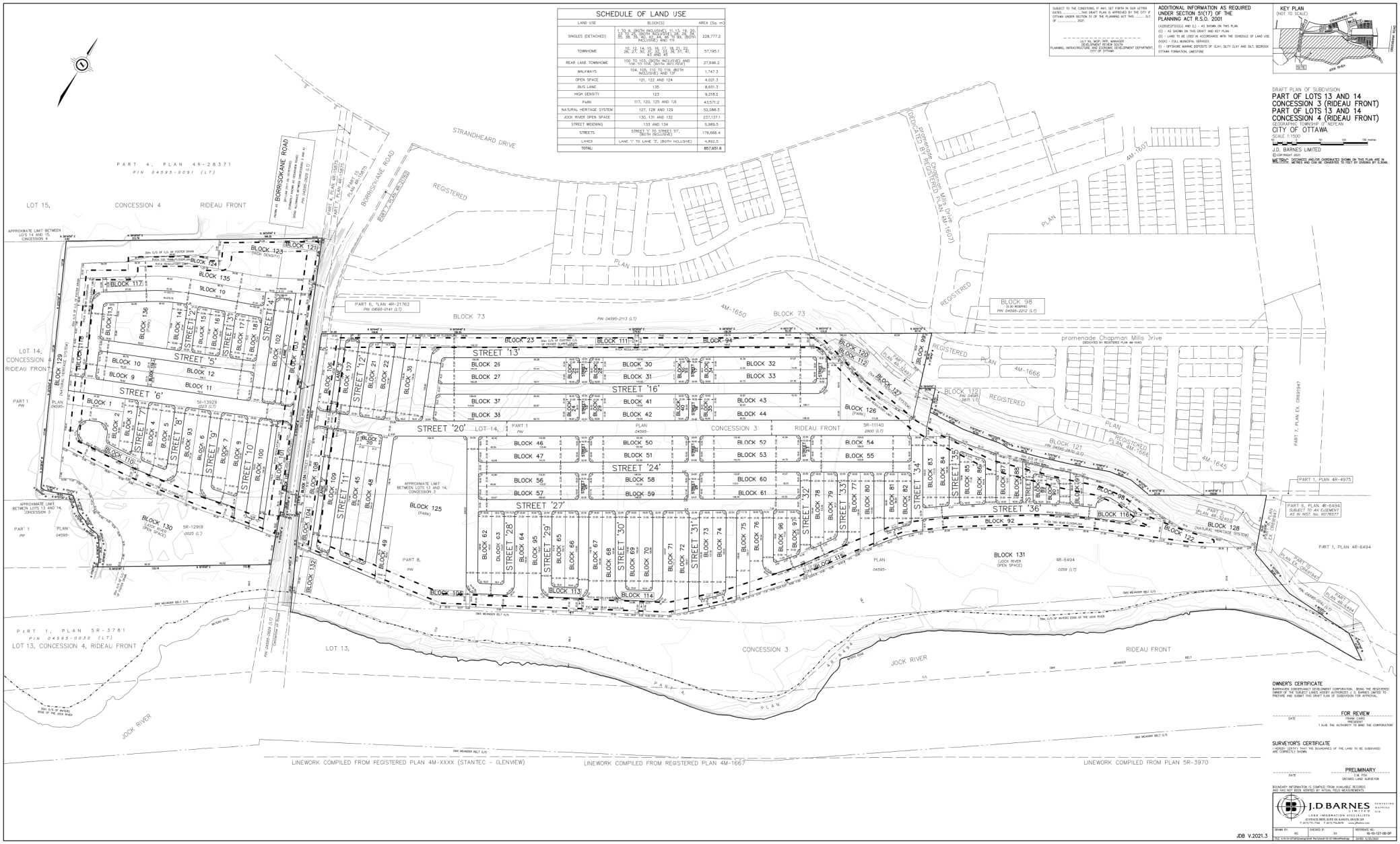
2.1 Proposed Development

The proposed development is composed 3285 and 3305 Borrisokane Road and a portion of 3288 Borrisokane Road. These properties are currently greenfield lots that are currently zoned DR – Development Reserve Zone and are within both the Nepean South 8 and South 10 secondary plan areas. The proposed residential development includes a mixture of detached homes, townhouses (row and rear lane) and a high-density block totalling approximately 1,300 units, with split of 600 single detached homes, 600 rear lane/townhomes and 100 apartments. The anticipated full build-out and occupancy horizon is 2029. Access to the proposed development will include a collector road intersection with Borrisokane Road, and a connection to the extension of Chapman Mills Drive. Figure 1 illustrates the Study Area Context and Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: May 24, 2020


SCHEDULE OF LAND USE
LAND USE | BLOCK(S) | AREA (Sq. m)
SINGLES (DETACHED) | 1, 70, 9, (BOTH INCLUSIVE), 11, 13, 19, 20, 22, 25, 29, (BOTH INCLUSIVE), 120, 124, 125, 126, 127, 128, 129, (BOTH INCLUSIVE) AND 131 | 228,777.2
TOWNHOME | 10, 12, 14, 15, 16, 17, 18, 21, 23, 26, 27, 30, 31, 32, 33, 34, 35, 37, 41, 43 AND 45 | 57,195.1
REAR LANE TOWNHOME | 100, TO 103, (BOTH INCLUSIVE) AND 106, TO 108, (BOTH INCLUSIVE) | 27,696.2
WALKWAYS | 104, 105, 110, TO 119, (BOTH INCLUSIVE) AND 133 | 1,747.3
OPEN SPACE | 121, 122 AND 124 | 4,021.3
BUS LANE | 135 | 8,651.3
HIGH DENSITY | 123 | 9,218.2
PARK | 117, 120, 125 AND 126 | 43,571.2
NATURAL HERITAGE SYSTEM | 127, 128 AND 129 | 52,088.3
JOCK RIVER OPEN SPACE | 130, 131 AND 132 | 237,137.1
STREET WIDENING | 133 AND 134 | 5,389.5
STREETS | STREET 'I' TO STREET 'J7', (BOTH INCLUSIVE) | 176,666.4
LANES | LANE 'I' TO LANE 'J', (BOTH INCLUSIVE) | 4,892.5
TOTAL: | | 857,651.6
SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED _____, THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT THIS _____ DAY OF _____, 2021.
LILY XU, MCIP, RPP, MANAGER DEVELOPMENT REVIEW SOUTH PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT CITY OF OTTAWA
ADDITIONAL INFORMATION AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 2001
(a)(b)(c)(f)(i)(j) AND (L) - AS SHOWN ON THIS PLAN.
(c) - AS SHOWN ON THIS DRAFT AND KEY PLAN.
(D) - LAND TO BE USED IN ACCORDANCE WITH THE SCHEDULE OF LAND USE.
(H)(K) - FULL MUNICIPAL SERVICES.
(l) - OFFSHORE MARINE DEPOSITS OF CLAY, SILTY CLAY AND SILT, BEDROCK OTTAWA FORMATION, LIMESTONE
KEY PLAN
(NOT TO SCALE)
STRANDHEARD DRIVE
BORRISOKANE ROAD
REGISTERED PLAN 4M-1607
SITE
JOCK RIVER
DRAFT PLAN OF SUBDIVISION
PART OF LOTS 13 AND 14
CONCESSION 3 (RIDEAU FRONT)
PART OF LOTS 13 AND 14
CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA
SCALE 1:1500
0 15 30 60 90 120 150 metres
J.D. BARNES LIMITED
©COPYRIGHT 2021
METRIC: DISTANCES AND/OR ORDINATES SHOWN ON THIS PLAN ARE IN METRES. METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.
PART 4, PLAN 4R-28371
PIN 04595-0091 (LT)
LOT 15, CONCESSION 4 RIDEAU FRONT
BORRISOKANE ROAD
PART 4, PLAN 4R-15875
PART 1, PLAN 4R-13929
PART 15, PLAN 4R-13929
STRANDHEARD DRIVE
REGISTERED PLAN 4M-1607
PART 6, PLAN 4R-21762
PIN 04595-0141 (LT)
BLOCK 73
PIN 04595-2113 (LT)
4M-1650
BLOCK 98
PIN 04595-2212 (LT)
promenade Chapman Mills Drive
(DEDICATED BY REGISTERED PLAN 4M-1666)
4M-1665
4M-1664
4M-1645
BLOCK 122
PIN 04595-2870 (LT)
PART 7, PLAN EX. OR601947
PART 1, PLAN 4R-4975
PART 6, PLAN 4R-6494
SUBJECT TO AN EASEMENT AS IN INST. No. N178577
PART 1, PLAN 4R-6494
PART 10, PLAN EX. OR601947
PART 11, PLAN 4R-6494
LOT 14, CONCESSION 4 RIDEAU FRONT
PART 1, PLAN 4R-13929
PIN 04595-0025 (LT)
APPROXIMATE LIMIT BETWEEN LOTS 14 AND 15, CONCESSION 4
APPROXIMATE LIMIT BETWEEN LOTS 13 AND 14, CONCESSION 3
LOT 14, CONCESSION 3 RIDEAU FRONT
PART 1, PLAN 5R-11140
2900 (LT)
PART 1, PLAN 5R-12999
0025 (LT)
PART 1, PLAN 5R-3781
PIN 04595-0030 (LT)
LOT 13, CONCESSION 4, RIDEAU FRONT
LOT 13, CONCESSION 3 RIDEAU FRONT
PART 8, PLAN 4R-6494
0059 (LT)
PART 1, PLAN 4R-6494
PIN 04595-0029 (LT)
CENTRELINE OF ROAD
30m O/S OF WATER'S EDGE OF THE JOCK RIVER
OHW MEANDER BELT O/S
JOCK RIVER
BLOCK 1 (Park)
BLOCK 130 (JOCK RIVER OPEN SPACE)
BLOCK 131 (JOCK RIVER OPEN SPACE)
BLOCK 132 (JOCK RIVER OPEN SPACE)
BLOCK 133 (ROAD WIDENING)
BLOCK 134 (ROAD WIDENING)
BLOCK 135 (BUS LANE)
BLOCK 136 (Park)
BLOCK 98 (NATURAL HERITAGE SYSTEM)
BLOCK 128 (NATURAL HERITAGE SYSTEM)
BLOCK 129 (NATURAL HERITAGE SYSTEM)
BLOCK 92
BLOCK 116
BLOCK 122
BLOCK 123
BLOCK 124
BLOCK 125 (Park)
BLOCK 126 (Park)
BLOCK 127
BLOCK 111
BLOCK 112
BLOCK 113
BLOCK 114
BLOCK 115
BLOCK 117
BLOCK 118
BLOCK 119
BLOCK 120
BLOCK 121
STREET '1'
STREET '2'
STREET '3'
STREET '4'
STREET '5'
STREET '6'
STREET '7'
STREET '8'
STREET '9'
STREET '10'
STREET '11'
STREET '12'
STREET '13'
STREET '16'
STREET '20'
STREET '24'
STREET '27'
STREET '28'
STREET '29'
STREET '30'
STREET '31'
STREET '32'
STREET '33'
STREET '34'
STREET '35'
STREET '36'
BLOCK 1 BLOCK 2 BLOCK 3 BLOCK 4 BLOCK 5 BLOCK 6 BLOCK 7 BLOCK 8 BLOCK 9 BLOCK 10 BLOCK 11 BLOCK 12 BLOCK 13 BLOCK 14 BLOCK 15 BLOCK 16 BLOCK 17 BLOCK 18 BLOCK 19 BLOCK 20 BLOCK 21 BLOCK 22 BLOCK 23 BLOCK 24 BLOCK 25 BLOCK 26 BLOCK 27 BLOCK 28 BLOCK 29 BLOCK 30 BLOCK 31 BLOCK 32 BLOCK 33 BLOCK 34 BLOCK 35 BLOCK 36 BLOCK 37 BLOCK 38 BLOCK 39 BLOCK 40 BLOCK 41 BLOCK 42 BLOCK 43 BLOCK 44 BLOCK 45 BLOCK 46 BLOCK 47 BLOCK 48 BLOCK 49 BLOCK 50 BLOCK 51 BLOCK 52 BLOCK 53 BLOCK 54 BLOCK 55 BLOCK 56 BLOCK 57 BLOCK 58 BLOCK 59 BLOCK 60 BLOCK 61 BLOCK 62 BLOCK 63 BLOCK 64 BLOCK 65 BLOCK 66 BLOCK 67 BLOCK 68 BLOCK 69 BLOCK 70 BLOCK 71 BLOCK 72 BLOCK 73 BLOCK 74 BLOCK 75 BLOCK 76 BLOCK 77 BLOCK 78 BLOCK 79 BLOCK 80 BLOCK 81 BLOCK 82 BLOCK 83 BLOCK 84 BLOCK 85 BLOCK 86 BLOCK 87 BLOCK 88 BLOCK 89 BLOCK 90 BLOCK 91 BLOCK 93 BLOCK 94 BLOCK 95 BLOCK 96 BLOCK 97 BLOCK 99 BLOCK 100 BLOCK 101 BLOCK 102 BLOCK 103 BLOCK 104 BLOCK 105 BLOCK 106 BLOCK 107 BLOCK 108 BLOCK 109
LINEWORK COMPILED FROM REGISTERED PLAN 4M-XXXX (STANTEC - GLENVIEW)
LINEWORK COMPILED FROM REGISTERED PLAN 4M-1667
LINEWORK COMPILED FROM PLAN 5R-3970
OWNER'S CERTIFICATE
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ARE CORRECTLY SHOWN.
FOR REVIEW
DATE
PRELIMINARY
SURVEYOR'S CERTIFICATE
BOUNDARY INFORMATION IS COMPILED FROM AVAILABLE RECORDS AND HAS NOT BEEN VERIFIED BY ACTUAL FIELD MEASUREMENTS
J.D.BARNES
LAND INFORMATION SPECIALISTS
JDB V.2021.3

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 Ottawa Official Plan reserves a 37.5 metre right of way 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 and an 80 km/h posted speed limit within the study area. The Ottawa Official Plan reserves a 44.5 metre right of way. No sidewalks are provided along the section of Strandherd Drive within the study area.

Cambrian Road: Cambrian Road is a City of Ottawa arterial road with a two-lane rural cross-section including gravel shoulders and a 70 km/h posted speed limit. The Ottawa Official Plan reserves a 37.5 metre right of way from Cedarview (now Borrisokane Road) to Jockvale Road.

Greenbank Road: Greenbank Road is a City of Ottawa arterial road with a four-lane urban cross-section, transitioning to two-lanes south of Jockvale Road. Sidewalks are provided on the east side of the road and transition to a paved shoulder on the east side. The posted speed limit is 60 km/h. The Ottawa Official Plan reserves a 37.5 metre right of way between Strandherd Drive and future Chapman Mills Drive, and 44.5 metre south of Chapman Mills Drive.

Chapman Mills Drive: The future extension of Chapman Mills Drive will abut the previously approved Phase 1 of the Conservancy Development. A section of the planned future collector road portion of Chapman Mills Drive is planned as part of the construction of the development to the North of Phase 1 of the Conservancy development. This north-south collector road will serve as the connection for the first phases of the overall Conservancy.

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 right-of-way is 20.0m.

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 right-of-way is 24.0m.

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.

Fraser Fields Way: Fraser Fields Way is a City of Ottawa local road with a two-lane urban cross-section including sidewalks on both sides of the road and a 50 km/h unposted speed limit.

2.2.2 Existing Intersections

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, 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 are present.

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 are present.
Strandherd Drive at Fraser Fields Way/Chapman Mills Drive	The intersection of Strandherd Drive at Fraser Fields Way/Chapman Mills Drive is an unsignalized intersection. The eastbound approach consists of an auxiliary left-turn lane and shared through/right-turn lane, the westbound approach consists of a through lane and auxiliary right-turn lane, the southbound and southbound approaches consist of a right-turn only. The temporary median on the north and south side of the intersection restricts left-turns in and out of Chapman Mills Drive and Fraser Fields Way. A eastbound and westbound auxiliary left-turn lanes have been gored out as an interim measure.
Strandherd Drive at Greenbank Road	The intersection of Strandherd Dive and Greenbank Road is a signalized intersection. The eastbound and westbound approaches consist of an auxiliary left-turn lane, two through lanes and an auxiliary right-turn lane. The northbound approach consists of dual left-turn lanes, a through lane and shared through/right-turn lane, and the southbound approach consists of dual left-turn lanes, a two through lanes and an auxiliary right-turn lane. No turn restrictions are present.
Cambrian Road at Borrisokane Road	The intersection of Cambrian Road at Borrisokane Road is an unsignalized intersection with no auxiliary lanes. The intersection is stop controlled on the Cambrian Road (minor) leg of the road. No crosswalks are present, and none of the legs of the intersection have sidewalks. No cycling facilities are present on any of the legs of the intersection. No turn restrictions are present.
Chapman Mills Drive at Point Prim Crescent	The intersection of Chapman Mills Drive at Point Prim Crescent is a minor stop-controlled intersection. Chapman Mills Drive dead ends at this location and the northbound approach has the stop control. No turn restrictions are present.
Chapman Mills Drive at Chapman Mills Drive	The intersection of Chapman Mills Drive at Chapman Mills Drive is a minor stop-controlled intersection. No turn restrictions are present.

2.2.3 Existing Driveways

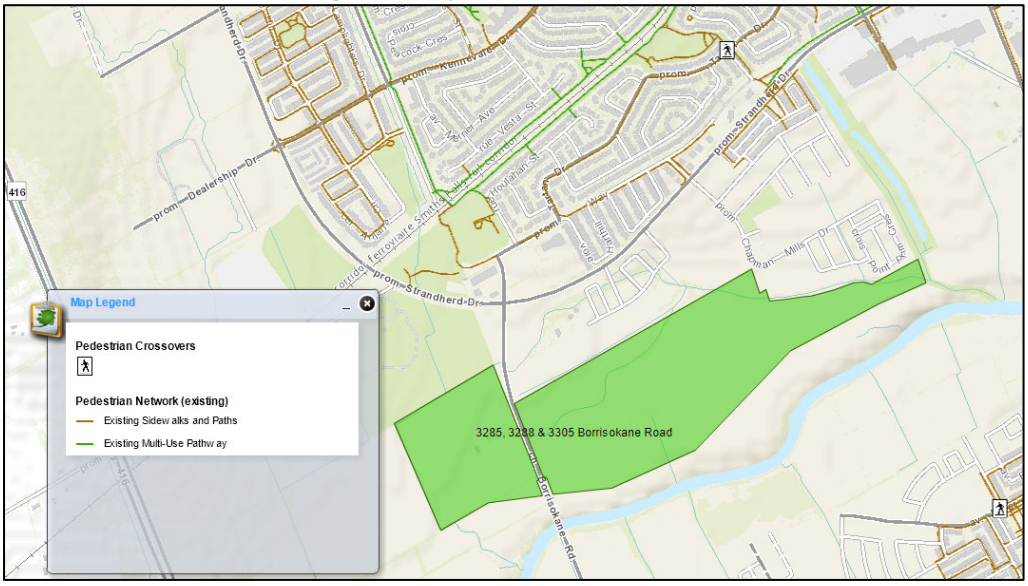
There are existing field entrances along Borrisokane Road, and private driveways for 3231 Borrisokane Road north of the site and 3288 Borrisokane Road that will be removed once the subject site is developed.

2.2.4 Cycling and Pedestrian Facilities

Figure 3 illustrates the pedestrian facilities in the study area and Figure 4 illustrates the cycling facilities.

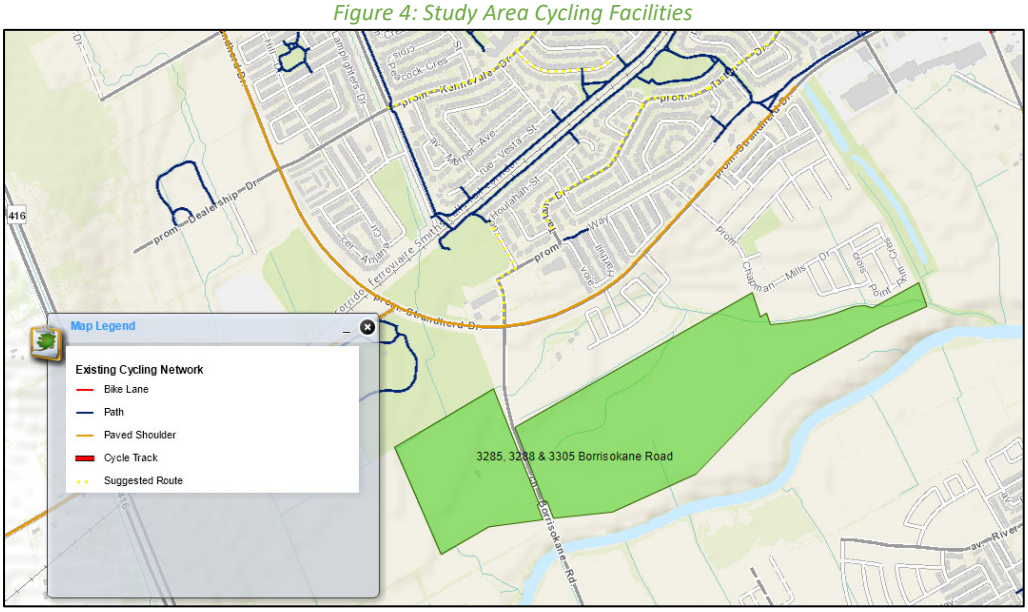
Strandherd Drive is noted on the City of Ottawa's Existing Cycling Network as a "Paved Shoulder". No pedestrian facilities are provided along either Strandherd Drive or Borrisokane Road. Bot networks are developing in the area and will include sidewalks and cycling tracks along Strandherd Drive and Chapman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

Figure 3: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: May 24, 2020

Figure 4: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: May 24, 2020

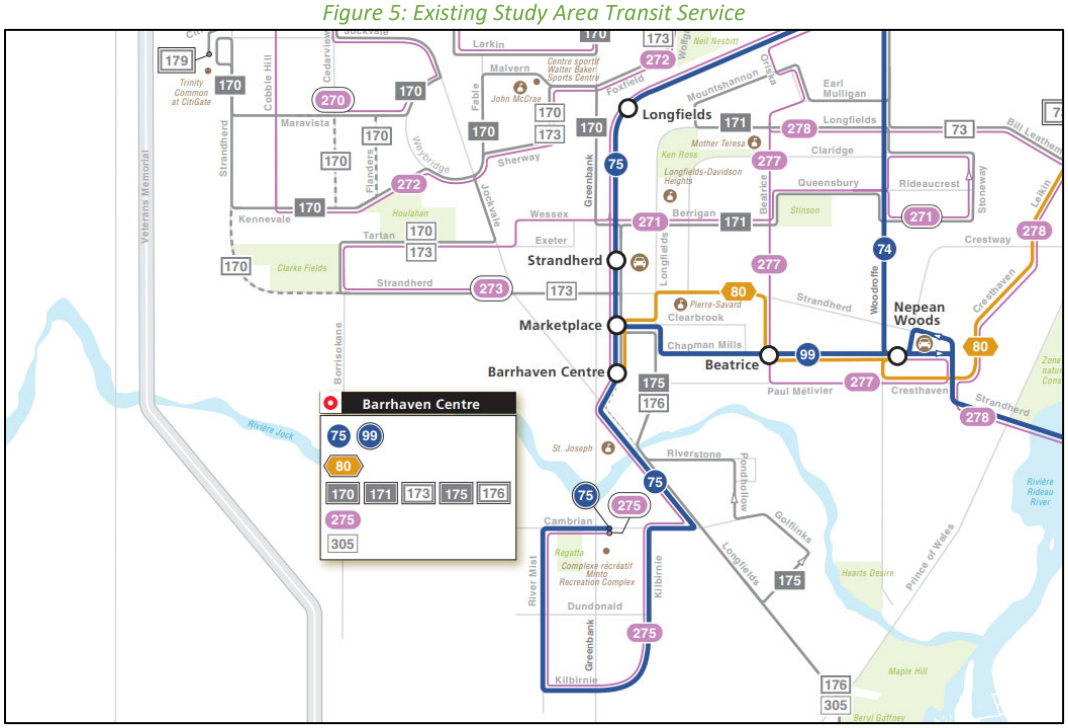
2.2.5 Existing Transit

Within the study area, the routes #170, 173 and 273 provide service within 400 metres of the proposed site. Stops are located on Strandherd Drive at Andora Avenue, Madrid Avenue and Chapman Mills Drive, and on Tartan Dive north of Strandherd Drive. The frequency of these routes within proximity of the proposed site currently 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 15-20 minutes to downtown, returned 3:30 to 6:25 PM to Strandherd Drive and Jockvale Road

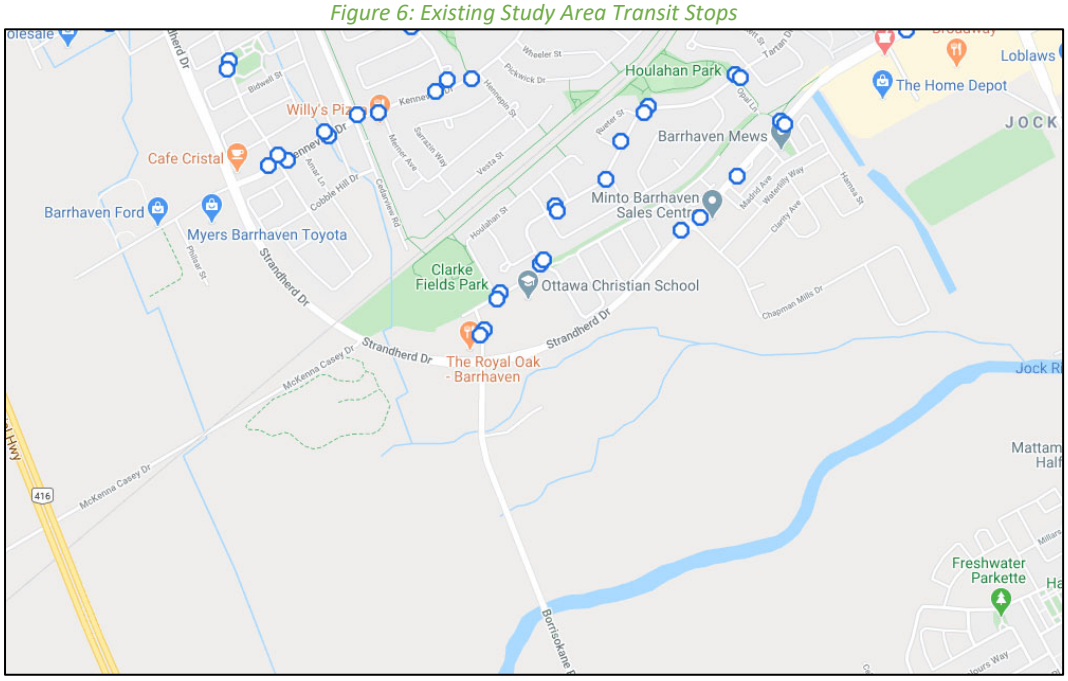
Figure 5 illustrates the transit system map in the study area and Figure 6 illustrates nearby transit stops. The service maps and descriptions are a snap shot of the transit services in the area, as of May 2020, and may change slightly as time proceeds. For example, the City typically changes service 2 or 3 times a year, not accounting for major service changes, such as new or cancelled routes.

Figure 5: Existing Study Area Transit Service



Source: http://www.octranspo.com/ Accessed: May 24, 2020

Figure 6: Existing Study Area Transit Stops



Source: http://www.octranspo.com/ Accessed: May 24, 2020

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 and from previous studies in the Study Area for the existing intersections. The intersections were also balanced, and the Minto Harmony and Caivan Conservancy Phase 1 developments have been included to account for additional turning movements at Chapman Mills Drive and volumes distributed from 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
Fraser Fields Way at Strandherd Drive	January 18, 2018
Greenbank Road at Strandherd Drive	August 16, 2016
Borrisokane Road at Cambrian Road	February 15, 2018

Figure 7 illustrates the existing traffic counts and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM 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 7: Existing Traffic Counts

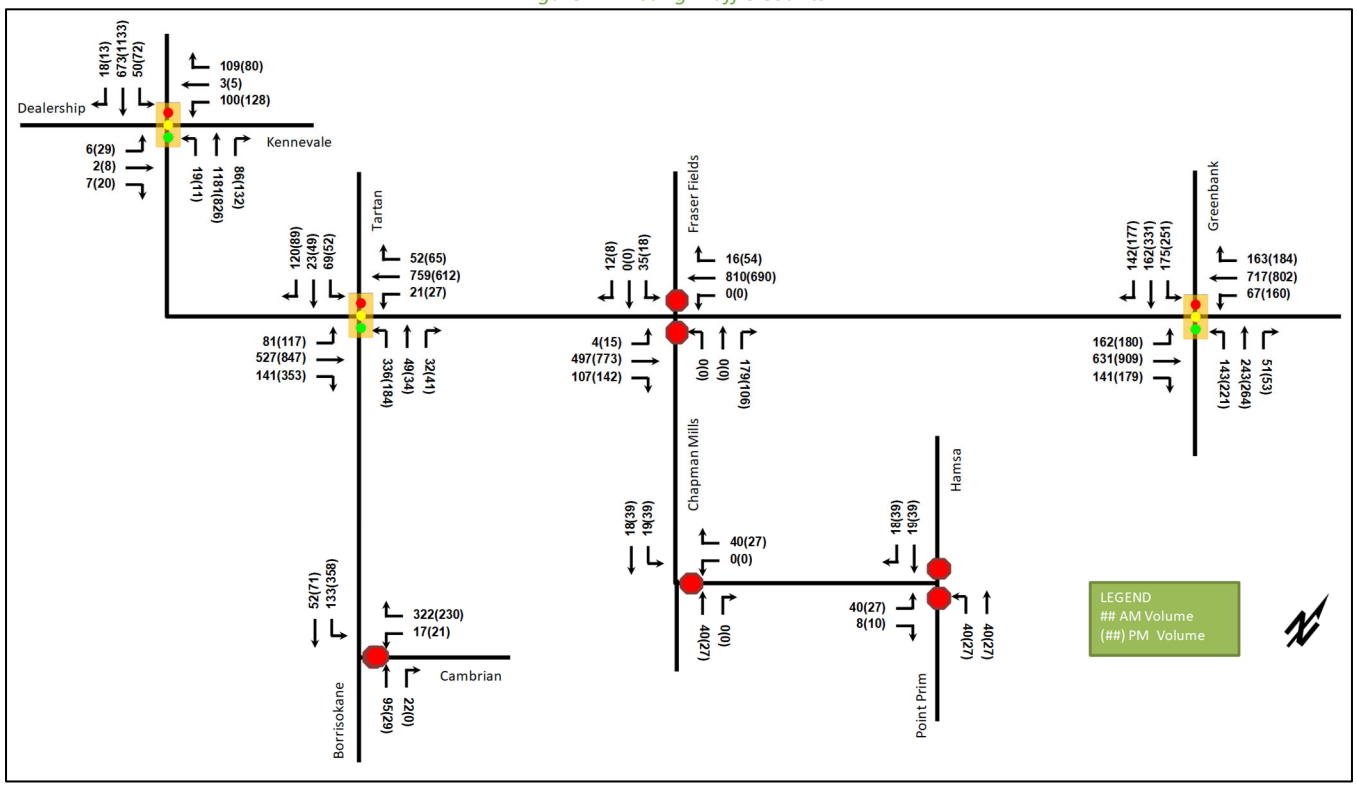


Table 2: Existing Intersection Operations

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	0.05	43.0	5.5	A	0.17	43.6	14.7
	EBT	A	0.01	41.5	2.7	A	0.03	39.5	6.0
	EBR	A	0.03	0.1	0.0	A	0.08	0.5	0.0
	WBL	B	0.65	66.6	41.3	C	0.72	67.7	49.7
	WBT/R	A	0.42	12.5	16.4	A	0.32	12.3	14.7
	NBL	A	0.05	9.9	5.7	A	0.16	19.4	6.0
	NBT	**F**	**1.15**	**100.1**	**#474.6**	D	0.84	27.8	**#292.9**
	NBR	A	0.10	2.6	7.4	A	0.16	5.0	15.0
	SBL	A	0.38	16.7	12.5	A	0.30	8.3	11.0
	SBT	A	0.58	9.1	115.0	E	1.00	43.5	**#409.4**
	SBR	A	0.02	0.9	1.3	A	0.01	0.5	0.7
	Overall	**F**	**1.07**	**59.4**	-	**F**	**1.01**	**34.6**	-
Strandherd Drive & Borrisokane Road/Tartan Drive *Signalized*	EBL	**F**	**1.29**	**230.3**	**#39.0**	A	0.49	19.6	35.0
	EBT	B	0.66	21.6	113.6	E	0.90	30.3	**#248.2**
	EBR	A	0.19	2.7	8.9	A	0.38	2.3	12.3
	WBL	A	0.09	13.1	6.3	A	0.21	14.5	8.8
	WBT/R	**F**	**1.02**	**60.4**	**#252.4**	C	0.73	18.5	**#166.8**
	NBL	E	0.96	67.9	**#120.0**	C	0.75	46.2	51.2
	NBT/R	A	0.15	14.3	16.7	A	0.20	13.7	14.4
	SBL	A	0.18	22.8	20.0	A	0.20	25.5	15.9
	SBT/R	A	0.26	7.6	17.0	A	0.34	12.0	19.9
	Overall	**F**	**1.14**	**48.1**	-	**D**	**0.86**	**22.0**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Strandherd Drive & Chapman Mills Dive/Fraser Fields Way ***Unsignalized***	EBT/R	-	-	-	-	-	-	-	-
	WBT	-	-	-	-	-	-	-	-
	WBR	-	-	-	-	-	-	-	-
	NBR	B	0.40	17.2	14.3	C	0.37	22.6	12.0
	SBR	B	0.16	17.6	3.8	B	0.07	14.6	1.5
	Overall	**A**	**-**	**6.2**	**-**	**A**	**-**	**3.2**	**-**
Strandherd Drive & Greenbank Road ***Signalized***	EBL	C	0.78	47.8	#58.7	E	0.95	**81.6**	**#77.7**
	EBT	B	0.67	39.4	98.6	**F**	**1.08**	**94.8**	**#178.1**
	EBR	A	0.28	6.2	15.0	A	0.36	6.4	16.7
	WBL	A	0.30	23.5	18.9	D	0.85	62.1	**#64.9**
	WBT	E	0.90	55.8	**#119.0**	E	0.96	63.1	**#147.1**
	WBR	A	0.35	6.7	16.1	A	0.36	6.6	17.6
	NBL	A	0.53	58.0	28.4	B	0.65	58.5	40.5
	NBT/R	A	0.34	32.8	44.4	A	0.40	35.7	48.3
	SBL	A	0.58	58.1	33.1	B	0.69	59.3	45.5
	SBT	A	0.18	31.9	26.4	A	0.40	37.2	52.5
	SBR	A	0.28	6.5	15.5	A	0.36	6.9	17.5
	Overall	**B**	**0.63**	**39.5**	**-**	**C**	**0.77**	**58.3**	**-**
Cambrian Road & Borrisokane Road ***Unsignalized***	WB	B	0.42	11.9	15.8	B	0.35	11.9	12.0
	NB	-	-	-	-	-	-	-	-
	SB/R	A	0.10	7.8	2.3	A	0.25	8.0	7.5
	Overall	**A**	**-**	**7.9**	**-**	**A**		**8.3**	**-**
Chapman Mills Drive & Hamsa Street/Prim Point Crescent ***Unsignalized***	EB	-	-	-	-	-	-	-	-
	NB	-	-	-	-	-	-	-	-
	SB	-	-	-	-	-	-	-	-
	Overall	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Chapman Mills Drive & Chapman Mills Drive ***Unsignalized***	WB	A	0.04	8.8	0.8	A	0.03	8.6	0.8
	NB	-	-	-	-	-	-	-	-
	SB	A	0.01	7.4	0.0	A	0.03	7.4	0.8
	Overall	**A**	**-**	**4.2**	**-**	**A**	**-**	**3.9**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 0.90
m = metered queue
# = queue exceeds storage or mid-block length

The existing intersection operations illustrate capacity issues in the peak direction of travel along Strandherd Drive intersections during the peak hours.

At the Dealership/Kennevale intersection, the northbound through is over capacity during the AM peak and the southbound through is at capacity during the PM peak, with extended queuing during both peaks and high delays during the AM peak. The northbound through also has long queues during the PM peak.

During the AM peak, the Tartan/Borrisokane intersection eastbound left-turn and westbound through lanes are over capacity, with high delays noted for the eastbound left-turn and extended queues for the eastbound left-turn, westbound through, and northbound left-turn lanes. During the PM peak, extended queues are noted for the eastbound through and westbound through lanes.

The southbound left-turn from Fraser Fields also experiences high delays during the peak hours.

At the Greenbank Road intersection, the westbound through queues are noted to extend past the adjacent turning lanes during the AM peak. During the PM peak, the eastbound through lanes are over capacity and both the

eastbound left-turn and through lanes experience high delays. Extended queuing is noted for the eastbound left-turn and through, and the westbound left-turn and through.

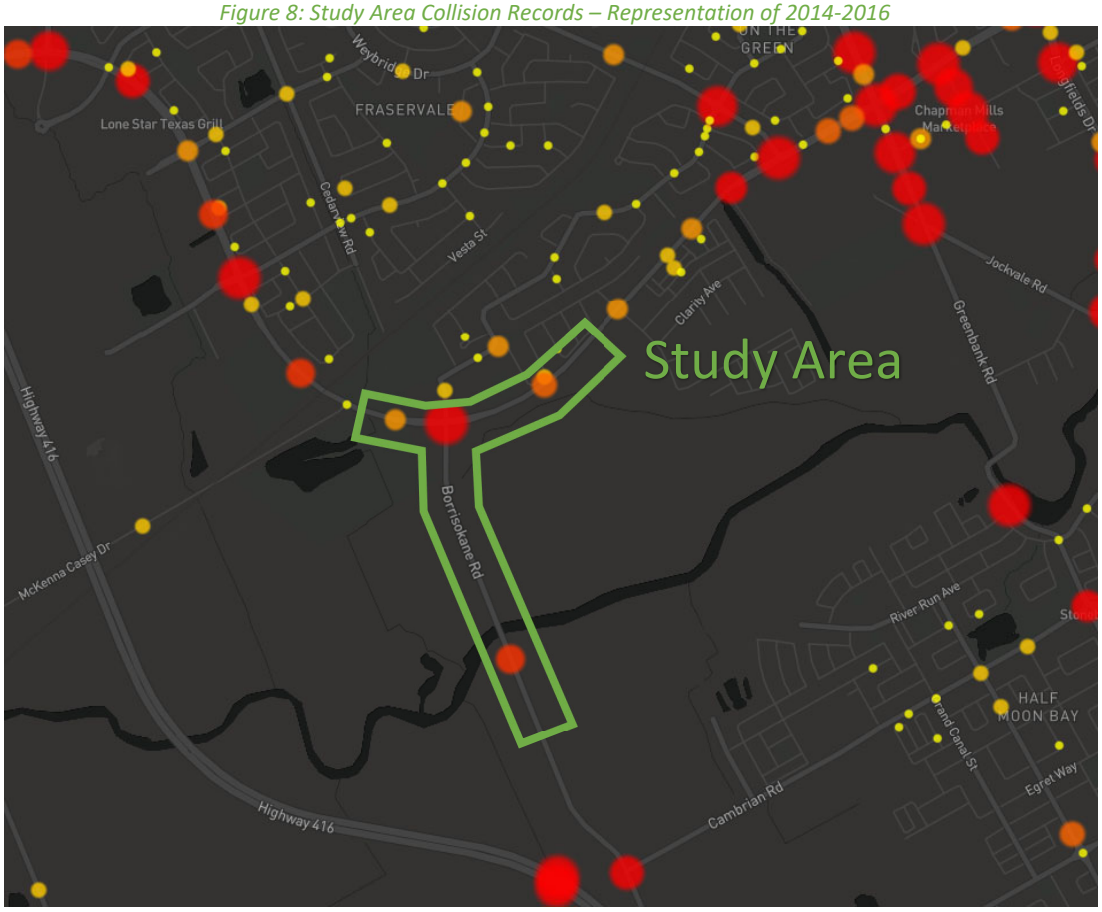
2.2.8 Collision Analysis

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: Study Area Collision Summary, 2014-2018Table 3 summarizes the collisions types and conditions in the study area, Figure 8 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, 2014-2018

		Number	%
Total Collisions		83	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	19	23%
	Property Damage Only	64	77%
Initial Impact Type	**Angled**	8	10%
	Rear end	36	43%
	Sideswipe	2	2%
	Turning Movement	13	16%
	SMV Unattended	1	1%
	SMV Other	22	27%
	Other	1	1%
Road Surface Condition	**Dry**	47	57%
	Wet	27	33%
	Loose Snow	4	5%
	Slush	1	1%
	Packed Snow	1	1%
	Ice	3	4%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

Figure 8: Study Area Collision Records – Representation of 2014-2016



Source: https://maps.bikeottawa.ca/collisions/ Accessed: May 24, 2020

Table 4: Summary of Collision Locations, 2014-2018

	Number	%
Intersections / Segments	**83**	**100%**
Strandherd Dr @ Borrisokane Rd/Tartan Dr	39	47%
Fraser Fields Way @ Strandherd Dr	7	8%
Strandherd Dr btwn Borrisokane Rd & Mckenna Casey Dr	5	6%
Strandherd Dr btwn Borrisokane Rd & Madrid Ave	12	14%
Borrisokane Rd btwn Cambrian Rd & Strandherd Dr	20	24%

Overall, no fatal collisions, or collisions involving cyclist or pedestrians were documented in the study area. The intersections of Strandherd Drive and Borrisokane Road/Tartan Drive, and the segments of Strandherd Drive between Borrisokane Road and McKenna Casey Drive and Borrisokane Rod between Cambrian Road and Strandherd Drive are noted to have higher collision rates than the rest of the study area and will be examined in greater detail in Table 5, Table 6 and Table 7 respectively.

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

		Number	%
Total Collisions		39	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	5	13%
	Property Damage Only	34	87%
Initial Impact Type	**Angled**	3	8%
	Rear end	27	69%
	Sideswipe	1	3%
	Turning Movement	6	15%
	SMV Unattended	2	5%
Road Surface Condition	**Dry**	20	51%
	Wet	19	49%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The Strandherd Drive and Borrisokane Road intersection had a total of 39 collisions during the 2014-2018 time period, with five involving property damage only and the remaining 34 having non-fatal injuries. The collision types are most represented by rear end with 27 collisions, turning movements with six collisions and the remaining angled, sideswipe and SMV unattended with three or less. The rear end collisions are typical of congested conditions, although the weather conditions are balanced between wet and dry. This neither directly supports nor discounts the congestion rationale.

Table 6: Collision Summary – Strandherd Drive between Borrisokane Road and Madrid Avenue

		Number	%
Total Collisions		12	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	6	50%
	Property Damage Only	6	50%
Initial Impact Type	**Rear end**	5	42%
	Turning Movement	5	42%
	SMV Other	2	17%
Road Surface Condition	**Dry**	8	67%
	Wet	4	33%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The segment of Strandherd Drive between Borrisokane Road and Madrid Avenue had a total of 12 collisions during the 2014-2018 time period, with a split between property damage only and non-fatal injuries. The collision types are most represented by rear end and turning movement with five collisions each, and the remaining collisions as SMV other. These collisions may be the result of construction activities or turning movements from Tartan Drive along this stretch. The data does not suggest any patterns and the widening of Strandherd Drive will likely address the cause of them in the future. Weather/road conditions are not considered a contributing factor.

Table 7: Collision Summary – Borrisokane Road Between Strandherd Drive and Cambrian Road

		Number	%
Total Collisions		20	**100%**
Classification	**Fatality**	0	0%
	Non-Fatal Injury	5	33%
	Property Damage Only	15	67%
Initial Impact Type	**Rear end**	1	5%
	SMV Other	18	90%
	Other	1	5%
Road Surface Condition	**Dry**	11	55%
	Wet	2	10%
	Loose Snow	3	15%
	Packed Snow	1	5%
	Ice	3	15%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The segment of Borrisokane Road between Strandherd Drive and Cambrian Road had a total of 20 collisions during the 2014-2018 time period, with a 15-property damage only and five non-fatal injuries. The collision types are most represented by SMV Other with 18 collisions and a single collision for rear end and other. The rural nature of the roadway may be the cause of these collisions, from running off the road or animal strikes. Weather/road conditions are not considered a contributing factor.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

Strandherd Drive Widening (Maravista Drive to Jockvale Road)

The detail design of the widening of Strandherd Drive from two to four lanes is currently underway. It is anticipated that this will be completed by 2022. This will include the reconstruction of the intersection of Borrisokane Road at Strandherd Drive.

Chapman Mills Drive Extension

As part of the construction of 4025 Strandherd Drive the section of Chapman Mills Drive extension that runs north-south will be constructed. As part of the Phase 1 construction a portion of the east-west section of the Chapman Mills Drive extension. An environmental assessment study has been completed for the Chapman Mills Drive Extensions and Bus Rapid Transit corridor. This study was completed in December 2016 and, while construction is planned in the TMP by 2025, it is anticipated to be completed by 2031. This project will include a new four-lane road between Strandherd Drive and Longfields Drive as well as a provision for a centre median Bus Rapid Transit facility that is anticipated to be constructed post 2031.

Greenbank Road Re-Alignment

While not directly 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 negotiated 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.

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 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. This development is expected to produce 180 two-way AM peak period auto trips and 207 two-way PM peak period auto trips. (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. This development is expected to produce 786 two-way AM peak period auto trips and 1193 two-way PM peak period auto trips. (Stantec 2016)

Half Moon Bay North Phase 9

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. This development is expected to produce 74 two-way AM peak period auto trips and 80 two-way PM peak period auto trips. (Stantec 2018)

Quinn's Pointe 2

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. A total of 749 two-way AM peak period auto trips and 813 two-way PM peak period auto trips are expected from this development (Stantec 2018)

The Meadows Phase 4

Phase 4 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 This development is anticipated to produce 142 two-way AM peak period auto trips and 171 two-way PM peak period auto trips. (IBI 2018)

The Meadows Phase 5

Phase 5 of the Meadows Tamarack Development is located south of Cambrian Road on the west side of Re-Aligned Greenbank Road. However, it is understood that while this application is on the City of Ottawa's Development Applications site, the TIA has not been approved.

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. The development is anticipated to produce 137 two-way AM peak period auto trips and 174 two-way PM peak period auto trips. (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 and is expected to produce 4,267 two-way AM peak period auto trips and 4,848 two-way PM peak period auto trips. (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. This development is

expected to produce 129 two-way AM peak period auto trips and 146 two-way PM peak period auto trips. (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 and is expected to produce 401 two-way AM peak period auto trips and 457 two-way PM peak period auto trips. (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. This development is expected to produce 349 two-way AM peak period auto trips and 407 two-way PM peak period auto trips. (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. This development is expected to produce 122 two-way AM peak period auto trips and 172 two-way PM peak period auto trips. (CGH 2020)

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
    - Fraser Fields Drive/Chapman Mills Drive
    - Greenbank Road
- Cambrian Road at Borrisokane Road
- Chapman Mills Drive
    - Chapman Mills Drive
    - Hamsa Street/Point Prim Crescent
    - Greenbank Road (Future Intersection)

The boundary roads are Borrisokane Road. 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 2029 and the full build-out plus five years horizon year is 2034.

4 Exemption Review

Table 8 summarizes the exemptions for this TIA.

Table 8: 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
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
Network 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 Trip Generation and Mode Shares

This TIA has been prepared using the vehicle and person trip rates for the residential units using the TRANS Trip Generation Study Report (2009). Table 9 summarizes the person trip rates for the proposed land uses.

Table 9: TRANS Trip Generation Person Trip Rates

Dwelling Type	Land Use Code	Peak Hour	Vehicle Trip Rate	Person Trip Rates
Single Detached	210 (TRANS)	AM	0.70	1.27
		PM	0.90	1.41
Townhouse	224 (TRANS)	AM	0.54	0.98
		PM	0.71	1.16
Mid-Rise	223 (TRANS)	AM	0.29	0.66
		PM	0.37	0.84

Using the above Person Trip rates, the total person trip generation has been estimates. Table 10 below illustrates the total person trip generation by dwelling type.

Table 10: Total Person Trip Generation

Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single Detached	600	221	541	762	516	330	846
Townhouse	600	218	370	588	369	327	696
Mid-Rise	100	16	49	65	43	27	70
Total Person Trips		**455**	**960**	**1,415**	**928**	**684**	**1,612**

Using the most recent National Capital Region Origin-Destination survey (OD Survey), the existing mode shares for South Nepean have been determined and compared to various modes share breakdowns identified by City Staff as potential interpretations of the data.

Table 11: Mode Shares Comparison

Travel Mode	South Nepean (average)	South Nepean (AM from/within)	South Nepean (PM to/within)	BRT Area	South Nepean (blended)
Auto Driver	65%	62%	60%	45%	60%
Auto Passenger	15%	12%	15%	15%	15%
Transit	15%	18%	15%	30%	15%
Cycling	0%	1%	0%	1%	1%
Walking	5%	7%	10%	9%	9%
Total	100%	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 provide access to a transit station within a 5–10-minute walk. Therefore, the blended BRT mode shares will be generated and subject to the demand rationalization in Section 7, the targets will be recommended and later assessed in Sections 10.3 and 15.2.

Using the above mode shares and person trip rates the person trips by mode have been projected. Table 12 summarizes the trip generation by mode for the site.

Table 12: Trip Generation by Mode

Travel Mode	Mode Share	In	Out	Total	In	Out	Total
South Nepean – Blended							
Auto Driver	60%	274	576	849	557	410	968
Auto Passenger	15%	68	144	212	138	103	242
Transit	15%	68	144	212	138	103	242
Cycling	1%	4	9	15	9	6	16
Walking	9%	41	86	128	83	61	145
Total	100%	455	960	1,415	928	684	1,612
BRT Area							
Auto Driver	45%	204	432	637	417	308	726
Auto Passenger	15%	68	144	212	138	103	242
Transit	30%	136	288	425	279	205	484
Cycling	1%	4	9	15	9	6	16
Walking	9%	41	86	128	83	61	145
Total	100%	455	960	1,415	928	684	1,612

As shown above, the proposed subdivision is forecasted to generate approximately 1,415 AM and 1,612 PM peak hour two-way people trips. The auto trips decrease from 849 AM and 968 PM peak two-way trips to 637 AM and 726 PM peak two-way trips for BRT transit modal share targets.

No trip reductions factors (i.e., synergy, pass-by, etc.) have been applied as the subject development is composed entirely of residential units.

5.2 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the existing travel patterns. Table 13 below summarizes the distribution.

Table 13: OD Survey Distribution – South Nepean

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

5.3 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. Figure 9 and Figure 10 illustrate the new site generated volumes.

Figure 9: New Site Generation Auto Volumes – Blended Rate Mode Shares

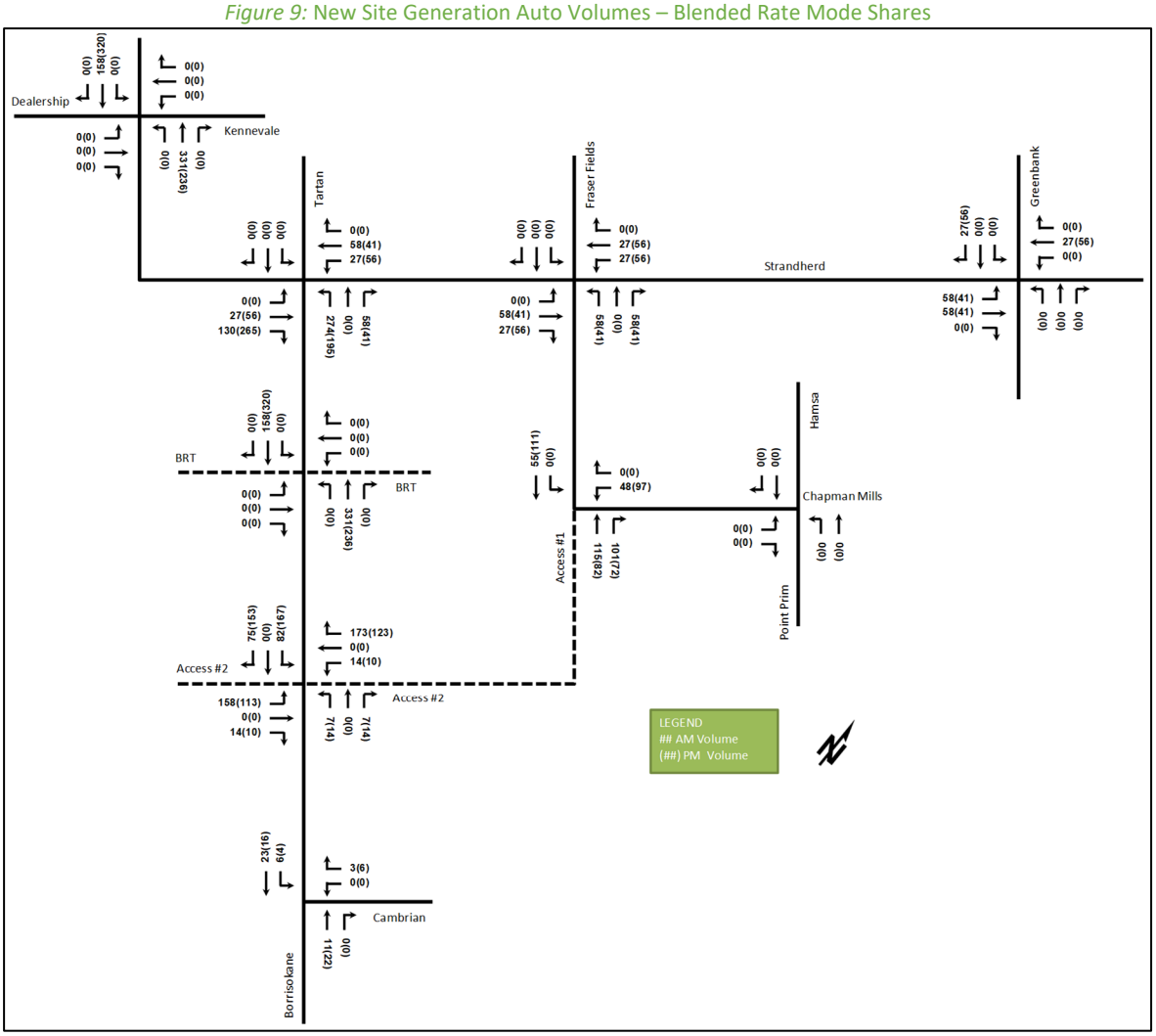
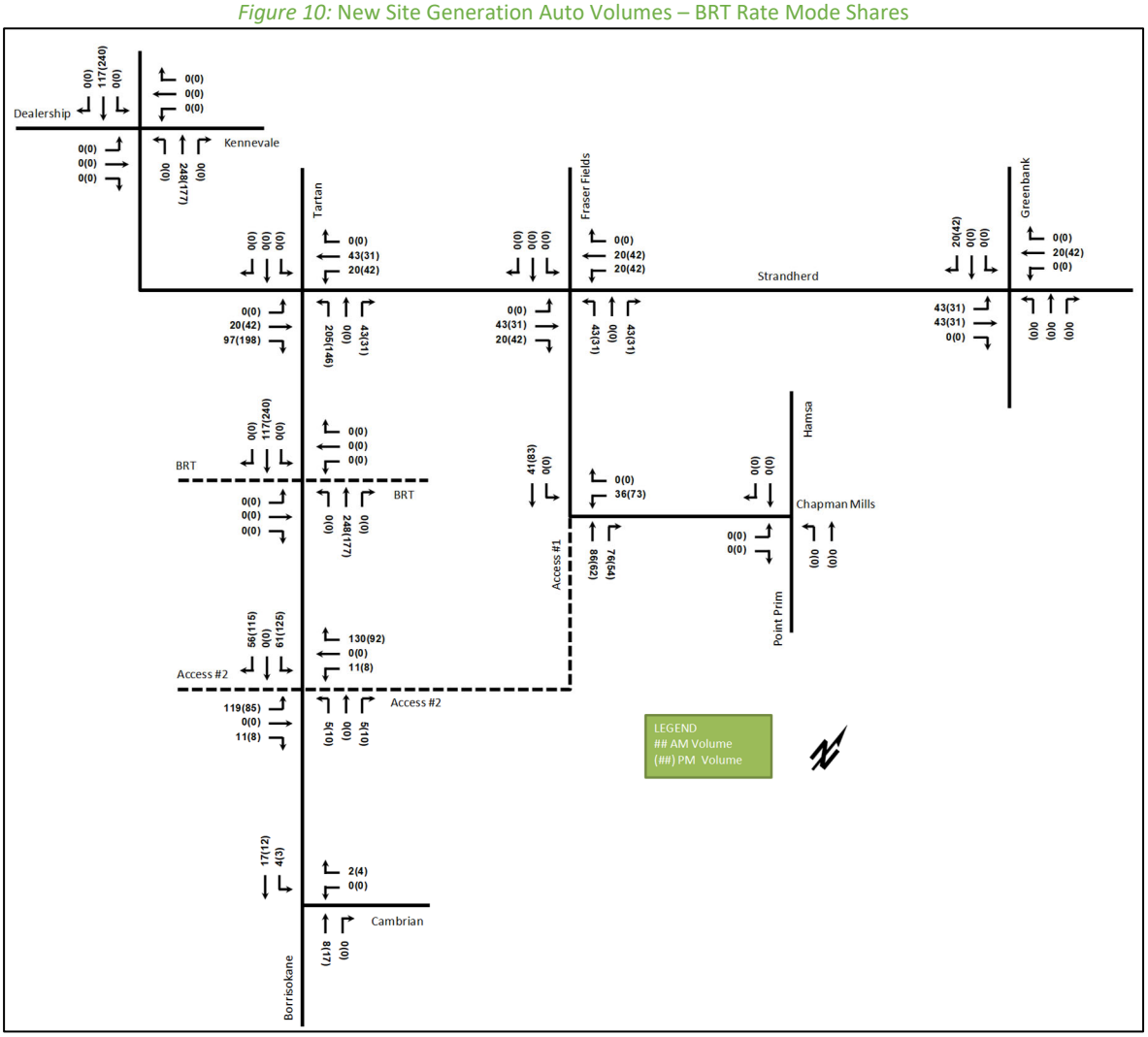


Figure 10: New Site Generation Auto Volumes – BRT Rate Mode Shares



6 Background Network Travel Demand

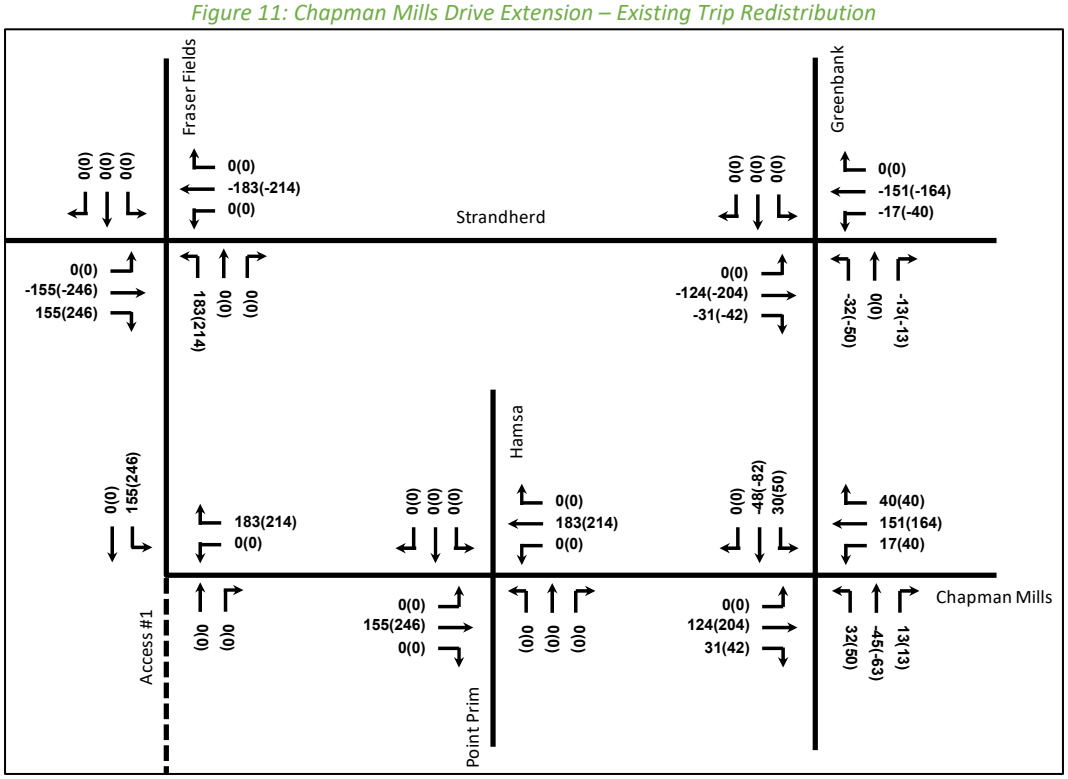
6.1 Transportation Network Plans

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

For the future horizons, the Strandherd Drive widening, Chapman Mills Drive extension and the widening of Greenbank Road to Chapman Mills Drive 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.

Figure 11 illustrates the trip assignment for the East Phase once Chapman Mills Drive has been extended. A simple 25% has been shifted from Greenbank Road/Strandherd Drive to the Chapman Mills Drive corridor, and the remaining volumes will be factored in with background development volumes adjustments.

Figure 11: Chapman Mills Drive Extension – Existing Trip Redistribution



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 along Cambrian Road, where most of the developments have been built or planned. 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, Greenbank Road, 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.

Figure 12: 2029 Background Growth

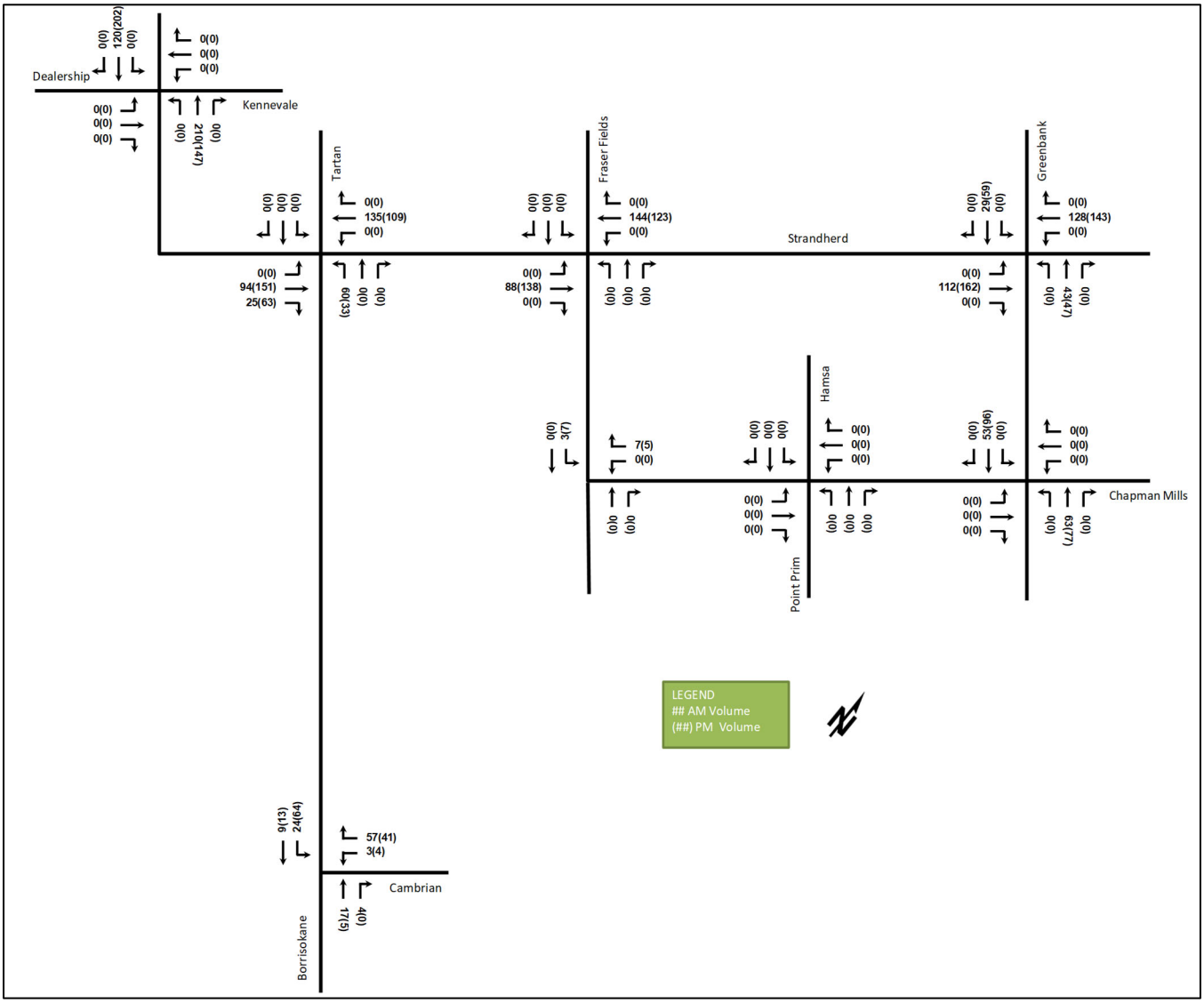
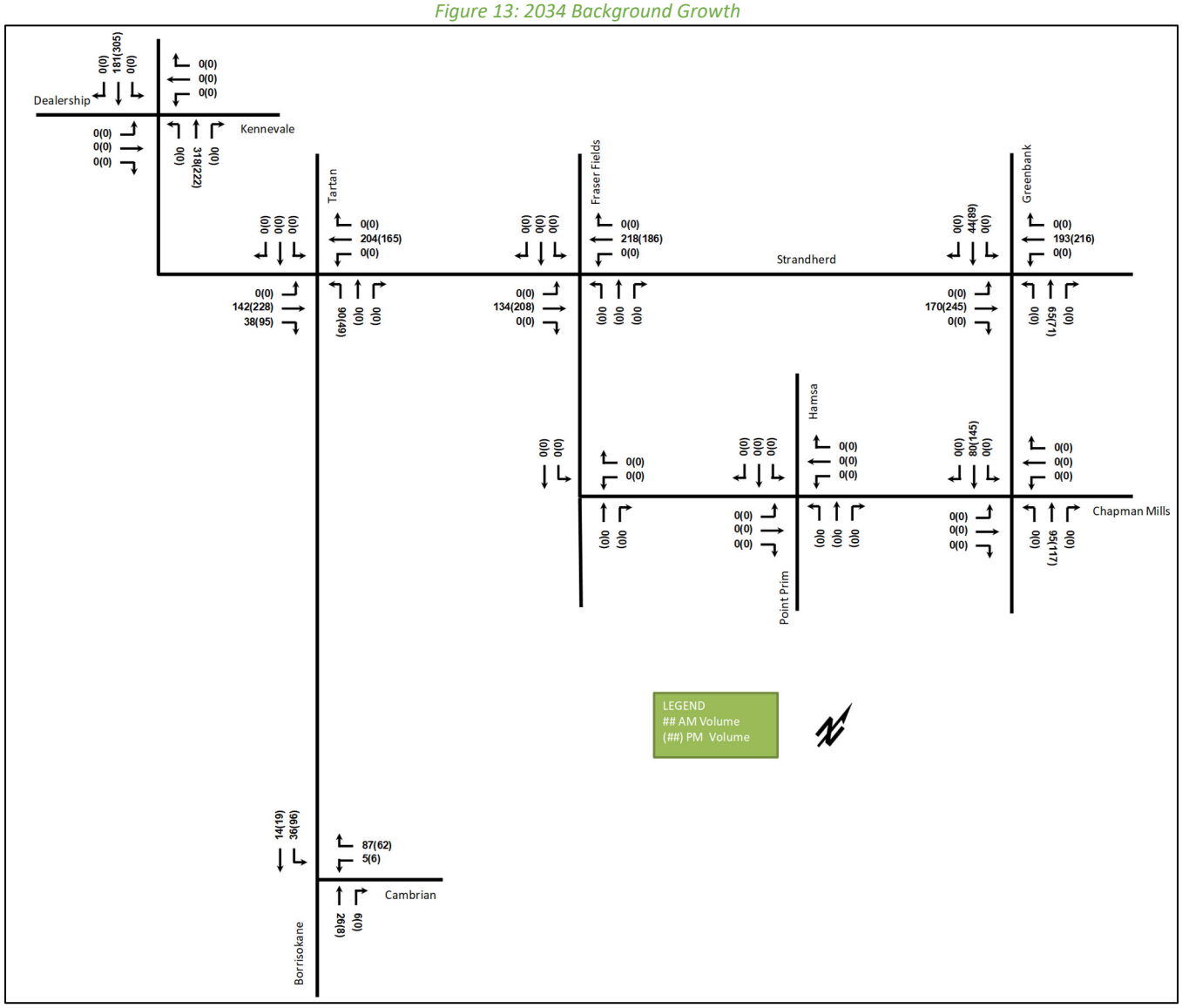


Figure 13: 2034 Background Growth



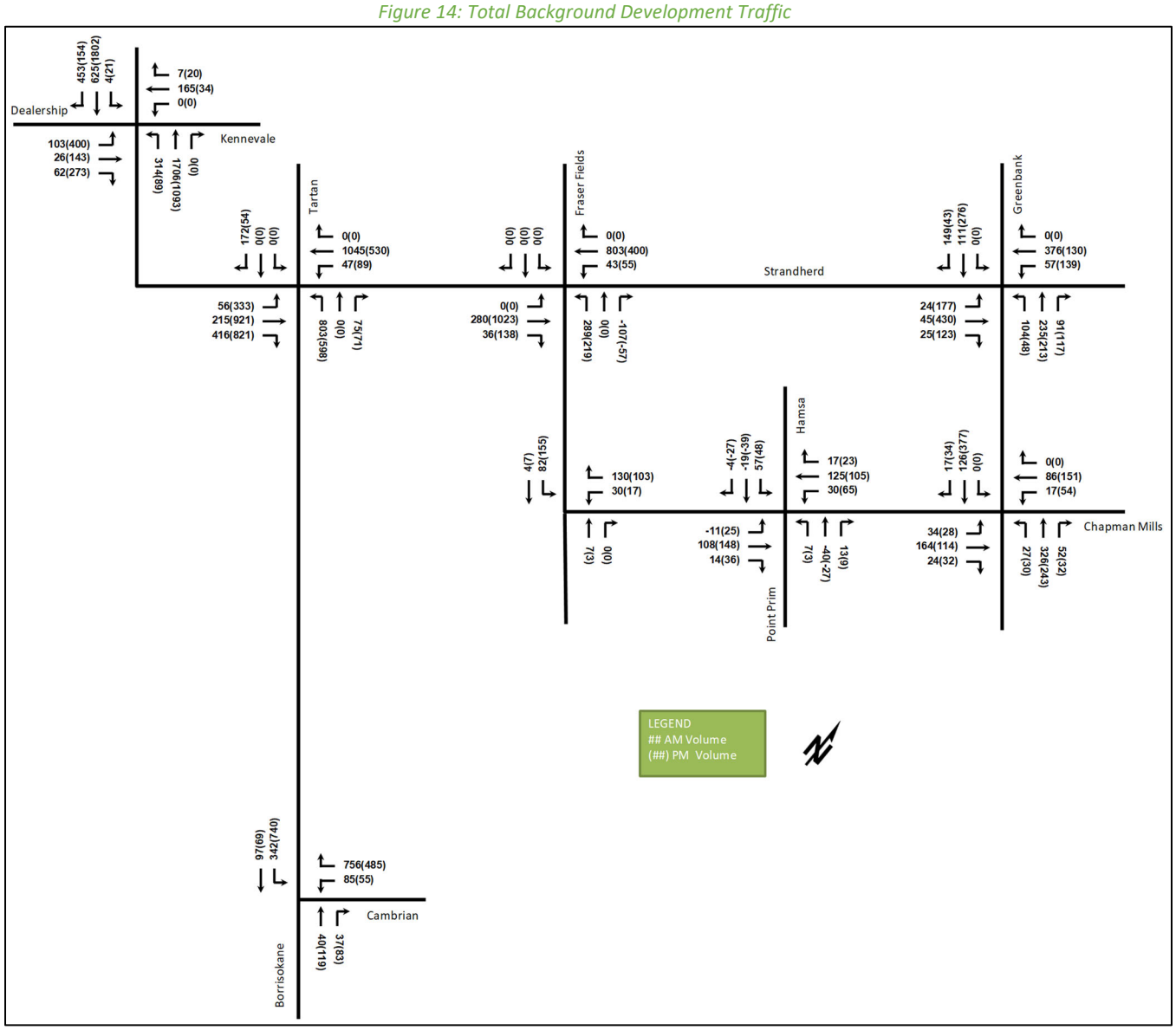
6.3 Other Developments

As detailed in Section 2.3.2, the following developments have been included in the background traffic forecasts, and Figure 14 illustrates the total background development volumes for the study area, adjusted for the above noted transportation network plans.

- 3195 Jockvale Road
- Harmony Phase 5 – 3232 Jockvale Road
- 3201 Greenbank Road
- S3288 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 4
- The Meadows Phase 5
- 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

Figure 14: Total Background Development Traffic



7 Demand Rationalization

7.1 2029 Future Background Operations

Figure 15 illustrates the 2029 future background traffic volumes and Table 14 summarizes the 2029 forecasted intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The Synchro worksheets are provided in Appendix E.

The study area intersections have been modified to include the following improvements previously noted in Section 2.3.1.

- Strandherd Drive and Dealership Way/Kennevale Drive
  - Widening of Strandherd Drive to a 4-lane divided roadway
- Strandherd Drive and Borrisokane Road/Tartan Drive
  - Widening of Strandherd Drive to a 4-lane divided roadway
  - Eastbound left-turn lane with 105m of storage
  - Eastbound right-turn lane with 110 m of storage
  - Westbound left-turn lane with 55m of storage (reduced)
  - Westbound right-turn lane with 30m of storage (new)
  - Northbound dual left-turn lanes with 100m of storage each (extension from 69m)
- Strandherd Drive and Chapman Mills Drive/Fraser Fields Way
  - Widening of Strandherd Drive to a 4-lane divided roadway
  - Signalization of the intersection (new)
  - Eastbound left-turn lane with 40m of storage (new)
  - Eastbound right-turn lane with 145 m of storage (new)
  - Westbound left-turn lane maintaining current 40m of storage
  - Northbound dual left-turn lanes with 105m of storage (new)
  - Northbound shared through/right-turn lane (new)
  - Southbound left-turn lane with 40m of storage (new)
- Chapman Mills Drive and Greenbank Road
  - Widening of Greenbank Road to a 4-lane divided roadway
  - Signalization of the intersection (new)
  - Eastbound and westbound left-turn lanes with 40m of storage
  - Eastbound right-turn lane with 60m of storage
  - Westbound right-turn lane with 30m of storage
  - Northbound and southbound left-turn lanes with 60m of storage
- Chapman Mills Drive and Hamsa Street/Point Prim Crescent
  - Chapman Mills Drive corridor constructed, excluding BRT
  - Minor stop-controlled
  - Shared all movement northbound and southbound approaches
  - Eastbound and westbound left-turn lanes with 38m of storage (new)
- Chapman Mills Drive and Chapman Mills Drive
  - Chapman Mills Drive corridor constructed, excluding BRT
  - Minor stop-controlled
  - Northbound through lane (new)
  - Northbound right-turn lane with 15m of storage (new)

- Southbound through lane (new)
- Southbound left-turn lane with 38m of storage (new)
- Westbound right-turn lane
- Westbound left-turn lane with 38m of storage (new)

- Cambrian Road and Borrisokane Road
  - Signalization of the intersection (new)
  - Southbound dual left-turn lanes with 150.0m of storage (new)
  - Westbound left-turn lane with 38.0m of storage (new)
  - Northbound right-turn with a 30m of storage (new)
- All signalized intersections optimized for new lane arrangements, as approximations of future signal coordination and sequencing

Figure 15: 2029 Future Background Traffic Volumes

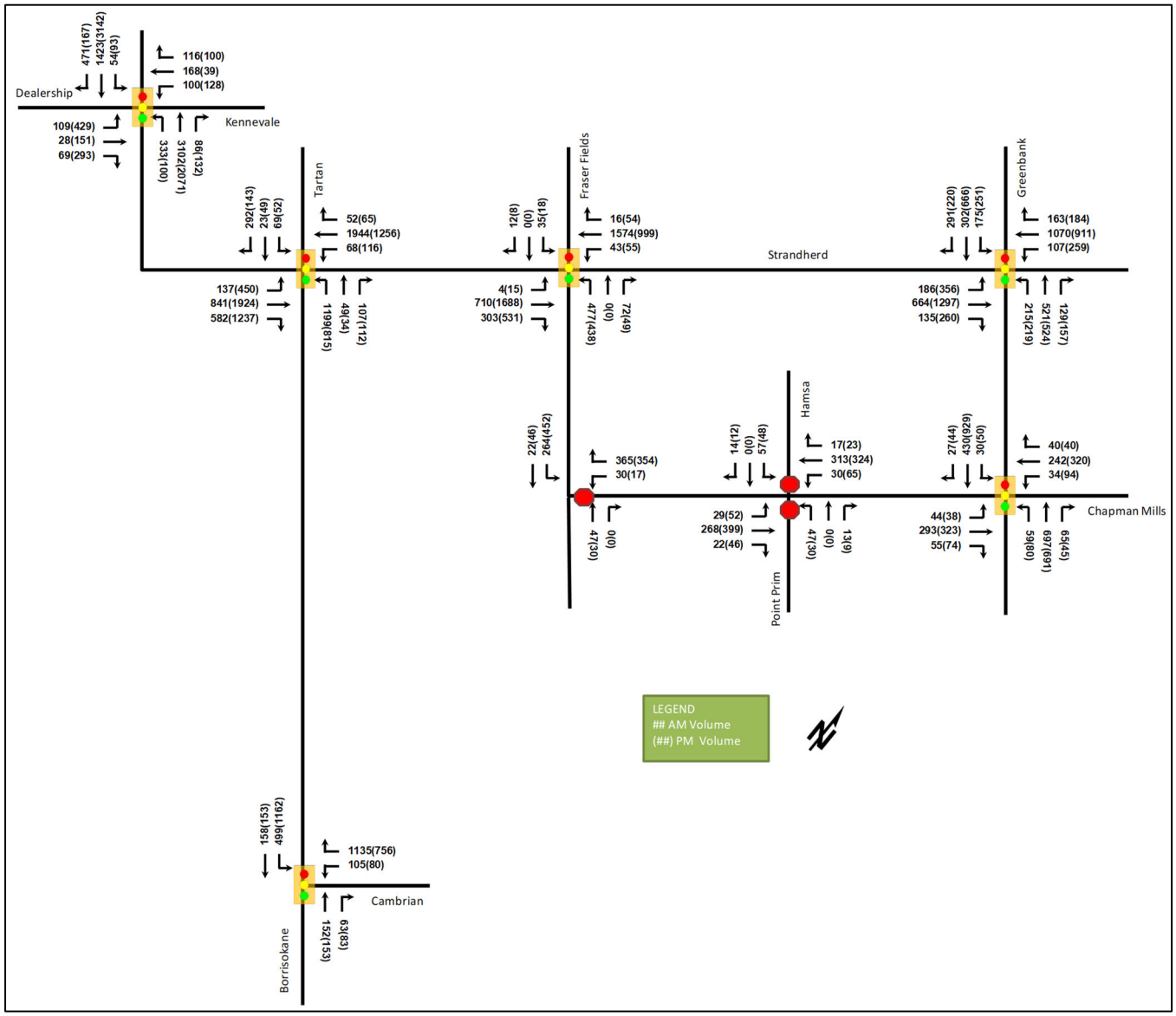


Table 14: 2029 Future Background Intersection Operations

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	D	0.83	86.4	**#46.4**	**F**	**1.30**	**189.7**	**#187.8**
	EBT	A	0.07	34.4	11.7	A	0.30	35.0	45.1
	EBR	A	0.22	37.8	23.6	C	0.70	48.1	91.9
	WBL	A	0.36	41.6	32.6	A	0.40	38.6	41.9
	WBT/R	D	0.80	60.9	85.6	A	0.31	35.5	42.5
	NBL	B	0.68	58.7	m22.2	C	0.76	72.0	m9.8
	NBT/R	**F**	**1.75**	**356.3**	**m#270.3**	**F**	**1.38**	**193.5**	**m#235.0**
	SBL	A	0.48	68.0	**#28.7**	**F**	**1.24**	**228.4**	**#60.0**
	SBT	E	0.96	47.5	**#216.2**	**F**	**1.93**	**445.3**	**#628.3**
	SBR	C	0.71	33.5	126.7	A	0.23	17.9	34.7
	Overall	**F**	**1.47**	**210.8**	**-**	**F**	**1.68**	**287.5**	**-**
Strandherd Drive & Borrisokane Road/Tartan Drive ***Signalized***	EBL	**F**	**1.63**	**347.7**	**m#56.8**	**F**	**2.20**	**568.1**	**m#112.8**
	EBT	A	0.59	10.3	m20.6	**F**	**1.29**	**151.0**	m42.3
	EBR	E	0.92	24.5	m45.6	**F**	**1.85**	**404.3**	**m#192.3**
	WBL	C	0.79	**92.9**	m17.1	B	0.68	59.5	**m#60.8**
	WBT/R	**F**	**1.41**	**207.8**	**m#328.0**	E	0.94	38.7	m123.1
	NBL	**F**	**5.10**	**1867.0**	**#309.5**	**F**	**4.45**	**1580.0**	**#217.6**
	NBT/R	A	0.39	41.4	50.9	A	0.49	48.5	48.1
	SBL	B	0.66	83.9	**#36.7**	B	0.64	**90.2**	**#31.2**
	SBT/R	E	0.94	82.9	**#124.1**	C	0.75	64.5	63.0
	Overall	**F**	**1.64**	**516.2**	**-**	**F**	**1.91**	**386.4**	**-**
Strandherd Drive & Chapman Mills Dive/Fraser Fields Way ***Signalized***	EBL	A	0.05	71.2	m1.3	A	0.17	75.1	m3.2
	EBT	A	0.42	11.7	99.7	**F**	**1.02**	**30.9**	**m#184.2**
	EBR	A	0.40	13.2	95.8	C	0.72	11.9	m82.7
	WBL	A	0.39	66.8	m13.2	A	0.45	38.4	m13.4
	WBT/R	D	0.81	16.4	**m#263.0**	A	0.56	30.0	m138.5
	NBL	**F**	**1.30**	**197.0**	**#105.5**	**F**	**1.29**	**192.8**	**#98.1**
	NBT/R	A	0.24	42.2	24.7	A	0.15	38.2	18.1
	SBL	A	0.39	67.5	18.5	A	0.27	65.9	11.7
	SBT/R	A	0.08	45.2	7.4	A	0.05	44.2	5.6
	Overall	**D**	**0.87**	**43.6**	**-**	**D**	**0.90**	**47.0**	**-**
Strandherd Drive & Greenbank Road ***Signalized***	EBL	D	0.89	**86.3**	**#70.9**	**F**	**1.09**	81.0	**m#78.8**
	EBT	A	0.54	17.9	28.9	**F**	**1.13**	**104.3**	**m#188.0**
	EBR	A	0.21	1.0	0.4	A	0.41	17.3	m43.3
	WBL	A	0.36	20.1	22.6	**F**	**1.23**	**169.6**	**#112.2**
	WBT	E	0.95	55.2	**#166.7**	E	1.00	72.0	**#154.5**
	WBR	A	0.27	6.6	16.2	A	0.33	4.5	11.5
	NBL	D	0.83	80.5	**#46.0**	**F**	**1.09**	**141.3**	**#53.8**
	NBT/R	C	0.77	46.4	93.3	D	0.81	48.2	97.1
	SBL	C	0.73	72.6	**#36.0**	**F**	**1.11**	**141.7**	**#60.1**
	SBT	A	0.36	38.1	43.3	C	0.76	46.7	96.3
	SBR	A	0.59	22.4	54.7	A	0.40	6.8	18.1
	Overall	**D**	**0.88**	**42.6**	**-**	**F**	**1.07**	**77.5**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Chapman Mills Drive & Greenbank Road *Signalized*	EBL	A	0.44	65.5	21.3	A	0.38	62.9	19.2
	EBT	C	0.73	52.0	86.1	D	0.83	60.7	95.5
	EBR	A	0.16	34.8	19.4	A	0.22	36.3	24.6
	WBL	A	0.34	61.1	17.5	D	0.87	**110.9**	**#51.2**
	WBT	B	0.68	51.1	70.4	B	0.67	45.5	94.9
	WBR	A	0.13	35.3	15.1	A	0.10	32.6	15.1
	NBL	A	0.50	66.5	**#30.3**	B	0.62	73.0	**#43.8**
	NBT/R	A	0.50	26.6	99.4	A	0.57	31.3	95.2
	SBL	A	0.30	59.4	16.0	A	0.47	66.4	**#23.8**
	SBT/R	A	0.32	25.6	56.1	D	0.83	42.1	**#146.3**
	Overall	B	0.64	36.5	-	D	0.82	45.5	-
Cambrian Road & Borrisokane Road *Signalized*	WBL	A	0.12	13.1	20.3	A	0.28	30.6	22.8
	WBR	**F**	**1.01**	40.6	**#277.8**	D	0.86	14.1	**#62.6**
	NBT	B	0.69	64.5	54.4	A	0.53	37.1	39.9
	NBR	A	0.26	13.7	12.2	A	0.26	9.8	11.0
	SBL	E	0.93	73.5	**#92.3**	D	0.85	28.2	**#135.5**
	SBT	A	0.27	29.3	42.0	A	0.14	5.6	15.6
	Overall	E	0.95	47.1	-	B	0.70	22.3	-
Chapman Mills Drive & Hamsa Street/Prim Point Crescent *Unsignalized*	EBL	A	0.02	8.0	0.8	A	0.04	8.1	0.8
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.02	7.9	0.8	A	0.06	8.4	1.5
	WBT/R	-	-	-	-	-	-	-	-
	NB	C	0.16	16.7	4.5	C	0.16	22.8	4.5
	SB	C	0.20	17.4	5.3	D	0.25	25.3	7.5
	Overall	A	-	3.3	-	A	-	3.3	-
Chapman Mills Drive & Chapman Mills Drive *Unsignalized*	WBR	C	0.08	15.1	2.3	C	0.09	24.9	2.3
	WBL	B	0.36	10.5	12.0	B	0.34	10.2	11.3
	NBT	-	-	-	-	-	-	-	-
	NBR	-	-	-	-	-	-	-	-
	SBL	A	0.17	7.8	4.5	A	0.29	8.2	9.0
	SBT	-	-	-	-	-	-	-	-
	Overall	A	-	8.7	-	A	-	8.6	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue exceeds storage or mid-block length

The 2029 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 15 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.

Beyond Strandherd Drive, the intersection of Cambrian Road and Borrisokane Road is anticipated to experience capacity constraints and extended queuing during the AM peak hour in the westbound right-turn and southbound left-turn movements. During the PM peak, the southbound left-turn queues may exceed the available storage. The Chapman Mills Drive corridor is expected to operate well, although it is noted as Strandherd Drive operations degrade, additional traffic will utilize Chapman Mills Drive even to short cut a portion of Strandherd Drive. This will ultimately result in capacity constraints being stressed on Chapman Mills Drive as well. This is not examined

in this analysis as it would extensive sensitivity testing and encompass analysis that is assumed to be completed by the City's team during the EA study.

7.2 Background Transportation Infrastructure Scenarios

Due to the unconstrained demand capacity constraints noted in the future 2029 background conditions, a rationalization exercise will be completed prior to the analysis of the 2034 future background conditions. Without additional regional transportation infrastructure being advanced in Barrhaven and Barrhaven South, it is unlikely to see any change in the network operations to achieve any meaningful improvement to "acceptable" level of service standards. Neither will any modal shifts be realized to help achieve an overall vehicle trip reduction in a multifaceted approach.

A list of potential regional solutions was compiled from infrastructure items approved through the Transportation Master Plan, the Development Charge Bylaw, various EAs and noted within various Barrhaven Community Design Plans:

1. New Re-Aligned Greenbank Road, from Chapman Mills Drive to Cambrian Road
2. Re-Aligned Greenbank Road extension south of Cambrian Road
3. Widening of Cambrian Road from the Re-Aligned Greenbank Road to the existing Greenbank Road
4. Widening of Jockvale Road from Cambrian Road to Prince of Wales Drive
5. Widening of Barnsdale Road between Highway 416 and Prince of Wales Drive
6. New interchange at Barnsdale Road and Highway 416
7. Chapman Mills Drive BRT Corridor

Of these items, only the new interchange at Barnsdale Road and Highway 416, and the BRT component of the Re-Aligned Greenbank Road are considered viable to reducing vehicle volume along the area road network. The remaining items would increase capacity to the already congested corridors and exacerbate the problems noted at bottle neck locations.

Therefore, to assess the impact and potential mitigation of each, both will be summarized individually and together to illustrate the benefits of the City advancing these projects.

7.2.1 New Barnsdale Road and Highway 416 Interchange

The Barrhaven South Community Design Plan (2006) identified two possible interchange locations for Highway 416, at Cambrian Road and at Barnsdale Road. The TMP also notes a new interchange being required for Barnsdale Road as the road is widened to 4-lanes between the Highway and Prince of Wales Drive. Preliminary concepts presented to the MTO, prior to the road widening, include a northbound on-ramp from Borrisokane Drive and a southbound off-ramp on Barnsdale Road, shifting Trail Road to the west and replacing the north leg of the Barnsdale-Trail-William McEwen intersection.

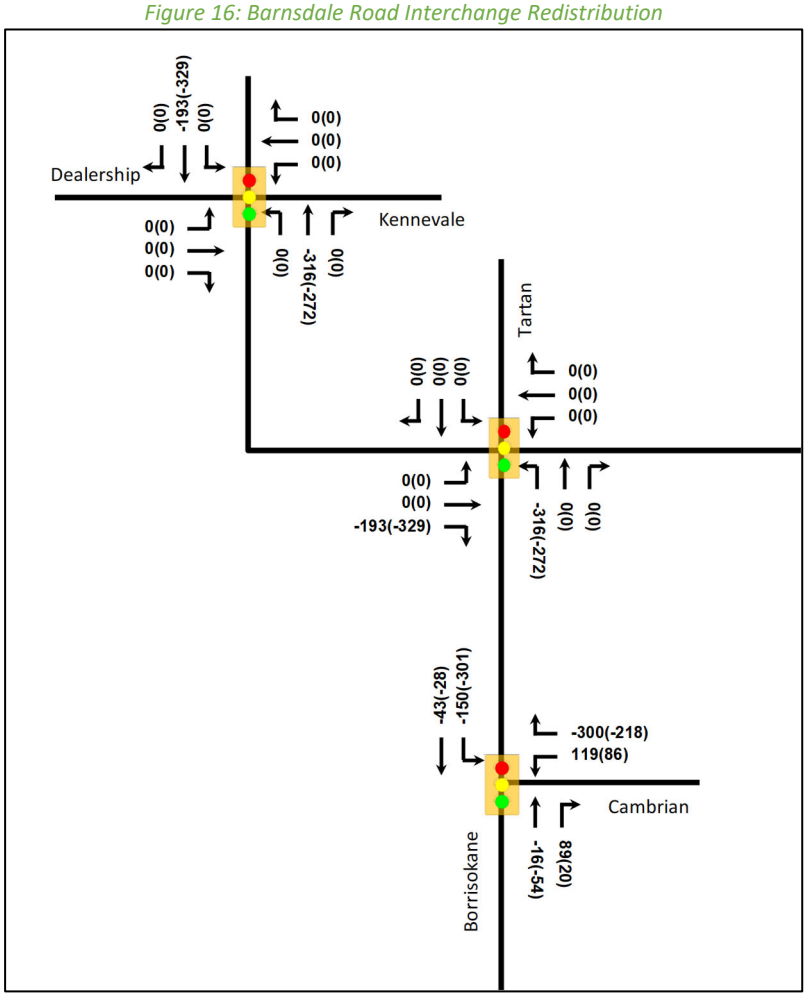
As a general impact to the Barrhaven South area traffic, the interchange would represent the following travel shifts:

- The new developments located along the future Re-Aligned Greenbank Road and west to Borrisokane Road have been assumed to shift 50% of the projected travel demand from Borrisokane Road to the new interchange. This is based on the northbound left-turn and eastbound right-turn at the Strandherd Drive and Borrisokane Road intersection.
- Additionally, a minor shift of travel from the existing volumes at the Borrisokane Road and Cambrian Road travel to/from the north to the south along Borrisokane Road

- No existing traffic reduction is explicitly considered. The broad application of the percent shift above is assumed to capture varying levels of travel shifts each development would be expected to see due to proximity to Borrisokane Road, effectively balancing existing and new development volumes.

Figure 16 illustrates the assumed redistribution that may be realized from the Barnsdale Road Interchange.

Figure 16: Barnsdale Road Interchange Redistribution



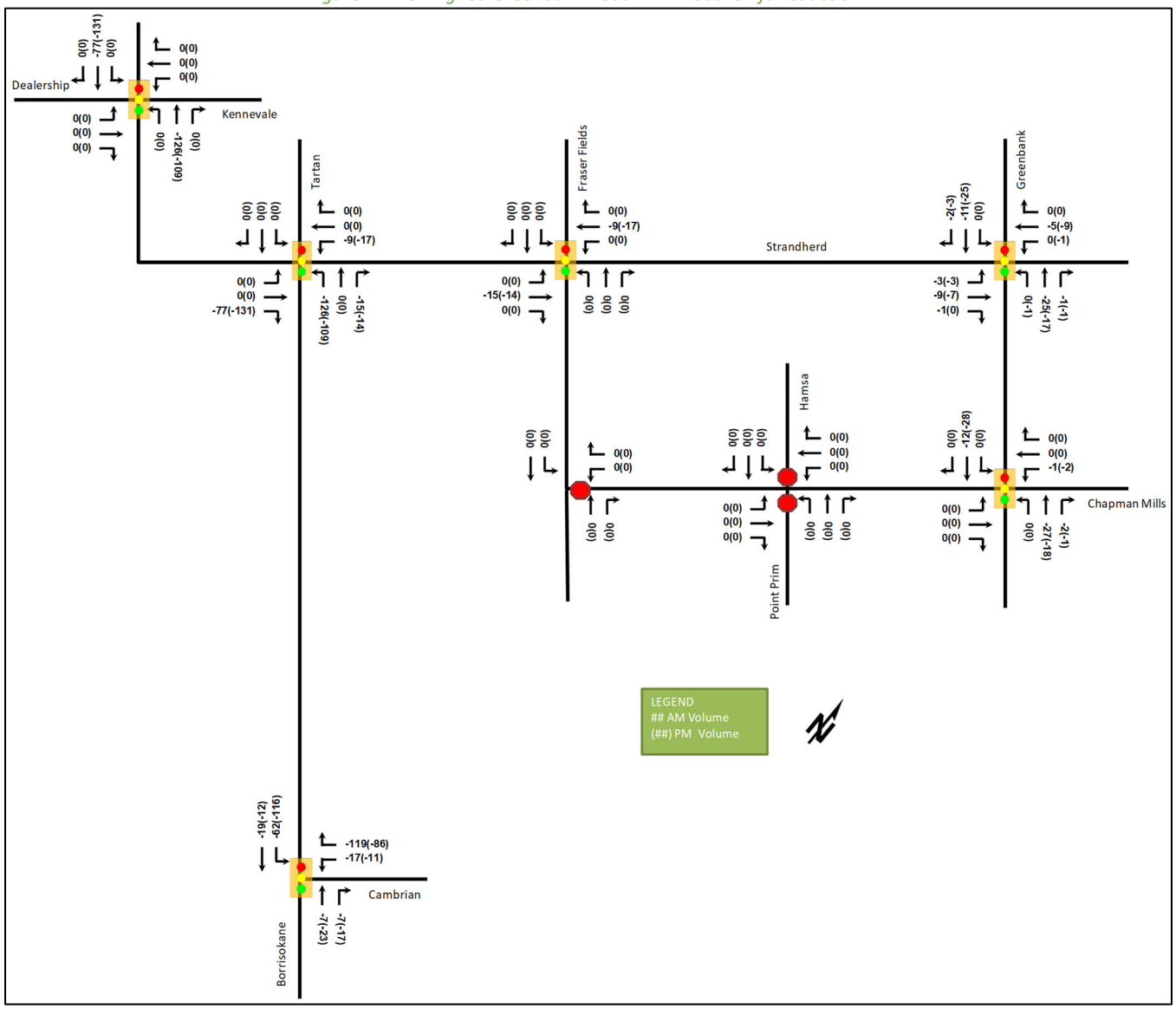
7.2.2 Re-Aligned Greenbank Road – BRT Corridor

The EA studies have been completed for the Southwest Transitway extensions from the Barrhaven Towncentre to Cambrian Road, and Cambrian Road to Barnsdale Road. The bus rapid transit corridor is comprised of median bus lanes along Re-Aligned Greenbank Road to a park and ride at Kilbirnie Drive. Whether the BRT corridor or increased service with the park and ride are completed, the following generalized impacts to the Barrhaven South area traffic are outlined below:

- A shift from 60-80% auto travel to upwards of 30% transit travel would represent a 20% reduction on all auto volumes projected from the new developments proposed within Barrhaven South.
- No existing traffic reduction is explicitly considered. The broad application of the percent shift above is assumed to capture varying levels of travel shifts each development would be expected to see due to proximity to Borrisokane Road, effectively balancing existing and new development volumes.

Figure 17 illustrates the assumed trip reduction at the study area intersections that may be realized from providing higher order transit service, either BRT or a park and ride accompanied by an increased service program.

Figure 17: Re-Aligned Greenbank Road BRT Modal Shift Reduction



7.2.3 Assessment of Total Mitigation

Figure 18 illustrates the 2029 future background traffic volumes with both the Barnsdale interchange and Re-Aligned Greenbank Road BRT Barrhaven improvements and Table 15 summarizes the intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. The intersection modifications previously outlined, and timing optimization have been included in the analysis. The Synchro worksheets are provided in Appendix F.

Figure 18: 2029 Future Background Traffic Volumes – Mitigated Conditions

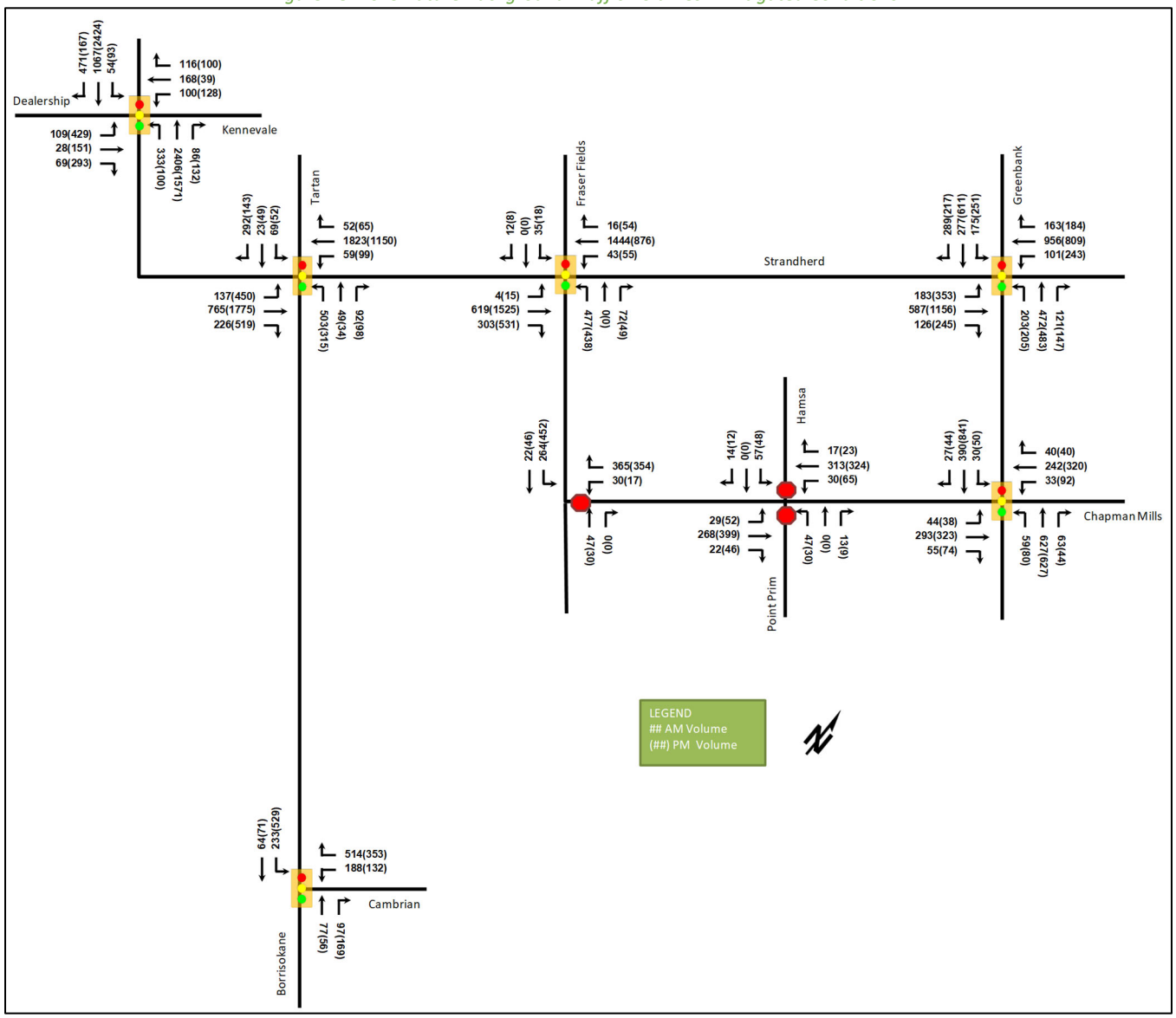


Table 15: 2029 Future Background Intersection Operations– Barrhaven Improvements

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	D	0.84	**89.6**	**#47.7**	**F**	**1.26**	**174.1**	**#185.3**
	EBT	A	0.08	34.7	11.8	A	0.29	34.1	44.5
	EBR	A	0.22	38.1	23.8	B	0.68	46.3	90.8
	WBL	A	0.36	41.9	33.0	A	0.39	37.4	41.3
	WBT/R	D	0.81	61.7	86.5	A	0.30	34.6	42.0
	NBL	C	0.76	60.3	m27.9	C	0.76	83.3	m13.1
	NBT/R	**F**	**1.36**	**180.7**	**m#281.3**	**F**	**1.09**	65.3	**m#236.0**
	SBL	A	0.50	70.0	**#32.6**	**F**	**1.24**	**228.4**	**#60.0**
	SBT	B	0.69	28.8	137.3	**F**	**1.52**	**262.5**	**#453.4**
	SBR	B	0.68	32.5	135.7	A	0.23	18.5	35.3
	Overall	**F**	**1.23**	**110.9**	**-**	**F**	**1.42**	**157.0**	**-**

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	**F**	**1.63**	**363.2**	**m#81.7**	**F**	**1.84**	**412.7**	**m#129.8**
	EBT	A	0.49	8.9	16.4	**F**	**1.17**	**93.8**	m57.3
	EBR	A	0.32	8.5	11.1	C	0.76	10.4	m19.3
	WBL	C	0.76	**85.3**	m15.8	A	0.58	62.5	m#50.9
	WBT/R	**F**	**1.28**	**151.2**	**m#295.3**	E	0.90	35.3	m165.5
	NBL	**F**	**2.75**	**823.4**	**#135.4**	**F**	**2.01**	**503.8**	**#87.1**
	NBT/R	A	0.40	43.1	46.7	A	0.46	48.5	44.2
	SBL	C	0.73	**96.0**	**#40.0**	B	0.64	**90.2**	**#31.2**
	SBT/R	E	0.94	82.9	**#124.1**	C	0.75	64.5	63.0
	Overall	**F**	**1.31**	**195.6**	-	**F**	**1.29**	**124.0**	-
Strandherd Drive & Chapman Mills Dive/Fraser Fields Way *Signalized*	EBL	A	0.05	69.8	m1.6	A	0.17	74.4	m3.4
	EBT	A	0.37	13.8	86.7	E	0.94	14.3	**m#178.8**
	EBR	A	0.40	16.0	94.7	C	0.73	10.6	m87.7
	WBL	A	0.39	63.3	21.2	A	0.45	65.0	**#30.3**
	WBT/R	C	0.76	23.0	**#246.3**	A	0.50	18.4	117.3
	NBL	**F**	**1.21**	**161.9**	**#102.3**	**F**	**1.20**	**157.4**	**#94.8**
	NBT/R	A	0.23	41.2	24.4	A	0.16	42.6	19.9
	SBL	A	0.39	67.5	18.5	A	0.15	52.3	10.8
	SBT/R	A	0.08	45.2	7.4	A	0.05	44.2	5.6
	Overall	**D**	**0.81**	**44.0**	-	**D**	**0.84**	**34.1**	-
Strandherd Drive & Greenbank Road *Signalized*	EBL	**F**	**1.03**	**101.9**	**#63.8**	E	0.96	80.6	**#118.3**
	EBT	A	0.56	29.9	64.7	**F**	**1.06**	**82.6**	**#195.7**
	EBR	A	0.21	1.8	3.6	A	0.38	5.3	16.8
	WBL	A	0.39	23.0	21.2	**F**	**1.06**	**119.3**	**#97.3**
	WBT	**F**	**1.04**	74.5	**#136.0**	E	0.91	56.9	**#126.8**
	WBR	A	0.30	4.3	10.2	A	0.34	4.7	11.7
	NBL	**F**	**1.08**	**132.5**	**#42.5**	D	0.88	**89.9**	**#45.9**
	NBT/R	A	0.57	27.6	60.4	C	0.76	45.6	88.8
	SBL	**F**	**1.06**	**132.1**	**#38.1**	E	0.99	**108.8**	**#56.8**
	SBT	A	0.27	25.2	29.6	C	0.71	45.2	88.0
	SBR	A	0.50	12.7	36.1	A	0.40	6.9	18.0
	Overall	**D**	**0.88**	**51.4**	-	**E**	**0.98**	**62.1**	-
Chapman Mills Drive & Greenbank Road *Signalized*	EBL	A	0.44	65.5	21.3	A	0.38	62.9	19.2
	EBT	C	0.73	52.0	86.1	D	0.83	60.7	95.5
	EBR	A	0.16	34.8	19.4	A	0.22	36.3	24.6
	WBL	A	0.33	60.7	17.1	D	0.85	**107.3**	**#49.8**
	WBT	B	0.68	51.1	70.4	B	0.67	45.5	94.9
	WBR	A	0.13	35.3	15.1	A	0.10	32.6	15.1
	NBL	A	0.50	66.5	**#30.3**	B	0.62	73.0	**#43.8**
	NBT/R	A	0.46	25.7	88.4	A	0.52	30.2	85.4
	SBL	A	0.30	59.4	16.0	A	0.47	66.4	**#23.8**
	SBT/R	A	0.30	25.3	51.0	C	0.76	38.4	119.8
	Overall	**B**	**0.61**	**36.7**	-	**C**	**0.78**	**44.2**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Cambrian Road & Borrisokane Road ***Signalized***	WBL	A	0.45	18.7	29.9	A	0.36	20.4	24.3
	WBR	B	0.68	7.1	17.9	A	0.59	7.1	16.5
	NBT	A	0.19	15.9	14.1	A	0.15	17.5	12.1
	NBR	A	0.23	5.8	8.4	A	0.37	6.3	11.6
	SBL	A	0.51	25.0	**#24.7**	C	0.72	27.3	**#56.8**
	SBT	A	0.08	7.5	8.4	A	0.08	6.4	8.6
	Overall	**A**	**0.36**	**13.0**	**-**	**A**	**0.41**	**16.9**	**-**
Chapman Mills Drive & Hamsa Street/Prim Point Crescent ***Unsignalized***	EBL	A	0.02	8.0	0.8	A	0.04	8.1	0.8
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.02	7.9	0.8	A	0.06	8.4	1.5
	WBT/R	-	-	-	-	-	-	-	-
	NB	C	0.16	16.7	4.5	C	0.16	22.8	4.5
	SB	C	0.20	17.4	5.3	D	0.25	25.3	7.5
	Overall	**A**	**-**	**3.3**	**-**	**A**	**-**	**3.3**	**-**
Chapman Mills Drive & Chapman Mills Drive ***Unsignalized***	WBR	C	0.08	15.1	2.3	C	0.09	24.9	2.3
	WBL	B	0.36	10.5	12.0	B	0.34	10.2	11.3
	NBT	-	-	-	-	-	-	-	-
	NBR	-	-	-	-	-	-	-	-
	SBL	A	0.17	7.8	4.5	A	0.29	8.2	9.0
	SBT	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**8.7**	**-**	**A**	**-**	**8.6**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue may exceed storage or mid-block length

The traffic redistributions and mode shift to transit produce a noticeable benefit to the Strandherd Drive corridor, reducing the capacity demands on most movements. There are still capacity, delay, and queuing constraints along Strandherd Drive from Borrisokane Road north to Kennevale Drive, and delay and queuing constraints east of Borrisokane Road.

At the Kennevale Drive intersection, the northbound through/right-turn movements will be over capacity during the AM peak, with high delays noted for the eastbound left-turn and northbound through/right-turn movements and may experience extended queuing for the eastbound left-turn, northbound through/right-turn and southbound left-turn movements. During the PM peak, the eastbound left-turn, northbound through/right-turn and southbound left-turn and through movements will be over capacity. High delays are noted for the eastbound left-turn, northbound left-turn, and southbound left-turn and through movements, and may experience extended queuing for the four over capacity movements.

During the AM peak, the Strandherd Drive and Borrisokane Road intersection will be over capacity in the eastbound left-turn, westbound through/right-turn, and northbound left-turn movements. These movements, along with the southbound left-turn movement, are also noted to have high delays and may experience extended queuing. The southbound through/right-turn may also experience extended queues. During the PM peak, eastbound left-turn and through, and westbound through/right-turn movements will be over capacity, experience high delays and have may experience extended queuing. The southbound left-turn and through/right-turn movements are also noted to have high delays.

The Strandherd Drive and Chapman Mills Drive intersection will be over capacity in the northbound left-turn movement with high delays and extended queues, with the westbound through/right-turn also experiencing

extended queuing during the AM peak. During the PM peak, the northbound left-turn movement over will be capacity with high delays and extended queues, and both the eastbound through and the westbound left-turn movements will also experience extended queuing.

During the AM peak, the Strandherd Drive and Greenbank Road intersection will be over capacity in the eastbound left-turn, westbound through, northbound left-turn and southbound left-turn movements with high delays and extended queueing. During the PM peak, the eastbound through and westbound left-turn movements will be over capacity with high delays and extended queues, the northbound left-turn and southbound left-turn will experience high delays and extended queues and the eastbound left-turn will have extended queuing.

High delays are noted for the westbound left-turn at the Chapman Mills Drive and Greenbank Road intersection during the PM peak. The westbound left-turn, northbound left-turn, and southbound left-turn movements may experience extended queueing.

The remaining intersections operate satisfactorily.

Overall, the infrastructure improvements of the additional interchange at Barnsdale Road and enhanced transit service south of the Jock River shows significant improvements at the study area intersections. A commitment from the City is required to advance these items and continue to look for continual mode shifting within Barrhaven to further reduce the auto dependency currently observed.

7.3 2034 Future Background Operations

Figure 19 illustrates the 2034 future background traffic volumes and Table 16 summarizes the 2034 forecasted intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection, and HCM average delay for unsignalized intersections. Previous intersection modifications have been carried forward, traffic mitigations outlined in Section 7.1, and timing optimization have been included in the operational analysis. the Synchro worksheets are provided in Appendix G.

Figure 19: 2034 Future Background Traffic Volumes – Mitigated Conditions

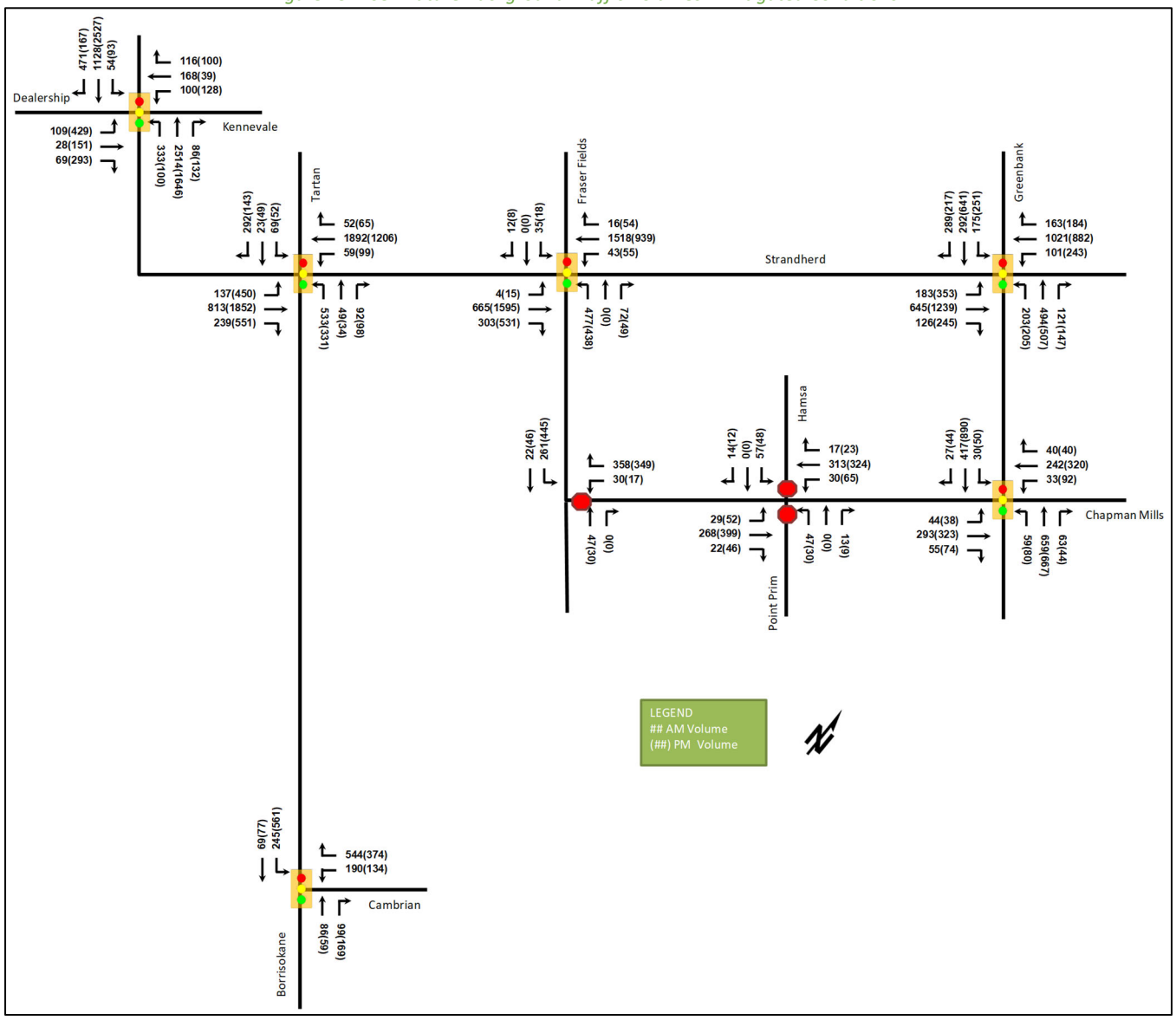


Table 16: 2034 Future Background Intersection Operations– Barrhaven Improvements

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	D	0.84	**89.6**	**#47.7**	**F**	**1.26**	**174.1**	**#185.3**
	EBT	A	0.08	34.7	11.8	A	0.29	34.1	44.5
	EBR	A	0.22	38.1	23.8	B	0.68	46.3	90.8
	WBL	A	0.36	41.9	33.0	A	0.39	37.4	41.3
	WBT/R	D	0.81	61.7	86.5	A	0.30	34.6	42.0
	NBL	C	0.76	60.4	m27.1	C	0.76	75.6	m12.5
	NBT	**F**	**1.42**	**207.1**	**m#285.6**	**F**	**1.14**	**83.4**	**m#243.5**
	SBL	A	0.50	70.0	**#32.6**	**F**	**1.24**	**228.4**	**#60.0**
	SBT	C	0.73	30.0	148.6	**F**	**1.58**	**290.7**	**#479.1**
	SBR	B	0.68	32.4	135.2	A	0.23	18.5	35.3
	Overall	**F**	**1.27**	**124.9**	**-**	**F**	**1.45**	**175.3**	**-**

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	**F**	**1.63**	**361.6**	**m#77.1**	**F**	**1.84**	**412.7**	**m#124.1**
	EBT	A	0.52	8.5	16.5	**F**	**1.22**	**116.9**	**m56.4**
	EBR	A	0.34	8.1	m10.8	D	0.81	11.3	m19.1
	WBL	C	0.76	83.8	m15.3	A	0.58	61.9	**m#51.5**
	WBT/R	**F**	**1.32**	**171.9**	**m#313.7**	E	0.94	39.8	m173.4
	NBL	**F**	**2.91**	**895.6**	**#143.4**	**F**	**2.11**	**547.4**	**#91.5**
	NBT/R	A	0.40	43.1	46.7	A	0.46	48.5	44.2
	SBL	C	0.73	**96.0**	**#40.0**	B	0.64	**90.2**	**#31.2**
	SBT/R	E	0.94	82.9	**#124.1**	C	0.75	64.5	63.0
	Overall	**F**	**1.35**	**215.0**	-	**F**	**1.33**	**135.9**	-
Strandherd Drive & Chapman Mills Dive/Fraser Fields Way *Signalized*	EBL	A	0.05	69.8	m1.5	A	0.17	74.5	m3.4
	EBT	A	0.40	13.5	90.4	E	0.98	17.7	**m#181.7**
	EBR	A	0.40	15.2	95.1	C	0.73	10.4	m79.4
	WBL	A	0.39	63.3	21.2	A	0.45	65.0	**#30.3**
	WBT/R	D	0.80	24.3	**#265.1**	A	0.53	19.0	127.9
	NBL	**F**	**1.21**	**161.9**	**#102.3**	**F**	**1.20**	**157.4**	**#94.8**
	NBT/R	A	0.23	41.2	24.4	A	0.14	37.4	17.9
	SBL	A	0.39	67.5	18.5	A	0.27	65.9	11.7
	SBT/R	A	0.08	45.2	7.4	A	0.05	44.2	5.6
	Overall	**D**	**0.84**	**43.5**	-	**D**	**0.87**	**35.0**	-
Strandherd Drive & Greenbank Road *Signalized*	EBL	D	0.87	64.5	**#68.0**	**F**	**1.08**	**106.5**	**#135.2**
	EBT	A	0.53	31.3	78.0	**F**	**1.11**	**98.3**	**#213.6**
	EBR	A	0.20	3.2	8.2	A	0.39	7.3	22.6
	WBL	A	0.35	20.5	22.0	**F**	**1.08**	**117.2**	**#99.5**
	WBT	E	0.93	53.6	**#157.1**	E	0.96	65.0	**#146.8**
	WBR	A	0.28	6.4	15.7	A	0.33	4.5	11.5
	NBL	D	0.80	77.0	**#42.6**	**F**	**1.02**	**124.0**	**#49.8**
	NBT/R	C	0.70	42.8	86.2	C	0.78	46.5	92.7
	SBL	C	0.73	72.6	**#36.0**	**F**	**1.11**	**141.7**	**#60.1**
	SBT	A	0.33	36.8	41.4	C	0.73	45.5	92.1
	SBR	A	0.58	21.9	54.1	A	0.40	6.8	17.9
	Overall	**D**	**0.85**	**42.5**	-	**F**	**1.04**	**72.3**	-
Chapman Mills Drive & Greenbank Road *Signalized*	EBL	A	0.44	65.5	21.3	A	0.38	62.9	19.2
	EBT	C	0.73	52.0	86.1	D	0.83	60.7	95.5
	EBR	A	0.16	34.8	19.4	A	0.22	36.3	24.6
	WBL	A	0.33	60.7	17.1	D	0.85	**107.3**	**#49.8**
	WBT	B	0.68	51.1	70.4	B	0.67	45.5	94.9
	WBR	A	0.13	35.3	15.1	A	0.10	32.6	15.1
	NBL	A	0.50	66.5	**#30.3**	B	0.62	73.0	**#43.8**
	NBT/R	A	0.48	26.1	93.2	A	0.56	30.9	91.3
	SBL	A	0.30	59.4	16.0	A	0.47	66.4	#23.8
	SBT/R	A	0.32	25.5	54.3	D	0.80	40.3	#136.5
	Overall	**B**	**0.63**	**36.5**	-	**C**	**0.80**	**44.7**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Cambrian Road & Borrisokane Road *Signalized*	WBL	A	0.45	18.9	30.3	A	0.37	20.6	24.6
	WBR	C	0.70	7.4	18.5	B	0.61	7.2	16.9
	NBT	A	0.21	16.3	15.5	A	0.16	17.7	12.7
	NBR	A	0.23	5.8	8.4	A	0.37	6.3	11.7
	SBL	A	0.52	25.2	**#26.0**	C	0.76	28.8	**#61.3**
	SBT	A	0.08	7.5	8.9	A	0.08	6.4	9.2
	Overall	**A**	**0.37**	**13.2**	**-**	**A**	**0.43**	**17.6**	**-**
Chapman Mills Drive & Hamsa Street/Prim Point Crescent *Unsignalized*	EBL	A	0.02	8.0	0.8	A	0.04	8.1	0.8
	EBT/R	-	-	-	-	-	-	-	-
	WBL	A	0.02	7.9	0.8	A	0.06	8.4	1.5
	WBT/R	-	-	-	-	-	-	-	-
	NB	C	0.16	16.7	4.5	C	0.16	22.8	4.5
	SB	C	0.20	17.4	5.3	D	0.25	25.3	7.5
	Overall	**A**	**-**	**3.3**	**-**	**A**	**-**	**3.3**	**-**
Chapman Mills Drive & Chapman Mills Drive *Unsignalized*	WBR	B	0.08	14.9	1.5	C	0.08	24.3	2.3
	WBL	B	0.35	10.4	12.0	B	0.33	10.2	11.3
	NBT	-	-	-	-	-	-	-	-
	NBR	-	-	-	-	-	-	-	-
	SBL	A	0.17	7.8	4.5	A	0.28	8.2	9.0
	SBT	-	-	-	-	-	-	-	-
	Overall	**A**	**-**	**8.6**	**-**	**A**	**-**	**8.6**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue exceeds storage or mid-block length

The 2034 background operations are expected to be similar to the 2029 background mitigated 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.

7.4 Demand Rationalization Conclusions

As outlined through the existing conditions and 2029 future background analysis, Barrhaven has significant auto volume demands on Strandherd Drive, both from north and south of the Jock River. These demands are along the mainline of Strandherd Drive itself, and on the turning movements to and from the corridor, all competing to limited time available at each intersection.

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 active mode connectivity and supporting programs within the community. It will also be assumed that the Chapman Mills BRT will be extended to support this development and the BRT modal shares will be applied to the future conditions. Ultimately, this will only serve to ease the impacts of this development but does not addressed the existing systemic issues in Barrhaven.

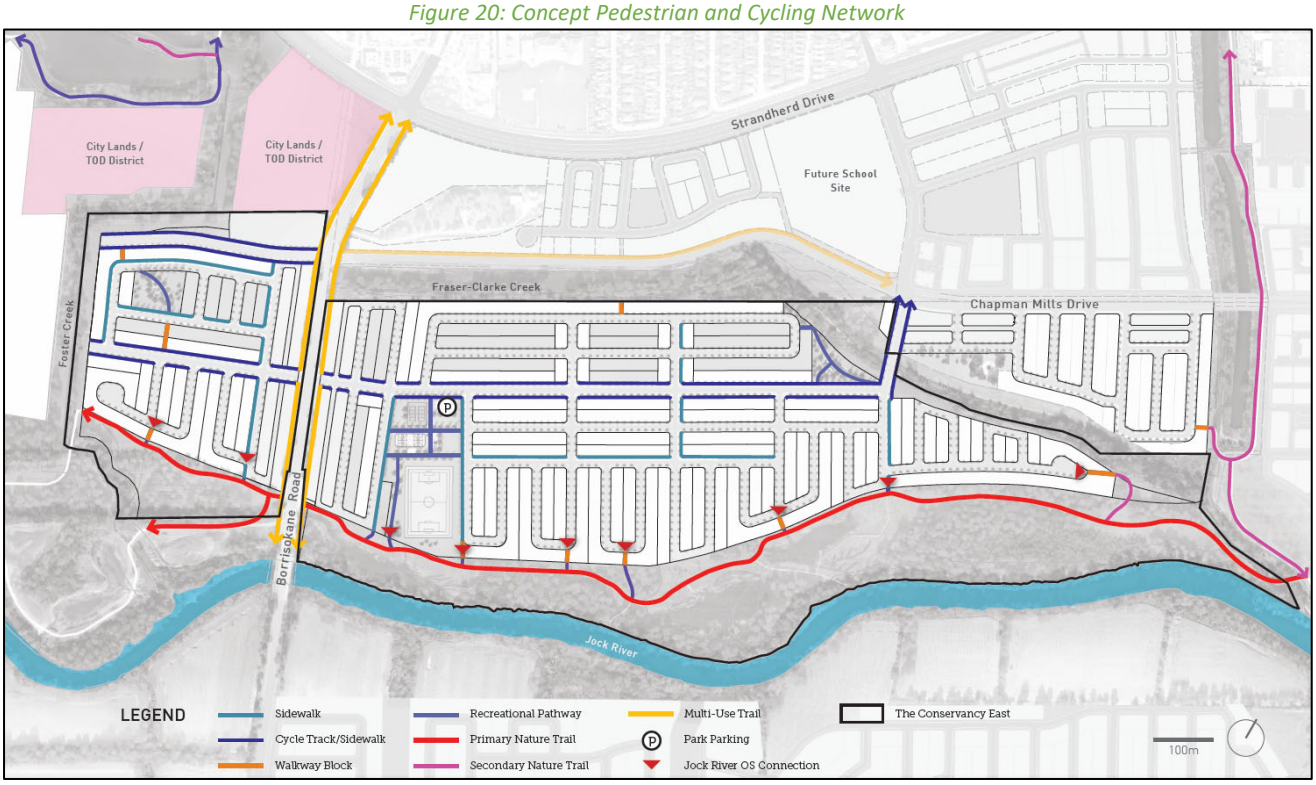
To address the systemic issues noted in the existing and background conditions, the deferral of planned infrastructure, such as the Re-Aligned Greenbank Road corridor being shifted to beyond 2031, will need to be reassessed and additional regional TDM programs or infrastructure will be needed from the City of Ottawa. The minimum needs have been highlighted above with the new Barnsdale Road Interchange and transit corridor to Barrhaven South, but still leaves capacity and queuing concerns along Strandherd Drive.

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 20 illustrates the proposed pedestrian network. The plan incorporates the adjacent developments and planned routes on geoOttawa. Street 10 and 15 will include cycle tracks.

Figure 20: Concept Pedestrian and Cycling Network



The active mode network will also connect to the future Chapman Mills BRT stops at the Chapman Mills Drive and Chapman Mills Drive intersection, and a stop near Borrisokane Road, either on the east side of the roadway or at the park and ride to the north.

8.2 New Street Networks

The new streets proposed as part of the plan of subdivision internal local roads with 8.5 metre laneways, 14.0 metre single loaded roads, 16.5 metre and 180 metre rights of ways, and 24.0m for the collector road right of way. Traffic calming elements will be included at the pedestrian and cycle track crossing locations, 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.

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 Streets

Table 17 summarizes the MMLOS analysis for the boundary road of Borrisokane Road. The existing and future conditions have been summarized in separate rows, with the future assuming a 2-lane arterial road cross-section with curb side bike lanes. The targets are based on the policy area of developing community and within 600m of a rapid transit station. The MMLOS worksheet has been provided in Appendix H.

Table 17: Boundary Street MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Borrisokane Road – Existing (developing community)	F	C	F	B	D	D	B	N/A
Borrisokane Road – Future (600m of rapid transit)	C	A	C	B	D	D	B	E

The existing Borrisokane Road corridor does not provide and pedestrian or cycling facilities beyond a gravel shoulders, therefore failing for MMLOS targets.

The future corridor with sidewalks will still fall short of the pedestrian LOS target of A, which is a function of both vehicle speeds and volumes along Borrisokane Road. The City would need to reduce the speeds to below 30 km/h or reduce the volumes along Borrisokane Road to less than 3000 vehicles per day to reach a LOS A. For cycling, a physically separated facility or reducing Borrisokane Road speeds to less than 50 km/h would achieve the MMLOS targets.

10 Access Intersections

10.1 Location and Design of Access

The residential accesses will connect via new collector roads to Borrisokane Road and Chapman Mills Drive. Within the subdivision, no turn lanes are proposed for the intersections and will be controlled by minor stop control. The collector road intersections with Borrisokane Road will be signalized intersections, with Access #2 being full movements on each leg, and Access #3 will include the BRT access on the east leg of the intersection. The summary of the lane arrangements are as follows:

- Access #2
  - Northbound left-turn, through and right-turn lanes (right-turn can be converted for future widenings and reduces queue conflicts with through movement)
  - Southbound left-turn, through and right-turn lanes (right-turn can be converted for future widenings and reduces queue conflicts with through movement)
  - Eastbound left-turn and shared through/right-turn lanes
  - Westbound left-turn and shared through/right-turn lanes
- Access #3
  - Northbound left-turn and through lanes
  - Southbound through and right-turn lanes (need for left-turn to be confirmed with OC Transpo)
  - Eastbound shared left-turn/through lane (need for future dedicated left-turn protection or separate through lane for transit to be confirmed with OC Transpo)
  - Westbound transit only through lane

The connection to Chapman Mills Drive (Access #1) will remain consistent with the proposed EA study intersection and modifications resulting from Phase 1 of the Conservancy area.

10.2 Access Intersection Control

The signal warrants illustrate that the Borrisokane Road intersection will not meet warrants, although it is still recommended to be signalized. From a planning perspective, a stop controlled intersection will significantly limit the active mode and transit operations within the communities, and create a significant barrier between the east and west side communities. The ability to cross Borrisokane Road would also facilitate the park/open space/Jock River greenspace connectivity as it crosses the roadway.

From an operational perspective, a comparison of the operations will be provided in Section 10.3.1. It is also noted that a minor stop-controlled intersection would introduce congested turning operations from the eastbound and westbound approaches, requiring the crossing of two or more lanes and needing to wait for gaps in both the north and south directions with up to six individual movements. A higher order control would provide additional safety for vehicle movements, in addition to the active modes above.

The Chapman Mills Drive intersection will require signalization due to the BRT corridor, and was planned as such through the Chapman Mills Drive and BRT Extension EA.

Signal warrants for the Borrisokane Road intersection are provided in Appendix I.

10.3 Access Intersection Design

10.3.1 2029 Future Total Operations

Figure 21 illustrates the 2029 future total traffic volumes and Table 18 summarizes the 2029 forecasted future total access intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection. The signalized intersections have been optimized and coordinated. Detailed turning movement count data is included in Appendix J.

Figure 21: 2029 Future Total Traffic Volumes – Mitigated Conditions

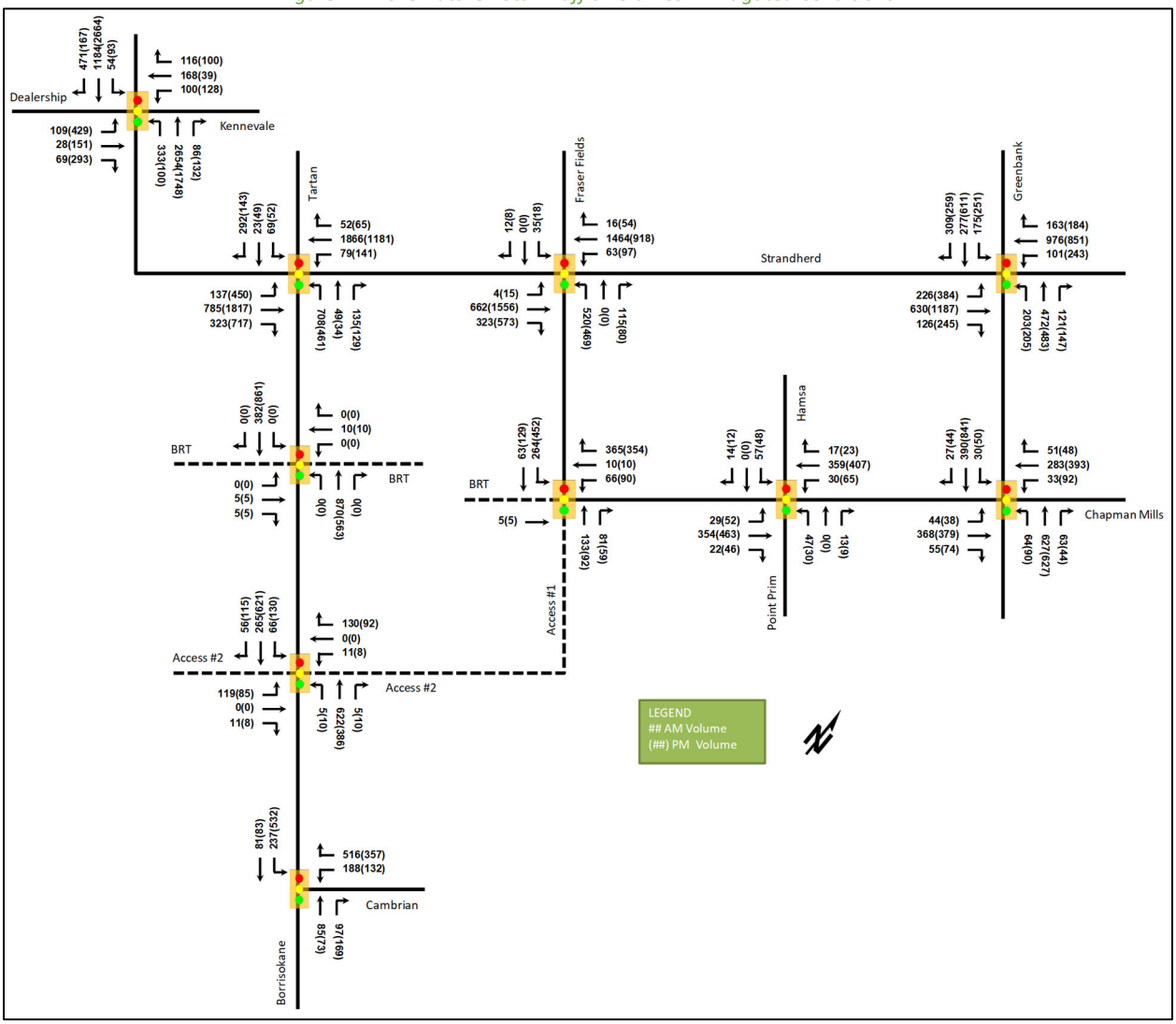


Table 18: 2029 Future Total Access Intersection Operations– Barrhaven Improvements

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Chapman Mills Drive & Access #1 *Signalized*	EB	A	0.01	39.0	4.3	A	0.02	41.6	4.3
	WBL	A	0.14	22.1	10.3	A	0.20	12.1	m15.4
	WBT	A	0.03	32.1	m5.6	A	0.04	44.4	m3.2
	WBR	D	0.86	49.0	**#42.4**	D	0.87	38.8	**#104.1**
	NBT	A	0.27	27.1	29.4	A	0.14	20.0	21.1
	NBR	A	0.20	25.6	19.8	A	0.10	19.7	15.1
	SBL	D	0.81	51.1	66.1	E	0.96	63.3	**#144.1**
	SBT	A	0.13	24.1	15.9	A	0.19	20.7	28.1
	Overall	**A**	**0.60**	**41.1**	-	**C**	**0.77**	**41.7**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Access #2 & Borrisokane Road *Signalized*	EBL	A	0.56	38.7	28.1	A	0.40	31.6	19.2
	EBT/R	A	0.04	23.6	4.7	A	0.03	22.2	3.6
	WBL	A	0.05	23.8	4.7	A	0.04	22.4	3.6
	WBT/R	A	0.49	34.1	29.1	A	0.36	29.5	19.9
	NBL	A	0.04	35.8	4.0	A	0.08	34.0	5.6
	NBT	B	0.61	19.3	**#137.8**	A	0.41	16.5	73.3
	NBR	A	0.01	12.2	2.2	A	0.01	14.3	3.8
	SBL	A	0.43	40.0	**#26.3**	A	0.59	40.1	**m#28.9**
	SBT	A	0.22	11.9	62.3	A	0.52	9.6	**#146.2**
	SBR	A	0.05	11.3	16.3	A	0.11	3.6	m11.3
	Overall	**B**	**0.64**	**21.9**	**-**	**B**	**0.61**	**16.5**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue exceeds storage or mid-block length

The 2029 future total operations at the access intersections generally operate well during both peak hours.

The Chapman Mills Drive and Access #1 intersection is noted to have extended queuing for the westbound right-turn movement during the AM peak and in both the westbound right-turn and southbound left-turn movements during the PM peak.

The Borrisokane Road and Access #2 intersection is noted to have extended queuing for the northbound through and southbound left-turn movements during the AM peak and in both the southbound left-turn and through movements during the PM peak. The intersection is assumed to be signalized due to operational constraints of a stop-controlled intersection and for both active mode and transit LOS considerations.

As noted above in Section 10.2, if the Access #2 intersection is considered as a stop-controlled intersection, the expected operations are summarized below in Table 19.

Table 19: 2029 Future Total Access Intersection Operations– Stop Control on Borrisokane Road

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Access #2 & Borrisokane Road *Unsignalized*	EB	**F**	**0.92**	**115.3**	**47.3**	**F**	**0.86**	**125.0**	**37.5**
	WB	C	0.33	17.4	10.5	B	0.21	14.6	6.0
	NBL	A	0.00	7.9	0.0	A	0.01	9.2	0.0
	NBT/R	-	-	-	-	-	-	-	-
	SBL	A	0.07	9.0	1.5	A	0.11	8.5	3.0
	SBT	-	-	-	-	-	-	-	-
	SBR	-	-	-	-	-	-	-	-
	Overall	**B**	**-**	**14.0**	**-**	**A**	**-**	**9.8**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue exceeds storage or mid-block length

As a stop-controlled intersection, the eastbound approach would experience high delays of up to two minutes. As the volumes are predominantly left turns, the addition of an auxiliary lane would only provide minimal improvement (e.g. AM delays from 115 second to 107 seconds). As the intersection is the only egress point for the parcel west of Borrisokane Road, the operations are not ideal for a new intersection and it is recommended that it be signalized.

10.3.2 2034 Future Total Operations

Figure 22 illustrates the 2034 future total traffic volumes and Table 20 summarizes the 2034 forecasted future total access intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection. The signalized intersections have been optimized and coordinated. Detailed turning movement count data is included in Appendix K

Figure 22: 2034 Future Total Traffic Volumes – Mitigated Conditions

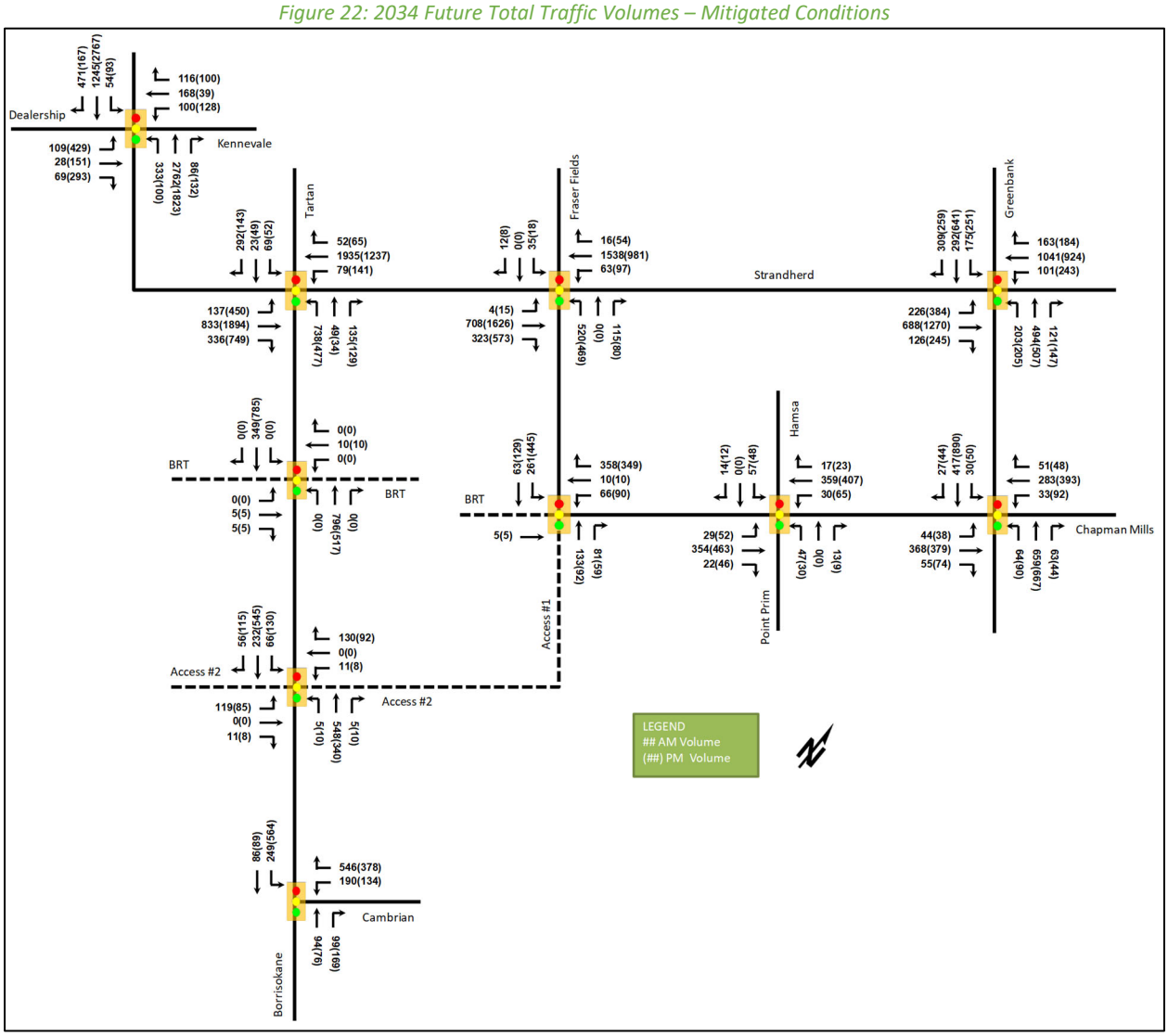


Table 20: 2034 Future Total Access Intersection Operations– Barrhaven Improvements

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Chapman Mills Drive & Access #1 ***Signalized***	EB	A	0.01	38.8	4.3	A	0.02	41.6	4.3
	WBL	A	0.14	26.1	24.4	A	0.20	19.5	m23.9
	WBT	A	0.02	48.0	m6.4	A	0.04	52.6	m0.0
	WBR	D	0.85	51.8	101.2	D	0.86	46.0	**#101.7**
	NBT	A	0.28	27.4	29.7	A	0.14	20.0	21.1
	NBR	A	0.20	25.8	20.0	A	0.10	19.7	15.1
	SBL	D	0.81	51.3	65.7	E	0.94	60.2	**#140.9**
	SBT	A	0.13	24.3	16.0	A	0.19	20.7	28.1
	Overall	**A**	**0.59**	**42.6**	-	**C**	**0.76**	**43.3**	-
Access #2 & Borrisokane Road ***Signalized***	EBL	A	0.51	31.4	23.7	A	0.38	28.3	17.6
	EBT/R	A	0.04	19.3	4.0	A	0.01	0.0	0.0
	WBL	A	0.04	19.5	4.0	A	0.03	20.1	3.3
	WBT/R	A	0.44	27.9	24.4	A	0.15	0.5	0.0
	NBL	A	0.04	30.8	3.5	A	0.08	31.4	5.3
	NBT	A	0.58	20.0	**#118.4**	A	0.37	16.6	63.7
	NBR	A	0.01	13.2	2.3	A	0.01	0.0	0.0
	SBL	A	0.40	33.7	**#22.8**	A	0.57	37.1	**m#33.7**
	SBT	A	0.20	9.0	48.3	A	0.47	9.0	**#124.5**
	SBR	A	0.06	8.2	14.6	A	0.11	1.5	m7.3
	Overall	**A**	**0.60**	**20.1**	-	**A**	**0.56**	**13.8**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue exceeds storage or mid-block length

The 2034 total future operations are expected to be similar to the 2029 future total operations.

10.3.3 Access Intersection MMLOS

Table 21 summarizes the MMLOS analysis for the access intersections for the development. The targets are based on the policy area of developing community and within 600m of a rapid transit station. The MMLOS worksheet has been provided in Appendix H.

Table 21: Access Intersection MMLOS Analysis

Intersection	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Chapman Mills Drive & Access #1 (future)	**F**	A	A	B	**E**	A	-	N/A	B	E
Borrisokane Road & Access #2	**D**	A	A	B	D	D	-	N/A	A	E

The MMLOS targets for the pedestrian and transit LOS will not be met at the development access intersections. The pedestrian level of service would require a maximum of four lanes at a crossing to meet a LOS C.

For transit, the BRT corridor at Access #1 is assumed to 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 unlikely to be achievable. A LOS B with less than 10 seconds delay may be a more realistic target for the Chapman Mills Drive corridor. At the Access #2 intersection, this service would be mixed flow for local routes and is a function of the east and west legs having higher delays to allow the major flows north and south along Borrisokane Road.

10.3.4 Recommended Design Elements

The intersection lane requirements have been noted in Section 10.1. The final design for Borrisokane Road and the associated intersections will require consultation with the City and OC Transpo.

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. Theses 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 L.

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, and to Chapman Mills Drive which is a collector road. Prior to the connection of Chapman Mills Drive across the Kennedy-Burnett SWM Pond, the background developments (see Section 2.3.2) will be the only traffic accessing Chapman Mills Drive. The forecasted volumes along Chapman Mills Drive between Strandherd Drive and the east-west segment is in the range of 7,000-9,000 two-way vehicles per day. These volumes exceed the TIA Guidelines threshold of 2,500 vehicles per day or 300 vehicles during the peak hour, equivalent to 5 cars per minute in both directions total. In general, the TIA thresholds are too low for collector roadways of this nature, in areas of the City that is currently under served by both the collector and arterial road network. For example, the Minto Harmony development

consumes this entire threshold prior to any additional development in the area or the connection east to Greenbank Road.

13 Transit

13.1 Route Capacity

The proposed development will require additional transit service to be provided to support the area. It is forecasted that approximately 250-290 two-way peak hour transit trips will be generated with the existing modal shares in Nepean and up to 500-575 two-way peak hour transit trips for BRT level modal shares are achieved. Table 22 summarizes the forecasted peak direction transit trips to estimate the minimum bus type and service required to support Conservancy.

Table 22: Forecasted Transit Service – Minimum Bus Requirements

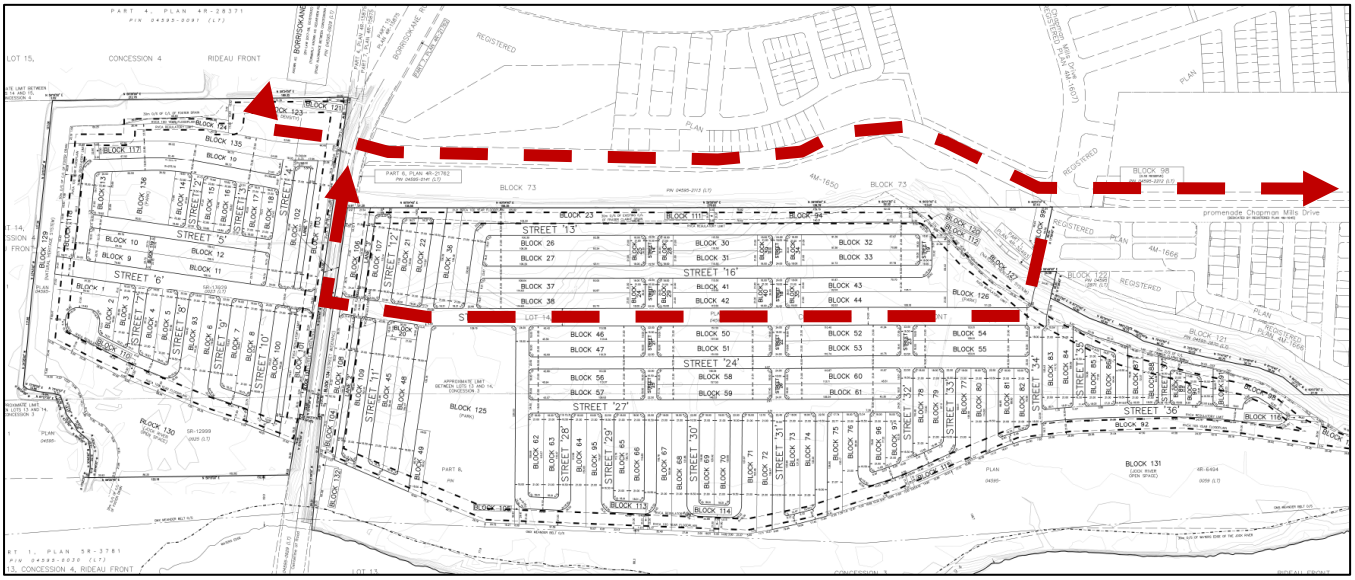
Phase	Trips in Peak Direction	Minimum Buses Required By Type		
		Single Capacity: 55	Articulated Capacity: 75	Double Decker Capacity: 95
East – Auto Focus	170	3-4 buses	2-3 buses	2-3 buses
East – Transit Focus	340	7-8 buses	5-6 buses	4-5 buses

Note: capacity assessed at 80% for bus number calculations

With the numbers above, the route frequencies would be required to achieve the forecasted transit mode shares would require 15–20-minute service with lower transit modal shares and 5–15-minute service to achieve BRT level modal shares. If the higher adoption of transit is to be achieved, it is recommended that the higher service is provided prior to the implementation of the Chapman Mills BRT.

Figure 23 illustrates the potential transit service options with the existing network and future networks in place.

Figure 23: Local Bus Service – Potential Service Loop



13.2 Transit Priority

No transit priority was considered within the development. The Chapman Mills Drive EA proposed a transit only left-turn lane at the Strandherd Drive intersection and provided transit signals for buses to enter and exit the BRT as Chapman Mills Drive transitioned from the centre median cross-section along the east-west portion, to a

divided two-lane collector on the north-south portion. A transit signal will need to be incorporated into the signalized intersection once the BRT is extended to Borrisokane Road.

14 Review of 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
  - 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 at Cambrian Road and Borrisokane Road. These changes have been noted in Section 7.1.

15.2 Network Intersection Design

15.2.1 2029 Future Total Operations

Figure 21 illustrates the 2029 future total traffic volumes and Table 23 summarizes the 2029 forecasted future total intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection. The signalized intersections have been optimized and coordinated. Detailed turning movement count data is included in Appendix I

Table 23: 2029 Future Total Intersection Operations– Barrhaven Improvements

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	D	0.84	89.6	#47.7	**F**	**1.26**	**174.1**	**#185.3**
	EBT	A	0.08	34.7	11.8	A	0.29	34.1	44.5
	EBR	A	0.22	38.1	23.8	B	0.68	46.3	90.8
	WBL	A	0.36	41.9	33.0	A	0.39	37.4	41.3
	WBT/R	D	0.81	61.7	86.5	A	0.30	34.6	42.0
	NBL	C	0.76	61.0	m25.9	C	0.76	87.9	m13.2
	NBT/R	**F**	**1.49**	**240.9**	**m#286.3**	**F**	**1.20**	**115.6**	**m#307.0**
	SBL	A	0.50	70.0	**#32.6**	**F**	**1.24**	**228.4**	**#60.0**
	SBT	C	0.76	31.2	158.4	**F**	**1.67**	**328.3**	**#513.2**
	SBR	B	0.68	32.2	133.9	A	0.23	18.5	35.3
	Overall	**F**	**1.32**	**143.6**	**-**	**F**	**1.50**	**203.2**	**-**
Strandherd Drive & Borrisokane Road/Tartan Drive ***Signalized***	EBL	**F**	**1.63**	**360.1**	**m#73.2**	**F**	**2.88**	**872.4**	**m#114.2**
	EBT	A	0.55	10.3	15.3	**F**	**1.19**	**101.8**	**m41.0**
	EBR	A	0.51	10.6	m13.3	**F**	**1.05**	**41.4**	**m26.9**
	WBL	D	0.81	82.0	m20.5	**F**	**1.88**	**455.0**	**m#69.6**
	WBT/R	**F**	**1.33**	**175.7**	**m#317.3**	E	0.92	45.3	m163.2
	NBL	**F**	**3.39**	**1103.8**	**#186.4**	E	0.98	87.6	**#88.0**
	NBT/R	A	0.48	44.5	60.2	A	0.43	43.1	53.7
	SBL	B	0.66	83.9	**#36.7**	C	0.78	116.4	#34.4
	SBT/R	E	0.94	82.9	**#124.1**	**F**	**1.02**	**121.9**	**#92.0**
	Overall	**F**	**1.41**	**271.3**	**-**	**F**	**1.34**	**153.6**	**-**
Strandherd Drive & Chapman Mills Dive/Fraser Fields Way ***Signalized***	EBL	A	0.05	71.2	m1.3	A	0.17	73.6	m3.9
	EBT	A	0.41	14.5	88.8	**F**	**1.01**	**21.7**	**m#178.8**
	EBR	A	0.45	17.2	101.9	D	0.83	10.9	m60.8
	WBL	A	0.50	66.6	28.7	A	0.54	62.9	**#50.7**
	WBT/R	C	0.79	25.2	**#258.2**	A	0.51	18.1	122.3
	NBL	**F**	**1.17**	**142.8**	**#107.2**	**F**	**1.38**	**228.3**	**#106.5**
	NBT/R	A	0.34	41.7	35.8	A	0.24	39.9	26.8
	SBL	A	0.39	67.5	18.5	A	0.27	65.9	11.7
	SBT/R	A	0.08	45.2	7.4	A	0.05	44.2	5.6
	Overall	**D**	**0.87**	**43.2**	**-**	**E**	**0.91**	**46.6**	**-**
Strandherd Drive & Greenbank Road ***Signalized***	EBL	E	0.90	66.5	**#82.3**	**F**	**1.08**	**106.4**	**#145.6**
	EBT	A	0.51	30.6	75.6	**F**	**1.06**	**82.5**	**#200.2**
	EBR	A	0.20	3.2	8.1	A	0.38	5.5	17.5
	WBL	A	0.34	20.6	22.0	**F**	**1.06**	**109.8**	**#98.0**
	WBT	E	0.95	58.9	**#155.5**	E	0.98	68.9	**#144.2**
	WBR	A	0.27	2.7	6.6	A	0.34	4.8	11.8
	NBL	D	0.83	81.1	**#44.2**	D	0.89	92.1	**#46.2**
	NBT/R	B	0.68	41.6	82.0	C	0.78	47.6	89.9
	SBL	C	0.77	76.5	**#37.6**	E	0.99	108.8	**#56.8**
	SBT	A	0.32	36.4	39.1	C	0.73	46.7	89.0
	SBR	A	0.58	17.1	47.4	A	0.46	7.1	20.0
	Overall	**D**	**0.84**	**43.6**	**-**	**F**	**1.02**	**65.9**	**-**

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Chapman Mills Drive & Greenbank Road *Signalized*	EBL	A	0.44	65.5	21.3	A	0.38	62.9	19.2
	EBT	D	0.83	56.1	**#119.1**	D	0.89	64.0	**#124.2**
	EBR	A	0.15	32.7	19.4	A	0.20	34.4	24.6
	WBL	A	0.33	60.7	17.1	D	0.85	107.3	**#49.8**
	WBT	C	0.70	49.6	82.7	C	0.76	48.1	**#131.6**
	WBR	A	0.15	34.0	18.3	A	0.11	31.5	17.5
	NBL	A	0.59	73.7	**#32.3**	C	0.75	87.9	**#48.5**
	NBT/R	A	0.48	27.5	88.4	A	0.55	31.8	85.4
	SBL	A	0.31	59.8	15.9	A	0.50	68.7	23.5
	SBT/R	A	0.31	26.4	51.0	C	0.79	40.7	119.8
	Overall	**C**	**0.67**	**39.1**	-	**D**	**0.84**	**47.1**	-
Cambrian Road & Borrisokane Road *Signalized*	WBL	A	0.25	52.1	m12.0	A	0.42	44.5	m13.6
	WBR	A	0.33	9.3	16.5	D	0.84	64.7	**m#111.3**
	NBT	A	0.25	48.1	14.0	A	0.52	59.0	25.4
	NBR	A	0.33	14.4	91.6	C	0.70	36.0	**#113.2**
	SBL	A	0.29	36.6	15.8	A	0.07	19.3	11.1
	SBT	A	0.36	39.0	18.3	A	0.11	19.9	15.2
	Overall	**A**	**0.37**	**17.9**	-	**A**	**0.39**	**48.9**	-
Chapman Mills Drive & Hamsa Street/Prim Point Crescent *Signalized*	EBL	A	0.45	18.8	30.0	A	0.44	27.3	24.8
	EBT/R	B	0.68	7.1	17.9	B	0.64	8.4	16.7
	WBL	A	0.21	16.2	15.4	A	0.13	17.8	15.1
	WBT/R	A	0.23	5.8	8.4	A	0.29	5.1	11.8
	NB	A	0.51	25.0	**#25.1**	C	0.71	30.2	**#55.5**
	SB	A	0.10	7.6	10.1	A	0.08	5.8	9.7
	Overall	**A**	**0.37**	**13.0**	-	**A**	**0.48**	**18.8**	-
Borrisokane Road & BRT Corridor *Signalized*	EBL	A	0.02	25.2	2.9	A	0.02	22.6	2.6
	EBR	A	0.02	25.2	2.9	A	0.02	22.6	2.6
	WB	A	0.04	25.6	4.5	A	0.03	23.2	4.0
	NB	A	0.59	5.5	**#183.4**	A	0.39	3.7	82.1
	SB	A	0.26	4.4	45.7	A	0.59	9.6	**#180.2**
	Overall	**A**	**0.60**	**5.5**	-	**A**	**0.60**	**7.5**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue exceeds storage or mid-block length

The study area network intersections operate with similar capacity constraints, delays, and queuing as the 2029 future background conditions. The network was optimized for 120 second signal cycle lengths and the offset between intersections along Strandherd Drive and Borrisokane Road, and along Chapman Mills Drive.

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 2034 Future Total Operations

Figure 22 illustrates the 2034 future total traffic volumes and Table 24 summarizes the 2034 forecasted future total intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for volume to capacity ratio of the lane movements and HCM average delay for the overall intersection. The signalized intersections have been optimized and coordinated. Detailed turning movement count data is included in Appendix K.

Table 24: 2034 Future Total Intersection Operations– Barrhaven Improvements

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	D	0.84	**89.6**	**#47.7**	**F**	**1.26**	**174.1**	**#185.3**
	EBT	A	0.08	34.7	11.8	A	0.29	34.1	44.5
	EBR	A	0.22	38.1	23.8	B	0.68	46.3	90.8
	WBL	A	0.36	41.9	33.0	A	0.39	37.4	41.3
	WBT/R	D	0.81	61.7	86.5	A	0.30	34.6	42.0
	NBL	C	0.77	61.2	m25.0	C	0.76	**86.4**	m12.8
	NBT/R	**F**	**1.55**	**267.3**	**m#290.3**	**F**	**1.25**	**135.7**	**m#309.9**
	SBL	A	0.50	70.0	**#32.6**	**F**	**1.24**	**228.4**	**#60.0**
	SBT	D	0.80	32.9	**#182.7**	**F**	**1.73**	**356.6**	**#538.8**
	SBR	B	0.68	32.2	134.4	A	0.23	18.5	35.3
	Overall	**F**	**1.36**	**158.2**	-	**F**	**1.54**	**223.1**	-
Strandherd Drive & Borrisokane Road/Tartan Drive ***Signalized***	EBL	**F**	**1.63**	**358.1**	**m#69.2**	**F**	**2.88**	**872.5**	**m#109.4**
	EBT	A	0.59	10.2	15.5	**F**	**1.24**	**124.8**	**m40.4**
	EBR	A	0.53	10.4	m12.7	**F**	**1.10**	**61.1**	**m26.2**
	WBL	D	0.81	78.2	m19.9	**F**	**1.88**	**454.2**	**m#70.6**
	WBT/R	**F**	**1.38**	**195.6**	**m#316.8**	E	0.96	50.6	m170.8
	NBL	**F**	**3.53**	**1167.6**	**#194.4**	**F**	**1.01**	**95.4**	**#92.5**
	NBT/R	A	0.48	44.5	60.2	A	0.43	43.1	53.7
	SBL	B	0.66	**83.9**	#36.7	C	0.78	116.4	**#34.4**
	SBT/R	E	0.94	**82.9**	#124.1	**F**	**1.02**	**121.9**	**#92.0**
	Overall	**F**	**1.45**	**290.2**	-	**F**	**1.37**	**163.6**	-
Strandherd Drive & Chapman Mills Dive/Fraser Fields Way ***Signalized***	EBL	A	0.05	72.2	m1.2	A	0.17	74.1	m3.7
	EBT	A	0.43	14.8	101.4	**F**	**1.08**	**49.0**	**m#177.7**
	EBR	A	0.44	16.9	101.8	D	0.85	10.8	m48.1
	WBL	A	0.50	66.5	28.6	A	0.50	60.2	**#54.0**
	WBT/R	D	0.81	24.7	**#270.2**	A	0.55	18.6	132.4
	NBL	**F**	**1.32**	**203.3**	**#113.8**	**F**	**1.38**	**228.3**	**#106.5**
	NBT/R	A	0.36	44.0	36.7	A	0.24	39.9	26.8
	SBL	A	0.39	67.5	18.5	A	0.27	65.9	11.7
	SBT/R	A	0.08	45.2	7.4	A	0.05	44.2	5.6
	Overall	**D**	**0.90**	**51.7**	-	**E**	**0.95**	**57.1**	-
Strandherd Drive & Greenbank Road ***Signalized***	EBL	E	0.93	73.2	**#84.6**	**F**	**1.09**	**110.1**	**#150.9**
	EBT	A	0.54	30.3	82.2	**F**	**1.08**	**87.9**	**#222.2**
	EBR	A	0.19	3.0	8.0	A	0.37	6.2	20.1
	WBL	A	0.35	20.0	21.4	**F**	**1.07**	**114.6**	**#102.4**
	WBT	E	0.96	58.8	**#165.9**	E	0.99	72.5	**#161.3**
	WBR	A	0.28	7.0	16.6	A	0.33	5.1	13.3
	NBL	D	0.86	**86.7**	**#45.8**	D	0.89	**93.4**	**#47.3**
	NBT/R	C	0.72	44.1	86.3	D	0.85	54.8	**#104.8**
	SBL	D	0.83	**84.8**	**#40.5**	E	0.99	**110.9**	**#58.5**
	SBT	A	0.35	37.7	41.6	D	0.80	52.6	98.9
	SBR	B	0.63	25.0	60.9	A	0.47	7.5	20.7
	Overall	**D**	**0.88**	**45.8**	-	**F**	**1.05**	**70.3**	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95th)	LOS	V/C	Delay	Q (95th)
Chapman Mills Drive & Greenbank Road *Signalized*	EBL	A	0.44	65.5	21.3	A	0.38	62.9	19.2
	EBT	D	0.83	56.1	**#119.1**	D	0.89	64.0	**#124.2**
	EBR	A	0.15	32.7	19.4	A	0.20	34.4	24.6
	WBL	A	0.33	60.7	17.1	D	0.85	**107.3**	**#49.8**
	WBT	C	0.70	49.6	82.7	C	0.76	48.1	**#131.6**
	WBR	A	0.15	34.0	18.3	A	0.11	31.5	17.5
	NBL	B	0.60	75.9	**#33.6**	C	0.76	**90.3**	**#49.8**
	NBT/R	A	0.50	28.0	93.2	A	0.58	32.6	91.3
	SBL	A	0.32	60.5	16.0	A	0.51	70.7	**#23.8**
	SBT/R	A	0.33	26.7	54.3	D	0.84	43.7	**#136.5**
	Overall	**C**	**0.69**	**39.1**	-	**D**	**0.86**	**48.1**	-
Cambrian Road & Borrisokane Road *Signalized*	WBL	A	0.53	25.2	29.9	A	0.44	27.3	25.0
	WBR	C	0.73	8.5	18.4	B	0.65	8.6	17.1
	NBT	A	0.15	15.7	16.6	A	0.15	18.5	15.6
	NBR	A	0.17	5.1	8.4	A	0.31	5.3	11.8
	SBL	A	0.53	29.7	**#27.9**	B	0.68	28.5	**#60.3**
	SBT	A	0.09	7.1	10.8	A	0.08	5.8	10.3
	Overall	**A**	**0.34**	**15.4**	-	**A**	**0.41**	**18.3**	-
Chapman Mills Drive & Hamsa Street/Prim Point Crescent *Signalized*	EBL	A	0.25	54.0	m10.4	A	0.42	36.9	m13.8
	EBT/R	A	0.33	10.2	104.9	D	0.84	60.6	**m#118.6**
	WBL	A	0.25	48.6	14.2	A	0.52	59.0	25.4
	WBT/R	A	0.33	14.4	91.6	C	0.70	36.0	**#113.2**
	NB	A	0.29	36.6	15.8	A	0.07	19.3	11.1
	SB	A	0.36	39.0	18.3	A	0.11	19.9	15.2
	Overall	**A**	**0.39**	**18.3**	-	**A**	**0.48**	**46.8**	-
Borrisokane Road & BRT Corridor *Signalized*	EBL	A	0.02	20.2	2.4	A	0.02	20.2	2.4
	EBR	A	0.02	20.2	2.5	A	0.02	0.2	0.0
	WB	A	0.03	20.7	3.7	A	0.03	20.7	3.7
	NB	A	0.55	6.1	**#156.9**	A	0.36	3.8	82.9
	SB	A	0.24	4.9	42.6	A	0.55	9.3	**#155.3**
	Overall	**A**	**0.56**	**6.0**	-	**A**	**0.55**	**7.2**	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00
m = metered queue
# = queue exceeds storage or mid-block length

The operations noted are similar to the 2029 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.

15.3 Network Intersection MMLOS

Table 25 summarizes the MMLOS analysis for the study area network intersections. The targets are based on the policy area of employment area (Kennevale), developing community (existing Borrisokane, future Cambrian) and within 600m of a rapid transit station. The MMLOS worksheet has been provided in Appendix H.

Table 25: Network 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
Strandherd Drive & Chapman Mills Drive/Fraser Fields Way (future)	F	A	B	C	F	C	-	N/A	D	E
Strandherd Drive & Greenbank Road (existing/future)	D/F	A	F	C	F	D	A	B	E	D
Chapman Mills Drive & Greenbank Road (future)	F	A	A	B	F	A	-	N/A	A	E
Chapman Mills Drive & Hamsa Street/Point Prim Crescent (future)	E	A	D	B	D	A	-	N/A	A	E
Chapman Mills Drive & Chapman Mills Drive (future)	F	A	A	B	E	A	-	N/A	B	E
Cambrian Road & Borrisokane Road (future)	C	C	E	D	C	D	-	N/A	A	D
Borrisokane Road & BRT	C	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 unlikely to be 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 and Chapman Mills 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.

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 includes approximately 1,300 residential homes, with 600 single detached, 600 townhomes and 100 apartment units
- The application is for a zoning by-law amendment and draft plan of subdivision
- A new intersection is proposed along Borrisokane Road and a connection through the Chapman Mills Drive and Chapman Mills Drive intersection will provide access to the community
- The development is proposed to be completed by 2029
- The Trip Generation, Location and Safety triggers were met for the TIA Screening

Existing Conditions

- Borrisokane Road, Strandherd Drive, Cambrian Road and Greenbank Road are arterial roads, and Chapman Mills Drive, Kennevale Drive, Dealership Way and Tartan Drive are collector roads in the study area
- It is noted that the only signalized intersection within 1.0km of the subdivision is the Strandherd Drive and Borrisokane Road/Tartan Drive intersection, and additional intersections were included per City request to include the signals on Strandherd Drive at Kennevale Drive/Dealership Way and Greenbank Road, and additional stop-controlled intersections that will become signalized in the future, such as at Cambrian Road and along Chapman Mills Drive
- Sidewalks/MUPS are generally planned to the north and east of the site, with Strandherd Drive and Borrisokane current existing as rural cross-sections without active mode facilities
- No significant collision issues were noted in the vicinity of the site, although it is anticipated that with the Strandherd Drive widening and Borrisokane Road improvements subject to this development may improve the single motor vehicle collisions on Borrisokane Road south of Strandherd Drive

Development Generated Travel Demand

- The proposed development as forecasted produces 1,415 two-way people trips during the AM peak hour and 1,612 two-way people trips during the PM peak hour
- Two mode share scenarios were developed to reflect the existing area travel modes and a transit focused development based on BRT modal shares
- The resulting auto trips for these two scenarios were 849 AM and 968 PM peak two-way trips for the existing mode shares and 637 AM and 726 PM peak for the BRT mode shares
- Of the forecasted trips, 80% are anticipated to travel north, 10% to the east, and 5% to both the west and south
- Due to the background conditions, the transit focused targets were used for the future total analysis

Background Conditions

- A total of 20 Barrhaven developments were included in the background conditions, including all new developments in Barrhaven South west of Greenbank Road, along Strandherd Drive and along Chapman Mills Drive
- A background growth rate of 1.5% annually was considered along the mainline volumes, as adjacent developments were explicitly considered within the study area, as the explicit consideration of the above background developments results in a relative growth rate of approximately 11% per annum, or 320% over existing volumes along Borrisokane Road
- Significant capacity constraints are noted along Strandherd Drive at Borrisokane Road/Tartan Drive and at Kennevale Drive/Dealership Way, with delays and queuing constraints to the Strandherd Drive intersections to the east in the 2029 background horizon
- As a result of the constraints noted, infrastructure improvements planned in Barrhaven were examined for possible area improvements, resulting in the Barnsdale Road and enhanced transit service to Barrhaven South (assumed to be achieved through the Greenbank Road BRT corridor and park and ride) being assessed
- These infrastructure improvements would provide significant benefit to the Borrisokane Road corridor, but would not totally mitigate the background development impacts along Strandherd Drive
- The mitigated 2029 and 2034 future background horizons identify capacity constraints for the Strandherd Drive at Borrisokane Road/Tartan Drive and at Kennevale Drive/Dealership Way intersections
- Therefore, a commitment from the City is required to advance these items and continue to look for continual mode shifting within Barrhaven to further reduce the auto dependency currently observed
- The Chapman Mills BRT will be considered in place for the build-out of Conservancy (2029) to support this development, using the BRT mode share targets and planning for additional TDM measures

Development Design

- The bike and auto parking will be provided at each unit
- Pedestrian connections will be made through the community along key local roads, bordering parks and along the collector roads Street 10 and 15
- The new streets proposed as part of the plan of subdivision include local roads with 8.5 metre laneways, 14.0 metre single loaded roads, 16.5 metre and 180 metre rights of ways, and 24.0m for the collector road right of way
- Horizontal traffic calming elements are proposed to be included along the collector roads and at pedestrian crossing locations, to reduce underground infrastructure requirements

- Once the road network is confirmed, the measures will be prepared in a geometric road design drawing
- No vertical measures are proposed with the exception of the combined sidewalk/cycle track crossings along the collector roads

Boundary Street Design

- The boundary street of Borrisokane Road does not meet MMLOS targets currently for the area or in the future for pedestrian and bicycle levels of service
- The pedestrian LOS cannot be achieved due to the speeds and volumes along Borrisokane Road and a cycle track facility would be required to meet the bicycle LOS targets

Access Intersections Design

- The new intersection along Borrisokane Road will be signalized at the new collector road (Access #2), and the connection to the Chapman Mills Drive and Chapman Mills Drive intersection (Access #1) will be signalized once the BRT is extended
- Access #1 would be consistent with the modifications to the Chapman Mills Drive EA concept to support development on the south side of the intersection
- Access #2 is proposed to include left-turn auxiliary lanes on all approached and north and south bound approaches are proposed to include right-turn lanes as reserve for future widening (would become shared through/right-turn lanes)
- Generally, the access intersections will operate well during the total future horizons, with high eastbound left-turn delays at Access #2 during the AM peak and extended queuing during the PM peak southbound of Borrisokane Road, and for the southbound left-turn and westbound right-turn movements on Chapman Mills Drive
- The MMLOS targets for the pedestrian and transit LOS cannot be met at the access intersections due to the crossing widths of the roadways, and the delays are too high for the transit targets
- While it is assumed the BRT will pre-empt the signal timing along the BRT corridor, a zero second delay for a LOS target of A would still not be achievable
- No additional intersection design elements are proposed

Transportation Demand Management

- 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)

Neighbourhood Traffic Management

- As Chapman Mills Drive will exceed the TIA thresholds for a collector road, it is not considered applicable the demands a new collector road that spans most of Barrhaven will need to accommodate

- Regardless of the above, Chapman Mills Drive is anticipated to operate acceptable during the peak hours, with the limitations being the Strandherd Drive corridor

Transit

- To meet forecasted transit use, it is anticipated that a 5–15-minute service will be required to the area to support the community and the aggressive adoption of transit
- This service is required by the City to justify the BRT corridor extension and limit auto dependency of the area
- No specific transit priority measures were considered as part of this development, and the BRT related measures along Chapman Mills Drive are beyond the scope of this study

Network Intersection Design

- Overall, the study area intersections continue to outline the capacity constraints along Strandherd Drive at Borrisokane Road and at Kennevale Drive
- The development traffic will have noticeable impacts on the northbound left-turn movement during the AM peak at the Strandherd Drive and Borrisokane Road/Tartan Drive intersection and decrease operations at opposing movements requiring time within the cycle length
- Throughout the study area, the ability to meet the MMLOS targets is severely limited due to the geometric constraints along the roadways:
    - Pedestrian LOS will not be met due to width of crossings, roadway speeds and volumes, even at protected intersections along Strandherd Drive
    - Cycling LOS will not be met along the side street and can be met by providing separate left-turn arrangements for cyclists (e.g., bike boxes)
    - Transit LOS will not be met along at the study area network intersections, although it is assumed that the BRT will pre-empt the signal timing to allow transit to proceed and would operate closer to the targets
    - While it is assumed the BRT will pre-empt the signal timing along the BRT corridor, a zero second delay for a LOS target of A would still not be achievable
    - Truck LOS will not be met within the study are on the side streets due to single receiving lanes and is not recommended for mitigation
    - Auto LOS will not be met due to capacity constraints along Strandherd Drive
- No mitigation or intersection design elements are proposed beyond the Strandherd Drive widening design and Chapman Mills EA concept

17 Conclusion

As part of Next Steps, critical regional transportation infrastructure noted throughout the report, such as the Barnsdale Interchange EA and Detail Design will be undertaken by MTO with potential inclusion of the Borrisokane Road corridor EA. While the Detail Design for Greenbank Road is commencing (spring 2020), its implementation timelines should be considered in the upcoming TMP review and in the subsequent Development Charge Bylaw.

Given that transportation solutions noted are being considered for the future, the re-zoning of the lands and draft plan of subdivision should proceed to serve as a baseline condition for the area moving forward. The confirmation of these lands will allow for an integrated planning process of the future transportation infrastructure.

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Appendix A

TIA Screening Form and PM Certification Form

13 Markham Avenue
Ottawa ON K2G 3Z1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 22-May-20
Project Number: 2018-24
Project Reference: Caivan Conservancy East

1.1 Description of Proposed Development	
Municipal Address	3285, 3288, 3305 Borrisokane Road
Description of Location	Existing farmer fields, north of the Jock River, west of Highway 416
Land Use Classification	Residential
Development Size	1,500 homes
Accesses	Two on Borrisokane Road, one connection to Chapman Mills Drive
Phase of Development	Multiple phases, to be determined
Buildout Year	2029
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Townhomes or apartments	
Development Size	1500	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?	Yes
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	No
Location Trigger	Yes

1.4. Safety Triggers	
Are posted speed limits on a boundary street 80 km/hr or greater?	Yes
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	Yes

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.

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Dated at Newmarket (City) this 17 day of August 2018.

Name: Mark Crockford

Professional Title: Professional Engineer

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

Office Contact Information (Please Print)
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Appendix B

Turning Movement Counts

Survey Date: Tuesday February 15 2018
Weather: Cloudy

TURNING MOVEMENT COUNT SUMMARY - ALL MODES

AM Peak Hour: 7:30 AM to 8:30 AM
MD Peak Hour: 11:30 AM to 12:30 PM
PM Peak Hour: 4:45 PM to 5:45 PM

AADT FACTOR: 1.0

Turning Movement Count - Full Study Summary Report (Vehicles)

Time Period		Borrisokane Road Northbound					Borrisokane Road Southbound					N/S STREET TOTAL	0 Eastbound					Cambrian Road Westbound					E/W STREET TOTAL	Grand TOTAL
		LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
7:00	8:00	0	28	10	0	**38**	72	15	0	0	**87**	**125**	0	0	0	0	**0**	8	0	350	0	**358**	**358**	**483**
8:00	9:00	0	48	13	0	**61**	123	22	0	0	**145**	**206**	0	0	0	0	**0**	5	0	346	0	**351**	**351**	**557**
9:00	10:00	0	24	1	0	**25**	60	22	0	0	**82**	**107**	0	0	0	0	**0**	1	0	209	0	**210**	**210**	**317**
AVG AM Pk HR		0	33	8	0	**41**	85	20	0	0	**105**	**146**	0	0	0	0	**0**	5	0	302	0	**306**	**306**	**452**
11:30	12:30	0	54	9	0	**63**	105	26	0	0	**131**	**194**	0	0	0	0	**0**	4	0	139	0	**143**	**143**	**337**
12:30	13:30	0	48	6	0	**54**	87	23	0	0	**110**	**164**	0	0	0	0	**0**	2	0	117	0	**119**	**119**	**283**
AVG MD Pk HR		0	51	8	0	**59**	96	25	0	0	**121**	**179**	0	0	0	0	**0**	3	0	128	0	**131**	**131**	**310**
15:00	16:00	0	40	1	0	**41**	58	51	0	0	**109**	**150**	0	0	0	0	**0**	13	0	159	0	**172**	**172**	**322**
16:00	17:00	0	25	0	0	**25**	344	43	0	0	**387**	**412**	0	0	0	0	**0**	11	0	162	0	**173**	**173**	**585**
17:00	18:00	0	22	0	0	**22**	352	36	0	0	**388**	**410**	0	0	0	0	**0**	14	0	198	0	**212**	**212**	**622**
AVG PM Pk HR		0	29	0	0	**29**	251	43	0	0	**295**	**324**	0	0	0	0	**0**	13	0	173	0	**186**	**186**	**510**
TOTAL		0	373	56	0	**429**	1,382	282	0	0	**1,664**	**2,093**	0	0	0	0	**0**	66	0	2,110	0	**2,175**	**2,175**	**4,268**
EQ 12Hr		0	519	77	0	596	1921	392	0	0	2313	2909	0	0	0	0	0	91	0	2932	0	3024	3024	5933
Note: These volumes are calculated by multiplying the totals by the appropriate expansion factor.											1.39													
AVG 12Hr		0	519	77	0	596	1921	392	0	0	2313	2909	0	0	0	0	0	91	0	2932	0	3024	3024	5933
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.											1.0													
AVG 24Hr		0	680	101	0	781	2516	514	0	0	3030	3811	0	0	0	0	0	120	0	3841	0	3961	3961	7772
Note: These volumes are calculated by multiplying the Average Daily 12hr. totals by the 12 to 24 expansion factor.													1.31											

Turning Movement Count - Full Study Summary Report (Pedestrians)

Time Period		Borrisokane Road NB Approach (East or West Crossing)	Borrisokane Road SB Approach (East or West Crossing)	N/S STREET TOTAL	0 EB Approach (North or South Crossing)	Cambrian Road WB Approach (North or South Crossing)	E/W STREET TOTAL	Grand TOTAL
7:00	8:00	0	0	**0**	0	0	**0**	**0**
8:00	9:00	0	0	**0**	0	0	**0**	**0**
9:00	10:00	0	0	**0**	0	1	**1**	**1**
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	228	**228**	0	0	**0**	**228**
17:00	18:00	0	0	**0**	0	0	**0**	**0**
TOTAL:		0	228	**228**	0	1	**1**	**229**

Turning Movement Count - Full Study Summary Report (Cyclists)

Time Period		Borrisokane Road Northbound	Borrisokane Road Southbound	N/S STREET TOTAL	0 Eastbound	Cambrian Road Westbound	E/W STREET TOTAL	Grand TOTAL
7:00	8:00	0	0	**0**	0	0	**0**	**0**
8:00	9:00	0	0	**0**	0	0	**0**	**0**
9:00	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**

Turning Movement Count - Full Study Summary Report (Heavy Vehicles)

Time Period		Borrisokane Road Northbound					Borrisokane Road Southbound					N/S STREET TOTAL	0 Eastbound					Cambrian Road Westbound					E/W STREET TOTAL	Grand TOTAL
		LT	ST	RT	U-Turns	NB TOTAL	LT	ST	RT	U-Turns	SB TOTAL		LT	ST	RT	U-Turns	EB TOTAL	LT	ST	RT	U-Turns	WB TOTAL		
7:00	8:00	0	9	0	0	**9**	16	8	0	0	**24**	**33**	0	0	0	0	**0**	0	0	5	0	**5**	**5**	**38**
8:00	9:00	0	10	2	0	**12**	4	10	0	0	**14**	**26**	0	0	0	0	**0**	2	0	16	0	**18**	**18**	**44**
9:00	10:00	0	12	0	0	**12**	7	13	0	0	**20**	**32**	0	0	0	0	**0**	0	0	10	0	**10**	**10**	**42**
11:30	12:30	0	11	1	0	**12**	2	11	0	0	**13**	**25**	0	0	0	0	**0**	1	0	5	0	**6**	**6**	**31**
12:30	13:30	0	10	3	0	**13**	2	11	0	0	**13**	**26**	0	0	0	0	**0**	0	0	5	0	**5**	**5**	**31**
15:00	16:00	0	2	0	0	**2**	10	2	0	0	**12**	**14**	0	0	0	0	**0**	1	0	11	0	**12**	**12**	**26**
16:00	17:00	0	1	5	0	**6**	6	2	0	0	**8**	**14**	0	0	0	0	**0**	4	0	17	0	**21**	**21**	**35**
17:00	18:00	0	2	1	0	**3**	1	1	0	0	**2**	**5**	0	0	0	0	**0**	2	0	5	0	**7**	**7**	**12**
TOTAL:		0	57	12	0	**69**	48	58	0	0	**106**	**175**	0	0	0	0	**0**	10	0	74	0	**84**	**84**	**259**

Transportation Services - Traffic Services

W.O. 37498

Turning Movement Count - 15 Minute Summary Report

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 3 Westbound: 3

		FRASER FIELDS WAY									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	0	0	0	**0**	8	0	7	**15**	**15**	1	95	0	**97**	0	119	1	**121**	**218**	**233**
07:15	07:30	0	0	0	**0**	7	0	6	**13**	**13**	1	136	0	**137**	0	157	1	**158**	**295**	**308**
07:30	07:45	0	0	0	**0**	9	0	9	**18**	**18**	2	116	0	**118**	0	190	0	**190**	**308**	**326**
07:45	08:00	0	0	0	**0**	11	0	4	**15**	**15**	0	159	0	**159**	0	173	2	**175**	**334**	**349**
08:00	08:15	0	0	0	**0**	8	0	4	**12**	**12**	1	131	0	**132**	0	194	4	**198**	**330**	**342**
08:15	08:30	0	0	0	**0**	8	0	1	**9**	**9**	1	147	0	**148**	0	188	3	**191**	**339**	**348**
08:30	08:45	0	0	0	**0**	8	0	3	**11**	**11**	2	109	0	**111**	0	209	7	**216**	**327**	**338**
08:45	09:00	0	0	0	**0**	11	0	3	**14**	**14**	3	114	0	**117**	0	163	5	**168**	**285**	**299**
09:00	09:15	0	0	0	**0**	5	0	7	**12**	**12**	2	102	0	**104**	0	174	2	**176**	**280**	**292**
09:15	09:30	0	0	0	**0**	5	0	0	**5**	**5**	1	114	0	**116**	0	160	1	**161**	**277**	**282**
09:30	09:45	0	0	0	**0**	3	0	1	**4**	**4**	0	123	0	**123**	0	160	1	**161**	**284**	**288**
09:45	10:00	0	0	0	**0**	2	0	0	**2**	**2**	0	114	0	**114**	0	134	3	**138**	**252**	**254**
11:30	11:45	0	0	0	**0**	4	0	0	**4**	**4**	1	122	0	**123**	0	147	3	**150**	**273**	**277**
11:45	12:00	0	0	0	**0**	1	0	1	**2**	**2**	0	122	0	**122**	0	119	8	**127**	**249**	**251**
12:00	12:15	0	0	0	**0**	2	0	1	**3**	**3**	0	134	0	**135**	0	138	4	**142**	**277**	**280**
12:15	12:30	0	0	0	**0**	3	0	4	**7**	**7**	1	144	0	**145**	0	132	4	**136**	**281**	**288**
12:30	12:45	0	0	0	**0**	3	0	0	**3**	**3**	0	154	0	**154**	0	142	1	**143**	**297**	**300**
12:45	13:00	0	0	0	**0**	1	0	0	**1**	**1**	1	182	0	**183**	0	141	8	**149**	**332**	**333**
13:00	13:15	0	0	0	**0**	3	0	0	**3**	**3**	0	151	0	**151**	0	135	2	**137**	**288**	**291**
13:15	13:30	0	0	0	**0**	2	0	0	**2**	**2**	2	133	0	**135**	0	126	9	**136**	**271**	**273**
15:00	15:15	0	0	0	**0**	6	0	3	**9**	**9**	3	154	0	**157**	0	168	6	**174**	**331**	**340**
15:15	15:30	0	0	0	**0**	5	0	2	**7**	**7**	1	197	0	**198**	0	195	10	**205**	**403**	**410**
15:30	15:45	0	0	0	**0**	5	0	3	**8**	**8**	2	197	0	**199**	0	150	7	**157**	**356**	**364**
15:45	16:00	0	0	0	**0**	7	0	1	**8**	**8**	2	178	0	**180**	0	182	10	**192**	**372**	**380**
16:00	16:15	0	0	0	**0**	4	0	5	**9**	**9**	3	197	0	**200**	0	163	10	**173**	**373**	**382**
16:15	16:30	0	0	0	**0**	8	0	1	**9**	**9**	2	211	0	**213**	0	193	13	**206**	**419**	**428**
16:30	16:45	0	0	0	**0**	6	0	1	**7**	**7**	5	184	0	**189**	0	174	7	**181**	**370**	**377**
16:45	17:00	0	0	0	**0**	1	0	3	**4**	**4**	3	190	0	**193**	0	180	17	**197**	**390**	**394**
17:00	17:15	0	0	0	**0**	3	0	3	**6**	**6**	5	190	0	**195**	0	169	17	**186**	**381**	**387**
17:15	17:30	0	0	0	**0**	5	0	1	**6**	**6**	2	195	0	**197**	0	168	15	**183**	**380**	**386**
17:30	17:45	0	0	0	**0**	4	0	4	**8**	**8**	3	198	0	**201**	0	158	10	**168**	**369**	**377**
17:45	18:00	0	0	0	**0**	2	0	3	**5**	**5**	4	177	0	**181**	0	182	12	**194**	**375**	**380**
TOTAL:		0	0	0	**0**	160	0	81	**241**	**241**	54	4870	0	**4927**	0	5183	203	**5389**	**10316**	**10557**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 37498

FRASER FIELDS WAY @ STRANDHERD DR

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

		FRASER FIELDS WAY			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	1	**1**	**1**
Total	.....	0	0	**0**	0	1	**1**	**1**

Comment:

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

Transportation Services - Traffic Services

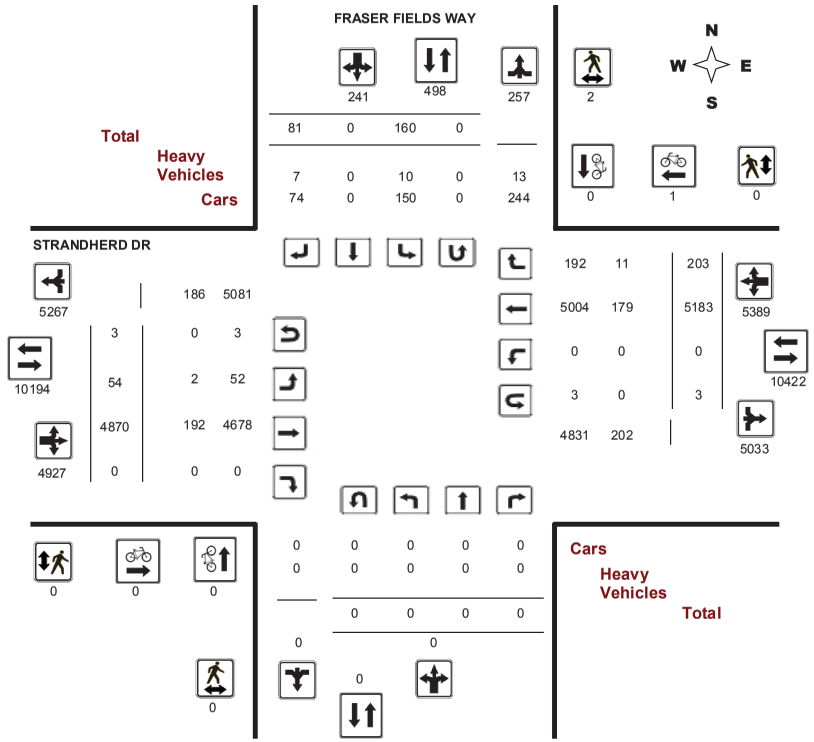
Turning Movement Count - Full Study Diagram

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

WO#: 37498

Device: Miovision



Comments

Transportation Services - Traffic Services

W.O. 37498

Turning Movement Count - Heavy Vehicle Report

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

		FRASER FIELDS WAY									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	0	0	0	**0**	0	0	1	**1**	**1**	0	31	0	**31**	0	28	1	**29**	**60**	**61**
08:00	09:00	0	0	0	**0**	2	0	1	**3**	**3**	0	27	0	**27**	0	27	4	**31**	**58**	**61**
09:00	10:00	0	0	0	**0**	0	0	0	**0**	**0**	0	34	0	**34**	0	34	0	**34**	**68**	**68**
11:30	12:30	0	0	0	**0**	1	0	0	**1**	**1**	1	21	0	**22**	0	23	0	**23**	**45**	**46**
12:30	13:30	0	0	0	**0**	1	0	0	**1**	**1**	0	30	0	**30**	0	18	4	**22**	**52**	**53**
15:00	16:00	0	0	0	**0**	3	0	3	**6**	**6**	1	14	0	**15**	0	19	1	**20**	**35**	**41**
16:00	17:00	0	0	0	**0**	3	0	2	**5**	**5**	0	21	0	**21**	0	20	1	**21**	**42**	**47**
17:00	18:00	0	0	0	**0**	0	0	0	**0**	**0**	0	14	0	**14**	0	10	0	**10**	**24**	**24**
Sub Total		0	0	0	**0**	10	0	7	**17**	**17**	2	192	0	**194**	0	179	11	**190**	**384**	**401**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		0	0	0	**0**	10	0	7	**17**	**17**	2	192	0	**194**	0	179	11	**190**	**384**	**401**

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 37498

Turning Movement Count - Pedestrian Volume Report

FRASER FIELDS WAY @ STRANDHERD 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	1	1	0	0	0	1
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	1	1	0	0	0	1
09:00 09:15	0	0	0	0	0	0	0
09:15 09:30	0	1	1	0	0	0	1
09:30 09:45	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	0	0
09:00 10:00	0	1	1	0	0	0	1
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	0	0	0	0	0	0	0
11:30 12:30	0	0	0	0	0	0	0
12:30 12:45	0	0	0	0	0	0	0
12:45 13:00	0	0	0	0	0	0	0
13:00 13:15	0	0	0	0	0	0	0
13:15 13:30	0	0	0	0	0	0	0
12:30 13:30	0	0	0	0	0	0	0
15:00 15:15	0	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	2	2	0	0	0	2

Comment:

Transportation Services - Traffic Services

Work Order 37498

Turning Movement Count - Full Study Summary Report

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 3 Westbound: 3

AADT Factor 1.00

Full Study

	FRASER FIELDS WAY									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	0	0	0	**0**	35	0	26	**61**	**61**	4	506	0	**510**	0	639	4	**643**	**1153**	**1214**
08:00 09:00	0	0	0	**0**	35	0	11	**46**	**46**	7	501	0	**508**	0	754	19	**773**	**1281**	**1327**
09:00 10:00	0	0	0	**0**	15	0	8	**23**	**23**	3	453	0	**456**	0	628	7	**635**	**1091**	**1114**
11:30 12:30	0	0	0	**0**	10	0	6	**16**	**16**	2	522	0	**524**	0	536	19	**555**	**1079**	**1095**
12:30 13:30	0	0	0	**0**	9	0	0	**9**	**9**	3	620	0	**623**	0	544	20	**564**	**1187**	**1196**
15:00 16:00	0	0	0	**0**	23	0	9	**32**	**32**	8	726	0	**734**	0	695	33	**728**	**1462**	**1494**
16:00 17:00	0	0	0	**0**	19	0	10	**29**	**29**	13	782	0	**795**	0	710	47	**757**	**1552**	**1581**
17:00 18:00	0	0	0	**0**	14	0	11	**25**	**25**	14	760	0	**774**	0	677	54	**731**	**1505**	**1530**
Sub Total	0	0	0	**0**	160	0	81	**241**	**241**	54	4870	0	**4924**	0	5183	203	**5386**	**10310**	**10551**
U Turns				**0**				**0**	**0**				**3**				**3**	**6**	**6**
Total	0	0	0	**0**	160	0	81	**241**	**241**	54	4870	0	**4927**	0	5183	203	**5389**	**10316**	**10557**
EQ 12Hr	0	0	0	**0**	222	0	113	**335**	**335**	75	6769	0	**6849**	0	7204	282	**7491**	**14340**	**14675**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	0	0	0	**0**	222	0	113	**335**	**335**	75	6769	0	**6849**	0	7204	282	**7491**	**14340**	**14675**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**1.00**						
AVG 24Hr	0	0	0	**0**	291	0	147	**439**	**439**	98	8868	0	**8972**	0	9438	370	**9813**	**18785**	**19224**
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.

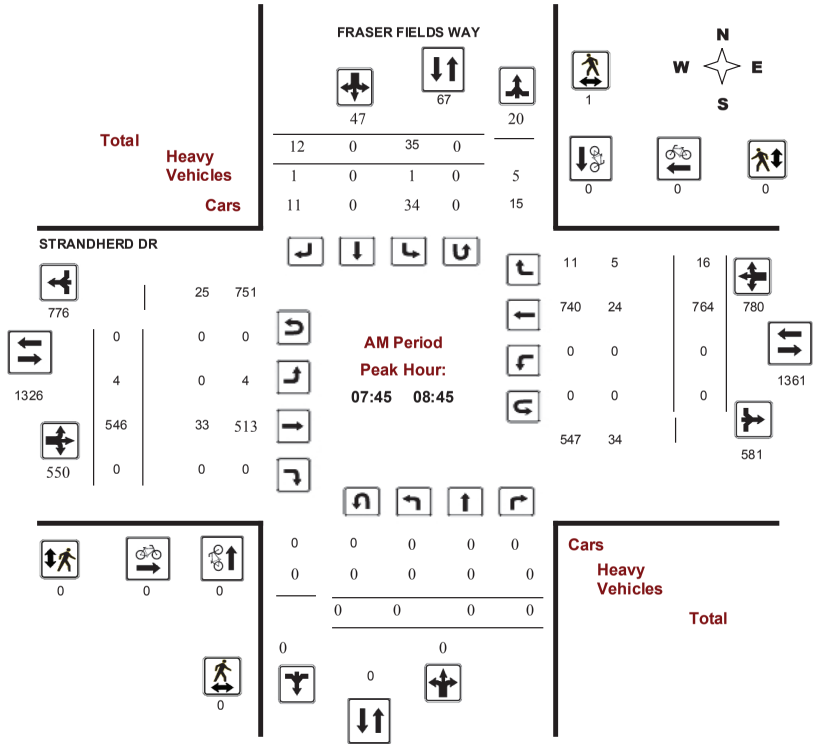
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37498

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



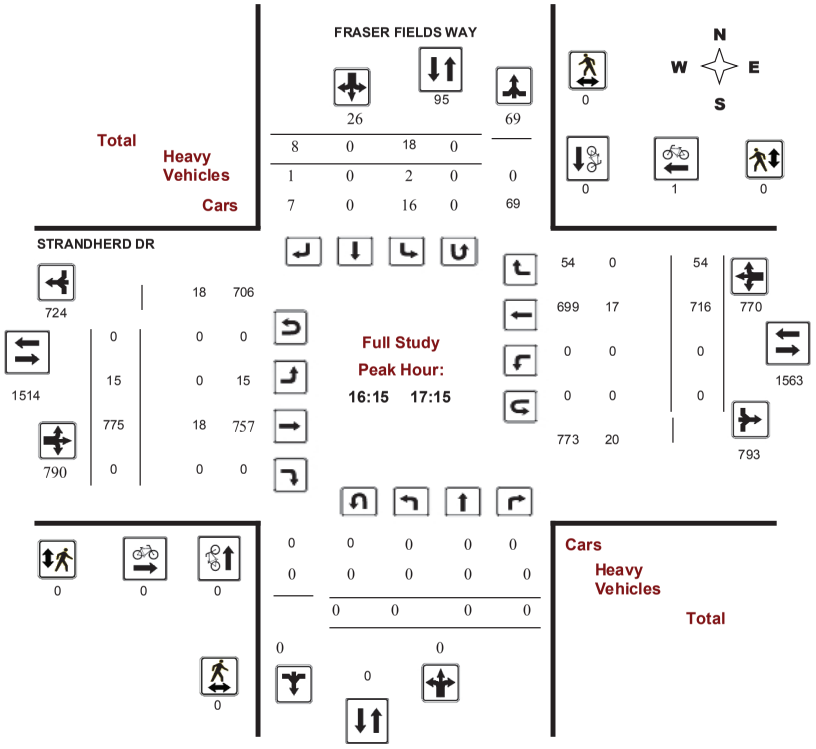
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37498

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



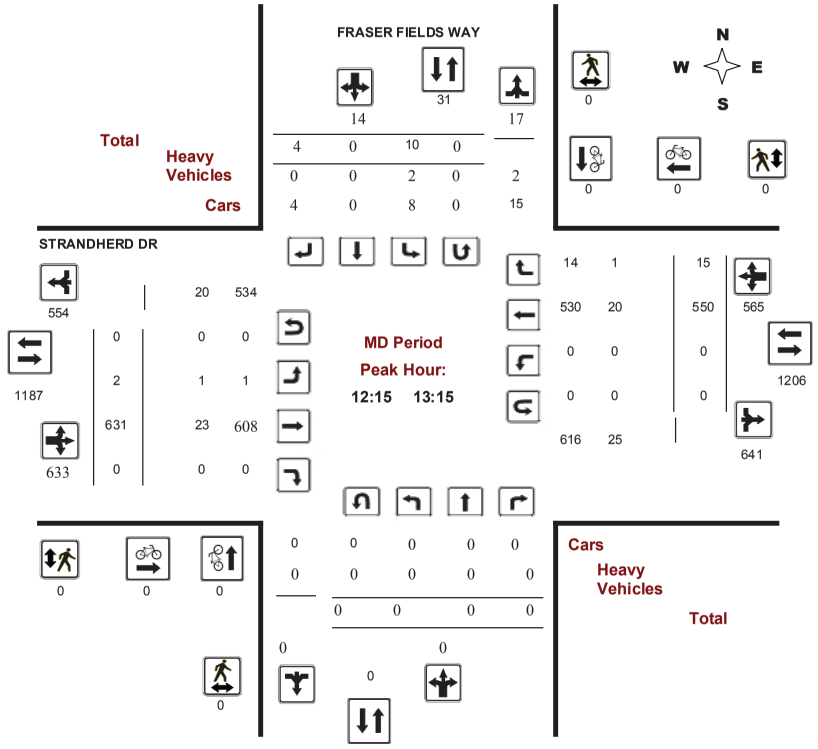
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37498

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



Comments

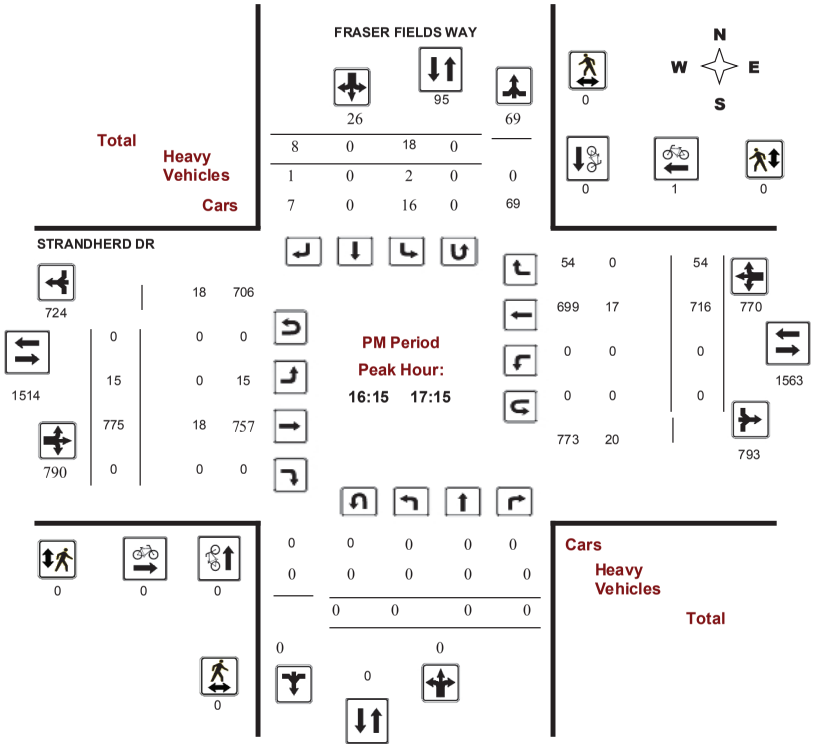
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

FRASER FIELDS WAY @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37498

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



Comments

Transportation Services - Traffic Services

Work Order 37498

Turning Movement Count - 15 Min U-Turn Total Report

FRASER FIELDS WAY @ STRANDHERD 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	1	1	2
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	1	0	1
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	1	1
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	1	0	1
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	1	1
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	3	3	6

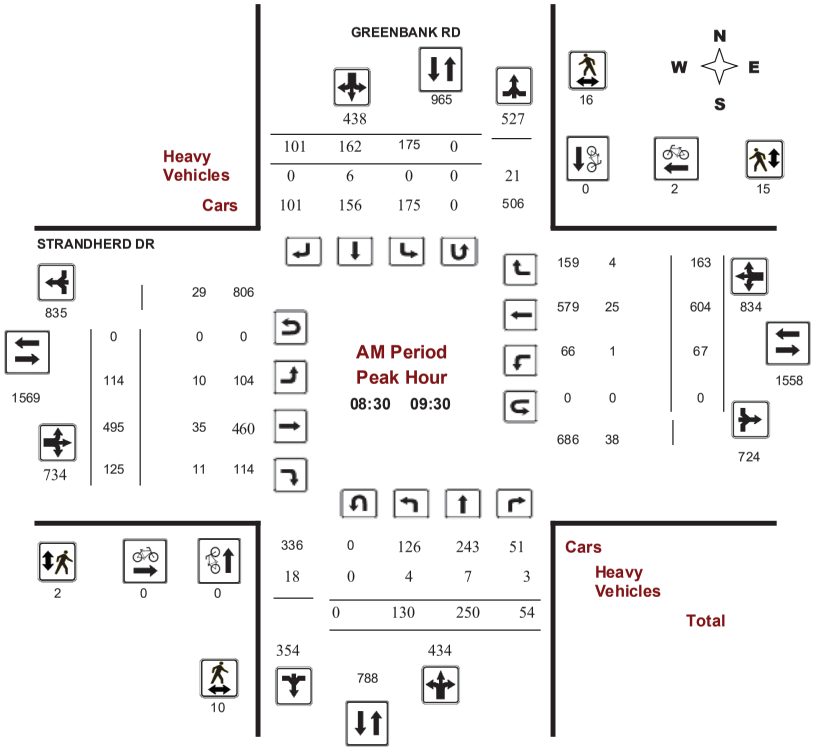
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016 **WO No:** 36175

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



Comments

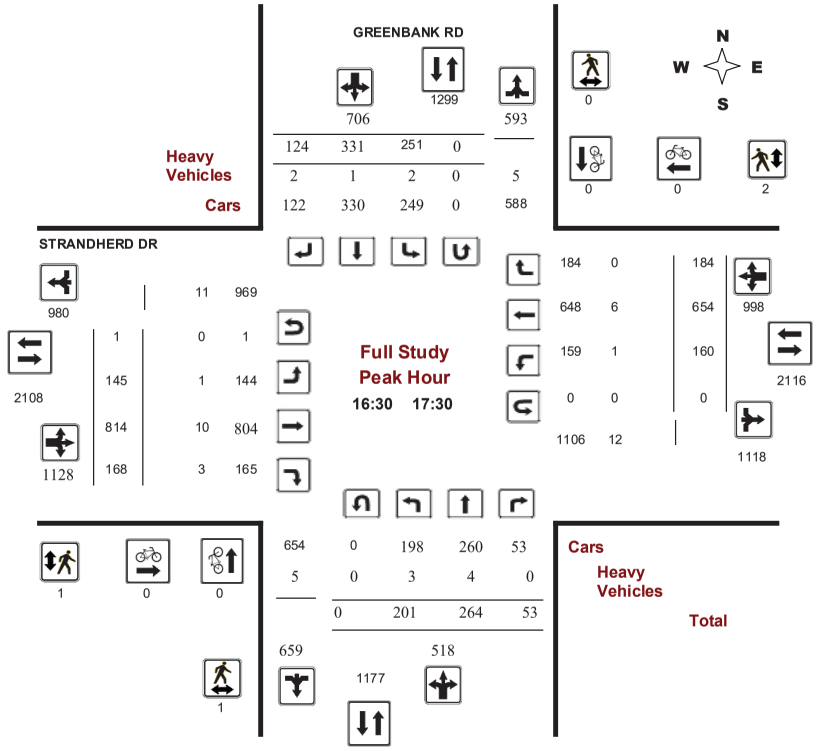
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016 **WO No:** 36175

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



Comments

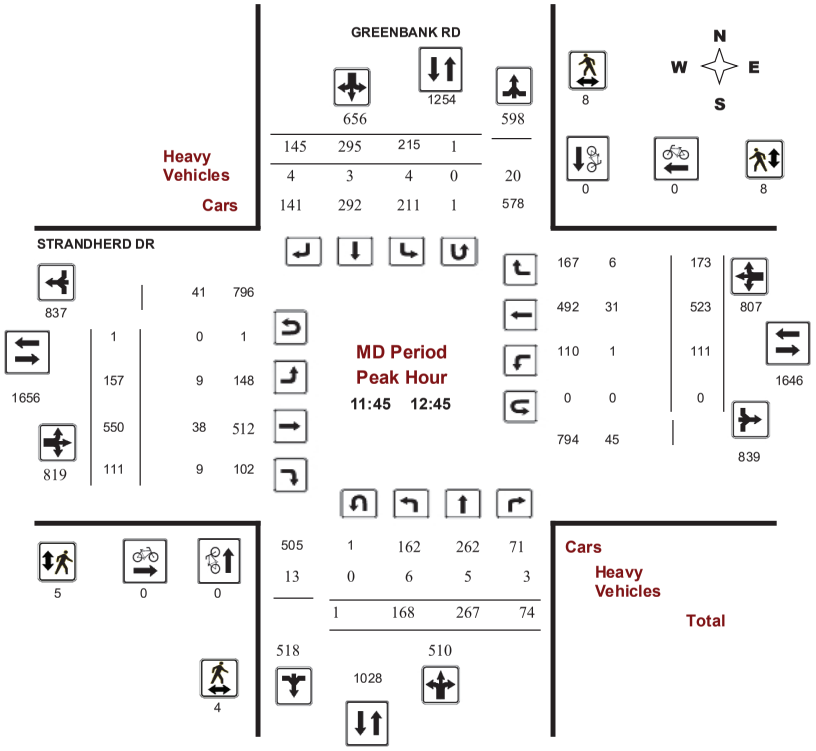
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016 **WO No:** 36175

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



Comments

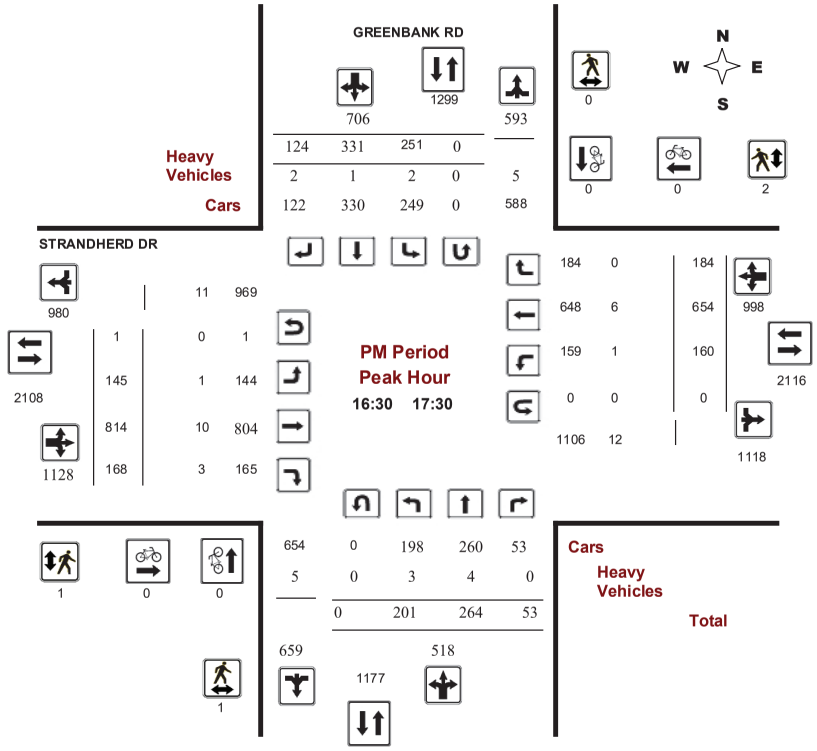
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016 **WO No:** 36175

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



Comments

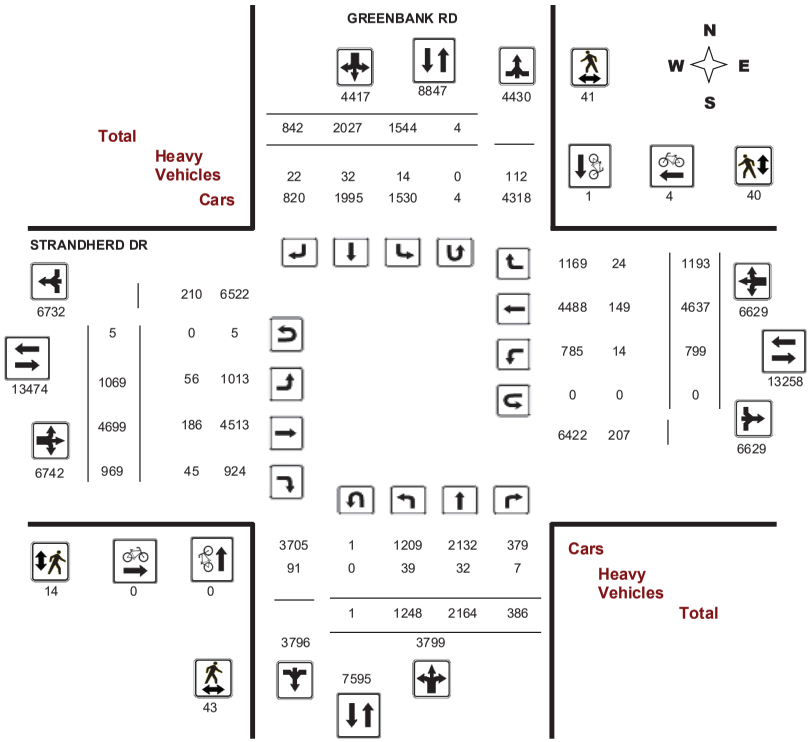
Transportation Services - Traffic Services

Turning Movement Count - Full Study Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016 **WO#:** 36175

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 36175

Turning Movement Count - Full Study Summary Report

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Total Observed U-Turns

Northbound: 1 Southbound: 4
Eastbound: 5 Westbound: 0

AADT Factor .90

Full Study

	GREENBANK RD									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	108	379	19	**506**	95	120	69	**284**	**790**	112	471	77	**660**	36	526	120	**682**	**1342**	**2132**
08:00 09:00	129	257	49	**435**	149	139	95	**383**	**818**	109	472	116	**697**	47	684	188	**919**	**1616**	**2434**
09:00 10:00	146	247	38	**431**	181	207	106	**494**	**925**	110	518	99	**727**	77	512	125	**714**	**1441**	**2366**
11:30 12:30	181	262	69	**512**	213	287	135	**635**	**1147**	155	581	116	**852**	101	518	169	**788**	**1640**	**2787**
12:30 13:30	153	287	58	**498**	198	250	135	**583**	**1081**	170	551	115	**836**	108	521	172	**801**	**1637**	**2718**
15:00 16:00	151	222	45	**418**	240	322	97	**659**	**1077**	123	605	123	**851**	126	590	116	**832**	**1683**	**2760**
16:00 17:00	190	259	56	**505**	228	322	96	**646**	**1151**	147	708	164	**1019**	142	658	161	**961**	**1980**	**3131**
17:00 18:00	190	251	52	**493**	240	380	109	**729**	**1222**	143	793	159	**1095**	162	628	142	**932**	**2027**	**3249**
Sub Total	1248	2164	386	**3798**	1544	2027	842	**4413**	**8211**	1069	4699	969	**6737**	799	4637	1193	**6629**	**13366**	**21577**
U Turns				**1**				**4**	**5**				**5**				**0**	**5**	**10**
Total	1248	2164	386	**3799**	1544	2027	842	**4417**	**8216**	1069	4699	969	**6742**	799	4637	1193	**6629**	**13371**	**21587**
EQ 12Hr	1735	3008	537	**5281**	2146	2818	1170	**6140**	**11421**	1486	6532	1347	**9371**	1111	6445	1658	**9214**	**18585**	**30006**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	1561	2707	483	**4753**	1932	2536	1053	**5526**	**10279**	1337	5878	1212	**8434**	1000	5801	1492	**8293**	**16727**	**27006**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	2045	3546	633	**6226**	2530	3322	1380	**7239**	**13465**	1752	7701	1588	**11049**	1309	7599	1955	**10864**	**21913**	**35378**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

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

Transportation Services - Traffic Services

W.O. 36175

Turning Movement Count - 15 Minute Summary Report

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Total Observed U-Turns

Northbound: 1 Southbound: 4
Eastbound: 5 Westbound: 0

	GREENBANK RD									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	24	87	6	**117**	18	28	14	**60**	**177**	26	95	17	**138**	8	93	23	**124**	**262**	**439**
07:15 07:30	24	89	4	**117**	25	31	21	**78**	**195**	27	115	12	**154**	9	125	32	**166**	**320**	**515**
07:30 07:45	33	106	6	**145**	28	23	13	**64**	**209**	31	142	15	**188**	10	153	33	**196**	**384**	**593**
07:45 08:00	27	97	3	**127**	24	38	21	**83**	**210**	28	119	33	**180**	9	155	32	**196**	**376**	**586**
08:00 08:15	33	64	14	**111**	29	28	19	**76**	**187**	14	130	24	**169**	10	176	48	**234**	**403**	**590**
08:15 08:30	33	70	6	**109**	35	38	29	**102**	**211**	33	110	20	**163**	10	163	39	**212**	**375**	**586**
08:30 08:45	25	68	11	**104**	33	27	16	**76**	**180**	34	122	37	**193**	9	201	52	**262**	**455**	**635**
08:45 09:00	38	55	18	**111**	52	46	31	**129**	**240**	28	110	35	**173**	18	144	49	**211**	**384**	**624**
09:00 09:15	37	65	11	**113**	41	41	20	**102**	**215**	28	146	23	**197**	24	119	34	**177**	**374**	**589**
09:15 09:30	30	62	14	**106**	49	48	34	**131**	**237**	24	117	30	**171**	16	140	28	**184**	**355**	**592**
09:30 09:45	33	61	2	**96**	40	71	26	**137**	**233**	27	118	24	**169**	15	132	25	**172**	**341**	**574**
09:45 10:00	46	59	11	**116**	51	47	26	**124**	**240**	31	137	22	**191**	22	121	38	**181**	**372**	**612**
11:30 11:45	42	77	14	**133**	50	53	27	**130**	**263**	37	160	28	**226**	20	135	32	**187**	**413**	**676**
11:45 12:00	50	60	16	**127**	50	74	35	**159**	**286**	44	142	36	**223**	32	118	40	**190**	**413**	**699**
12:00 12:15	43	61	17	**121**	50	87	30	**167**	**288**	34	138	29	**201**	24	141	50	**215**	**416**	**704**
12:15 12:30	46	64	22	**132**	63	73	43	**179**	**311**	40	141	23	**204**	25	124	47	**196**	**400**	**711**
12:30 12:45	29	82	19	**130**	52	61	37	**151**	**281**	39	129	23	**191**	30	140	36	**206**	**397**	**678**
12:45 13:00	45	85	20	**150**	41	45	38	**124**	**274**	41	112	33	**186**	33	129	46	**208**	**394**	**668**
13:00 13:15	33	60	8	**101**	52	62	30	**144**	**245**	46	177	31	**254**	19	126	47	**192**	**446**	**691**
13:15 13:30	46	60	11	**117**	53	82	30	**165**	**282**	44	133	28	**205**	26	126	43	**195**	**400**	**682**
15:00 15:15	43	58	10	**111**	69	80	31	**180**	**291**	24	129	30	**183**	34	118	33	**185**	**368**	**659**
15:15 15:30	40	54	13	**107**	55	98	26	**179**	**286**	44	148	26	**218**	20	145	25	**190**	**408**	**694**
15:30 15:45	29	59	10	**98**	54	77	21	**153**	**251**	26	177	33	**236**	35	138	36	**209**	**445**	**696**
15:45 16:00	39	51	12	**102**	62	67	19	**149**	**251**	29	151	34	**214**	37	189	22	**248**	**462**	**713**
16:00 16:15	44	60	15	**119**	62	89	11	**162**	**281**	28	167	39	**234**	39	145	45	**229**	**463**	**744**
16:15 16:30	47	63	14	**124**	46	91	26	**163**	**287**	44	149	39	**232**	30	183	31	**244**	**476**	**763**
16:30 16:45	51	79	11	**141**	67	76	27	**170**	**311**	38	215	41	**294**	41	159	46	**246**	**540**	**851**
16:45 17:00	48	57	16	**121**	53	66	32	**151**	**272**	37	177	45	**260**	32	171	39	**242**	**502**	**774**
17:00 17:15	47	80	19	**146**	65	91	38	**194**	**340**	24	197	40	**261**	40	152	52	**244**	**505**	**845**
17:15 17:30	55	48	7	**110**	66	98	27	**191**	**301**	46	225	42	**313**	47	172	47	**266**	**579**	**880**
17:30 17:45	38	72	14	**124**	55	93	28	**176**	**300**	39	199	41	**279**	41	131	27	**199**	**478**	**778**
17:45 18:00	50	51	12	**113**	54	98	16	**168**	**281**	34	172	36	**242**	34	173	16	**223**	**465**	**746**
TOTAL:	1248	2164	386	**3799**	1544	2027	842	**4417**	**8216**	1069	4699	969	**6742**	799	4637	1193	**6629**	**13371**	**21587**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 36175

GREENBANK RD @ STRANDHERD DR

Count Date: Tuesday, August 16, 2016 **Start Time:** 07:00

Time Period	GREENBANK RD Northbound	GREENBANK RD Southbound	GREENBANK RD Street Total	STRANDHERD DR Eastbound	STRANDHERD DR Westbound	STRANDHERD DR Street Total	Grand Total
07:00 08:00	0	1	**1**	0	0	**0**	**1**
08:00 09:00	0	0	**0**	0	2	**2**	**2**
09:00 10:00	0	0	**0**	0	1	**1**	**1**
11:30 12:30	0	0	**0**	0	1	**1**	**1**
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	1	**1**	0	4	**4**	**5**

Comment:

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

Transportation Services - Traffic Services

W.O. 36175

Turning Movement Count - Heavy Vehicle Report

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Time Period	GREENBANK RD Northbound LT	ST	RT	N TOT	Southbound LT	ST	RT	S TOT	STR TOT	STRANDHERD DR Eastbound LT	ST	RT	E TOT	Westbound LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 08:00	5	1	0	**6**	0	3	7	**10**	**16**	8	22	7	**37**	3	16	2	**21**	**58**	**74**
08:00 09:00	6	10	3	**19**	0	3	1	**4**	**23**	12	25	7	**44**	0	26	7	**33**	**77**	**100**
09:00 10:00	6	3	0	**9**	2	11	4	**17**	**26**	12	39	7	**58**	6	25	4	**35**	**93**	**119**
11:30 12:30	7	2	2	**11**	3	2	3	**8**	**19**	8	34	8	**50**	1	34	9	**44**	**94**	**113**
12:30 13:30	4	8	1	**13**	5	7	4	**16**	**29**	9	34	7	**50**	2	19	1	**22**	**72**	**101**
15:00 16:00	4	0	0	**4**	2	1	1	**4**	**8**	1	16	3	**20**	1	14	0	**15**	**35**	**43**
16:00 17:00	3	3	0	**6**	0	2	2	**4**	**10**	4	10	3	**17**	0	9	1	**10**	**27**	**37**
17:00 18:00	4	5	1	**10**	2	3	0	**5**	**15**	2	6	3	**11**	1	6	0	**7**	**18**	**33**
Sub Total	39	32	7	**78**	14	32	22	**68**	**146**	56	186	45	**287**	14	149	24	**187**	**474**	**620**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	39	32	7	**0**	14	32	22	**68**	**146**	56	186	45	**287**	14	149	24	**187**	**474**	**620**

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 36175

Turning Movement Count - Pedestrian Volume Report

GREENBANK RD @ STRANDHERD DR

Count Date: Tuesday, August 16, 2016 **Start Time:** 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	1	1	0	0	0	1
07:15 07:30	2	0	2	0	2	2	4
07:30 07:45	2	2	4	0	1	1	5
07:45 08:00	1	0	1	0	1	1	2
07:00 08:00	5	3	8	0	4	4	12
08:00 08:15	0	2	2	0	0	0	2
08:15 08:30	0	1	1	0	0	0	1
08:30 08:45	0	4	4	2	0	2	6
08:45 09:00	3	5	8	0	0	0	8
08:00 09:00	3	12	15	2	0	2	17
09:00 09:15	6	2	8	0	7	7	15
09:15 09:30	1	5	6	0	8	8	14
09:30 09:45	4	2	6	0	3	3	9
09:45 10:00	3	0	3	2	1	3	6
09:00 10:00	14	9	23	2	19	21	44
11:30 11:45	3	1	4	0	3	3	7
11:45 12:00	2	1	3	1	1	2	5
12:00 12:15	0	2	2	2	1	3	5
12:15 12:30	0	3	3	1	4	5	8
11:30 12:30	5	7	12	4	9	13	25
12:30 12:45	2	2	4	1	2	3	7
12:45 13:00	3	2	5	0	0	0	5
13:00 13:15	1	1	2	1	1	2	4
13:15 13:30	4	2	6	1	0	1	7
12:30 13:30	10	7	17	3	3	6	23
15:00 15:15	0	0	0	0	0	0	0
15:15 15:30	0	1	1	0	0	0	1
15:30 15:45	1	0	1	0	0	0	1
15:45 16:00	0	1	1	0	0	0	1
15:00 16:00	1	2	3	0	0	0	3
16:00 16:15	2	0	2	0	0	0	2
16:15 16:30	0	1	1	1	1	2	3
16:30 16:45	0	0	0	0	1	1	1
16:45 17:00	0	0	0	0	1	1	1
16:00 17:00	2	1	3	1	3	4	7
17:00 17:15	1	0	1	0	0	0	1
17:15 17:30	0	0	0	1	0	1	1
17:30 17:45	0	0	0	0	2	2	2
17:45 18:00	2	0	2	1	0	1	3
17:00 18:00	3	0	3	2	2	4	7
Total	43	41	84	14	40	54	138

Comment:

Transportation Services - Traffic Services

Work Order 36175

Turning Movement Count - 15 Min U-Turn Total Report

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

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	1	0	0	1
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	1	0	1
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	1	0	1
11:30	11:45	0	0	1	0	1
11:45	12:00	1	0	1	0	2
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	1	0	0	1
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	1	0	0	1
15:45	16:00	0	1	0	0	1
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	1	0	1
17:00	17:15	0	0	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		1	4	5	0	10

Transportation Services - Traffic Services

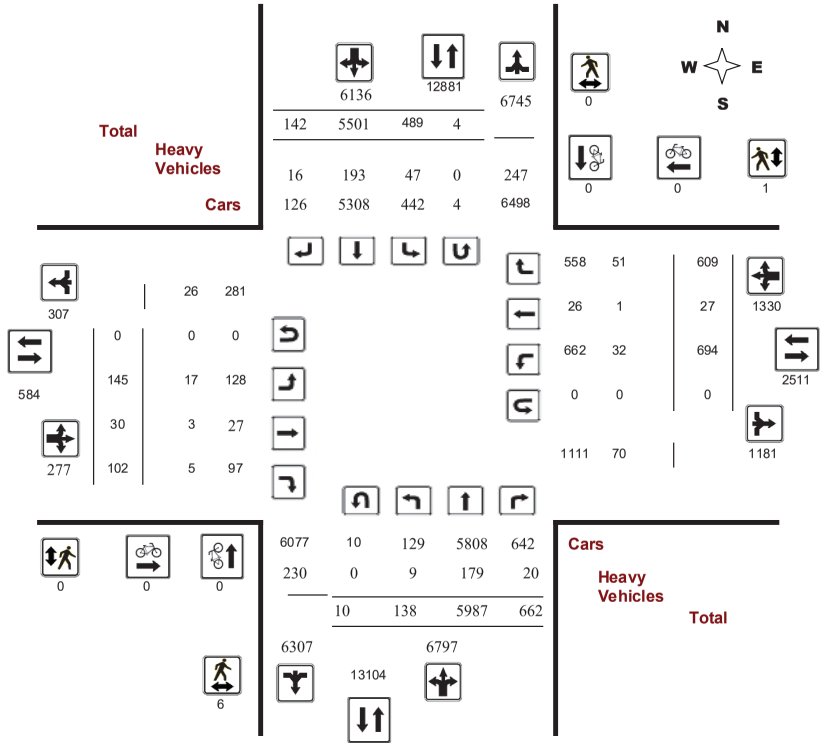
Turning Movement Count - Study Results

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

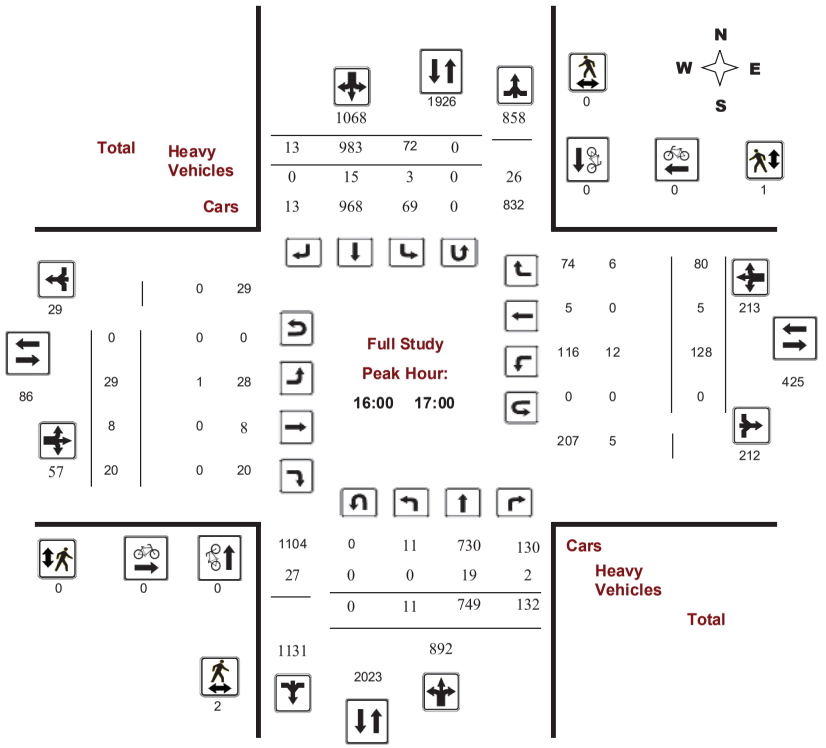
Turning Movement Count - Study Results

KENNEVALE DR @ STRANDHERD DR

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

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

Full Study Peak Hour Diagram



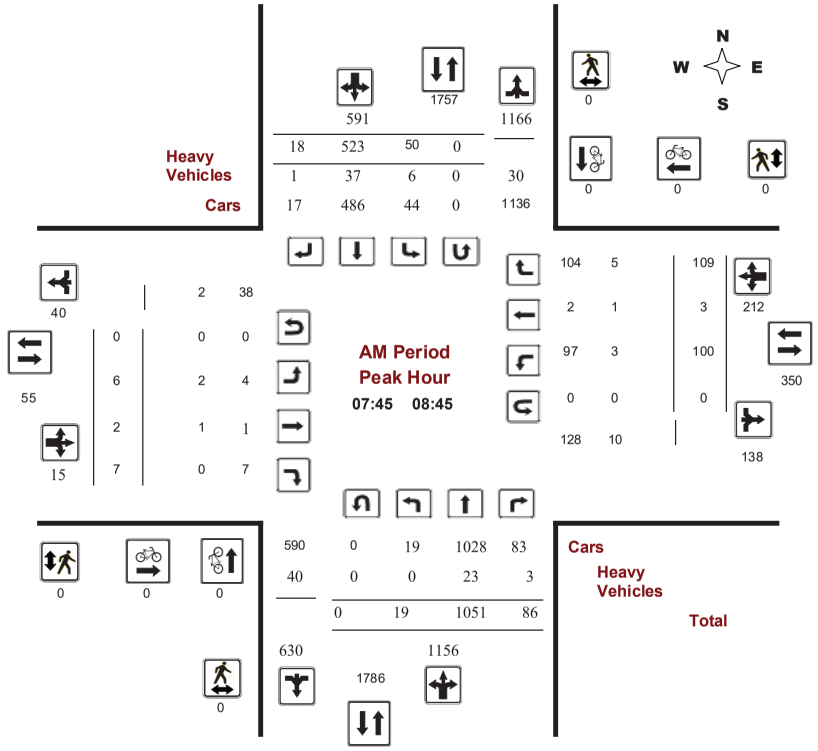
Transportation Services - Traffic Services

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



Comments

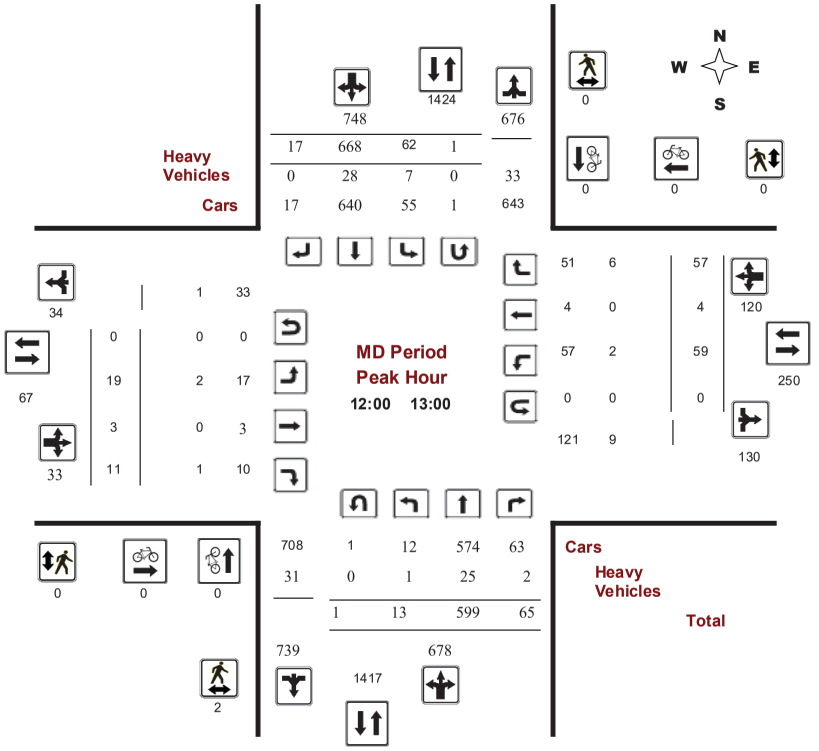
Transportation Services - Traffic Services

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

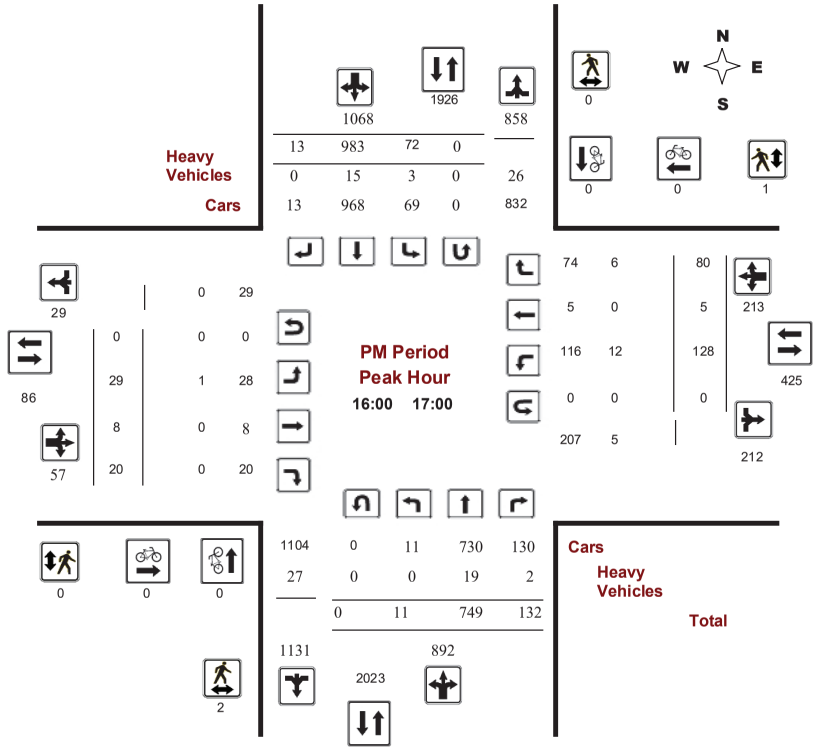
Transportation Services - Traffic Services

Turning Movement Count - 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

Time Period		Northbound				Southbound					Eastbound				Westbound					Grand Total
		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	
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.

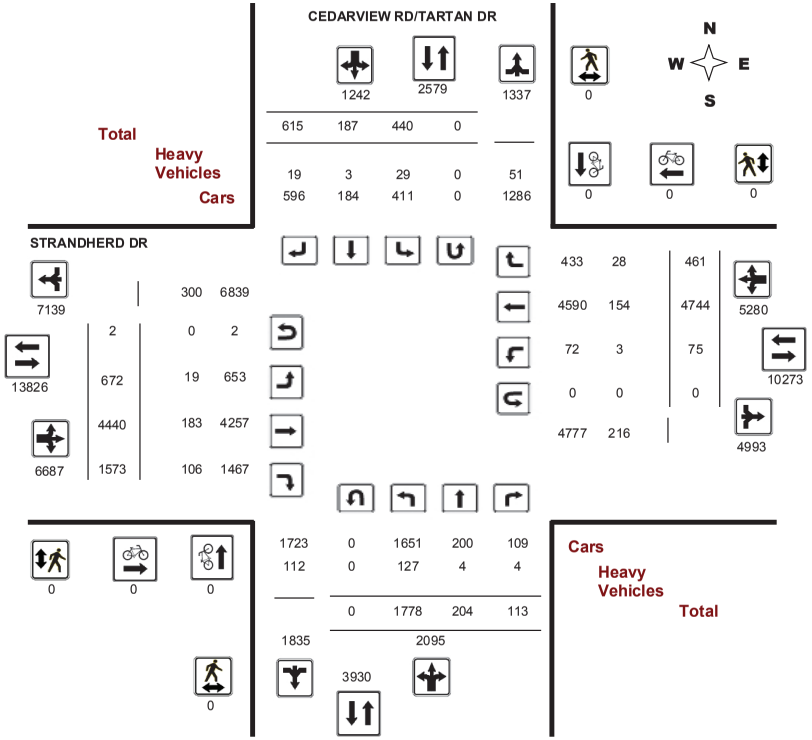
Transportation Services - Traffic Services

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.

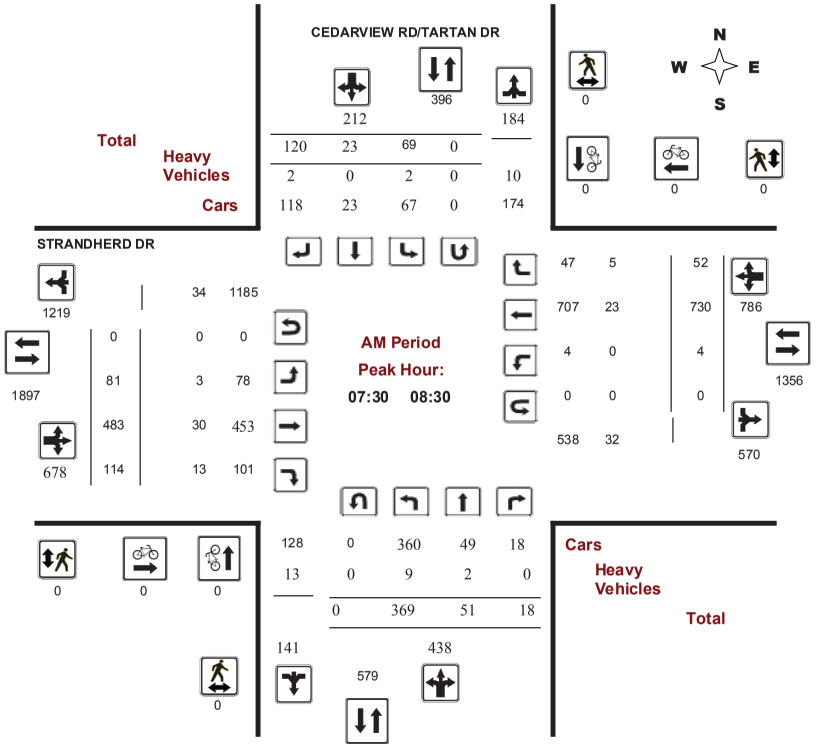
Transportation Services - Traffic Services

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

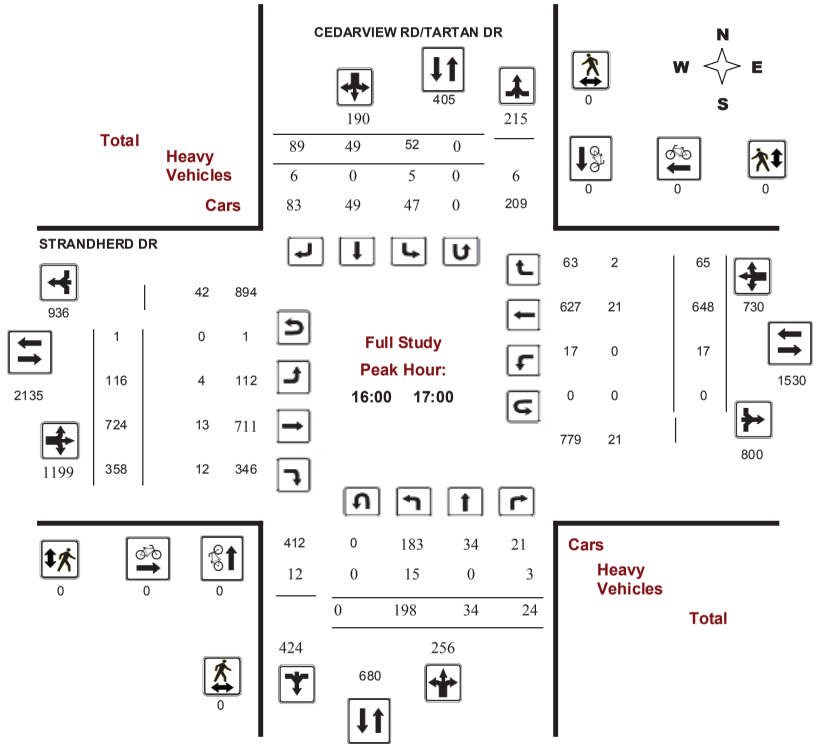
Transportation Services - Traffic Services

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

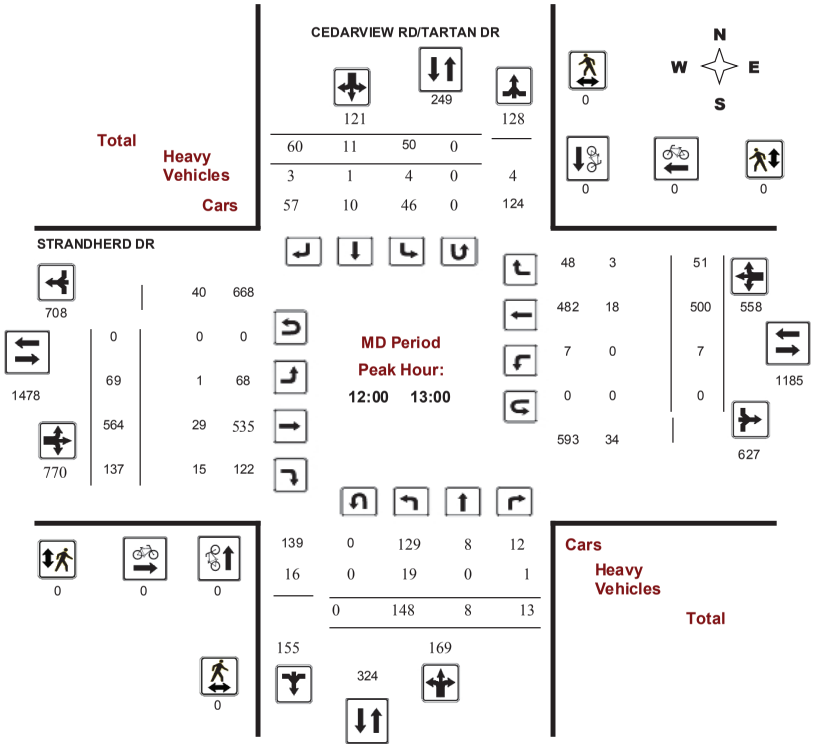
Transportation Services - Traffic Services

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

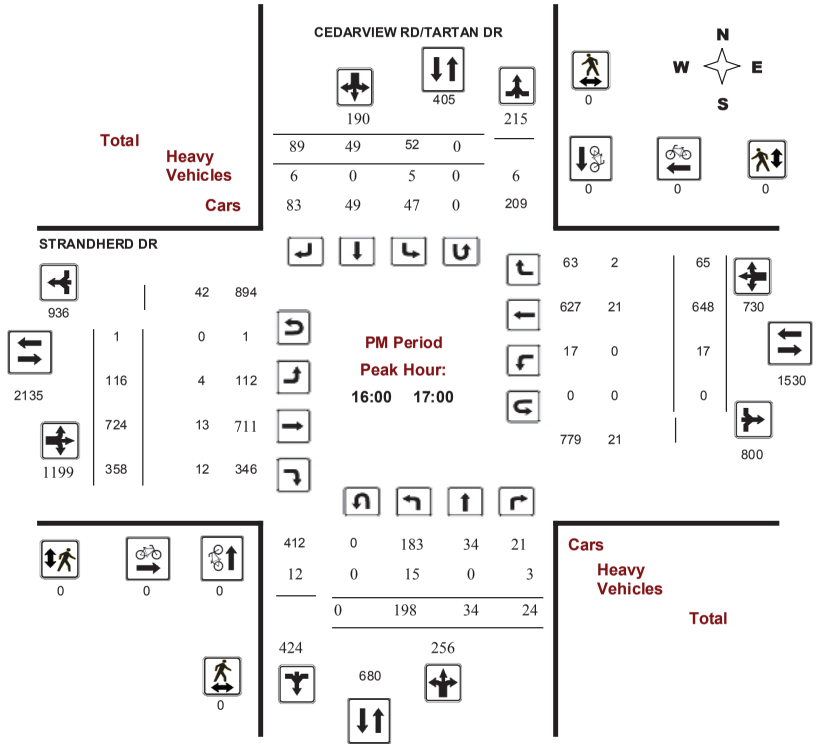
Transportation Services - Traffic Services

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

CGH TRANSPORTATION

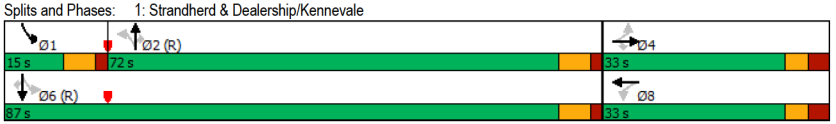
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	29	8	20	128	5	11	826	132	72	1133	13
Future Volume (vph)	29	8	20	128	5	11	826	132	72	1133	13
Lane Group Flow (vph)	32	9	22	142	95	12	918	147	80	1259	14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	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%
Maximum Green (s)	26.4	26.4	26.4	26.4	26.4	65.6	65.6	65.6	8.6	80.6	80.6
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		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	19.0	19.0	19.0	19.0	19.0	17.0	17.0	17.0		17.0	17.0
Pedestrian Calls (#/hr)	2	2	2	0	0	2	2	2		0	0
Act Effct Green (s)	18.5	18.5	18.5	18.5	18.5	77.3	77.3	77.3	88.5	88.5	88.5
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15	0.64	0.64	0.64	0.74	0.74	0.74
v/c Ratio	0.17	0.03	0.08	0.72	0.32	0.16	0.84	0.16	0.30	1.00	0.01
Control Delay	43.6	39.5	0.5	67.7	12.3	19.4	27.8	5.0	8.3	43.5	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	43.6	39.5	0.5	67.7	12.3	19.4	27.8	5.0	8.3	43.5	0.5
LOS	D	D	A	E	D	D	C	A	A	D	A
Approach Delay		27.9			45.5		24.6			41.0	
Approach LOS		C			D		C			D	
Queue Length 50th (m)	6.5	1.8	0.0	31.8	1.2	1.1	162.1	4.4	4.5	~258.7	0.0
Queue Length 95th (m)	14.7	6.0	0.0	49.7	14.7	6.0	#292.9	15.0	11.0	#409.4	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)	260	375	380	280	391	73	1098	946	281	1257	1077
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	0.51	0.24	0.16	0.84	0.16	0.28	1.00	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: 1.00
Intersection Signal Delay: 34.6 Intersection LOS: C
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Strandherd & Dealership/Kennevale



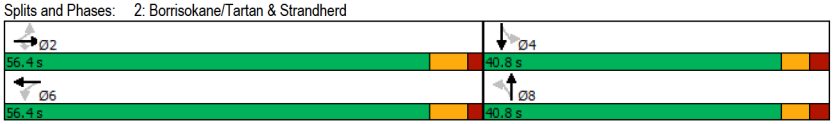
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	117	847	353	27	612	184	34	52	49
Future Volume (vph)	117	847	353	27	612	184	34	52	49
Lane Group Flow (vph)	130	941	392	30	752	204	84	58	153
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA
Protected Phases		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%
Maximum Green (s)	50.0	50.0	50.0	50.0	50.0	35.0	35.0	35.0	35.0
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?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max	None	None	None	None
Walk Time (s)	15.0	15.0	15.0	15.0	15.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	10.0	10.0	10.0	10.0	10.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.3	50.3	50.3	50.3	50.3	19.9	19.9	19.9	19.9
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61	0.24	0.24	0.24	0.24
v/c Ratio	0.49	0.90	0.38	0.21	0.73	0.75	0.20	0.20	0.34
Control Delay	19.6	30.3	2.3	14.5	18.5	46.2	13.7	25.5	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	30.3	2.3	14.5	18.5	46.2	13.7	25.5	12.0
LOS	B	C	A	B	B	D	B	C	B
Approach Delay		21.9			18.4		36.7		15.7
Approach LOS		C			B		D		B
Queue Length 50th (m)	10.1	113.8	0.0	1.9	72.9	29.2	4.6	7.1	6.6
Queue Length 95th (m)	35.0	#248.2	12.3	8.8	#166.8	51.2	14.4	15.9	19.9
Internal Link Dist (m)		1040.6			787.0		275.6		103.1
Turn Bay Length (m)	140.0		175.0	150.0		70.0		38.0	
Base Capacity (vph)	264	1040	1037	141	1028	480	694	511	714
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	0.49	0.90	0.38	0.21	0.73	0.42	0.12	0.11	0.21

Intersection Summary

Cycle Length: 97.2
Actuated Cycle Length: 82.5
Natural Cycle: 85
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.90
Intersection Signal Delay: 22.0 — Intersection LOS: C
Intersection Capacity Utilization 95.0% — 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



Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	773	142	0	690	54	0	0	106	0	0	26
Future Vol, veh/h	0	773	142	0	690	54	0	0	106	0	0	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	750	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	859	158	0	767	60	0	0	118	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	938	-	-	767
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.22	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.318	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	321	0	0	402
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	321	-	-	402
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	22.6	14.6
HCM LOS			C	B

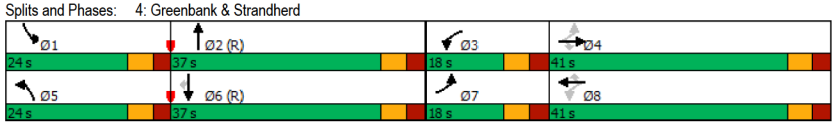
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	321	-	-	-	-	402
HCM Lane V/C Ratio	0.367	-	-	-	-	0.072
HCM Control Delay (s)	22.6	-	-	-	-	14.6
HCM Lane LOS	C	-	-	-	-	B
HCM 95th %tile Q(veh)	1.6	-	-	-	-	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	180	909	179	160	802	184	221	264	251	331	177
Future Volume (vph)	180	909	179	160	802	184	221	264	251	331	177
Lane Group Flow (vph)	200	1010	199	178	891	204	246	352	279	368	197
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases	4		4	8		8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5	11.3	35.5	35.5
Total Split (s)	18.0	41.0	41.0	18.0	41.0	41.0	24.0	37.0	24.0	37.0	37.0
Total Split (%)	15.0%	34.2%	34.2%	15.0%	34.2%	34.2%	20.0%	30.8%	20.0%	30.8%	30.8%
Maximum Green (s)	11.4	34.5	34.5	11.4	34.5	34.5	17.7	30.5	17.7	30.5	30.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8	2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5	6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0		22.0		22.0	22.0
Pedestrian Calls (#/hr)		1	1		0	0		2		1	1
Act Effct Green (s)	45.9	34.6	34.6	45.7	34.5	34.5	14.4	32.8	15.4	33.8	33.8
Actuated g/C Ratio	0.38	0.29	0.29	0.38	0.29	0.29	0.12	0.27	0.13	0.28	0.28
v/c Ratio	0.95	1.08	0.36	0.85	0.96	0.36	0.65	0.40	0.69	0.40	0.36
Control Delay	81.6	94.8	6.4	62.1	63.1	6.6	58.5	35.7	59.3	37.2	6.9
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	81.6	94.8	6.4	62.1	63.1	6.6	58.5	35.7	59.3	37.2	6.9
LOS	F	F	A	E	E	A	E	D	E	D	A
Approach Delay		80.5			53.9			45.1		37.4	
Approach LOS		F			D			D		D	
Queue Length 50th (m)	32.6	~138.4	0.0	26.7	107.1	0.5	28.5	33.4	32.2	36.5	0.0
Queue Length 95th (m)	#77.7	#178.1	16.7	#64.9	#147.1	17.6	40.5	48.3	45.5	52.5	17.5
Internal Link Dist (m)		596.1			267.5			273.7		216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0		85.0		145.0
Base Capacity (vph)	210	934	554	210	931	560	463	876	463	912	544
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	1.08	0.36	0.85	0.96	0.36	0.53	0.40	0.60	0.40	0.36

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 7 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 58.3 Intersection LOS: E
Intersection Capacity Utilization 89.2% 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: 4: Greenbank & Strandherd



Intersection	
Int Delay, s/veh	8.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	230	29	0	358	71
Future Vol, veh/h	21	230	29	0	358	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	256	32	0	398	79

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	907	32	0	0	32	0
Stage 1	32	-	-	-	-	-
Stage 2	875	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	306	1042	-	-	1580	-
Stage 1	991	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	226	1042	-	-	1580	-
Mov Cap-2 Maneuver	226	-	-	-	-	-
Stage 1	991	-	-	-	-	-
Stage 2	301	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	6.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	800	1580	-
HCM Lane V/C Ratio	-	-	0.349	0.252	-
HCM Control Delay (s)	-	-	11.9	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	1.6	1	-

Intersection	
Int Delay, s/veh	3.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	27	27	0	39	39
Future Vol, veh/h	0	27	27	0	39	39
Conflicting Peds, #/hr	5	5	0	5	5	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	600	0	-	-	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	30	30	0	43	43

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	169	40	0	0	35	0
Stage 1	35	-	-	-	-	-
Stage 2	134	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	821	1031	-	-	1576	-
Stage 1	987	-	-	-	-	-
Stage 2	892	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	791	1021	-	-	1569	-
Mov Cap-2 Maneuver	791	-	-	-	-	-
Stage 1	982	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	1021	1569	-
HCM Lane V/C Ratio	-	-	-	0.029	0.028	-
HCM Control Delay (s)	-	-	0	8.6	7.4	-
HCM Lane LOS	-	-	A	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0.1	0.1	-

Appendix D

Collision Data

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition
2014-03-22	2014	11:54	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	03 - Snow	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	03 - Loose snow
2015-01-09	2015	7:21	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	03 - Dawn	10 - No control		03 - P.D. only	07 - SMV other	06 - Ice
2015-01-09	2015	7:14	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	03 - Snow	03 - Dawn	10 - No control		03 - P.D. only	07 - SMV other	05 - Packed snow
2015-04-03	2015	20:09	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	07 - Dark	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2016-09-28	2016	13:17	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2017-02-06	2017	20:11	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	03 - Snow	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	03 - Loose snow
2017-02-10	2017	22:39	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	04 - Freezing Rain	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	06 - Ice
2017-05-23	2017	14:40	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	99 - Other	01 - Dry
2017-09-23	2017	21:27	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2017-10-07	2017	10:28	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	02 - Rain	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2017-12-06	2017	8:10	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2018-03-07	2018	8:37	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	03 - Snow	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	03 - Loose snow
2018-05-15	2018	8:26	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2018-08-02	2018	16:36	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2018-08-15	2018	11:11	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2018-08-24	2018	17:17	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		02 - Non-fatal injury	07 - SMV other	01 - Dry
2018-09-15	2018	17:30	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2018-10-08	2018	13:45	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	02 - Rain	01 - Daylight	10 - No control		03 - P.D. only	07 - SMV other	02 - Wet
2018-12-01	2018	22:45	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	07 - Dark	10 - No control		03 - P.D. only	07 - SMV other	01 - Dry
2018-12-27	2018	12:27	BORRISOKANE RD btwn CAMBRIAN RD & STRANDHERD D	01 - Clear	01 - Daylight	10 - No control		03 - P.D. only	03 - Rear end	06 - Ice
2014-06-07	2014	12:20	FRASER FIELDS WAY @ STRANDHERD DR	01 - Clear	01 - Daylight	0		03 - P.D. only	02 - Angle	01 - Dry
2014-12-18	2014	20:15	FRASER FIELDS WAY @ STRANDHERD DR	01 - Clear	07 - Dark	0		03 - P.D. only	05 - Turning movement	01 - Dry
2015-02-04	2015	11:28	FRASER FIELDS WAY @ STRANDHERD DR	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	04 - Slush
2017-02-18	2017	7:46	FRASER FIELDS WAY @ STRANDHERD DR	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	01 - Dry
2018-01-14	2018	14:07	FRASER FIELDS WAY @ STRANDHERD DR	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	05 - Turning movement	01 - Dry
2018-02-11	2018	9:43	FRASER FIELDS WAY @ STRANDHERD DR	01 - Clear	01 - Daylight	02 - Stop sign		02 - Non-fatal injury	02 - Angle	02 - Wet
2018-03-15	2018	11:45	FRASER FIELDS WAY @ STRANDHERD DR	01 - Clear	01 - Daylight	02 - Stop sign		03 - P.D. only	02 - Angle	01 - Dry
2014-05-25	2014	12:45	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2014-06-11	2014	16:36	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-06-24	2014	18:43	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-07-15	2014	9:52	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-09-21	2014	12:15	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-11-17	2014	9:40	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	03 - Snow	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-12-16	2014	13:21	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-12-16	2014	15:00	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2014-12-18	2014	19:06	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2015-03-31	2015	19:09	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	07 - Dark	01 - Traffic signal		02 - Non-fatal injury	03 - Rear end	01 - Dry
2015-05-02	2015	18:09	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2015-05-25	2015	16:50	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-06-16	2015	6:04	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	07 - SMV other	02 - Wet
2015-06-28	2015	13:23	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-08-13	2015	10:00	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2015-08-20	2015	18:20	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-09-12	2015	14:46	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-10-20	2015	12:34	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	02 - Angle	01 - Dry
2015-11-12	2015	11:26	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-12-02	2015	8:46	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2015-12-21	2015	13:23	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2016-01-15	2016	12:02	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2016-02-06	2016	17:26	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	05 - Dusk	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2016-05-08	2016	20:00	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-08-02	2016	20:57	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-08-04	2016	13:20	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2016-12-02	2016	13:33	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-06-12	2017	13:03	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2017-11-25	2017	14:07	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	02 - Wet
2017-12-08	2017	1:22	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	07 - Dark	01 - Traffic signal		03 - P.D. only	02 - Angle	01 - Dry
2018-04-02	2018	18:22	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	05 - Dusk	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-04-07	2018	17:29	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	03 - Rear end	01 - Dry
2018-07-05	2018	11:00	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	05 - Turning movement	01 - Dry
2018-07-12	2018	10:08	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal		03 - P.D. only	04 - Sideswipe	01 - Dry

2018-10-11	2018	16:22	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2018-10-17	2018	7:45	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	02 - Wet
2018-10-22	2018	11:58	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2018-12-25	2018	8:03	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	07 - SMV other	01 - Dry
2018-12-30	2018	18:56	STRANDHERD DR @ CEDARVIEW RD/TARTAN DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	03 - Rear end	02 - Wet
2014-01-12	2014	17:31	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	05 - Dusk	10 - No control	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2014-11-16	2014	14:24	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	05 - Turning movement	02 - Wet
2015-02-17	2015	16:00	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-07-01	2015	23:12	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2015-10-09	2015	12:55	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	07 - SMV other	02 - Wet
2015-10-11	2015	19:40	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	05 - Turning movement	01 - Dry
2016-12-16	2016	15:15	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-12-16	2016	21:31	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	07 - SMV other	01 - Dry
2017-12-31	2017	13:23	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	03 - Rear end	02 - Wet
2018-05-29	2018	11:00	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2018-07-08	2018	11:36	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2018-12-21	2018	16:40	STRANDHERD DR btwn CEDARVIEW RD & MADRID AVE	02 - Rain	05 - Dusk	10 - No control	02 - Non-fatal injury	03 - Rear end	02 - Wet
2014-12-04	2014	16:38	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASE	01 - Clear	05 - Dusk	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2015-02-08	2015	8:45	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASE	03 - Snow	01 - Daylight	10 - No control	02 - Non-fatal injury	01 - Approaching	03 - Loose snow
2016-11-26	2016	14:39	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	03 - Rear end	01 - Dry
2017-12-22	2017	16:50	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASE	01 - Clear	05 - Dusk	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2018-08-04	2018	14:19	STRANDHERD DR btwn CEDARVIEW RD & MCKENNA CASE	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	02 - Wet

Appendix E

Synchro Intersection Worksheets – 2029 Background Conditions

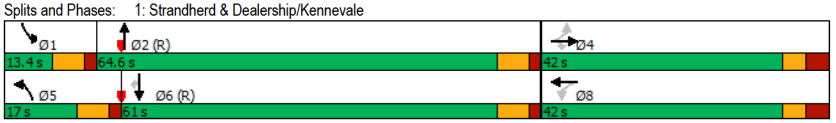
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	109	28	69	100	168	333	3102	54	1423	471
Future Volume (vph)	109	28	69	100	168	333	3102	54	1423	471
Lane Group Flow (vph)	109	28	69	100	284	333	3188	54	1423	471
Turn Type	Perm	NA	Perm	Perm	NA	Prot	NA	Prot	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)	42.0	42.0	42.0	42.0	42.0	17.0	64.6	13.4	61.0	61.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	14.2%	53.8%	11.2%	50.8%	50.8%
Maximum Green (s)	35.1	35.1	35.1	35.1	35.1	10.6	58.2	7.0	54.6	54.6
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?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	7.0	7.0		7.0		5.0	5.0
Flash Dont Walk (s)	26.0	26.0	26.0	14.0	14.0		14.0		26.0	26.0
Pedestrian Calls (#/hr)	10	10	10	10	10		10		10	10
Act Effct Green (s)	26.5	26.5	26.5	26.5	26.5	18.9	67.9	8.4	54.9	54.9
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22	0.16	0.57	0.07	0.46	0.46
v/c Ratio	0.83	0.07	0.22	0.36	0.80	0.68	1.75	0.48	0.96	0.71
Control Delay	86.4	34.4	37.8	41.6	60.9	58.7	356.3	68.0	47.5	33.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.4	34.4	37.8	41.6	60.9	58.7	356.3	68.0	47.5	33.5
LOS	F	C	D	D	E	E	F	E	D	C
Approach Delay		63.0			55.9		328.2		44.7	
Approach LOS		E			E		F		D	
Queue Length 50th (m)	24.3	5.2	13.2	19.8	62.9	36.4	~607.9	12.2	165.3	86.3
Queue Length 95th (m)	#46.4	11.7	23.6	32.6	85.6	m22.2	m#270.3	#28.7	#216.2	126.7
Internal Link Dist (m)		172.9			177.4		1040.6		345.0	
Turn Bay Length (m)	70.0		150.0	50.0		130.0		180.0		60.0
Base Capacity (vph)	175	499	418	368	468	493	1824	116	1483	663
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	0.62	0.06	0.17	0.27	0.61	0.68	1.75	0.47	0.96	0.71

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.75
Intersection Signal Delay: 210.8 Intersection LOS: F
Intersection Capacity Utilization 144.9% 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



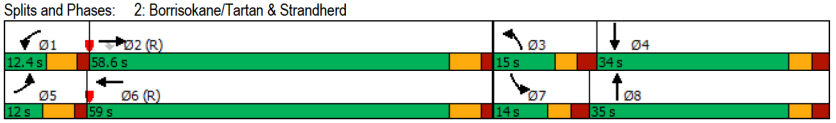
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	137	841	582	68	1944	1199	49	69	23
Future Volume (vph)	137	841	582	68	1944	1199	49	69	23
Lane Group Flow (vph)	137	841	582	68	1996	1199	156	69	315
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4	11.0	34.0	11.0	34.0
Total Split (s)	12.0	58.6	58.6	12.4	59.0	15.0	35.0	14.0	34.0
Total Split (%)	10.0%	48.8%	48.8%	10.3%	49.2%	12.5%	29.2%	11.7%	28.3%
Maximum Green (s)	5.6	52.2	52.2	6.0	52.6	9.0	29.0	8.0	28.0
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	2.7	2.7	2.7	2.7
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	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	6.3	52.5	52.5	6.4	52.6	9.0	31.1	7.7	27.3
Actuated g/C Ratio	0.05	0.44	0.44	0.05	0.44	0.08	0.26	0.06	0.23
v/c Ratio	1.63	0.59	0.92	0.79	1.41	5.10	0.39	0.66	0.94
Control Delay	347.7	10.3	24.5	92.9	207.8	1867.0	41.4	83.9	82.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	347.7	10.3	24.5	92.9	207.8	1867.0	41.4	83.9	82.9
LOS	F	B	C	F	F	F	D	F	F
Approach Delay		45.3			204.0		1656.8		83.1
Approach LOS		D			F		F		F
Queue Length 50th (m)	~49.6	16.2	21.3	16.1	~323.2	~269.4	30.8	15.9	71.9
Queue Length 95th (m)	m#56.8	m20.6	m45.6	m17.1	m#328.0	#309.5	50.9	#36.7	#124.1
Internal Link Dist (m)		1040.6			787.0		275.6		103.1
Turn Bay Length (m)	105.0		110.0	55.0		100.0		38.0	
Base Capacity (vph)	84	1418	634	86	1414	235	396	108	342
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	1.63	0.59	0.92	0.79	1.41	5.10	0.39	0.64	0.92

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 47 (39%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 5.10
Intersection Signal Delay: 516.2 Intersection LOS: F
Intersection Capacity Utilization 143.6% 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



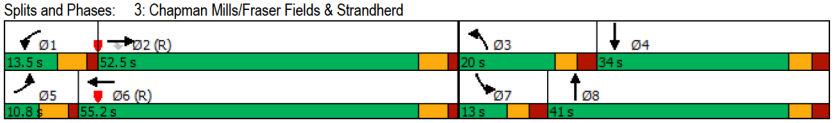
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	710	303	43	1574	477	0	35	0
Future Volume (vph)	4	710	303	43	1574	477	0	35	0
Lane Group Flow (vph)	4	710	303	43	1590	477	72	35	12
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8	11.0	34.0	11.0	34.0
Total Split (s)	10.8	52.5	52.5	13.5	55.2	20.0	41.0	13.0	34.0
Total Split (%)	9.0%	43.8%	43.8%	11.3%	46.0%	16.7%	34.2%	10.8%	28.3%
Maximum Green (s)	5.0	46.7	46.7	7.7	49.4	14.0	35.0	7.0	28.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6	2.7	2.7	2.7	2.7
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)	5.8	5.8	5.8	5.8	5.8	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Min	None	Min
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	5.9	63.3	63.3	8.2	72.5	14.0	25.4	6.7	13.2
Actuated g/C Ratio	0.05	0.53	0.53	0.07	0.60	0.12	0.21	0.06	0.11
v/c Ratio	0.05	0.42	0.40	0.39	0.81	1.30	0.24	0.39	0.08
Control Delay	71.2	11.7	13.2	66.8	16.4	197.0	42.2	67.5	45.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.2	11.7	13.2	66.8	16.4	197.0	42.2	67.5	45.2
LOS	E	B	B	E	B	F	D	E	D
Approach Delay		12.4			17.7		176.7		61.8
Approach LOS		B			B		F		E
Queue Length 50th (m)	1.0	36.5	28.9	10.6	56.2	~73.1	15.3	8.0	2.6
Queue Length 95th (m)	m1.3	99.7	95.8	m13.2	m#263.0	#105.5	24.7	18.5	7.4
Internal Link Dist (m)		787.0			628.9		349.9		82.1
Turn Bay Length (m)	40.0		145.0	40.0		105.0		40.0	
Base Capacity (vph)	79	1709	764	118	1953	366	422	94	338
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	0.05	0.42	0.40	0.36	0.81	1.30	0.17	0.37	0.04

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 43.6 Intersection LOS: D
Intersection Capacity Utilization 77.3% ICU Level of Service D
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: 3: Chapman Mills/Fraser Fields & Strandherd



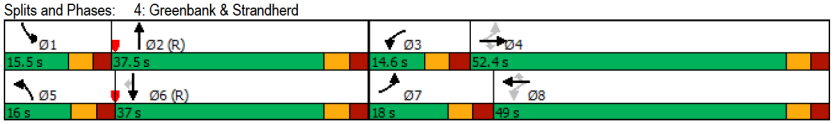
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	186	664	135	107	1070	163	215	521	175	302	291
Future Volume (vph)	186	664	135	107	1070	163	215	521	175	302	291
Lane Group Flow (vph)	186	664	135	107	1070	163	215	650	175	302	291
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases	4		4	8		8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5	11.3	35.5	35.5
Total Split (s)	18.0	52.4	52.4	14.6	49.0	49.0	16.0	37.5	15.5	37.0	37.0
Total Split (%)	15.0%	43.7%	43.7%	12.2%	40.8%	40.8%	13.3%	31.3%	12.9%	30.8%	30.8%
Maximum Green (s)	11.4	45.9	45.9	8.0	42.5	42.5	9.7	31.0	9.2	30.5	30.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8	2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5	6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0		22.0		22.0	22.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10	10
Act Effct Green (s)	56.8	45.5	45.5	49.5	41.8	41.8	9.9	31.8	9.1	31.0	31.0
Actuated g/C Ratio	0.47	0.38	0.38	0.41	0.35	0.35	0.08	0.26	0.08	0.26	0.26
v/c Ratio	0.89	0.54	0.21	0.36	0.95	0.27	0.83	0.77	0.73	0.36	0.59
Control Delay	86.3	17.9	1.0	20.1	55.2	6.6	80.5	46.4	72.6	38.1	22.4
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	86.3	17.9	1.0	20.1	55.2	6.6	80.5	46.4	72.6	38.1	22.4
LOS	F	B	A	C	E	A	F	D	E	D	C
Approach Delay		28.5			46.5			54.9		40.0	
Approach LOS		C			D			D		D	
Queue Length 50th (m)	31.8	45.9	0.0	12.8	125.2	2.1	25.8	71.7	20.8	30.4	25.4
Queue Length 95th (m)	#70.9	28.9	0.4	22.6	#166.7	16.2	#46.0	93.3	#36.0	43.3	54.7
Internal Link Dist (m)		596.1			267.5			571.3		216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0		85.0		145.0
Base Capacity (vph)	210	1239	639	300	1147	609	258	847	241	837	490
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	0.89	0.54	0.21	0.36	0.93	0.27	0.83	0.77	0.73	0.36	0.59

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 42.6 Intersection LOS: D
Intersection Capacity Utilization 94.3% 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: 4: Greenbank & Strandherd



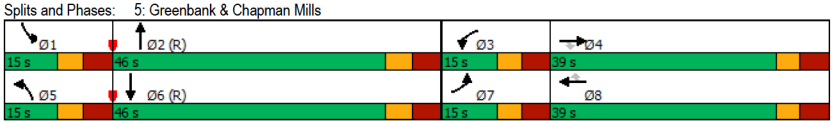
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	44	293	55	34	242	40	59	697	30	430
Future Volume (vph)	44	293	55	34	242	40	59	697	30	430
Lane Group Flow (vph)	44	293	55	34	242	40	59	762	30	457
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases			4			8				
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9	12.7	38.9
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0	15.0	46.0
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%	13.0%	40.0%
Maximum Green (s)	7.7	31.5	31.5	7.7	31.5	31.5	7.3	38.1	7.3	38.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2	4.0	4.2
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9	7.7	7.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		24.0		24.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10
Act Effct Green (s)	7.2	26.9	26.9	7.0	24.0	24.0	8.3	54.4	7.1	50.4
Actuated g/C Ratio	0.06	0.23	0.23	0.06	0.21	0.21	0.07	0.47	0.06	0.44
v/c Ratio	0.44	0.73	0.16	0.34	0.68	0.13	0.50	0.50	0.30	0.32
Control Delay	65.5	52.0	34.8	61.1	51.1	35.3	66.5	26.6	59.4	25.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	52.0	34.8	61.1	51.1	35.3	66.5	26.6	59.4	25.6
LOS	E	D	C	E	D	D	E	C	E	C
Approach Delay		51.1			50.2			29.4		27.7
Approach LOS		D			D			C		C
Queue Length 50th (m)	9.5	61.9	10.0	7.3	49.3	7.2	12.7	70.7	6.5	39.0
Queue Length 95th (m)	21.3	86.1	19.4	17.5	70.4	15.1	#30.3	99.4	16.0	56.1
Internal Link Dist (m)		626.4			183.5			478.9		571.3
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0		60.0	
Base Capacity (vph)	108	471	401	108	467	397	121	1513	106	1407
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	0.41	0.62	0.14	0.31	0.52	0.10	0.49	0.50	0.28	0.32

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 62 (54%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 36.5 Intersection LOS: D
Intersection Capacity Utilization 72.5% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	268	22	30	313	17	47	0	13	57	0	14
Future Vol, veh/h	29	268	22	30	313	17	47	0	13	57	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	268	22	30	313	17	47	0	13	57	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	330	0	0	290	0	0	726	727	279	726	730	322
Stage 1	-	-	-	-	-	-	337	337	-	382	382	-
Stage 2	-	-	-	-	-	-	389	390	-	344	348	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1229	-	-	1272	-	-	340	351	760	340	349	719
Stage 1	-	-	-	-	-	-	677	641	-	640	613	-
Stage 2	-	-	-	-	-	-	635	608	-	671	634	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1229	-	-	1272	-	-	322	335	760	322	333	719
Mov Cap-2 Maneuver	-	-	-	-	-	-	322	335	-	322	333	-
Stage 1	-	-	-	-	-	-	661	626	-	625	598	-
Stage 2	-	-	-	-	-	-	608	593	-	644	619	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.7	16.7	17.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	368	1229	-	-	1272	-	-	361
HCM Lane V/C Ratio	0.163	0.024	-	-	0.024	-	-	0.197
HCM Control Delay (s)	16.7	8	-	-	7.9	-	-	17.4
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.1	-	-	0.7

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	105	1135	152	63	499	158
Future Volume (vph)	105	1135	152	63	499	158
Lane Group Flow (vph)	105	1135	152	63	499	158
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	71.0	71.0	24.8	24.8	24.2	49.0
Total Split (%)	59.2%	59.2%	20.7%	20.7%	20.2%	40.8%
Maximum Green (s)	65.0	65.0	19.0	19.0	19.8	43.2
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	None	Min
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	2	2	2	2		2
Act Effct Green (s)	65.1	65.1	15.1	15.1	19.8	39.3
Actuated g/C Ratio	0.56	0.56	0.13	0.13	0.17	0.34
v/c Ratio	0.12	1.01	0.69	0.26	0.93	0.27
Control Delay	13.1	40.6	64.5	13.7	73.5	29.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	40.6	64.5	13.7	73.5	29.3
LOS	B	D	E	B	E	C
Approach Delay	38.3		49.6			62.8
Approach LOS	D		D			E
Queue Length 50th (m)	10.7	~159.5	33.0	0.0	57.8	25.7
Queue Length 95th (m)	20.3	#277.8	54.4	12.2	#92.3	42.0
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	907	1124	279	290	536	634
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	0.12	1.01	0.54	0.22	0.93	0.25

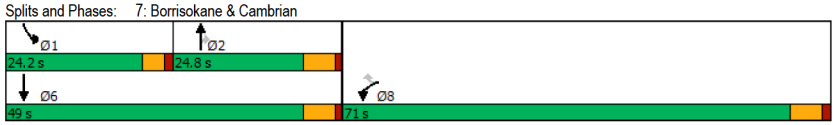
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 116.2
Natural Cycle: 120
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 47.1	Intersection LOS: D
Intersection Capacity Utilization 92.5%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 7: Borrisokane & Cambrian



Intersection	
Int Delay, s/veh	8.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	365	47	0	264	22
Future Vol, veh/h	30	365	47	0	264	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	380	0	-	150	380	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	365	47	0	264	22

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	597	47	0	0	47	0
Stage 1	47	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	466	1022	-	-	1560	-
Stage 1	975	-	-	-	-	-
Stage 2	578	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	387	1022	-	-	1560	-
Mov Cap-2 Maneuver	387	-	-	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	480	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	7.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	387	1022	1560	-
HCM Lane V/C Ratio	-	-	0.078	0.357	0.169	-
HCM Control Delay (s)	-	-	15.1	10.5	7.8	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	1.6	0.6	-

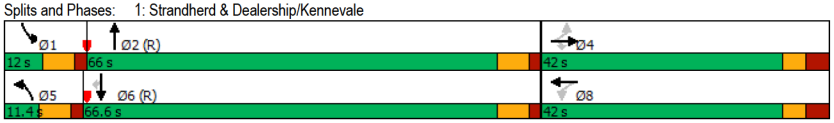
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	429	151	293	128	39	100	2071	93	3142	167
Future Volume (vph)	429	151	293	128	39	100	2071	93	3142	167
Lane Group Flow (vph)	429	151	293	128	139	100	2203	93	3142	167
Turn Type	Perm	NA	Perm	Perm	NA	Prot	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)	42.0	42.0	42.0	42.0	42.0	11.4	66.0	12.0	66.6	66.6
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	9.5%	55.0%	10.0%	55.5%	55.5%
Maximum Green (s)	35.1	35.1	35.1	35.1	35.1	5.0	59.6	5.6	60.2	60.2
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?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	7.0	7.0		7.0		5.0	5.0
Flash Dont Walk (s)	26.0	26.0	26.0	14.0	14.0		14.0		26.0	26.0
Pedestrian Calls (#/hr)	10	10	10	10	10		10		10	10
Act Effct Green (s)	35.1	35.1	35.1	35.1	35.1	5.0	59.6	5.6	60.2	60.2
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29	0.04	0.50	0.05	0.50	0.50
v/c Ratio	1.30	0.30	0.70	0.40	0.31	0.76	1.38	1.24	1.93	0.23
Control Delay	189.7	35.0	48.1	38.6	35.5	72.0	193.5	228.4	445.3	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	189.7	35.0	48.1	38.6	35.5	72.0	193.5	228.4	445.3	17.9
LOS	F	D	D	D	D	E	F	F	F	B
Approach Delay		115.5			36.9		188.2		418.4	
Approach LOS		F			D		F		F	
Queue Length 50th (m)	~127.3	27.2	60.6	23.8	25.2	11.8	~366.3	~26.7	~592.7	21.1
Queue Length 95th (m)	#187.8	45.1	91.9	41.9	42.5	m9.8	m#235.0	#60.0	#628.3	34.7
Internal Link Dist (m)		172.9			177.4		1040.6		345.0	
Turn Bay Length (m)	70.0		150.0	50.0		130.0		180.0		60.0
Base Capacity (vph)	331	499	418	321	445	131	1592	75	1625	727
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	1.30	0.30	0.70	0.40	0.31	0.76	1.38	1.24	1.93	0.23

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 74 (62%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.93
Intersection Signal Delay: 287.5 Intersection LOS: F
Intersection Capacity Utilization 142.3% 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	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	450	1924	1237	116	1256	815	34	52	49
Future Volume (vph)	450	1924	1237	116	1256	815	34	52	49
Lane Group Flow (vph)	450	1924	1237	116	1321	815	146	52	192
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4	11.0	34.0	11.0	34.0
Total Split (s)	14.0	61.6	61.6	11.4	59.0	13.0	35.0	12.0	34.0
Total Split (%)	11.7%	51.3%	51.3%	9.5%	49.2%	10.8%	29.2%	10.0%	28.3%
Maximum Green (s)	7.6	55.2	55.2	5.0	52.6	7.0	29.0	6.0	28.0
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	2.7	2.7	2.7	2.7
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	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	15.2	55.2	55.2	12.6	52.6	7.0	23.8	6.0	20.4
Actuated g/C Ratio	0.13	0.46	0.46	0.10	0.44	0.06	0.20	0.05	0.17
v/c Ratio	2.20	1.29	1.85	0.68	0.94	4.45	0.49	0.64	0.75
Control Delay	568.1	151.0	404.3	59.5	38.7	1580.0	48.5	90.2	64.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	568.1	151.0	404.3	59.5	38.7	1580.0	48.5	90.2	64.5
LOS	F	F	F	E	D	F	D	F	E
Approach Delay		289.8			40.4		1347.3		70.0
Approach LOS		F			D		F		E
Queue Length 50th (m)	~173.8	~296.0	~434.2	27.2	120.9	~180.3	31.2	12.1	42.9
Queue Length 95th (m)	m#112.8	m42.3	m#192.3	m#60.8	m123.1	#217.6	48.1	#31.2	63.0
Internal Link Dist (m)		1040.6			787.0		275.6		103.1
Turn Bay Length (m)	105.0		110.0	55.0		100.0		38.0	
Base Capacity (vph)	205	1490	667	170	1410	183	364	81	353
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	2.20	1.29	1.85	0.68	0.94	4.45	0.40	0.64	0.54

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

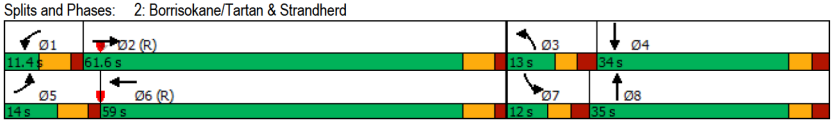
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 4.45
Intersection Signal Delay: 386.4 Intersection LOS: F
Intersection Capacity Utilization 122.4% ICU Level of Service H
Analysis Period (min) 15

~ 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: 2: Borrisokane/Tartan & Strandherd



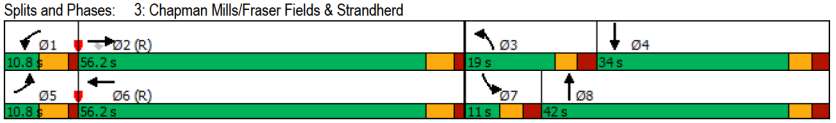
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	15	1688	531	55	999	438	0	18	0
Future Volume (vph)	15	1688	531	55	999	438	0	18	0
Lane Group Flow (vph)	15	1688	531	55	1053	438	49	18	8
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8	11.0	34.0	11.0	34.0
Total Split (s)	10.8	56.2	56.2	10.8	56.2	19.0	42.0	11.0	34.0
Total Split (%)	9.0%	46.8%	46.8%	9.0%	46.8%	15.8%	35.0%	9.2%	28.3%
Maximum Green (s)	5.0	50.4	50.4	5.0	50.4	13.0	36.0	5.0	28.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6	2.7	2.7	2.7	2.7
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)	5.8	5.8	5.8	5.8	5.8	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Min	None	Min
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	6.4	61.1	61.1	9.1	70.8	13.0	27.8	5.0	13.2
Actuated g/C Ratio	0.05	0.51	0.51	0.08	0.59	0.11	0.23	0.04	0.11
v/c Ratio	0.17	1.02	0.72	0.45	0.56	1.29	0.15	0.27	0.05
Control Delay	75.1	30.9	11.9	38.4	30.0	192.8	38.2	65.9	44.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.1	30.9	11.9	38.4	30.0	192.8	38.2	65.9	44.2
LOS	E	C	B	D	C	F	D	E	D
Approach Delay		26.7			30.4		177.2		59.2
Approach LOS		C			C		F		E
Queue Length 50th (m)	3.7	217.7	47.1	10.0	129.6	~66.7	9.0	4.1	1.8
Queue Length 95th (m)	m3.2	m#184.2	m82.7	m13.4	m138.5	#98.1	18.1	11.7	5.6
Internal Link Dist (m)		787.0			628.9		349.9		82.1
Turn Bay Length (m)	40.0		145.0	40.0		105.0		40.0	
Base Capacity (vph)	86	1649	738	123	1895	340	435	67	338
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	1.02	0.72	0.45	0.56	1.29	0.11	0.27	0.02

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 63 (53%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.29
Intersection Signal Delay: 47.0 Intersection LOS: D
Intersection Capacity Utilization 78.9% ICU Level of Service D
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: 3: Chapman Mills/Fraser Fields & Strandherd



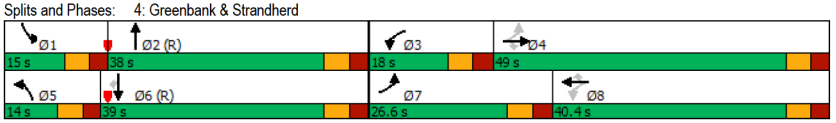
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	356	1297	260	259	911	184	219	524	251	666	220
Future Volume (vph)	356	1297	260	259	911	184	219	524	251	666	220
Lane Group Flow (vph)	356	1297	260	259	911	184	219	681	251	666	220
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases	4		4	8		8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5	11.3	35.5	35.5
Total Split (s)	26.6	49.0	49.0	18.0	40.4	40.4	14.0	38.0	15.0	39.0	39.0
Total Split (%)	22.2%	40.8%	40.8%	15.0%	33.7%	33.7%	11.7%	31.7%	12.5%	32.5%	32.5%
Maximum Green (s)	20.0	42.5	42.5	11.4	33.9	33.9	7.7	31.5	8.7	32.5	32.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8	2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5	6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0		22.0		22.0	22.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10	10
Act Effct Green (s)	60.4	42.5	42.5	45.2	33.9	33.9	7.7	31.5	8.7	32.5	32.5
Actuated g/C Ratio	0.50	0.35	0.35	0.38	0.28	0.28	0.06	0.26	0.07	0.27	0.27
v/c Ratio	1.09	1.13	0.41	1.23	1.00	0.33	1.09	0.81	1.11	0.76	0.40
Control Delay	81.0	104.3	17.3	169.6	72.0	4.5	141.3	48.2	141.7	46.7	6.8
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	81.0	104.3	17.3	169.6	72.0	4.5	141.3	48.2	141.7	46.7	6.8
LOS	F	F	B	F	E	A	F	D	F	D	A
Approach Delay		88.1			81.5			70.8		60.0	
Approach LOS		F			F			E		E	
Queue Length 50th (m)	~76.9	~189.5	34.6	~60.6	111.3	0.0	~29.4	74.8	~34.1	74.9	0.0
Queue Length 95th (m)	m#78.8	m#188.0	m43.3	#112.2	#154.5	11.5	#53.8	97.1	#60.1	96.3	18.1
Internal Link Dist (m)		596.1			267.5			571.3		216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0		85.0		145.0
Base Capacity (vph)	327	1147	641	210	915	559	201	841	227	877	547
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	1.09	1.13	0.41	1.23	1.00	0.33	1.09	0.81	1.11	0.76	0.40

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.23
Intersection Signal Delay: 77.5 Intersection LOS: E
Intersection Capacity Utilization 106.3% 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: 4: Greenbank & Strandherd



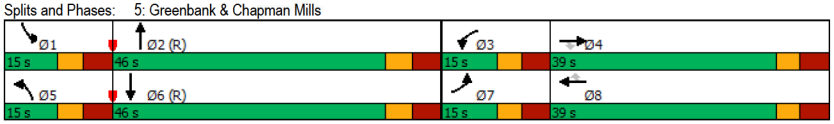
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	38	323	74	94	320	40	80	691	50	929
Future Volume (vph)	38	323	74	94	320	40	80	691	50	929
Lane Group Flow (vph)	38	323	74	94	320	40	80	736	50	973
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases			4			8				
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9	12.7	38.9
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0	15.0	46.0
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%	13.0%	40.0%
Maximum Green (s)	7.7	31.5	31.5	7.7	31.5	31.5	7.3	38.1	7.3	38.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2	4.0	4.2
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9	7.7	7.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		24.0		24.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10
Act Effct Green (s)	7.1	26.1	26.1	7.7	32.1	32.1	9.1	45.9	7.6	41.7
Actuated g/C Ratio	0.06	0.23	0.23	0.07	0.28	0.28	0.08	0.40	0.07	0.36
v/c Ratio	0.38	0.83	0.22	0.87	0.67	0.10	0.62	0.57	0.47	0.83
Control Delay	62.9	60.7	36.3	110.9	45.5	32.6	73.0	31.3	66.4	42.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.9	60.7	36.3	110.9	45.5	32.6	73.0	31.3	66.4	42.1
LOS	E	E	D	F	D	C	E	C	E	D
Approach Delay		56.7			57.9			35.4		43.3
Approach LOS		E			E			D		D
Queue Length 50th (m)	8.2	68.1	13.3	21.1	67.4	7.0	17.0	71.0	10.8	108.4
Queue Length 95th (m)	19.2	95.5	24.6	#51.2	94.9	15.1	#43.8	95.2	#23.8	#146.3
Internal Link Dist (m)		626.4			183.5			478.9		571.3
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0		60.0	
Base Capacity (vph)	108	467	397	108	493	419	128	1281	111	1166
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	0.35	0.69	0.19	0.87	0.65	0.10	0.63	0.57	0.45	0.83

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 40 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 45.5 Intersection LOS: D
Intersection Capacity Utilization 82.0% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	399	46	65	324	23	30	0	9	48	0	12
Future Vol, veh/h	52	399	46	65	324	23	30	0	9	48	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	52	399	46	65	324	23	30	0	9	48	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	347	0	0	445	0	0	998	1003	422	997	1015	336
Stage 1	-	-	-	-	-	-	526	526	-	466	466	-
Stage 2	-	-	-	-	-	-	472	477	-	531	549	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1212	-	-	1115	-	-	223	242	632	223	238	706
Stage 1	-	-	-	-	-	-	535	529	-	577	562	-
Stage 2	-	-	-	-	-	-	573	556	-	532	516	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1212	-	-	1115	-	-	203	218	632	203	214	706
Mov Cap-2 Maneuver	-	-	-	-	-	-	203	218	-	203	214	-
Stage 1	-	-	-	-	-	-	512	506	-	552	529	-
Stage 2	-	-	-	-	-	-	530	524	-	502	494	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	1.3	22.8	25.3
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	241	1212	-	-	1115	-	-	237
HCM Lane V/C Ratio	0.162	0.043	-	-	0.058	-	-	0.253
HCM Control Delay (s)	22.8	8.1	-	-	8.4	-	-	25.3
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.2	-	-	1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	80	756	153	83	1162	153
Future Volume (vph)	80	756	153	83	1162	153
Lane Group Flow (vph)	80	756	153	83	1162	153
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	25.1	25.1	25.9	25.9	39.0	64.9
Total Split (%)	27.9%	27.9%	28.8%	28.8%	43.3%	72.1%
Maximum Green (s)	19.1	19.1	20.1	20.1	34.6	59.1
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	None	Min
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	2	2	2	2		2
Act Effct Green (s)	13.3	13.3	12.7	12.7	32.6	49.8
Actuated g/C Ratio	0.18	0.18	0.17	0.17	0.43	0.66
v/c Ratio	0.28	0.86	0.53	0.26	0.85	0.14
Control Delay	30.6	14.1	37.1	9.8	28.2	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.6	14.1	37.1	9.8	28.2	5.6
LOS	C	B	D	A	C	A
Approach Delay	15.7		27.5			25.5
Approach LOS	B		C			C
Queue Length 50th (m)	9.9	0.0	19.2	0.0	63.1	5.5
Queue Length 95th (m)	22.8	#62.6	39.9	11.0	#135.5	15.6
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	419	935	464	454	1472	1364
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	0.19	0.81	0.33	0.18	0.79	0.11

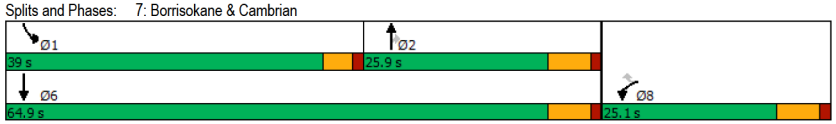
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 75.1
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 22.3	Intersection LOS: C
Intersection Capacity Utilization 67.7%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 7: Borrisokane & Cambrian



Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	354	30	0	452	46
Future Vol, veh/h	17	354	30	0	452	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	380	0	-	150	380	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	354	30	0	452	46

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	980	30	0	0	30	0
Stage 1	30	-	-	-	-	-
Stage 2	950	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	277	1044	-	-	1583	-
Stage 1	993	-	-	-	-	-
Stage 2	376	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	198	1044	-	-	1583	-
Mov Cap-2 Maneuver	198	-	-	-	-	-
Stage 1	993	-	-	-	-	-
Stage 2	268	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	7.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	198	1044	1583	-
HCM Lane V/C Ratio	-	-	0.086	0.339	0.286	-
HCM Control Delay (s)	-	-	24.9	10.2	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	1.5	1.2	-

Appendix F

Synchro Intersection Worksheets – 2029 Mitigated Background Conditions

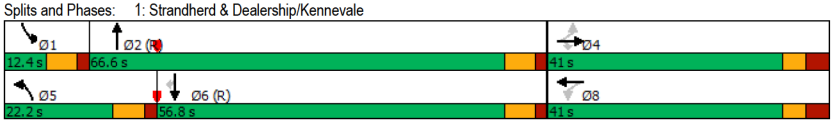
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	109	28	69	100	168	333	2406	54	1067	471
Future Volume (vph)	109	28	69	100	168	333	2406	54	1067	471
Lane Group Flow (vph)	109	28	69	100	284	333	2492	54	1067	471
Turn Type	Perm	NA	Perm	Perm	NA	Prot	NA	Prot	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	22.2	66.6	12.4	56.8	56.8
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%	18.5%	55.5%	10.3%	47.3%	47.3%
Maximum Green (s)	34.1	34.1	34.1	34.1	34.1	15.8	60.2	6.0	50.4	50.4
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?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	7.0	7.0		7.0		5.0	5.0
Flash Dont Walk (s)	26.0	26.0	26.0	14.0	14.0		14.0		26.0	26.0
Pedestrian Calls (#/hr)	10	10	10	10	10		10		10	10
Act Effct Green (s)	26.3	26.3	26.3	26.3	26.3	16.8	68.4	8.1	57.2	57.2
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22	0.14	0.57	0.07	0.48	0.48
v/c Ratio	0.84	0.08	0.22	0.36	0.81	0.76	1.36	0.50	0.69	0.68
Control Delay	89.6	34.7	38.1	41.9	61.7	60.3	180.7	70.0	28.8	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.6	34.7	38.1	41.9	61.7	60.3	180.7	70.0	28.8	32.5
LOS	F	C	D	D	E	E	F	E	C	C
Approach Delay		64.9			56.6		166.5		31.3	
Approach LOS		E			E		F		C	
Queue Length 50th (m)	24.3	5.2	13.2	19.8	62.9	35.6	~425.1	12.1	102.3	85.1
Queue Length 95th (m)	#47.7	11.8	23.8	33.0	86.5	m27.9	m#281.3	#32.6	137.3	135.7
Internal Link Dist (m)		172.9			177.4		1040.6		345.0	
Turn Bay Length (m)	70.0		150.0	50.0		130.0		180.0		60.0
Base Capacity (vph)	168	484	406	357	455	451	1837	109	1545	691
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	0.65	0.06	0.17	0.28	0.62	0.74	1.36	0.50	0.69	0.68

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 100 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.36
Intersection Signal Delay: 110.9 Intersection LOS: F
Intersection Capacity Utilization 124.6% 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: 1: Strandherd & Dealership/Kennevale



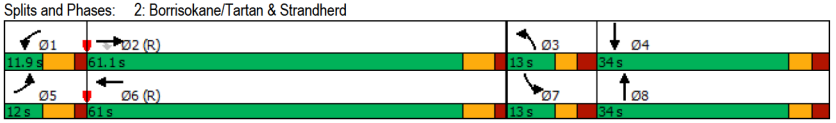
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	137	765	226	59	1823	503	49	69	23
Future Volume (vph)	137	765	226	59	1823	503	49	69	23
Lane Group Flow (vph)	137	765	226	59	1875	503	141	69	315
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4	11.0	34.0	11.0	34.0
Total Split (s)	12.0	61.1	61.1	11.9	61.0	13.0	34.0	13.0	34.0
Total Split (%)	10.0%	50.9%	50.9%	9.9%	50.8%	10.8%	28.3%	10.8%	28.3%
Maximum Green (s)	5.6	54.7	54.7	5.5	54.6	7.0	28.0	7.0	28.0
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	2.7	2.7	2.7	2.7
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	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	6.3	57.8	57.8	5.8	54.6	7.0	27.3	7.0	27.3
Actuated g/C Ratio	0.05	0.48	0.48	0.05	0.46	0.06	0.23	0.06	0.23
v/c Ratio	1.63	0.49	0.32	0.76	1.28	2.75	0.40	0.73	0.94
Control Delay	363.2	8.9	8.5	85.3	151.2	823.4	43.1	96.0	82.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	363.2	8.9	8.5	85.3	151.2	823.4	43.1	96.0	82.9
LOS	Γ	A	A	Γ	Γ	Γ	D	Γ	Γ
Approach Delay		51.8			149.2		652.6		85.2
Approach LOS		D			F		F		F
Queue Length 50th (m)	~49.7	13.8	7.8	13.3	~284.3	~102.5	27.8	16.1	71.9
Queue Length 95th (m)	m#81.7	16.4	11.1	m15.8	m#295.3	#135.4	46.7	#40.0	#124.1
Internal Link Dist (m)		1040.6			787.0		275.6		103.1
Turn Bay Length (m)	105.0		110.0	55.0		100.0		38.0	
Base Capacity (vph)	84	1560	697	78	1468	183	359	94	342
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	1.63	0.49	0.32	0.76	1.28	2.75	0.39	0.73	0.92

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.75
Intersection Signal Delay: 195.6 Intersection LOS: F
Intersection Capacity Utilization 119.1% 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	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	619	303	43	1444	477	0	35	0
Future Volume (vph)	4	619	303	43	1444	477	0	35	0
Lane Group Flow (vph)	4	619	303	43	1460	477	72	35	12
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8	11.0	34.0	11.0	34.0
Total Split (s)	10.8	51.5	51.5	13.5	54.2	21.0	42.0	13.0	34.0
Total Split (%)	9.0%	42.9%	42.9%	11.3%	45.2%	17.5%	35.0%	10.8%	28.3%
Maximum Green (s)	5.0	45.7	45.7	7.7	48.4	15.0	36.0	7.0	28.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6	2.7	2.7	2.7	2.7
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)	5.8	5.8	5.8	5.8	5.8	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Min	None	Min
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	5.9	62.3	62.3	8.2	71.5	15.0	26.4	6.7	13.2
Actuated g/C Ratio	0.05	0.52	0.52	0.07	0.60	0.12	0.22	0.06	0.11
v/c Ratio	0.05	0.37	0.40	0.39	0.76	1.21	0.23	0.39	0.08
Control Delay	69.8	13.8	16.0	63.3	23.0	161.9	41.2	67.5	45.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.8	13.8	16.0	63.3	23.0	161.9	41.2	67.5	45.2
LOS	E	B	B	E	C	F	D	E	D
Approach Delay		14.7			24.2		146.0		61.8
Approach LOS		B			C		F		E
Queue Length 50th (m)	0.9	47.9	47.6	9.7	107.4	~69.8	15.2	8.0	2.6
Queue Length 95th (m)	m1.6	86.7	94.7	21.2	#246.3	#102.3	24.4	18.5	7.4
Internal Link Dist (m)		787.0			367.4		349.9		82.1
Turn Bay Length (m)	40.0		145.0	40.0		105.0		40.0	
Base Capacity (vph)	79	1682	752	118	1926	393	435	94	338
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	0.05	0.37	0.40	0.36	0.76	1.21	0.17	0.37	0.04

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 96 (80%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

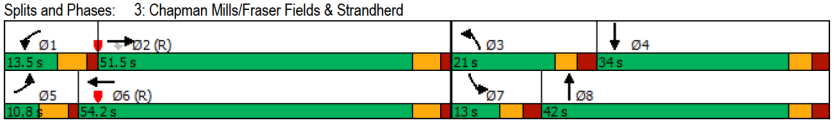
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 44.0 Intersection LOS: D
Intersection Capacity Utilization 73.5% ICU Level of Service D
Analysis Period (min) 15

~ 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: 3: Chapman Mills/Fraser Fields & Strandherd



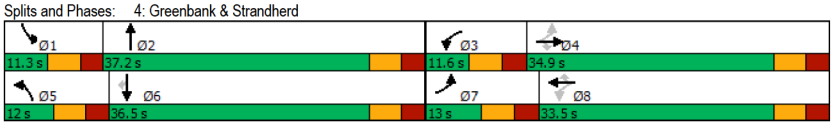
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	183	587	126	101	956	163	203	472	175	277	289
Future Volume (vph)	183	587	126	101	956	163	203	472	175	277	289
Lane Group Flow (vph)	183	587	126	101	956	163	203	593	175	277	289
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases	4		4	8		8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5	11.3	35.5	35.5
Total Split (s)	13.0	34.9	34.9	11.6	33.5	33.5	12.0	37.2	11.3	36.5	36.5
Total Split (%)	13.7%	36.7%	36.7%	12.2%	35.3%	35.3%	12.6%	39.2%	11.9%	38.4%	38.4%
Maximum Green (s)	6.4	28.4	28.4	5.0	27.0	27.0	5.7	30.7	5.0	30.0	30.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8	2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5	6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0		22.0		22.0	22.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10	10
Act Effct Green (s)	35.7	30.7	30.7	31.9	27.0	27.0	5.7	30.7	5.0	30.0	30.0
Actuated g/C Ratio	0.38	0.32	0.32	0.34	0.28	0.28	0.06	0.32	0.05	0.32	0.32
v/c Ratio	1.03	0.56	0.21	0.39	1.04	0.30	1.08	0.57	1.06	0.27	0.50
Control Delay	101.9	29.9	1.8	23.0	74.5	4.3	132.5	27.6	132.1	25.2	12.7
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	101.9	29.9	1.8	23.0	74.5	4.3	132.5	27.6	132.1	25.2	12.7
LOS	F	C	A	C	E	A	F	C	F	C	B
Approach Delay		40.7			60.8			54.4		45.6	
Approach LOS		D			E			D		D	
Queue Length 50th (m)	~23.1	47.6	0.0	11.0	~98.9	0.0	~21.2	43.7	~18.0	19.6	13.4
Queue Length 95th (m)	#63.8	64.7	3.6	21.2	#136.0	10.2	#42.5	60.4	#38.1	29.6	36.1
Internal Link Dist (m)		138.8			267.5			571.3		216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0		85.0		145.0
Base Capacity (vph)	177	1047	589	258	921	546	188	1035	165	1023	580
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	1.03	0.56	0.21	0.39	1.04	0.30	1.08	0.57	1.06	0.27	0.50

Intersection Summary

Cycle Length: 95
Actuated Cycle Length: 95
Natural Cycle: 95
Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.08
Intersection Signal Delay: 51.4 Intersection LOS: D
Intersection Capacity Utilization 90.5% 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: 4: Greenbank & Strandherd



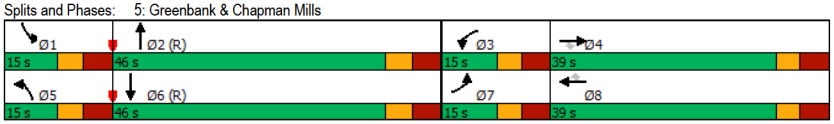
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	44	293	55	33	242	40	59	627	30	390
Future Volume (vph)	44	293	55	33	242	40	59	627	30	390
Lane Group Flow (vph)	44	293	55	33	242	40	59	690	30	417
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases			4			8				
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9	12.7	38.9
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0	15.0	46.0
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%	13.0%	40.0%
Maximum Green (s)	7.7	31.5	31.5	7.7	31.5	31.5	7.3	38.1	7.3	38.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2	4.0	4.2
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9	7.7	7.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		24.0		24.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10
Act Effct Green (s)	7.2	26.9	26.9	7.0	24.0	24.0	8.3	54.4	7.1	50.4
Actuated g/C Ratio	0.06	0.23	0.23	0.06	0.21	0.21	0.07	0.47	0.06	0.44
v/c Ratio	0.44	0.73	0.16	0.33	0.68	0.13	0.50	0.46	0.30	0.30
Control Delay	65.5	52.0	34.8	60.7	51.1	35.3	66.5	25.7	59.4	25.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	52.0	34.8	60.7	51.1	35.3	66.5	25.7	59.4	25.3
LOS	E	D	C	E	D	D	E	C	E	C
Approach Delay		51.1			50.1			28.9		27.5
Approach LOS		D			D			C		C
Queue Length 50th (m)	9.5	61.9	10.0	7.1	49.3	7.2	12.7	62.3	6.5	35.1
Queue Length 95th (m)	21.3	86.1	19.4	17.1	70.4	15.1	#30.3	88.4	16.0	51.0
Internal Link Dist (m)		626.4			183.5			478.9		571.3
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0		60.0	
Base Capacity (vph)	108	471	401	108	467	397	121	1511	106	1405
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	0.41	0.62	0.14	0.31	0.52	0.10	0.49	0.46	0.28	0.30

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 15 (13%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 36.7 Intersection LOS: D
Intersection Capacity Utilization 70.4% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	268	22	30	313	17	47	0	13	57	0	14
Future Vol, veh/h	29	268	22	30	313	17	47	0	13	57	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	268	22	30	313	17	47	0	13	57	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	330	0	0	290	0	0	726	727	279	726	730	322
Stage 1	-	-	-	-	-	-	337	337	-	382	382	-
Stage 2	-	-	-	-	-	-	389	390	-	344	348	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1229	-	-	1272	-	-	340	351	760	340	349	719
Stage 1	-	-	-	-	-	-	677	641	-	640	613	-
Stage 2	-	-	-	-	-	-	635	608	-	671	634	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1229	-	-	1272	-	-	322	335	760	322	333	719
Mov Cap-2 Maneuver	-	-	-	-	-	-	322	335	-	322	333	-
Stage 1	-	-	-	-	-	-	661	626	-	625	598	-
Stage 2	-	-	-	-	-	-	608	593	-	644	619	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.7	16.7	17.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	368	1229	-	-	1272	-	-	361
HCM Lane V/C Ratio	0.163	0.024	-	-	0.024	-	-	0.197
HCM Control Delay (s)	16.7	8	-	-	7.9	-	-	17.4
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.1	-	-	0.7

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	188	514	77	97	233	64
Future Volume (vph)	188	514	77	97	233	64
Lane Group Flow (vph)	188	514	77	97	233	64
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	24.0	24.0	11.2	35.2
Total Split (%)	41.3%	41.3%	40.0%	40.0%	18.7%	58.7%
Maximum Green (s)	18.8	18.8	18.2	18.2	6.8	29.4
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	None	Min
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	2	2	2	2		2
Act Effct Green (s)	12.1	12.1	11.4	11.4	6.9	22.8
Actuated g/C Ratio	0.26	0.26	0.24	0.24	0.15	0.49
v/c Ratio	0.45	0.68	0.19	0.23	0.51	0.08
Control Delay	18.7	7.1	15.9	5.8	25.0	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	7.1	15.9	5.8	25.0	7.5
LOS	D	A	D	A	C	A
Approach Delay	10.2		10.3			21.2
Approach LOS	B		B			C
Queue Length 50th (m)	12.0	0.0	4.5	0.0	8.1	2.2
Queue Length 95th (m)	29.9	17.9	14.1	8.4	#24.7	8.4
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	660	895	673	630	463	1087
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	0.28	0.57	0.11	0.15	0.50	0.06

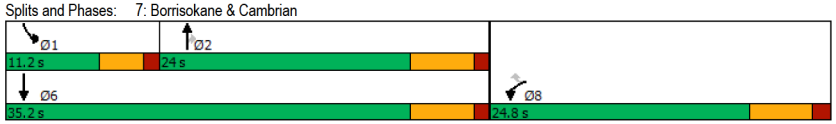
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 46.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 51.8%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 7: Borrisokane & Cambrian



Intersection	
Int Delay, s/veh	8.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	365	47	0	264	22
Future Vol, veh/h	30	365	47	0	264	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	380	0	-	150	380	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	365	47	0	264	22

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	597	47	0	0	47	0
Stage 1	47	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	466	1022	-	-	1560	-
Stage 1	975	-	-	-	-	-
Stage 2	578	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	387	1022	-	-	1560	-
Mov Cap-2 Maneuver	387	-	-	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	480	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	7.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	387	1022	1560	-
HCM Lane V/C Ratio	-	-	0.078	0.357	0.169	-
HCM Control Delay (s)	-	-	15.1	10.5	7.8	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	1.6	0.6	-

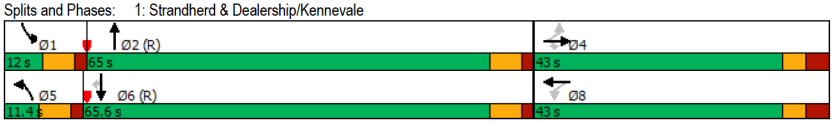
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	429	151	293	128	39	100	1571	93	2424	167
Future Volume (vph)	429	151	293	128	39	100	1571	93	2424	167
Lane Group Flow (vph)	429	151	293	128	139	100	1703	93	2424	167
Turn Type	Perm	NA	Perm	Perm	NA	Prot	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%
Maximum Green (s)	36.1	36.1	36.1	36.1	36.1	5.0	58.6	5.6	59.2	59.2
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?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	7.0	7.0		7.0		5.0	5.0
Flash Dont Walk (s)	26.0	26.0	26.0	14.0	14.0		14.0		26.0	26.0
Pedestrian Calls (#/hr)	10	10	10	10	10		10		10	10
Act Effct Green (s)	36.1	36.1	36.1	36.1	36.1	5.0	58.6	5.6	59.2	59.2
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.04	0.49	0.05	0.49	0.49
v/c Ratio	1.26	0.29	0.68	0.39	0.30	0.76	1.09	1.24	1.52	0.23
Control Delay	174.1	34.1	46.3	37.4	34.6	83.3	65.3	228.4	262.5	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.1	34.1	46.3	37.4	34.6	83.3	65.3	228.4	262.5	18.5
LOS	F	C	D	D	C	F	E	F	F	B
Approach Delay		107.0			35.9		66.3		246.2	
Approach LOS		F			D		E		F	
Queue Length 50th (m)	~124.8	26.9	59.9	23.5	24.8	11.4	~238.0	~26.7	~413.4	21.6
Queue Length 95th (m)	#185.3	44.5	90.8	41.3	42.0	m13.1	m#236.0	#60.0	#453.4	35.3
Internal Link Dist (m)		172.9			177.4		1040.6		345.0	
Turn Bay Length (m)	70.0		150.0	50.0		130.0		180.0		60.0
Base Capacity (vph)	341	513	430	331	457	131	1560	75	1598	715
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	1.26	0.29	0.68	0.39	0.30	0.76	1.09	1.24	1.52	0.23

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: 1.52
Intersection Signal Delay: 157.0 Intersection LOS: F
Intersection Capacity Utilization 130.8% 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	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	450	1775	519	99	1150	315	34	52	49
Future Volume (vph)	450	1775	519	99	1150	315	34	52	49
Lane Group Flow (vph)	450	1775	519	99	1215	315	132	52	192
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4	11.0	34.0	11.0	34.0
Total Split (s)	17.0	62.6	62.6	11.4	57.0	12.0	34.0	12.0	34.0
Total Split (%)	14.2%	52.2%	52.2%	9.5%	47.5%	10.0%	28.3%	10.0%	28.3%
Maximum Green (s)	10.6	56.2	56.2	5.0	50.6	6.0	28.0	6.0	28.0
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	2.7	2.7	2.7	2.7
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	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	18.2	56.2	56.2	12.6	50.6	6.0	22.8	6.0	20.4
Actuated g/C Ratio	0.15	0.47	0.47	0.10	0.42	0.05	0.19	0.05	0.17
v/c Ratio	1.84	1.17	0.76	0.58	0.90	2.01	0.46	0.64	0.75
Control Delay	412.7	93.8	10.4	62.5	35.3	503.8	48.5	90.2	64.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	412.7	93.8	10.4	62.5	35.3	503.8	48.5	90.2	64.5
LOS	F	F	B	E	D	F	D	F	E
Approach Delay		130.3			37.3		369.4		70.0
Approach LOS		F			D		F		E
Queue Length 50th (m)	~160.2	~254.9	36.6	23.3	159.9	~58.9	28.2	12.1	42.9
Queue Length 95th (m)	m#129.8	m57.3	m19.3	m#50.9	m165.5	#87.1	44.2	#31.2	63.0
Internal Link Dist (m)		1040.6			787.0		275.6		103.1
Turn Bay Length (m)	105.0		110.0	55.0		100.0		38.0	
Base Capacity (vph)	245	1517	679	170	1355	157	353	81	353
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	1.84	1.17	0.76	0.58	0.90	2.01	0.37	0.64	0.54

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: 2.01
Intersection Signal Delay: 124.0 Intersection LOS: F
Intersection Capacity Utilization 104.2% 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

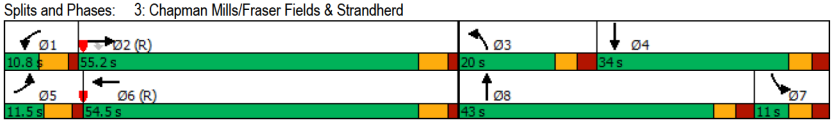
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	15	1525	531	55	876	438	0	18	0
Future Volume (vph)	15	1525	531	55	876	438	0	18	0
Lane Group Flow (vph)	15	1525	531	55	930	438	49	18	8
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8	11.0	34.0	11.0	34.0
Total Split (s)	11.5	55.2	55.2	10.8	54.5	20.0	43.0	11.0	34.0
Total Split (%)	9.6%	46.0%	46.0%	9.0%	45.4%	16.7%	35.8%	9.2%	28.3%
Maximum Green (s)	5.7	49.4	49.4	5.0	48.7	14.0	37.0	5.0	28.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6	2.7	2.7	2.7	2.7
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)	5.8	5.8	5.8	5.8	5.8	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Min	None	Min
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	6.5	60.1	60.1	9.1	69.7	14.0	25.4	9.0	13.2
Actuated g/C Ratio	0.05	0.50	0.50	0.08	0.58	0.12	0.21	0.08	0.11
v/c Ratio	0.17	0.94	0.73	0.45	0.50	1.20	0.16	0.15	0.05
Control Delay	74.4	14.3	10.6	65.0	18.4	157.4	42.6	52.3	44.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.4	14.3	10.6	65.0	18.4	157.4	42.6	52.3	44.2
LOS	E	B	B	E	B	F	D	D	D
Approach Delay		13.8			21.0		145.9		49.8
Approach LOS		B			C		F		D
Queue Length 50th (m)	3.7	117.6	26.4	12.3	51.4	~63.4	8.9	4.1	1.8
Queue Length 95th (m)	m3.4	m#178.8	m87.7	#30.3	117.3	#94.8	19.9	10.8	5.6
Internal Link Dist (m)		787.0			383.8		349.9		82.1
Turn Bay Length (m)	40.0		145.0	40.0		105.0		40.0	
Base Capacity (vph)	88	1622	725	123	1862	366	447	121	338
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.94	0.73	0.45	0.50	1.20	0.11	0.15	0.02

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.20
Intersection Signal Delay: 34.1 Intersection LOS: C
Intersection Capacity Utilization 77.9% ICU Level of Service D
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: 3: Chapman Mills/Fraser Fields & Strandherd



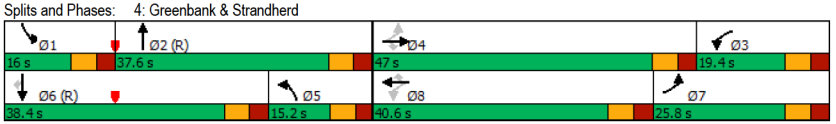
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	353	1156	245	243	809	184	205	483	251	611	217
Future Volume (vph)	353	1156	245	243	809	184	205	483	251	611	217
Lane Group Flow (vph)	353	1156	245	243	809	184	205	630	251	611	217
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases	4		4	8		8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5	11.3	35.5	35.5
Total Split (s)	25.8	47.0	47.0	19.4	40.6	40.6	15.2	37.6	16.0	38.4	38.4
Total Split (%)	21.5%	39.2%	39.2%	16.2%	33.8%	33.8%	12.7%	31.3%	13.3%	32.0%	32.0%
Maximum Green (s)	19.2	40.5	40.5	12.8	34.1	34.1	8.9	31.1	9.7	31.9	31.9
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8	2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5	6.3	6.5	6.5
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0		22.0		22.0	22.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10	10
Act Effct Green (s)	59.7	40.5	40.5	45.7	33.0	33.0	8.9	31.1	9.7	31.9	31.9
Actuated g/C Ratio	0.50	0.34	0.34	0.38	0.28	0.28	0.07	0.26	0.08	0.27	0.27
v/c Ratio	0.96	1.06	0.38	1.06	0.91	0.34	0.88	0.76	0.99	0.71	0.40
Control Delay	80.6	82.6	5.3	119.3	56.9	4.7	89.9	45.6	108.8	45.2	6.9
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	80.6	82.6	5.3	119.3	56.9	4.7	89.9	45.6	108.8	45.2	6.9
LOS	F	F	A	F	E	A	F	D	F	D	A
Approach Delay		71.4			61.4			56.5		52.3	
Approach LOS		E			E			E		D	
Queue Length 50th (m)	58.5	~155.0	0.0	~47.1	94.4	0.0	24.7	67.8	30.5	67.7	0.0
Queue Length 95th (m)	#118.3	#195.7	16.8	#97.3	#126.8	11.7	#45.9	88.8	#56.8	88.0	18.0
Internal Link Dist (m)		150.2			267.5			571.3		216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0		85.0		145.0
Base Capacity (vph)	367	1093	645	229	920	560	233	831	254	861	539
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	0.96	1.06	0.38	1.06	0.88	0.33	0.88	0.76	0.99	0.71	0.40

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 62.1 Intersection LOS: E
Intersection Capacity Utilization 101.2% 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.

Splits and Phases: 4: Greenbank & Strandherd



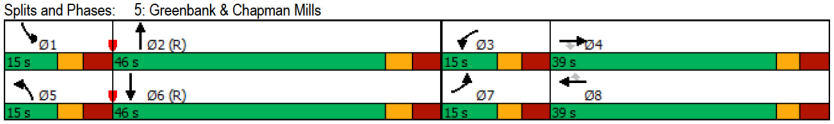
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	38	323	74	92	320	40	80	627	50	841
Future Volume (vph)	38	323	74	92	320	40	80	627	50	841
Lane Group Flow (vph)	38	323	74	92	320	40	80	671	50	885
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases			4			8				
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9	12.7	38.9
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0	15.0	46.0
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%	13.0%	40.0%
Maximum Green (s)	7.7	31.5	31.5	7.7	31.5	31.5	7.3	38.1	7.3	38.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2	4.0	4.2
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9	7.7	7.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		24.0		24.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10
Act Effct Green (s)	7.1	26.1	26.1	7.7	32.1	32.1	9.1	45.9	7.6	41.7
Actuated g/C Ratio	0.06	0.23	0.23	0.07	0.28	0.28	0.08	0.40	0.07	0.36
v/c Ratio	0.38	0.83	0.22	0.85	0.67	0.10	0.62	0.52	0.47	0.76
Control Delay	62.9	60.7	36.3	107.3	45.5	32.6	73.0	30.2	66.4	38.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.9	60.7	36.3	107.3	45.5	32.6	73.0	30.2	66.4	38.4
LOS	E	E	D	F	D	C	E	C	E	D
Approach Delay		56.7			56.9			34.8		39.9
Approach LOS		E			E			C		D
Queue Length 50th (m)	8.2	68.1	13.3	20.6	67.4	7.0	17.0	63.1	10.8	94.9
Queue Length 95th (m)	19.2	95.5	24.6	#49.8	94.9	15.1	#43.8	85.4	#23.8	119.8
Internal Link Dist (m)		626.4			183.5			478.9		571.3
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0		60.0	
Base Capacity (vph)	108	467	397	108	493	419	128	1280	111	1166
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	0.35	0.69	0.19	0.85	0.65	0.10	0.63	0.52	0.45	0.76

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 24 (21%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 44.2 Intersection LOS: D
Intersection Capacity Utilization 79.4% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	399	46	65	324	23	30	0	9	48	0	12
Future Vol, veh/h	52	399	46	65	324	23	30	0	9	48	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	52	399	46	65	324	23	30	0	9	48	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	347	0	0	445	0	0	998	1003	422	997	1015	336
Stage 1	-	-	-	-	-	-	526	526	-	466	466	-
Stage 2	-	-	-	-	-	-	472	477	-	531	549	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1212	-	-	1115	-	-	223	242	632	223	238	706
Stage 1	-	-	-	-	-	-	535	529	-	577	562	-
Stage 2	-	-	-	-	-	-	573	556	-	532	516	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1212	-	-	1115	-	-	203	218	632	203	214	706
Mov Cap-2 Maneuver	-	-	-	-	-	-	203	218	-	203	214	-
Stage 1	-	-	-	-	-	-	512	506	-	552	529	-
Stage 2	-	-	-	-	-	-	530	524	-	502	494	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	1.3	22.8	25.3
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	241	1212	-	-	1115	-	-	237
HCM Lane V/C Ratio	0.162	0.043	-	-	0.058	-	-	0.253
HCM Control Delay (s)	22.8	8.1	-	-	8.4	-	-	25.3
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.2	-	-	1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	132	353	56	169	529	71
Future Volume (vph)	132	353	56	169	529	71
Lane Group Flow (vph)	132	353	56	169	529	71
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	23.9	23.9	16.3	40.2
Total Split (%)	38.2%	38.2%	36.8%	36.8%	25.1%	61.8%
Maximum Green (s)	18.8	18.8	18.1	18.1	11.9	34.4
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	None	Min
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	2	2	2	2		2
Act Effct Green (s)	11.5	11.5	11.4	11.4	12.0	27.9
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.23	0.54
v/c Ratio	0.36	0.59	0.15	0.37	0.72	0.08
Control Delay	20.4	7.1	17.5	6.3	27.3	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	7.1	17.5	6.3	27.3	6.4
LOS	C	A	D	A	C	A
Approach Delay	10.7		9.1			24.9
Approach LOS	B		A			C
Queue Length 50th (m)	9.6	0.0	3.9	0.0	20.6	2.5
Queue Length 95th (m)	24.3	16.5	12.1	11.6	#56.8	8.6
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	601	760	609	627	738	1158
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	0.22	0.46	0.09	0.27	0.72	0.06

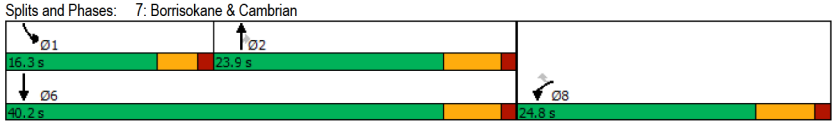
Intersection Summary
Cycle Length: 65
Actuated Cycle Length: 51.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 16.9	Intersection LOS: B
Intersection Capacity Utilization 41.2%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 7: Borrisokane & Cambrian



Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	354	30	0	452	46
Future Vol, veh/h	17	354	30	0	452	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	380	0	-	150	380	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	354	30	0	452	46

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	980	30	0	0	30	0
Stage 1	30	-	-	-	-	-
Stage 2	950	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	277	1044	-	-	1583	-
Stage 1	993	-	-	-	-	-
Stage 2	376	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	198	1044	-	-	1583	-
Mov Cap-2 Maneuver	198	-	-	-	-	-
Stage 1	993	-	-	-	-	-
Stage 2	268	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	7.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	198	1044	1583	-
HCM Lane V/C Ratio	-	-	0.086	0.339	0.286	-
HCM Control Delay (s)	-	-	24.9	10.2	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	1.5	1.2	-

Appendix G

Synchro Intersection Worksheets – 2034 Mitigated Background Conditions

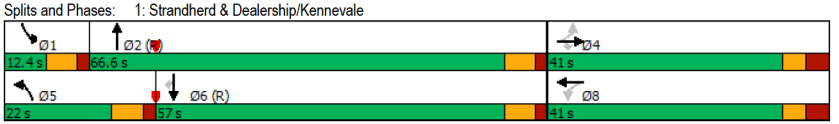
CGH TRANSPORTATION

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	28	69	100	168	116	333	2514	86	54	1128	471
Future Volume (vph)	109	28	69	100	168	116	333	2514	86	54	1128	471
Satd. Flow (prot)	1621	1706	1450	1621	1602	0	3144	3222	0	1621	3241	1450
Flt Permitted	0.348			0.739			0.950			0.950		
Satd. Flow (perm)	594	1706	1431	1259	1602	0	3144	3222	0	1620	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	109	28	69	100	284	0	333	2600	0	54	1128	471
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		22.0	66.6		12.4	57.0	57.0
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%		18.3%	55.5%		10.3%	47.5%	47.5%
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)	26.3	26.3	26.3	26.3	26.3		16.7	68.4		8.1	57.3	57.3
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.14	0.57		0.07	0.48	0.48
v/c Ratio	0.84	0.08	0.22	0.36	0.81		0.76	1.42		0.50	0.73	0.68
Control Delay	89.6	34.7	38.1	41.9	61.7		60.4	207.1		70.0	30.0	32.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	89.6	34.7	38.1	41.9	61.7		60.4	207.1		70.0	30.0	32.4
LOS	F	C	D	D	E		E	F		E	C	C
Approach Delay		64.9			56.6			190.4			32.0	
Approach LOS		E			E			F			C	
Queue Length 50th (m)	24.3	5.2	13.2	19.8	62.9		35.6	~453.2		12.1	111.1	85.1
Queue Length 95th (m)	#47.7	11.8	23.8	33.0	86.5		m27.1	m#285.6		#32.6	148.6	135.2
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)	168	484	406	357	455		448	1837		109	1546	692
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	0.65	0.06	0.17	0.28	0.62		0.74	1.42		0.50	0.73	0.68

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 100 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.42
Intersection Signal Delay: 124.9 Intersection LOS: F
Intersection Capacity Utilization 127.7% 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)	137	813	239	59	1892	52	533	49	92	69	23	292
Future Volume (vph)	137	813	239	59	1892	52	533	49	92	69	23	292
Satd. Flow (prot)	1621	3241	1450	1621	3228	0	3144	1539	0	1621	1469	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3228	0	3144	1539	0	1621	1469	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	137	813	239	59	1944	0	533	141	0	69	315	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4		11.0	34.0		11.0	34.0	
Total Split (s)	12.0	61.1	61.1	11.9	61.0		13.0	34.0		13.0	34.0	
Total Split (%)	10.0%	50.9%	50.9%	9.9%	50.8%		10.8%	28.3%		10.8%	28.3%	
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		2.7	2.7		2.7	2.7	
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		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	
Act Effct Green (s)	6.3	57.8	57.8	5.8	54.6		7.0	27.3		7.0	27.3	
Actuated g/C Ratio	0.05	0.48	0.48	0.05	0.46		0.06	0.23		0.06	0.23	
v/c Ratio	1.63	0.52	0.34	0.76	1.32		2.91	0.40		0.73	0.94	
Control Delay	361.6	8.5	8.1	83.8	171.9		895.6	43.1		96.0	82.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	361.6	8.5	8.1	83.8	171.9		895.6	43.1		96.0	82.9	
LOS	F	A	A	F	F		F	D		F	F	
Approach Delay		49.1			169.3			717.2			85.2	
Approach LOS		D			F			F			F	
Queue Length 50th (m)	~49.6	14.0	7.9	13.2	~302.5		~110.0	27.8		16.1	71.9	
Queue Length 95th (m)	m#77.1	16.5	m10.8	m15.3	m#313.7		#143.4	46.7		#40.0	#124.1	
Internal Link Dist (m)		1040.6			787.0			275.6			103.1	
Turn Bay Length (m)	105.0		110.0	55.0			100.0			38.0		
Base Capacity (vph)	84	1560	697	78	1468		183	359		94	342	
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	1.63	0.52	0.34	0.76	1.32		2.91	0.39		0.73	0.92	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.91
Intersection Signal Delay: 215.0 Intersection LOS: F
Intersection Capacity Utilization 122.0% 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: 2: Borrisokane/Tartan & Strandherd

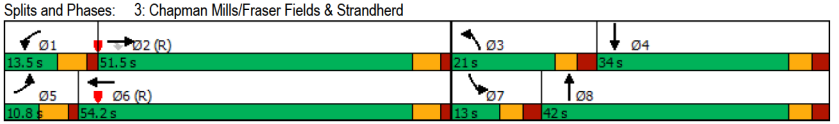
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	665	303	43	1518	16	477	0	72	35	0	12
Future Volume (vph)	4	665	303	43	1518	16	477	0	72	35	0	12
Satd. Flow (prot)	1621	3241	1450	1621	3234	0	3144	1450	0	1621	1450	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3234	0	3144	1450	0	1621	1450	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	4	665	303	43	1534	0	477	72	0	35	12	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8		11.0	34.0		11.0	34.0	
Total Split (s)	10.8	51.5	51.5	13.5	54.2		21.0	42.0		13.0	34.0	
Total Split (%)	9.0%	42.9%	42.9%	11.3%	45.2%		17.5%	35.0%		10.8%	28.3%	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6		2.7	2.7		2.7	2.7	
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)	5.8	5.8	5.8	5.8	5.8		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	
Act Effct Green (s)	5.9	62.3	62.3	8.2	71.5		15.0	26.4		6.7	13.2	
Actuated g/C Ratio	0.05	0.52	0.52	0.07	0.60		0.12	0.22		0.06	0.11	
v/c Ratio	0.05	0.40	0.40	0.39	0.80		1.21	0.23		0.39	0.08	
Control Delay	69.8	13.5	15.2	63.3	24.3		161.9	41.2		67.5	45.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	69.8	13.5	15.2	63.3	24.3		161.9	41.2		67.5	45.2	
LOS	E	B	B	E	C		F	D		E	D	
Approach Delay		14.3			25.4			146.0			61.8	
Approach LOS		B			C			F			E	
Queue Length 50th (m)	0.8	50.1	44.1	9.7	117.8		~69.8	15.2		8.0	2.6	
Queue Length 95th (m)	m1.5	90.4	95.1	21.2	#265.1		#102.3	24.4		18.5	7.4	
Internal Link Dist (m)		787.0			345.9			349.9			82.1	
Turn Bay Length (m)	40.0		145.0	40.0			105.0			40.0		
Base Capacity (vph)	79	1682	752	118	1926		393	435		94	338	
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	0.05	0.40	0.40	0.36	0.80		1.21	0.17		0.37	0.04	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 96 (80%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.21
Intersection Signal Delay: 43.5 Intersection LOS: D
Intersection Capacity Utilization 75.7% ICU Level of Service D
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: 3: Chapman Mills/Fraser Fields & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	183	645	126	101	1021	163	203	494	121	175	292	289
Future Volume (vph)	183	645	126	101	1021	163	203	494	121	175	292	289
Satd. Flow (prot)	1621	3241	1450	1621	3241	1450	3144	3135	0	3144	3241	1450
Flt Permitted	0.089			0.338			0.950			0.950		
Satd. Flow (perm)	152	3241	1431	576	3241	1450	3140	3135	0	3138	3241	1431
Satd. Flow (RTOR)			149			153		24				159
Lane Group Flow (vph)	183	645	126	101	1021	163	203	615	0	175	292	289
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8						6
Detector Phase	7	4	4	3	8	8	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5		11.3	35.5	35.5
Total Split (s)	18.0	52.0	52.0	14.0	48.0	48.0	16.0	38.5		15.5	38.0	38.0
Total Split (%)	15.0%	43.3%	43.3%	11.7%	40.0%	40.0%	13.3%	32.1%		12.9%	31.7%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8		2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5		6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	56.0	44.7	44.7	47.8	40.6	40.6	9.7	33.0		9.1	32.4	32.4
Actuated g/C Ratio	0.47	0.37	0.37	0.40	0.34	0.34	0.08	0.28		0.08	0.27	0.27
v/c Ratio	0.87	0.53	0.20	0.35	0.93	0.28	0.80	0.70		0.73	0.33	0.58
Control Delay	64.5	31.3	3.2	20.5	53.6	6.4	77.0	42.8		72.6	36.8	21.9
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	64.5	31.3	3.2	20.5	53.6	6.4	77.0	42.8		72.6	36.8	21.9
LOS	E	C	A	C	D	A	E	D		E	D	C
Approach Delay		33.9			45.0			51.3			39.4	
Approach LOS		C			D			D			D	
Queue Length 50th (m)	27.9	60.5	0.0	12.3	118.6	1.5	24.3	65.9		20.8	29.0	25.5
Queue Length 95th (m)	#68.0	78.0	8.2	22.0	#157.1	15.7	#42.6	86.2		#36.0	41.4	54.1
Internal Link Dist (m)		152.4			267.5			571.3			216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0			85.0		145.0
Base Capacity (vph)	210	1228	635	294	1120	601	254	878		241	874	501
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	0.87	0.53	0.20	0.34	0.91	0.27	0.80	0.70		0.73	0.33	0.58

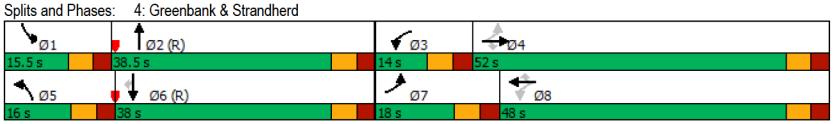
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 42.5	Intersection LOS: D
Intersection Capacity Utilization 92.4%	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: 4: Greenbank & Strandherd



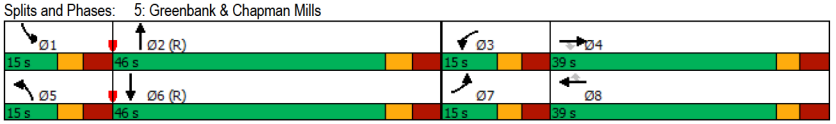
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	293	55	33	242	40	59	659	63	30	417	27
Future Volume (vph)	44	293	55	33	242	40	59	659	63	30	417	27
Satd. Flow (prot)	1621	1706	1450	1621	1706	1450	1621	3199	0	1621	3212	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	1706	1450	1621	1706	1450	1621	3199	0	1621	3212	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	44	293	55	33	242	40	59	722	0	30	444	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9		12.7	38.9	
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0		15.0	46.0	
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%		13.0%	40.0%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7		3.7	3.7	
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2		4.0	4.2	
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9		7.7	7.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	7.2	26.9	26.9	7.0	24.0	24.0	8.3	54.4		7.1	50.4	
Actuated g/C Ratio	0.06	0.23	0.23	0.06	0.21	0.21	0.07	0.47		0.06	0.44	
v/c Ratio	0.44	0.73	0.16	0.33	0.68	0.13	0.50	0.48		0.30	0.32	
Control Delay	65.5	52.0	34.8	60.7	51.1	35.3	66.5	26.1		59.4	25.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	65.5	52.0	34.8	60.7	51.1	35.3	66.5	26.1		59.4	25.5	
LOS	E	D	C	E	D	D	E	C		E	C	
Approach Delay		51.1			50.1			29.1			27.6	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	9.5	61.9	10.0	7.1	49.3	7.2	12.7	66.0		6.5	37.7	
Queue Length 95th (m)	21.3	86.1	19.4	17.1	70.4	15.1	#30.3	93.2		16.0	54.3	
Internal Link Dist (m)		626.4			183.5			478.9			571.3	
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0			60.0		
Base Capacity (vph)	108	471	401	108	467	397	121	1513		106	1407	
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	0.41	0.62	0.14	0.31	0.52	0.10	0.49	0.48		0.28	0.32	

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 76 (66%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73
Intersection Signal Delay: 36.5 — Intersection LOS: D
Intersection Capacity Utilization 71.3% — ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	268	22	30	313	17	47	0	13	57	0	14
Future Vol, veh/h	29	268	22	30	313	17	47	0	13	57	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	268	22	30	313	17	47	0	13	57	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	330	0	0	290	0	0	726	727	279	726	730	322
Stage 1	-	-	-	-	-	-	337	337	-	382	382	-
Stage 2	-	-	-	-	-	-	389	390	-	344	348	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1229	-	-	1272	-	-	340	351	760	340	349	719
Stage 1	-	-	-	-	-	-	677	641	-	640	613	-
Stage 2	-	-	-	-	-	-	635	608	-	671	634	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1229	-	-	1272	-	-	322	335	760	322	333	719
Mov Cap-2 Maneuver	-	-	-	-	-	-	322	335	-	322	333	-
Stage 1	-	-	-	-	-	-	661	626	-	625	598	-
Stage 2	-	-	-	-	-	-	608	593	-	644	619	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.7	16.7	17.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	368	1229	-	-	1272	-	-	361
HCM Lane V/C Ratio	0.163	0.024	-	-	0.024	-	-	0.197
HCM Control Delay (s)	16.7	8	-	-	7.9	-	-	17.4
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.1	-	-	0.7

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	190	544	86	99	245	69
Future Volume (vph)	190	544	86	99	245	69
Satd. Flow (prot)	1621	1450	1706	1450	3144	1706
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1621	1450	1706	1450	3144	1706
Satd. Flow (RTOR)		544		99		
Lane Group Flow (vph)	190	544	86	99	245	69
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	23.8	23.8	11.4	35.2
Total Split (%)	41.3%	41.3%	39.7%	39.7%	19.0%	58.7%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	None	Min
Act Effct Green (s)	12.2	12.2	11.4	11.4	7.1	23.0
Actuated g/C Ratio	0.26	0.26	0.24	0.24	0.15	0.49
v/c Ratio	0.45	0.70	0.21	0.23	0.52	0.08
Control Delay	18.9	7.4	16.3	5.8	25.2	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	7.4	16.3	5.8	25.2	7.5
LOS	B	A	B	A	C	A
Approach Delay	10.4		10.7			21.3
Approach LOS	B		B			C
Queue Length 50th (m)	12.2	0.0	5.2	0.0	8.6	2.4
Queue Length 95th (m)	30.3	18.5	15.5	8.4	#26.0	8.9
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	657	911	662	623	474	1081
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	0.29	0.60	0.13	0.16	0.52	0.06

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 47.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.70

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	429	151	293	128	39	100	100	1646	132	93	2527	167
Future Volume (vph)	429	151	293	128	39	100	100	1646	132	93	2527	167
Satd. Flow (prot)	1621	1706	1450	1621	1522	0	3144	3199	0	1621	3241	1450
Flt Permitted	0.666			0.647			0.950			0.950		
Satd. Flow (perm)	1136	1706	1431	1103	1522	0	3144	3199	0	1620	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	429	151	293	128	139	0	100	1778	0	93	2527	167
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)	36.1	36.1	36.1	36.1	36.1		5.0	58.6		5.6	59.2	59.2
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.04	0.49		0.05	0.49	0.49
v/c Ratio	1.26	0.29	0.68	0.39	0.30		0.76	1.14		1.24	1.58	0.23
Control Delay	174.1	34.1	46.3	37.4	34.6		75.6	83.4		228.4	290.7	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	174.1	34.1	46.3	37.4	34.6		75.6	83.4		228.4	290.7	18.5
LOS	F	C	D	D	C		E	F		F	F	B
Approach Delay		107.0			35.9			83.0			272.3	
Approach LOS		F			D			F			F	
Queue Length 50th (m)	~124.8	26.9	59.9	23.5	24.8		11.5	~257.3		~26.7	~439.6	21.6
Queue Length 95th (m)	#185.3	44.5	90.8	41.3	42.0		m12.5	m#243.5		#60.0	#479.1	35.3
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	341	513	430	331	457		131	1562		75	1598	715
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	1.26	0.29	0.68	0.39	0.30		0.76	1.14		1.24	1.58	0.23

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

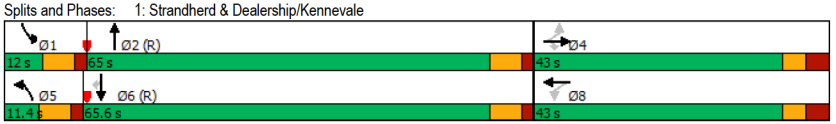
Maximum v/c Ratio: 1.58
Intersection Signal Delay: 175.3 — Intersection LOS: F
Intersection Capacity Utilization 132.2% — ICU Level of Service H
Analysis Period (min) 15

~ 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.

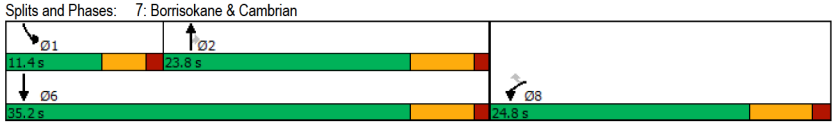
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Strandherd & Dealership/Kennevale



Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 53.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Borrisokane & Cambrian



Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	358	47	0	261	22
Future Vol, veh/h	30	358	47	0	261	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	380	0	-	150	380	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	358	47	0	261	22

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	591	47	0	0	47	0
Stage 1	47	-	-	-	-	-
Stage 2	544	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	470	1022	-	-	1560	-
Stage 1	975	-	-	-	-	-
Stage 2	582	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	392	1022	-	-	1560	-
Mov Cap-2 Maneuver	392	-	-	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	485	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	7.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	392	1022	1560	-
HCM Lane V/C Ratio	-	-	0.077	0.35	0.167	-
HCM Control Delay (s)	-	-	14.9	10.4	7.8	-
HCM Lane LOS	-	-	B	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	1.6	0.6	-

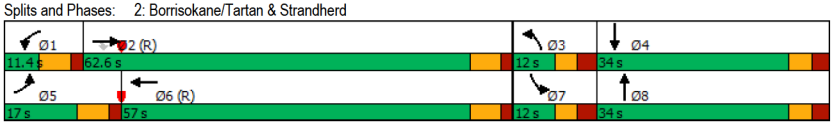
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	450	1852	551	99	1206	65	331	34	98	52	49	143
Future Volume (vph)	450	1852	551	99	1206	65	331	34	98	52	49	143
Satd. Flow (prot)	1621	3241	1450	1621	3215	0	3144	1517	0	1621	1515	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3215	0	3144	1517	0	1621	1515	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	450	1852	551	99	1271	0	331	132	0	52	192	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4		11.0	34.0		11.0	34.0	
Total Split (s)	17.0	62.6	62.6	11.4	57.0		12.0	34.0		12.0	34.0	
Total Split (%)	14.2%	52.2%	52.2%	9.5%	47.5%		10.0%	28.3%		10.0%	28.3%	
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		2.7	2.7		2.7	2.7	
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		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	
Act Effct Green (s)	18.2	56.2	56.2	12.6	50.6		6.0	22.8		6.0	20.4	
Actuated g/C Ratio	0.15	0.47	0.47	0.10	0.42		0.05	0.19		0.05	0.17	
v/c Ratio	1.84	1.22	0.81	0.58	0.94		2.11	0.46		0.64	0.75	
Control Delay	412.7	116.9	11.3	61.9	39.8		547.4	48.5		90.2	64.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	412.7	116.9	11.3	61.9	39.8		547.4	48.5		90.2	64.5	
LOS	F	F	B	E	D		F	D		F	E	
Approach Delay		143.1			41.4			405.2			70.0	
Approach LOS		F			D			F			E	
Queue Length 50th (m)	~160.0	~274.6	41.2	23.2	167.3		~62.9	28.2		12.1	42.9	
Queue Length 95th (m)	m#124.1	m56.4	m19.1	m#51.5	m173.4		#91.5	44.2		#31.2	63.0	
Internal Link Dist (m)		1040.6			787.0			275.6			103.1	
Turn Bay Length (m)	105.0		110.0	55.0			100.0			38.0		
Base Capacity (vph)	245	1517	679	170	1355		157	353		81	353	
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	1.84	1.22	0.81	0.58	0.94		2.11	0.37		0.64	0.54	

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: 2.11
Intersection Signal Delay: 135.9 Intersection LOS: F
Intersection Capacity Utilization 106.3% 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)	15	1595	531	55	939	54	438	0	49	18	0	8
Future Volume (vph)	15	1595	531	55	939	54	438	0	49	18	0	8
Satd. Flow (prot)	1621	3241	1450	1621	3212	0	3144	1450	0	1621	1450	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3212	0	3144	1450	0	1621	1450	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	15	1595	531	55	993	0	438	49	0	18	8	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8		11.0	34.0		11.0	34.0	
Total Split (s)	11.4	55.2	55.2	10.8	54.6		20.0	43.0		11.0	34.0	
Total Split (%)	9.5%	46.0%	46.0%	9.0%	45.5%		16.7%	35.8%		9.2%	28.3%	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6		2.7	2.7		2.7	2.7	
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)	5.8	5.8	5.8	5.8	5.8		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	
Act Effct Green (s)	6.5	60.1	60.1	9.1	69.7		14.0	28.8		5.0	13.2	
Actuated g/C Ratio	0.05	0.50	0.50	0.08	0.58		0.12	0.24		0.04	0.11	
v/c Ratio	0.17	0.98	0.73	0.45	0.53		1.20	0.14		0.27	0.05	
Control Delay	74.5	17.7	10.4	65.0	19.0		157.4	37.4		65.9	44.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	74.5	17.7	10.4	65.0	19.0		157.4	37.4		65.9	44.2	
LOS	E	B	B	E	B		F	D		E	D	
Approach Delay		16.3			21.4			145.3			59.2	
Approach LOS		B			C			F			E	
Queue Length 50th (m)	3.8	203.8	25.9	12.3	56.5		~63.4	8.9		4.1	1.8	
Queue Length 95th (m)	m3.4	m#181.7	m79.4	#30.3	127.9		#94.8	17.9		11.7	5.6	
Internal Link Dist (m)		787.0			371.5			349.9			82.1	
Turn Bay Length (m)	40.0		145.0	40.0			105.0			40.0		
Base Capacity (vph)	88	1622	725	123	1865		366	447		67	338	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.98	0.73	0.45	0.53		1.20	0.11		0.27	0.02	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

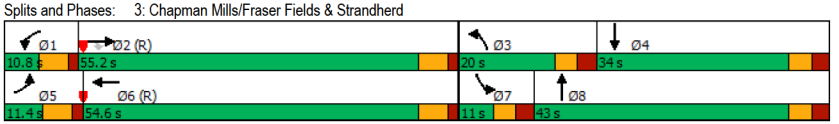
Maximum v/c Ratio: 1.20
Intersection Signal Delay: 35.0 — Intersection LOS: D
Intersection Capacity Utilization 77.9% — ICU Level of Service D
Analysis Period (min) 15

~ 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: 3: Chapman Mills/Fraser Fields & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	353	1239	245	243	882	184	205	507	147	251	641	217
Future Volume (vph)	353	1239	245	243	882	184	205	507	147	251	641	217
Satd. Flow (prot)	1621	3241	1450	1621	3241	1450	3144	3121	0	3144	3241	1450
Flt Permitted	0.099			0.118			0.950			0.950		
Satd. Flow (perm)	169	3241	1431	201	3241	1450	3141	3121	0	3139	3241	1431
Satd. Flow (RTOR)			216			209		30				217
Lane Group Flow (vph)	353	1239	245	243	882	184	205	654	0	251	641	217
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8						6
Detector Phase	7	4	4	3	8	8	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5		11.3	35.5	35.5
Total Split (s)	26.6	48.0	48.0	19.0	40.4	40.4	14.0	38.0		15.0	39.0	39.0
Total Split (%)	22.2%	40.0%	40.0%	15.8%	33.7%	33.7%	11.7%	31.7%		12.5%	32.5%	32.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8		2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5		6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	60.4	41.5	41.5	46.2	33.9	33.9	7.7	31.5		8.7	32.5	32.5
Actuated g/C Ratio	0.50	0.35	0.35	0.38	0.28	0.28	0.06	0.26		0.07	0.27	0.27
v/c Ratio	1.08	1.11	0.39	1.08	0.96	0.33	1.02	0.78		1.11	0.73	0.40
Control Delay	106.5	98.3	7.3	117.2	65.0	4.5	124.0	46.5		141.7	45.5	6.8
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	106.5	98.3	7.3	117.2	65.0	4.5	124.0	46.5		141.7	45.5	6.8
LOS	F	F	A	F	E	A	F	D		F	D	A
Approach Delay		87.7			66.2			65.0			59.7	
Approach LOS		F			E			E			E	
Queue Length 50th (m)	~77.6	~172.6	4.5	~49.3	106.4	0.0	~25.4	71.1		~34.1	71.3	0.0
Queue Length 95th (m)	#135.2	#213.6	22.6	#99.5	#146.8	11.5	#49.8	92.7		#60.1	92.1	17.9
Internal Link Dist (m)		133.4			267.5			571.3			216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0			85.0		145.0
Base Capacity (vph)	327	1120	636	224	915	559	201	841		227	877	545
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	1.08	1.11	0.39	1.08	0.96	0.33	1.02	0.78		1.11	0.73	0.40

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

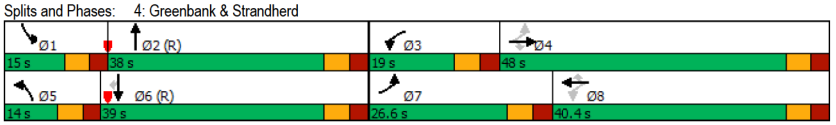
Maximum v/c Ratio: 1.11

Intersection Signal Delay: 72.3	Intersection LOS: E
Intersection Capacity Utilization 103.7%	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.

Splits and Phases: 4: Greenbank & Strandherd



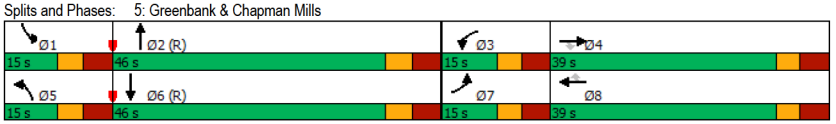
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	323	74	92	320	40	80	667	44	50	890	44
Future Volume (vph)	38	323	74	92	320	40	80	667	44	50	890	44
Satd. Flow (prot)	1621	1706	1450	1621	1706	1450	1621	3212	0	1621	3218	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	1706	1450	1621	1706	1450	1621	3212	0	1621	3218	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	38	323	74	92	320	40	80	711	0	50	934	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9		12.7	38.9	
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0		15.0	46.0	
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%		13.0%	40.0%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7		3.7	3.7	
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2		4.0	4.2	
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9		7.7	7.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	7.1	26.1	26.1	7.7	32.1	32.1	9.1	45.9		7.6	41.7	
Actuated g/C Ratio	0.06	0.23	0.23	0.07	0.28	0.28	0.08	0.40		0.07	0.36	
v/c Ratio	0.38	0.83	0.22	0.85	0.67	0.10	0.62	0.56		0.47	0.80	
Control Delay	62.9	60.7	36.3	107.3	45.5	32.6	73.0	30.9		66.4	40.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	62.9	60.7	36.3	107.3	45.5	32.6	73.0	30.9		66.4	40.3	
LOS	E	E	D	F	D	C	E	C		E	D	
Approach Delay		56.7			56.9			35.1			41.6	
Approach LOS		E			E			D			D	
Queue Length 50th (m)	8.2	68.1	13.3	20.6	67.4	7.0	17.0	68.0		10.8	102.3	
Queue Length 95th (m)	19.2	95.5	24.6	#49.8	94.9	15.1	#43.8	91.3		#23.8	#136.5	
Internal Link Dist (m)		626.4			183.5			478.9			571.3	
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0			60.0		
Base Capacity (vph)	108	467	397	108	493	419	128	1281		111	1166	
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	0.35	0.69	0.19	0.85	0.65	0.10	0.63	0.56		0.45	0.80	

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 24 (21%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85
Intersection Signal Delay: 44.7 — Intersection LOS: D
Intersection Capacity Utilization 80.8% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	399	46	65	324	23	30	0	9	48	0	12
Future Vol, veh/h	52	399	46	65	324	23	30	0	9	48	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	400	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	52	399	46	65	324	23	30	0	9	48	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	347	0	0	445	0	0	998	1003	422	997	1015	336
Stage 1	-	-	-	-	-	-	526	526	-	466	466	-
Stage 2	-	-	-	-	-	-	472	477	-	531	549	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1212	-	-	1115	-	-	223	242	632	223	238	706
Stage 1	-	-	-	-	-	-	535	529	-	577	562	-
Stage 2	-	-	-	-	-	-	573	556	-	532	516	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1212	-	-	1115	-	-	203	218	632	203	214	706
Mov Cap-2 Maneuver	-	-	-	-	-	-	203	218	-	203	214	-
Stage 1	-	-	-	-	-	-	512	506	-	552	529	-
Stage 2	-	-	-	-	-	-	530	524	-	502	494	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	1.3	22.8	25.3
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	241	1212	-	-	1115	-	-	237
HCM Lane V/C Ratio	0.162	0.043	-	-	0.058	-	-	0.253
HCM Control Delay (s)	22.8	8.1	-	-	8.4	-	-	25.3
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0.2	-	-	1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	134	374	59	169	561	77
Future Volume (vph)	134	374	59	169	561	77
Satd. Flow (prot)	1621	1450	1706	1450	3144	1706
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1621	1450	1706	1450	3144	1706
Satd. Flow (RTOR)		374		169		
Lane Group Flow (vph)	134	374	59	169	561	77
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	23.8	23.8	16.4	40.2
Total Split (%)	38.2%	38.2%	36.6%	36.6%	25.2%	61.8%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	None	Min
Act Effct Green (s)	11.5	11.5	11.4	11.4	12.2	28.0
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.24	0.54
v/c Ratio	0.37	0.61	0.16	0.37	0.76	0.08
Control Delay	20.6	7.2	17.7	6.3	28.8	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	7.2	17.7	6.3	28.8	6.4
LOS	C	A	B	A	C	A
Approach Delay	10.8		9.2			26.1
Approach LOS	B		A			C
Queue Length 50th (m)	9.8	0.0	4.1	0.0	22.1	2.7
Queue Length 95th (m)	24.6	16.9	12.7	11.7	#61.3	9.2
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	599	771	604	622	741	1154
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	0.22	0.49	0.10	0.27	0.76	0.07

Intersection Summary
Cycle Length: 65
Actuated Cycle Length: 51.5
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76

Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 42.6%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 7: Borrisokane & Cambrian

Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	349	30	0	445	46
Future Vol, veh/h	17	349	30	0	445	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	380	0	-	150	380	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	349	30	0	445	46

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	966	30	0	0	30	0
Stage 1	30	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	282	1044	-	-	1583	-
Stage 1	993	-	-	-	-	-
Stage 2	382	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	203	1044	-	-	1583	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	993	-	-	-	-	-
Stage 2	275	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	7.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	203	1044	1583	-
HCM Lane V/C Ratio	-	-	0.084	0.334	0.281	-
HCM Control Delay (s)	-	-	24.3	10.2	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	1.5	1.2	-

Appendix H

MMLOS Analysis

CGH TRANSPORTATION

Consultant	**CGH Transportation**	**Project**	**Conservancy East**
Scenario	**Existing/Future**	**Date**	**21-Jul-21**
Comments			

INTERSECTIONS		**Strandherd-Kennevale (Existing)**				**Strandherd-Kennevale (Future)**				**Strandherd-Borris**	
	Crossing Side	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**
Pedestrian	Lanes	4	5	3	5	7	7	3	5	4	3
	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	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive	Protected	Protected	Protected	Protected	Permissive	Permissive
	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	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	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	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	No Channel	No Channel
	Corner Radius	10-15m	10-15m	5-10m	15-25m	10-15m	10-15m	15-25m	15-25m	10-15m	10-15m
	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	Std transverse markings	Std transverse markings
	PETSI Score	**53**	**37**	**71**	**35**	**18**	**12**	**76**	**43**	**53**	**70**
	Ped. Exposure to Traffic LoS	**D**	**E**	**C**	**E**	**F**	**F**	**B**	**E**	**D**	**C**
	Cycle Length										
	Effective Walk Time										
	Average Pedestrian Delay										
	Pedestrian Delay LoS	-	-	-	-	-	-	-	-	-	-
	Level of Service	**D**	**E**	**C**	**E**	**F**	**F**	**B**	**E**	**D**	**C**
		E				**F**					**D**
	Approach From	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**
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	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	≤ 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	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	**B**	**D**	**D**	**D**	**Not Applicable**	**Not Applicable**	**D**	**D**	**D**	**D**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**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	One 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	> 50 to < 60 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	**E**	**E**	**B**	**E**	**A**	**A**	**B**	**E**	**E**	**D**
	Level of Service	**E**	**E**	**D**	**E**	**A**	**A**	**D**	**E**	**E**	**D**
		E				**E**					**F**
Transit	Average Signal Delay	> 40 sec	> 40 sec	≤ 30 sec		> 40 sec	> 40 sec	> 40 sec		≤ 30 sec	
	Level of Service	**F**	**F**	**D**	**-**	**F**	**F**	**F**	**-**	**D**	**-**
		F				**F**					**F**
Truck	Effective Corner Radius	10 - 15 m	< 10 m		> 15 m	10 - 15 m	10 - 15 m		> 15 m		10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	≥ 2		1	1	≥ 2		≥ 2		1
	Level of Service	**E**	**D**	**-**	**C**	**E**	**B**	**-**	**A**	**-**	**E**
		E				**E**					**E**
Auto	Volume to Capacity Ratio	> 1.00				> 1.00					> 1
	Level of Service	**F**				**F**					**F**

sokane (Existing)		Strandherd-Borrisokane (Future)				Strandherd-Chapman Mills (Future)				Strandherd-Greenbank (Existing & Future)			
EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
3	4	3	4	5	6	3	4	5	6	7	7	6	7
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	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	Protected	Protected	Protected	Protected	Protected	Protected	Protected	Protected	Protected/ Permissive	Protected/ 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	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	RTOR allowed	RTOR allowed
No	No	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	Smart Channel	No Channel	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane
5-10m	15-25m	5-10m	5-10m	10-15m	10-15m	5-10m	5-10m	10-15m	10-15m	>25m	>25m	15-25m	>25m
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	Std transverse markings	Std transverse markings
71	**51**	**79**	**62**	**45**	**28**	**79**	**62**	**45**	**28**	**7**	**1**	**30**	**13**
C	**D**	**B**	**C**	**D**	**F**	**B**	**C**	**D**	**F**	**F**	**F**	**E**	**F**
-	-	-	-	-	-	-	-	-	-	-	-	-	-
C	**D**	**B**	**C**	**D**	**F**	**B**	**C**	**D**	**F**	**F**	**F**	**E**	**F**
D		**F**				**F**				**F**			
EAST	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**
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	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												
≤ 25 km/h	>25 km/h												
D	**F**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
Mixed Traffic	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**
One lane crossed	≥ 2 lanes crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box	No lane crossed	2-stage, LT box	2-stage, LT box	2-stage, LT box	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed
≥ 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	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h
F	**F**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**	**F**	**F**	**F**	**F**
F	**F**	**A**	**A**	**A**	**A**	**B**	**A**	**A**	**A**	**F**	**F**	**F**	**F**
		A				**B**				**F**			
> 40 sec	≤ 40 sec	> 40 sec		> 40 sec	> 40 sec		> 40 sec	≤ 30 sec	> 40 sec	> 40 sec		> 40 sec	> 40 sec
F	**E**	**F**	**-**	**F**	**F**	**-**	**F**	**D**	**F**	**F**	**-**	**F**	**F**
		F				**F**				**F**			
	> 15 m		< 10 m		10 - 15 m					> 15 m	> 15 m	> 15 m	> 15 m
	1		≥ 2		1					≥ 2	≥ 2	≥ 2	≥ 2
-	**C**	**-**	**D**	**-**	**E**	**-**	**-**	**-**	**-**	**A**	**A**	**A**	**A**
		E				**-**				**A**			
.00		> 1.00				0.91 - 1.00				> 1.00			
		F				**E**				**F**			

Chapman Mills-Greenbank (Future)				Chapman Mills-Hamsa (Future)				Chapman Mills-Chapman Mills (Future)				Cambrian-Borri	
NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH
5	5	7	7	0 - 2	0 - 2	6	6	0 - 2	0 - 2	6	0 - 2	4	3
No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m	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	Median > 2.4 m
Protected	Protected	Protected	Protected	Protected	Protected	Protected	Protected	No left turn / Prohib.	Protected	Permissive	No left turn / Prohib.	No left turn / Prohib.	Permissive
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	No right turn	Permissive or yield control	No right turn	Permissive or yield control	No right turn
RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR allowed
No	No	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	No Right Turn	No Channel
5-10m	10-15m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	No Right Turn	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	Std transverse markings	Std transverse markings
46	**45**	**19**	**19**	**94**	**94**	**34**	**34**	**97**	**99**	**26**	**102**	**74**	**75**
D	**D**	**F**	**F**	**A**	**A**	**E**	**E**	**A**	**A**	**F**	**A**	**C**	**B**
-	-	-	-	-	-	-	-	-	-	-	-	-	-
D	**D**	**F**	**F**	**A**	**A**	**E**	**E**	**A**	**A**	**F**	**A**	**C**	**B**
F				**E**				**F**					**C**
NORTH	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**	**EAST**	**WEST**	**NORTH**	**SOUTH**
Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic ≤ 50 m ≤ 25 km/h	Mixed Traffic ≤ 50 m ≤ 25 km/h	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		Pocket Bike Lane ≤ 50 m Introduced right turn lane ≤ 25 km/h
Not Applicable	**Not Applicable**	**Not Applicable**	**Not Applicable**	**D**	**D**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**-**	**B**
Separated	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**-**	**Separated**
2-stage, LT box ≥ 60 km/h	2-stage, LT box ≥ 60 km/h	2-stage, LT box > 40 to ≤ 50 km/h	2-stage, LT box > 40 to ≤ 50 km/h	No lane crossed ≤ 40 km/h	No lane crossed ≤ 40 km/h	2-stage, LT box	2-stage, LT box	2-stage, LT box > 40 to ≤ 50 km/h	2-stage, LT box > 40 to ≤ 50 km/h	2-stage, LT box > 50 to < 60 km/h	2-stage, LT box > 50 to < 60 km/h	≥ 2 lanes crossed ≥ 60 km/h	
A	**A**	**A**	**A**	**B**	**B**	**-**	**-**	**A**	**A**	**A**	**A**	**F**	**-**
A	**A**	**A**	**A**	**D**	**D**	**-**	**-**	**A**	**A**	**A**	**A**	**-**	**-**
A				**D**				**A**					**E**
≤ 40 sec		> 40 sec	> 40 sec			≤ 40 sec	> 40 sec	≤ 30 sec	≤ 30 sec	≤ 30 sec	≤ 40 sec	≤ 30 sec	
E	**-**	**F**	**F**	**-**	**-**	**E**	**F**	**D**	**D**	**D**	**E**	**D**	**-**
F				**F**				**E**					**D**
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
-				**-**				**-**					**-**
0.81 - 0.90				0.0 - 0.60				0.71 - 0.80				0.0 -	
D				**A**				**C**					**A**

sokane (Future)		Access #2-Borrisokane (Future)				BRT-Borrisokane (Future)			
EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
3		4	4	3	3	4	3	0 - 2	3
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	Median > 2.4 m	No Median - 2.4 m
Protected		Permissive	Permissive	Protected	Protected	Permissive	Permissive	No left turn / Prohib.	Permissive
Permissive or yield control		Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn	Permissive or yield control	No right turn	Permissive or yield control
RTOR allowed		RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR allowed
No		No	No	No	No	No	No	No	No
No Channel		No Channel	No Channel	No Channel	No Channel	No Right Turn	No Channel	No Right Turn	No Channel
10-15m		10-15m	10-15m	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
78		**53**	**53**	**78**	**78**	**62**	**73**	**105**	**70**
B	**-**	**D**	**D**	**B**	**B**	**C**	**C**	**A**	**C**
-	-	-	-	-	-	-	-	-	-
B	**-**	**D**	**D**	**B**	**B**	**C**	**C**	**A**	**C**
C		**D**				**C**			
EAST	WEST	NORTH	SOUTH	EAST	WEST	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	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
Not Applicable	**-**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
Separated	**-**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**
1 lane 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
≥ 60 km/h		> 50 to < 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
E	**-**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
E	**-**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
E		**A**				**A**			
≤ 10 sec		≤ 10 sec	≤ 30 sec	≤ 30 sec	≤ 20 sec	≤ 10 sec	≤ 20 sec	≤ 30 sec	≤ 30 sec
B	**-**	**B**	**D**	**D**	**C**	**B**	**C**	**D**	**D**
D		**D**				**D**			
-	-	-	-	-	-	-	-	-	-
-		-				-			
0.60		0.0 - 0.60				0.0 - 0.60			
A		**A**				**A**			

Multi-Modal Level of Service - Segments Form

Consultant	**CGH Transportation**	**Project**	**Conservancy East**
Scenario	**Existing/Future**	**Date**	**21-Jul-21**
Comments			

SEGMENTS		**Street A**	Borrisokane (Existing)	Borrisokane (Future)	Section
			1	2	3
Pedestrian	Sidewalk Width Boulevard Width	**C**	no sidewalk n/a	≥ 2 m > 2 m	
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	
	Operating Speed On-Street Parking		> 60 km/h no	> 50 to 60 km/h no	
	Exposure to Traffic PLoS		**F**	**C**	-
	Effective Sidewalk Width			2.0 m	
	Pedestrian Volume			250 ped/hr	
	Crowding PLoS		-	**B**	-
	Level of Service		**-**	**C**	**-**
Bicycle	Type of Cycling Facility	**C**	Mixed Traffic	Curbside Bike Lane	
	Number of Travel Lanes		2-3 lanes total	≤ 1 each direction	
	Operating Speed		≥ 60 km/h	>50 to 70 km/h	
	# of Lanes & Operating Speed LoS		**F**	**C**	-
	Bike Lane (+ Parking Lane) Width			≥1.5 to <1.8 m	
	Bike Lane Width LoS		-	**B**	-
	Bike Lane Blockages			Rare	
	Blockage LoS		-	**A**	-
	Median Refuge Width (no median = < 1.8 m)			< 1.8 m refuge	
	No. of Lanes at Unsignalized Crossing			≤ 3 lanes	
	Sidestreet Operating Speed			>40 to 50 km/h	
	Unsignalized Crossing - Lowest LoS		-	**A**	-
	Level of Service		**-**	**C**	**-**
Transit	Facility Type	**D**	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8	
	Level of Service		**D**	**D**	**-**
Truck	Truck Lane Width	**B**	> 3.7 m	> 3.7 m	
	Travel Lanes per Direction		1	1	
	Level of Service		**B**	**B**	**-**
Auto	**Level of Service**	**Not Applicable**			

Appendix I

OTM Justification Signal Warrants

Access #2 @ Borrisokane
FT 2029

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	689	96%	68%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	116	68%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	573	80%	74%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	56	74%		

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

Access #2 @ Borrisokane
FT 2034

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	632	88%	68%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	116	68%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	516	72%	72%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	56	74%		

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 J

Synchro Intersection Worksheets – 2029 Mitigated Future Total Conditions

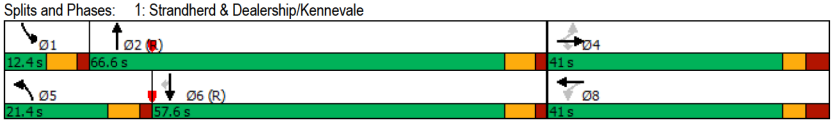
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	109	28	69	100	168	333	2654	54	1184	471
Future Volume (vph)	109	28	69	100	168	333	2654	54	1184	471
Lane Group Flow (vph)	109	28	69	100	284	333	2740	54	1184	471
Turn Type	Perm	NA	Perm	Perm	NA	Prot	NA	Prot	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	21.4	66.6	12.4	57.6	57.6
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%	17.8%	55.5%	10.3%	48.0%	48.0%
Maximum Green (s)	34.1	34.1	34.1	34.1	34.1	15.0	60.2	6.0	51.2	51.2
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?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	7.0	7.0		7.0		5.0	5.0
Flash Dont Walk (s)	26.0	26.0	26.0	14.0	14.0		14.0		26.0	26.0
Pedestrian Calls (#/hr)	10	10	10	10	10		10		10	10
Act Effct Green (s)	26.3	26.3	26.3	26.3	26.3	16.6	68.4	8.1	57.4	57.4
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22	0.14	0.57	0.07	0.48	0.48
v/c Ratio	0.84	0.08	0.22	0.36	0.81	0.76	1.49	0.50	0.76	0.68
Control Delay	89.6	34.7	38.1	41.9	61.7	61.0	240.9	70.0	31.2	32.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.6	34.7	38.1	41.9	61.7	61.0	240.9	70.0	31.2	32.2
LOS	F	C	D	D	E	E	F	E	C	C
Approach Delay		64.9			56.6		221.4		32.7	
Approach LOS		E			E		F		C	
Queue Length 50th (m)	24.3	5.2	13.2	19.8	62.9	35.7	~490.4	12.1	120.5	85.6
Queue Length 95th (m)	#47.7	11.8	23.8	33.0	86.5	m25.9	m#286.3	#32.6	158.4	133.9
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)	168	484	406	357	455	442	1837	109	1549	693
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	0.65	0.06	0.17	0.28	0.62	0.75	1.49	0.50	0.76	0.68

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: 1.49
Intersection Signal Delay: 143.6 Intersection LOS: F
Intersection Capacity Utilization 131.8% 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	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	137	785	323	79	1866	708	49	69	23
Future Volume (vph)	137	785	323	79	1866	708	49	69	23
Lane Group Flow (vph)	137	785	323	79	1918	708	184	69	315
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4	11.0	34.0	11.0	34.0
Total Split (s)	12.0	58.5	58.5	13.5	60.0	14.0	34.0	14.0	34.0
Total Split (%)	10.0%	48.8%	48.8%	11.3%	50.0%	11.7%	28.3%	11.7%	28.3%
Maximum Green (s)	5.6	52.1	52.1	7.1	53.6	8.0	28.0	8.0	28.0
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	2.7	2.7	2.7	2.7
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	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	6.3	52.6	52.6	7.3	53.6	8.0	30.1	7.7	27.3
Actuated g/C Ratio	0.05	0.44	0.44	0.06	0.45	0.07	0.25	0.06	0.23
v/c Ratio	1.63	0.55	0.51	0.81	1.33	3.39	0.48	0.66	0.94
Control Delay	360.1	10.3	10.6	82.0	175.7	1103.8	44.5	83.9	82.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	360.1	10.3	10.6	82.0	175.7	1103.8	44.5	83.9	82.9
LOS	F	B	B	F	F	F	D	F	F
Approach Delay		48.9			172.0		885.3		83.1
Approach LOS		D			F		F		F
Queue Length 50th (m)	~49.6	16.4	11.7	18.3	~304.4	~150.3	37.5	15.9	71.9
Queue Length 95th (m)	m#73.2	15.3	m13.3	m20.5	m#317.3	#186.4	60.2	#36.7	#124.1
Internal Link Dist (m)		1040.6			787.0		275.6		103.1
Turn Bay Length (m)	105.0		110.0	55.0		100.0		38.0	
Base Capacity (vph)	84	1419	635	98	1441	209	381	108	342
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	1.63	0.55	0.51	0.81	1.33	3.39	0.48	0.64	0.92

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 3.39
Intersection Signal Delay: 271.3 Intersection LOS: F
Intersection Capacity Utilization 126.5% 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: 2: Borrisokane/Tartan & Strandherd

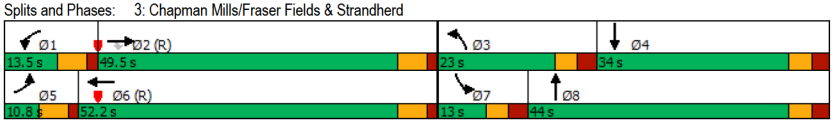
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	4	662	323	63	1464	520	0	35	0
Future Volume (vph)	4	662	323	63	1464	520	0	35	0
Lane Group Flow (vph)	4	662	323	63	1480	520	115	35	12
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8	11.0	34.0	11.0	34.0
Total Split (s)	10.8	49.5	49.5	13.5	52.2	23.0	44.0	13.0	34.0
Total Split (%)	9.0%	41.3%	41.3%	11.3%	43.5%	19.2%	36.7%	10.8%	28.3%
Maximum Green (s)	5.0	43.7	43.7	7.7	46.4	17.0	38.0	7.0	28.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6	2.7	2.7	2.7	2.7
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)	5.8	5.8	5.8	5.8	5.8	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Min	None	Min
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	5.9	59.3	59.3	9.3	69.5	17.0	28.4	6.7	13.2
Actuated g/C Ratio	0.05	0.49	0.49	0.08	0.58	0.14	0.24	0.06	0.11
v/c Ratio	0.05	0.41	0.45	0.50	0.79	1.17	0.34	0.39	0.08
Control Delay	71.2	14.5	17.2	66.6	25.2	142.8	41.7	67.5	45.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.2	14.5	17.2	66.6	25.2	142.8	41.7	67.5	45.2
LOS	E	B	B	E	C	F	D	E	D
Approach Delay		15.6			26.9		124.5		61.8
Approach LOS		B			C		F		E
Queue Length 50th (m)	1.0	51.5	50.6	14.2	116.2	~74.1	24.5	8.0	2.6
Queue Length 95th (m)	m1.3	88.8	101.9	28.7	#258.2	#107.2	35.8	18.5	7.4
Internal Link Dist (m)		787.0			324.7		349.9		82.1
Turn Bay Length (m)	40.0		145.0	40.0		105.0		40.0	
Base Capacity (vph)	79	1600	716	130	1872	445	459	94	338
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	0.05	0.41	0.45	0.48	0.79	1.17	0.25	0.37	0.04

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 64 (53%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 43.2 Intersection LOS: D
Intersection Capacity Utilization 84.4% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Chapman Mills/Fraser Fields & Strandherd



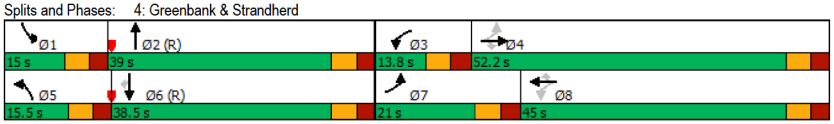
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	226	630	126	101	976	163	203	472	175	277	309
Future Volume (vph)	226	630	126	101	976	163	203	472	175	277	309
Lane Group Flow (vph)	226	630	126	101	976	163	203	593	175	277	309
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases	4		4	8		8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5	11.3	35.5	35.5
Total Split (s)	21.0	52.2	52.2	13.8	45.0	45.0	15.5	39.0	15.0	38.5	38.5
Total Split (%)	17.5%	43.5%	43.5%	11.5%	37.5%	37.5%	12.9%	32.5%	12.5%	32.1%	32.1%
Maximum Green (s)	14.4	45.7	45.7	7.2	38.5	38.5	9.2	32.5	8.7	32.0	32.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8	2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5	6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0		22.0		22.0	22.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10	10
Act Effct Green (s)	58.9	45.3	45.3	45.0	38.0	38.0	9.4	32.9	8.7	32.3	32.3
Actuated g/C Ratio	0.49	0.38	0.38	0.38	0.32	0.32	0.08	0.27	0.07	0.27	0.27
v/c Ratio	0.90	0.51	0.20	0.34	0.95	0.27	0.83	0.68	0.77	0.32	0.58
Control Delay	66.5	30.6	3.2	20.6	58.9	2.7	81.1	41.6	76.5	36.4	17.1
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	66.5	30.6	3.2	20.6	58.9	2.7	81.1	41.6	76.5	36.4	17.1
LOS	E	C	A	C	E	A	F	D	E	D	D
Approach Delay		35.3			48.4			51.7		37.8	
Approach LOS		D			D			D		D	
Queue Length 50th (m)	37.7	58.6	0.0	12.3	115.7	0.0	24.4	62.3	20.9	27.2	18.5
Queue Length 95th (m)	#82.3	75.6	8.1	22.0	#155.5	6.6	#44.2	82.0	#37.6	39.1	47.4
Internal Link Dist (m)		151.3			267.5			571.3		216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0		85.0		145.0
Base Capacity (vph)	251	1234	637	301	1039	607	246	877	228	872	537
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	0.90	0.51	0.20	0.34	0.94	0.27	0.83	0.68	0.77	0.32	0.58

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 65 (54%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 43.6 Intersection LOS: D
Intersection Capacity Utilization 93.6% 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: 4: Greenbank & Strandherd



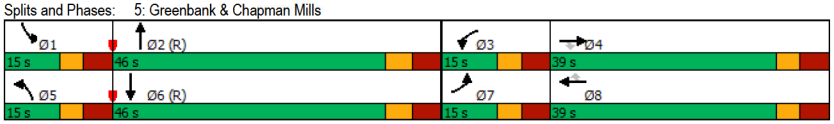
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	44	368	55	33	283	51	64	627	30	390
Future Volume (vph)	44	368	55	33	283	51	64	627	30	390
Lane Group Flow (vph)	44	368	55	33	283	51	64	690	30	417
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases			4			8				
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.3	38.9	12.7	38.9
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0	15.0	46.0
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%	13.0%	40.0%
Maximum Green (s)	7.7	31.5	31.5	7.7	31.5	31.5	7.7	38.1	7.7	38.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.3	3.7
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2	4.0	4.2
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.3	7.9	7.3	7.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		24.0		24.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10
Act Effct Green (s)	7.2	30.1	30.1	7.0	27.2	27.2	7.8	51.5	7.0	48.1
Actuated g/C Ratio	0.06	0.26	0.26	0.06	0.24	0.24	0.07	0.45	0.06	0.42
v/c Ratio	0.44	0.83	0.15	0.33	0.70	0.15	0.59	0.48	0.31	0.31
Control Delay	65.5	56.1	32.7	60.7	49.6	34.0	73.7	27.5	59.8	26.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	56.1	32.7	60.7	49.6	34.0	73.7	27.5	59.8	26.4
LOS	E	E	C	E	D	C	E	C	E	C
Approach Delay		54.2			48.4			31.5		28.6
Approach LOS		D			D			C		C
Queue Length 50th (m)	9.5	76.9	9.4	7.1	55.6	8.7	13.9	67.2	6.5	37.2
Queue Length 95th (m)	21.3	#119.1	19.4	17.1	82.7	18.3	#32.3	88.4	15.9	51.0
Internal Link Dist (m)		626.4			183.5			478.9		571.3
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0		60.0	
Base Capacity (vph)	108	479	407	108	467	397	113	1432	108	1342
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	0.41	0.77	0.14	0.31	0.61	0.13	0.57	0.48	0.28	0.31

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 39.1 Intersection LOS: D
Intersection Capacity Utilization 74.2% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



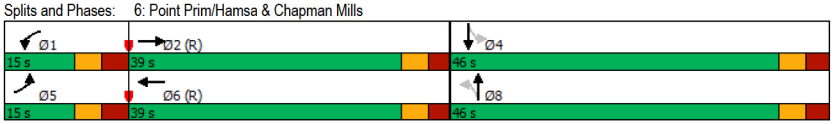
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	29	354	30	359	47	0	57	0
Future Volume (vph)	29	354	30	359	47	0	57	0
Lane Group Flow (vph)	29	376	30	376	0	60	0	71
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.5	24.9	11.5	25.9	44.3	44.3	44.3	44.3
Total Split (s)	15.0	39.0	15.0	39.0	46.0	46.0	46.0	46.0
Total Split (%)	15.0%	39.0%	15.0%	39.0%	46.0%	46.0%	46.0%	46.0%
Maximum Green (s)	8.5	33.1	8.5	33.1	39.7	39.7	39.7	39.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	2.6	3.2	2.6	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	6.5	5.9	6.5	5.9		6.3		6.3
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
Walk Time (s)		7.0		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		12.0		13.0	31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)		10		10	10	10	10	10
Act Effct Green (s)	7.3	66.9	7.4	66.9		16.4		16.4
Actuated g/C Ratio	0.07	0.67	0.07	0.67		0.16		0.16
v/c Ratio	0.25	0.33	0.25	0.33		0.29		0.36
Control Delay	52.1	9.3	48.1	14.4		36.6		39.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	52.1	9.3	48.1	14.4		36.6		39.0
LOS	D	A	D	B		D		D
Approach Delay		12.4		16.9		36.6		39.0
Approach LOS		B		B		D		D
Queue Length 50th (m)	6.0	22.7	5.5	31.0		10.9		13.1
Queue Length 95th (m)	m12.0	16.5	14.0	91.6		15.8		18.3
Internal Link Dist (m)		462.9		626.4		112.1		80.0
Turn Bay Length (m)	40.0		40.0					
Base Capacity (vph)	141	1130	141	1133		503		479
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	0.21	0.33	0.21	0.33		0.12		0.15

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 60 (60%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 17.9 Intersection LOS: B
Intersection Capacity Utilization 44.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Point Prim/Hamsa & Chapman Mills



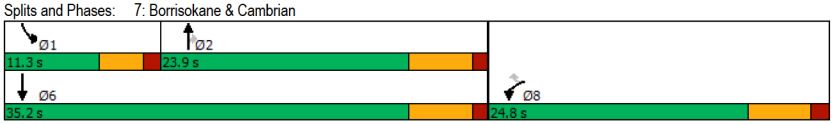
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	188	516	85	97	237	81
Future Volume (vph)	188	516	85	97	237	81
Lane Group Flow (vph)	188	516	85	97	237	81
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	23.9	23.9	11.3	35.2
Total Split (%)	41.3%	41.3%	39.8%	39.8%	18.8%	58.7%
Maximum Green (s)	18.8	18.8	18.1	18.1	6.9	29.4
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	None	Min
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	2	2	2	2		2
Act Effct Green (s)	12.1	12.1	11.4	11.4	7.0	22.9
Actuated g/C Ratio	0.26	0.26	0.24	0.24	0.15	0.49
v/c Ratio	0.45	0.68	0.21	0.23	0.51	0.10
Control Delay	18.8	7.1	16.2	5.8	25.0	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.8	7.1	16.2	5.8	25.0	7.6
LOS	B	A	B	A	C	A
Approach Delay	10.3		10.7			20.5
Approach LOS	B		B			C
Queue Length 50th (m)	12.0	0.0	5.1	0.0	8.3	2.8
Queue Length 95th (m)	30.0	17.9	15.4	8.4	#25.1	10.1
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	659	895	667	626	469	1084
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	0.29	0.58	0.13	0.15	0.51	0.07

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 47
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.68
Intersection Signal Delay: 13.0 — Intersection LOS: B
Intersection Capacity Utilization 51.9% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Borrisokane & Cambrian



Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	66	10	365	133	81	264	63
Future Volume (vph)	5	66	10	365	133	81	264	63
Lane Group Flow (vph)	5	66	10	365	133	81	264	63
Turn Type	NA	Prot	NA	custom	NA	Perm	Perm	NA
Protected Phases	2	9	6		8			4
Permitted Phases				9		8	4	
Detector Phase	2	9	6	9	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.9	26.5	10.9	26.5	44.3	44.3	44.3	44.3
Total Split (s)	15.0	39.0	15.0	39.0	46.0	46.0	46.0	46.0
Total Split (%)	15.0%	39.0%	15.0%	39.0%	46.0%	46.0%	46.0%	46.0%
Maximum Green (s)	9.1	32.5	9.1	32.5	39.7	39.7	39.7	39.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	3.2	2.6	3.2	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	6.5	5.9	6.5	6.3	6.3	6.3	6.3
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	Min	None	Min	Min	Min	Min	Min
Walk Time (s)		7.0		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		13.0		13.0	31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)		10		10	10	10	10	10
Act Effct Green (s)	23.4	29.3	23.4	29.3	28.5	28.5	28.5	28.5
Actuated g/C Ratio	0.23	0.29	0.23	0.29	0.28	0.28	0.28	0.28
v/c Ratio	0.01	0.14	0.03	0.86	0.27	0.20	0.81	0.13
Control Delay	39.0	22.1	32.1	49.0	27.1	25.6	51.1	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.0	22.1	32.1	49.0	27.1	25.6	51.1	24.1
LOS	D	C	C	D	C	C	D	C
Approach Delay	39.0		44.6		26.5			45.9
Approach LOS	D		D		C			D
Queue Length 50th (m)	0.8	9.7	1.6	66.5	19.6	11.6	46.5	8.9
Queue Length 95th (m)	4.3	10.3	m5.6	#42.4	29.4	19.8	66.1	15.9
Internal Link Dist (m)	50.9		462.9		117.7			349.9
Turn Bay Length (m)		38.0		60.0		15.0	38.0	
Base Capacity (vph)	399	535	399	479	677	575	454	677
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	0.01	0.12	0.03	0.76	0.20	0.14	0.58	0.09

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 24 (24%), Referenced to phase 2:EBT, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 41.1 Intersection LOS: D
Intersection Capacity Utilization 49.7% ICU Level of Service A
Analysis Period (min) 15
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: 8: Access #1 & BRT & Chapman Mills

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	119	0	11	0	5	622	5	66	265	56
Future Volume (vph)	119	0	11	0	5	622	5	66	265	56
Lane Group Flow (vph)	119	11	11	130	5	622	5	66	265	56
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8				2			6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	10.3	24.3	24.3	10.3	24.3	24.3
Total Split (s)	28.8	28.8	28.8	28.8	10.3	40.2	40.2	11.0	40.9	40.9
Total Split (%)	36.0%	36.0%	36.0%	36.0%	12.9%	50.3%	50.3%	13.8%	51.1%	51.1%
Maximum Green (s)	23.0	23.0	23.0	23.0	5.0	34.9	34.9	5.7	35.6	35.6
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.0	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	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.3	5.3	5.3	5.3	5.3	5.3
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)	16.0	16.0	16.0	16.0		12.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	10	10	10	10		10	10		10	10
Act Effct Green (s)	14.8	14.8	14.8	14.8	5.6	47.6	47.6	7.6	56.3	56.3
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.07	0.60	0.60	0.10	0.70	0.70
v/c Ratio	0.56	0.04	0.05	0.49	0.04	0.61	0.01	0.43	0.22	0.05
Control Delay	38.7	23.6	23.8	34.1	35.8	19.3	12.2	40.0	11.9	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	23.6	23.8	34.1	35.8	19.3	12.2	40.0	11.9	11.3
LOS	D	C	C	C	D	B	B	D	B	B
Approach Delay		37.5		33.3		19.4			16.6	
Approach LOS		D		C		B			B	
Queue Length 50th (m)	16.7	1.4	1.4	17.9	0.7	67.2	0.4	9.4	12.1	2.3
Queue Length 95th (m)	28.1	4.7	4.7	29.1	4.0	#137.8	2.2	#26.3	62.3	16.3
Internal Link Dist (m)		145.0		184.4		1276.6			273.4	
Turn Bay Length (m)	38.0		38.0		38.0		30.0	38.0		30.0
Base Capacity (vph)	330	416	367	416	112	1016	863	153	1199	1019
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	0.36	0.03	0.03	0.31	0.04	0.61	0.01	0.43	0.22	0.05

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 52 (65%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 74.1% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Borrisokane & Access #2

Lane Group	EBT	EBR	WBT	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	5	5	10	870	382
Future Volume (vph)	5	5	10	870	382
Lane Group Flow (vph)	5	5	10	870	382
Turn Type	NA	Perm	NA	NA	NA
Protected Phases	4		8	2	6
Permitted Phases		4			
Detector Phase	4	4	8	2	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	28.3	28.3	23.8	23.8
Total Split (s)	28.3	28.3	28.3	51.7	51.7
Total Split (%)	35.4%	35.4%	35.4%	64.6%	64.6%
Maximum Green (s)	23.0	23.0	23.0	46.1	46.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.0	2.0	2.0	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.3	5.3	5.3	5.6	5.6
Lead/Lag					
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	16.0	16.0	16.0	11.0	11.0
Pedestrian Calls (#/hr)	10	10	10	10	10
Act Effct Green (s)	12.6	12.6	12.6	69.0	69.0
Actuated g/C Ratio	0.16	0.16	0.16	0.86	0.86
v/c Ratio	0.02	0.02	0.04	0.59	0.26
Control Delay	25.2	25.2	25.6	5.5	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	25.2	25.6	5.5	4.4
LOS	C	C	C	A	A
Approach Delay	25.2		25.6	5.5	4.4
Approach LOS	C		C	A	A
Queue Length 50th (m)	0.7	0.7	1.4	2.2	0.0
Queue Length 95th (m)	2.9	2.9	4.5	#183.4	45.7
Internal Link Dist (m)	113.8		104.5	273.4	275.6
Turn Bay Length (m)		30.0			
Base Capacity (vph)	490	416	490	1472	1472
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.01	0.01	0.02	0.59	0.26

Intersection Summary
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 5.5 Intersection LOS: A
Intersection Capacity Utilization 65.8% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Borrisokane & Access #3/BRT

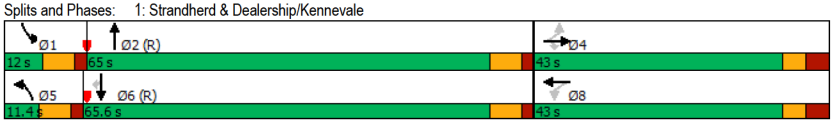
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	429	151	293	128	39	100	1748	93	2664	167
Future Volume (vph)	429	151	293	128	39	100	1748	93	2664	167
Lane Group Flow (vph)	429	151	293	128	139	100	1880	93	2664	167
Turn Type	Perm	NA	Perm	Perm	NA	Prot	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%
Maximum Green (s)	36.1	36.1	36.1	36.1	36.1	5.0	58.6	5.6	59.2	59.2
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?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	7.0	7.0		7.0		5.0	5.0
Flash Dont Walk (s)	26.0	26.0	26.0	14.0	14.0		14.0		26.0	26.0
Pedestrian Calls (#/hr)	10	10	10	10	10		10		10	10
Act Effct Green (s)	36.1	36.1	36.1	36.1	36.1	5.0	58.6	5.6	59.2	59.2
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.04	0.49	0.05	0.49	0.49
v/c Ratio	1.26	0.29	0.68	0.39	0.30	0.76	1.20	1.24	1.67	0.23
Control Delay	174.1	34.1	46.3	37.4	34.6	87.9	115.6	228.4	328.3	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.1	34.1	46.3	37.4	34.6	87.9	115.6	228.4	328.3	18.5
LOS	F	C	D	D	C	F	F	F	F	B
Approach Delay		107.0			35.9		114.2		307.4	
Approach LOS		F			D		F		F	
Queue Length 50th (m)	~124.8	26.9	59.9	23.5	24.8	11.5	~276.2	~26.7	~474.5	21.6
Queue Length 95th (m)	#185.3	44.5	90.8	41.3	42.0	m13.2	m#307.0	#60.0	#513.2	35.3
Internal Link Dist (m)		172.9			177.4		1040.6		345.0	
Turn Bay Length (m)	70.0		150.0	50.0		130.0		180.0		60.0
Base Capacity (vph)	341	513	430	331	457	131	1562	75	1598	715
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	1.26	0.29	0.68	0.39	0.30	0.76	1.20	1.24	1.67	0.23

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: 1.67
Intersection Signal Delay: 203.2 Intersection LOS: F
Intersection Capacity Utilization 132.2% 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	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	450	1817	717	141	1181	461	34	52	49
Future Volume (vph)	450	1817	717	141	1181	461	34	52	49
Lane Group Flow (vph)	450	1817	717	141	1246	461	163	52	192
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4	11.0	34.0	11.0	16.0
Total Split (s)	18.0	63.0	63.0	12.0	57.0	24.0	34.0	11.0	21.0
Total Split (%)	15.0%	52.5%	52.5%	10.0%	47.5%	20.0%	28.3%	9.2%	17.5%
Maximum Green (s)	11.6	56.6	56.6	5.6	50.6	18.0	28.0	5.0	15.0
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	2.7	2.7	2.7	2.7
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	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Walk Time (s)		7.0	7.0		7.0		5.0		
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		
Pedestrian Calls (#/hr)		10	10		10		10		
Act Effct Green (s)	11.6	56.6	56.6	5.6	50.6	18.0	30.2	5.0	15.0
Actuated g/C Ratio	0.10	0.47	0.47	0.05	0.42	0.15	0.25	0.04	0.12
v/c Ratio	2.88	1.19	1.05	1.88	0.92	0.98	0.43	0.78	1.02
Control Delay	872.4	101.8	41.4	455.0	45.3	87.6	43.1	116.4	121.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	872.4	101.8	41.4	455.0	45.3	87.6	43.1	116.4	121.9
LOS	F	F	D	F	D	F	D	F	F
Approach Delay		203.5			86.9		76.0		120.7
Approach LOS		F			F		E		F
Queue Length 50th (m)	~182.3	~264.1	~177.9	~51.0	160.7	55.7	32.8	12.2	~46.1
Queue Length 95th (m)	m#114.2	m41.0	m26.9	m#69.6	m163.2	#88.0	53.7	#34.4	#92.0
Internal Link Dist (m)		1040.6			787.0		275.6		103.1
Turn Bay Length (m)	105.0		110.0	55.0		100.0		38.0	
Base Capacity (vph)	156	1528	683	75	1355	471	378	67	189
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	2.88	1.19	1.05	1.88	0.92	0.98	0.43	0.78	1.02

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

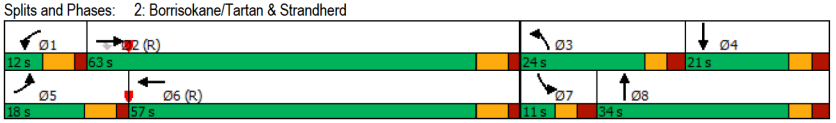
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.88
Intersection Signal Delay: 153.6 Intersection LOS: F
Intersection Capacity Utilization 109.5% ICU Level of Service H
Analysis Period (min) 15

~ 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: 2: Borrisokane/Tartan & Strandherd



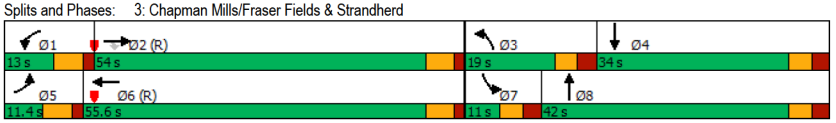
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	15	1556	573	97	918	469	0	18	0
Future Volume (vph)	15	1556	573	97	918	469	0	18	0
Lane Group Flow (vph)	15	1556	573	97	972	469	80	18	8
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	5	2		1	6	3	8	7	4
Permitted Phases			2						
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8	11.0	34.0	11.0	34.0
Total Split (s)	11.4	54.0	54.0	13.0	55.6	19.0	42.0	11.0	34.0
Total Split (%)	9.5%	45.0%	45.0%	10.8%	46.3%	15.8%	35.0%	9.2%	28.3%
Maximum Green (s)	5.6	48.2	48.2	7.2	49.8	13.0	36.0	5.0	28.0
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2	3.3	3.3	3.3	3.3
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6	2.7	2.7	2.7	2.7
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)	5.8	5.8	5.8	5.8	5.8	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	None	Min	None	Min
Walk Time (s)		7.0	7.0		7.0		5.0		5.0
Flash Dont Walk (s)		14.0	14.0		14.0		21.0		21.0
Pedestrian Calls (#/hr)		10	10		10		10		10
Act Effct Green (s)	6.5	56.9	56.9	13.3	70.7	13.0	27.8	5.0	13.2
Actuated g/C Ratio	0.05	0.47	0.47	0.11	0.59	0.11	0.23	0.04	0.11
v/c Ratio	0.17	1.01	0.83	0.54	0.51	1.38	0.24	0.27	0.05
Control Delay	73.6	21.7	10.9	62.9	18.1	228.3	39.9	65.9	44.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.6	21.7	10.9	62.9	18.1	228.3	39.9	65.9	44.2
LOS	E	C	B	E	B	F	D	E	D
Approach Delay		19.2			22.1		200.8		59.2
Approach LOS		B			C		F		E
Queue Length 50th (m)	3.7	24.7	17.2	21.3	53.2	~74.4	15.0	4.1	1.8
Queue Length 95th (m)	m3.9	m#178.8	m60.8	#50.7	122.3	#106.5	26.8	11.7	5.6
Internal Link Dist (m)		787.0			324.9		349.9		82.1
Turn Bay Length (m)	40.0		145.0	40.0		105.0		40.0	
Base Capacity (vph)	88	1537	688	179	1892	340	435	67	338
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	1.01	0.83	0.54	0.51	1.38	0.18	0.27	0.02

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 44 (37%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 46.6 Intersection LOS: D
Intersection Capacity Utilization 86.5% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Chapman Mills/Fraser Fields & Strandherd



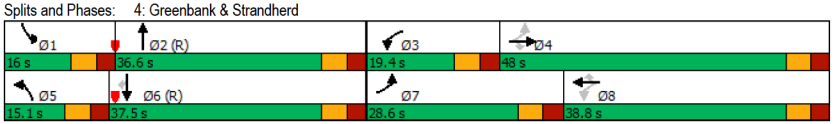
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	384	1187	245	243	851	184	205	483	251	611	259
Future Volume (vph)	384	1187	245	243	851	184	205	483	251	611	259
Lane Group Flow (vph)	384	1187	245	243	851	184	205	630	251	611	259
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	1	6	
Permitted Phases	4		4	8		8					6
Detector Phase	7	4	4	3	8	8	5	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5	11.3	35.5	35.5
Total Split (s)	28.6	48.0	48.0	19.4	38.8	38.8	15.1	36.6	16.0	37.5	37.5
Total Split (%)	23.8%	40.0%	40.0%	16.2%	32.3%	32.3%	12.6%	30.5%	13.3%	31.3%	31.3%
Maximum Green (s)	22.0	41.5	41.5	12.8	32.3	32.3	8.8	30.1	9.7	31.0	31.0
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8	2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5	6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)		20.0	20.0		20.0	20.0		22.0		22.0	22.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10	10
Act Effct Green (s)	60.8	41.5	41.5	45.0	32.3	32.3	8.8	30.1	9.7	31.0	31.0
Actuated g/C Ratio	0.51	0.35	0.35	0.38	0.27	0.27	0.07	0.25	0.08	0.26	0.26
v/c Ratio	1.08	1.06	0.38	1.06	0.98	0.34	0.89	0.78	0.99	0.73	0.46
Control Delay	106.4	82.5	5.5	109.8	68.9	4.8	92.1	47.6	108.8	46.7	7.1
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	106.4	82.5	5.5	109.8	68.9	4.8	92.1	47.6	108.8	46.7	7.1
LOS	F	F	A	F	E	A	F	D	F	D	A
Approach Delay		77.2			67.5			58.5		51.4	
Approach LOS		E			E			E		D	
Queue Length 50th (m)	~86.1	~159.4	0.8	~47.8	103.4	0.0	24.7	68.7	30.5	68.5	0.0
Queue Length 95th (m)	#145.6	#200.2	17.5	#98.0	#144.2	11.8	#46.2	89.9	#56.8	89.0	20.0
Internal Link Dist (m)		145.0			267.5			571.3		216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0		85.0		145.0
Base Capacity (vph)	354	1120	651	229	872	543	230	805	254	837	561
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	1.08	1.06	0.38	1.06	0.98	0.34	0.89	0.78	0.99	0.73	0.46

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 65.9 Intersection LOS: E
Intersection Capacity Utilization 102.2% 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.

Splits and Phases: 4: Greenbank & Strandherd



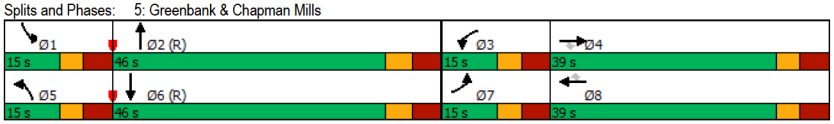
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	38	379	74	92	393	48	90	627	50	841
Future Volume (vph)	38	379	74	92	393	48	90	627	50	841
Lane Group Flow (vph)	38	379	74	92	393	48	90	671	50	885
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Prot	NA
Protected Phases	7	4		3	8		5	2	1	6
Permitted Phases			4			8				
Detector Phase	7	4	4	3	8	8	5	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.3	38.9	12.3	38.9
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0	15.0	46.0
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%	13.0%	40.0%
Maximum Green (s)	7.7	31.5	31.5	7.7	31.5	31.5	7.7	38.1	7.7	38.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.3	3.7
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2	4.0	4.2
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.3	7.9	7.3	7.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		24.0		24.0
Pedestrian Calls (#/hr)		10	10		10	10		10		10
Act Effct Green (s)	7.1	28.9	28.9	7.7	34.9	34.9	8.6	43.7	7.2	39.8
Actuated g/C Ratio	0.06	0.25	0.25	0.07	0.30	0.30	0.07	0.38	0.06	0.35
v/c Ratio	0.38	0.89	0.20	0.85	0.76	0.11	0.75	0.55	0.50	0.79
Control Delay	62.9	64.0	34.4	107.3	48.1	31.5	87.9	31.8	68.7	40.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.9	64.0	34.4	107.3	48.1	31.5	87.9	31.8	68.7	40.7
LOS	E	E	C	F	D	C	F	C	E	D
Approach Delay		59.5			56.8			38.4		42.2
Approach LOS		E			E			D		D
Queue Length 50th (m)	8.2	78.7	12.6	20.6	82.4	8.0	20.1	65.9	10.9	94.9
Queue Length 95th (m)	19.2	#124.2	24.6	#49.8	#131.6	17.5	#48.5	85.4	23.5	119.8
Internal Link Dist (m)		626.4			183.5			478.9		571.3
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0		60.0	
Base Capacity (vph)	108	467	397	108	517	440	120	1220	108	1115
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	0.35	0.81	0.19	0.85	0.76	0.11	0.75	0.55	0.46	0.79

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 78 (68%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 47.1 Intersection LOS: D
Intersection Capacity Utilization 82.7% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



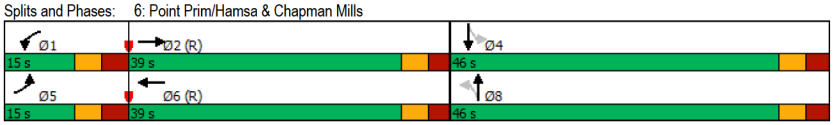
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	52	463	65	407	30	0	48	0
Future Volume (vph)	52	463	65	407	30	0	48	0
Lane Group Flow (vph)	52	509	65	430	0	39	0	60
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6		8		4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	11.5	25.9	11.5	25.9	44.3	44.3	44.3	44.3
Total Split (s)	15.0	39.0	15.0	39.0	46.0	46.0	46.0	46.0
Total Split (%)	15.0%	39.0%	15.0%	39.0%	46.0%	46.0%	46.0%	46.0%
Maximum Green (s)	8.5	33.1	8.5	33.1	39.7	39.7	39.7	39.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	3.2	2.6	3.2	2.6	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	6.5	5.9	6.5	5.9		6.3		6.3
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	C-Max	Max	Max	Max	Max
Walk Time (s)		7.0		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		13.0		13.0	31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)		10		10	10	10	10	10
Act Effct Green (s)	7.6	36.2	7.8	36.4		39.7		39.7
Actuated g/C Ratio	0.08	0.36	0.08	0.36		0.40		0.40
v/c Ratio	0.42	0.84	0.52	0.70		0.07		0.11
Control Delay	44.5	64.7	59.0	36.0		19.3		19.9
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	44.5	64.7	59.0	36.0		19.3		19.9
LOS	D	E	E	D		B		B
Approach Delay		62.8		39.0		19.3		19.9
Approach LOS		E		D		B		B
Queue Length 50th (m)	10.8	101.0	12.1	73.2		4.6		7.1
Queue Length 95th (m)	m13.6	m#111.3	25.4	#113.2		11.1		15.2
Internal Link Dist (m)		462.9		626.4		112.1		80.0
Turn Bay Length (m)	40.0		40.0					
Base Capacity (vph)	137	609	137	615		536		522
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	0.38	0.84	0.47	0.70		0.07		0.11

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 24 (24%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 48.9 Intersection LOS: D
Intersection Capacity Utilization 56.7% ICU Level of Service B
Analysis Period (min) 15
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: 6: Point Prim/Hamsa & Chapman Mills



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	132	357	73	169	532	83
Future Volume (vph)	132	357	73	169	532	83
Lane Group Flow (vph)	132	357	73	169	532	83
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	23.8	23.8	16.4	40.2
Total Split (%)	38.2%	38.2%	36.6%	36.6%	25.2%	61.8%
Maximum Green (s)	18.8	18.8	18.0	18.0	12.0	34.4
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	2	2	2	2		2
Act Effct Green (s)	12.2	12.2	21.2	21.2	15.5	41.0
Actuated g/C Ratio	0.19	0.19	0.33	0.33	0.24	0.63
v/c Ratio	0.44	0.64	0.13	0.29	0.71	0.08
Control Delay	27.3	8.4	17.8	5.1	30.2	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	8.4	17.8	5.1	30.2	5.8
LOS	C	A	D	A	C	A
Approach Delay	13.5		8.9			26.9
Approach LOS	B		A			C
Queue Length 50th (m)	14.5	0.0	6.0	0.0	28.7	3.0
Queue Length 95th (m)	24.8	16.7	15.1	11.8	#55.5	9.7
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	468	673	555	586	747	1076
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	0.28	0.53	0.13	0.29	0.71	0.08

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 18.8 Intersection LOS: B
Intersection Capacity Utilization 41.5% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Borrisokane & Cambrian

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	90	10	354	92	59	452	129
Future Volume (vph)	5	90	10	354	92	59	452	129
Lane Group Flow (vph)	5	90	10	354	92	59	452	129
Turn Type	NA	Prot	NA	custom	NA	Perm	Perm	NA
Protected Phases	2	9	6		8			4
Permitted Phases				9		8	4	
Detector Phase	2	9	6	9	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.9	27.5	10.9	27.5	44.3	44.3	44.3	44.3
Total Split (s)	15.0	39.0	15.0	39.0	46.0	46.0	46.0	46.0
Total Split (%)	15.0%	39.0%	15.0%	39.0%	46.0%	46.0%	46.0%	46.0%
Maximum Green (s)	9.1	32.5	9.1	32.5	39.7	39.7	39.7	39.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.6	3.2	2.6	3.2	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	6.5	5.9	6.5	6.3	6.3	6.3	6.3
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	None	None	None	Max	Max	Max	Max
Walk Time (s)		7.0		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		13.0		13.0	31.0	31.0	31.0	31.0
Pedestrian Calls (#/hr)		10		10	10	10	10	10
Act Effct Green (s)	13.3	28.3	13.3	28.3	39.7	39.7	39.7	39.7
Actuated g/C Ratio	0.13	0.28	0.13	0.28	0.40	0.40	0.40	0.40
v/c Ratio	0.02	0.20	0.04	0.87	0.14	0.10	0.96	0.19
Control Delay	41.6	12.1	44.4	38.8	20.0	19.7	63.3	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	12.1	44.4	38.8	20.0	19.7	63.3	20.7
LOS	D	B	D	D	B	B	E	C
Approach Delay	41.6		33.6		19.9			53.8
Approach LOS	D		C		B			D
Queue Length 50th (m)	0.9	13.2	2.0	69.0	11.0	7.0	82.4	15.8
Queue Length 95th (m)	4.3	m15.4	m3.2	#104.1	21.1	15.1	#144.1	28.1
Internal Link Dist (m)	67.7		462.9		117.7			349.9
Turn Bay Length (m)		38.0		60.0		15.0	38.0	
Base Capacity (vph)	227	526	227	471	677	575	472	677
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	0.02	0.17	0.04	0.75	0.14	0.10	0.96	0.19

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 19 (19%), Referenced to phase 2:EBT, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 41.7 — Intersection LOS: D
Intersection Capacity Utilization 55.2% — ICU Level of Service B
Analysis Period (min) 15
\# 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: 8: Access #1 & BRT & Chapman Mills

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	85	0	8	0	10	386	10	130	621	115
Future Volume (vph)	85	0	8	0	10	386	10	130	621	115
Lane Group Flow (vph)	85	8	8	92	10	386	10	130	621	115
Turn Type	Perm	NA	Perm	NA	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		8	5	2		1	6	
Permitted Phases	4		8				2			6
Detector Phase	4	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	28.8	28.8	28.8	28.8	10.3	24.3	24.3	10.3	24.3	24.3
Total Split (s)	28.8	28.8	28.8	28.8	10.3	30.9	30.9	15.3	35.9	35.9
Total Split (%)	38.4%	38.4%	38.4%	38.4%	13.7%	41.2%	41.2%	20.4%	47.9%	47.9%
Maximum Green (s)	23.0	23.0	23.0	23.0	5.0	25.6	25.6	10.0	30.6	30.6
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.5	2.5	2.0	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	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.3	5.3	5.3	5.3	5.3	5.3
Lead/Lag					Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)	16.0	16.0	16.0	16.0		12.0	12.0		12.0	12.0
Pedestrian Calls (#/hr)	10	10	10	10		10	10		10	10
Act Effct Green (s)	13.3	13.3	13.3	13.3	5.7	41.8	41.8	10.2	52.8	52.8
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.08	0.56	0.56	0.14	0.70	0.70
v/c Ratio	0.40	0.03	0.04	0.36	0.08	0.41	0.01	0.59	0.52	0.11
Control Delay	31.6	22.2	22.4	29.5	34.0	16.5	14.3	40.1	9.6	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	22.2	22.4	29.5	34.0	16.5	14.3	40.1	9.6	3.6
LOS	C	C	C	C	C	D	B	D	A	A
Approach Delay		30.8		29.0		16.9			13.4	
Approach LOS		C		C		B			B	
Queue Length 50th (m)	11.2	1.0	1.0	12.0	1.3	33.7	0.7	17.0	32.0	4.1
Queue Length 95th (m)	19.2	3.6	3.6	19.9	5.6	73.3	3.8	m#28.9	#146.2	m11.3
Internal Link Dist (m)		154.2		129.4		1276.6			273.4	
Turn Bay Length (m)	38.0		38.0		38.0		30.0	38.0		30.0
Base Capacity (vph)	364	444	393	444	122	950	807	236	1200	1020
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	0.23	0.02	0.02	0.21	0.08	0.41	0.01	0.55	0.52	0.11

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 44 (59%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 75

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 16.5 Intersection LOS: B
Intersection Capacity Utilization 64.0% ICU Level of Service B
Analysis Period (min) 15
\# 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: 9: Borrisokane & Access #2

Lane Group	EBT	EBR	WBT	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	5	5	10	563	861
Future Volume (vph)	5	5	10	563	861
Lane Group Flow (vph)	5	5	10	563	861
Turn Type	NA	Perm	NA	NA	NA
Protected Phases	4		8	2	6
Permitted Phases		4			
Detector Phase	4	4	8	2	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	28.3	28.3	28.3	23.6	23.6
Total Split (s)	28.3	28.3	28.3	46.7	46.7
Total Split (%)	37.7%	37.7%	37.7%	62.3%	62.3%
Maximum Green (s)	23.0	23.0	23.0	41.1	41.1
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.0	2.0	2.0	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.3	5.3	5.3	5.6	5.6
Lead/Lag					
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	16.0	16.0	16.0	11.0	11.0
Pedestrian Calls (#/hr)	10	10	10	10	10
Act Effct Green (s)	12.6	12.6	12.6	64.0	64.0
Actuated g/C Ratio	0.17	0.17	0.17	0.85	0.85
v/c Ratio	0.02	0.02	0.03	0.39	0.59
Control Delay	22.6	22.6	23.2	3.7	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.6	22.6	23.2	3.7	9.6
LOS	C	C	C	A	A
Approach Delay	22.6		23.2	3.7	9.6
Approach LOS	C		C	A	A
Queue Length 50th (m)	0.6	0.6	1.3	0.1	0.0
Queue Length 95th (m)	2.6	2.6	4.0	82.1	#180.2
Internal Link Dist (m)	209.1		212.9	273.4	275.6
Turn Bay Length (m)		30.0			
Base Capacity (vph)	523	444	523	1456	1456
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.01	0.01	0.02	0.39	0.59

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 7.5 — Intersection LOS: A
Intersection Capacity Utilization 78.0% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Borrisokane & Access #3/BRT

Intersection												
Int Delay, s/veh	14											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	119	0	11	11	0	130	5	622	5	66	265	56
Future Vol, veh/h	119	0	11	11	0	130	5	622	5	66	265	56
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	380	-	-	380	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	119	0	11	11	0	130	5	622	5	66	265	56

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1097	1034	265	1066	1088	625	321	0	0	627	0	0
Stage 1	397	397	-	635	635	-	-	-	-	-	-	-
Stage 2	700	637	-	431	453	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	191	232	774	200	216	485	1239	-	-	955	-	-
Stage 1	629	603	-	467	472	-	-	-	-	-	-	-
Stage 2	430	471	-	603	570	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	132	215	774	186	200	485	1239	-	-	955	-	-
Mov Cap-2 Maneuver	132	215	-	186	200	-	-	-	-	-	-	-
Stage 1	626	561	-	465	470	-	-	-	-	-	-	-
Stage 2	313	469	-	553	531	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	115.3	17.4	0.1	1.5
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1239	-	-	142	431	955	-	-
HCM Lane V/C Ratio	0.004	-	-	0.915	0.327	0.069	-	-
HCM Control Delay (s)	7.9	-	-	115.3	17.4	9	-	-
HCM Lane LOS	A	-	-	F	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	6.3	1.4	0.2	-	-

Intersection												
Int Delay, s/veh	9.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	0	8	8	0	92	10	386	10	130	621	115
Future Vol, veh/h	85	0	8	8	0	92	10	386	10	130	621	115
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	380	-	-	380	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	85	0	8	8	0	92	10	386	10	130	621	115

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1338	1297	621	1354	1407	391	736	0	0	396	0	0
Stage 1	881	881	-	411	411	-	-	-	-	-	-	-
Stage 2	457	416	-	943	996	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	130	162	487	127	139	658	870	-	-	1163	-	-
Stage 1	341	365	-	618	595	-	-	-	-	-	-	-
Stage 2	583	592	-	315	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	101	142	487	113	122	658	870	-	-	1163	-	-
Mov Cap-2 Maneuver	101	142	-	113	122	-	-	-	-	-	-	-
Stage 1	337	324	-	611	588	-	-	-	-	-	-	-
Stage 2	496	585	-	275	286	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	125	14.6	0.2	1.3
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	870	-	-	108	475	1163	-	-
HCM Lane V/C Ratio	0.011	-	-	0.861	0.211	0.112	-	-
HCM Control Delay (s)	9.2	-	-	125	14.6	8.5	-	-
HCM Lane LOS	A	-	-	F	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	5	0.8	0.4	-	-

Appendix K

Synchro Intersection Worksheets – 2034 Mitigated Future Total Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	28	69	100	168	116	333	2762	86	54	1245	471
Future Volume (vph)	109	28	69	100	168	116	333	2762	86	54	1245	471
Satd. Flow (prot)	1621	1706	1450	1621	1602	0	3144	3222	0	1621	3241	1450
Flt Permitted	0.348			0.739			0.950			0.950		
Satd. Flow (perm)	594	1706	1431	1259	1602	0	3144	3222	0	1620	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	109	28	69	100	284	0	333	2848	0	54	1245	471
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		21.6	66.6		12.4	57.4	57.4
Total Split (%)	34.2%	34.2%	34.2%	34.2%	34.2%		18.0%	55.5%		10.3%	47.8%	47.8%
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)	26.3	26.3	26.3	26.3	26.3		16.6	68.4		8.1	57.4	57.4
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.14	0.57		0.07	0.48	0.48
v/c Ratio	0.84	0.08	0.22	0.36	0.81		0.77	1.55		0.50	0.80	0.68
Control Delay	89.6	34.7	38.1	41.9	61.7		61.2	267.3		70.0	32.9	32.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	89.6	34.7	38.1	41.9	61.7		61.2	267.3		70.0	32.9	32.2
LOS	F	C	D	D	E		E	F		E	C	C
Approach Delay		64.9			56.6			245.8			33.9	
Approach LOS		E			E			F			C	
Queue Length 50th (m)	24.3	5.2	13.2	19.8	62.9		35.9	~518.8		12.1	130.1	85.3
Queue Length 95th (m)	#47.7	11.8	23.8	33.0	86.5		m25.0	m#290.3		#32.6	#182.7	134.4
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)	168	484	406	357	455		443	1837		109	1549	693
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	0.65	0.06	0.17	0.28	0.62		0.75	1.55		0.50	0.80	0.68

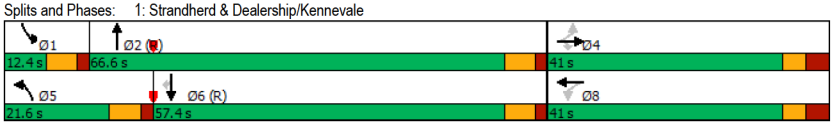
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.55

Intersection Signal Delay: 158.2	Intersection LOS: F
Intersection Capacity Utilization 135.0%	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)	137	833	336	79	1935	52	738	49	135	69	23	292
Future Volume (vph)	137	833	336	79	1935	52	738	49	135	69	23	292
Satd. Flow (prot)	1621	3241	1450	1621	3228	0	3144	1518	0	1621	1469	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3228	0	3144	1518	0	1621	1469	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	137	833	336	79	1987	0	738	184	0	69	315	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4		11.0	34.0		11.0	34.0	
Total Split (s)	12.0	58.5	58.5	13.5	60.0		14.0	34.0		14.0	34.0	
Total Split (%)	10.0%	48.8%	48.8%	11.3%	50.0%		11.7%	28.3%		11.7%	28.3%	
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		2.7	2.7		2.7	2.7	
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		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	
Act Effct Green (s)	6.3	52.6	52.6	7.3	53.6		8.0	30.1		7.7	27.3	
Actuated g/C Ratio	0.05	0.44	0.44	0.06	0.45		0.07	0.25		0.06	0.23	
v/c Ratio	1.63	0.59	0.53	0.81	1.38		3.53	0.48		0.66	0.94	
Control Delay	358.1	10.2	10.4	78.2	195.6		1167.6	44.5		83.9	82.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	358.1	10.2	10.4	78.2	195.6		1167.6	44.5		83.9	82.9	
LOS	F	B	B	E	F		F	D		F	F	
Approach Delay		46.7			191.1			943.4			83.1	
Approach LOS		D			F			F			F	
Queue Length 50th (m)	~49.6	18.9	12.8	17.7	~316.9		~157.8	37.5		15.9	71.9	
Queue Length 95th (m)	m#69.2	15.5	m12.7	m19.9	m#316.8		#194.4	60.2		#36.7	#124.1	
Internal Link Dist (m)		1040.6			787.0			275.6			103.1	
Turn Bay Length (m)	105.0		110.0	55.0			100.0			38.0		
Base Capacity (vph)	84	1419	635	98	1441		209	381		108	342	
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	1.63	0.59	0.53	0.81	1.38		3.53	0.48		0.64	0.92	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 116 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 3.53
Intersection Signal Delay: 290.2 Intersection LOS: F
Intersection Capacity Utilization 129.4% 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: 2: Borrisokane/Tartan & Strandherd

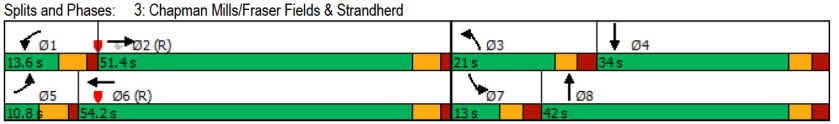
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	708	323	63	1538	16	520	0	115	35	0	12
Future Volume (vph)	4	708	323	63	1538	16	520	0	115	35	0	12
Satd. Flow (prot)	1621	3241	1450	1621	3234	0	3144	1450	0	1621	1450	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3234	0	3144	1450	0	1621	1450	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	4	708	323	63	1554	0	520	115	0	35	12	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8		11.0	34.0		11.0	34.0	
Total Split (s)	10.8	51.4	51.4	13.6	54.2		21.0	42.0		13.0	34.0	
Total Split (%)	9.0%	42.8%	42.8%	11.3%	45.2%		17.5%	35.0%		10.8%	28.3%	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6		2.7	2.7		2.7	2.7	
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)	5.8	5.8	5.8	5.8	5.8		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	
Act Effct Green (s)	5.9	61.2	61.2	9.4	71.5		15.0	26.4		6.7	13.2	
Actuated g/C Ratio	0.05	0.51	0.51	0.08	0.60		0.12	0.22		0.06	0.11	
v/c Ratio	0.05	0.43	0.44	0.50	0.81		1.32	0.36		0.39	0.08	
Control Delay	72.2	14.8	16.9	66.5	24.7		203.3	44.0		67.5	45.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.2	14.8	16.9	66.5	24.7		203.3	44.0		67.5	45.2	
LOS	E	B	B	E	C		F	D		E	D	
Approach Delay		15.6			26.3			174.4			61.8	
Approach LOS		B			C			F			E	
Queue Length 50th (m)	1.0	56.8	50.0	14.2	120.7		~80.6	25.0		8.0	2.6	
Queue Length 95th (m)	m1.2	101.4	101.8	28.6	#270.2		#113.8	36.7		18.5	7.4	
Internal Link Dist (m)		787.0			357.0			349.9			82.1	
Turn Bay Length (m)	40.0		145.0	40.0			105.0			40.0		
Base Capacity (vph)	79	1654	739	130	1926		393	435		94	338	
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	0.05	0.43	0.44	0.48	0.81		1.32	0.26		0.37	0.04	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 65 (54%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.32
Intersection Signal Delay: 51.7 Intersection LOS: D
Intersection Capacity Utilization 86.6% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Chapman Mills/Fraser Fields & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	226	688	126	101	1041	163	203	494	121	175	292	309
Future Volume (vph)	226	688	126	101	1041	163	203	494	121	175	292	309
Satd. Flow (prot)	1621	3241	1450	1621	3241	1450	3144	3135	0	3144	3241	1450
Flt Permitted	0.085			0.339			0.950			0.950		
Satd. Flow (perm)	145	3241	1431	578	3241	1450	3140	3135	0	3138	3241	1431
Satd. Flow (RTOR)			149			149		24				160
Lane Group Flow (vph)	226	688	126	101	1041	163	203	615	0	175	292	309
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8						6
Detector Phase	7	4	4	3	8	8	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5		11.3	35.5	35.5
Total Split (s)	20.5	53.5	53.5	14.0	47.0	47.0	15.0	38.4		14.1	37.5	37.5
Total Split (%)	17.1%	44.6%	44.6%	11.7%	39.2%	39.2%	12.5%	32.0%		11.8%	31.3%	31.3%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8		2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5		6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	60.5	46.8	46.8	47.3	40.2	40.2	9.0	31.9		8.1	31.0	31.0
Actuated g/C Ratio	0.50	0.39	0.39	0.39	0.34	0.34	0.08	0.27		0.07	0.26	0.26
v/c Ratio	0.93	0.54	0.19	0.35	0.96	0.28	0.86	0.72		0.83	0.35	0.63
Control Delay	73.2	30.3	3.0	20.0	58.8	7.0	86.7	44.1		84.8	37.7	25.0
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	73.2	30.3	3.0	20.0	58.8	7.0	86.7	44.1		84.8	37.7	25.0
LOS	E	C	A	C	E	A	F	D		F	D	C
Approach Delay		36.3			49.3			54.6			43.3	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	38.3	64.1	0.0	11.9	123.6	2.2	24.5	66.0		21.1	29.2	30.4
Queue Length 95th (m)	#84.6	82.2	8.0	21.4	#165.9	16.6	#45.8	86.3		#40.5	41.6	60.9
Internal Link Dist (m)		160.6			267.5			571.3			216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0			85.0		145.0
Base Capacity (vph)	244	1269	651	292	1093	588	236	851		212	837	488
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	0.93	0.54	0.19	0.35	0.95	0.28	0.86	0.72		0.83	0.35	0.63

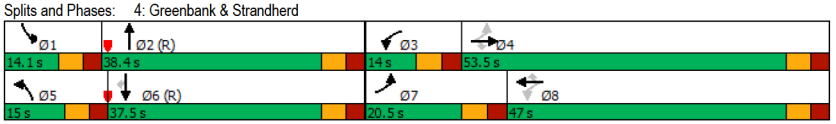
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 45.8	Intersection LOS: D
Intersection Capacity Utilization 95.5%	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: 4: Greenbank & Strandherd



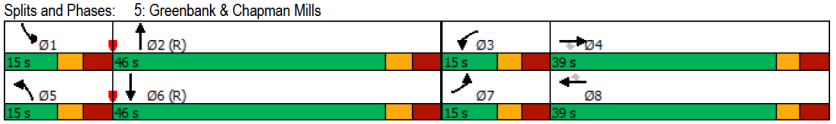
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	368	55	33	283	51	64	659	63	30	417	27
Future Volume (vph)	44	368	55	33	283	51	64	659	63	30	417	27
Satd. Flow (prot)	1621	1706	1450	1621	1706	1450	1621	3199	0	1621	3212	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	1706	1450	1621	1706	1450	1621	3199	0	1621	3212	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	44	368	55	33	283	51	64	722	0	30	444	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9		12.7	38.9	
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0		15.0	46.0	
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%		13.0%	40.0%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7		3.7	3.7	
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2		4.0	4.2	
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9		7.7	7.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	7.2	30.1	30.1	7.0	27.2	27.2	7.6	51.5		6.8	48.0	
Actuated g/C Ratio	0.06	0.26	0.26	0.06	0.24	0.24	0.07	0.45		0.06	0.42	
v/c Ratio	0.44	0.83	0.15	0.33	0.70	0.15	0.60	0.50		0.32	0.33	
Control Delay	65.5	56.1	32.7	60.7	49.6	34.0	75.9	28.0		60.5	26.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	65.5	56.1	32.7	60.7	49.6	34.0	75.9	28.0		60.5	26.7	
LOS	E	E	C	E	D	C	E	C		E	C	
Approach Delay		54.2			48.4			31.9			28.9	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	9.5	76.9	9.4	7.1	55.6	8.7	14.0	71.6		6.5	40.1	
Queue Length 95th (m)	21.3	#119.1	19.4	17.1	82.7	18.3	#33.6	93.2		16.0	54.3	
Internal Link Dist (m)		626.4			183.5			478.9			571.3	
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0			60.0		
Base Capacity (vph)	108	479	407	108	467	397	109	1431		103	1341	
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	0.41	0.77	0.14	0.31	0.61	0.13	0.59	0.50		0.29	0.33	

Intersection Summary

Cycle Length: 115
Actuated Cycle Length: 115
Offset: 52 (45%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83
Intersection Signal Delay: 39.1 — Intersection LOS: D
Intersection Capacity Utilization 75.5% — ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Chapman Mills



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	354	22	30	359	17	47	0	13	57	0	14
Future Volume (vph)	29	354	22	30	359	17	47	0	13	57	0	14
Satd. Flow (prot)	1621	1691	0	1621	1694	0	0	1593	0	0	1595	0
Flt Permitted	0.950			0.950				0.766			0.728	
Satd. Flow (perm)	1621	1691	0	1621	1694	0	0	1269	0	0	1208	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	29	376	0	30	376	0	0	60	0	0	71	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.5	25.9		11.5	25.9		44.3	44.3		44.3	44.3	
Total Split (s)	15.0	39.0		15.0	39.0		46.0	46.0		46.0	46.0	
Total Split (%)	15.0%	39.0%		15.0%	39.0%		46.0%	46.0%		46.0%	46.0%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	3.2	2.6		3.2	2.6		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.5	5.9		6.5	5.9			6.3			6.3	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	7.3	66.9		7.3	66.9			16.4			16.4	
Actuated g/C Ratio	0.07	0.67		0.07	0.67			0.16			0.16	
v/c Ratio	0.25	0.33		0.25	0.33			0.29			0.36	
Control Delay	54.0	10.2		48.6	14.4			36.6			39.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	54.0	10.2		48.6	14.4			36.6			39.0	
LOS	D	B		D	B			D			D	
Approach Delay		13.3			16.9			36.6			39.0	
Approach LOS		B			B			D			D	
Queue Length 50th (m)	5.9	4.7		5.5	31.0			10.9			13.1	
Queue Length 95th (m)	m10.4	104.9		14.2	91.6			15.8			18.3	
Internal Link Dist (m)		462.9			626.4			112.1			80.0	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	141	1132		137	1133			503			479	
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	0.21	0.33		0.22	0.33			0.12			0.15	

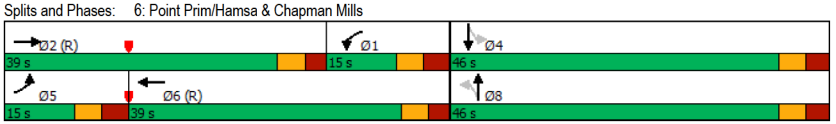
Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 2 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.36

Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 44.8%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 6: Point Prim/Hamsa & Chapman Mills



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	190	546	94	99	249	86
Future Volume (vph)	190	546	94	99	249	86
Satd. Flow (prot)	1621	1450	1706	1450	3144	1706
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1621	1450	1706	1450	3144	1706
Satd. Flow (RTOR)		546		99		
Lane Group Flow (vph)	190	546	94	99	249	86
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	24.2	24.2	11.0	35.2
Total Split (%)	41.3%	41.3%	40.3%	40.3%	18.3%	58.7%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	13.3	13.3	21.5	21.5	8.9	34.9
Actuated g/C Ratio	0.22	0.22	0.36	0.36	0.15	0.58
v/c Ratio	0.53	0.73	0.15	0.17	0.53	0.09
Control Delay	25.2	8.5	15.7	5.1	29.7	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	8.5	15.7	5.1	29.7	7.1
LOS	C	A	B	A	C	A
Approach Delay	12.8		10.2			23.9
Approach LOS	B		B			C
Queue Length 50th (m)	18.7	0.0	6.8	0.0	12.7	3.4
Queue Length 95th (m)	29.9	18.4	16.6	8.4	#27.9	10.8
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	509	830	620	590	468	993
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	0.37	0.66	0.15	0.17	0.53	0.09

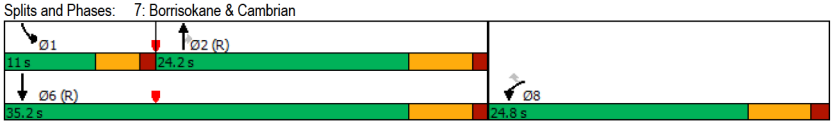
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 53.9%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 7: Borrisokane & Cambrian



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑		↰	↑	↱		↑	↱	↰	↑	
Traffic Volume (vph)	0	5	0	66	10	358	0	133	81	261	63	0
Future Volume (vph)	0	5	0	66	10	358	0	133	81	261	63	0
Satd. Flow (prot)	0	1706	0	1621	1706	1450	0	1706	1450	1621	1706	0
Flt Permitted				0.950						0.672		
Satd. Flow (perm)	0	1706	0	1621	1706	1450	0	1706	1450	1146	1706	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	5	0	66	10	358	0	133	81	261	63	0
Turn Type		NA		Prot	NA	custom		NA	Perm	Perm	NA	
Protected Phases		2		9	6			8			4	
Permitted Phases						9			8	4		
Detector Phase		2		9	6	9		8	8	4	4	
Switch Phase												
Minimum Initial (s)		5.0		10.0	5.0	10.0		10.0	10.0	10.0	10.0	
Minimum Split (s)		10.9		27.5	10.9	27.5		44.3	44.3	44.3	44.3	
Total Split (s)		15.0		39.0	15.0	39.0		46.0	46.0	46.0	46.0	
Total Split (%)		15.0%		39.0%	15.0%	39.0%		46.0%	46.0%	46.0%	46.0%	
Yellow Time (s)		3.3		3.3	3.3	3.3		3.3	3.3	3.3	3.3	
All-Red Time (s)		2.6		3.2	2.6	3.2		3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.9		6.5	5.9	6.5		6.3	6.3	6.3	6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max		Min	None	Min		Min	Min	Min	Min	
Act Effct Green (s)		24.0		29.0	24.0	29.0		28.3	28.3	28.3	28.3	
Actuated g/C Ratio		0.24		0.29	0.24	0.29		0.28	0.28	0.28	0.28	
v/c Ratio		0.01		0.14	0.02	0.85		0.28	0.20	0.81	0.13	
Control Delay		38.8		26.1	48.0	51.8		27.4	25.8	51.3	24.3	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		38.8		26.1	48.0	51.8		27.4	25.8	51.3	24.3	
LOS		D		C	D	D		C	C	D	C	
Approach Delay		38.8			47.8			26.8			46.1	
Approach LOS		D			D			C			D	
Queue Length 50th (m)		0.8		9.0	1.5	49.9		19.7	11.7	46.1	8.9	
Queue Length 95th (m)		4.3		24.4	m6.4	101.2		29.7	20.0	65.7	16.0	
Internal Link Dist (m)		50.9			462.9			117.7			349.9	
Turn Bay Length (m)				38.0		60.0			15.0	38.0		
Base Capacity (vph)		409		535	409	479		677	575	454	677	
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		0.01		0.12	0.02	0.75		0.20	0.14	0.57	0.09	

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 19 (19%), Referenced to phase 2:EBT, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 42.6	Intersection LOS: D
Intersection Capacity Utilization 49.5%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 8: Access #1 & BRT & Chapman Mills

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	119	0	11	11	0	130	5	548	5	66	232	56
Future Volume (vph)	119	0	11	11	0	130	5	548	5	66	232	56
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1706	1450	1621	1706	1450
Flt Permitted	0.674			0.750			0.950			0.950		
Satd. Flow (perm)	1150	1450	0	1279	1450	0	1621	1706	1450	1621	1706	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	119	11	0	11	130	0	5	548	5	66	232	56
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	28.8	28.8		28.8	28.8		10.3	24.3	24.3	10.3	24.3	24.3
Total Split (s)	28.8	28.8		28.8	28.8		10.3	30.9	30.9	10.3	30.9	30.9
Total Split (%)	41.1%	41.1%		41.1%	41.1%		14.7%	44.1%	44.1%	14.7%	44.1%	44.1%
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5		2.5	2.5		2.0	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	0.0
Total Lost Time (s)	5.8	5.8		5.8	5.8		5.3	5.3	5.3	5.3	5.3	5.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	14.2	14.2		14.2	14.2		5.5	38.6	38.6	7.2	46.9	46.9
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.08	0.55	0.55	0.10	0.67	0.67
v/c Ratio	0.51	0.04		0.04	0.44		0.04	0.58	0.01	0.40	0.20	0.06
Control Delay	31.4	19.3		19.5	27.9		30.8	20.0	13.2	33.7	9.0	8.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	19.3		19.5	27.9		30.8	20.0	13.2	33.7	9.0	8.2
LOS	C	B		B	C		C	C	B	C	A	A
Approach Delay		30.4			27.3			20.1			13.5	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	14.2	1.2		1.2	15.3		0.6	53.0	0.3	8.0	9.8	2.1
Queue Length 95th (m)	23.7	4.0		4.0	24.4		3.5	#118.4	2.3	#22.8	48.3	14.6
Internal Link Dist (m)		145.0			184.4			1276.6			273.4	
Turn Bay Length (m)	38.0			38.0			38.0		30.0	38.0		30.0
Base Capacity (vph)	377	476		420	476		128	941	800	166	1143	971
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.02		0.03	0.27		0.04	0.58	0.01	0.40	0.20	0.06

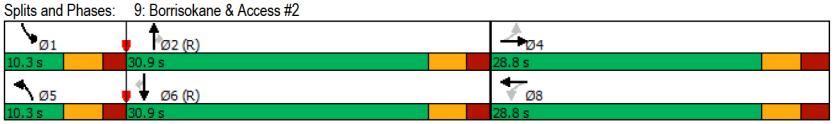
Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 43 (61%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 20.1	Intersection LOS: C
Intersection Capacity Utilization 69.9%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 9: Borrisokane & Access #2



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	5	5	0	10	0	0	796	0	0	349	0
Future Volume (vph)	0	5	5	0	10	0	0	796	0	0	349	0
Satd. Flow (prot)	1706	1706	1450	0	1706	0	1706	1706	0	1706	1706	1706
Flt Permitted												
Satd. Flow (perm)	1706	1706	1450	0	1706	0	1706	1706	0	1706	1706	1706
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	5	5	0	10	0	0	796	0	0	349	0
Turn Type	Perm	NA	Perm		NA		Perm	NA		Perm	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	10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.3	28.3	28.3	28.3	28.3		23.8	23.8		23.8	23.8	23.8
Total Split (s)	28.3	28.3	28.3	28.3	28.3		41.7	41.7		41.7	41.7	41.7
Total Split (%)	40.4%	40.4%	40.4%	40.4%	40.4%		59.6%	59.6%		59.6%	59.6%	59.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.3	2.3		2.3	2.3	2.3
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)	5.3	5.3	5.3		5.3		5.6	5.6		5.6	5.6	5.6
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)		12.6	12.6		12.6			59.0			59.0	
Actuated g/C Ratio		0.18	0.18		0.18			0.84			0.84	
v/c Ratio		0.02	0.02		0.03			0.55			0.24	
Control Delay		20.2	20.2		20.7			6.1			4.9	
Queue Delay		0.0	0.0		0.0			0.0			0.0	
Total Delay		20.2	20.2		20.7			6.1			4.9	
LOS		C	C		C			A			A	
Approach Delay		20.2			20.7			6.1			4.9	
Approach LOS		C			C			A			A	
Queue Length 50th (m)		0.6	0.6		1.2			0.0			0.0	
Queue Length 95th (m)		2.4	2.5		3.7			#156.9			42.6	
Internal Link Dist (m)		113.8			104.5			273.4			275.6	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		560	476		560			1439			1439	
Starvation Cap Reductn		0	0		0			0			0	
Spillback Cap Reductn		0	0		0			0			0	
Storage Cap Reductn		0	0		0			0			0	
Reduced v/c Ratio		0.01	0.01		0.02			0.55			0.24	

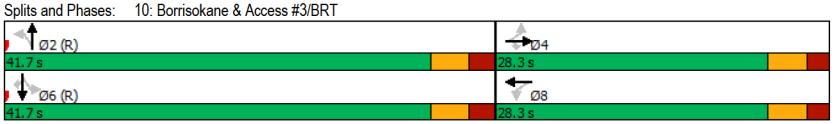
Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 6.0	Intersection LOS: A
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 10: Borrisokane & Access #3/BRT

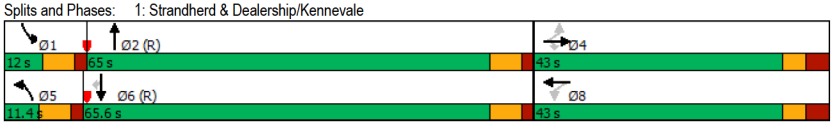


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	429	151	293	128	39	100	100	1823	132	93	2767	167
Future Volume (vph)	429	151	293	128	39	100	100	1823	132	93	2767	167
Satd. Flow (prot)	1621	1706	1450	1621	1522	0	3144	3203	0	1621	3241	1450
Flt Permitted	0.666			0.647			0.950			0.950		
Satd. Flow (perm)	1136	1706	1431	1103	1522	0	3144	3203	0	1620	3241	1450
Satd. Flow (RTOR)												
Lane Group Flow (vph)	429	151	293	128	139	0	100	1955	0	93	2767	167
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)	36.1	36.1	36.1	36.1	36.1		5.0	58.6		5.6	59.2	59.2
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.04	0.49		0.05	0.49	0.49
v/c Ratio	1.26	0.29	0.68	0.39	0.30		0.76	1.25		1.24	1.73	0.23
Control Delay	174.1	34.1	46.3	37.4	34.6		86.4	135.7		228.4	356.6	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	174.1	34.1	46.3	37.4	34.6		86.4	135.7		228.4	356.6	18.5
LOS	F	C	D	D	C		F	F		F	F	B
Approach Delay		107.0			35.9			133.3			334.0	
Approach LOS		F			D			F			F	
Queue Length 50th (m)	~124.8	26.9	59.9	23.5	24.8		11.6	~295.0		~26.7	~500.7	21.6
Queue Length 95th (m)	#185.3	44.5	90.8	41.3	42.0		m12.8	m#309.9		#60.0	#538.8	35.3
Internal Link Dist (m)		172.9			177.4			1040.6			345.0	
Turn Bay Length (m)	70.0		150.0	50.0			130.0			180.0		60.0
Base Capacity (vph)	341	513	430	331	457		131	1564		75	1598	715
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	1.26	0.29	0.68	0.39	0.30		0.76	1.25		1.24	1.73	0.23

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: 1.73
Intersection Signal Delay: 223.1 Intersection LOS: F
Intersection Capacity Utilization 132.2% 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



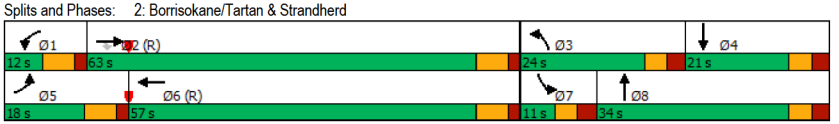
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	450	1894	749	141	1237	65	477	34	129	52	49	143
Future Volume (vph)	450	1894	749	141	1237	65	477	34	129	52	49	143
Satd. Flow (prot)	1621	3241	1450	1621	3218	0	3144	1503	0	1621	1515	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3218	0	3144	1503	0	1621	1515	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	450	1894	749	141	1302	0	477	163	0	52	192	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.4	56.4	56.4	11.4	56.4		11.0	34.0		11.0	16.0	
Total Split (s)	18.0	63.0	63.0	12.0	57.0		24.0	34.0		11.0	21.0	
Total Split (%)	15.0%	52.5%	52.5%	10.0%	47.5%		20.0%	28.3%		9.2%	17.5%	
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		2.7	2.7		2.7	2.7	
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		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	
Act Effct Green (s)	11.6	56.6	56.6	5.6	50.6		18.0	30.2		5.0	15.0	
Actuated g/C Ratio	0.10	0.47	0.47	0.05	0.42		0.15	0.25		0.04	0.12	
v/c Ratio	2.88	1.24	1.10	1.88	0.96		1.01	0.43		0.78	1.02	
Control Delay	872.5	124.8	61.1	454.2	50.6		95.4	43.1		116.4	121.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	872.5	124.8	61.1	454.2	50.6		95.4	43.1		116.4	121.9	
LOS	F	F	E	F	D		F	D		F	F	
Approach Delay		218.2			90.0			82.1			120.7	
Approach LOS		F			F			F			F	
Queue Length 50th (m)	~182.2	~283.7	~193.2	~50.9	168.1		~58.7	32.8		12.2	~46.1	
Queue Length 95th (m)	m#109.4	m40.4	m26.2	m#70.6	m170.8		#92.5	53.7		#34.4	#92.0	
Internal Link Dist (m)		1040.6			787.0			275.6			103.1	
Turn Bay Length (m)	105.0		110.0	55.0			100.0			38.0		
Base Capacity (vph)	156	1528	683	75	1356		471	378		67	189	
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	2.88	1.24	1.10	1.88	0.96		1.01	0.43		0.78	1.02	

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: 2.88
Intersection Signal Delay: 163.6 Intersection LOS: F
Intersection Capacity Utilization 111.6% 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



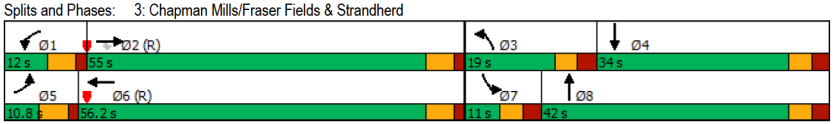
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1626	573	97	981	54	469	0	80	18	0	8
Future Volume (vph)	15	1626	573	97	981	54	469	0	80	18	0	8
Satd. Flow (prot)	1621	3241	1450	1621	3212	0	3144	1450	0	1621	1450	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	3241	1450	1621	3212	0	3144	1450	0	1621	1450	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	15	1626	573	97	1035	0	469	80	0	18	8	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Detector Phase	5	2	2	1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.8	26.8	26.8	10.8	26.8		11.0	34.0		11.0	34.0	
Total Split (s)	10.8	55.0	55.0	12.0	56.2		19.0	42.0		11.0	34.0	
Total Split (%)	9.0%	45.8%	45.8%	10.0%	46.8%		15.8%	35.0%		9.2%	28.3%	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.3	3.3		3.3	3.3	
All-Red Time (s)	1.6	1.6	1.6	1.6	1.6		2.7	2.7		2.7	2.7	
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)	5.8	5.8	5.8	5.8	5.8		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max	None	C-Max		None	Min		None	Min	
Act Effct Green (s)	6.4	55.8	55.8	14.4	70.8		13.0	27.8		5.0	13.2	
Actuated g/C Ratio	0.05	0.46	0.46	0.12	0.59		0.11	0.23		0.04	0.11	
v/c Ratio	0.17	1.08	0.85	0.50	0.55		1.38	0.24		0.27	0.05	
Control Delay	74.1	49.0	10.8	60.2	18.6		228.3	39.9		65.9	44.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	74.1	49.0	10.8	60.2	18.6		228.3	39.9		65.9	44.2	
LOS	E	D	B	E	B		F	D		E	D	
Approach Delay		39.2			22.1			200.8			59.2	
Approach LOS		D			C			F			E	
Queue Length 50th (m)	3.7	~209.3	16.7	21.2	58.2		~74.4	15.0		4.1	1.8	
Queue Length 95th (m)	m3.7	m#177.7	m48.1	#54.0	132.4		#106.5	26.8		11.7	5.6	
Internal Link Dist (m)		787.0			385.7			349.9			82.1	
Turn Bay Length (m)	40.0		145.0	40.0			105.0			40.0		
Base Capacity (vph)	86	1507	674	194	1895		340	435		67	338	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.17	1.08	0.85	0.50	0.55		1.38	0.18		0.27	0.02	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 43 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.38
Intersection Signal Delay: 57.1 Intersection LOS: E
Intersection Capacity Utilization 88.6% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Chapman Mills/Fraser Fields & Strandherd



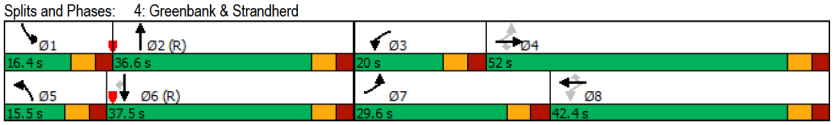
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	384	1270	245	243	924	184	205	507	147	251	641	259
Future Volume (vph)	384	1270	245	243	924	184	205	507	147	251	641	259
Satd. Flow (prot)	1621	3241	1450	1621	3241	1450	3144	3121	0	3144	3241	1450
Flt Permitted	0.094			0.111			0.950			0.950		
Satd. Flow (perm)	160	3241	1431	189	3241	1450	3141	3121	0	3138	3241	1431
Satd. Flow (RTOR)			227			201		28				259
Lane Group Flow (vph)	384	1270	245	243	924	184	205	654	0	251	641	259
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8						6
Detector Phase	7	4	4	3	8	8	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.6	33.5	33.5	11.6	33.5	33.5	11.3	35.5		11.3	35.5	35.5
Total Split (s)	29.6	52.0	52.0	20.0	42.4	42.4	15.5	36.6		16.4	37.5	37.5
Total Split (%)	23.7%	41.6%	41.6%	16.0%	33.9%	33.9%	12.4%	29.3%		13.1%	30.0%	30.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7		3.7	3.7	3.7
All-Red Time (s)	2.9	2.8	2.8	2.9	2.8	2.8	2.6	2.8		2.6	2.8	2.8
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	6.5	6.5	6.6	6.5	6.5	6.3	6.5		6.3	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	65.4	45.5	45.5	49.2	35.9	35.9	9.2	30.1		10.1	31.0	31.0
Actuated g/C Ratio	0.52	0.36	0.36	0.39	0.29	0.29	0.07	0.24		0.08	0.25	0.25
v/c Ratio	1.09	1.08	0.37	1.07	0.99	0.33	0.89	0.85		0.99	0.80	0.47
Control Delay	110.1	87.9	6.2	114.6	72.5	5.1	93.4	54.8		110.9	52.6	7.5
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	110.1	87.9	6.2	114.6	72.5	5.1	93.4	54.8		110.9	52.6	7.5
LOS	F	F	A	F	E	A	F	D		F	D	A
Approach Delay		81.9			70.9			64.0			55.2	
Approach LOS		F			E			E			E	
Queue Length 50th (m)	~90.9	~180.5	2.8	~51.1	117.7	0.0	25.8	76.9		31.9	77.0	0.0
Queue Length 95th (m)	#150.9	#222.2	20.1	#102.4	#161.3	13.3	#47.3	#104.8		#58.5	98.9	20.7
Internal Link Dist (m)		167.6			267.5			571.3			216.2	
Turn Bay Length (m)	66.0		95.0	120.0		66.0	72.0			85.0		145.0
Base Capacity (vph)	352	1179	665	227	930	559	231	772		254	803	549
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	1.09	1.08	0.37	1.07	0.99	0.33	0.89	0.85		0.99	0.80	0.47

Intersection Summary

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

Maximum v/c Ratio: 1.09
Intersection Signal Delay: 70.3 Intersection LOS: E
Intersection Capacity Utilization 104.6% 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.

Splits and Phases: 4: Greenbank & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	379	74	92	393	48	90	667	44	50	890	44
Future Volume (vph)	38	379	74	92	393	48	90	667	44	50	890	44
Satd. Flow (prot)	1621	1706	1450	1621	1706	1450	1621	3212	0	1621	3218	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1621	1706	1450	1621	1706	1450	1621	3212	0	1621	3218	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	38	379	74	92	393	48	90	711	0	50	934	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	12.3	38.5	38.5	12.3	38.5	38.5	12.7	38.9		12.7	38.9	
Total Split (s)	15.0	39.0	39.0	15.0	39.0	39.0	15.0	46.0		15.0	46.0	
Total Split (%)	13.0%	33.9%	33.9%	13.0%	33.9%	33.9%	13.0%	40.0%		13.0%	40.0%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7		3.7	3.7	
All-Red Time (s)	4.0	4.2	4.2	4.0	4.2	4.2	4.0	4.2		4.0	4.2	
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)	7.3	7.5	7.5	7.3	7.5	7.5	7.7	7.9		7.7	7.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	7.1	28.9	28.9	7.7	34.9	34.9	8.4	43.7		7.0	39.6	
Actuated g/C Ratio	0.06	0.25	0.25	0.07	0.30	0.30	0.07	0.38		0.06	0.34	
v/c Ratio	0.38	0.89	0.20	0.85	0.76	0.11	0.76	0.58		0.51	0.84	
Control Delay	62.9	64.0	34.4	107.3	48.1	31.5	90.3	32.6		70.7	43.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	62.9	64.0	34.4	107.3	48.1	31.5	90.3	32.6		70.7	43.7	
LOS	E	E	C	F	D	C	F	C		E	D	
Approach Delay		59.5			56.8			39.0			45.1	
Approach LOS		E			E			D			D	
Queue Length 50th (m)	8.2	78.7	12.6	20.6	82.4	8.0	20.2	71.0		10.9	102.3	
Queue Length 95th (m)	19.2	#124.2	24.6	#49.8	#131.6	17.5	#49.8	91.3		#23.8	#136.5	
Internal Link Dist (m)		626.4			183.5			478.9			571.3	
Turn Bay Length (m)	40.0		60.0	40.0		30.0	60.0			60.0		
Base Capacity (vph)	108	467	397	108	517	440	118	1219		103	1107	
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	0.35	0.81	0.19	0.85	0.76	0.11	0.76	0.58		0.49	0.84	

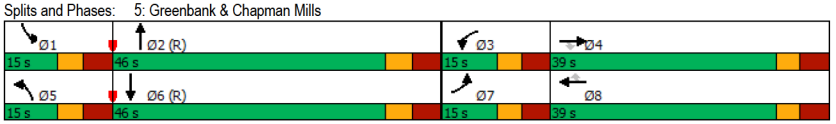
Intersection Summary
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 78 (68%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 48.1	Intersection LOS: D
Intersection Capacity Utilization 84.5%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 5: Greenbank & Chapman Mills



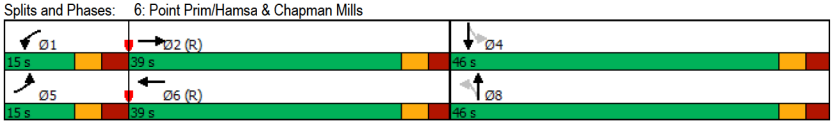
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	463	46	65	407	23	30	0	9	48	0	12
Future Volume (vph)	52	463	46	65	407	23	30	0	9	48	0	12
Satd. Flow (prot)	1621	1682	0	1621	1692	0	0	1592	0	0	1597	0
Flt Permitted	0.950			0.950				0.817			0.793	
Satd. Flow (perm)	1621	1682	0	1621	1692	0	0	1351	0	0	1316	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	52	509	0	65	430	0	0	39	0	0	60	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.5	25.9		11.5	25.9		44.3	44.3		44.3	44.3	
Total Split (s)	15.0	39.0		15.0	39.0		46.0	46.0		46.0	46.0	
Total Split (%)	15.0%	39.0%		15.0%	39.0%		46.0%	46.0%		46.0%	46.0%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	3.2	2.6		3.2	2.6		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.5	5.9		6.5	5.9			6.3			6.3	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		Max	Max		Max	Max	
Act Effct Green (s)	7.6	36.2		7.8	36.4			39.7			39.7	
Actuated g/C Ratio	0.08	0.36		0.08	0.36			0.40			0.40	
v/c Ratio	0.42	0.84		0.52	0.70			0.07			0.11	
Control Delay	36.9	60.6		59.0	36.0			19.3			19.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	36.9	60.6		59.0	36.0			19.3			19.9	
LOS	D	E		E	D			B			B	
Approach Delay		58.4			39.0			19.3			19.9	
Approach LOS		E			D			B			B	
Queue Length 50th (m)	10.7	105.2		12.1	73.2			4.6			7.1	
Queue Length 95th (m)	m13.8	m#118.6		25.4	#113.2			11.1			15.2	
Internal Link Dist (m)		462.9			626.4			112.1			80.0	
Turn Bay Length (m)	40.0			40.0								
Base Capacity (vph)	137	609		137	615			536			522	
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	0.38	0.84		0.47	0.70			0.07			0.11	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 24 (24%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84
Intersection Signal Delay: 46.8 Intersection LOS: D
Intersection Capacity Utilization 56.7% ICU Level of Service B
Analysis Period (min) 15
\# 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: 6: Point Prim/Hamsa & Chapman Mills



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	134	378	76	169	564	89
Future Volume (vph)	134	378	76	169	564	89
Satd. Flow (prot)	1621	1450	1706	1450	3144	1706
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1621	1450	1706	1450	3144	1706
Satd. Flow (RTOR)		378		169		
Lane Group Flow (vph)	134	378	76	169	564	89
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0
Minimum Split (s)	24.8	24.8	23.8	23.8	9.4	23.8
Total Split (s)	24.8	24.8	24.2	24.2	16.0	40.2
Total Split (%)	38.2%	38.2%	37.2%	37.2%	24.6%	61.8%
Yellow Time (s)	4.6	4.6	4.6	4.6	3.2	4.6
All-Red Time (s)	1.4	1.4	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	5.8	5.8	4.4	5.8
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	12.2	12.2	19.5	19.5	17.1	41.0
Actuated g/C Ratio	0.19	0.19	0.30	0.30	0.26	0.63
v/c Ratio	0.44	0.65	0.15	0.31	0.68	0.08
Control Delay	27.3	8.6	18.5	5.3	28.5	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	8.6	18.5	5.3	28.5	5.8
LOS	C	A	B	A	C	A
Approach Delay	13.5		9.4			25.4
Approach LOS	B		A			C
Queue Length 50th (m)	14.8	0.0	6.5	0.0	29.8	3.2
Queue Length 95th (m)	25.0	17.1	15.6	11.8	#60.3	10.3
Internal Link Dist (m)	489.2		241.1			1276.6
Turn Bay Length (m)	38.0			30.0	150.0	
Base Capacity (vph)	468	688	520	559	825	1075
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	0.29	0.55	0.15	0.30	0.68	0.08

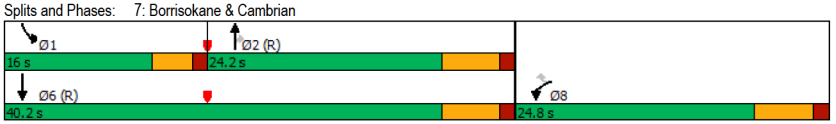
Intersection Summary
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 42.9%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 7: Borrisokane & Cambrian



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑		↰	↑	↱		↑	↱	↰	↑	
Traffic Volume (vph)	0	5	0	90	10	349	0	92	59	445	129	0
Future Volume (vph)	0	5	0	90	10	349	0	92	59	445	129	0
Satd. Flow (prot)	0	1706	0	1621	1706	1450	0	1706	1450	1621	1706	0
Flt Permitted				0.950						0.697		
Satd. Flow (perm)	0	1706	0	1621	1706	1450	0	1706	1450	1189	1706	0
Satd. Flow (RTOR)												
Lane Group Flow (vph)	0	5	0	90	10	349	0	92	59	445	129	0
Turn Type		NA		Prot	NA	custom		NA	Perm	Perm	NA	
Protected Phases		2		9	6			8			4	
Permitted Phases						9			8	4		
Detector Phase		2		9	6	9		8	8	4	4	
Switch Phase												
Minimum Initial (s)		5.0		10.0	5.0	10.0		10.0	10.0	10.0	10.0	
Minimum Split (s)		10.9		26.5	10.9	26.5		44.3	44.3	44.3	44.3	
Total Split (s)		15.0		39.0	15.0	39.0		46.0	46.0	46.0	46.0	
Total Split (%)		15.0%		39.0%	15.0%	39.0%		46.0%	46.0%	46.0%	46.0%	
Yellow Time (s)		3.3		3.3	3.3	3.3		3.3	3.3	3.3	3.3	
All-Red Time (s)		2.6		3.2	2.6	3.2		3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.9		6.5	5.9	6.5		6.3	6.3	6.3	6.3	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Max		None	None	None		Max	Max	Max	Max	
Act Effct Green (s)		13.6		28.0	13.6	28.0		39.7	39.7	39.7	39.7	
Actuated g/C Ratio		0.14		0.28	0.14	0.28		0.40	0.40	0.40	0.40	
v/c Ratio		0.02		0.20	0.04	0.86		0.14	0.10	0.94	0.19	
Control Delay		41.6		19.5	52.6	46.0		20.0	19.7	60.2	20.7	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.6		19.5	52.6	46.0		20.0	19.7	60.2	20.7	
LOS		D		B	D	D		B	B	E	C	
Approach Delay		41.6			40.8			19.9			51.3	
Approach LOS		D			D			B			D	
Queue Length 50th (m)		0.9		16.7	0.0	72.2		11.0	7.0	80.5	15.8	
Queue Length 95th (m)		4.3		m23.9	m0.0	#101.7		21.1	15.1	#140.9	28.1	
Internal Link Dist (m)		67.7			462.9			117.7			349.9	
Turn Bay Length (m)				38.0		60.0			15.0	38.0		
Base Capacity (vph)		231		526	231	471		677	575	472	677	
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		0.02		0.17	0.04	0.74		0.14	0.10	0.94	0.19	

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 28 (28%), Referenced to phase 2:EBT, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 43.3	Intersection LOS: D
Intersection Capacity Utilization 54.8%	ICU Level of Service A
Analysis Period (min) 15	

\# 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: 8: Access #1 & BRT & Chapman Mills

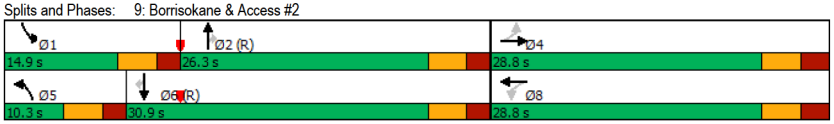
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	0	8	8	0	92	10	340	10	130	545	115
Future Volume (vph)	85	0	8	8	0	92	10	340	10	130	545	115
Satd. Flow (prot)	1621	1450	0	1621	1450	0	1621	1706	1450	1621	1706	1450
Flt Permitted	0.697			0.752			0.950			0.950		
Satd. Flow (perm)	1189	1450	0	1283	1450	0	1621	1706	1450	1621	1706	1450
Satd. Flow (RTOR)		334			411				126			126
Lane Group Flow (vph)	85	8	0	8	92	0	10	340	10	130	545	115
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	28.8	28.8		28.8	28.8		10.3	24.3	24.3	10.3	24.3	24.3
Total Split (s)	28.8	28.8		28.8	28.8		10.3	26.3	26.3	14.9	30.9	30.9
Total Split (%)	41.1%	41.1%		41.1%	41.1%		14.7%	37.6%	37.6%	21.3%	44.1%	44.1%
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5		2.5	2.5		2.0	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	0.0
Total Lost Time (s)	5.8	5.8		5.8	5.8		5.3	5.3	5.3	5.3	5.3	5.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	13.1	13.1		13.1	13.1		5.7	37.2	37.2	9.8	47.9	47.9
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.08	0.53	0.53	0.14	0.68	0.68
v/c Ratio	0.38	0.01		0.03	0.15		0.08	0.37	0.01	0.57	0.47	0.11
Control Delay	28.3	0.0		20.1	0.5		31.4	16.6	0.0	37.1	9.0	1.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	0.0		20.1	0.5		31.4	16.6	0.0	37.1	9.0	1.5
LOS	C	A		C	A		C	B	A	D	A	A
Approach Delay		25.9			2.1			16.6			12.6	
Approach LOS		C			A			B			B	
Queue Length 50th (m)	10.3	0.0		0.9	0.0		1.2	28.0	0.0	15.6	25.7	0.0
Queue Length 95th (m)	17.6	0.0		3.3	0.0		5.3	63.7	0.0	m#33.7	#124.5	m7.3
Internal Link Dist (m)		154.2			129.4			1276.6			273.4	
Turn Bay Length (m)	38.0			38.0			38.0		30.0	38.0		30.0
Base Capacity (vph)	390	700		421	752		131	907	830	243	1167	1032
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	0.22	0.01		0.02	0.12		0.08	0.37	0.01	0.53	0.47	0.11

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 70
Offset: 42 (60%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57
Intersection Signal Delay: 13.8 — Intersection LOS: B
Intersection Capacity Utilization 59.7% — ICU Level of Service B
Analysis Period (min) 15
\# 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: 9: Borrisokane & Access #2



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	5	5	0	10	0	0	517	0	0	785	0
Future Volume (vph)	0	5	5	0	10	0	0	517	0	0	785	0
Satd. Flow (prot)	1706	1706	1450	0	1706	0	1706	1706	0	1706	1706	1706
Flt Permitted												
Satd. Flow (perm)	1706	1706	1450	0	1706	0	1706	1706	0	1706	1706	1706
Satd. Flow (RTOR)			41									
Lane Group Flow (vph)	0	5	5	0	10	0	0	517	0	0	785	0
Turn Type	Perm	NA	Perm		NA		Perm	NA		Perm	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	10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	28.3	28.3	28.3	28.3	28.3		23.6	23.6		23.6	23.6	23.6
Total Split (s)	28.3	28.3	28.3	28.3	28.3		41.7	41.7		41.7	41.7	41.7
Total Split (%)	40.4%	40.4%	40.4%	40.4%	40.4%		59.6%	59.6%		59.6%	59.6%	59.6%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.3	2.3		2.3	2.3	2.3
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)	5.3	5.3	5.3		5.3		5.6	5.6		5.6	5.6	5.6
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)		12.6	12.6		12.6			59.0			59.0	
Actuated g/C Ratio		0.18	0.18		0.18			0.84			0.84	
v/c Ratio		0.02	0.02		0.03			0.36			0.55	
Control Delay		20.2	0.2		20.7			3.8			9.3	
Queue Delay		0.0	0.0		0.0			0.0			0.0	
Total Delay		20.2	0.2		20.7			3.8			9.3	
LOS		C	A		C			A			A	
Approach Delay		10.2			20.7			3.8			9.3	
Approach LOS		B			C			A			A	
Queue Length 50th (m)		0.6	0.0		1.2			0.8			0.0	
Queue Length 95th (m)		2.4	0.0		3.7			82.9			#155.3	
Internal Link Dist (m)		209.1			212.9			273.4			275.6	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		560	503		560			1439			1439	
Starvation Cap Reductn		0	0		0			0			0	
Spillback Cap Reductn		0	0		0			0			0	
Storage Cap Reductn		0	0		0			0			0	
Reduced v/c Ratio		0.01	0.01		0.02			0.36			0.55	

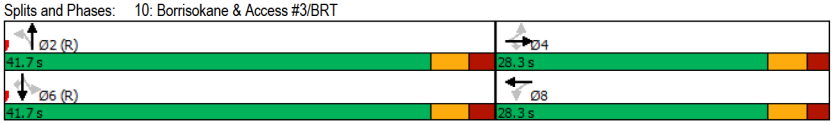
Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 73.8%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 10: Borrisokane & Access #3/BRT



Appendix L

TDM Checklist for Subdivisions

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	☐