3288 Greenbank Road

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report

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PN: 2019-09

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1 Screening

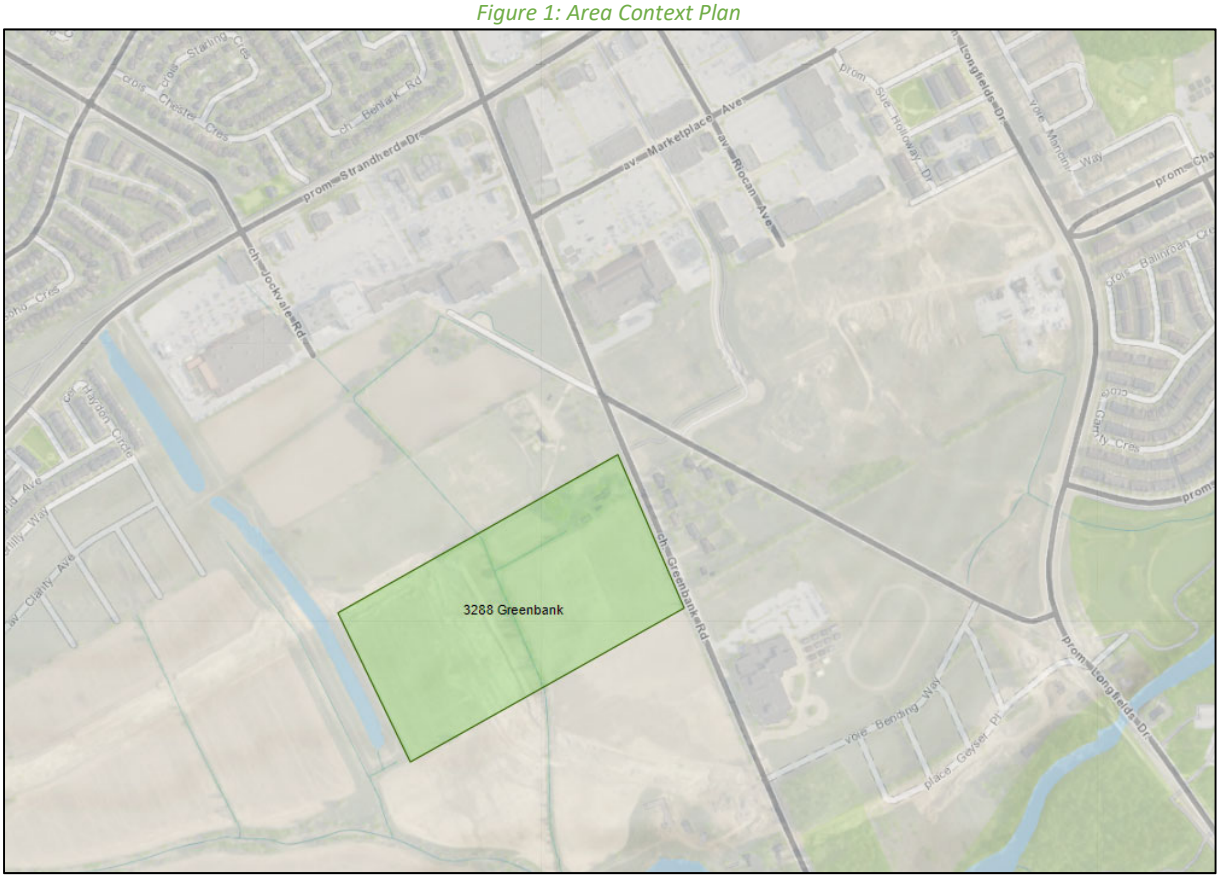
This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required including the Design Review component and the Network Impact Component.

2 Existing and Planned Conditions

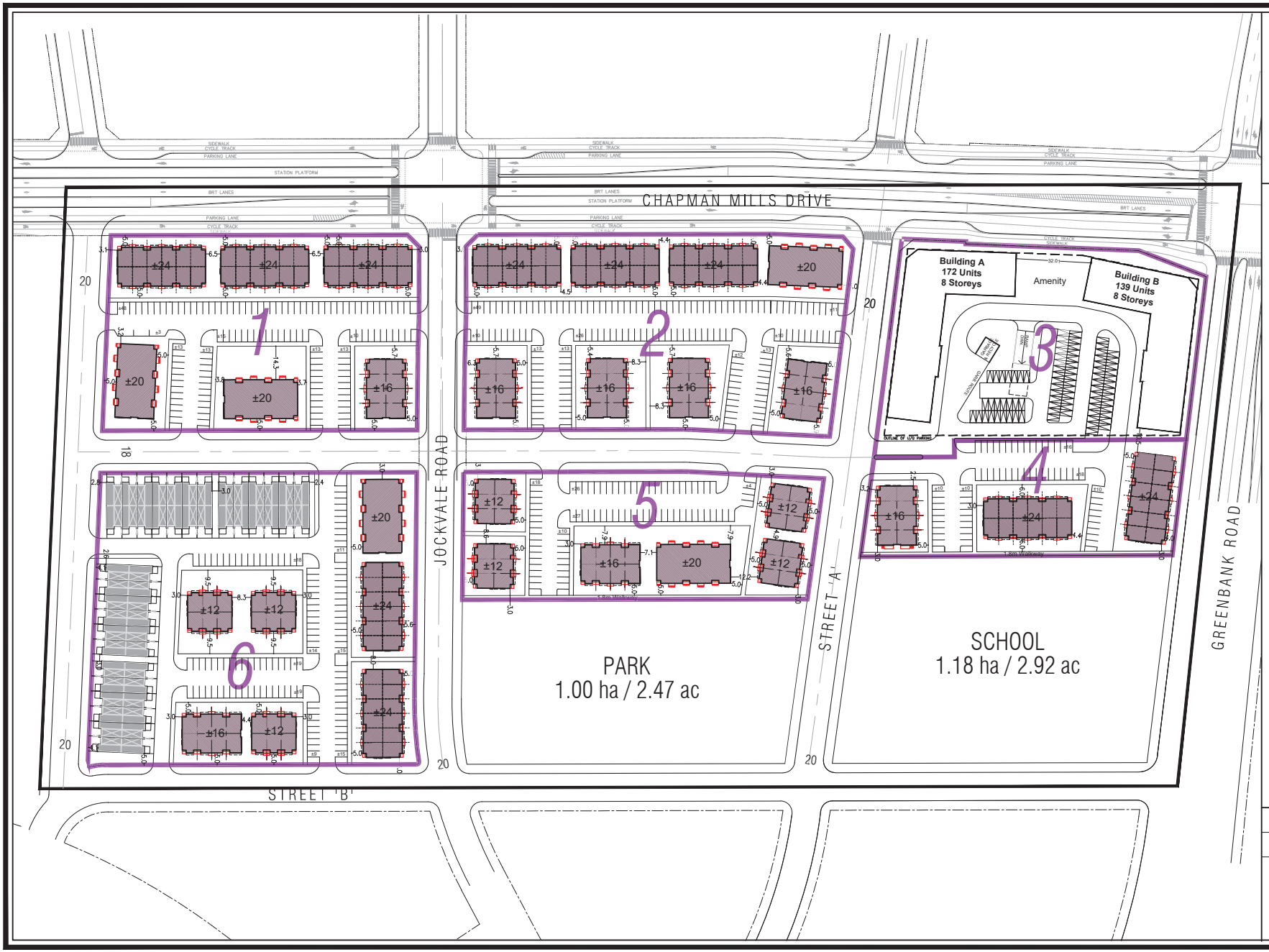
2.1 Proposed Development

The proposed development, located at 3288 Greenbank Road, is currently zoned as Development Reserve (DR). The existing land is currently a mix of farm fields and a private dwelling. The proposed development would include a total of 310 apartment units and 602 townhome units within a single development phase. Jockvale Road will be extended south from the adjacent development to the north, Chapman Mills Drive will be extended west of Greenbank Road with the adjacent development to the north, and a new east-west road Street 'B' will be constructed along the south frontage with the adjacent project owner to connect to Greenbank Road. Two right-in/right-out accesses are proposed along Chapman Mills Road, with a signalized full movement intersection at Jockvale Road and Chapman Mills. Three local road intersections will connect to Street 'B'. The anticipated full build-out and occupancy horizon is 2025. The development is located within the Nepean Towncentre Design Priority and Community Design Plan area, and the Nepean Area 7 Secondary Plan area. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 13, 2019



Concept 12B

South Nepean Town Centre
City of Ottawa

DWELLING TYPE	UNIT COUNT	(%)
Stacked Back To Back Town	552	60
Back-to-Back Town	50	5
Apartment	311	34
Total	**913**	**100**

PARCEL #	UNIT COUNT	AREA (HA)	DENSITY (UPH)
1	128	1.11	115
2	156	1.35	116
3	311	1.10	283
4	64	0.63	102
5	84	0.81	104
6	170	1.71	99
Total	**913**	**6.71**	**136**

PARKING PROVIDED

Stacked B2B Towns

Parcel 1: ±128 spaces (±1.00 space/unit)
Parcel 2: ±157 spaces (±1.01 space/unit)
Parcel 4: ±64 spaces (±1.00 space/unit)
Parcel 5: ±85 spaces (±1.01 space/unit)
Parcel 6: ±120 spaces (±1.00 space/unit)

Total: ±554 spaces

December 11, 2018

Scale 1:1500

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2.2 Existing Conditions

2.2.1 Area Road Network

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.

Jockvale Road (rural): Jockvale Road, adjacent to Greenbank Road, is a City of Ottawa local road with a two-lane cross-section that transitions between an urban cross section and a rural cross section, with gravel shoulders. The posted speed is 60 km/h and the right-of-way is 26.0 metre west of Greenbank Road and 20.0 metre to the east.

Jockvale Road (urban): Jockvale Road, north of Strandherd Drive, is a City of Ottawa major collector road with a two-lane rural cross-section including gravel shoulders. The posted speed limit is 60 km/h and the right-of-way is 26.0 metre. South of Strandherd Drive, Jockvale Road is a City of Ottawa collector road with an unposted 50 km/h speed limit. The road is an urban cross-section, with 24.0 metre dedicated to the right-of-way, narrowing to 20.0 metre between the existing commercial/retail (currently a Best Buy and Home Depot).

Strandherd Drive: Strandherd Drive is a City of Ottawa arterial road with a four-lane urban cross-section, including sidewalks. The posted speed limit is 60 km/h and the Ottawa Official Plan reserves a 44.5 metre right of way.

Marketplace Avenue: Marketplace Avenue is a City of Ottawa collector road with a two-lane urban cross-section, including sidewalks and on-street parking. The posted speed limit is 50 km/h and the right-of-way is 20.0 metre.

Chapman Mills Drive: Chapman Mills Drive is a City of Ottawa major collector road with a divided two-lane urban cross-section and centre median bus rapid transit. Sidewalks and on-street parking are provided on both sides of the roadway, and buffered bike lanes are provided on blocks east of Beatrice Drive. The posted speed limit is 40 km/h during school days/hours, otherwise an unposted 50km/h speed limit, and the right-of-way is 41.0 metres.

2.2.2 Existing Intersections

Greenbank Road / Jockvale Road	The intersection of Greenbank Road and Jockvale Road is a signalized intersection with shared all movement lanes on the north and east bound approaches. The southbound approach consists of an auxiliary left-turn lane and a shared through/right-turn lane, and the westbound approach consists of a shared left-turn/through lane and an auxiliary right-turn lane. No turn restrictions were noted.
Greenbank Road / Marketplace Avenue	The intersection of Greenbank Road and Marketplace Avenue is a signalized intersection. The east and west bound approaches consist of an auxiliary left-turn lane and a shared through/right-turn lane. The southbound approach consists of dual auxiliary left-turn lanes, a through lane, a shared through/right-turn lane, and a bike lane. The northbound approach consists of an auxiliary left-turn lane, a through lane, and a shared through/right-turn lane. No turn restrictions were noted.
Strandherd Drive / Greenbank Road	The intersection of Strandherd Drive and Greenbank Road is a signalized intersection. The east and west bound approaches consist of an auxiliary left-turn lane, two through lanes, an auxiliary channelized right-turn lane, and a pocket bike lane. The northbound

	approach consists of dual auxiliary left-turn lanes, a through lane, a shared through/right-turn lane and a bike lane. The southbound approach consists of dual auxiliary left-turn lanes, two through lanes, an auxiliary channelized right-turn lane, and a pocket bike lane. No turn restrictions were noted.
Strandherd Drive / Jockvale Road	The intersection of Strandherd Drive and Greenbank Road is a signalized intersection. The east and west bound approaches consist of an auxiliary left-turn lane, a through lane, and a shared through/right-turn lane. The northbound approach consists of an auxiliary left-turn lane, through lane, and an auxiliary right-turn lane. The southbound approach consists of an auxiliary left-turn lane, and a shared through/right-turn lane. No turn restrictions were noted.

2.2.3 Existing Driveways

Along Greenbank Road, there are two accesses to the Barrhaven Towncentre, two accesses to the Loblaws site in the Chapman Mills Marketplace, and a residential driveways and St Joseph High School accesses are south of the Jockvale Road intersection. The Barrhaven Towncentre accesses are both right-in/right-out, the Loblaws access to the parking lot is right-in/right-out, and the loading access at the back of Loblaws permits full movements.

Along Strandherd Drive, there are an additional three right-in/right-out accesses and a signalized intersection for the Barrhaven Towncentre.

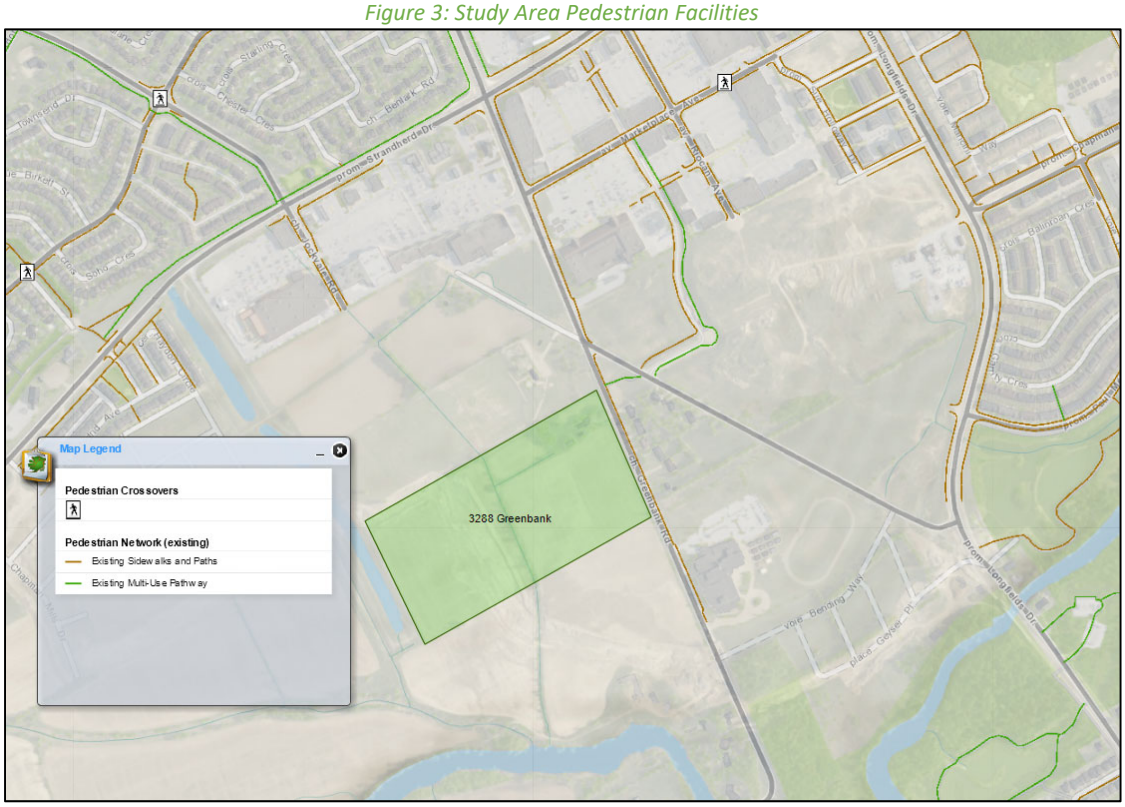
The On The Green golf range and mini putt access is located on Jockvale Road, west of Greenbank Road.

2.2.4 Cycling and Pedestrian Facilities

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

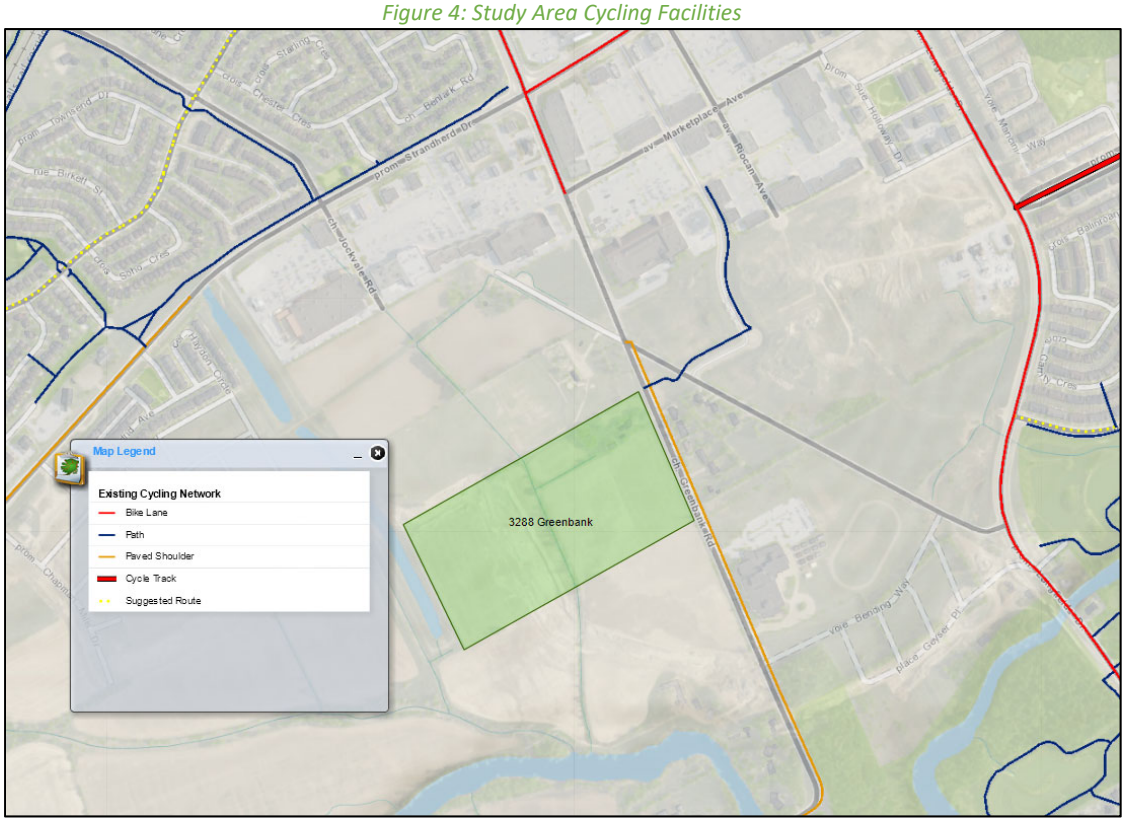
Sidewalks are provided along both sides of the roadways in the study area with a multi-use pathway on the north side of Strandherd Drive and along the Southwest Transitway. The cycling network consists of the bike lanes north and east of the Greenbank Road and Strandherd Drive intersection, the multi-use pathways and a path along the east side of Greenbank Road, south of Jockvale Road.

Figure 3: Study Area Pedestrian Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 13, 2019

Figure 4: Study Area Cycling Facilities



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 13, 2019

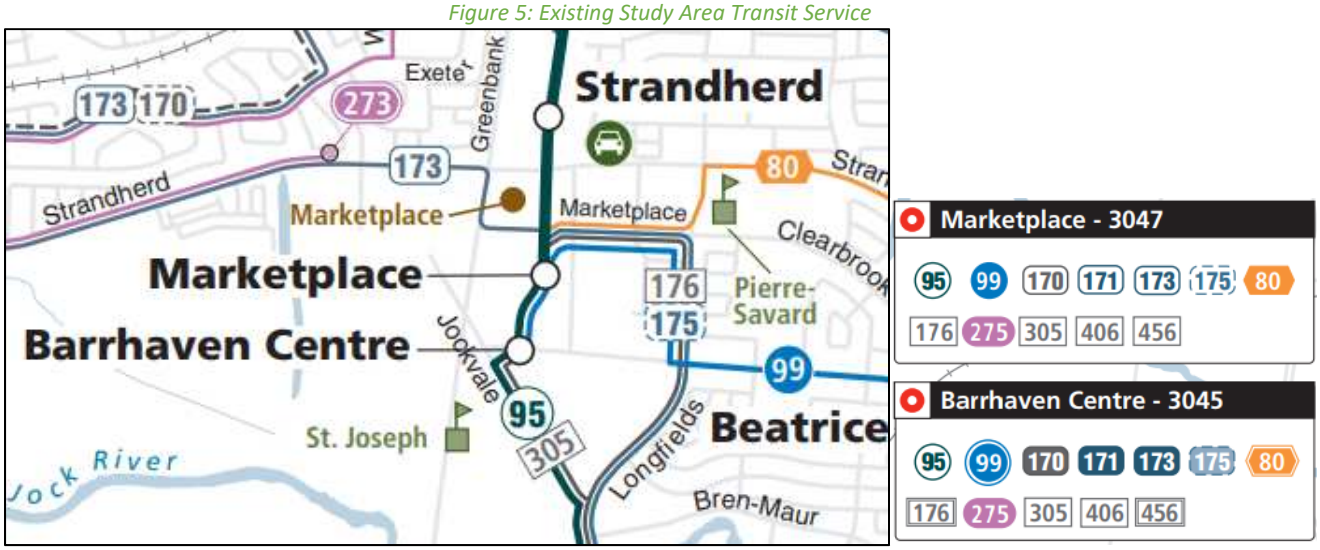
2.2.5 Existing Transit

Within the study area, the Southwest Transitway ends at the Barrhaven Towncentre Station, and includes Marketplace and Strandherd Stations. Routes #80, 95, 99, 170, 171, 173, 175, 176, 276, 305, 406, and 456 stop at the Marketplace and Barrhaven Towncentre Stations, with route #173 traveling along Marketplace Avenue to Greenbank Road and west on Strandherd Drive, and routes #95 and 305 south on Greenbank Road from Jockvale Road. An additional route #273 travels along Strandherd Drive, west of Jockvale Road. The frequency of these routes within proximity of the proposed site currently are:

- Route #95 – under 5 minutes in the peak direction, and 10-15 minutes or 30 minutes in the off-peak direction and off-peak times
- Route #99 – every 15 minutes in the peak direction, and 30 minutes in the off-peak direction and off-peak times
- Route #173 – every 30 minutes

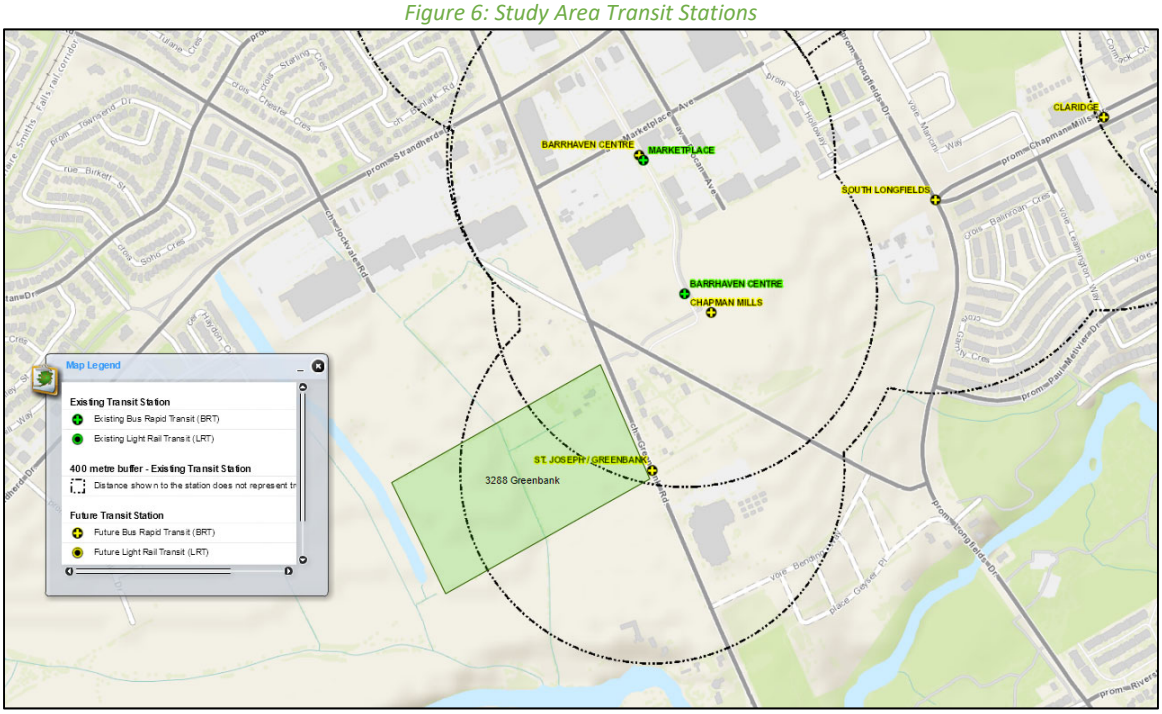
Figure 5 illustrates the transit system map in the study area and Figure 6 illustrates the walking distance for the Southwest Transitway. The existing Transitway stations are beyond the 400m walk distance to the site, and the future Greenbank-St Joseph station will be directly adjacent to the proposed site.

Figure 5: Existing Study Area Transit Service



Source: http://www.octranspo.com/ Accessed: March 13, 2019

Figure 6: Study Area Transit Stations



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: March 13, 2019

2.2.6 Existing Area Traffic Management Measures

No existing area traffic management measures are noted within the Study Area.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the City of Ottawa for the existing Study Area intersection. Table 1 summarizes the intersection count dates.

Table 1: Intersection Count Date

Intersection	Count Date
Greenbank Road and Jockvale Road	August 16, 2016
Greenbank Road and Marketplace Avenue	February 10, 2016
Strandherd Drive and Greenbank Road	August 16, 2016
Strandherd Drive and Jockvale Road	January 18, 2018

Figure 7 illustrates the existing traffic counts and Table 2 summarizes the existing intersection operations. The level of service is based on the HCM criteria for average delay at signalized 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

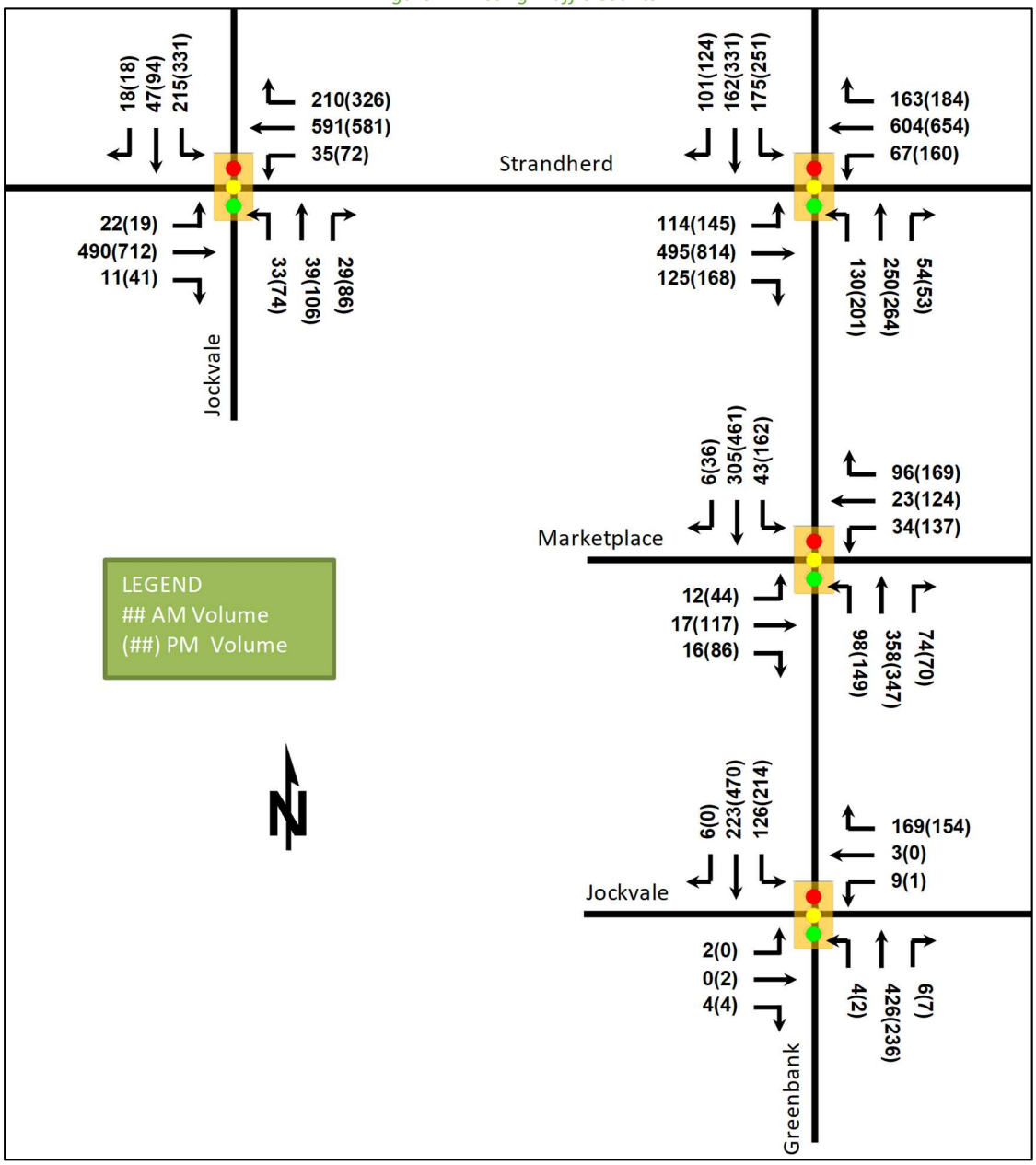


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Greenbank Road & Jockvale Road *Signalized*	EB	A	0.2	0.03	0.0	D	37.0	0.04	4.9
	WBL/T	D	52.9	0.10	9.7	D	51.0	0.01	2.1
	WBR	B	12.4	0.56	19.5	B	14.7	0.58	18.1
	NB	A	6.7	0.36	71.1	A	4.6	0.20	38.8
	SBL	A	2.8	0.18	7.0	A	1.6	0.25	13.4
	SBT/R	A	1.6	0.16	11.3	A	1.6	0.31	36.2
	Overall	**A**	**6.5**	-	-	**A**	**4.3**	-	-
Greenbank Road & Marketplace Avenue *Signalized*	EBL	D	40.4	0.08	8.2	C	31.2	0.27	17.3
	EBT/R	C	34.2	0.23	15	D	46.6	0.65	69.8
	WBL	D	43.9	0.22	17.4	D	44.5	0.62	44.5
	WBT/R	C	21	0.5	25.7	E	55.7	0.83	#108.0
	NBL	E	58.8	0.54	44.7	F	84.9	0.83	#83.7
	NBT/R	A	9.2	0.23	34.9	C	21.7	0.32	45.1
	SBL	E	59.1	0.25	12.9	E	63.5	0.58	m34.3
	SBT/R	B	14.4	0.18	28	C	21.2	0.40	m44.4
	Overall	**C**	**20.7**	-	-	**D**	**39.8**	-	-
Greenbank Road & Strandherd Drive *Signalized*	EBL	C	30.7	0.52	31.7	C	34.7	0.65	40.0
	EBT	D	39.2	0.57	79.2	E	62.4	0.95	#157.7
	EBR	A	5.5	0.26	13.2	A	6.3	0.34	17.3
	WBL	C	24.1	0.27	20.1	E	58.8	0.84	#67.9
	WBT	D	50.9	0.82	100.4	D	44.8	0.76	110.2
	WBR	A	6.8	0.36	17.2	A	6.2	0.36	18.2
	NBL	E	73.6	0.5	30.8	E	69.9	0.61	m42.6
	NBT/R	C	27.6	0.31	52	C	25.7	0.39	m28.4
	SBL	E	57.9	0.58	35.3	E	58.9	0.69	48.4
	SBT	C	29.2	0.15	27.8	D	36.1	0.38	55.5
	SBR	A	2.8	0.18	6.8	A	5.8	0.26	13.8
	Overall	**D**	**36.9**	-	-	**D**	**43.7**	-	-
Jockvale Road & Strandherd Drive *Signalized*	EBL	B	15.2	0.09	7.3	B	12.5	0.08	6.3
	EBT/R	C	23.4	0.37	66.2	C	23.6	0.51	107.6
	WBL	B	15.1	0.1	10.5	B	13.5	0.25	17.2
	WBT/R	C	26.2	0.6	111.5	B	19.1	0.57	121.8
	NBL	D	42.9	0.15	18.2	E	66.9	0.59	35.4
	NBT	D	41.9	0.13	19.8	E	60.8	0.57	46.1
	NBR	A	0.4	0.08	0	A	4.5	0.32	4.5
	SBL	C	33.2	0.54	66.5	F	108.8	1.08	#149.9
	SBT/R	B	19.5	0.11	19.2	C	29.9	0.24	35.3
	Overall	**C**	**25.9**	-	-	**D**	**35.5**	-	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 0.90

The existing intersection operations generally operate satisfactorily during the peak hours, with the exception of the northbound left-turn movement at the Greenbank Road and Marketplace Avenue intersection and the southbound left-turn at the Jockvale Road and Strandherd Drive intersection during the PM peak that may operate at a level of service F.

The northbound left-turn at the Greenbank Road and Marketplace Avenue intersection may experience high delays with residual volume-to-capacity is provided. Greenbank Road provides space for a dual left-turn

movement, but this will require modification to the Barrhaven Town Centre access, limiting the feasibility of this modification until redevelopment occurs.

The Jockvale Road and Strandherd Drive southbound left-turn will experience high delays and is over capacity. Additional time may be available in the signal cycle to shift from the east-west movements to alleviate the delays for the north-south movements, although this will need to be coordinated along the Strandherd Drive corridor and beyond the study area.

2.2.8 Collision Analysis

Collision data has been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study are road network. Table 3 summarizes the collisions types and conditions in the study area, Figure 8 illustrates the intersections and segments analyzed, and Table 4 summarizes the total collisions for each of these locations.

Table 3: Study Area Collision Summary, 2013-2017

		Number	%
Total Collisions		**301**	**100%**
Classification	**Fatality**	1	0%
	Non-Fatal Injury	61	20%
	Property Damage Only	239	79%
Initial Impact Type	**Approaching**	6	2%
	Angle	21	7%
	Rear end	150	50%
	Sideswipe	32	11%
	Turning Movement	63	21%
	SMV Unattended	1	0%
	SMV Other	24	8%
	Other	4	1%
Road Surface Condition	**Dry**	197	65%
	Wet	60	20%
	Loose Snow	23	8%
	Slush	3	1%
	Packed Snow	6	2%
	Ice	11	4%
	Unknown	1	0%
Pedestrian Involved		2	1%
Cyclists Involved		5	2%

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

Table 4: Summary of Collision Locations

Intersections / Segments	Number 301	% 100%
Greenbank Rd @ Jockvale Rd	33	11%
Greenbank Rd @ Marketplace Ave	23	8%
Greenbank Rd @ Strandherd Dr	127	42%
Greenbank Rd btwn Jockvale Rd & Cambrian Rd	29	10%
Greenbank Rd btwn Marketplace Ave & Jockvale Rd	7	2%
Greenbank Rd btwn Strandherd Dr & Marketplace Ave	5	2%
Jockvale Rd @ Strandherd Dr	50	17%
Jockvale Rd btwn End & Strandherd Dr	1	0%
Strandherd Dr @ 215 W of Greenbank Rd/Barrhaven	7	2%
Strandherd Dr btwn 215 W of Greenbank Rd/Barrhaven Mall SC & Greenbank	7	2%
Strandherd Dr btwn Andora Ave & Jockvale Rd	9	3%
Strandherd Dr btwn Jockvale Rd & 215 W of Greenbank Rd/Barrhaven Mall	3	1%

Within the study area, the intersections of Greenbank Road at Strandherd Drive, and Jockvale Road at Strandherd Drive are noted to have significantly higher collision rates than the other study area intersections. Table 5 and Table 6 summarize the collision types and conditions for each of the Greenbank Road at Strandherd Drive, Jockvale Road at Strandherd Drive intersections.

Table 5: Greenbank Road at Strandherd Drive Collision Summary

		Number	%
Total Collisions		**127**	**100%**
Classification	Fatality	0	0%
	Non-Fatal Injury	26	20%
	Property Damage Only	101	80%
Initial Impact Type	Angle	5	4%
	Rear end	69	54%
	Sideswipe	16	13%
	Turning Movement	33	26%
	SMV Other	2	2%
	Other	2	2%
Road Surface Condition	Dry	87	69%
	Wet	25	20%
	Loose Snow	9	7%
	Slush	2	2%
	Packed Snow	1	1%
	Ice	2	2%
	Unknown	1	1%
Pedestrian Involved		0	0%
Cyclists Involved		2	2%

The Greenbank Road at Strandherd Drive intersection had a total of 127 collisions during the 2013-2017 time period, with 101 involving property damage only, and the remaining 26 having non-fatal injuries. The high volume of rear end and turning movement collisions would indicate congestion being a major factor in the cause for the high collision rates. Combined with the predominantly property damage classification, these are low speed impacts. The turning movement collisions typically present a potential hazard to pedestrians and cyclists, in which the only documented cyclist collisions occurred in 2013. Weather conditions are not considered to have a major impact on the collisions.

Table 6: Jockvale Road at Strandherd Drive Collision Summary

		Number	%
Total Collisions		**50**	**100%**
Classification	Fatality	1	2%
	Non-Fatal Injury	10	20%
	Property Damage Only	39	78%
Initial Impact Type	Angle	1	2%
	Rear end	27	54%
	Sideswipe	1	2%
	Turning Movement	18	36%
	SMV Other	3	6%
Road Surface Condition	Dry	34	68%
	Wet	9	18%
	Loose Snow	5	10%
	Ice	2	4%
Pedestrian Involved		2	4%
Cyclists Involved		1	2%

Similar to Greenbank Road at Strandherd Drive, property damage classification with rear end and turning movement collisions are the predominant trend at the Jockvale Road at Strandherd Drive intersection. Similar conclusions can also be drawn at this intersection, although a fatal collision with a pedestrian did occur in 2014. The fatal collision was at night, which likely contributed to the incident.

Collision data is included in Appendix D.

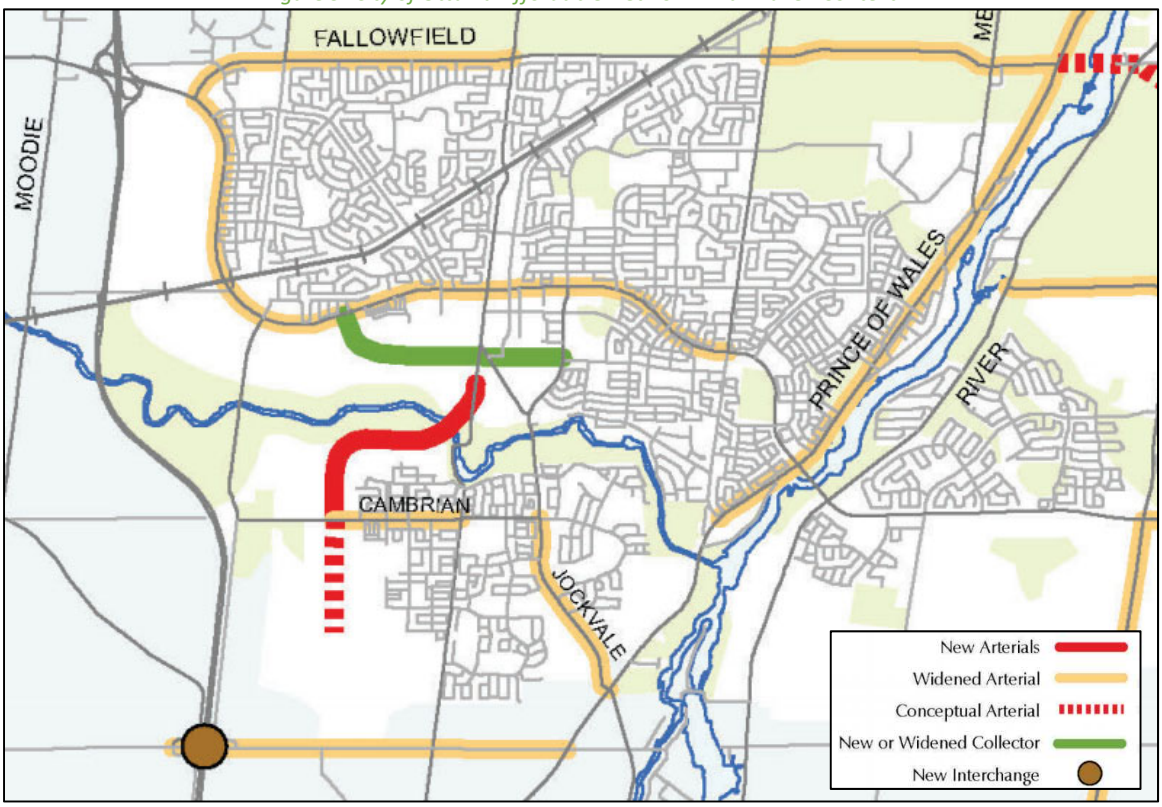
2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

The subject development is within the South Nepean Towncentre (SNTC) Community Design Plan (CDP) and the Nepean South Area 7 Secondary Plan. A revision to the SNTC CDP is currently underway and this development is being proposed within the context of these revisions. The following projects are currently included within the 2031 Affordable Network and illustrated in Figure 9:

- Strandherd Drive Widening is in the process of being designed and constructed between Kennevale Road and Jockvale Road, including a 4-lane cross-section, and is estimated to be completed by 2023
- Chapman Mills Drive Extension from Longfields Drive to Strandherd Drive, including the extension of the bus rapid transit (BRT) corridor to the Southwest Transitway/Greenbank Road within the centre median
- Greenbank Road Re-Alignment, south of Chapman Mills Drive, to loop west around the existing Half Moon Bay development and connect to Cambrian Road, and will include cycle tracks and a future BRT extension within the centre median

Figure 9: City of Ottawa Affordable Network – Barrhaven Context



Beyond the 2031 Affordable Network horizon, the following network improvements are planned for the study area:

- Chapman Mills Drive BRT extension from Greenbank Road to Borrisokane Road
- Greenbank Road Re-Alignment extension south of Cambrian Road that will ultimately connect to Barnsdale Road and include connectivity improvements to Manotick

2.3.2 Other Study Area Developments

3195 Jockvale Road (Richcraft)

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.

3311 Greenbank Road

A residential subdivision has been proposed south of St Joseph High School by Minto Communities, in conjunction with the City of Ottawa. A total 144 townhome units (119 Minto and 25 City), and 64 mid-rise units (City) will ultimately be constructed within the proposed lands.

3201 Greenbank Road

Currently under construction, approximately 11,000 ft^2 of retail and an 8,000 ft^2 restaurant space will be incorporated into the existing retail development of the Loblaws and Home Sense.

Barrhaven Towncentre – 3777 Strandherd Drive

A new retail pad is proposed for the Barrhaven Towncentre, with a total of 5,025 ft^2. This new pad is located south of the existing BMO building.

Burnett Lands – 3370 Greenbank Road (Claridge)
The Burnett Lands are located south of the 3288 Greenbank Road development and 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.

Barrhaven South – South of the Jock River
Beyond the study area, Barrhaven South includes various developments from Caivan, Mattamy, Minto, and Tamarack. These lands will be considered within the background growth percentage applied to the study area.

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of Greenbank Road and Street 'B', Greenbank Road and Jockvale Road, Greenbank Road and Marketplace Avenue, Greenbank Road and Strandherd Drive, and Strandherd Drive and Jockvale Road. Greenbank Road is noted as the boundary road.

The TRANS screenline SL-9 is located to the north at Fallowfield Road and SL-49 is located to the south along the Jock River and will not be reviewed as part of this study.

3.2 Time Periods

The AM and PM peak hours will be examined for the proposed development.

3.3 Horizon Years

The anticipated build-out year is 2025. As a result, the full build-out plus five years horizon year is 2030.

4 Exemption Review

Table 7 summarizes the exemptions for this TIA.

Table 7: Exemption Review

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

Module	Element	Explanation	Exempt/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	Exempt
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 (Official Plan Amendment has been adopted to revise the land use designations, minimum building heights, permit 18.0m local roads, and realign the east-west local road. The area land-use designations are High Rise Residential and Mid Rise Residential)	Exempt

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 components using the TRANS Trip Generation Study Report (2009). Table 8 summarizes the person trip rates for the proposed land uses.

Table 8: Trip Generation Person Trip Rates

Dwelling Type	Land Use Code	Peak Hour	Vehicle Trip Rate	Person Trip Rates
Townhomes	224 (TRANS)	AM	0.54	0.98
		PM	0.71	1.16
Mid-Rise Apartments	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 9 below illustrates the total person trip generation by dwelling type.

Table 9: Total Person Trip Generation

Land Use	Units / GFA	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Townhomes	602	218	372	590	370	328	698
Mid-Rise Apartments	311	49	156	205	162	99	261
Total Person Trips		**267**	**528**	**795**	**532**	**427**	**959**

Using the most recent National Capital Region Origin-Destination survey (OD Survey), the existing mode shares for South Nepean and target BRT area mode shares have been summarized in Table 10.

Table 10: Mode Share

Travel Mode	South Nepean	BRT Area
Auto Driver	60%	40%
Auto Passenger	15%	15%
Transit	15%	35%
Non-Auto	10%	10%
Total	**100%**	**100%**

Using the above mode shares for a BRT area and person trip rates the person trips by mode have been projected. Table 11 summarizes the trip generation by mode.

Table 11: Trip Generation by Mode

Travel Mode	Mode Share	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto Driver	40%	107	211	318	213	171	383
Auto Passenger	15%	40	79	120	80	64	144
Transit	35%	93	185	279	187	150	335
Non-Auto Modes	10%	27	53	80	53	43	96
Total	**100%**	**267**	**528**	**795**	**532**	**427**	**959**

As shown above, 318 AM and 383 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.2 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the travel for the residential component patterns were applied based on the build-out of Barrhaven. Table 12 below summarizes the distributions.

Table 12: OD Survey Existing Mode Share – South Nepean

To/From	Residential % 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 10 and Figure 11 illustrate the new site generated volumes.

Figure 10: 2025 New Site Generation Auto Volumes

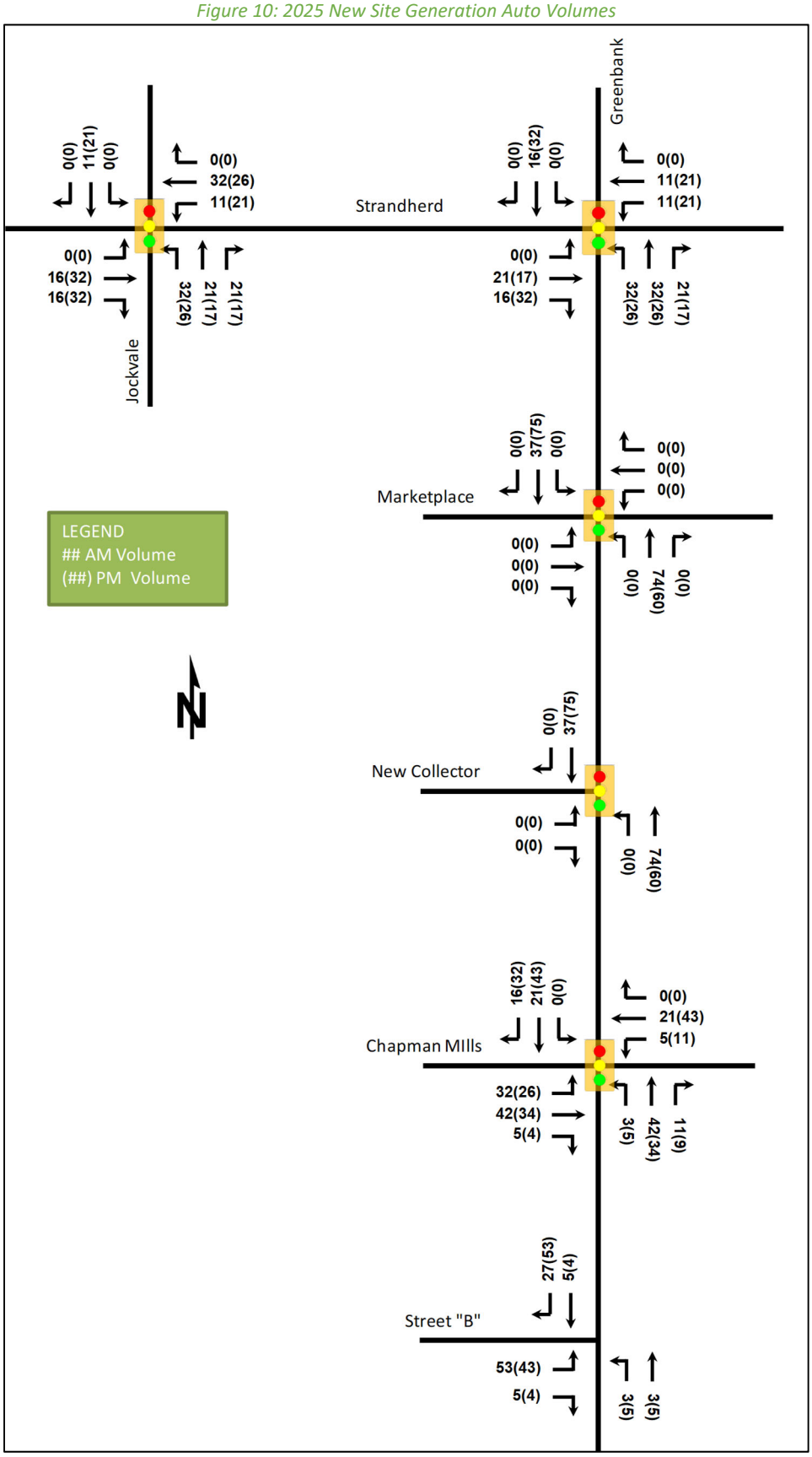
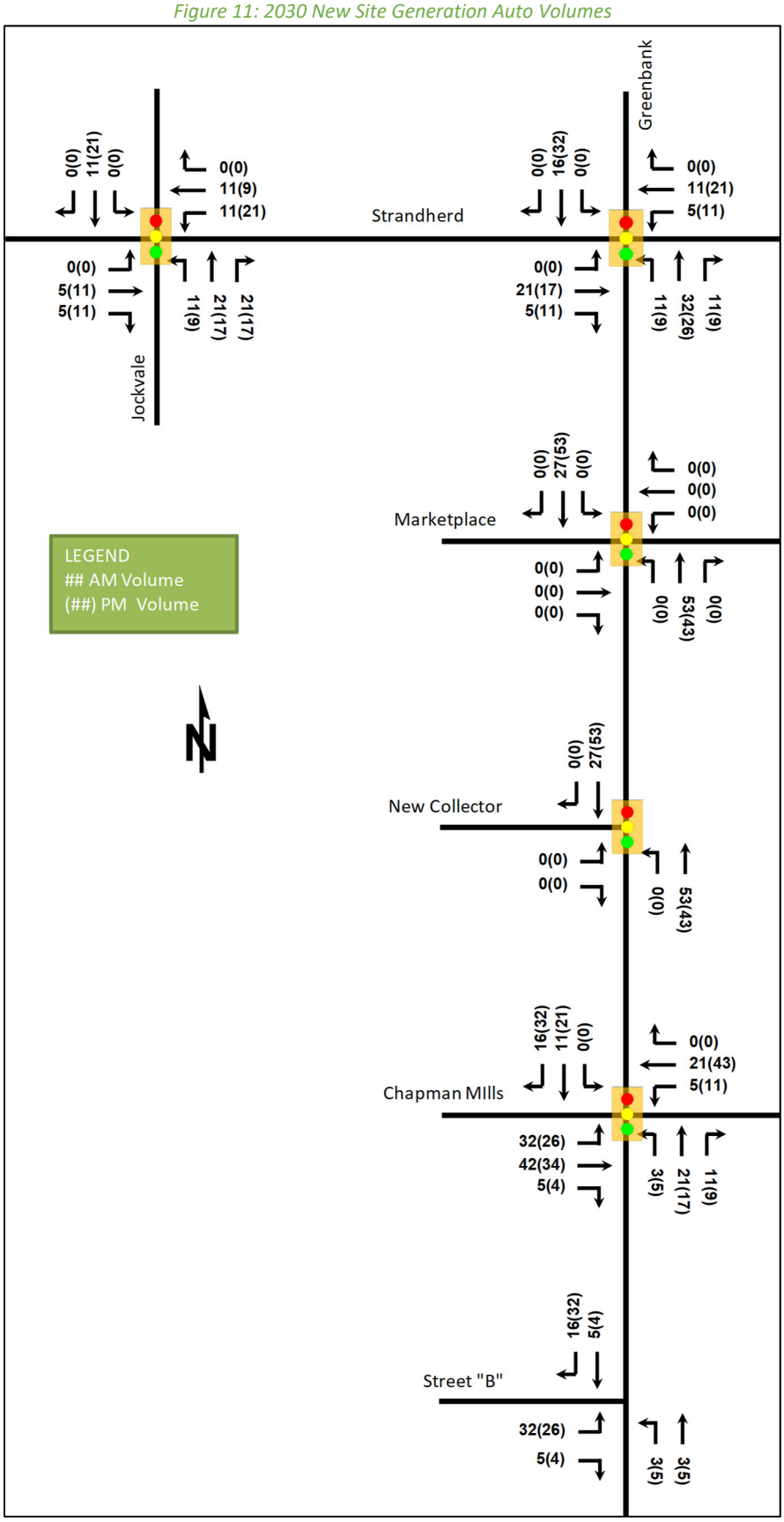


Figure 11: 2030 New Site Generation Auto Volumes



6 Background Network Travel Demands

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3. The widening of Strandherd Drive (west of the study area) and the re-alignment of Greenbank Road (south of the study area) are not considered to have any notable impact on the study area traffic volumes and travel patterns. The extension of Chapman Mills Drive to Strandherd Drive is anticipated to have an impact along Greenbank Road, as commuters are likely going to travel west from Greenbank Road along Chapman Mills Drive, as an alternative to the Greenbank Road and Strandherd intersection.

To account for the diversion of traffic along Greenbank Road to the Chapman Mills Drive extension, two scenarios were developed for the build-out of the site. The 2025 background horizon assumes that Chapman Mills Drive will be extended between Greenbank Road and Longfields Drive, the 2025 total horizon assumes Chapman Mills Drive extended from Greenbank Road to the Kennedy Burnette Pond, and both 2030 background and total horizons assume that Chapman Mills Drive will be extended across the Kennedy-Burnett Pond. As the Chapman Mills Drive corridor intersects Jockvale Road and the two intersections would be in close proximity along Greenbank Road, Jockvale Road will be decommissioned, and the intersection removed from Greenbank Road. Therefore, the Greenbank Road and Jockvale Road intersection is not considered during the background and future build-out horizons.

The background traffic redistributions are illustrated in Figure 12 and Figure 13.

Figure 12: Chapman Mills Extension to Greenbank Road –2025 Background Traffic Redistribution

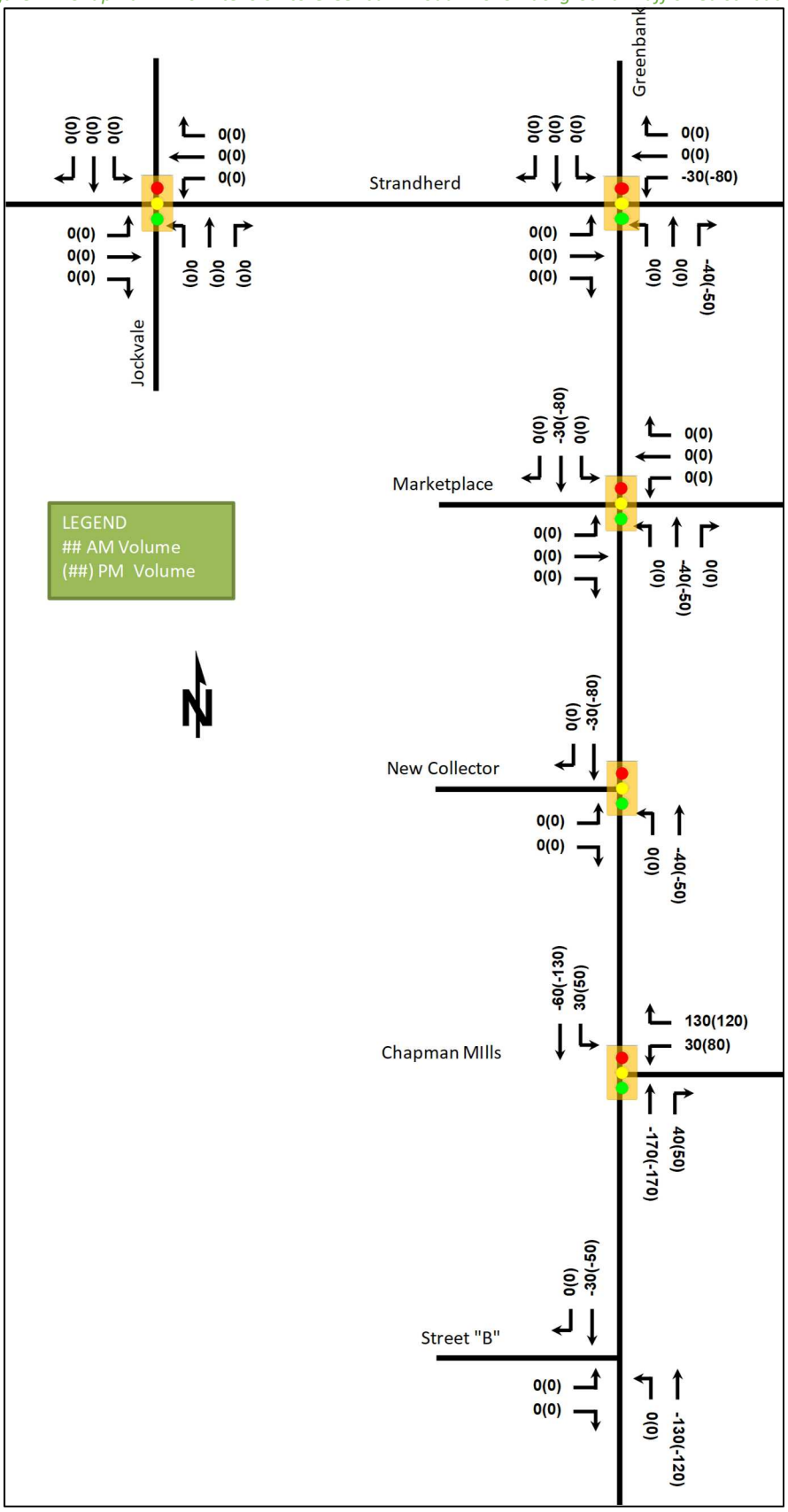
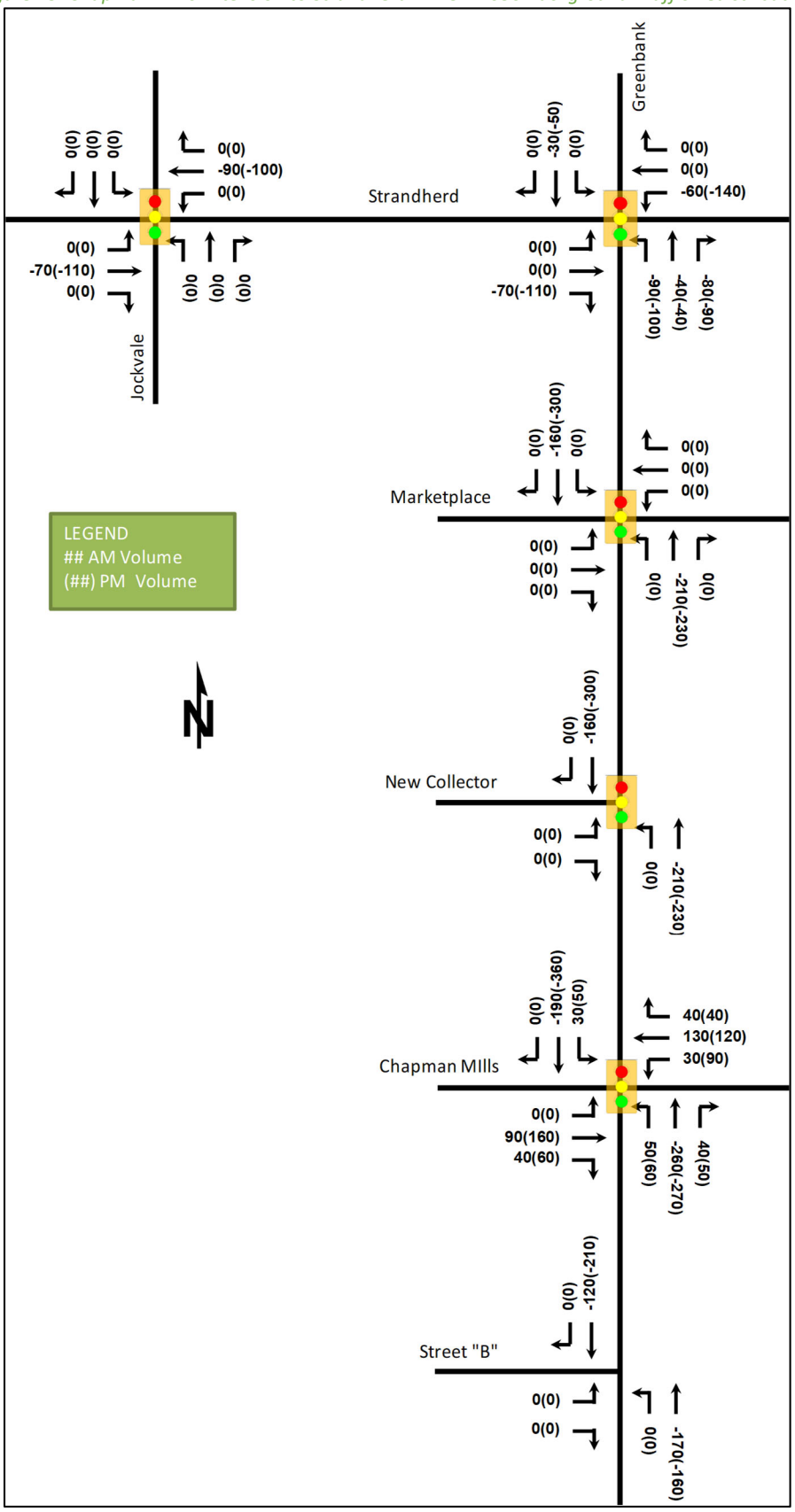


Figure 13: Chapman Mills Extension to Strandherd Drive – 2030 Background Traffic Redistribution



6.2 Background Growth

The adjacent area transportation studies have used a 2-3% traffic growth in the area. This background growth would be conservative for the short-term horizons, but by the 2031 horizon, would overburden the existing road network. Given the known roadway capacity issues in Barrhaven, a 10% growth total is proposed for the area, between 2018 and 2031. This results in an approximate 0.76% growth annually along the mainline volumes.

Figure 14 illustrates the 2025 background volumes and Table 13 summarizes the 2025 background intersection operations. Figure 15 illustrates the 2030 background volumes and Table 14 summarizes the 2030 background intersection operations.

The synchro worksheets for the 2025 and 2030 horizons are provided in Appendix E and Appendix F, respectively.

Figure 14: 2025 Future Background Volumes

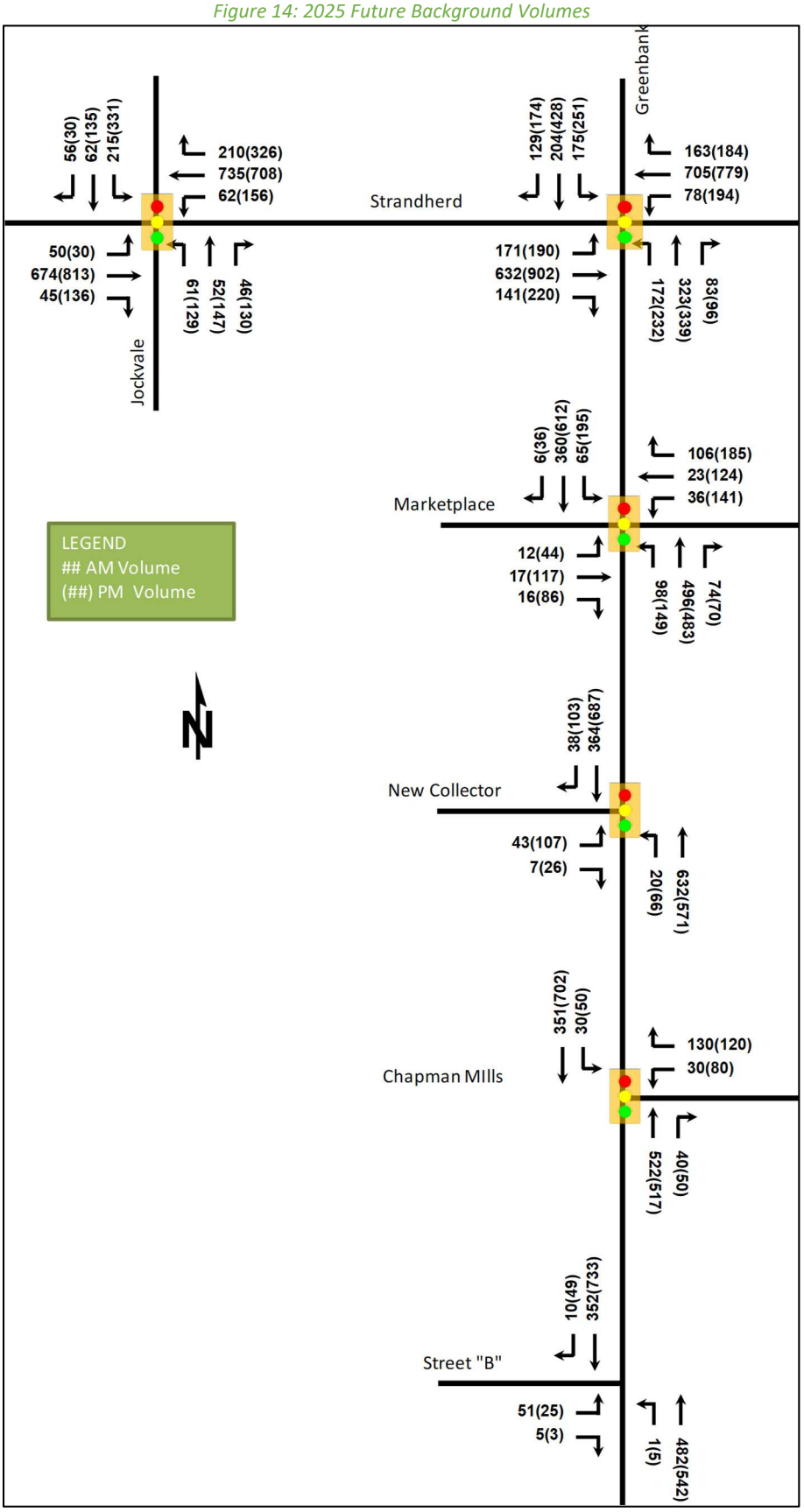


Table 13: 2025 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Greenbank Road & Strandherd Drive ***Signalized***	EBL	D	38.4	0.69	#44.1	D	48.8	0.81	#62.0
	EBT	D	39.7	0.63	92.7	E	62.3	0.95	#157.2
	EBR	A	5.6	0.26	13.6	A	6.2	0.38	18.7
	WBL	C	24.2	0.30	20.9	E	70.6	0.90	#77.7
	WBT	D	51.4	0.83	106.3	D	48.1	0.82	119.6
	WBR	A	6.8	0.33	16.3	A	6.3	0.33	17.2
	NBL	E	76.0	0.55	35.5	E	73.2	0.62	m44.9
	NBT/R	C	23.6	0.38	51.7	C	23.8	0.47	30.0
	SBL	E	57.9	0.55	32.7	E	58.3	0.65	44.0
	SBT	C	31.1	0.19	31.5	D	37.4	0.45	64.8
	SBR	A	4.6	0.22	11.2	A	6.8	0.32	17.8
	Overall	**D**	**37.4**	-	-	**D**	**44.7**	-	-
Greenbank Road & Marketplace Avenue ***Signalized***	EBL	D	40.3	0.08	7.8	C	30.9	0.24	16.0
	EBT/R	C	34.2	0.21	14.1	D	44.8	0.61	62.1
	WBL	D	43.8	0.21	16.7	D	41.7	0.56	41.5
	WBT/R	C	20.5	0.49	24.6	D	53.1	0.81	92.2
	NBL	E	60.5	0.54	40.2	E	77.7	0.78	#71.4
	NBT/R	B	10.9	0.27	50.2	C	24.2	0.38	68.1
	SBL	E	59.6	0.31	16.1	E	63.4	0.61	m36.1
	SBT/R	B	13.2	0.19	28.1	C	20.7	0.46	m49.5
	Overall	**C**	**20.4**	-	-	**D**	**37.2**	-	-
Jockvale Road & Strandherd Drive ***Signalized***	EBL	B	11.7	0.16	11.1	B	15.0	0.13	8.6
	EBT/R	B	19.0	0.40	83.5	C	31.0	0.67	130.6
	WBL	B	11.3	0.15	13.2	C	23.0	0.58	32.6
	WBT/R	C	20.4	0.53	114.7	C	25.2	0.64	137.6
	NBL	E	64.8	0.50	28.5	E	76.3	0.76	52.0
	NBT	D	53.3	0.29	24.3	E	55.8	0.57	54.1
	NBR	A	1.4	0.17	0.0	B	10.8	0.39	17.0
	SBL	D	45.7	0.65	63.4	D	53.0	0.85	#99.2
	SBT/R	C	21.9	0.27	28.3	C	28.4	0.29	43.8
	Overall	**C**	**23.5**	-	-	**C**	**33.0**	-	-
Greenbank Road & New Collector ***Signalized***	EBL	D	43.1	0.30	17.4	D	45.2	0.52	33.4
	EBR	C	21.9	0.05	4.2	B	14.1	0.13	7.1
	NBL	A	2.1	0.03	1.5	D	54.1	0.40	26.9
	NBT	A	1.8	0.22	14.0	A	2.7	0.22	16.3
	SBT/R	A	2.0	0.14	12.0	B	10.8	0.37	62.6
	Overall	**A**	**3.6**	-	-	**B**	**12.1**	-	-
Greenbank Road & Chapman Mills Drive ***Signalized***	WBL	D	40.9	0.21	13.2	D	44.8	0.45	27.0
	WBR	B	15.5	0.53	16.2	B	12.7	0.45	15.2
	NBT/R	A	6.7	0.25	34.7	A	9.2	0.28	40.0
	SBL	E	55.6	0.23	15.4	D	51.7	0.38	25.1
	SBT	A	2.8	0.26	13.9	A	7.4	0.53	54.0
	Overall	**A**	**8.7**	-	-	**B**	**12.2**	-	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Greenbank Road & Street "B" ***Unsignalized***	EBL/R	C	17.2	0.16	0.6	D	27.9	0.15	0.5
	NBL	A	8.0	0.00	0.0	A	9.3	0.10	0.0
	NBT	-	-	-	-	-	-	-	-
	SBT/R	-	-	-	-	-	-	-	-
	Overall	**A**	**1.1**	**-**	**-**	**A**	**0.6**	**-**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The intersection operations for the 2025 future background horizon generally operate satisfactorily during the peak hours. The peak hour factor adjustments for future horizons account for the increase in intersection operations (e.g. lower delays and volume-to-capacity ratios).

Figure 15: 2030 Future Background Volumes

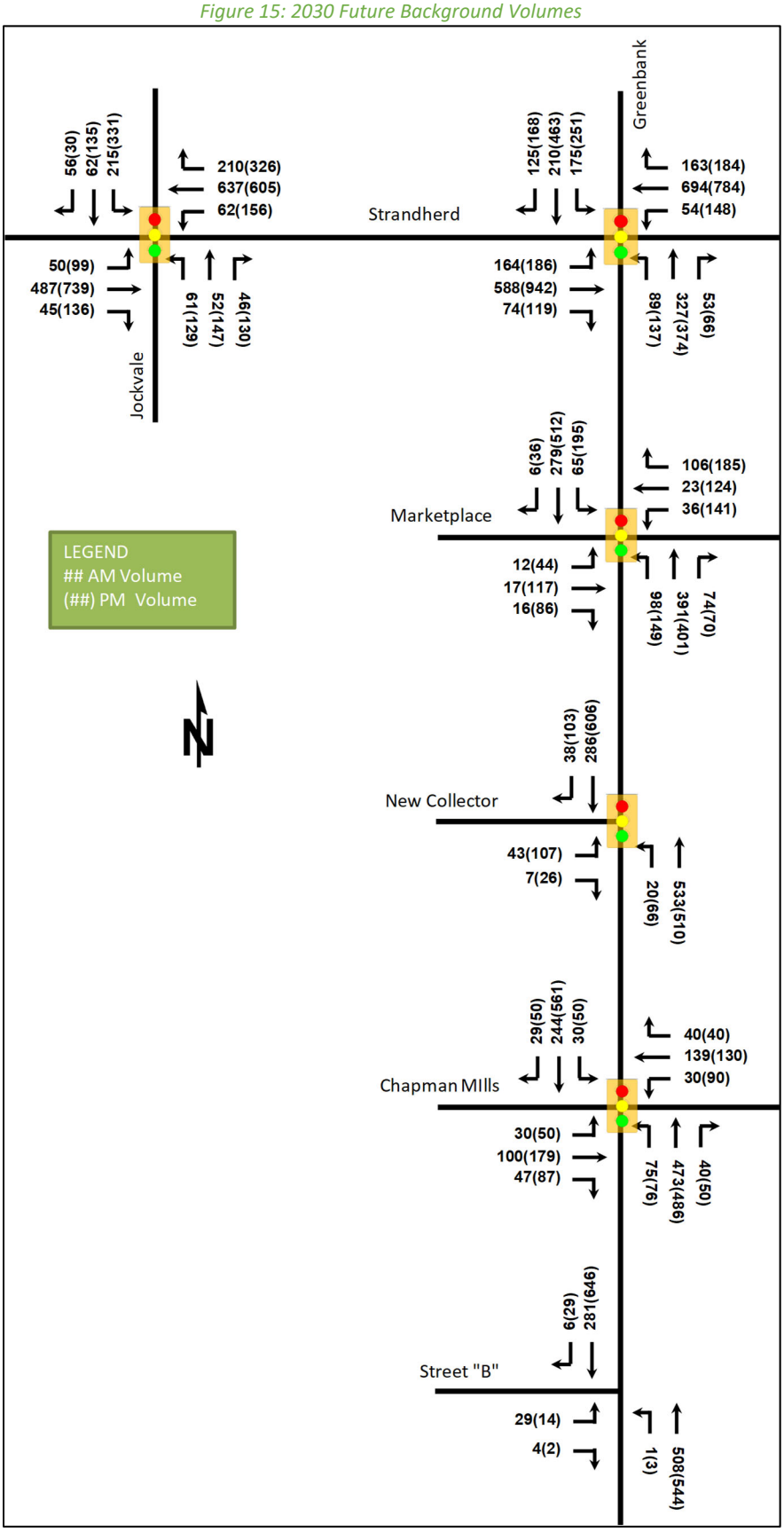


Table 14: 2030 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Greenbank Road & Strandherd Drive ***Signalized***	EBL	D	35.9	0.66	39.9	D	47.3	0.79	#60.4
	EBT	D	37.8	0.58	83.6	E	64.5	0.97	#168.3
	EBR	A	0.5	0.13	0.0	A	3.5	0.22	8.4
	WBL	C	22.6	0.20	15.6	D	45.1	0.72	#49.0
	WBT	D	51.2	0.83	104.3	D	47.9	0.82	120.6
	WBR	A	6.8	0.33	16.3	A	6.3	0.33	17.2
	NBL	E	75.4	0.38	21.5	E	68.8	0.49	m28.6
	NBT/R	C	25.0	0.35	57.0	C	27.4	0.48	42.4
	SBL	E	57.9	0.55	32.7	E	58.3	0.65	44.0
	SBT	C	28.5	0.18	30.8	C	34.9	0.44	66.5
	SBR	A	3.8	0.20	9.7	A	6.1	0.29	16.7
	Overall	**D**	**36.4**	-	-	**D**	**44.1**	-	-
Greenbank Road & Marketplace Avenue ***Signalized***	EBL	D	40.3	0.08	7.8	C	30.9	0.24	16.0
	EBT/R	C	34.2	0.21	14.1	D	44.8	0.61	62.1
	WBL	D	43.8	0.21	16.7	D	41.7	0.56	41.5
	WBT/R	C	20.5	0.49	24.6	D	53.1	0.81	92.2
	NBL	E	60.5	0.54	40.2	E	77.7	0.78	#71.4
	NBT/R	B	10.3	0.22	39.7	C	23.1	0.33	56.6
	SBL	E	65.5	0.31	16.2	E	69.1	0.61	m38.7
	SBT/R	A	9.2	0.15	15.1	B	16.5	0.39	34.0
	Overall	**C**	**20.9**	-	-	**D**	**37.7**	-	-
Jockvale Road & Strandherd Drive ***Signalized***	EBL	B	11.5	0.14	11.1	B	17.8	0.37	21.7
	EBT/R	B	17.4	0.29	59.0	C	29.5	0.62	117.1
	WBL	B	11.0	0.12	13.2	C	21.3	0.54	33.2
	WBT/R	B	19.1	0.47	98.2	C	27.1	0.65	119.1
	NBL	E	64.8	0.50	28.5	E	76.3	0.76	52.0
	NBT	D	53.3	0.29	24.3	E	55.8	0.57	54.1
	NBR	A	1.4	0.17	0.0	B	10.8	0.39	17.0
	SBL	D	45.7	0.65	63.4	D	53.0	0.85	#99.2
	SBT/R	C	21.9	0.27	28.3	C	28.4	0.29	43.8
	Overall	**C**	**23.2**	-	-	**C**	**33.0**	-	-
Greenbank Road & New Collector ***Signalized***	EBL	D	43.1	0.30	17.4	D	45.2	0.52	33.4
	EBR	C	21.9	0.05	4.2	B	14.1	0.13	7.1
	NBL	A	1.2	0.02	m1.0	D	50.3	0.40	m26.8
	NBT	A	1.1	0.19	6.4	A	1.8	0.20	8.8
	SBT/R	A	2.0	0.12	9.5	B	10.4	0.34	54.6
	Overall	**A**	**3.5**	-	-	**B**	**11.8**	-	-

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Greenbank Road & Chapman Mills Drive ***Signalized***	EBL	D	50.7	0.33	14.4	E	61.9	0.53	#24.5
	EBT	D	37.8	0.39	29.9	D	45.2	0.64	48.7
	EBR	A	0.8	0.13	0.0	A	1.4	0.23	0.0
	WBL	D	46.5	0.27	14.2	D	50.6	0.54	31.1
	WBT/R	D	42.4	0.65	45.9	C	31.5	0.48	40.0
	NBL	D	44.6	0.43	25.9	D	46.5	0.45	27.8
	NBT/R	B	14.2	0.28	48.9	C	20.4	0.37	56.4
	SBL	D	40.3	0.23	10.8	E	61.4	0.35	22.3
	SBT	B	15.6	0.31	60.1	C	31.2	0.82	#195.5
	Overall	**C**	**23.8**	**-**	**-**	**C**	**31.3**	**-**	**-**
Greenbank Road & Street "B" ***Unsignalized***	EBL/R	C	15.3	0.09	0.3	C	23.1	0.06	0.2
	NBL	A	7.8	0.00	0.0	A	8.9	0.00	0.0
	NBT	-	-	-	-	-	-	-	-
	SBT/R	-	-	-	-	-	-	-	-
	Overall	**A**	**0.6**	**-**	**-**	**A**	**0.3**	**-**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The intersection operations for the 2030 futurebackground horizon generally operate satisfactorily during the peak hours.

6.3 Other Developments

The background developments explicitly considered in the background conditions (Section 6.2) include:

- 3195 Greenbank Road
- 3201 Greenbank Road
- 3311 Greenbank Road
- 3370 Greenbank Road (Phase 1 for 2025, Phase 2 for 2030)
- 4005 Strandherd Drive (2030)

The development within the Barrhaven Towncentre (3777 Strandherd Drive is for a 5,000 sq. ft. pad and is anticipated to be negligible within the existing trips within the Towncentre.

The background development volumes within the study area have been provided in Appendix G.

7 Demand Rationalization

No capacity constraints are currently noted for the area and rationalization for adjusted demand is not required for this TIA.

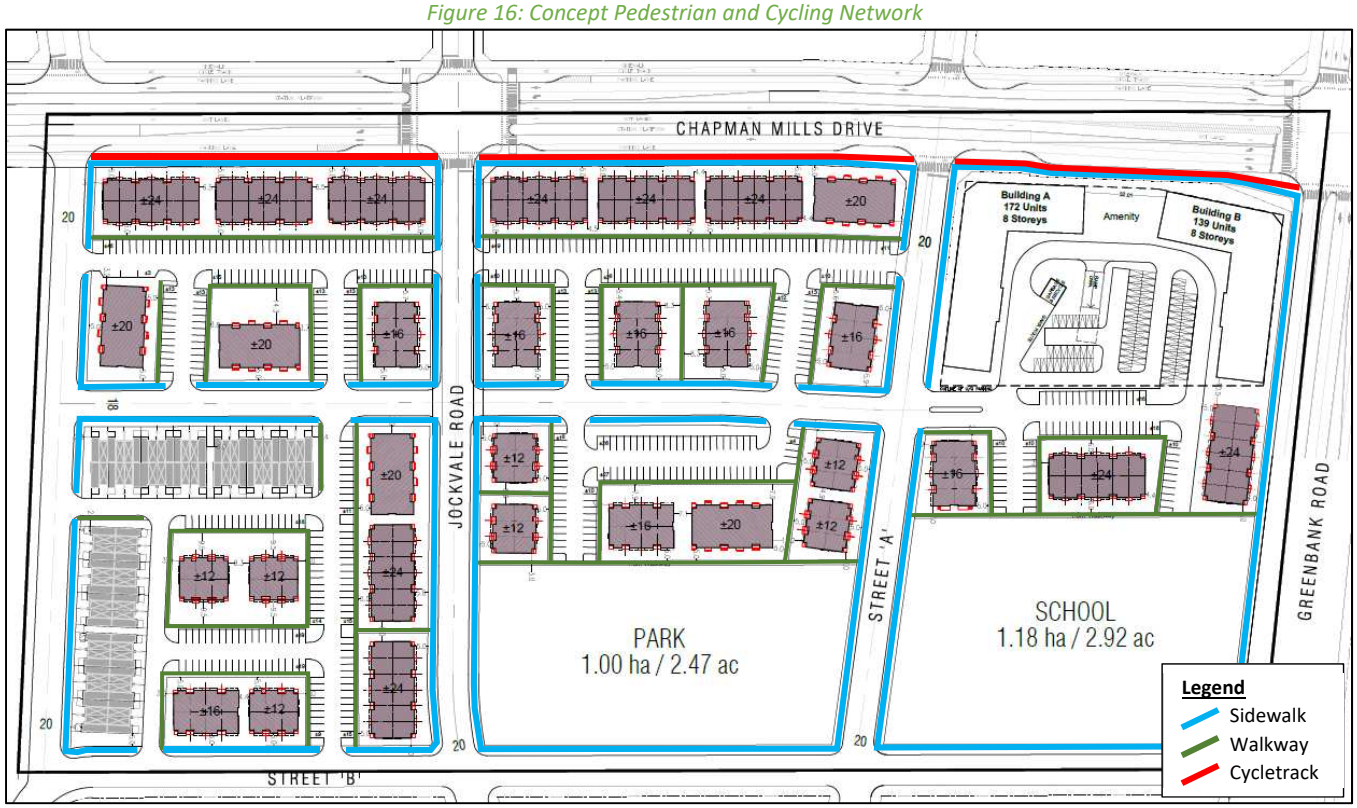
8 Development Design

8.1 Design for Sustainable Modes

The proposed development is a residential subdivision and the auto parking areas will be located adjacent to the back-to-back townhomes with a total of 554 parking spaces or one per unit. The apartments will include meet bylaw requirements with a combination of surface and underground parking, and bicycle parking. Bicycle parking for the townhomes is assumed to be within the individual units.

Figure 16 illustrates the pedestrian and cycling network. The plan incorporates the adjacent developments, planned routes on geoOttawa, and the South Nepean Town Centre Community Design Plan Area.

Figure 16: Concept Pedestrian and Cycling Network

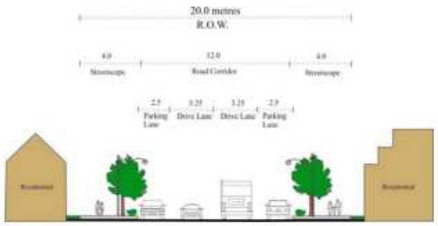
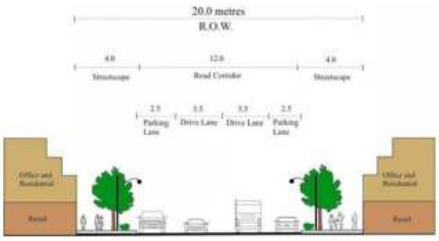


Beyond the active mode network, the existing transit system stop is provided at Barrhaven Centre (future Chapman Mills station) is a maximum of approximately 900 metres walking distance away, and the future St Joseph/Greenbank station will be a maximum of approximately 675 metres walking distance to all the proposed units.

8.2 New Street Networks

The new streets proposed as part of the plan of subdivision include the extension of Jockvale Road and a new collector road along the southern edge of the property. Figure 17 illustrates the cross-sections included within the South Nepean Town Centre Community Design Plan (2006) for the internal local roads and collectors.

Figure 17: South Nepean Town Centre CDP Concept Cross-Sections

Street	R.O.W.	Type	Design Function	Typical Cross Section
Residential Street	20.0	Local	• Access to residential properties • Permeable connections to higher order streets for all modes of transportation	
Commercial Street	20.0	Local	• Access to commercial properties • Permeable connections to higher order streets for all modes of transportation	

Recent developments in the area have highlighted the need to review these cross-sections to include additional space for utilities within the right-of-way. As illustrated, the cross-sections will need to support pedestrian, cycling, and transit modes.

Traffic calming elements are recommended at the internal intersections, including bulb-outs to narrow each approach to the intersection (e.g. reduced crossing distance).

9 Boundary Street Design

Table 15 summarizes the MMLOS analysis for the boundary road of Greenbank Road, existing and future, and the future collector roads of Chapman Mills Drive and Street B. The existing and future conditions have been summarized in separate rows. The future conditions of Greenbank Road are based on the existing four-lane divided cross section to the north. The MMLOS targets are based on the policy area of within 600m of a rapid transit station and 300m of a school. The MMLOS worksheet has been provided in Appendix H.

Table 15: Boundary Street MMLOS Analysis

Segment	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Greenbank Road (existing)	E	A	F	C	D	A	A	E
Greenbank Road (future)	E	A	C	B	A	D	A	D
Chapman Mills Drive (future)	B	A	A	B	A	A	C	N/A
Street B (future)	B	A	B	B	D	D	C	N/A

Existing Greenbank Road does not meet the pedestrian and cycling MMLOS targets. The current cross-section is a two-lane rural cross-section, and as such, it is understandable why these targets are not met in this location. With the extension of the urban cross-section of Greenbank Road, the bicycle target will be met, and the pedestrian

target will continue to not be met. The travel speed and volumes along Greenbank Road are the primary influence on the pedestrian LOS and will not be met along any arterial.

Chapman Mills Drive and future Street B will not meet with pedestrian level of service with the City proposed cross-sections. Traffic volumes and speed (between 30 and 50 km/h) are the primary influence on the LOS B level of service for Chapman Mills Drive. In addition to lowering the traffic volumes and speeds to below 30km/h for Chapman Mills Drive, the sidewalks on both Chapman Mills Drive and Street B would need to be increased to 3 metres to achieve the target LOS A. Therefore, a pedestrian LOS B is deemed satisfactory for these two streets.

10 Access Intersections Design

10.1 Location and Design of Access

The residential accesses will connect via local roads the adjacent collector roads and to the adjacent arterial roads via Chapman Mills Drive, Jockvale Road and Street B. Within the subdivision, no turn lanes are proposed for the intersections and will be controlled by minor stop control. The connections to Chapman Mills Drive remain consistent with the proposed EA study intersections, with Jockvale Road being the only full movement intersection. Along Street B, the accesses are proposed as minor-stop controlled intersection with Street B remaining free-flow between the Kennedy-Burnett SWM Pond and Greenbank Road.

10.2 Intersection Control

The Greenbank Road and Chapman Mills Drive intersection will be signalized, as per the Chapman Mills Drive EA Study, and the Greenbank Road and Street B intersection is assumed to be a minor stop control as per the approved RMA (Novatech 2018). No change to the existing Jockvale Road and Strandherd Drive intersection is proposed.

10.3 Access Intersection Design

10.3.1 2025 Future Total Access Intersection Operations

The 2025 future total intersection volumes are illustrated above in Figure 18 and the access intersection operations are summarized below in Table 16. The level of service is based on the HCM criteria for average delay at signalized intersections. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix I.

Figure 18: 2025 Future Total Volumes

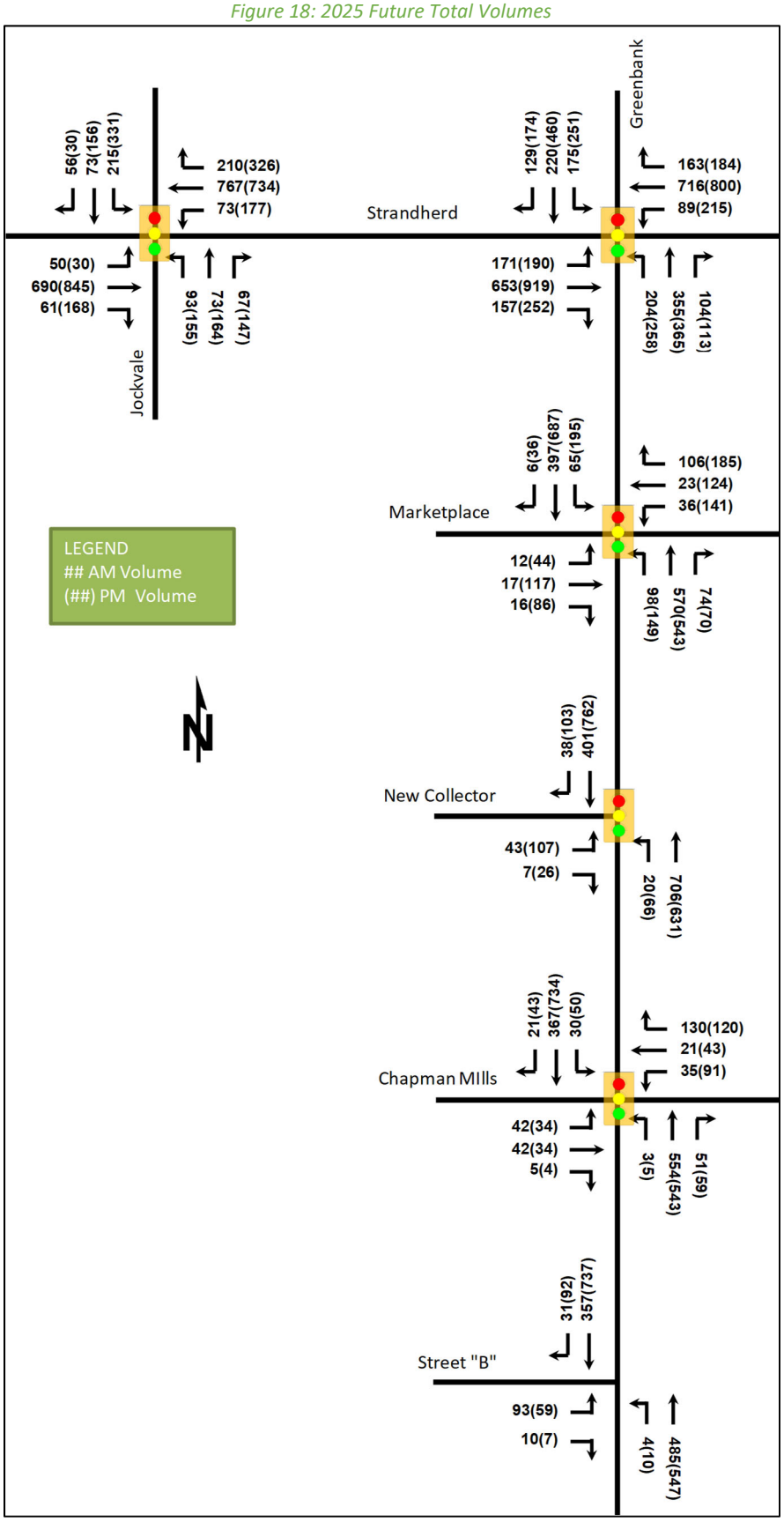


Table 16: 2025 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Jockvale Road & Strandherd Drive *Signalized*	EBL	B	13.8	0.18	12.2	B	15.9	0.14	8.6
	EBT/R	C	22.3	0.46	92.8	D	35.0	0.76	142.6
	WBL	B	13.5	0.20	16.5	D	36.5	0.74	#54.3
	WBT/R	C	24.3	0.60	128.5	C	27.6	0.69	143.5
	NBL	E	68.1	0.63	39.0	F	82.1	0.83	#69.5
	NBT	D	50.9	0.33	30.4	D	53.5	0.56	59.9
	NBR	A	1.7	0.22	0.0	B	10.0	0.40	18.0
	SBL	D	37.8	0.56	59.6	D	49.1	0.83	#101.0
	SBT/R	C	22.7	0.25	30.7	C	28.2	0.31	49.6
	Overall	**C**	**26.1**	**-**	**-**	**D**	**35.6**	**-**	**-**
Greenbank Road & Chapman Mills Drive *Signalized*	EBL	D	52.5	0.45	17.2	D	36.6	0.24	13.8
	EBT	D	39.5	0.24	16.3	C	32.7	0.13	13.2
	EBR	A	0.2	0.02	0.0	A	0.0	0.01	0.0
	WBL	D	41.8	0.28	14.7	D	47.8	0.54	29.4
	WBT/R	B	18.2	0.57	20.7	B	17.9	0.53	24.3
	NBL	A	8.3	0.00	1.5	B	10.6	0.01	2.3
	NBT/R	A	7.5	0.27	39.7	A	9.5	0.29	45.7
	SBL	D	44.6	0.23	14.8	D	52.9	0.33	22.1
	SBT	A	4.0	0.27	29.2	A	8.7	0.57	59.2
	Overall	**A**	**0.7**	**0.02**	**1.1**	**A**	**0.6**	**0.04**	**0.6**
Greenbank Road & Street "B" *Unsignalized*	EBL/R	C	20.1	0.30	1.3	E	37.5	0.38	1.6
	NBL	A	8.1	0.00	0.0	A	9.5	0.10	0.0
	NBT	-	-	-	-	-	-	-	-
	SBT/R	-	-	-	-	-	-	-	-
	Overall	**A**	**2.2**	**-**	**-**	**A**	**1.8**	**-**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The access intersection operations for the 2025 future total horizon generally operate satisfactorily during the peak hours with the exception of the westbound left-turn at the Greenbank Road and Strandherd Drive intersection during the PM peak. This movement may experience high delays.

10.3.2 2030 Future Total Access Intersection Operations

The 2030 future total intersection volumes are illustrated above in Figure 19 and the access intersection operations are summarized below in Table 17. The level of service is based on the HCM criteria for average delay at signalized intersections. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix J.

Figure 19: 2030 Future Total Volumes

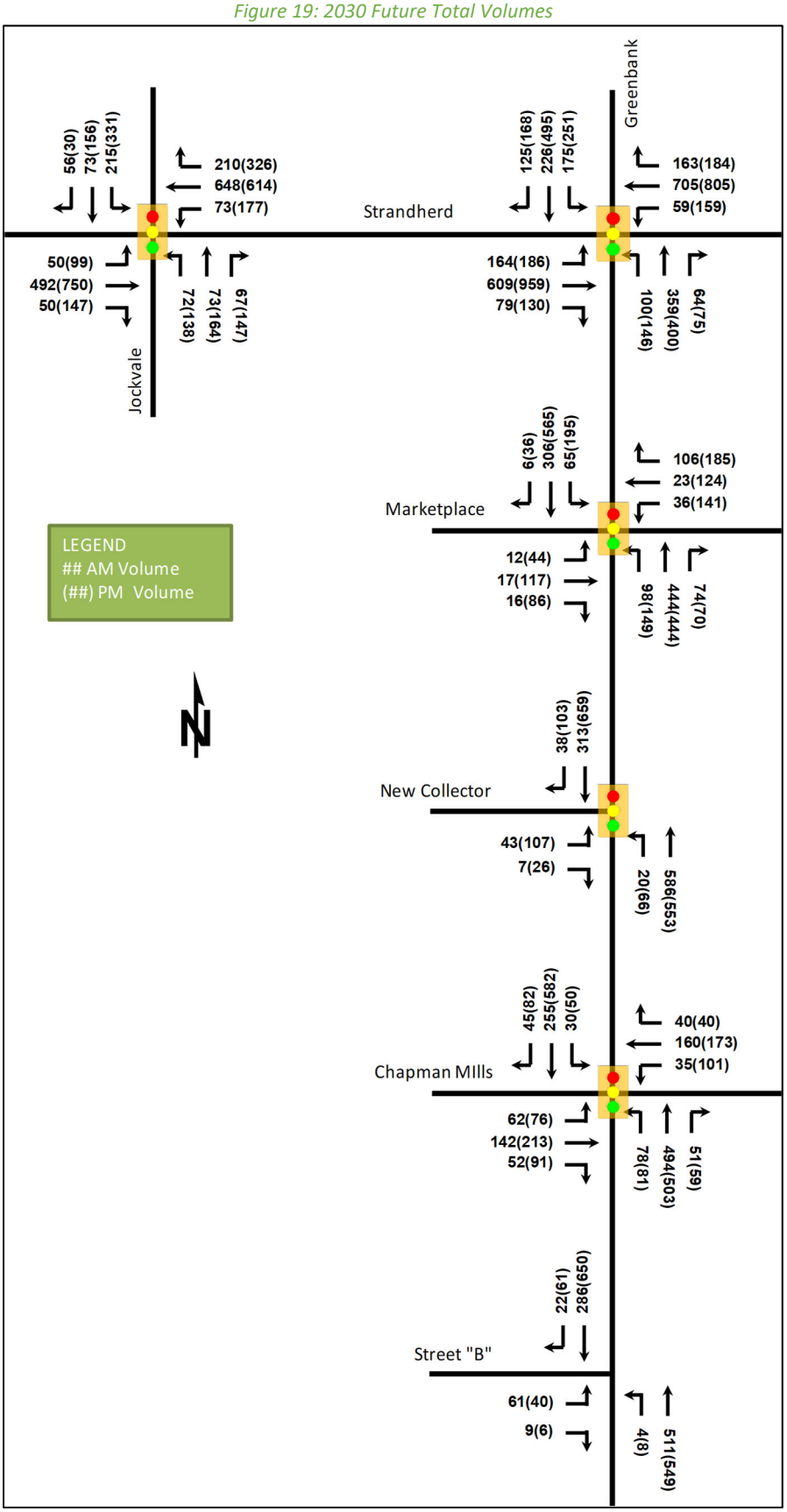


Table 17: 2030 Future Total Access Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Jockvale Road & Strandherd Drive *Signalized*	EBL	B	12.2	0.15	11.5	B	18.6	0.38	21.7
	EBT/R	B	19.1	0.32	62.4	C	31.0	0.66	120.7
	WBL	B	11.8	0.16	15.5	C	25.4	0.62	36.7
	WBT/R	C	20.8	0.51	102.5	C	28.2	0.67	121.0
	NBL	E	67.0	0.56	32.1	E	78.3	0.79	#58.6
	NBT	D	54.8	0.38	31.3	E	56.2	0.60	59.9
	NBR	A	2.0	0.24	0.0	B	10.3	0.41	18.0
	SBL	D	40.7	0.59	62.2	D	53.5	0.86	#103.2
	SBT/R	C	24.2	0.27	32.1	C	28.9	0.32	49.6
	Overall	**C**	**24.3**	-	-	**C**	**34.2**	-	-
Greenbank Road & Chapman Mills Drive *Signalized*	EBL	E	77.0	0.67	#32.1	E	71.9	0.66	#36.8
	EBT	D	36.7	0.45	39.3	D	51.5	0.71	62.1
	EBR	A	0.7	0.13	0.0	A	1.9	0.24	1.6
	WBL	D	48.1	0.32	15.9	E	56.2	0.58	36.7
	WBT/R	D	42.8	0.67	50.5	D	39.7	0.59	55.7
	NBL	D	44.6	0.44	26.5	E	60.0	0.54	#46.9
	NBT/R	B	15.7	0.32	53.5	C	21.4	0.37	62.8
	SBL	D	40.2	0.23	10.2	D	53.1	0.40	22.2
	SBT	B	17.8	0.36	68.1	D	47.3	0.90	#219.1
	Overall	**C**	**26.9**	-	-	**D**	**39.8**	-	-
Greenbank Road & Street "B" *Unsignalized*	EBL/R	C	16.9	0.19	0.7	D	27.6	0.22	0.8
	NBL	A	7.9	0.00	0.0	A	9.1	0.01	0.0
	NBT	-	-	-	-	-	-	-	-
	SBT/R	-	-	-	-	-	-	-	-
	Overall	**A**	**1.4**	-	-	**A**	**1.0**	-	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The access intersection operations for the 2030 future total horizon generally operate satisfactorily during the peak hours.

10.3.3 Access Intersection MMLOS

Table 18 summarizes the MMMLOS analysis for the site access intersections of Greenbank Road and Chapman Mills Drive and Jockvale Road and Strandherd Drive. The existing and future conditions of the Jockvale Road and Strandherd Drive intersection will be the same and are considered in one row. The Jockvale Road and Strandherd Drive intersection analysis is based on general urban area and the Greenbank Road and Chapman Mills Drive intersection analysis is based on the policy area of within 600m of a rapid transit station and 300m of a school. The MMLOS worksheets has been provided in Appendix H.

Table 18: 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
Jockvale Road & Strandherd Drive	E	C	F	C	F	D	F	D	B	D
Greenbank Road & Chapman Mills Drive	D	A	E	C	F	A	E	E	C	E

The MMLOS targets for the pedestrian, bicycle and transit LOS will not be met at both of the signalized access intersections, and the truck LOS will not be met at the Jockvale Road and Strandherd Drive intersection. The pedestrian level of service would require a maximum of four lanes at a crossing to meet a LOS C and two lanes at a crossing to meet a LOS A. The mixed traffic approaches for cyclists and speeds along the arterial roads drive the LOS F and E for the intersections and would require travel speeds under 50 km/h to meet a LOS C. The transit LOS will not be met at the Jockvale Road and Strandherd Drive or the Greenbank Road and Chapman Mills Drive due to the intersection delays. Transit actuation will be required once the BRT lanes are provided along Greenbank Road and Chapman Mills Drive, which may achieve the transit LOS. The truck LOS The truck LOS is does not meet the targets at the Jockvale Road and Chapman Mills Drive due to the single receiving lanes.

10.3.4 Recommended Design Elements

The design elements for the site intersections are consistent with the CDP and various EA study recommendations.

11 Transportation Demand Management

11.1 Context for TDM

The mode shares used within the TIA represent a shift from auto modes to transit modes, although not as high as anticipated once the BRT network is extended. Overall, the modal shares are likely to be achieved and supporting TDM measures should be provided.

The subject site is within a design priority area.

Total bedrooms within the development is subject to the final unit count. No age restrictions are noted.

11.2 Need and Opportunity

The subject site has been assumed to rely predominantly on auto travel and an increase on transit ridership with the proximity to the Southwest Transitway and future BRT corridors, and those assumptions have been carried through the analysis. The study area intersections are anticipated to have residual capacity and the increase in transit ridership is achievable.

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 K.

The key TDM measures recommended include:

- Enhanced connectivity of pedestrians and cyclists to the adjacent network and transit
- Bike parking locations at each building in proximity to the entrances
- Inclusion of a 1-month Presto card for first time new townhome purchase and apartment rental, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
- Unbundle parking cost from purchase or rental costs

12 Transit

12.1 Route Capacity

Overall, the forecasted new transit trips would result in the need for approximately 4 single buses (55-person capacity) during the AM and PM peak hours for local service.

12.2 Transit Priority

No transit priority is required explicitly for this study. The planned BRT corridors along Chapman Mills and Greenbank Road may or may not be implemented prior to the 2030 horizon.

13 Network Intersection Design

13.1 Network Intersection Control

No change to the existing signalized control is recommended for the network intersections.

13.2 Network Intersection Design

13.2.1 2025 Future Total Network Intersection Operations

The 2025 future total network intersection operations are summarized below in Table 19. The level of service is based on the HCM criteria for average delay at signalized intersections. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix I.

Table 19: 2025 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Greenbank Road & Strandherd Drive *Signalized*	EBL	D	40.9	0.71	#48.4	D	52.0	0.82	#65.9
	EBT	D	43.6	0.71	97.1	E	64.2	0.96	#161.8
	EBR	A	6.5	0.30	16.1	A	6.2	0.42	19.8
	WBL	C	25.6	0.36	23.4	F	93.0	1.00	#90.8
	WBT	D	51.7	0.84	108.1	D	49.1	0.84	123.8
	WBR	A	6.7	0.32	16.3	A	6.3	0.33	17.2
	NBL	E	75.8	0.59	40.9	E	74.7	0.66	m49.3
	NBT/R	C	23.8	0.43	57.1	C	23.4	0.52	30.5
	SBL	E	57.9	0.55	32.7	E	58.3	0.65	44.0
	SBT	C	32.2	0.21	34.4	D	38.9	0.50	69.7
	SBR	A	4.8	0.22	11.4	A	6.9	0.32	17.8
	Overall	D	38.6	-	-	D	46.6	-	-
Greenbank Road & Marketplace Avenue *Signalized*	EBL	D	40.3	0.08	7.8	C	30.9	0.24	16.0
	EBT/R	C	34.2	0.21	14.1	D	44.8	0.61	62.1
	WBL	D	43.8	0.21	16.7	D	41.7	0.56	41.5
	WBT/R	C	20.5	0.49	24.6	D	53.1	0.81	92.2
	NBL	E	60.5	0.54	40.2	E	77.7	0.78	#71.4
	NBT/R	B	11.3	0.31	58.0	C	25.0	0.42	76.4
	SBL	E	58.3	0.31	16.3	E	62.3	0.61	m35.5
	SBT/R	B	13.7	0.21	31.4	C	21.4	0.51	m54.8
	Overall	**C**	**20.0**	**-**	**-**	**D**	**36.7**	**-**	**-**
Greenbank Road & New Collector *Signalized*	EBL	D	43.1	0.30	17.4	D	45.2	0.52	33.4
	EBR	C	21.9	0.05	4.2	B	14.1	0.13	7.1
	NBL	A	2.4	0.03	2.0	D	50.4	0.40	26.7
	NBT	A	1.9	0.25	15.6	A	3.0	0.24	21.5
	SBT/R	A	2.1	0.16	13.2	B	11.3	0.41	70.5
	Overall	**A**	**3.5**	**-**	**-**	**B**	**11.9**	**-**	**-**

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The network intersection operations for the 2025 future total horizon generally operate satisfactorily during the peak hours with the exception of the westbound left-turn at the Greenbank Road and Strandherd Drive intersection during the PM peak. This movement may experience high delays and may be at capacity.

13.2.2 2030 Future Total Network Intersection Operations

The 2030 future total network intersection operations are summarized below in Table 20. The level of service is based on the HCM criteria for average delay at signalized intersections. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix J.

Table 20: 2030 Future Total Network Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Greenbank Road & Strandherd Drive *Signalized*	EBL	D	36.2	0.66	39.9	D	51.0	0.81	#64.4
	EBT	D	38.2	0.60	87.4	E	70.1	0.99	#173.0
	EBR	A	0.5	0.14	0.0	A	4.7	0.24	11.2
	WBL	C	22.9	0.23	16.6	D	49.4	0.76	#56.3
	WBT	D	51.4	0.83	106.3	D	49.4	0.84	#125.1
	WBR	A	6.8	0.33	16.3	A	6.3	0.33	17.2
	NBL	E	76.3	0.41	23.1	E	70.4	0.51	m30.4
	NBT/R	C	25.2	0.39	63.2	C	27.0	0.51	44.4
	SBL	E	57.9	0.55	32.7	E	58.3	0.65	44.0
	SBT	C	29.1	0.19	33.1	D	35.8	0.48	71.9
	SBR	A	3.8	0.20	9.8	A	6.2	0.29	16.8
	Overall	**D**	**36.6**	-	-	**D**	**46.1**	-	-
Greenbank Road & Marketplace Avenue *Signalized*	EBL	D	40.3	0.08	7.8	C	30.9	0.24	16.0
	EBT/R	C	34.2	0.21	14.1	D	44.8	0.61	62.1
	WBL	D	43.8	0.21	16.7	D	41.7	0.56	41.5
	WBT/R	C	20.5	0.49	24.6	D	53.1	0.81	92.2
	NBL	E	60.5	0.54	40.2	E	77.7	0.78	#71.4
	NBT/R	B	10.6	0.25	45.0	C	23.7	0.35	62.4
	SBL	E	65.0	0.31	16.3	E	68.3	0.61	m38.1
	SBT/R	A	9.9	0.16	16.6	B	16.8	0.43	37.5
	Overall	**C**	**20.4**	-	-	**D**	**37.1**	-	-
Greenbank Road & New Collector *Signalized*	EBL	D	43.1	0.30	17.4	D	45.2	0.52	33.4
	EBR	C	21.9	0.05	4.2	B	14.1	0.13	7.1
	NBL	A	1.7	0.02	m1.5	D	48.0	0.40	m25.4
	NBT	A	1.4	0.20	11.0	A	2.3	0.21	m11.8
	SBT/R	A	2.0	0.12	10.3	B	10.7	0.36	59.9
	Overall	**A**	**3.6**	-	-	**B**	**11.8**	-	-

Notes: Saturation flow rate of 1800 veh/h/lane
PHF = 1.00

The network intersection operations for the 2030 future total horizon generally operate satisfactorily during the peak hours.

13.2.3 Network Intersection MMLOS

Table 21 summarizes the MMMLOS analysis for the network intersections of Greenbank Road and Marketplace Avenue, and Greenbank Road and Strandherd Drive. The existing and future conditions for both intersections will be the same and are considered in one row. The analysis is based on the policy area of within 600m of a rapid transit station. The MMLOS worksheets has been provided in Appendix H.

Table 21: Study Area Intersection MMLOS Analysis

Intersection	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Greenbank Road & Strandherd Drive	F	A	F	C	F	A	B	E	C	E
Greenbank Road & New Collector	F	A	F	C	E	A	F	E	A	E
Greenbank Road & Marketplace Avenue	F	A	F	C	F	A	B	E	B	E

The MMLOS targets for the pedestrian, bicycle and transit LOS will not be met at all of the signalized network intersections, and the truck LOS will not be met at the Greenbank Road and New Collector intersection. The pedestrian level of service would require a maximum of four lanes at a crossing to meet a LOS C and two lanes at a crossing to meet a LOS A. The mixed traffic approaches for cyclists and speeds along the arterial roads drive the LOS F and E for the intersections and would require travel speeds under 50 km/h to meet a bicycle LOS C. The transit LOS will not be met due to the intersection delays. Transit actuation will be required once the BRT lanes are provided along Greenbank Road and Chapman Mills Drive, which may achieve the transit LOS. The truck LOS is does not meet the targets at the Greenbank Road and Chapman Mills Drive intersection due to the single receiving lane of the New Collector.

13.2.4 Recommended Design Elements

No study area intersection design elements are proposed as part of this study beyond the approved intersection modifications and proposed intersections within the Chapman Mills Drive EA Study.

14 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 site includes 310 apartment units and 602 stacked townhome units
- Accesses will be provided along the internal road network, and connect to Chapman Mills Drive and Street B
- The development is proposed to be completed as a single phase by 2025
- The Trip Generation, Location, and Safety triggers were met for the TIA Screening

Existing Conditions

- Greenbank Road and Strandherd Drive are arterial roads, and Jockvale Road and Marketplace Avenue are collector roads in the study area
- Future roadways include Chapman Mills Drive and Street B as collector roads
- Sidewalks/MUPS are generally provided on both sides of the study area roadways, and on-street bike lanes on both sides of the roadway on Greenbank Road and on Strandherd Drive, east of Greenbank Road
- The high volumes roadways have produced a high number of collisions at the study are intersections, primarily at the Greenbank Road and Strandherd Drive, and Jockvale Road and Strandherd Drive intersections
- The collisions are predominantly rear end and turning movement collisions indicating that they are lower speed and a result of congestion

Development Generated Travel Demand

- The proposed development is forecasted produce 795 two-way people trips during the AM peak hour and 959 two-way people trips during the PM peak hour
- Of the forecasted people trips, 318 two-way trips will be vehicle trips during the AM peak hour and 383 two-way trips will be vehicle trips during the PM peak hour
- Of the forecasted trips, 80% are anticipated to travel north, 10% to the east, and 5% to both the west and south

Background Conditions

- The background developments of 3195 Greenbank, 3201 Greenbank Road, 3311 Greenbank Road, 3370 Greenbank Road (Phase 1 for 2026, ultimate with the Chapman Mills Drive reduction for 2031), and 4005 Strandherd Drive (during 2030) were included in the background conditions, along with a total background growth of 10% along the mainline volumes
- By the 2030 horizon, the Chapman Mills Drive Extension to the west of the Kennedy-Burnett stormwater pond as been assumed to be constructed and an 25% diversion from Greenbank Road was assumed to use Chapman Mills Drive.
- Generally, the study area intersections will operate acceptably during the background horizons

Development Design

- The bike and auto parking areas are to be located near the main entrances for the residential units
- Pedestrian connections will be made along Jockvale Road and to Chapman Mills Drive to the north, Street B to the south, Greenbank Road to the east, and the Kennedy-Burnett stormwater pond to the west
- The new streets proposed as part of the plan of subdivision include the extension of Jockvale Road, Chapman Mills Drive along the north edge of the property and Street B along the southern edge of the property
- The cross-sections provided as part of the South Nepean Town Centre Community Design Plan (2006) should be used as the basis for the Jockvale Road extension and other new roads within the subdivision, and the Chapman Mills Drive cross-section from the associated EA study should be used
- The cross-sections noted above will need to be reviewed to assess the need for additional space to accommodate utilities within the right-of-way
- Traffic calming elements are recommended at the future local road intersections with Jockvale Road, Street A and Street B, including bulb-outs to narrow each approach to the intersection and reduce pedestrian crossing distances

Boundary Street Design

- The boundary streets will not meet pedestrian MMLOS targets, due to auto volumes and/or posted speed limits (e.g. 60km/h)
- Due to the issues limiting the ability to meet the MMLOS targets, no improvements are recommended for the boundary streets to meet the pedestrian MMLOS targets

Access Intersections Design

- Accesses are proposed along the internal road network, including Jockvale Road
- The new intersections along Chapman Mills Drive are consistent with the EA study recommendations and no changes to the Greenbank Road and Chapman Mills drive intersection are recommended

- The intersections along Street B are assumed to be minor stop-controlled, with Street B operating as a free flow corridor, and the intersection of Greenbank Road and Street B is consistent with the Novatech 2018 configuration
- No specific recommendations or design elements are required outside of typical plan of subdivision design
- Should any of the internal intersections, such as the apartment access, be reduced to a private approach, the access will require a depressed curb and sidewalk through the access
- During the 2025 future total horizon, the access intersections are expected to operate acceptably with the northbound left-turn at Jockvale Road and Strandherd Drive may experience high delays during the PM peak
- During the 2030 future total horizon, the access intersections are expected to operate acceptably
- The MMLOS targets for pedestrians, bicycles and transit cannot be met due to the nature of arterial roadways at both signalized access intersections and truck movements may be limited along Jockvale Road

TDM

- Supportive TDM measures to be included within the proposed development should include:
  - Enhanced connectivity of pedestrians and cyclists to the adjacent network and transit
  - Bike parking locations at each building in proximity to the entrances
  - Inclusion of a 1-month Presto card for first time new townhome purchase and apartment rental, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
  - Unbundle parking cost from purchase or rental costs

Transit

- No transit service is currently provided on the boundary road network, although future BRT corridors will border the north and east of the site
- To meet forecasted transit use, four single buses, or equivalent capacity, would be required for peak hour service on local routes
- No specific transit priority measures were considered as part of this development and any BRT related measures would be subject to the detailed design of those corridors

Network Intersection Design

- Generally, the network intersections will operate acceptably during the background horizons, with the westbound left-turn at Greenbank Road and Strandherd Drive experience high delays during the 2025 horizon only
- The MMLOS targets for pedestrians, bicycles and transit cannot be met due to the nature of arterial roadways at all signalized network intersections and truck movements may be limited along New Collector for 3195 Jockvale Road development

15 Next Steps

Following the circulation and review of this Strategy Report, any outstanding comments will be addressed, within the context of the draft plan of subdivision submission. Once remaining TIA Steps are completed and sign-off has been received from City Transportation Project Manager, a signed and stamped final report will be provided to City staff.

Appendix A

TIA Screening Form and PM Certification Form

CGH TRANSPORTATION INC.

13 Markham Avenue
Nepean ON K2G 3Z1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: 03-Mar-19
Project Number: 2019-09
Project Reference: Caivan Barrhaven Towncentre

1.1 Description of Proposed Development	
Municipal Address	3288 Greenbank Road
Description of Location	CON 3RF PT LOT 14
Land Use Classification	Residential
Development Size	311 apartments, 602 townhomes
Accesses	2 RIRO & 1 Signal on Chapman Mills, shared (Claridge) local connection to Greenbank
Phase of Development	Single Phase
Buildout Year	2028
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Townhomes or apartments	
Development Size	913	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?	Yes
Location Trigger	Yes

1.4. Safety Triggers	
Are posted speed limits on a boundary street are 80 km/hr or greater?	No
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	No
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?	Yes
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.**

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

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

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

Name: _____Andrew Harte_____
(Please Print)

Professional Title: _____Professional Engineer_____

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

Office Contact Information (Please Print)
Address: 13 Markham Avenue
City / Postal Code: Ottawa / K2G 3Z1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com

Appendix B

Turning Movement Counts

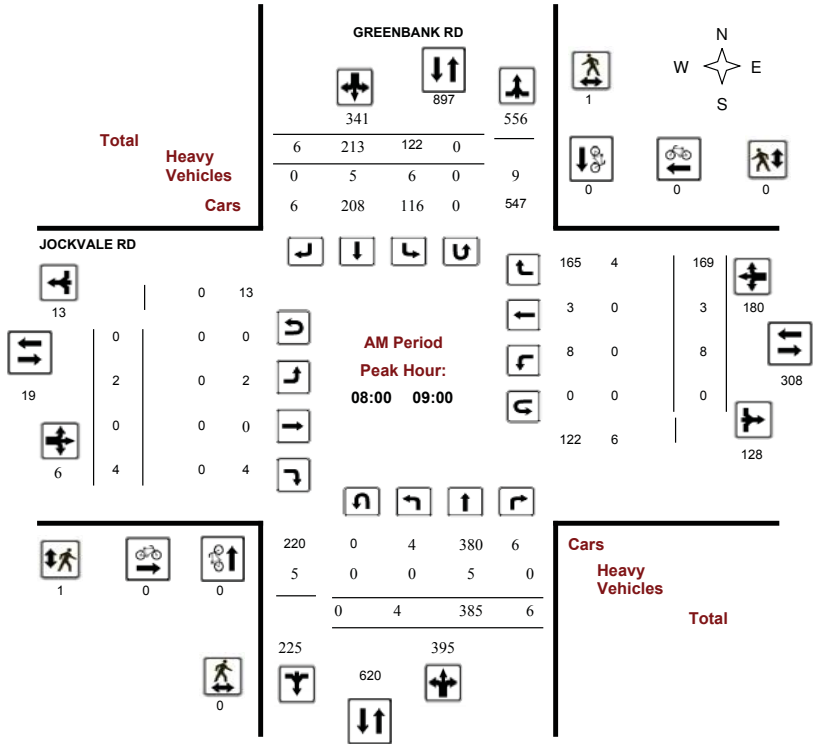
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016 **WO No:** 36178

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



Comments

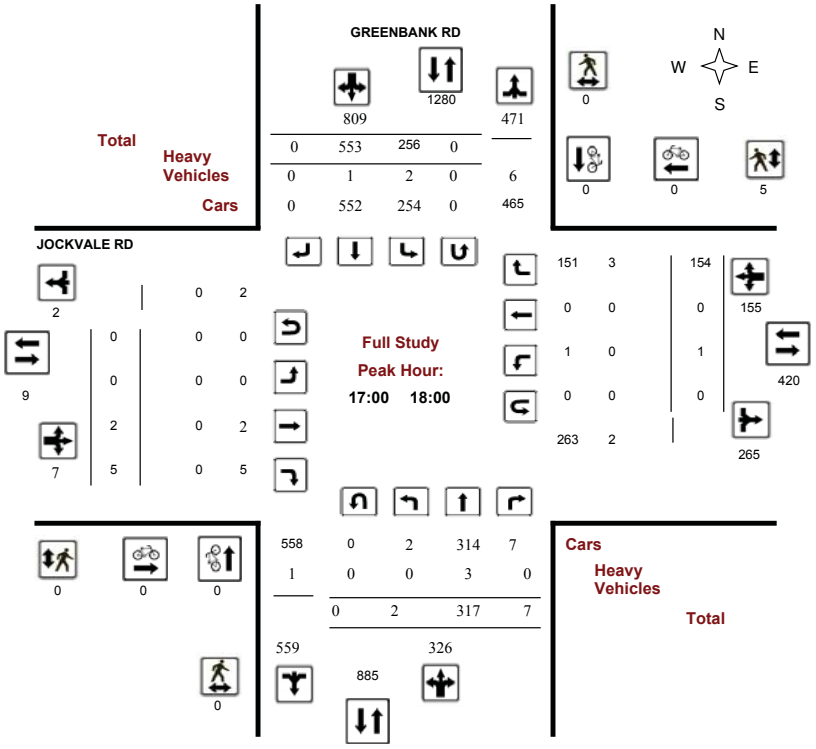
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016 **WO No:** 36178

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



Comments

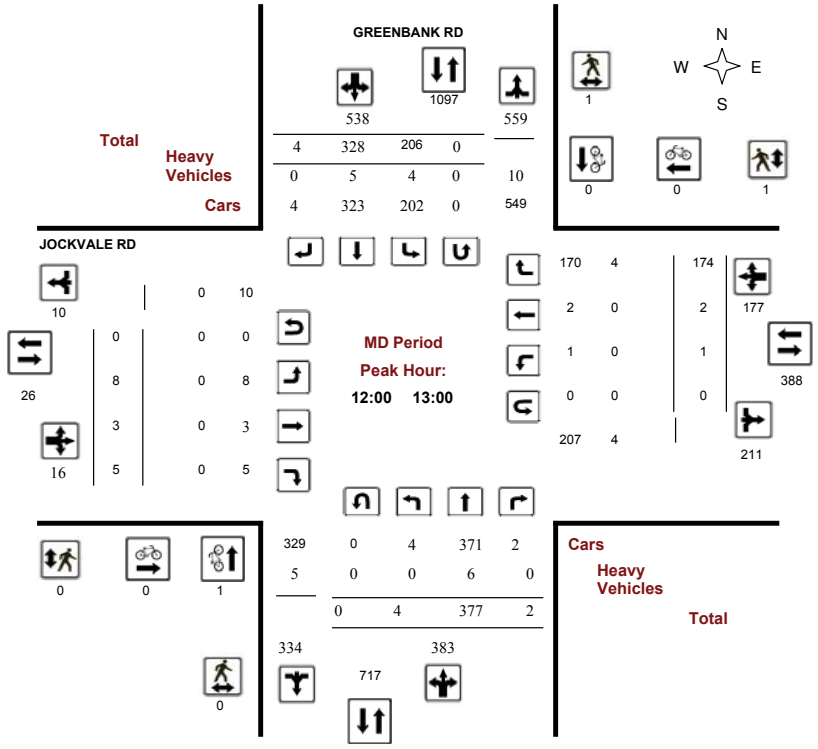
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016 **WO No:** 36178

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



Comments

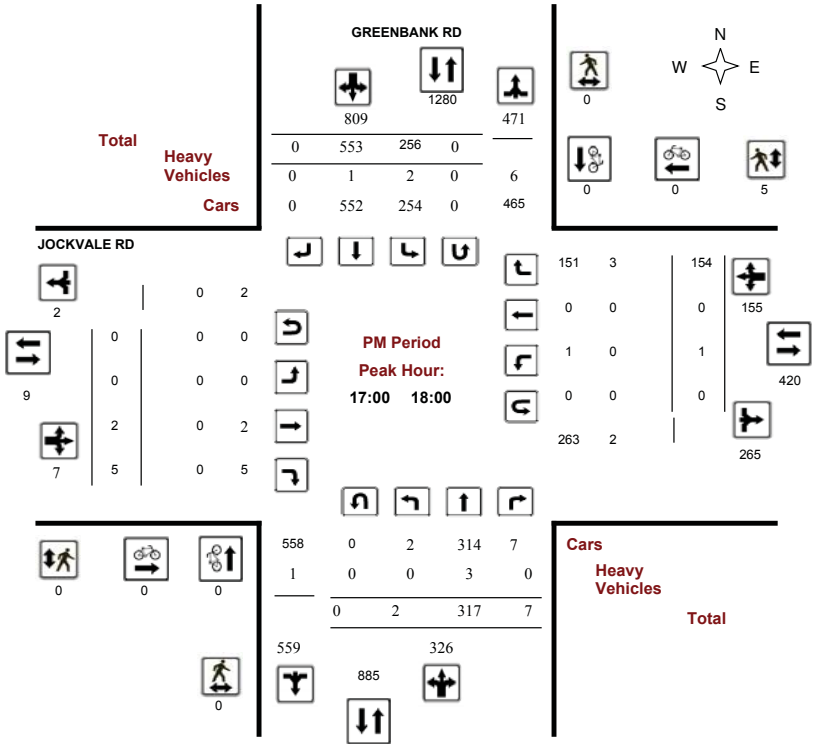
Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016 **WO No:** 36178

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



Comments

Transportation Services - Traffic Services

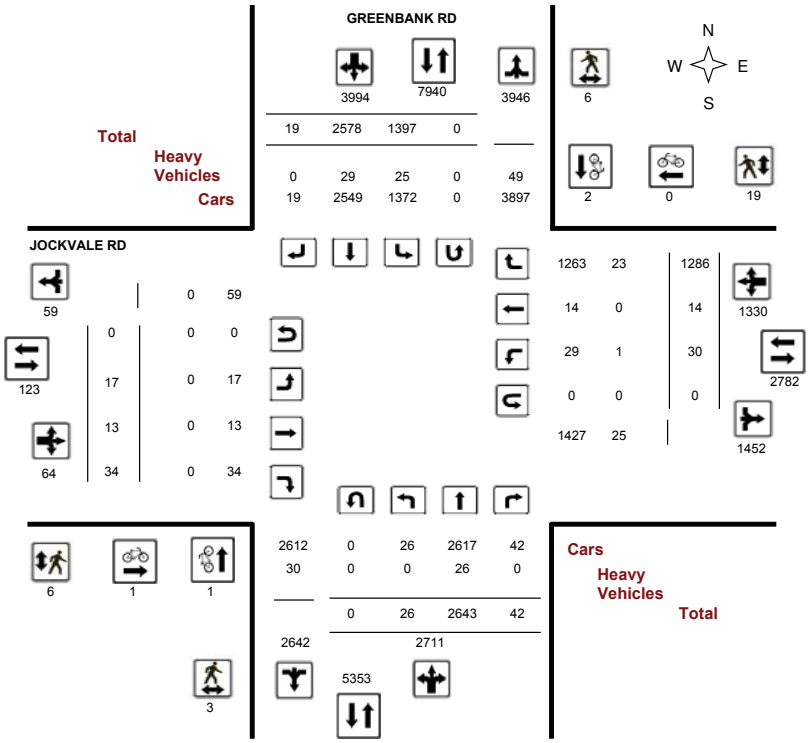
Turning Movement Count - Full Study Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

WO#: 36178

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 36178

Turning Movement Count - Full Study Summary Report

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

AADT Factor .90

Full Study

	GREENBANK RD									JOCKVALE RD									
	Northbound				Southbound					Eastbound				Westbound					
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	**WB TOT**	STR TOT	Grand Total
07:00 08:00	4	415	2	421	85	162	0	247	668	0	1	3	4	5	1	160	166	170	838
08:00 09:00	4	385	6	395	122	213	6	341	736	2	0	4	6	8	3	169	180	186	922
09:00 10:00	8	313	5	326	109	197	2	308	634	6	2	1	9	4	1	179	184	193	827
11:30 12:30	7	328	7	342	193	317	9	519	861	8	4	5	17	0	3	155	158	175	1036
12:30 13:30	0	318	2	320	210	316	2	528	848	1	3	6	10	2	3	201	206	216	1064
15:00 16:00	0	238	1	239	194	363	0	557	796	0	0	4	4	5	0	140	145	149	945
16:00 17:00	1	329	12	342	228	457	0	685	1027	0	1	6	7	5	3	128	136	143	1170
17:00 18:00	2	317	7	326	256	553	0	809	1135	0	2	5	7	1	0	154	155	162	1297
Sub Total	26	2643	42	2711	1397	2578	19	3994	6705	17	13	34	64	30	14	1286	1330	1394	8099
U Turns				0				0	0				0				0	0	0
Total	26	2643	42	2711	1397	2578	19	3994	6705	17	13	34	64	30	14	1286	1330	1394	8099
EQ 12Hr	36	3674	58	3768	1942	3583	26	5552	9320	24	18	47	89	42	19	1788	1849	1938	11258
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	33	3306	53	3391	1748	3225	24	4996	8387	21	16	43	80	38	18	1609	1664	1744	10131
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	43	4331	69	4443	2289	4225	31	6545	10988	28	21	56	105	49	23	2108	2180	2285	13273
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. 36178

Turning Movement Count - 15 Minute Summary Report

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

		GREENBANK RD									JOCKVALE RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	112	0	**112**	22	39	0	**61**	**173**	0	0	0	**0**	1	0	27	**28**	**28**	**201**
07:15	07:30	0	107	0	**107**	18	36	0	**54**	**161**	0	1	0	**1**	0	1	46	**47**	**48**	**209**
07:30	07:45	2	108	0	**110**	16	40	0	**56**	**166**	0	0	1	**1**	0	0	40	**40**	**41**	**207**
07:45	08:00	2	88	2	**92**	29	47	0	**76**	**168**	0	0	2	**2**	4	0	47	**51**	**53**	**221**
08:00	08:15	1	107	3	**111**	29	46	1	**76**	**187**	0	0	1	**1**	4	0	46	**50**	**51**	**238**
08:15	08:30	2	96	2	**100**	30	44	1	**75**	**175**	0	0	2	**2**	0	0	37	**37**	**39**	**214**
08:30	08:45	1	85	0	**86**	25	60	0	**85**	**171**	0	0	0	**0**	0	0	40	**40**	**40**	**211**
08:45	09:00	0	97	1	**98**	38	63	4	**105**	**203**	2	0	1	**3**	4	3	46	**53**	**56**	**259**
09:00	09:15	3	88	1	**92**	23	43	2	**68**	**160**	3	1	0	**4**	0	0	41	**41**	**45**	**205**
09:15	09:30	1	77	1	**79**	29	51	0	**80**	**159**	1	0	0	**1**	3	1	38	**42**	**43**	**202**
09:30	09:45	4	81	2	**87**	29	55	0	**84**	**171**	1	1	0	**2**	1	0	40	**41**	**43**	**214**
09:45	10:00	0	67	1	**68**	28	48	0	**76**	**144**	1	0	1	**2**	0	0	60	**60**	**62**	**206**
11:30	11:45	1	73	5	**79**	44	66	2	**112**	**191**	1	0	2	**3**	0	1	36	**37**	**40**	**231**
11:45	12:00	2	76	1	**79**	52	76	3	**131**	**210**	0	2	1	**3**	0	2	39	**41**	**44**	**254**
12:00	12:15	3	86	1	**90**	56	87	2	**145**	**235**	3	2	0	**5**	0	0	40	**40**	**45**	**280**
12:15	12:30	1	93	0	**94**	41	88	2	**131**	**225**	4	0	2	**6**	0	0	40	**40**	**46**	**271**
12:30	12:45	0	112	1	**113**	51	88	0	**139**	**252**	1	1	2	**4**	1	1	50	**52**	**56**	**308**
12:45	13:00	0	86	0	**86**	58	65	0	**123**	**209**	0	0	1	**1**	0	1	44	**45**	**46**	**255**
13:00	13:15	0	60	1	**61**	44	79	1	**124**	**185**	0	0	3	**3**	0	1	54	**55**	**58**	**243**
13:15	13:30	0	60	0	**60**	57	84	1	**142**	**202**	0	2	0	**2**	1	0	53	**54**	**56**	**258**
15:00	15:15	0	50	1	**51**	44	86	0	**130**	**181**	0	0	0	**0**	0	0	34	**34**	**34**	**215**
15:15	15:30	0	46	0	**46**	58	74	0	**132**	**178**	0	0	1	**1**	3	0	39	**42**	**43**	**221**
15:30	15:45	0	63	0	**63**	47	95	0	**142**	**205**	0	0	2	**2**	0	0	27	**27**	**29**	**234**
15:45	16:00	0	79	0	**79**	45	108	0	**153**	**232**	0	0	1	**1**	2	0	40	**42**	**43**	**275**
16:00	16:15	0	65	2	**67**	59	120	0	**179**	**246**	0	0	0	**0**	0	2	31	**33**	**33**	**279**
16:15	16:30	1	79	3	**83**	64	111	0	**175**	**258**	0	0	3	**3**	1	0	30	**31**	**34**	**292**
16:30	16:45	0	93	4	**97**	55	119	0	**174**	**271**	0	0	2	**2**	2	0	28	**30**	**32**	**303**
16:45	17:00	0	92	3	**95**	50	107	0	**157**	**252**	0	1	1	**2**	2	1	39	**42**	**44**	**296**
17:00	17:15	0	91	3	**94**	53	145	0	**198**	**292**	0	1	2	**3**	1	0	34	**35**	**38**	**330**
17:15	17:30	1	73	1	**75**	70	135	0	**205**	**280**	0	0	1	**1**	0	0	36	**36**	**37**	**317**
17:30	17:45	1	77	2	**80**	66	140	0	**206**	**286**	0	0	2	**2**	0	0	46	**46**	**48**	**334**
17:45	18:00	0	76	1	**77**	67	133	0	**200**	**277**	0	1	0	**1**	0	0	38	**38**	**39**	**316**
TOTAL:		26	2643	42	**2711**	1397	2578	19	**3994**	**6705**	17	13	34	**64**	30	14	1286	**1330**	**1394**	**8099**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 36178

GREENBANK RD @ JOCKVALE RD

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

	GREENBANK RD			JOCKVALE RD			
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 08:00	0	1	**1**	1	0	**1**	**2**
08:00 09:00	0	0	**0**	0	0	**0**	**0**
09:00 10:00	0	1	**1**	0	0	**0**	**1**
11:30 12:30	1	0	**1**	0	0	**0**	**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	1	2	**3**	1	0	**1**	**4**

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. 36178

Turning Movement Count - Heavy Vehicle Report

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

		GREENBANK RD									JOCKVALE RD									
		Northbound				Southbound					Eastbound				Westbound					
Time Period		LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	08:00	0	2	0	**2**	0	5	0	**5**	**7**	0	0	0	**0**	0	0	7	**7**	**7**	**14**
08:00	09:00	0	5	0	**5**	6	5	0	**11**	**16**	0	0	0	**0**	0	0	4	**4**	**4**	**20**
09:00	10:00	0	5	0	**5**	4	8	0	**12**	**17**	0	0	0	**0**	0	0	2	**2**	**2**	**19**
11:30	12:30	0	5	0	**5**	5	4	0	**9**	**14**	0	0	0	**0**	0	0	2	**2**	**2**	**16**
12:30	13:30	0	6	0	**6**	6	3	0	**9**	**15**	0	0	0	**0**	0	0	4	**4**	**4**	**19**
15:00	16:00	0	0	0	**0**	2	2	0	**4**	**4**	0	0	0	**0**	1	0	1	**2**	**2**	**6**
16:00	17:00	0	0	0	**0**	0	1	0	**1**	**1**	0	0	0	**0**	0	0	0	**0**	**0**	**1**
17:00	18:00	0	3	0	**3**	2	1	0	**3**	**6**	0	0	0	**0**	0	0	3	**3**	**3**	**9**
Sub Total		0	26	0	**26**	25	29	0	**54**	**80**	0	0	0	**0**	1	0	23	**24**	**24**	**104**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		0	26	0	**0**	25	29	0	**54**	**80**	0	0	0	**0**	1	0	23	**24**	**24**	**104**

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 36178

Turning Movement Count - Pedestrian Volume Report

GREENBANK RD @ JOCKVALE RD

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	0	**0**	0	0	**0**	**0**
07:15	07:30	0	0	**0**	0	1	**1**	**1**
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	1	**1**	**1**
08:00	08:15	0	0	**0**	1	0	**1**	**1**
08:15	08:30	0	0	**0**	0	0	**0**	**0**
08:30	08:45	0	1	**1**	0	0	**0**	**1**
08:45	09:00	0	0	**0**	0	0	**0**	**0**
08:00	09:00	0	1	**1**	1	0	**1**	**2**
09:00	09:15	0	2	**2**	2	3	**5**	**7**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	2	**2**	0	3	**3**	**5**
09:45	10:00	0	0	**0**	0	1	**1**	**1**
09:00	10:00	0	4	**4**	2	7	**9**	**13**
11:30	11:45	0	0	**0**	0	1	**1**	**1**
11:45	12:00	0	0	**0**	0	0	**0**	**0**
12:00	12:15	0	1	**1**	0	1	**1**	**2**
12:15	12:30	0	0	**0**	0	0	**0**	**0**
11:30	12:30	0	1	**1**	0	2	**2**	**3**
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	3	0	**3**	3	0	**3**	**6**
12:30	13:30	3	0	**3**	3	0	**3**	**6**
15:00	15:15	0	0	**0**	0	2	**2**	**2**
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	1	**1**	**1**
15:00	16:00	0	0	**0**	0	3	**3**	**3**
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	1	**1**	**1**
16:00	17:00	0	0	**0**	0	1	**1**	**1**
17:00	17:15	0	0	**0**	0	0	**0**	**0**
17:15	17:30	0	0	**0**	0	2	**2**	**2**
17:30	17:45	0	0	**0**	0	0	**0**	**0**
17:45	18:00	0	0	**0**	0	3	**3**	**3**
17:00	18:00	0	0	**0**	0	5	**5**	**5**
Total	.....	3	6	**9**	6	19	**25**	**34**

Comment:

Transportation Services - Traffic Services

Work Order 36178

Turning Movement Count - Pedestrian Volume Report

GREENBANK RD @ JOCKVALE RD

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	0	0	0	0	0	0
07:15 07:30	0	0	0	0	1	1	1
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	1	1	1
08:00 08:15	0	0	0	1	0	1	1
08:15 08:30	0	0	0	0	0	0	0
08:30 08:45	0	1	1	0	0	0	1
08:45 09:00	0	0	0	0	0	0	0
08:00 09:00	0	1	1	1	0	1	2
09:00 09:15	0	2	2	2	3	5	7
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	2	2	0	3	3	5
09:45 10:00	0	0	0	0	1	1	1
09:00 10:00	0	4	4	2	7	9	13
11:30 11:45	0	0	0	0	1	1	1
11:45 12:00	0	0	0	0	0	0	0
12:00 12:15	0	1	1	0	1	1	2
12:15 12:30	0	0	0	0	0	0	0
11:30 12:30	0	1	1	0	2	2	3
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	3	0	3	3	0	3	6
12:30 13:30	3	0	3	3	0	3	6
15:00 15:15	0	0	0	0	2	2	2
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	1	1	1
15:00 16:00	0	0	0	0	3	3	3
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	1	1	1
16:00 17:00	0	0	0	0	1	1	1
17:00 17:15	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	2	2	2
17:30 17:45	0	0	0	0	0	0	0
17:45 18:00	0	0	0	0	3	3	3
17:00 18:00	0	0	0	0	5	5	5
Total	3	6	9	6	19	25	34

Comment:

Transportation Services - Traffic Services

Work Order 36178

Turning Movement Count - 15 Min U-Turn Total Report

GREENBANK RD @ JOCKVALE RD

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	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		0	0	0	0	0

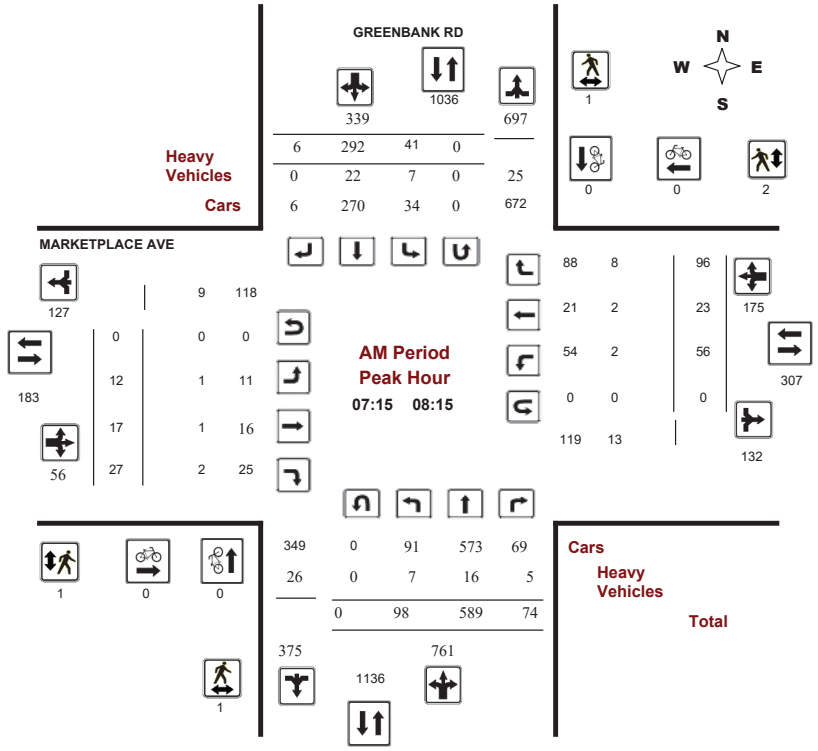
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016 **WO No:** 35721

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



Comments

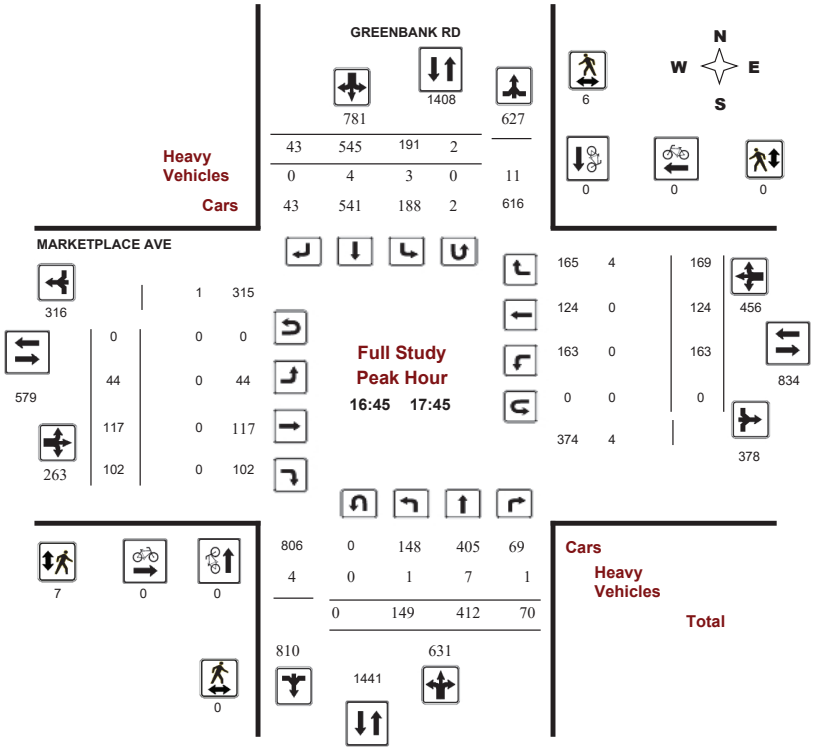
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016 **WO No:** 35721

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



Comments

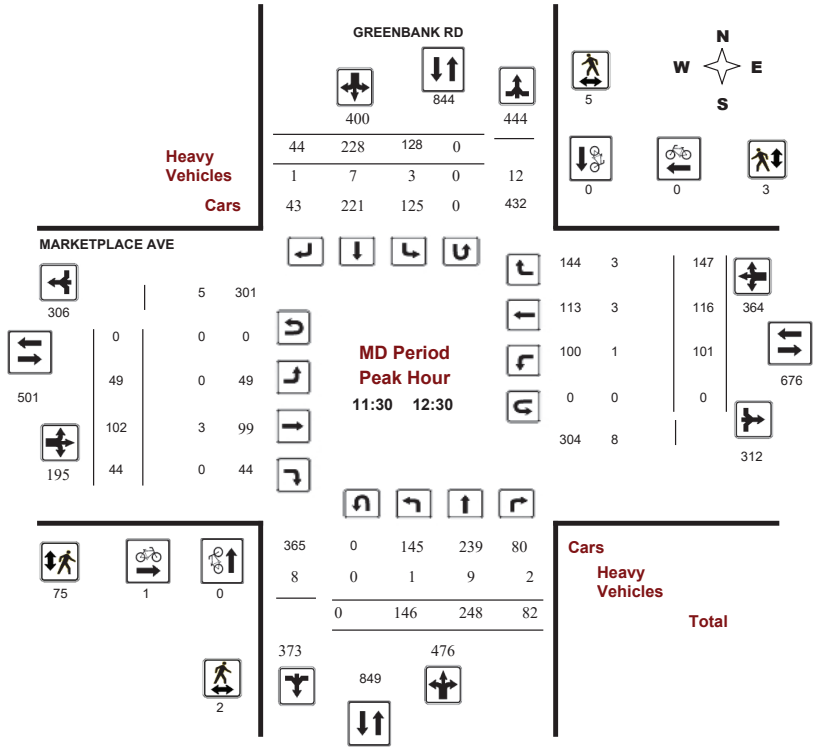
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016 **WO No:** 35721

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



Comments

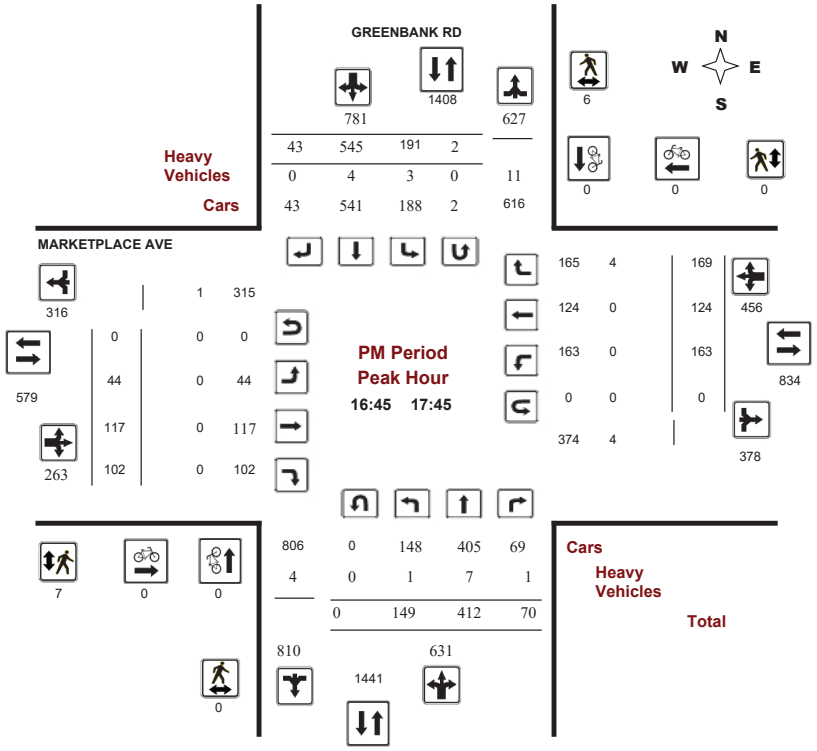
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016 **WO No:** 35721

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



Comments

Transportation Services - Traffic Services

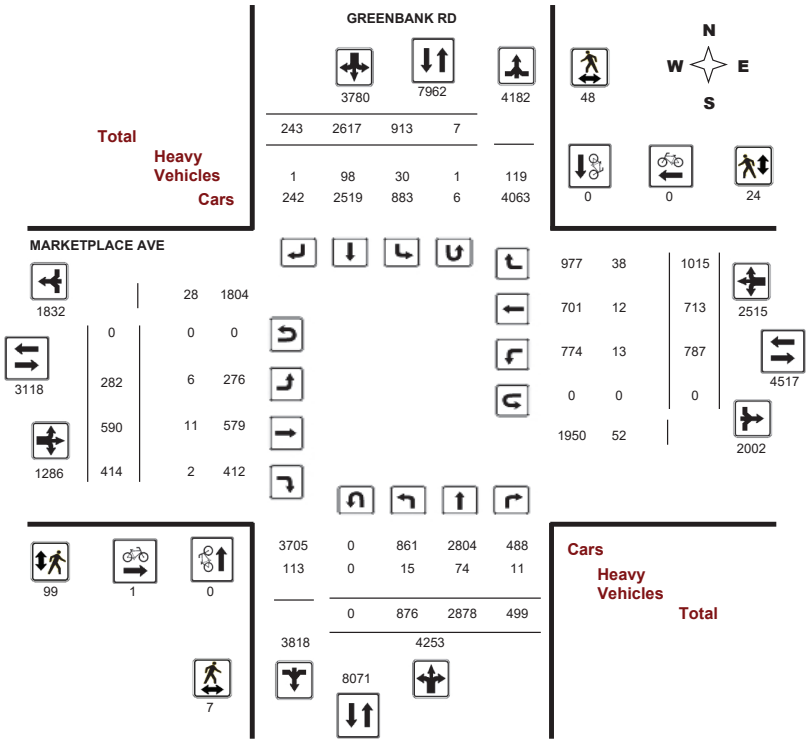
Turning Movement Count - Full Study Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

WO#: 35721

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 35721

Turning Movement Count - Full Study Summary Report

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 7

Eastbound: 0 Westbound: 0

AADT Factor 1.00

Full Study

	GREENBANK RD									MARKETPLACE AVE									
	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	75	543	78	**696**	34	281	6	**321**	**1017**	10	18	20	**48**	53	25	90	**168**	**216**	**1233**
08:00 09:00	90	514	45	**649**	57	231	11	**299**	**948**	8	22	23	**53**	39	40	118	**197**	**250**	**1198**
09:00 10:00	104	300	62	**466**	82	226	37	**345**	**811**	29	52	27	**108**	66	69	81	**216**	**324**	**1135**
11:30 12:30	146	248	82	**476**	128	228	44	**400**	**876**	49	102	44	**195**	101	116	147	**364**	**559**	**1435**
12:30 13:30	93	226	57	**376**	140	237	39	**416**	**792**	52	86	46	**184**	90	110	144	**344**	**528**	**1320**
15:00 16:00	101	302	45	**448**	134	385	30	**549**	**997**	31	86	72	**189**	114	111	140	**365**	**554**	**1551**
16:00 17:00	113	324	64	**501**	149	491	39	**679**	**1180**	57	109	81	**247**	157	128	124	**409**	**656**	**1836**
17:00 18:00	154	421	66	**641**	189	538	37	**764**	**1405**	46	115	101	**262**	167	114	171	**452**	**714**	**2119**
Sub Total	876	2878	499	**4253**	913	2617	243	**3773**	**8026**	282	590	414	**1286**	787	713	1015	**2515**	**3801**	**11827**
U Turns				**0**				**7**	**7**				**0**				**0**	**0**	**7**
Total	876	2878	499	**4253**	913	2617	243	**3780**	**8033**	282	590	414	**1286**	787	713	1015	**2515**	**3801**	**11834**
EQ 12Hr	1218	4000	694	**5912**	1269	3638	338	**5254**	**11166**	392	820	575	**1788**	1094	991	1411	**3496**	**5284**	**16450**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	1218	4000	694	**5912**	1269	3638	338	**5254**	**11166**	392	820	575	**1788**	1094	991	1411	**3496**	**5284**	**16450**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**1.00**						
AVG 24Hr	1595	5241	909	**7744**	1662	4765	442	**6883**	**14627**	513	1074	754	**2342**	1433	1298	1848	**4580**	**6922**	**21549**
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. 35721

Turning Movement Count - 15 Minute Summary Report

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 7

Eastbound: 0 Westbound: 0

		GREENBANK RD									MARKETPLACE AVE									
		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	10	112	18	**140**	5	46	0	**51**	**191**	1	5	1	**7**	11	6	14	**31**	**38**	**229**
07:15	07:30	17	143	18	**178**	6	46	2	**54**	**232**	2	3	7	**12**	8	8	21	**37**	**49**	**281**
07:30	07:45	19	152	22	**193**	10	98	1	**109**	**302**	5	6	7	**18**	22	6	28	**56**	**74**	**376**
07:45	08:00	29	136	20	**185**	13	91	3	**107**	**292**	2	4	5	**11**	12	5	27	**44**	**55**	**347**
08:00	08:15	33	158	14	**205**	12	57	0	**69**	**274**	3	4	8	**15**	14	4	20	**38**	**53**	**327**
08:15	08:30	15	97	5	**117**	6	45	3	**54**	**171**	0	8	5	**13**	8	10	35	**53**	**66**	**237**
08:30	08:45	20	119	16	**155**	18	75	4	**97**	**252**	1	4	6	**11**	11	12	35	**58**	**69**	**321**
08:45	09:00	22	140	10	**172**	21	54	4	**79**	**251**	4	6	4	**14**	6	14	28	**48**	**62**	**313**
09:00	09:15	30	109	13	**152**	21	69	15	**105**	**257**	11	11	4	**26**	10	12	13	**35**	**61**	**318**
09:15	09:30	31	69	18	**118**	17	52	11	**80**	**198**	5	11	9	**25**	17	17	22	**56**	**81**	**279**
09:30	09:45	22	67	20	**109**	17	51	4	**72**	**181**	7	16	11	**34**	18	27	31	**76**	**110**	**291**
09:45	10:00	21	55	11	**87**	27	54	7	**89**	**176**	6	14	3	**23**	21	13	15	**49**	**72**	**248**
11:30	11:45	38	60	14	**112**	33	53	11	**97**	**209**	13	26	12	**51**	12	30	34	**76**	**127**	**336**
11:45	12:00	32	57	28	**117**	22	59	9	**90**	**207**	11	22	12	**45**	22	26	38	**86**	**131**	**338**
12:00	12:15	35	60	24	**119**	36	60	14	**110**	**229**	15	29	7	**51**	29	27	35	**91**	**142**	**371**
12:15	12:30	41	71	16	**128**	37	56	10	**103**	**231**	10	25	13	**48**	38	33	40	**111**	**159**	**390**
12:30	12:45	21	63	15	**99**	33	49	12	**94**	**193**	11	19	9	**39**	17	28	43	**88**	**127**	**320**
12:45	13:00	25	55	19	**99**	36	70	11	**118**	**217**	16	13	11	**40**	19	28	32	**79**	**119**	**336**
13:00	13:15	22	62	10	**94**	36	63	8	**107**	**201**	13	31	13	**57**	24	14	30	**68**	**125**	**326**
13:15	13:30	25	46	13	**84**	35	55	8	**98**	**182**	12	23	13	**48**	30	40	39	**109**	**157**	**339**
15:00	15:15	30	84	12	**126**	34	73	7	**114**	**240**	13	23	12	**48**	21	27	34	**82**	**130**	**370**
15:15	15:30	24	82	4	**110**	24	104	7	**135**	**245**	5	16	20	**41**	32	32	37	**101**	**142**	**387**
15:30	15:45	26	78	15	**119**	41	100	7	**149**	**268**	7	23	17	**47**	35	24	30	**89**	**136**	**404**
15:45	16:00	21	58	14	**93**	35	108	9	**153**	**246**	6	24	23	**53**	26	28	39	**93**	**146**	**392**
16:00	16:15	26	73	20	**119**	32	124	10	**166**	**285**	17	30	28	**75**	29	30	24	**83**	**158**	**443**
16:15	16:30	24	93	8	**125**	30	112	12	**154**	**279**	15	25	12	**52**	34	24	26	**84**	**136**	**415**
16:30	16:45	28	69	16	**113**	42	140	5	**187**	**300**	10	30	21	**61**	51	38	41	**130**	**191**	**491**
16:45	17:00	35	89	20	**144**	45	115	12	**172**	**316**	15	24	20	**59**	43	36	33	**112**	**171**	**487**
17:00	17:15	42	115	18	**175**	48	141	9	**200**	**375**	11	33	26	**70**	42	39	45	**126**	**196**	**571**
17:15	17:30	35	106	19	**160**	48	144	9	**201**	**361**	10	28	23	**61**	38	29	51	**118**	**179**	**540**
17:30	17:45	37	102	13	**152**	50	145	13	**208**	**360**	8	32	33	**73**	40	20	40	**100**	**173**	**533**
17:45	18:00	40	98	16	**154**	43	108	6	**158**	**312**	17	22	19	**58**	47	26	35	**108**	**166**	**478**
TOTAL:		876	2878	499	**4253**	913	2617	243	**3780**	**8033**	282	590	414	**1286**	787	713	1015	**2515**	**3801**	**11834**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 35721

GREENBANK RD @ MARKETPLACE AVE

Count Date: Wednesday, February 10, 2016 **Start Time:** 07:00

		GREENBANK RD			MARKETPLACE AVE			
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**	1	0	**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	0	**0**	1	0	**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

W.O. 35721

Turning Movement Count - Heavy Vehicle Report

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

		GREENBANK RD									MARKETPLACE AVE									
		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	7	14	5	**26**	6	22	0	**28**	**54**	2	4	2	**8**	2	2	9	**13**	**21**	**75**
08:00	09:00	3	17	2	**22**	4	15	0	**19**	**41**	2	1	0	**3**	5	1	6	**12**	**15**	**56**
09:00	10:00	2	12	1	**15**	6	9	0	**15**	**30**	0	1	0	**1**	3	2	5	**10**	**11**	**41**
11:30	12:30	1	9	2	**12**	3	7	1	**11**	**23**	0	3	0	**3**	1	3	3	**7**	**10**	**33**
12:30	13:30	1	6	0	**7**	2	16	0	**18**	**25**	2	1	0	**3**	1	2	2	**5**	**8**	**33**
15:00	16:00	0	7	0	**7**	3	15	0	**19**	**26**	0	0	0	**0**	0	2	3	**5**	**5**	**31**
16:00	17:00	0	5	0	**5**	4	12	0	**16**	**21**	0	1	0	**1**	1	0	6	**7**	**8**	**29**
17:00	18:00	1	4	1	**6**	2	2	0	**4**	**10**	0	0	0	**0**	0	0	4	**4**	**4**	**14**
Sub Total		15	74	11	**100**	30	98	1	**130**	**230**	6	11	2	**19**	13	12	38	**63**	**82**	**312**
U-Turns (Heavy Vehicles)					**0**				**1**	**1**				**0**				**0**	**0**	**1**
Total		15	74	11	**0**	30	98	1	**131**	**231**	6	11	2	**19**	13	12	38	**63**	**82**	**313**

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 35721

Turning Movement Count - Pedestrian Volume Report

GREENBANK RD @ MARKETPLACE AVE

Count Date: Wednesday, February 10, 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	1	2	**3**	0	0	**0**	**3**
07:15	07:30	0	0	**0**	0	1	**1**	**1**
07:30	07:45	0	1	**1**	0	0	**0**	**1**
07:45	08:00	1	0	**1**	1	1	**2**	**3**
07:00	08:00	2	3	**5**	1	2	**3**	**8**
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	1	**1**	1	1	**2**	**3**
08:45	09:00	0	1	**1**	1	1	**2**	**3**
08:00	09:00	0	2	**2**	2	2	**4**	**6**
09:00	09:15	0	1	**1**	0	1	**1**	**2**
09:15	09:30	0	0	**0**	0	0	**0**	**0**
09:30	09:45	0	1	**1**	0	1	**1**	**2**
09:45	10:00	0	0	**0**	0	1	**1**	**1**
09:00	10:00	0	2	**2**	0	3	**3**	**5**
11:30	11:45	1	0	**1**	16	1	**17**	**18**
11:45	12:00	0	3	**3**	33	1	**34**	**37**
12:00	12:15	1	0	**1**	22	0	**22**	**23**
12:15	12:30	0	2	**2**	4	1	**5**	**7**
11:30	12:30	2	5	**7**	75	3	**78**	**85**
12:30	12:45	0	1	**1**	1	2	**3**	**4**
12:45	13:00	0	1	**1**	1	0	**1**	**2**
13:00	13:15	0	2	**2**	1	2	**3**	**5**
13:15	13:30	0	1	**1**	2	1	**3**	**4**
12:30	13:30	0	5	**5**	5	5	**10**	**15**
15:00	15:15	0	5	**5**	2	1	**3**	**8**
15:15	15:30	0	5	**5**	0	1	**1**	**6**
15:30	15:45	1	1	**2**	1	0	**1**	**3**
15:45	16:00	1	4	**5**	1	5	**6**	**11**
15:00	16:00	2	15	**17**	4	7	**11**	**28**
16:00	16:15	1	1	**2**	0	0	**0**	**2**
16:15	16:30	0	4	**4**	0	0	**0**	**4**
16:30	16:45	0	4	**4**	4	0	**4**	**8**
16:45	17:00	0	5	**5**	3	0	**3**	**8**
16:00	17:00	1	14	**15**	7	0	**7**	**22**
17:00	17:15	0	1	**1**	4	0	**4**	**5**
17:15	17:30	0	0	**0**	0	0	**0**	**0**
17:30	17:45	0	0	**0**	0	0	**0**	**0**
17:45	18:00	0	1	**1**	1	2	**3**	**4**
17:00	18:00	0	2	**2**	5	2	**7**	**9**
Total	.....	7	48	**55**	99	24	**123**	**178**

Comment:

Transportation Services - Traffic Services

Work Order 35721

Turning Movement Count - 15 Min U-Turn Total Report

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 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	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	1	0	0	1
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
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	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	0	0	0
17:00	17:15	0	2	0	0	2
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	1	0	0	1
Total		0	7	0	0	7

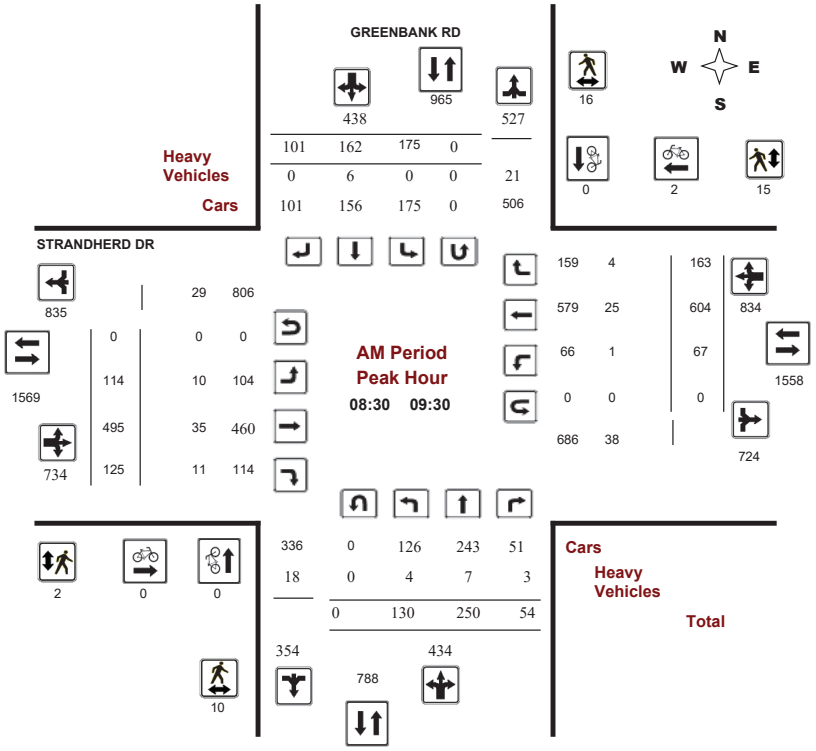
Transportation Services - Traffic Services

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

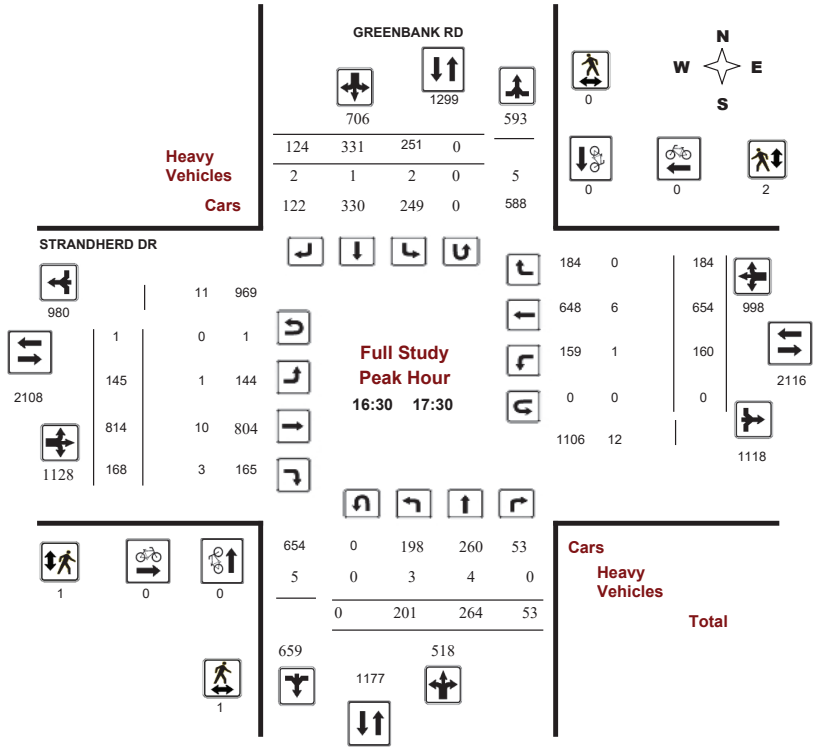
Transportation Services - Traffic Services

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

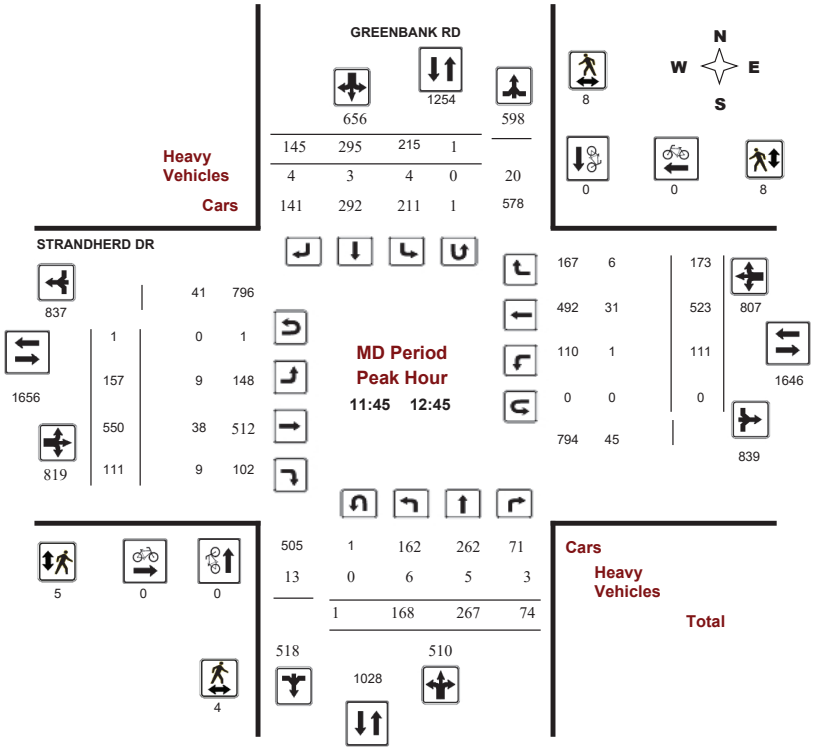
Transportation Services - Traffic Services

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

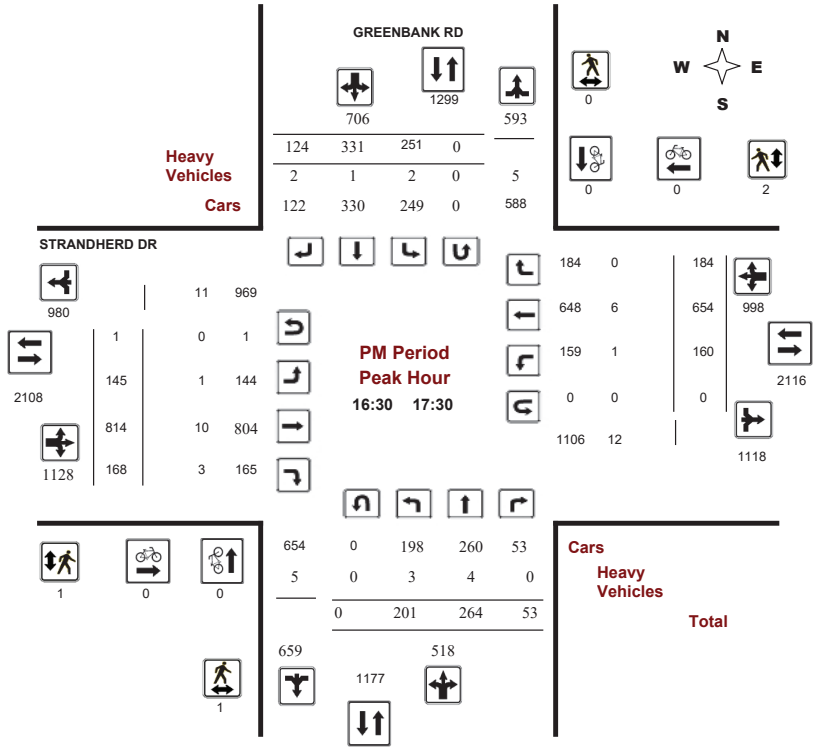
Transportation Services - Traffic Services

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

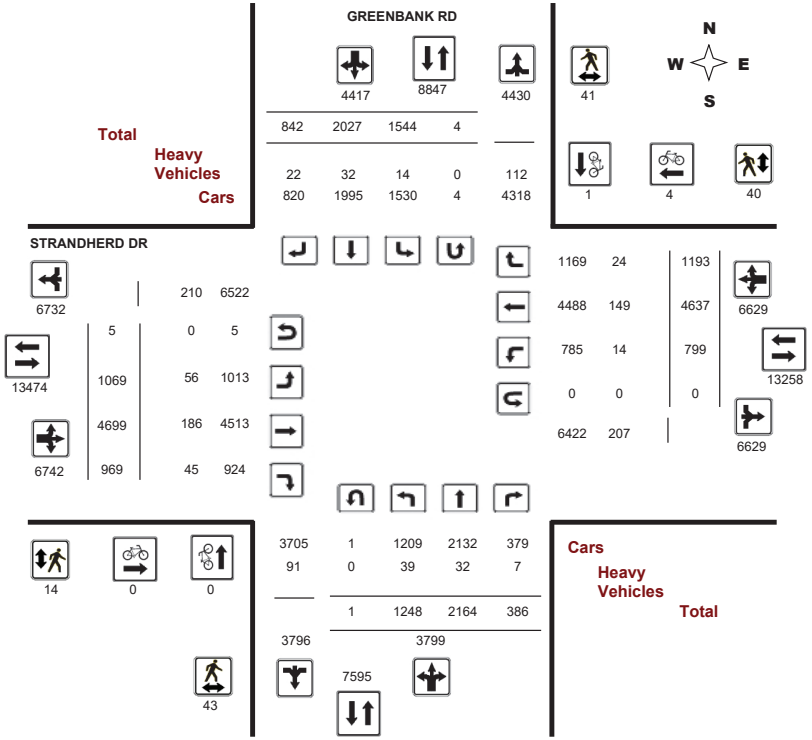
Transportation Services - Traffic Services

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

	GREENBANK RD			STRANDHERD DR			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**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

	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 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

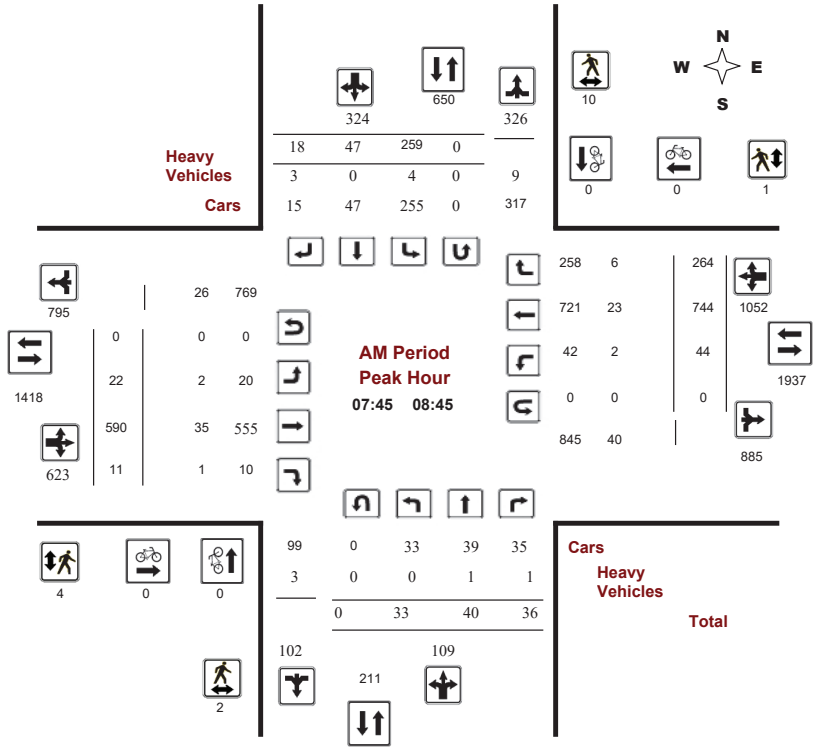
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37499

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



Comments

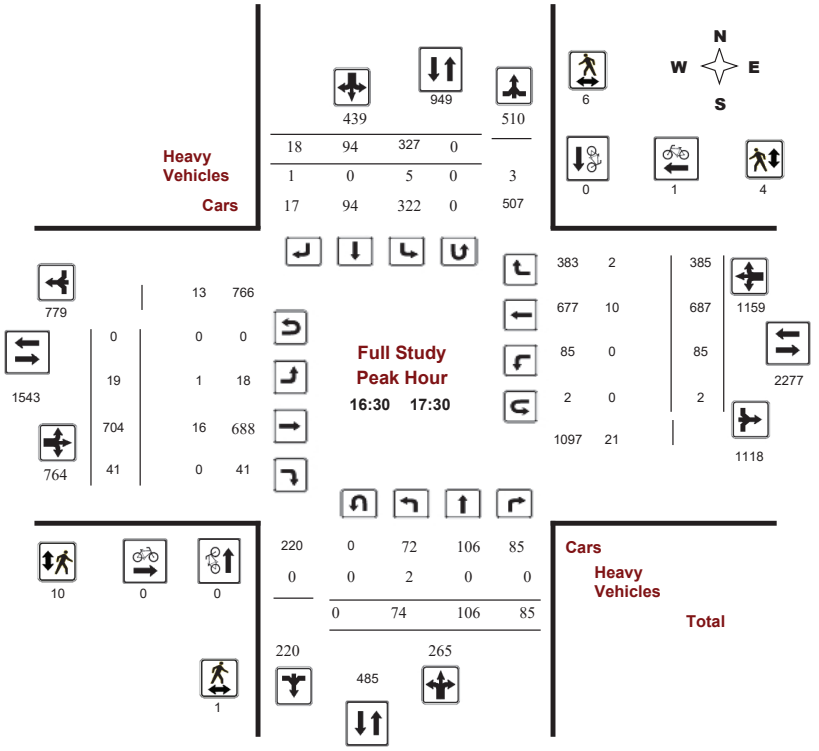
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37499

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



Comments

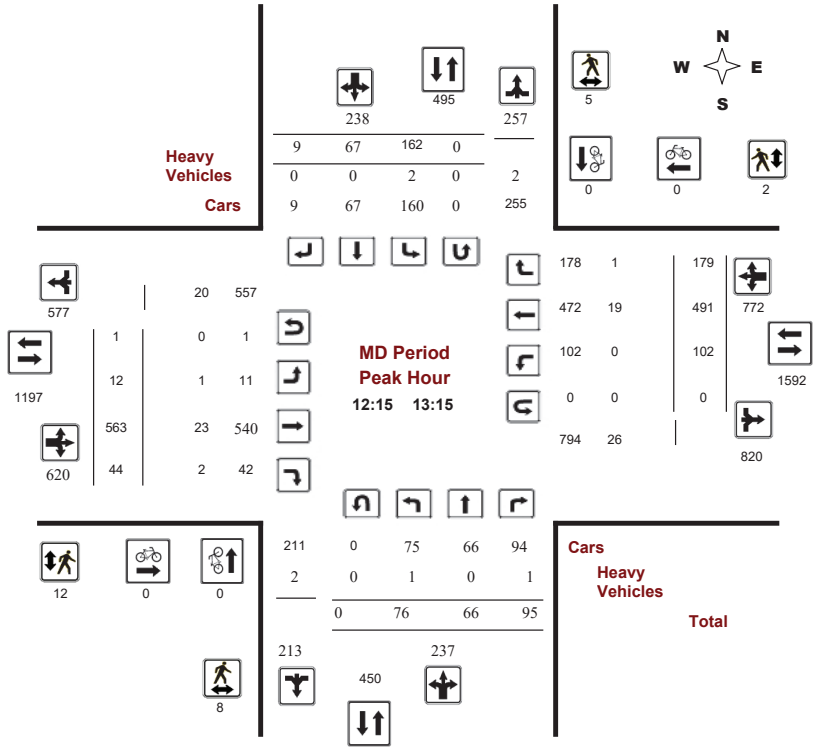
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37499

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



Comments

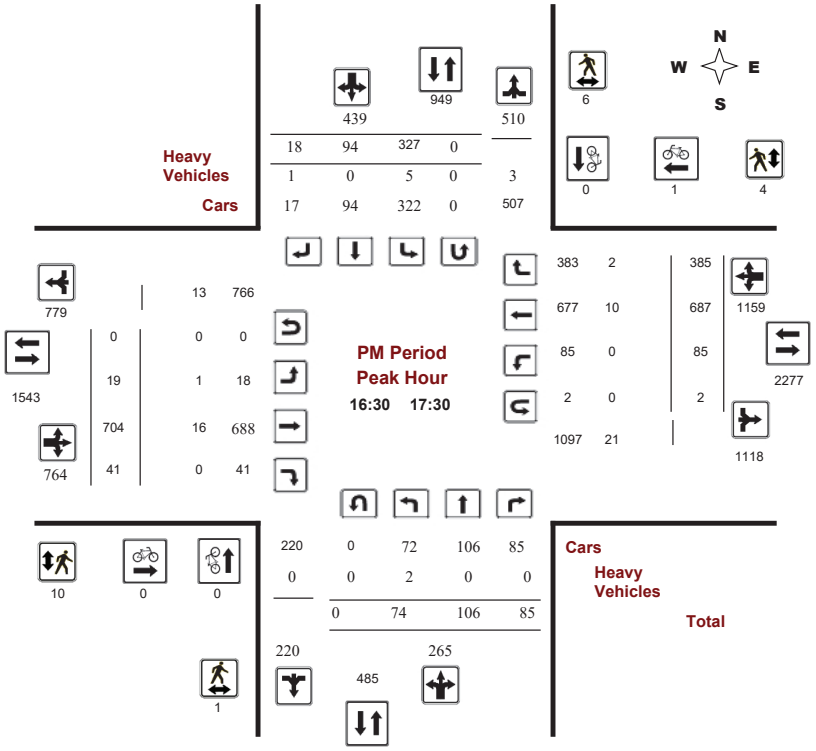
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018 **WO No:** 37499

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



Comments

Transportation Services - Traffic Services

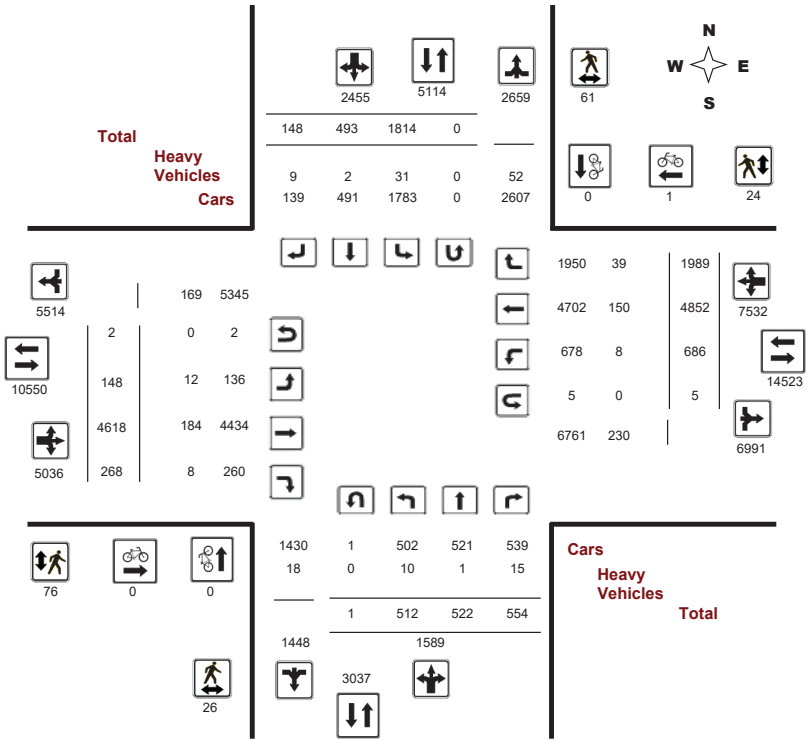
Turning Movement Count - Full Study Diagram

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

WO#: 37499

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order 37499

Turning Movement Count - Full Study Summary Report

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

Total Observed U-Turns

Northbound: 1 Southbound: 0

Eastbound: 2 Westbound: 5

AADT Factor 1.00

Full Study

	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	36	18	20	**74**	251	42	9	**302**	**376**	16	504	9	**529**	33	599	176	**808**	**1337**	**1713**
08:00 09:00	29	44	43	**116**	234	42	21	**297**	**413**	24	551	11	**586**	49	756	259	**1064**	**1650**	**2063**
09:00 10:00	65	40	52	**157**	209	38	14	**261**	**418**	15	439	26	**480**	97	557	153	**807**	**1287**	**1705**
11:30 12:30	77	64	83	**224**	160	51	13	**224**	**448**	5	487	52	**544**	109	473	179	**761**	**1305**	**1753**
12:30 13:30	82	67	98	**247**	158	75	12	**245**	**492**	13	552	39	**604**	110	472	186	**768**	**1372**	**1864**
15:00 16:00	69	85	81	**235**	212	68	27	**307**	**542**	23	649	34	**706**	116	643	330	**1089**	**1795**	**2337**
16:00 17:00	81	101	88	**270**	297	84	26	**407**	**677**	29	727	51	**807**	88	680	356	**1124**	**1931**	**2608**
17:00 18:00	73	103	89	**265**	293	93	26	**412**	**677**	23	709	46	**778**	84	672	350	**1106**	**1884**	**2561**
Sub Total	512	522	554	**1588**	1814	493	148	**2455**	**4043**	148	4618	268	**5034**	686	4852	1989	**7527**	**12561**	**16604**
U Turns				**1**				**0**	**1**				**2**				**5**	**7**	**8**
Total	512	522	554	**1589**	1814	493	148	**2455**	**4044**	148	4618	268	**5036**	686	4852	1989	**7532**	**12568**	**16612**
EQ 12Hr	712	726	770	**2209**	2521	685	206	**3412**	**5621**	206	6419	373	**7000**	954	6744	2765	**10469**	**17469**	**23090**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.																	**1.39**		
AVG 12Hr	712	726	770	**2209**	2521	685	206	**3412**	**5621**	206	6419	373	**7000**	954	6744	2765	**10469**	**17469**	**23090**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.																	**1.00**		
AVG 24Hr	932	951	1009	**2893**	3303	898	269	**4470**	**7363**	269	8409	488	**9170**	1249	8835	3622	**13715**	**22885**	**30248**
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. 37499

Turning Movement Count - 15 Minute Summary Report

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

Total Observed U-Turns

Northbound: 1 Southbound: 0

Eastbound: 2 Westbound: 5

		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	4	2	4	**10**	45	3	2	**50**	**60**	1	97	2	**100**	4	118	23	**145**	**245**	**305**
07:15	07:30	5	7	1	**13**	66	12	2	**80**	**93**	5	128	3	**136**	4	139	33	**176**	**312**	**405**
07:30	07:45	18	4	11	**33**	64	8	3	**75**	**108**	4	127	1	**132**	10	181	45	**236**	**368**	**476**
07:45	08:00	9	5	4	**18**	76	19	2	**97**	**115**	6	152	3	**161**	15	161	75	**251**	**412**	**527**
08:00	08:15	8	13	10	**31**	56	13	6	**75**	**106**	7	165	2	**174**	5	174	67	**246**	**420**	**526**
08:15	08:30	8	10	10	**28**	64	7	3	**74**	**102**	6	149	2	**157**	13	199	65	**277**	**434**	**536**
08:30	08:45	8	12	12	**32**	63	8	7	**78**	**110**	3	124	4	**131**	11	210	57	**278**	**409**	**519**
08:45	09:00	5	9	11	**25**	51	14	5	**70**	**95**	8	113	3	**124**	20	173	70	**263**	**387**	**482**
09:00	09:15	16	12	9	**37**	68	11	3	**82**	**119**	4	105	5	**114**	25	151	45	**222**	**336**	**455**
09:15	09:30	11	11	22	**44**	61	6	4	**71**	**115**	2	102	8	**112**	31	141	35	**207**	**319**	**434**
09:30	09:45	15	7	12	**34**	34	12	4	**50**	**84**	3	112	4	**119**	17	139	47	**203**	**322**	**406**
09:45	10:00	23	10	9	**42**	46	9	3	**58**	**100**	6	120	9	**135**	24	126	26	**176**	**311**	**411**
11:30	11:45	17	18	20	**55**	36	8	2	**46**	**101**	2	132	5	**139**	18	124	46	**188**	**327**	**428**
11:45	12:00	23	16	19	**58**	46	11	4	**61**	**119**	0	110	20	**130**	30	102	48	**181**	**311**	**430**
12:00	12:15	20	14	20	**54**	43	21	6	**70**	**124**	1	115	14	**130**	37	124	42	**204**	**334**	**458**
12:15	12:30	17	16	24	**57**	35	11	1	**47**	**104**	2	130	13	**146**	24	123	43	**190**	**336**	**440**
12:30	12:45	14	8	27	**49**	47	22	2	**71**	**120**	4	135	12	**151**	33	128	48	**209**	**360**	**480**
12:45	13:00	20	17	27	**64**	40	18	4	**62**	**126**	3	155	10	**168**	19	118	46	**183**	**351**	**477**
13:00	13:15	25	25	17	**67**	40	16	2	**58**	**125**	3	143	9	**155**	26	122	42	**190**	**345**	**470**
13:15	13:30	23	17	27	**67**	31	19	4	**54**	**121**	3	119	8	**130**	32	104	50	**186**	**316**	**437**
15:00	15:15	14	23	27	**64**	47	14	4	**65**	**129**	3	140	9	**152**	28	165	76	**269**	**421**	**550**
15:15	15:30	21	23	15	**59**	42	16	6	**64**	**123**	5	185	11	**201**	32	169	77	**278**	**479**	**602**
15:30	15:45	20	27	19	**67**	67	15	6	**88**	**155**	6	171	7	**184**	21	145	82	**248**	**432**	**587**
15:45	16:00	14	12	20	**46**	56	23	11	**90**	**136**	9	153	7	**169**	35	164	95	**294**	**463**	**599**
16:00	16:15	26	22	21	**69**	65	17	6	**88**	**157**	9	192	16	**218**	25	155	86	**266**	**484**	**641**
16:15	16:30	19	22	30	**71**	70	22	9	**101**	**172**	9	187	16	**212**	20	187	78	**285**	**497**	**669**
16:30	16:45	14	36	21	**71**	89	25	5	**119**	**190**	7	145	7	**159**	24	162	95	**282**	**441**	**631**
16:45	17:00	22	21	16	**59**	73	20	6	**99**	**158**	4	203	12	**219**	19	176	97	**292**	**511**	**669**
17:00	17:15	22	23	30	**75**	83	24	3	**110**	**185**	5	154	11	**170**	20	182	93	**296**	**466**	**651**
17:15	17:30	16	26	18	**60**	82	25	4	**111**	**171**	3	202	11	**216**	22	167	100	**289**	**505**	**676**
17:30	17:45	20	27	20	**67**	65	32	9	**106**	**173**	3	174	14	**191**	24	156	83	**263**	**454**	**627**
17:45	18:00	15	27	21	**63**	63	12	10	**85**	**148**	12	179	10	**201**	18	167	74	**259**	**460**	**608**
TOTAL:		512	522	554	**1589**	1814	493	148	**2455**	**4044**	148	4618	268	**5036**	686	4852	1989	**7532**	**12568**	**16612**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order 37499

JOCKVALE RD @ STRANDHERD DR

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

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

Comment:

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

Transportation Services - Traffic Services

W.O. 37499

Turning Movement Count - Heavy Vehicle Report

JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018

Time Period	Northbound				Southbound					Eastbound				Westbound						
	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 08:00	1	0	2	**3**	9	0	0	**9**	**12**	1	32	1	**34**	2	25	3	**30**	**64**	**76**
08:00 09:00	0	1	2	**3**	2	0	3	**5**	**8**	2	29	1	**32**	2	22	10	**34**	**66**	**74**
09:00 10:00	2	0	3	**5**	3	0	1	**4**	**9**	1	26	2	**29**	1	27	6	**34**	**63**	**72**
11:30 12:30	2	0	5	**7**	1	0	1	**2**	**9**	1	22	1	**24**	2	22	1	**25**	**49**	**58**
12:30 13:30	2	0	0	**2**	2	0	2	**4**	**6**	2	30	2	**34**	0	15	6	**21**	**55**	**61**
15:00 16:00	1	0	2	**3**	4	2	0	**6**	**9**	2	10	0	**12**	0	16	9	**25**	**37**	**46**
16:00 17:00	1	0	1	**2**	6	0	2	**8**	**10**	3	23	0	**26**	1	18	4	**23**	**49**	**59**
17:00 18:00	1	0	0	**1**	4	0	0	**4**	**5**	0	12	1	**13**	0	5	0	**5**	**18**	**23**
Sub Total	10	1	15	**26**	31	2	9	**42**	**68**	12	184	8	**204**	8	150	39	**197**	**401**	**469**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	10	1	15	**0**	31	2	9	**42**	**68**	12	184	8	**204**	8	150	39	**197**	**401**	**469**

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 37499

Turning Movement Count - Pedestrian Volume Report

JOCKVALE RD @ 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**	2	0	**2**	**2**
07:15 07:30	0	1	**1**	1	0	**1**	**2**
07:30 07:45	1	2	**3**	5	0	**5**	**8**
07:45 08:00	0	4	**4**	1	1	**2**	**6**
07:00 08:00	1	7	**8**	9	1	**10**	**18**
08:00 08:15	0	0	**0**	0	0	**0**	**0**
08:15 08:30	0	3	**3**	1	0	**1**	**4**
08:30 08:45	2	3	**5**	2	0	**2**	**7**
08:45 09:00	0	2	**2**	2	0	**2**	**4**
08:00 09:00	2	8	**10**	5	0	**5**	**15**
09:00 09:15	2	3	**5**	1	0	**1**	**6**
09:15 09:30	1	4	**5**	1	0	**1**	**6**
09:30 09:45	1	0	**1**	0	1	**1**	**2**
09:45 10:00	0	2	**2**	3	1	**4**	**6**
09:00 10:00	4	9	**13**	5	2	**7**	**20**
11:30 11:45	1	2	**3**	1	1	**2**	**5**
11:45 12:00	1	2	**3**	3	2	**5**	**8**
12:00 12:15	0	1	**1**	5	1	**6**	**7**
12:15 12:30	2	3	**5**	3	0	**3**	**8**
11:30 12:30	4	8	**12**	12	4	**16**	**28**
12:30 12:45	3	1	**4**	3	1	**4**	**8**
12:45 13:00	1	0	**1**	2	1	**3**	**4**
13:00 13:15	2	1	**3**	4	0	**4**	**7**
13:15 13:30	1	2	**3**	1	3	**4**	**7**
12:30 13:30	7	4	**11**	10	5	**15**	**26**
15:00 15:15	1	3	**4**	5	0	**5**	**9**
15:15 15:30	1	1	**2**	2	1	**3**	**5**
15:30 15:45	0	0	**0**	1	0	**1**	**1**
15:45 16:00	1	4	**5**	5	0	**5**	**10**
15:00 16:00	3	8	**11**	13	1	**14**	**25**
16:00 16:15	0	2	**2**	1	1	**2**	**4**
16:15 16:30	0	5	**5**	1	2	**3**	**8**
16:30 16:45	0	1	**1**	2	1	**3**	**4**
16:45 17:00	1	4	**5**	2	3	**5**	**10**
16:00 17:00	1	12	**13**	6	7	**13**	**26**
17:00 17:15	0	1	**1**	3	0	**3**	**4**
17:15 17:30	0	0	**0**	3	0	**3**	**3**
17:30 17:45	1	2	**3**	6	2	**8**	**11**
17:45 18:00	3	2	**5**	4	2	**6**	**11**
17:00 18:00	4	5	**9**	16	4	**20**	**29**
Total	26	61	**87**	76	24	**100**	**187**

Comment:

Transportation Services - Traffic Services

Work Order
37499

Turning Movement Count - 15 Min U-Turn Total Report

JOCKVALE RD @ 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	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	1	1
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	1	1
12:00	12:15	0	0	0	1	1
12:15	12:30	0	0	1	0	1
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	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	1	0	0	0	1
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	1	0	1
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	1	1
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	1	1
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Total		1	0	2	5	8

Appendix C

Synchro Intersection Worksheets – Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	4	9	3	169	4	426	6	126	223	6
Future Volume (vph)	2	0	4	9	3	169	4	426	6	126	223	6
Satd. Flow (prot)	0	1563	0	0	1681	1483	0	1742	0	1658	1738	0
Flt Permitted		0.884			0.885			0.998		0.458		
Satd. Flow (perm)	0	1404	0	0	1544	1483	0	1738	0	799	1738	0
Satd. Flow (RTOR)		102				188		1			3	
Lane Group Flow (vph)	0	6	0	0	13	188	0	484	0	140	255	0
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	1	2	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	5.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	27.0	27.0		27.0	27.0	20.0	73.0	73.0		20.0	93.0	
Total Split (s)	27.0	27.0		27.0	27.0	20.0	73.0	73.0		20.0	93.0	
Total Split (%)	22.5%	22.5%		22.5%	22.5%	16.7%	60.8%	60.8%		16.7%	77.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.7	3.7		3.7	3.7	
All-Red Time (s)	2.7	2.7		2.7	2.7	3.4	3.4	3.4		3.4	3.4	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)		6.4			6.4	7.1		7.1		7.1	7.1	
Lead/Lag						Lead	Lag	Lag		Lead		
Lead-Lag Optimize?						Yes	Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)		10.0			10.0	13.6		92.2		106.3	110.6	
Actuated g/C Ratio		0.08			0.08	0.11		0.77		0.89	0.92	
v/c Ratio		0.03			0.10	0.56		0.36		0.18	0.16	
Control Delay		0.2			52.9	12.4		6.7		2.8	1.6	
Queue Delay		0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay		0.2			52.9	12.4		6.7		2.8	1.6	
LOS		A			D	B		A		A	A	
Approach Delay		0.2			15.1			6.7			2.0	
Approach LOS		A			B			A			A	
Queue Length 50th (m)		0.0			3.0	0.0		21.3		2.4	0.0	
Queue Length 95th (m)		0.0			9.7	19.5		71.1		7.0	11.3	
Internal Link Dist (m)		194.4			396.8			294.1			283.1	
Turn Bay Length (m)												
Base Capacity (vph)		325			265	398		1336		800	1602	
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		0.02			0.05	0.47		0.36		0.17	0.16	

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

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 6.5	Intersection LOS: A
Intersection Capacity Utilization 62.6%	ICU Level of Service B
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 1: Greenbank & Jockvale

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	17	16	34	23	96	98	358	74	43	305	6
Future Volume (vph)	12	17	16	34	23	96	98	358	74	43	305	6
Satd. Flow (prot)	1658	1618	0	1658	1534	0	1658	3229	0	3216	3306	0
Flt Permitted	0.627			0.667			0.950			0.950		
Satd. Flow (perm)	1094	1618	0	1164	1534	0	1658	3229	0	3216	3306	0
Satd. Flow (RTOR)		18			107			25			2	
Lane Group Flow (vph)	13	37	0	38	133	0	109	480	0	48	346	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (%)	10.0%	29.2%		10.0%	29.2%		12.5%	48.3%		12.5%	48.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	14.4	10.9		15.7	13.3		14.7	78.0		7.2	68.2	
Actuated g/C Ratio	0.12	0.09		0.13	0.11		0.12	0.65		0.06	0.57	
v/c Ratio	0.08	0.23		0.22	0.50		0.54	0.23		0.25	0.18	
Control Delay	40.4	34.2		43.9	21.0		58.8	9.2		59.1	14.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.4	34.2		43.9	21.0		58.8	9.2		59.1	14.4	
LOS	D	C		D	C		E	A		E	B	
Approach Delay		35.8			26.1			18.4			19.8	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	2.7	4.5		8.0	5.4		26.8	23.7		6.2	16.8	
Queue Length 95th (m)	8.2	15.0		17.4	25.7		44.7	34.9		12.9	28.0	
Internal Link Dist (m)		102.8			148.8			283.1			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	157	398		175	445		203	2108		235	1878	
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	0.08	0.09		0.22	0.30		0.54	0.23		0.20	0.18	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 20.7	Intersection LOS: C
Intersection Capacity Utilization 41.6%	ICU Level of Service A
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 2: Greenbank & Marketplace

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	495	125	67	604	163	130	250	54	175	162	101
Future Volume (vph)	114	495	125	67	604	163	130	250	54	175	162	101
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3226	0	3216	3316	1483
Flt Permitted	0.183			0.357			0.950			0.950		
Satd. Flow (perm)	319	3316	1483	623	3316	1483	3216	3226	0	3216	3316	1483
Satd. Flow (RTOR)			149			181		20				149
Lane Group Flow (vph)	127	550	139	74	671	181	144	338	0	194	180	112
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)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (s)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (%)	15.8%	34.2%	34.2%	15.8%	34.2%	34.2%	20.0%	30.0%		20.0%	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?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	44.2	34.8	34.8	38.5	29.8	29.8	10.7	40.6		12.5	42.4	42.4
Actuated g/C Ratio	0.37	0.29	0.29	0.32	0.25	0.25	0.09	0.34		0.10	0.35	0.35
v/c Ratio	0.52	0.57	0.26	0.27	0.82	0.36	0.50	0.31		0.58	0.15	0.18
Control Delay	30.7	39.2	5.5	24.1	50.9	6.8	73.6	27.6		57.9	29.2	2.8
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	30.7	39.2	5.5	24.1	50.9	6.8	73.6	27.6		57.9	29.2	2.8
LOS	C	D	A	C	D	A	E	C		E	C	A
Approach Delay		32.1			40.2			41.4			34.5	
Approach LOS		C			D			D			C	
Queue Length 50th (m)	19.9	62.0	0.0	11.2	82.4	0.0	19.4	25.2		24.0	16.2	0.0
Queue Length 95th (m)	31.7	79.2	13.2	20.1	100.4	17.2	30.8	52.0		35.3	27.8	6.8
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	256	988	546	325	953	555	474	1103		474	1171	620
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	0.50	0.56	0.25	0.23	0.70	0.33	0.30	0.31		0.41	0.15	0.18

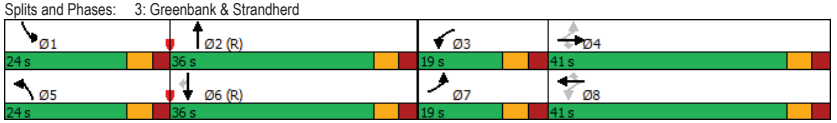
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 36.9	Intersection LOS: D
Intersection Capacity Utilization 60.3%	ICU Level of Service B
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 3: Greenbank & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	490	11	35	591	210	33	39	29	215	47	18
Future Volume (vph)	22	490	11	35	591	210	33	39	29	215	47	18
Satd. Flow (prot)	1658	3306	0	1658	3186	0	1658	1745	1483	1658	1672	0
Flt Permitted	0.222			0.389			0.710			0.550		
Satd. Flow (perm)	387	3306	0	679	3186	0	1239	1745	1483	960	1672	0
Satd. Flow (RTOR)		2			50				145		18	
Lane Group Flow (vph)	24	556	0	39	890	0	37	43	32	239	72	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	10.8%	46.3%		10.8%	46.3%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	6.9	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	Max		None	Max		C-Max	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	59.1	55.1		59.4	55.2		23.6	23.6	23.6	45.0	45.0	
Actuated g/C Ratio	0.49	0.46		0.49	0.46		0.20	0.20	0.20	0.37	0.37	
v/c Ratio	0.09	0.37		0.10	0.60		0.15	0.13	0.08	0.54	0.11	
Control Delay	15.2	23.4		15.1	26.2		42.9	41.9	0.4	33.2	19.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	15.2	23.4		15.1	26.2		42.9	41.9	0.4	33.2	19.5	
LOS	B	C		B	C		D	D	A	C	B	
Approach Delay		23.0			25.7			30.4			30.0	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	2.8	50.5		4.6	87.3		7.8	9.0	0.0	43.4	8.7	
Queue Length 95th (m)	7.3	66.2		10.5	111.5		18.2	19.8	0.0	66.5	19.2	
Internal Link Dist (m)		158.5			396.5			177.6			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	262	1508		389	1482		241	340	406	444	633	
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	0.09	0.37		0.10	0.60		0.15	0.13	0.08	0.54	0.11	

Intersection Summary

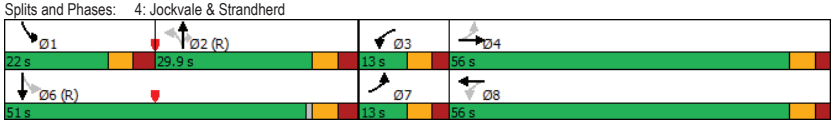
Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 22 (18%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 25.9	Intersection LOS: C
Intersection Capacity Utilization 60.8%	ICU Level of Service B
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 4: Jockvale & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2	4	1	0	154	2	236	7	214	470	0
Future Volume (vph)	0	2	4	1	0	154	2	236	7	214	470	0
Satd. Flow (prot)	0	1588	0	0	1658	1483	0	1738	0	1658	1745	0
Flt Permitted								0.998		0.569		
Satd. Flow (perm)	0	1588	0	0	1745	1483	0	1735	0	993	1745	0
Satd. Flow (RTOR)		4				171		2				
Lane Group Flow (vph)	0	6	0	0	1	171	0	272	0	238	522	0
Turn Type		NA		Perm	NA	pm+ov	Perm	NA		pm+pt	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	1	2	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	5.0	10.0	10.0		5.0	10.0	
Minimum Split (s)	27.0	27.0		27.0	27.0	30.0	63.0	63.0		30.0	93.0	
Total Split (s)	27.0	27.0		27.0	27.0	30.0	63.0	63.0		30.0	93.0	
Total Split (%)	22.5%	22.5%		22.5%	22.5%	25.0%	52.5%	52.5%		25.0%	77.5%	
Yellow Time (s)	3.7	3.7		3.7	3.7	3.7	3.7	3.7		3.7	3.7	
All-Red Time (s)	2.7	2.7		2.7	2.7	3.4	3.4	3.4		3.4	3.4	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)		6.4			6.4	7.1		7.1		7.1	7.1	
Lead/Lag						Lead	Lag	Lag		Lead		
Lead-Lag Optimize?						Yes	Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Max	C-Max		None	C-Max	
Act Effct Green (s)		10.0			10.0	11.2		94.6		109.6	115.3	
Actuated g/C Ratio		0.08			0.08	0.09		0.79		0.91	0.96	
v/c Ratio		0.04			0.01	0.58		0.20		0.25	0.31	
Control Delay		37.0			51.0	14.7		4.6		1.6	1.6	
Queue Delay		0.0			0.0	0.0		0.0		0.0	0.0	
Total Delay		37.0			51.0	14.7		4.6		1.6	1.6	
LOS		D			D	B		A		A	A	
Approach Delay		37.0			14.9			4.6			1.6	
Approach LOS		D			B			A			A	
Queue Length 50th (m)		0.5			0.2	0.0		10.5		0.0	2.8	
Queue Length 95th (m)		4.9			2.1	18.1		38.8		13.4	36.2	
Internal Link Dist (m)		194.4			396.8			294.1			283.1	
Turn Bay Length (m)												
Base Capacity (vph)		275			299	457		1368		1034	1677	
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		0.02			0.00	0.37		0.20		0.23	0.31	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 10 (8%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 4.3	Intersection LOS: A
Intersection Capacity Utilization 65.3%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 1: Greenbank & Jockvale

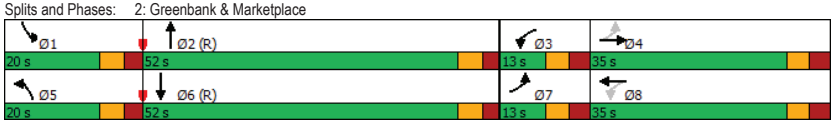
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	117	86	137	124	169	149	347	70	162	461	36
Future Volume (vph)	44	117	86	137	124	169	149	347	70	162	461	36
Satd. Flow (prot)	1658	1633	0	1658	1593	0	1658	3233	0	3216	3279	0
Flt Permitted	0.274			0.420			0.950			0.950		
Satd. Flow (perm)	478	1633	0	733	1593	0	1658	3233	0	3216	3279	0
Satd. Flow (RTOR)		29			54			23			8	
Lane Group Flow (vph)	49	226	0	152	326	0	166	464	0	180	552	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (%)	10.8%	29.2%		10.8%	29.2%		16.7%	43.3%		16.7%	43.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	30.3	23.8		31.8	26.4		14.4	52.5		11.7	49.7	
Actuated g/C Ratio	0.25	0.20		0.26	0.22		0.12	0.44		0.10	0.41	
v/c Ratio	0.27	0.65		0.62	0.83		0.83	0.32		0.58	0.40	
Control Delay	31.2	46.6		44.5	55.7		84.9	21.7		63.5	21.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.2	46.6		44.5	55.7		84.9	21.7		63.5	21.2	
LOS	C	D		D	E		F	C		E	C	
Approach Delay		43.9			52.1			38.3			31.6	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	8.3	43.9		27.5	65.3		37.9	38.8		23.5	32.9	
Queue Length 95th (m)	17.3	69.8		44.5	#108.0		#83.7	45.1		m34.3	m44.4	
Internal Link Dist (m)		102.8			148.8			283.1			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	186	409		245	419		201	1428		367	1363	
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	0.26	0.55		0.62	0.78		0.83	0.32		0.49	0.40	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83
Intersection Signal Delay: 39.8 Intersection LOS: D
Intersection Capacity Utilization 66.5% ICU Level of Service C
Analysis Period (min) 15
Description: As per timing plans provided 26-Nov-2018
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: Greenbank & Marketplace



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	814	168	160	654	184	201	264	53	251	331	124
Future Volume (vph)	145	814	168	160	654	184	201	264	53	251	331	124
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3233	0	3216	3316	1483
Flt Permitted	0.200			0.115			0.950			0.950		
Satd. Flow (perm)	349	3316	1483	201	3316	1483	3216	3233	0	3216	3316	1483
Satd. Flow (RTOR)			187			204		19				149
Lane Group Flow (vph)	161	904	187	178	727	204	223	352	0	279	368	138
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)	18.0	41.0	41.0	18.0	41.0	41.0	24.0	37.0		24.0	37.0	37.0
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%
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
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	45.0	34.3	34.3	46.0	34.8	34.8	13.6	33.3		15.2	34.9	34.9
Actuated g/C Ratio	0.38	0.29	0.29	0.38	0.29	0.29	0.11	0.28		0.13	0.29	0.29
v/c Ratio	0.65	0.95	0.34	0.84	0.76	0.36	0.61	0.39		0.69	0.38	0.26
Control Delay	34.7	62.4	6.3	58.8	44.8	6.2	69.9	25.7		58.9	36.1	5.8
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	34.7	62.4	6.3	58.8	44.8	6.2	69.9	25.7		58.9	36.1	5.8
LOS	C	E	A	E	D	A	E	C		E	D	A
Approach Delay		50.5			39.9			42.8			38.9	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	24.4	115.6	0.0	28.2	86.5	0.0	30.4	21.5		34.4	38.4	0.0
Queue Length 95th (m)	40.0	#157.7	17.3	#67.9	110.2	18.2	m42.6	m28.4		48.4	55.5	13.8
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	256	953	559	215	961	574	474	911		474	965	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	0.63	0.95	0.33	0.83	0.76	0.36	0.47	0.39		0.59	0.38	0.26

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

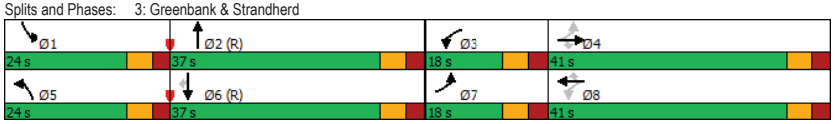
Intersection Signal Delay: 43.7	Intersection LOS: D
Intersection Capacity Utilization 71.7%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	712	41	72	581	326	74	106	86	331	94	18
Future Volume (vph)	19	712	41	72	581	326	74	106	86	331	94	18
Satd. Flow (prot)	1658	3289	0	1658	3137	0	1658	1745	1483	1658	1703	0
Flt Permitted	0.216			0.239			0.677			0.441		
Satd. Flow (perm)	377	3289	0	417	3137	0	1181	1745	1483	770	1703	0
Satd. Flow (RTOR)		6			104				145		9	
Lane Group Flow (vph)	21	837	0	80	1008	0	82	118	96	368	124	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	13.2%	43.8%		13.2%	43.8%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	3.7	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	6.9	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	65.0	59.8		70.3	66.4		14.3	14.3	14.3	36.3	36.3	
Actuated g/C Ratio	0.54	0.49		0.58	0.55		0.12	0.12	0.12	0.30	0.30	
v/c Ratio	0.08	0.51		0.25	0.57		0.59	0.57	0.32	1.08	0.24	
Control Delay	12.5	23.6		13.5	19.1		66.9	60.8	4.5	108.8	29.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	12.5	23.6		13.5	19.1		66.9	60.8	4.5	108.8	29.9	
LOS	B	C		B	B		E	E	A	F	C	
Approach Delay		23.3			18.7			44.2			88.9	
Approach LOS		C			B			D			F	
Queue Length 50th (m)	2.0	73.8		8.0	65.4		19.8	28.5	0.0	~92.8	21.7	
Queue Length 95th (m)	6.3	107.6		17.2	121.8		35.4	46.1	4.5	#149.9	35.3	
Internal Link Dist (m)		158.5			396.5			177.6			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	316	1631		346	1770		224	331	399	341	639	
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	0.07	0.51		0.23	0.57		0.37	0.36	0.24	1.08	0.19	

Intersection Summary
Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 82 (68%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

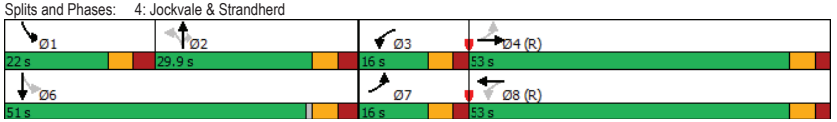
Intersection Signal Delay: 35.5	Intersection LOS: D
Intersection Capacity Utilization 74.1%	ICU Level of Service D
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

~ 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: Jockvale & Strandherd



Appendix D

Collision Data

Record	Location	X	Y	Date	Time	Environment	Road_Surface	Traffic_Control	Collision_Location	Light	Collision_Classification	Impact_type
5690	GREENBANK RD @ JOCKVALE RD	##########	##########	########	20:54	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	05 - Dusk	03 - P.D. only	03 - Rear end
5691	GREENBANK RD @ JOCKVALE RD	##########	##########	########	19:50	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
5692	GREENBANK RD @ JOCKVALE RD	##########	##########	########	10:10	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
5693	GREENBANK RD @ JOCKVALE RD	##########	##########	########	17:05	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
5694	GREENBANK RD @ JOCKVALE RD	##########	##########	########	16:35	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	05 - Dusk	03 - P.D. only	03 - Rear end
5695	GREENBANK RD @ JOCKVALE RD	##########	##########	########	17:04	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	02 - Non-fatal injury	03 - Rear end
5696	GREENBANK RD @ JOCKVALE RD	##########	##########	########	18:31	03 - Snow	05 - Packed snow	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
5697	GREENBANK RD @ JOCKVALE RD	##########	##########	########	11:44	01 - Clear	06 - Ice	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5723	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	9:00	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
5724	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	15:09	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5725	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	11:39	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
5730	GREENBANK RD @ STRANDHERD DR	##########	##########	########	8:09	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5731	GREENBANK RD @ STRANDHERD DR	##########	##########	########	17:50	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5732	GREENBANK RD @ STRANDHERD DR	##########	##########	########	21:42	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	05 - Turning movement
5733	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:26	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5734	GREENBANK RD @ STRANDHERD DR	##########	##########	########	12:02	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
5735	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:10	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
5736	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:25	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5737	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:39	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
5738	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:47	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5739	GREENBANK RD @ STRANDHERD DR	##########	##########	########	5:07	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	03 - Dawn	03 - P.D. only	03 - Rear end
5740	GREENBANK RD @ STRANDHERD DR	##########	##########	########	22:10	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
5741	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:29	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5742	GREENBANK RD @ STRANDHERD DR	##########	##########	########	8:17	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5743	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:20	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5744	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:30	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5745	GREENBANK RD @ STRANDHERD DR	##########	##########	########	21:44	01 - Clear	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
5746	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:56	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5747	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:29	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5748	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:44	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	07 - Dark	02 - Non-fatal injury	03 - Rear end
5749	GREENBANK RD @ STRANDHERD DR	##########	##########	########	17:58	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
5750	GREENBANK RD @ STRANDHERD DR	##########	##########	########	7:20	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5751	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:15	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	05 - Dusk	03 - P.D. only	03 - Rear end
5752	GREENBANK RD @ STRANDHERD DR	##########	##########	########	23:00	03 - Snow	03 - Loose snow	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	05 - Turning movement
5753	GREENBANK RD @ STRANDHERD DR	##########	##########	########	19:05	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	07 - Dark	02 - Non-fatal injury	03 - Rear end
5754	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:57	03 - Snow	04 - Slush	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	05 - Turning movement
5755	GREENBANK RD @ STRANDHERD DR	##########	##########	########	12:08	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5756	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:00	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5757	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:26	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
5758	GREENBANK RD @ STRANDHERD DR	##########	##########	########	12:50	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5759	GREENBANK RD @ STRANDHERD DR	##########	##########	########	12:07	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5760	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:44	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
5761	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:12	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
5762	GREENBANK RD @ STRANDHERD DR	##########	##########	########	12:35	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
5819	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	2:58	01 - Clear	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
5820	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	12:15	01 - Clear	01 - Dry	10 - No control	04 - At/near private drive	01 - Daylight	03 - P.D. only	02 - Angle
5821	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	8:02	05 - Drifting Sno	06 - Ice	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
5822	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	8:01	01 - Clear	02 - Wet	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
5823	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	1:14	01 - Clear	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
5824	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	0:43	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
5825	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	11:12	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
5835	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	##########	##########	########	19:15	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
5836	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	##########	##########	########	17:50	01 - Clear	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	02 - Non-fatal injury	04 - Sideswipe
8795	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	17:46	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8796	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:55	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
8797	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	18:40	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8798	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	8:47	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
8799	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	9:18	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
8800	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	15:56	03 - Snow	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
8801	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	17:30	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
8802	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	19:52	03 - Snow	03 - Loose snow	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
8803	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	13:00	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
8804	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	22:03	07 - Fog, mist, si	03 - Loose snow	01 - Traffic signal	02 - Intersection related	07 - Dark	02 - Non-fatal injury	03 - Rear end
8805	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:29	01 - Clear	03 - Loose snow	01 - Traffic signal	03 - At intersection	05 - Dusk	03 - P.D. only	03 - Rear end
13334	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	##########	##########	########	12:21	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	05 - Turning movement
13335	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	##########	##########	########	16:45	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	07 - SMV other
13370	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK	##########	##########	########	17:45	02 - Rain	02 - Wet	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	99 - Other
13383	STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BARRHAVEN MALL	##########	##########	########	9:25	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	99 - Other
13384	STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BARRHAVEN MALL	##########	##########	########	8:30	02 - Rain	02 - Wet	10 - No control	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	07 - SMV other
5512	GREENBANK RD @ JOCKVALE RD	##########	##########	########	13:29	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end

5513	GREENBANK RD @ JOCKVALE RD	##########	##########	########	9:00	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5514	GREENBANK RD @ JOCKVALE RD	##########	##########	########	12:54	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
5515	GREENBANK RD @ JOCKVALE RD	##########	##########	########	17:42	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
5538	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	18:31	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	07 - SMV other
5539	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	18:43	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
5540	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	12:36	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
5541	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	23:01	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	04 - Sideswipe
5542	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	14:09	01 - Clear	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	02 - Angle
5546	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:58	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
5547	GREENBANK RD @ STRANDHERD DR	##########	##########	########	20:45	03 - Snow	05 - Packed snow	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	99 - Other
5548	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:28	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5549	GREENBANK RD @ STRANDHERD DR	##########	##########	########	0:38	01 - Clear	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
5550	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:42	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
5551	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:15	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
5552	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:09	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
5553	GREENBANK RD @ STRANDHERD DR	##########	##########	########	17:39	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5554	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:10	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5555	GREENBANK RD @ STRANDHERD DR	##########	##########	########	19:40	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5556	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:15	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
5557	GREENBANK RD @ STRANDHERD DR	##########	##########	########	21:17	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
5558	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:18	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5559	GREENBANK RD @ STRANDHERD DR	##########	##########	########	19:20	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
5560	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:05	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	05 - Dusk	03 - P.D. only	04 - Sideswipe
5561	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:36	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	04 - Sideswipe
5562	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:12	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	99 - Other
5599	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	10:18	01 - Clear	03 - Loose snow	10 - No control	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	01 - Approaching
5600	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	11:26	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	06 - SMV unattended vehicle
5601	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	22:43	02 - Rain	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	01 - Approaching
5602	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	20:26	03 - Snow	05 - Packed snow	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
5603	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	21:36	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	03 - Rear end
5604	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	18:23	02 - Rain	03 - Loose snow	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	01 - Approaching
5609	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	##########	##########	########	20:53	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	05 - Dusk	03 - P.D. only	04 - Sideswipe
5618	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	##########	##########	########	15:44	04 - Freezing Ra	06 - Ice	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
8267	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	10:22	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
8268	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	13:50	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
8269	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	11:32	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
8270	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	0:05	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	02 - Non-fatal injury	03 - Rear end
8271	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	18:50	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	07 - SMV other
8272	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	15:03	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
8273	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:41	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8274	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	12:22	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8275	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	8:40	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8276	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	8:39	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8277	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	7:46	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
8278	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	15:52	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8279	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	20:15	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
8280	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	14:47	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8281	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	18:55	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
8282	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:45	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	05 - Dusk	03 - P.D. only	03 - Rear end
8283	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	7:30	07 - Fog, mist, s	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
8284	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	18:41	03 - Snow	06 - Ice	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
8285	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	12:43	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
12976	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK	##########	##########	########	14:34	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
12977	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	15:58	03 - Snow	03 - Loose snow	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	07 - SMV other
12978	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	10:30	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
12979	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	20:30	02 - Rain	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
37	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	15:12	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	03 - Rear end
81	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	15:28	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
153	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:20	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
164	GREENBANK RD @ JOCKVALE RD	##########	##########	########	10:00	01 - Clear	05 - Packed snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
172	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	15:51	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
180	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	7:51	01 - Clear	01 - Dry	10 - No control	04 - At/near private drive	01 - Daylight	02 - Non-fatal injury	03 - Rear end
1074	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	7:25	03 - Snow	05 - Packed snow	10 - No control	01 - Non intersection	03 - Dawn	02 - Non-fatal injury	07 - SMV other
1080	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	16:50	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	03 - Rear end
1259	GREENBANK RD @ STRANDHERD DR	##########	##########	########	20:05	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	02 - Non-fatal injury	03 - Rear end
1320	STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BARRHAVEN MALL	##########	##########	########	16:05	01 - Clear	06 - Ice	10 - No control	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	03 - Rear end
1363	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	0:50	02 - Rain	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	02 - Non-fatal injury	07 - SMV other
1686	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	13:39	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	02 - Angle
2373	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:30	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
2436	GREENBANK RD @ STRANDHERD DR	##########	##########	########	19:58	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	05 - Turning movement
2445	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	16:15	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement

3383	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	12:49	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
3513	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:20	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
3672	GREENBANK RD @ STRANDHERD DR	##########	##########	########	14:00	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
3687	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:46	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
3695	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	##########	##########	########	18:34	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
4060	GREENBANK RD @ JOCKVALE RD	##########	##########	########	13:20	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
4126	GREENBANK RD @ JOCKVALE RD	##########	##########	########	23:57	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	02 - Angle
4882	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	18:27	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
5087	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	12:39	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
5156	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:45	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
5224	GREENBANK RD @ STRANDHERD DR	##########	##########	########	14:53	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
5249	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:06	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	02 - Angle
5255	GREENBANK RD @ JOCKVALE RD	##########	##########	########	20:44	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	04 - Sideswipe
5348	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	21:33	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
5631	GREENBANK RD @ STRANDHERD DR	##########	##########	########	21:00	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	05 - Dusk	03 - P.D. only	03 - Rear end
5829	GREENBANK RD @ JOCKVALE RD	##########	##########	########	13:00	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
6123	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:00	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
6131	GREENBANK RD @ STRANDHERD DR	##########	##########	########	17:17	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	07 - SMV other
6812	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	12:38	01 - Clear	06 - Ice	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
6829	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	8:55	01 - Clear	02 - Wet	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	01 - Approaching
7545	GREENBANK RD @ STRANDHERD DR	##########	##########	########	22:11	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
7550	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:19	03 - Snow	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
7638	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK	##########	##########	########	18:52	01 - Clear	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	03 - Rear end
7662	GREENBANK RD @ JOCKVALE RD	##########	##########	########	15:00	03 - Snow	03 - Loose snow	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
7851	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	13:15	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
7964	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:39	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
7992	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:29	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
9549	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	##########	##########	########	12:00	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
9727	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	##########	##########	########	11:01	01 - Clear	01 - Dry	10 - No control	04 - At/near private drive	01 - Daylight	03 - P.D. only	05 - Turning movement
9742	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	##########	##########	########	11:40	01 - Clear	01 - Dry	10 - No control	04 - At/near private drive	01 - Daylight	03 - P.D. only	02 - Angle
9986	GREENBANK RD @ JOCKVALE RD	##########	##########	########	13:34	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
10179	GREENBANK RD @ JOCKVALE RD	##########	##########	########	18:52	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
10921	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	##########	##########	########	17:44	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
13072	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	14:20	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
13130	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:29	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	05 - Dusk	03 - P.D. only	04 - Sideswipe
13139	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	9:38	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	02 - Angle
13241	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	1:00	02 - Rain	02 - Wet	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
13768	GREENBANK RD @ JOCKVALE RD	##########	##########	########	9:31	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
14048	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	7:02	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	03 - Dawn	03 - P.D. only	03 - Rear end
14885	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	11:35	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
14945	GREENBANK RD @ STRANDHERD DR	##########	##########	########	14:00	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
15017	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	19:13	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	04 - Sideswipe
17	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	21:46	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	01 - Fatal injury	07 - SMV other
80	GREENBANK RD @ STRANDHERD DR	##########	##########	########	8:22	04 - Freezing Ra	06 - Ice	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
183	GREENBANK RD @ STRANDHERD DR	##########	##########	########	17:49	01 - Clear	06 - Ice	01 - Traffic signal	02 - Intersection related	07 - Dark	02 - Non-fatal injury	03 - Rear end
359	GREENBANK RD @ STRANDHERD DR	##########	##########	########	19:20	05 - Drifting Sno	03 - Loose snow	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	05 - Turning movement
739	GREENBANK RD @ STRANDHERD DR	##########	##########	########	21:00	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	05 - Turning movement
1018	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:50	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
1603	GREENBANK RD @ STRANDHERD DR	##########	##########	########	8:22	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
1753	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:43	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	07 - SMV other
2533	GREENBANK RD @ STRANDHERD DR	##########	##########	########	0:13	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	02 - Non-fatal injury	02 - Angle
2709	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	##########	##########	########	15:45	06 - Strong winc	06 - Ice	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
2809	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	##########	##########	########	8:58	01 - Clear	06 - Ice	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	01 - Approaching
2975	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	15:00	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	02 - Angle
3436	GREENBANK RD @ JOCKVALE RD	##########	##########	########	18:30	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	07 - SMV other
3679	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK	##########	##########	########	14:19	01 - Clear	01 - Dry	10 - No control	04 - At/near private drive	01 - Daylight	03 - P.D. only	05 - Turning movement
3781	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:15	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
4018	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:41	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
4169	GREENBANK RD @ STRANDHERD DR	##########	##########	########	12:35	01 - Clear	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
4188	GREENBANK RD @ JOCKVALE RD	##########	##########	########	15:10	01 - Clear	06 - Ice	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
4271	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:01	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
4379	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	10:37	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
4479	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	6:14	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	03 - Dawn	03 - P.D. only	05 - Turning movement
4529	GREENBANK RD @ JOCKVALE RD	##########	##########	########	8:25	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
4579	GREENBANK RD @ STRANDHERD DR	##########	##########	########	7:29	03 - Snow	03 - Loose snow	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
4742	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:44	03 - Snow	03 - Loose snow	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
5127	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	14:07	03 - Snow	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	02 - Angle
5665	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	18:40	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
5939	GREENBANK RD @ JOCKVALE RD	##########	##########	########	13:14	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
6095	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	##########	##########	########	21:25	01 - Clear	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	02 - Angle
6196	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	9:00	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe

6474	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	8:35	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
6488	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:53	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
6832	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:15	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
7719	GREENBANK RD @ STRANDHERD DR	##########	##########	########	17:27	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
8125	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:50	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
8598	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:47	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	02 - Angle
8611	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	14:15	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8635	GREENBANK RD @ JOCKVALE RD	##########	##########	########	14:19	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8696	GREENBANK RD @ STRANDHERD DR	##########	##########	########	14:30	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8744	GREENBANK RD @ STRANDHERD DR	##########	##########	########	7:45	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8882	GREENBANK RD @ JOCKVALE RD	##########	##########	########	13:54	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8927	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:58	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
8945	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	##########	##########	########	21:30	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	02 - Angle
9691	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK	##########	##########	########	14:06	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
10130	GREENBANK RD @ STRANDHERD DR	##########	##########	########	18:29	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
10134	GREENBANK RD @ STRANDHERD DR	##########	##########	########	21:51	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
10249	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	##########	##########	########	16:37	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
10910	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:20	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
11478	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:12	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
11605	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	15:30	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
12107	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:10	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
12279	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	14:20	01 - Clear	01 - Dry	10 - No control	04 - At/near private drive	01 - Daylight	03 - P.D. only	07 - SMV other
12288	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	8:10	03 - Snow	03 - Loose snow	10 - No control	04 - At/near private drive	01 - Daylight	03 - P.D. only	03 - Rear end
12434	GREENBANK RD @ STRANDHERD DR	##########	##########	########	1:30	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
12554	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:40	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
12789	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:16	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	04 - Sideswipe
12898	GREENBANK RD @ STRANDHERD DR	##########	##########	########	7:48	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	03 - Dawn	03 - P.D. only	05 - Turning movement
13400	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:45	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	05 - Dusk	03 - P.D. only	03 - Rear end
13642	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	16:15	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	07 - SMV other
13692	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:55	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
13744	GREENBANK RD @ STRANDHERD DR	##########	##########	########	19:50	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
13792	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:13	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
13-236	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	##########	##########	########	7:53	01 - Clear	04 - Slush	10 - No control	03 - At intersection	03 - Dawn	03 - P.D. only	07 - SMV other
13-665	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:50	01 - Clear	02 - Wet	01 - Traffic signal	03 - At intersection	05 - Dusk	03 - P.D. only	03 - Rear end
13-1065	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:52	01 - Clear	03 - Loose snow	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
13-1112	GREENBANK RD @ JOCKVALE RD	##########	##########	########	8:16	01 - Clear	03 - Loose snow	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-1263	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:02	03 - Snow	04 - Slush	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	02 - Angle
13-1278	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	12:18	03 - Snow	05 - Packed snow	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	07 - SMV other
13-1472	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	21:45	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	07 - Dark	03 - P.D. only	07 - SMV other
13-1556	GREENBANK RD @ STRANDHERD DR	##########	##########	########	20:28	01 - Clear	02 - Wet	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	05 - Turning movement
13-1720	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK	##########	##########	########	17:56	01 - Clear	01 - Dry	10 - No control	03 - At intersection	07 - Dark	03 - P.D. only	03 - Rear end
13-2460	GREENBANK RD @ JOCKVALE RD	##########	##########	########	10:15	01 - Clear	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-2552	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	12:34	03 - Snow	03 - Loose snow	10 - No control	01 - Non intersection	01 - Daylight	03 - P.D. only	01 - Approaching
13-2669	GREENBANK RD @ STRANDHERD DR	##########	##########	########	19:19	03 - Snow	02 - Wet	01 - Traffic signal	03 - At intersection	07 - Dark	03 - P.D. only	05 - Turning movement
13-3454	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:20	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-3683	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	12:20	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	02 - Angle
13-4177	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	16:05	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	05 - Turning movement
13-4383	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:30	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
13-4507	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:00	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	05 - Turning movement
13-4526	GREENBANK RD @ STRANDHERD DR	##########	##########	########	15:36	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	03 - Rear end
13-4718	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	12:19	01 - Clear	01 - Dry	10 - No control	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
13-4971	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	15:57	01 - Clear	01 - Dry	10 - No control	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
13-5148	GREENBANK RD @ JOCKVALE RD	##########	##########	########	19:50	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	05 - Turning movement
13-5151	GREENBANK RD @ STRANDHERD DR	##########	##########	########	5:49	02 - Rain	02 - Wet	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-5452	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:50	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-5540	GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD	##########	##########	########	17:55	01 - Clear	01 - Dry	10 - No control	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-5558	GREENBANK RD @ STRANDHERD DR	##########	##########	########	14:04	01 - Clear	01 - Dry	01 - Traffic signal	04 - At/near private drive	01 - Daylight	03 - P.D. only	03 - Rear end
13-5593	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	16:45	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	03 - Rear end
13-5643	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:02	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
13-5649	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	14:00	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	03 - P.D. only	05 - Turning movement
13-5777	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	##########	##########	########	10:30	02 - Rain	02 - Wet	10 - No control	02 - Intersection related	01 - Daylight	03 - P.D. only	05 - Turning movement
13-6324	GREENBANK RD @ STRANDHERD DR	##########	##########	########	17:00	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-6385	GREENBANK RD @ STRANDHERD DR	##########	##########	########	14:37	01 - Clear	01 - Dry	01 - Traffic signal	04 - At/near private drive	01 - Daylight	03 - P.D. only	03 - Rear end
13-6703	GREENBANK RD @ JOCKVALE RD	##########	##########	########	14:29	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	02 - Angle
13-6805	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	14:21	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
13-7136	GREENBANK RD @ JOCKVALE RD	##########	##########	########	20:55	01 - Clear	01 - Dry	01 - Traffic signal	04 - At/near private drive	05 - Dusk	02 - Non-fatal injury	03 - Rear end
13-7552	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK	##########	##########	########	13:07	01 - Clear	01 - Dry	10 - No control	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	02 - Angle
13-7930	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:47	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
13-8841	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	11:44	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	07 - SMV other
13-8862	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	18:41	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	05 - Turning movement
13-8920	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:26	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	02 - Non-fatal injury	02 - Angle

LOCATION & GEOID	TOTAL_CYCLIST	2013_CYCLIST	2014_CYCLIST	2015_CYCLIST	2016_CYCLIST	2017_CYCLIST
GREENBANK RD @ JOCKVALE RD (0010360)	1	1	0	0	0	0
GREENBANK RD @ MARKETPLACE AVE (0010406)	0	0	0	0	0	0
GREENBANK RD @ STRANDHERD DR (0005563)	2	2	0	0	0	0
GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD (__3ZA2WE)	0	0	0	0	0	0
GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD (__3ZA4JE)	0	0	0	0	0	0
GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE (__4NMF9S)	0	0	0	0	0	0
JOCKVALE RD @ STRANDHERD DR (0010541)	1	1	0	0	0	0
JOCKVALE RD btwn END & STRANDHERD DR (__8IAYNB)	0	0	0	0	0	0
STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE (0005413)	0	0	0	0	0	0
STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK (__3ZAZMMB)	1	1	0	0	0	0
STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD (__3ZAZMN)	0	0	0	0	0	0
STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BARRHAVEN MALL (__3ZAZMMA)	0	0	0	0	0	0

LOCATION & GEOID	TOTAL_PEDESTRIAN	2013_PEDESTRIAN	2014_PEDESTRIAN	2015_PEDESTRIAN	2016_PEDESTRIAN	2017_PEDESTRIAN
GREENBANK RD @ JOCKVALE RD (0010360)	0	0	0	0	0	0
GREENBANK RD @ MARKETPLACE AVE (0010406)	0	0	0	0	0	0
GREENBANK RD @ STRANDHERD DR (0005563)	0	0	0	0	0	0
GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD (__3ZA2WE)	0	0	0	0	0	0
GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD (__3ZA4JE)	0	0	0	0	0	0
GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE (__4NMF9S)	0	0	0	0	0	0
JOCKVALE RD @ STRANDHERD DR (0010541)	2	1	0	0	1	0
JOCKVALE RD btwn END & STRANDHERD DR (__8IAYNB)	0	0	0	0	0	0
STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE (0005413)	0	0	0	0	0	0
STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL SC & GREENBANK (__3ZAZMMB)	0	0	0	0	0	0
STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD (__3ZAZMN)	0	0	0	0	0	0
STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BARRHAVEN MALL (__3ZAZMMA)	0	0	0	0	0	0

13-8945	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	20:31	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	07 - Dark	03 - P.D. only	05 - Turning movement
13-8961	GREENBANK RD @ STRANDHERD DR	##########	##########	########	9:17	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
13-8964	GREENBANK RD @ STRANDHERD DR	##########	##########	########	8:20	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-9228	GREENBANK RD @ STRANDHERD DR	##########	##########	########	10:56	01 - Clear	01 - Dry	01 - Traffic signal	04 - At/near private drive	01 - Daylight	02 - Non-fatal injury	05 - Turning movement
13-10181	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	##########	##########	########	18:48	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	07 - Dark	03 - P.D. only	02 - Angle
13-10319	JOCKVALE RD @ STRANDHERD DR	##########	##########	########	12:30	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-10555	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	16:17	02 - Rain	02 - Wet	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-10720	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	##########	##########	########	11:30	01 - Clear	01 - Dry	10 - No control	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
13-10816	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	9:30	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	02 - Angle
13-11121	GREENBANK RD @ STRANDHERD DR	##########	##########	########	16:08	02 - Rain	02 - Wet	01 - Traffic signal	02 - Intersection related	01 - Daylight	02 - Non-fatal injury	03 - Rear end
13-11336	JOCKVALE RD btwn END & STRANDHERD DR	##########	##########	########	16:57	01 - Clear	01 - Dry	10 - No control	02 - Intersection related	05 - Dusk	03 - P.D. only	05 - Turning movement
13-11358	GREENBANK RD @ STRANDHERD DR	##########	##########	########	11:30	02 - Rain	02 - Wet	01 - Traffic signal	04 - At/near private drive	01 - Daylight	03 - P.D. only	03 - Rear end
13-11761	GREENBANK RD @ JOCKVALE RD	##########	##########	########	13:00	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	03 - Rear end
13-12147	GREENBANK RD @ STRANDHERD DR	##########	##########	########	12:15	01 - Clear	01 - Dry	01 - Traffic signal	04 - At/near private drive	01 - Daylight	03 - P.D. only	03 - Rear end
13-12168	GREENBANK RD @ STRANDHERD DR	##########	##########	########	20:15	01 - Clear	01 - Dry	01 - Traffic signal	02 - Intersection related	07 - Dark	03 - P.D. only	03 - Rear end
13-12257	GREENBANK RD @ STRANDHERD DR	##########	##########	########	8:35	01 - Clear	01 - Dry	01 - Traffic signal	01 - Non intersection	01 - Daylight	03 - P.D. only	04 - Sideswipe
13-12343	GREENBANK RD @ MARKETPLACE AVE	##########	##########	########	10:21	01 - Clear	01 - Dry	01 - Traffic signal	03 - At intersection	01 - Daylight	02 - Non-fatal injury	02 - Angle
13-13238	GREENBANK RD @ STRANDHERD DR	##########	##########	########	13:38	00 - Unknown	00 - Unknown	01 - Traffic signal	07 - Overpass or bridge	01 - Daylight	03 - P.D. only	05 - Turning movement

Appendix E

Synchro Intersection Worksheets – 2025 Background Conditions

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	7	20	632	364	38
Future Volume (vph)	43	7	20	632	364	38
Satd. Flow (prot)	1658	1483	1658	3316	3269	0
Flt Permitted	0.950		0.515			
Satd. Flow (perm)	1658	1483	899	3316	3269	0
Satd. Flow (RTOR)		7			19	
Lane Group Flow (vph)	43	7	20	632	402	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	30.8	30.8	30.8	
Total Split (s)	35.0	35.0	55.0	55.0	55.0	
Total Split (%)	38.9%	38.9%	61.1%	61.1%	61.1%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	
Act Effct Green (s)	7.9	7.9	77.6	77.6	77.6	
Actuated g/C Ratio	0.09	0.09	0.86	0.86	0.86	
v/c Ratio	0.30	0.05	0.03	0.22	0.14	
Control Delay	43.1	21.9	2.1	1.8	2.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	43.1	21.9	2.1	1.8	2.0	
LOS	D	C	A	A	A	
Approach Delay	40.1			1.8	2.0	
Approach LOS	D			A	A	
Queue Length 50th (m)	7.5	0.0	0.5	9.0	6.7	
Queue Length 95th (m)	17.4	4.2	1.5	14.0	12.0	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	537	485	775	2859	2821	
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	0.08	0.01	0.03	0.22	0.14	

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

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 3.6	Intersection LOS: A
Intersection Capacity Utilization 32.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Greenbank & New Collector

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	17	16	36	23	106	98	496	74	65	360	6
Future Volume (vph)	12	17	16	36	23	106	98	496	74	65	360	6
Satd. Flow (prot)	1658	1618	0	1658	1530	0	1658	3253	0	3216	3309	0
Flt Permitted	0.644			0.669			0.950			0.950		
Satd. Flow (perm)	1124	1618	0	1167	1530	0	1658	3253	0	3216	3309	0
Satd. Flow (RTOR)		16			106			17			2	
Lane Group Flow (vph)	12	33	0	36	129	0	98	570	0	65	366	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (%)	10.0%	29.2%		10.0%	29.2%		12.5%	48.3%		12.5%	48.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	14.3	10.8		15.6	13.2		13.3	77.6		7.8	69.7	
Actuated g/C Ratio	0.12	0.09		0.13	0.11		0.11	0.65		0.06	0.58	
v/c Ratio	0.08	0.21		0.21	0.49		0.54	0.27		0.31	0.19	
Control Delay	40.3	34.2		43.8	20.5		60.5	10.9		59.6	13.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.3	34.2		43.8	20.5		60.5	10.9		59.6	13.2	
LOS	D	C		D	C		E	B		E	B	
Approach Delay		35.8			25.6			18.2			20.2	
Approach LOS		D			C			B			C	
Queue Length 50th (m)	2.5	4.0		7.5	4.8		23.2	33.4		8.4	17.1	
Queue Length 95th (m)	7.8	14.1		16.7	24.6		40.2	50.2		16.1	28.1	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	158	396		174	444		183	2108		239	1922	
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	0.08	0.08		0.21	0.29		0.54	0.27		0.27	0.19	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 47.5%	ICU Level of Service A
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 2: Greenbank & Marketplace

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	632	141	78	705	163	172	323	83	175	204	129
Future Volume (vph)	171	632	141	78	705	163	172	323	83	175	204	129
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3213	0	3216	3316	1483
Flt Permitted	0.165			0.307			0.950			0.950		
Satd. Flow (perm)	288	3316	1483	536	3316	1483	3216	3213	0	3216	3316	1483
Satd. Flow (RTOR)			149			163		25				149
Lane Group Flow (vph)	171	632	141	78	705	163	172	406	0	175	204	129
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)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (s)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (%)	15.8%	34.2%	34.2%	15.8%	34.2%	34.2%	20.0%	30.0%		20.0%	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?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	46.1	36.3	36.3	39.5	30.7	30.7	11.7	39.6		11.8	39.7	39.7
Actuated g/C Ratio	0.38	0.30	0.30	0.33	0.26	0.26	0.10	0.33		0.10	0.33	0.33
v/c Ratio	0.69	0.63	0.26	0.30	0.83	0.33	0.55	0.38		0.55	0.19	0.22
Control Delay	38.4	39.7	5.6	24.2	51.4	6.8	76.0	23.6		57.9	31.1	4.6
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	38.4	39.7	5.6	24.2	51.4	6.8	76.0	23.6		57.9	31.1	4.6
LOS	D	D	A	C	D	A	E	C		E	C	A
Approach Delay		34.4			41.4			39.2			33.6	
Approach LOS		C			D			D			C	
Queue Length 50th (m)	27.0	72.3	0.0	11.6	86.5	0.0	23.3	31.0		21.7	19.1	0.0
Queue Length 95th (m)	#44.1	92.7	13.6	20.9	106.3	16.3	35.5	51.7		32.7	31.5	11.2
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	252	1010	555	307	953	542	474	1077		474	1097	590
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	0.68	0.63	0.25	0.25	0.74	0.30	0.36	0.38		0.37	0.19	0.22

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

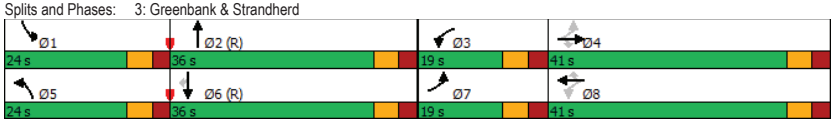
Maximum v/c Ratio: 0.83

Intersection Signal Delay: 37.4	Intersection LOS: D
Intersection Capacity Utilization 69.6%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

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

Splits and Phases: 3: Greenbank & Strandherd



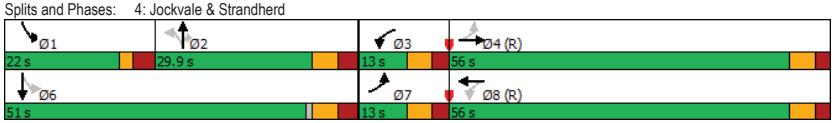
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	674	45	62	735	210	61	52	46	215	62	56
Future Volume (vph)	50	674	45	62	735	210	61	52	46	215	62	56
Satd. Flow (prot)	1658	3286	0	1658	3206	0	1658	1745	1483	1658	1621	0
Flt Permitted	0.231			0.323			0.681			0.482		
Satd. Flow (perm)	403	3286	0	564	3206	0	1188	1745	1483	841	1621	0
Satd. Flow (RTOR)		7			37				130		43	
Lane Group Flow (vph)	50	719	0	62	945	0	61	52	46	215	118	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	10.8%	46.3%		10.8%	46.3%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	72.5	66.6		73.2	66.9		12.4	12.4	12.4	31.9	30.2	
Actuated g/C Ratio	0.60	0.55		0.61	0.55		0.10	0.10	0.10	0.26	0.25	
v/c Ratio	0.16	0.40		0.15	0.53		0.50	0.29	0.17	0.65	0.27	
Control Delay	11.7	19.0		11.3	20.4		64.8	53.3	1.4	45.7	21.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	11.7	19.0		11.3	20.4		64.8	53.3	1.4	45.7	21.9	
LOS	B	B		B	C		E	D	A	D	C	
Approach Delay		18.5			19.8			42.7			37.3	
Approach LOS		B			B			D			D	
Queue Length 50th (m)	4.7	57.4		5.8	80.1		14.8	12.3	0.0	43.7	14.2	
Queue Length 95th (m)	11.1	83.5		13.2	114.7		28.5	24.3	0.0	63.4	28.3	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	318	1812		411	1790		226	331	387	340	630	
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	0.16	0.40		0.15	0.53		0.27	0.16	0.12	0.63	0.19	

Intersection Summary

Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 22 (18%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65
Intersection Signal Delay: 23.5 Intersection LOS: C
Intersection Capacity Utilization 67.8% ICU Level of Service C
Analysis Period (min) 15
Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 4: Jockvale & Strandherd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	30	130	522	40	30	351
Future Volume (vph)	30	130	522	40	30	351
Satd. Flow (prot)	1658	1483	3279	0	1658	1745
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1658	1483	3279	0	1658	1745
Satd. Flow (RTOR)		130	10			
Lane Group Flow (vph)	30	130	562	0	30	351
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Detector Phase	8	8	2		1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	33.8	33.8	33.8		10.9	33.8
Total Split (s)	35.0	35.0	42.0		13.0	55.0
Total Split (%)	38.9%	38.9%	46.7%		14.4%	61.1%
Yellow Time (s)	3.3	3.3	3.3		3.3	3.3
All-Red Time (s)	2.5	2.5	2.5		2.6	2.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8		5.9	5.8
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	7.6	7.6	62.4		7.2	70.8
Actuated g/C Ratio	0.08	0.08	0.69		0.08	0.79
v/c Ratio	0.21	0.53	0.25		0.23	0.26
Control Delay	40.9	15.5	6.7		55.6	2.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	40.9	15.5	6.7		55.6	2.8
LOS	D	B	A		E	A
Approach Delay	20.3		6.7			6.9
Approach LOS	C		A			A
Queue Length 50th (m)	5.2	0.0	19.7		6.1	9.0
Queue Length 95th (m)	13.2	16.2	34.7		15.4	13.9
Internal Link Dist (m)	403.7		204.2			161.2
Turn Bay Length (m)	38.0				38.0	
Base Capacity (vph)	537	568	2275		142	1372
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	0.06	0.23	0.25		0.21	0.26

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 13 (14%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.53

Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 39.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Greenbank & Chapman Mills

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	5	1	482	352	10
Future Vol, veh/h	51	5	1	482	352	10
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	-	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	51	5	1	482	352	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	841	357	362	0	-	0
Stage 1	357	-	-	-	-	-
Stage 2	484	-	-	-	-	-
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	335	687	1197	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	335	687	1197	-	-	-
Mov Cap-2 Maneuver	335	-	-	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	620	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1197	-	351	-	-
HCM Lane V/C Ratio	0.001	-	0.16	-	-
HCM Control Delay (s)	8	-	17.2	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	107	26	66	571	687	103
Future Volume (vph)	107	26	66	571	687	103
Satd. Flow (prot)	1658	1483	1658	3316	3249	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1658	1483	1658	3316	3249	0
Satd. Flow (RTOR)		26			22	
Lane Group Flow (vph)	107	26	66	571	790	0
Turn Type	Perm	Perm	Prot	NA	NA	
Protected Phases			5	2	6	
Permitted Phases	4	4				
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	10.8	30.8	30.8	
Total Split (s)	34.0	34.0	15.0	56.0	41.0	
Total Split (%)	37.8%	37.8%	16.7%	62.2%	45.6%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	11.2	11.2	8.9	70.9	58.4	
Actuated g/C Ratio	0.12	0.12	0.10	0.79	0.65	
v/c Ratio	0.52	0.13	0.40	0.22	0.37	
Control Delay	45.2	14.1	54.1	2.7	10.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	45.2	14.1	54.1	2.7	10.8	
LOS	D	B	D	A	B	
Approach Delay	39.2			8.1	10.8	
Approach LOS	D			A	B	
Queue Length 50th (m)	18.6	0.0	12.8	8.6	37.0	
Queue Length 95th (m)	33.4	7.1	26.9	16.3	62.6	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	519	482	185	2612	2117	
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	0.21	0.05	0.36	0.22	0.37	

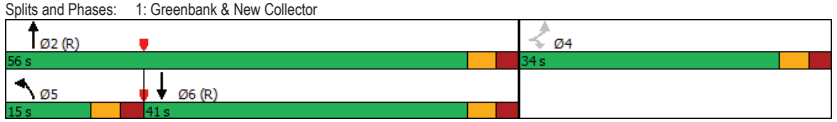
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 15 (17%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
1: Greenbank & New Collector

05-27-2019

Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 48.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Greenbank & New Collector



Lanes, Volumes, Timings
2: Greenbank & Marketplace

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	117	86	141	124	185	149	483	70	195	612	36
Future Volume (vph)	44	117	86	141	124	185	149	483	70	195	612	36
Satd. Flow (prot)	1658	1633	0	1658	1588	0	1658	3253	0	3216	3289	0
Flt Permitted	0.292			0.457			0.950			0.950		
Satd. Flow (perm)	510	1633	0	798	1588	0	1658	3253	0	3216	3289	0
Satd. Flow (RTOR)		29			59			15			6	
Lane Group Flow (vph)	44	203	0	141	309	0	149	553	0	195	648	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (%)	10.8%	29.2%		10.8%	29.2%		16.7%	43.3%		16.7%	43.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	29.3	22.8		30.8	25.4		13.9	53.2		12.0	51.3	
Actuated g/C Ratio	0.24	0.19		0.26	0.21		0.12	0.44		0.10	0.43	
v/c Ratio	0.24	0.61		0.56	0.81		0.78	0.38		0.61	0.46	
Control Delay	30.9	44.8		41.7	53.1		77.7	24.2		63.4	20.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.9	44.8		41.7	53.1		77.7	24.2		63.4	20.7	
LOS	C	D		D	D		E	C		E	C	
Approach Delay		42.3			49.5			35.6			30.6	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	7.6	38.9		26.1	60.5		35.3	48.0		25.5	38.4	
Queue Length 95th (m)	16.0	62.1		41.5	92.2		#71.4	68.1		m36.1	m49.5	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	188	409		251	422		200	1450		367	1409	
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	0.23	0.50		0.56	0.73		0.74	0.38		0.53	0.46	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
2: Greenbank & Marketplace

05-27-2019

Maximum v/c Ratio: 0.81

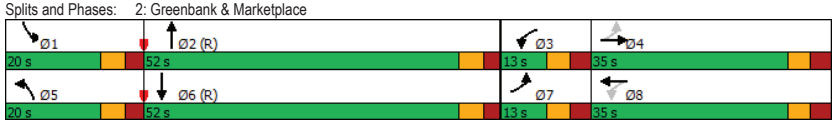
Intersection Signal Delay: 37.2	Intersection LOS: D
Intersection Capacity Utilization 72.0%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Marketplace



Lanes, Volumes, Timings
3: Greenbank & Strandherd

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	902	220	194	779	184	232	339	96	251	428	174
Future Volume (vph)	190	902	220	194	779	184	232	339	96	251	428	174
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3206	0	3216	3316	1483
Flt Permitted	0.164			0.116			0.950			0.950		
Satd. Flow (perm)	286	3316	1483	202	3316	1483	3216	3206	0	3216	3316	1483
Satd. Flow (RTOR)			220			184		29				174
Lane Group Flow (vph)	190	902	220	194	779	184	232	435	0	251	428	174
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)	18.0	41.0	41.0	18.0	41.0	41.0	24.0	37.0		24.0	37.0	37.0
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%
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
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	45.4	34.3	34.3	45.7	34.4	34.4	13.9	34.0		14.4	34.6	34.6
Actuated g/C Ratio	0.38	0.29	0.29	0.38	0.29	0.29	0.12	0.28		0.12	0.29	0.29
v/c Ratio	0.81	0.95	0.38	0.90	0.82	0.33	0.62	0.47		0.65	0.45	0.32
Control Delay	48.8	62.3	6.2	70.6	48.1	6.3	73.2	23.8		58.3	37.4	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	48.8	62.3	6.2	70.6	48.1	6.3	73.2	23.8		58.3	37.4	6.8
LOS	D	E	A	E	D	A	E	C		E	D	A
Approach Delay		50.9			45.3			41.0			37.3	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	29.4	115.2	0.0	32.4	94.7	0.0	31.8	22.4		31.0	45.8	0.0
Queue Length 95th (m)	#62.0	#157.2	18.7	#77.7	119.6	17.2	m44.9	30.0		44.0	64.8	17.8
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	238	953	583	215	953	557	474	929		474	954	550
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	0.80	0.95	0.38	0.90	0.82	0.33	0.49	0.47		0.53	0.45	0.32

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

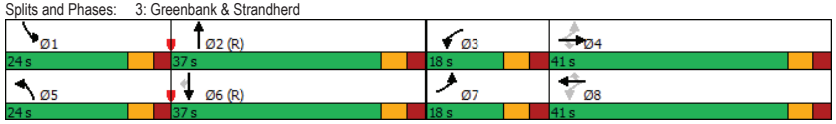
Intersection Signal Delay: 44.7	Intersection LOS: D
Intersection Capacity Utilization 79.9%	ICU Level of Service D
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	813	136	156	708	326	129	147	130	331	135	30
Future Volume (vph)	30	813	136	156	708	326	129	147	130	331	135	30
Satd. Flow (prot)	1658	3246	0	1658	3160	0	1658	1745	1483	1658	1698	0
Flt Permitted	0.193			0.167			0.653			0.449		
Satd. Flow (perm)	337	3246	0	291	3160	0	1140	1745	1483	784	1698	0
Satd. Flow (RTOR)		18			73				130		11	
Lane Group Flow (vph)	30	949	0	156	1034	0	129	147	130	331	165	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	13.2%	43.8%		13.2%	43.8%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	58.7	52.2		66.4	60.0		17.9	17.9	17.9	41.6	39.9	
Actuated g/C Ratio	0.49	0.43		0.55	0.50		0.15	0.15	0.15	0.34	0.33	
v/c Ratio	0.13	0.67		0.58	0.64		0.76	0.57	0.39	0.85	0.29	
Control Delay	15.0	31.0		23.0	25.2		76.3	55.8	10.8	53.0	28.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	15.0	31.0		23.0	25.2		76.3	55.8	10.8	53.0	28.4	
LOS	B	C		C	C		E	E	B	D	C	
Approach Delay		30.5			25.0			47.9			44.8	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	3.2	99.4		18.3	99.8		31.1	34.4	0.0	66.7	28.0	
Queue Length 95th (m)	8.6	130.6		32.6	137.6		52.0	54.1	17.0	#99.2	43.8	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	281	1410		276	1605		216	331	387	391	638	
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	0.11	0.67		0.57	0.64		0.60	0.44	0.34	0.85	0.26	

Intersection Summary

Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 82 (68%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

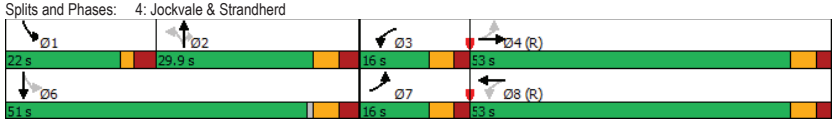
Maximum v/c Ratio: 0.85

Intersection Signal Delay: 33.0	Intersection LOS: C
Intersection Capacity Utilization 85.4%	ICU Level of Service E
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

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

Splits and Phases: 4: Jockvale & Strandherd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	80	120	517	50	60	702
Future Volume (vph)	80	120	517	50	60	702
Satd. Flow (prot)	1658	1483	3273	0	1658	1745
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1658	1483	3273	0	1658	1745
Satd. Flow (RTOR)		120	13			
Lane Group Flow (vph)	80	120	567	0	60	702
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Detector Phase	8	8	2		1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	33.8	33.8	33.8		10.8	33.8
Total Split (s)	33.8	33.8	41.3		14.9	56.2
Total Split (%)	37.6%	37.6%	45.9%		16.6%	62.4%
Yellow Time (s)	3.3	3.3	3.3		3.3	3.3
All-Red Time (s)	2.5	2.5	2.5		2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.8	5.8	5.8		5.8	5.8
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	C-Max		None	C-Max
Act Effct Green (s)	9.7	9.7	56.5		8.6	68.7
Actuated g/C Ratio	0.11	0.11	0.63		0.10	0.76
v/c Ratio	0.45	0.45	0.28		0.38	0.53
Control Delay	44.8	12.7	9.2		51.7	7.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	44.8	12.7	9.2		51.7	7.4
LOS	D	B	A		D	A
Approach Delay	25.5		9.2			10.9
Approach LOS	C		A			B
Queue Length 50th (m)	13.9	0.0	23.1		11.8	24.9
Queue Length 95th (m)	27.0	15.2	40.0		25.1	54.0
Internal Link Dist (m)	403.7		204.2			161.2
Turn Bay Length (m)	38.0				38.0	
Base Capacity (vph)	515	544	2060		181	1332
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	0.16	0.22	0.28		0.33	0.53

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 14.9 (17%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 53.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Greenbank & Chapman Mills

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	3	5	542	733	49
Future Vol, veh/h	25	3	5	542	733	49
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	-	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	25	3	5	542	733	49

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1310	758	782	0	-	0
Stage 1	758	-	-	-	-	-
Stage 2	552	-	-	-	-	-
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	175	407	836	-	-	-
Stage 1	463	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	174	407	836	-	-	-
Mov Cap-2 Maneuver	174	-	-	-	-	-
Stage 1	460	-	-	-	-	-
Stage 2	577	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.9	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	836	-	185	-	-
HCM Lane V/C Ratio	0.006	-	0.151	-	-
HCM Control Delay (s)	9.3	-	27.9	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Appendix F

Synchro Intersection Worksheets – 2030 Background Conditions

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	7	20	533	286	38
Future Volume (vph)	43	7	20	533	286	38
Satd. Flow (prot)	1658	1483	1658	3316	3256	0
Flt Permitted	0.950		0.556			
Satd. Flow (perm)	1658	1483	970	3316	3256	0
Satd. Flow (RTOR)		7			25	
Lane Group Flow (vph)	43	7	20	533	324	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	30.8	30.8	30.8	
Total Split (s)	35.0	35.0	55.0	55.0	55.0	
Total Split (%)	38.9%	38.9%	61.1%	61.1%	61.1%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	
Act Effct Green (s)	7.9	7.9	77.6	77.6	77.6	
Actuated g/C Ratio	0.09	0.09	0.86	0.86	0.86	
v/c Ratio	0.30	0.05	0.02	0.19	0.12	
Control Delay	43.1	21.9	1.2	1.1	2.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	43.1	21.9	1.2	1.1	2.0	
LOS	D	C	A	A	A	
Approach Delay	40.1			1.1	2.0	
Approach LOS	D			A	A	
Queue Length 50th (m)	7.5	0.0	0.3	5.0	5.1	
Queue Length 95th (m)	17.4	4.2	m1.0	6.4	9.5	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	537	485	836	2859	2811	
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	0.08	0.01	0.02	0.19	0.12	

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

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 3.5	Intersection LOS: A
Intersection Capacity Utilization 31.4%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 1: Greenbank & New Collector

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	17	16	36	23	106	98	391	74	65	279	6
Future Volume (vph)	12	17	16	36	23	106	98	391	74	65	279	6
Satd. Flow (prot)	1658	1618	0	1658	1530	0	1658	3236	0	3216	3306	0
Flt Permitted	0.644			0.669			0.950			0.950		
Satd. Flow (perm)	1124	1618	0	1167	1530	0	1658	3236	0	3216	3306	0
Satd. Flow (RTOR)		16			106			23			2	
Lane Group Flow (vph)	12	33	0	36	129	0	98	465	0	65	285	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (%)	10.0%	29.2%		10.0%	29.2%		12.5%	48.3%		12.5%	48.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	14.3	10.8		15.6	13.2		13.3	77.6		7.8	69.7	
Actuated g/C Ratio	0.12	0.09		0.13	0.11		0.11	0.65		0.06	0.58	
v/c Ratio	0.08	0.21		0.21	0.49		0.54	0.22		0.31	0.15	
Control Delay	40.3	34.2		43.8	20.5		60.5	10.3		65.5	9.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.3	34.2		43.8	20.5		60.5	10.3		65.5	9.2	
LOS	D	C		D	C		E	B		E	A	
Approach Delay		35.8			25.6			19.0			19.7	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	2.5	4.0		7.5	4.8		23.2	25.6		8.6	10.3	
Queue Length 95th (m)	7.8	14.1		16.7	24.6		40.2	39.7		16.2	15.1	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	158	396		174	444		183	2099		239	1920	
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	0.08	0.08		0.21	0.29		0.54	0.22		0.27	0.15	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 20.9	Intersection LOS: C
Intersection Capacity Utilization 44.4%	ICU Level of Service A
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 2: Greenbank & Marketplace

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	588	74	54	694	163	89	327	53	175	210	125
Future Volume (vph)	164	588	74	54	694	163	89	327	53	175	210	125
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3246	0	3216	3316	1483
Flt Permitted	0.165			0.356			0.950			0.950		
Satd. Flow (perm)	288	3316	1483	621	3316	1483	3216	3246	0	3216	3316	1483
Satd. Flow (RTOR)			149			163		14				149
Lane Group Flow (vph)	164	588	74	54	694	163	89	380	0	175	210	125
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)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (s)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (%)	15.8%	34.2%	34.2%	15.8%	34.2%	34.2%	20.0%	30.0%		20.0%	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?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	46.8	37.0	37.0	38.1	30.4	30.4	8.7	39.9		11.8	43.1	43.1
Actuated g/C Ratio	0.39	0.31	0.31	0.32	0.25	0.25	0.07	0.33		0.10	0.36	0.36
v/c Ratio	0.66	0.58	0.13	0.20	0.83	0.33	0.38	0.35		0.55	0.18	0.20
Control Delay	35.9	37.8	0.5	22.6	51.2	6.8	75.4	25.0		57.9	28.5	3.8
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	35.9	37.8	0.5	22.6	51.2	6.8	75.4	25.0		57.9	28.5	3.8
LOS	D	D	A	C	D	A	E	C		E	C	A
Approach Delay		34.0			41.6			34.5			32.5	
Approach LOS		C			D			C			C	
Queue Length 50th (m)	25.9	65.6	0.0	8.0	85.2	0.0	12.0	34.6		21.7	18.8	0.0
Queue Length 95th (m)	39.9	83.6	0.0	15.6	104.3	16.3	21.5	57.0		32.7	30.8	9.7
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	253	1025	561	327	953	542	474	1089		474	1189	627
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	0.65	0.57	0.13	0.17	0.73	0.30	0.19	0.35		0.37	0.18	0.20

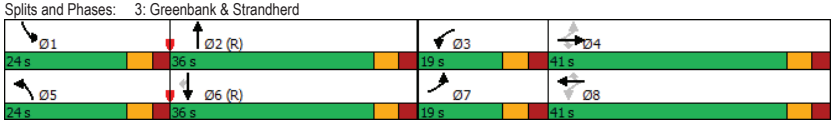
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 36.4	Intersection LOS: D
Intersection Capacity Utilization 68.0%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 3: Greenbank & Strandherd



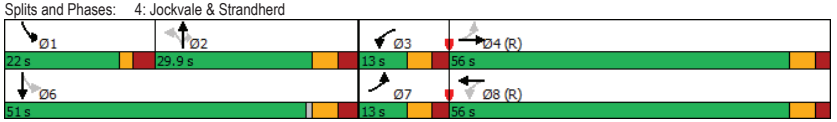
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	487	45	62	637	210	61	52	46	215	62	56
Future Volume (vph)	50	487	45	62	637	210	61	52	46	215	62	56
Satd. Flow (prot)	1658	3273	0	1658	3193	0	1658	1745	1483	1658	1621	0
Flt Permitted	0.270			0.421			0.681			0.482		
Satd. Flow (perm)	471	3273	0	735	3193	0	1188	1745	1483	841	1621	0
Satd. Flow (RTOR)		10			45				130		43	
Lane Group Flow (vph)	50	532	0	62	847	0	61	52	46	215	118	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	10.8%	46.3%		10.8%	46.3%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	72.5	66.6		73.2	66.9		12.4	12.4	12.4	31.9	30.2	
Actuated g/C Ratio	0.60	0.55		0.61	0.55		0.10	0.10	0.10	0.26	0.25	
v/c Ratio	0.14	0.29		0.12	0.47		0.50	0.29	0.17	0.65	0.27	
Control Delay	11.5	17.4		11.0	19.1		64.8	53.3	1.4	45.7	21.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	11.5	17.4		11.0	19.1		64.8	53.3	1.4	45.7	21.9	
LOS	B	B		B	B		E	D	A	D	C	
Approach Delay		16.9			18.6			42.7			37.3	
Approach LOS		B			B			D			D	
Queue Length 50th (m)	4.7	39.2		5.8	67.9		14.8	12.3	0.0	43.7	14.2	
Queue Length 95th (m)	11.1	59.0		13.2	98.2		28.5	24.3	0.0	63.4	28.3	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	355	1806		504	1786		226	331	387	340	630	
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	0.14	0.29		0.12	0.47		0.27	0.16	0.12	0.63	0.19	

Intersection Summary
Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 22 (18%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 65.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Jockvale & Strandherd



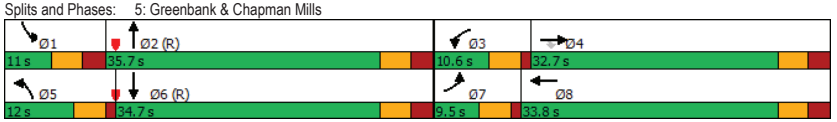
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	100	47	30	139	40	75	473	40	30	244	29
Future Volume (vph)	30	100	47	30	139	40	75	473	40	30	244	29
Satd. Flow (prot)	1658	1745	1483	1658	1686	0	1658	3276	0	1658	1717	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1658	1745	1483	1658	1686	0	1658	3276	0	1658	1717	0
Satd. Flow (RTOR)			160		17			10			7	
Lane Group Flow (vph)	30	100	47	30	179	0	75	513	0	30	273	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Detector Phase	7	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	23.8	23.8	9.5	33.8		9.5	33.8		10.9	33.8	
Total Split (s)	9.5	32.7	32.7	10.6	33.8		12.0	35.7		11.0	34.7	
Total Split (%)	10.6%	36.3%	36.3%	11.8%	37.6%		13.3%	39.7%		12.2%	38.6%	
Yellow Time (s)	3.5	3.3	3.3	3.5	3.3		3.5	3.3		3.3	3.3	
All-Red Time (s)	1.0	2.5	2.5	1.0	2.5		1.0	2.5		2.6	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)	4.5	5.8	5.8	4.5	5.8		4.5	5.8		5.9	5.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	5.0	13.4	13.4	6.0	14.1		9.5	50.2		7.2	46.7	
Actuated g/C Ratio	0.06	0.15	0.15	0.07	0.16		0.11	0.56		0.08	0.52	
v/c Ratio	0.33	0.39	0.13	0.27	0.65		0.43	0.28		0.23	0.31	
Control Delay	50.7	37.8	0.8	46.5	42.4		44.6	14.2		40.3	15.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	50.7	37.8	0.8	46.5	42.4		44.6	14.2		40.3	15.6	
LOS	D	D	A	D	D		D	B		D	B	
Approach Delay		30.1			43.0			18.1			18.0	
Approach LOS		C			D			B			B	
Queue Length 50th (m)	5.4	16.7	0.0	5.3	27.9		13.0	29.3		4.7	30.2	
Queue Length 95th (m)	14.4	29.9	0.0	14.2	45.9		25.9	48.9		10.8	60.1	
Internal Link Dist (m)		487.8			403.7			204.2			161.2	
Turn Bay Length (m)	38.0		60.0	38.0			38.0			38.0		
Base Capacity (vph)	92	521	555	112	536		180	1833		132	895	
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	0.33	0.19	0.08	0.27	0.33		0.42	0.28		0.23	0.31	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 12 (13%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 52.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	4	1	508	281	6
Future Vol, veh/h	29	4	1	508	281	6
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	-	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	29	4	1	508	281	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	794	284	287	0	-	0
Stage 1	284	-	-	-	-	-
Stage 2	510	-	-	-	-	-
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	357	755	1275	-	-	-
Stage 1	764	-	-	-	-	-
Stage 2	603	-	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	357	755	1275	-	-	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	763	-	-	-	-	-
Stage 2	603	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1275	-	381	-	-
HCM Lane V/C Ratio	0.001	-	0.087	-	-
HCM Control Delay (s)	7.8	-	15.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	107	26	66	510	606	103
Future Volume (vph)	107	26	66	510	606	103
Satd. Flow (prot)	1658	1483	1658	3316	3243	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1658	1483	1658	3316	3243	0
Satd. Flow (RTOR)		26			25	
Lane Group Flow (vph)	107	26	66	510	709	0
Turn Type	Perm	Perm	Prot	NA	NA	
Protected Phases			5	2	6	
Permitted Phases	4	4				
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	10.8	30.8	30.8	
Total Split (s)	34.0	34.0	16.0	56.0	40.0	
Total Split (%)	37.8%	37.8%	17.8%	62.2%	44.4%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	11.2	11.2	8.9	70.9	58.4	
Actuated g/C Ratio	0.12	0.12	0.10	0.79	0.65	
v/c Ratio	0.52	0.13	0.40	0.20	0.34	
Control Delay	45.2	14.1	50.3	1.8	10.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	45.2	14.1	50.3	1.8	10.4	
LOS	D	B	D	A	B	
Approach Delay	39.2			7.4	10.4	
Approach LOS	D			A	B	
Queue Length 50th (m)	18.6	0.0	12.6	5.5	31.8	
Queue Length 95th (m)	33.4	7.1	m26.8	8.8	54.6	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	519	482	196	2612	2114	
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	0.21	0.05	0.34	0.20	0.34	

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 16 (18%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
1: Greenbank & New Collector

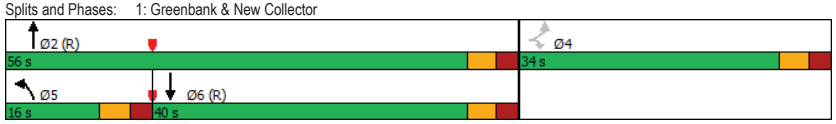
05-27-2019

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 46.1%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 1: Greenbank & New Collector



Lanes, Volumes, Timings
2: Greenbank & Marketplace

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	117	86	141	124	185	149	401	70	195	512	36
Future Volume (vph)	44	117	86	141	124	185	149	401	70	195	512	36
Satd. Flow (prot)	1658	1633	0	1658	1588	0	1658	3243	0	3216	3283	0
Flt Permitted	0.292			0.457			0.950			0.950		
Satd. Flow (perm)	510	1633	0	798	1588	0	1658	3243	0	3216	3283	0
Satd. Flow (RTOR)		29			59			19			7	
Lane Group Flow (vph)	44	203	0	141	309	0	149	471	0	195	548	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (%)	10.8%	29.2%		10.8%	29.2%		16.7%	43.3%		16.7%	43.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	29.3	22.8		30.8	25.4		13.9	53.2		12.0	51.3	
Actuated g/C Ratio	0.24	0.19		0.26	0.21		0.12	0.44		0.10	0.43	
v/c Ratio	0.24	0.61		0.56	0.81		0.78	0.33		0.61	0.39	
Control Delay	30.9	44.8		41.7	53.1		77.7	23.1		69.1	16.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.9	44.8		41.7	53.1		77.7	23.1		69.1	16.5	
LOS	C	D		D	D		E	C		E	B	
Approach Delay		42.3			49.5			36.2			30.3	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	7.6	38.9		26.1	60.5		35.3	39.1		25.7	25.8	
Queue Length 95th (m)	16.0	62.1		41.5	92.2		#71.4	56.6		m38.7	34.0	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	188	409		251	422		200	1448		367	1407	
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	0.23	0.50		0.56	0.73		0.74	0.33		0.53	0.39	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
2: Greenbank & Marketplace

05-27-2019

Maximum v/c Ratio: 0.81

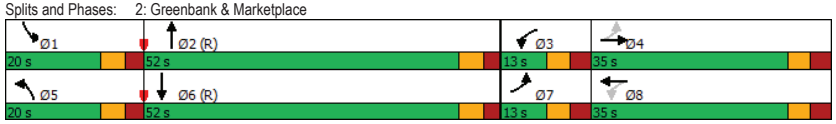
Intersection Signal Delay: 37.7	Intersection LOS: D
Intersection Capacity Utilization 69.1%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Marketplace



Lanes, Volumes, Timings
3: Greenbank & Strandherd

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	186	942	119	148	784	184	137	374	66	251	463	168
Future Volume (vph)	186	942	119	148	784	184	137	374	66	251	463	168
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3239	0	3216	3316	1483
Flt Permitted	0.160			0.115			0.950			0.950		
Satd. Flow (perm)	279	3316	1483	201	3316	1483	3216	3239	0	3216	3316	1483
Satd. Flow (RTOR)			149			184		16				168
Lane Group Flow (vph)	186	942	119	148	784	184	137	440	0	251	463	168
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)	18.0	41.0	41.0	18.0	41.0	41.0	24.0	37.0		24.0	37.0	37.0
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%
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
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	46.3	35.2	35.2	45.3	34.7	34.7	10.5	33.8		14.4	37.7	37.7
Actuated g/C Ratio	0.39	0.29	0.29	0.38	0.29	0.29	0.09	0.28		0.12	0.31	0.31
v/c Ratio	0.79	0.97	0.22	0.72	0.82	0.33	0.49	0.48		0.65	0.44	0.29
Control Delay	47.3	64.5	3.5	45.1	47.9	6.3	68.8	27.4		58.3	34.9	6.1
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	47.3	64.5	3.5	45.1	47.9	6.3	68.8	27.4		58.3	34.9	6.1
LOS	D	E	A	D	D	A	E	C		E	C	A
Approach Delay		56.1			40.6			37.2			36.0	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	28.7	122.3	0.0	22.3	95.5	0.0	18.7	31.5		31.0	48.0	0.0
Queue Length 95th (m)	#60.4	#168.3	8.4	#49.0	120.6	17.2	m28.6	42.4		44.0	66.5	16.7
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	239	973	540	215	960	560	474	923		474	1042	581
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	0.78	0.97	0.22	0.69	0.82	0.33	0.29	0.48		0.53	0.44	0.29

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

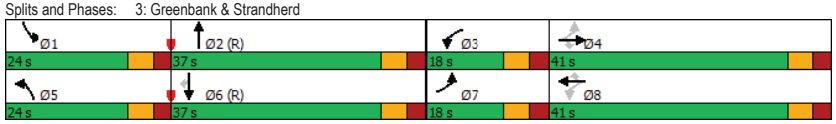
Intersection Signal Delay: 44.1	Intersection LOS: D
Intersection Capacity Utilization 78.4%	ICU Level of Service D
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	739	136	159	605	326	129	147	130	331	135	30
Future Volume (vph)	99	739	136	159	605	326	129	147	130	331	135	30
Satd. Flow (prot)	1658	3239	0	1658	3140	0	1658	1745	1483	1658	1698	0
Flt Permitted	0.201			0.210			0.653			0.449		
Satd. Flow (perm)	351	3239	0	366	3140	0	1140	1745	1483	784	1698	0
Satd. Flow (RTOR)		20			97				130		11	
Lane Group Flow (vph)	99	875	0	159	931	0	129	147	130	331	165	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	13.2%	43.8%		13.2%	43.8%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	60.7	52.1		63.0	53.3		17.9	17.9	17.9	41.6	39.9	
Actuated g/C Ratio	0.50	0.43		0.52	0.44		0.15	0.15	0.15	0.34	0.33	
v/c Ratio	0.37	0.62		0.54	0.65		0.76	0.57	0.39	0.85	0.29	
Control Delay	17.8	29.5		21.3	27.1		76.3	55.8	10.8	53.0	28.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	17.8	29.5		21.3	27.1		76.3	55.8	10.8	53.0	28.4	
LOS	B	C		C	C		E	E	B	D	C	
Approach Delay		28.3			26.3			47.9			44.8	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	11.2	88.7		18.6	86.0		31.1	34.4	0.0	66.7	28.0	
Queue Length 95th (m)	21.7	117.1		33.2	119.1		52.0	54.1	17.0	#99.2	43.8	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	287	1407		302	1437		216	331	387	391	638	
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	0.34	0.62		0.53	0.65		0.60	0.44	0.34	0.85	0.26	

Intersection Summary

Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 82 (68%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

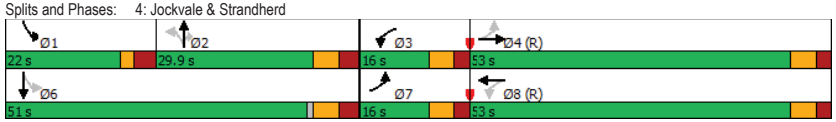
Maximum v/c Ratio: 0.85

Intersection Signal Delay: 33.0	Intersection LOS: C
Intersection Capacity Utilization 83.4%	ICU Level of Service E
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

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

Splits and Phases: 4: Jockvale & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	179	87	90	130	40	76	486	50	50	561	50
Future Volume (vph)	50	179	87	90	130	40	76	486	50	50	561	50
Satd. Flow (prot)	1658	1745	1483	1658	1684	0	1658	3269	0	1658	1724	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1658	1745	1483	1658	1684	0	1658	3269	0	1658	1724	0
Satd. Flow (RTOR)			175		18			13			5	
Lane Group Flow (vph)	50	179	87	90	170	0	76	536	0	50	611	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Detector Phase	7	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0	24.0	11.0	33.8		11.0	33.8		10.8	33.8	
Total Split (s)	11.0	28.8	28.8	16.0	33.8		11.0	34.4		10.8	34.2	
Total Split (%)	12.2%	32.0%	32.0%	17.8%	37.6%		12.2%	38.2%		12.0%	38.0%	
Yellow Time (s)	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	2.5		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)	5.8	5.8	5.8	5.8	5.8		5.8	5.8		5.8	5.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	5.2	14.5	14.5	9.0	18.1		9.3	40.2		7.7	38.9	
Actuated g/C Ratio	0.06	0.16	0.16	0.10	0.20		0.10	0.45		0.09	0.43	
v/c Ratio	0.53	0.64	0.23	0.54	0.48		0.45	0.37		0.35	0.82	
Control Delay	61.9	45.2	1.4	50.6	31.5		46.5	20.4		61.4	31.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	61.9	45.2	1.4	50.6	31.5		46.5	20.4		61.4	31.2	
LOS	E	D	A	D	C		D	C		E	C	
Approach Delay		35.8			38.1			23.7			33.5	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	9.0	30.8	0.0	15.6	23.9		13.0	36.5		9.9	~111.2	
Queue Length 95th (m)	#24.5	48.7	0.0	31.1	40.0		27.8	56.4		22.3	#195.5	
Internal Link Dist (m)		499.8			403.7			204.2			161.2	
Turn Bay Length (m)	38.0		60.0	38.0			38.0			38.0		
Base Capacity (vph)	95	445	509	187	536		170	1467		142	748	
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	0.53	0.40	0.17	0.48	0.32		0.45	0.37		0.35	0.82	

Intersection Summary

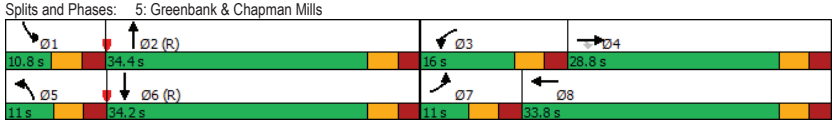
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 11 (12%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 31.3	Intersection LOS: C
Intersection Capacity Utilization 73.4%	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.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	14	2	3	544	646	29
Future Vol, veh/h	14	2	3	544	646	29
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	-	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	14	2	3	544	646	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1211	661	675	0	-	0
Stage 1	661	-	-	-	-	-
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	201	462	916	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	578	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	200	462	916	-	-	-
Mov Cap-2 Maneuver	200	-	-	-	-	-
Stage 1	512	-	-	-	-	-
Stage 2	578	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	916	-	215	-	-
HCM Lane V/C Ratio	0.003	-	0.074	-	-
HCM Control Delay (s)	8.9	-	23.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Appendix G

Background Development Volumes

Figure 9: Site Generated Traffic Volumes

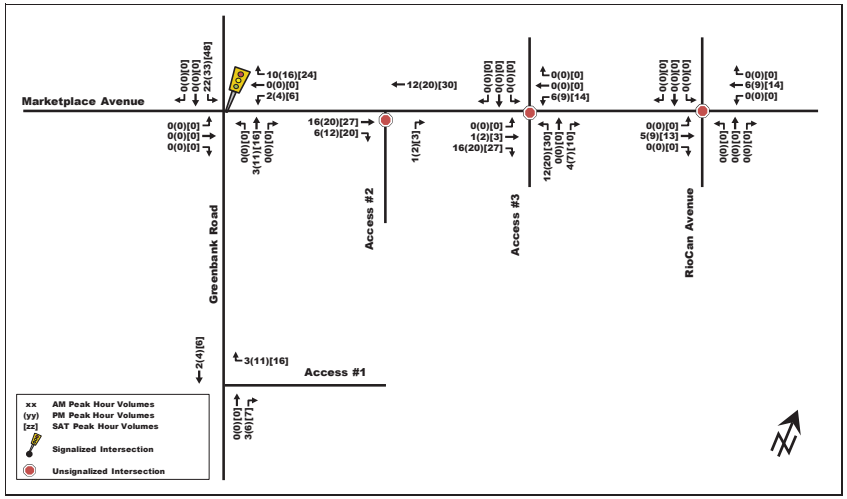
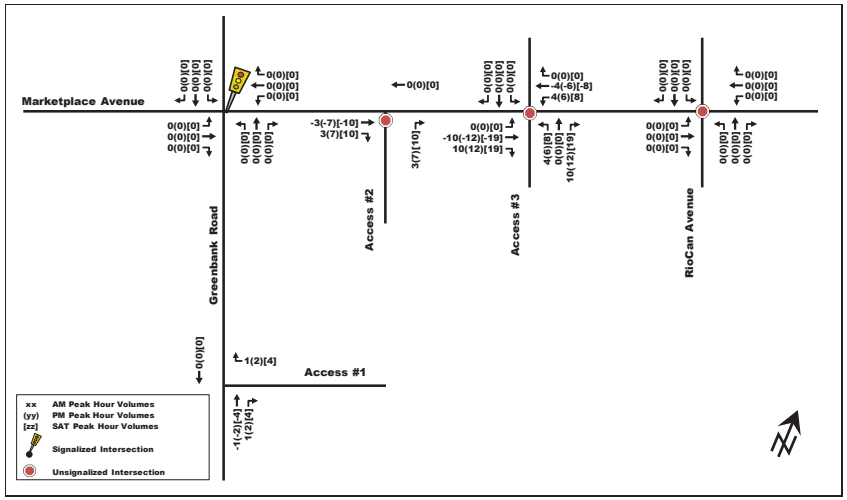
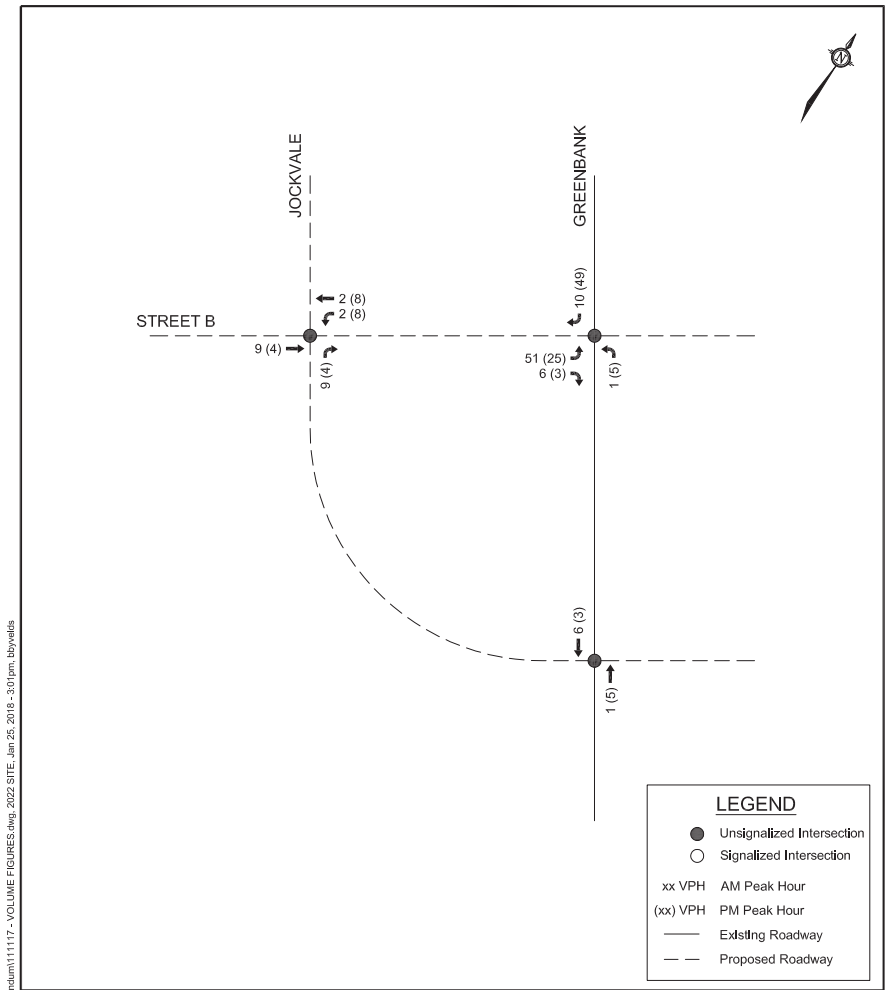


Figure 10: Pass-by Traffic Volumes





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3370 GREENBANK ROAD
BURNETT LANDS

PHASE 1 SITE
GENERATED TRAFFIC

JAN 2018 111117 FIGURE 5

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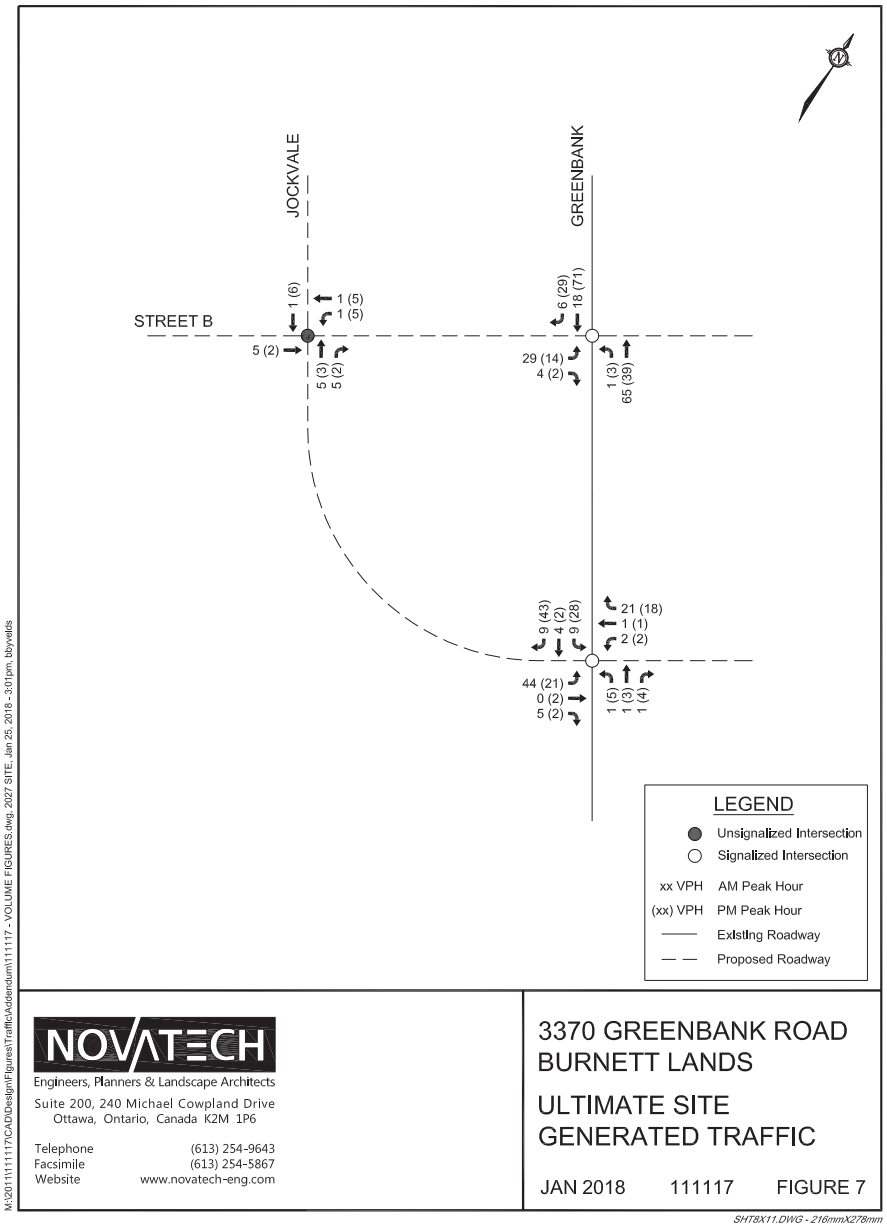
SHT8X11.DWG - 216mmX278mm



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3370 GREENBANK ROAD
BURNETT LANDS

ULTIMATE SITE
GENERATED TRAFFIC

JAN 2018 111117 FIGURE 7

SHT8X11.DWG - 216mmX278mm

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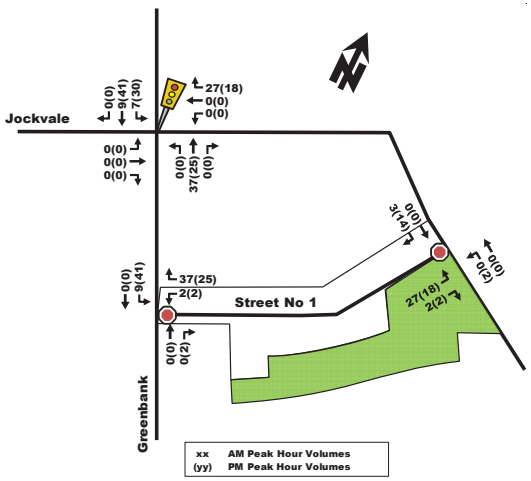
Figure 8: 'New' Site Generated Auto Volumes



4. FUTURE TRAFFIC OPERATIONS

4.1. PROJECTED 2020 CONDITIONS AT FULL SITE DEVELOPMENT

The total projected 2020 volumes associated with the proposed development were derived by superimposing 'new' site-generated traffic volumes (Figure 8) onto projected 2020 background traffic volumes (Figure 6). The resulting total projected 2020 volumes are illustrated as Figure 9.

The following Table 10 provides a projected performance summary for study area intersections, based on total projected 2020 traffic volumes. The detailed SYNCHRO model output of projected conditions is provided within Appendix F.

Figure 10: New Site Generation Auto Volumes

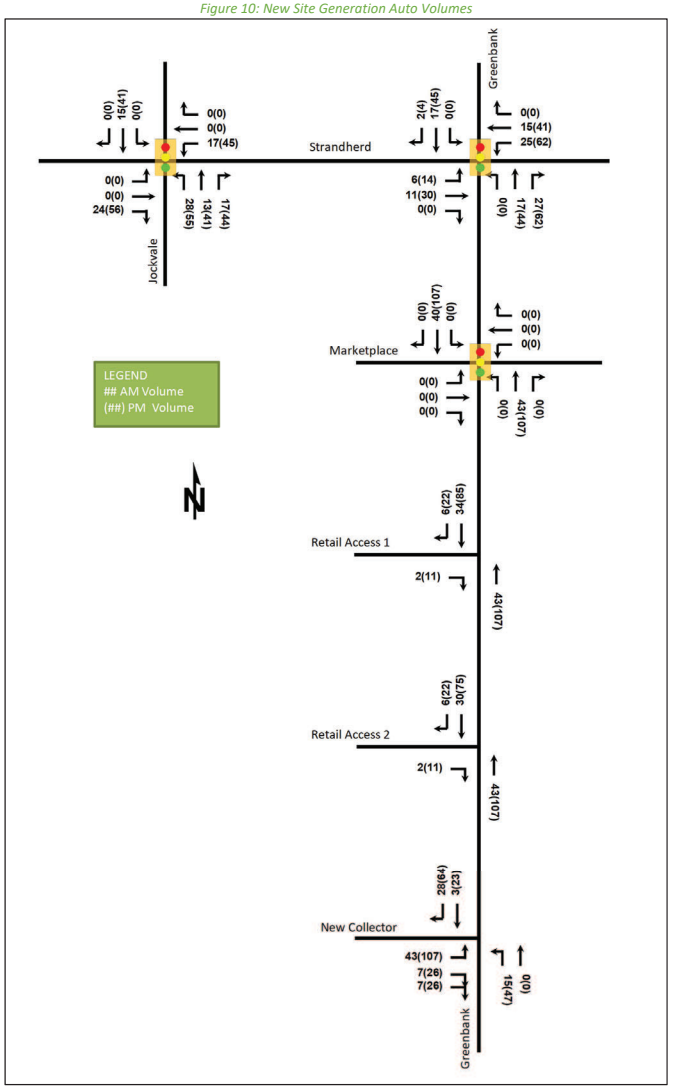
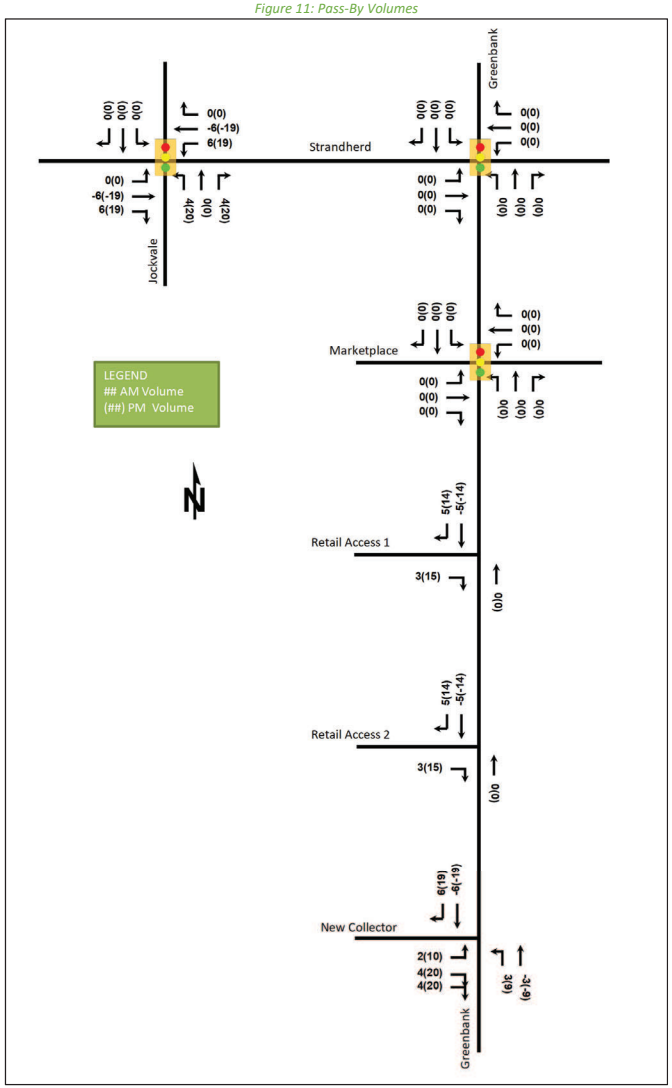
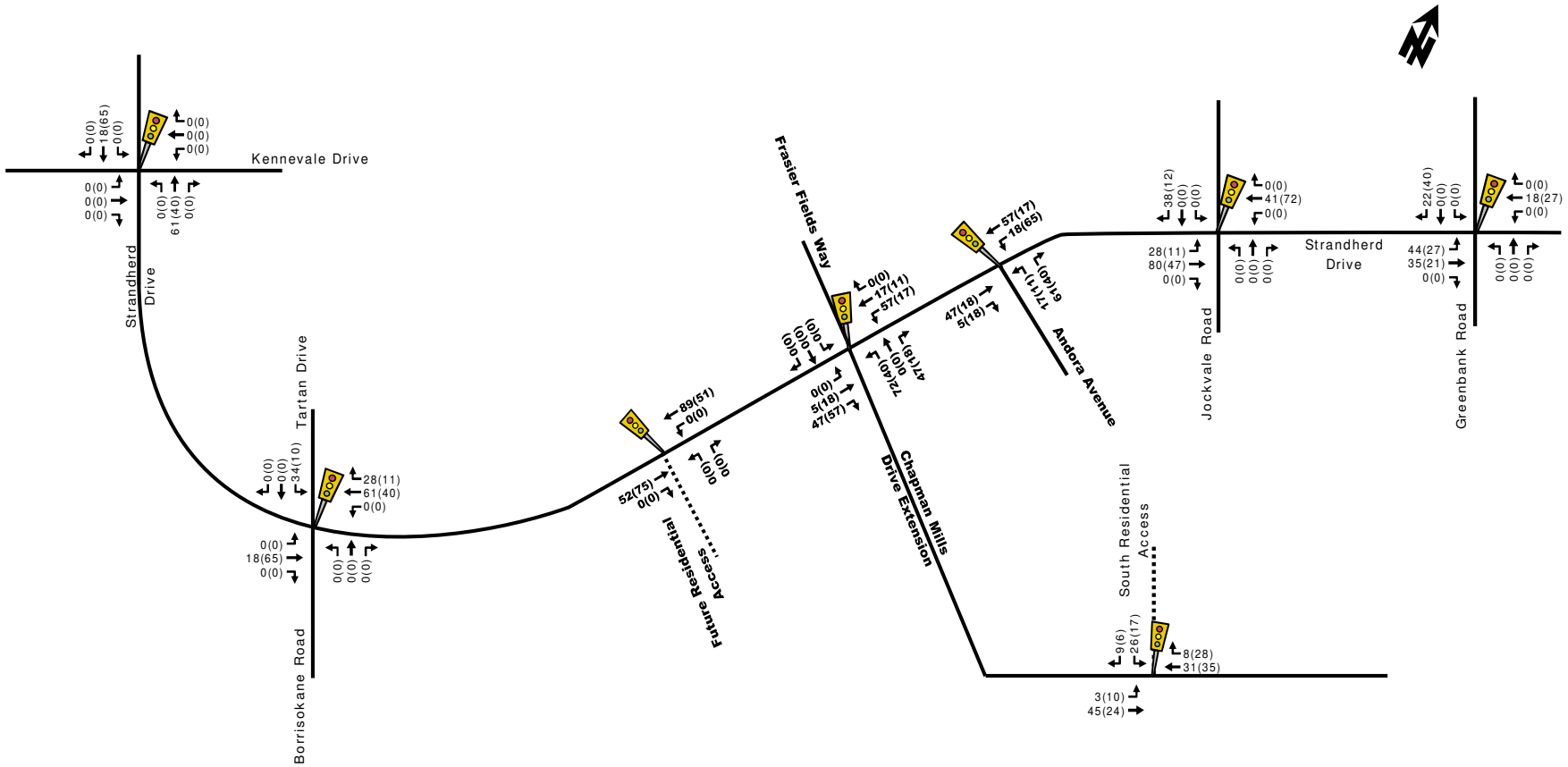


Figure 11: Pass-By Volumes





Legend

- Signalized Intersection
- Lane Configuration
- c Channelized
- Existing Roadway
- Future Roadway

xx AM Peak Hour Volumes
(yy) PM Peak Hour Volumes

PARSONS

Figure 13: Site Generated Traffic Volumes

Appendix H

MMLOS Analysis

Multi-Modal Level of Service - Intersections Form

Consultant	**CGH Transportation**	**Project**	**3194 Jockvale Road**
Scenario		**Date**	**Dec. 2018**
Comments			

	INTERSECTIONS	Greenbank Road & Marketplace Avenue				Greenbank Road & Strandherd Drive				Jockvale Road & Strandherd Driv		
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST
Pedestrian	Lanes	6	5	4	4	7	6	6	4	3	5	5
	Median	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	Median > 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	Median > 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected	Protected	Permissive	Permissive	Protected	Protected	Protected/ Permissive	Protected/ Permissive	Protected/ 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	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	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	No	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	Smart Channel	No Channel	Smart Channel	Smart Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	15-25m	15-25m	>25m	10-15m	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	Std transverse markings
	PETSI Score	**25**	**40**	**61**	**61**	**16**	**23**	**37**	**66**	**70**	**37**	**40**
	Ped. Exposure to Traffic LoS	**F**	**E**	**C**	**C**	**F**	**F**	**E**	**C**	**C**	**E**	**E**
	Cycle Length	120	120	120	120	120	120	120	120	120	120	120
	Effective Walk Time	28	28	25	25	27	27	29	29	30	30	23
	Average Pedestrian Delay	**35**	**35**	**38**	**38**	**36**	**36**	**35**	**35**	**34**	**34**	**39**
	Pedestrian Delay LoS	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**
	Level of Service	**F**	**E**	**D**	**D**	**F**	**F**	**E**	**D**	**D**	**E**	**E**
		F				**F**				**E**		
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST
Bicycle	Bicycle Lane Arrangement on Approach	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Pocket Bike Lane	Pocket Bike Lane	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	Not Applicable	Not Applicable	≤ 50 m	≤ 50 m	> 50 m Introduced right turn lane	Not Applicable	Bike lane shifts to the left of right turn	≤ 50 m Introduced right turn lane	Not Applicable	> 50 m	Not Applicable
	Right Turning Speed	Not Applicable	Not Applicable	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	Not Applicable	>25 to 30 km/h	>25 to 30 km/h	Not Applicable	≤ 25 km/h	Not Applicable
	Cyclist relative to RT motorists	**Not Applicable**	**Not Applicable**	**D**	**D**	**D**	**Not Applicable**	**F**	**C**	**Not Applicable**	**F**	**Not Applicable**
	Separated or Mixed Traffic	**Separated**	**Separated**	**Mixed Traffic**	**Mixed Traffic**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**Separated**
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	≥ 2 lanes crossed	Other LT config	One lane crossed	Other LT config
	Operating Speed	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	≤ 40 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	> 50 to < 60 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h
	Left Turning Cyclist	**F**	**F**	**B**	**B**	**F**	**F**	**F**	**F**	**F**	**D**	**F**
	Level of Service	**F**	**F**	**D**	**D**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
		F				**F**				**F**		
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	> 40 sec	> 40 sec	> 40 sec	> 40 sec	≤ 40 sec	≤ 40 sec	≤ 30 sec	> 40 sec	≤ 30 sec
	Level of Service	**D**	**D**	**F**	**F**	**F**	**F**	**E**	**E**	**D**	**F**	**D**
		F				**F**				**F**		
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	> 15 m	10 - 15 m	> 15 m	> 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	≥ 2	1
	Level of Service	**B**	**B**	**B**	**B**	**A**	**B**	**A**	**A**	**B**	**B**	**E**
		B				**B**				**E**		
Auto	Volume to Capacity Ratio	0.61 - 0.70				0.71 - 0.80				0.61 - 0.70		
	Level of Service	**B**				**C**				**B**		

ve	Greenbank Road & Chapman Mills				Greenbank Road & New Collector			
WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
5	5	5	3	4	6	5		4
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	Median > 2.4 m		No Median - 2.4 m
Permissive	Protected	Protected	Protected	Protected	Permissive	Permissive		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
RTOR allowed	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed
No	No	No	No	No	No	No		No
No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel		No Channel
10-15m	5-10m	5-10m	5-10m	5-10m	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
40	**46**	**46**	**82**	**62**	**25**	**40**		**61**
E	**D**	**D**	**B**	**C**	**F**	**E**	**-**	**C**
120	90	90	90	90	90	90		90
23	34	29	40	42	34	34		40
39	**17**	**21**	**14**	**13**	**17**	**17**		**14**
D	**B**	**C**	**B**	**B**	**B**	**B**	**-**	**B**
E	**D**	**D**	**B**	**C**	**F**	**E**	**-**	**C**
	D				**F**			
WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
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	Mixed Traffic	
≤ 50 m	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	≤ 50 m	
≤ 25 km/h	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	≤ 25 km/h	
D	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**	**D**	**-**
Mixed Traffic	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Separated**	**Mixed Traffic**	**-**
One lane crossed	1 lane crossed	1 lane crossed	1 lane crossed	1 lane crossed	≥ 2 lanes crossed		No lane crossed	
≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	≥ 60 km/h		> 40 to ≤ 50 km/h	
F	**E**	**C**	**C**	**C**	**F**	**-**	**B**	**-**
F	**E**	**C**	**C**	**C**	**F**	**-**	**D**	**-**
	E				**F**			
≤ 30 sec	> 40 sec	> 40 sec	≤ 30 sec	> 40 sec	≤ 10 sec	≤ 20 sec	≤ 40 sec	
D	**F**	**F**	**D**	**F**	**B**	**C**	**E**	**-**
	F				**E**			
< 10 m	< 10 m	< 10 m	< 10 m	< 10 m	< 10 m		< 10 m	
≥ 2	1	1	≥ 2	≥ 2	1		≥ 2	
D	**F**	**F**	**D**	**D**	**F**	**-**	**D**	**-**
	F				**F**			
	0.71 - 0.80				0.0 - 0.60			
	C				**A**			

Multi-Modal Level of Service - Segments Form

Consultant	**CGH Transportation**	**Project**	**3288 Greenbank Road**
Scenario		**Date**	**May-19**
Comments			

SEGMENTS		**Segment**	GB Existing	GB Future	CM Future	St B Future
			1	2	3	4
Pedestrian	Sidewalk Width Boulevard Width	**E**	1.8 m 0.5 - 2 m	≥ 2 m 0.5 - 2 m	≥ 2 m > 2 m	≥ 2 m 0.5 - 2 m
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	> 3000	≤ 3000
	Operating Speed On-Street Parking		> 60 km/h no	> 60 km/h no	> 30 to 50 km/h yes	> 30 to 50 km/h yes
	Exposure to Traffic PLoS		**E**	**E**	**B**	**A**
	Effective Sidewalk Width		1.2 m	2.0 m	2.5 m	2.0 m
	Pedestrian Volume		250 ped/hr	250 ped/hr	250 ped/hr	250 ped/hr
	Crowding PLoS		**B**	**B**	**B**	**B**
	Level of Service		**E**	**E**	**B**	**B**
Bicycle	Type of Cycling Facility	**F**	Mixed Traffic	Curbside Bike Lane	Physically Separated	Mixed Traffic
	Number of Travel Lanes		2-3 lanes total	2 ea. dir. (w median)		≤ 2 (no centreline)
	Operating Speed		≥ 60 km/h	>50 to 70 km/h		>40 to <50 km/h
	# of Lanes & Operating Speed LoS		**F**	**C**	**-**	**B**
	Bike Lane (+ Parking Lane) Width			≥ 1.8 m		
	Bike Lane Width LoS		**-**	**A**	**-**	**-**
	Bike Lane Blockages			Rare		
	Blockage LoS		**-**	**A**	**-**	**-**
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	≥ 1.8 m refuge		< 1.8 m refuge
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	≤ 3 lanes		≤ 3 lanes
	Sidestreet Operating Speed		>40 to 50 km/h	>40 to 50 km/h		>40 to 50 km/h
	Unsignalized Crossing - Lowest LoS		**B**	**B**	**A**	**A**
	Level of Service		**F**	**C**	**A**	**B**
Transit	Facility Type	**D**	Mixed Traffic	Segregated ROW	Segregated ROW	Mixed Traffic
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8			Vt/Vp ≥ 0.8
	Level of Service		**D**	**A**	**A**	**D**
Truck	Truck Lane Width	**C**	≤ 3.5 m	≤ 3.5 m	≤ 3.5 m	≤ 3.5 m
	Travel Lanes per Direction		> 1	> 1	1	1
	Level of Service		**A**	**A**	**C**	**C**
Auto	**Level of Service**	**Not Applicable**				

Appendix I

Synchro Intersection Worksheets – 2025 Future Total Conditions

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	7	20	706	401	38
Future Volume (vph)	43	7	20	706	401	38
Satd. Flow (prot)	1658	1483	1658	3316	3273	0
Flt Permitted	0.950		0.497			
Satd. Flow (perm)	1658	1483	867	3316	3273	0
Satd. Flow (RTOR)		7			17	
Lane Group Flow (vph)	43	7	20	706	439	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	30.8	30.8	30.8	
Total Split (s)	35.0	35.0	55.0	55.0	55.0	
Total Split (%)	38.9%	38.9%	61.1%	61.1%	61.1%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	
Act Effct Green (s)	7.9	7.9	77.6	77.6	77.6	
Actuated g/C Ratio	0.09	0.09	0.86	0.86	0.86	
v/c Ratio	0.30	0.05	0.03	0.25	0.16	
Control Delay	43.1	21.9	2.4	1.9	2.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	43.1	21.9	2.4	1.9	2.1	
LOS	D	C	A	A	A	
Approach Delay	40.1			1.9	2.1	
Approach LOS	D			A	A	
Queue Length 50th (m)	7.5	0.0	0.4	8.2	7.5	
Queue Length 95th (m)	17.4	4.2	2.0	15.6	13.2	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	537	485	747	2859	2824	
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	0.08	0.01	0.03	0.25	0.16	

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

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 3.5	Intersection LOS: A
Intersection Capacity Utilization 34.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Greenbank & New Collector

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	17	16	36	23	106	98	570	74	65	397	6
Future Volume (vph)	12	17	16	36	23	106	98	570	74	65	397	6
Satd. Flow (prot)	1658	1618	0	1658	1530	0	1658	3259	0	3216	3309	0
Flt Permitted	0.644			0.669			0.950			0.950		
Satd. Flow (perm)	1124	1618	0	1167	1530	0	1658	3259	0	3216	3309	0
Satd. Flow (RTOR)		16			106			15			2	
Lane Group Flow (vph)	12	33	0	36	129	0	98	644	0	65	403	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (%)	10.0%	29.2%		10.0%	29.2%		12.5%	48.3%		12.5%	48.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	14.3	10.8		15.6	13.2		13.3	77.6		7.8	69.7	
Actuated g/C Ratio	0.12	0.09		0.13	0.11		0.11	0.65		0.06	0.58	
v/c Ratio	0.08	0.21		0.21	0.49		0.54	0.31		0.31	0.21	
Control Delay	40.3	34.2		43.8	20.5		60.5	11.3		58.3	13.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.3	34.2		43.8	20.5		60.5	11.3		58.3	13.7	
LOS	D	C		D	C		E	B		E	B	
Approach Delay		35.8			25.6			17.8			19.9	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	2.5	4.0		7.5	4.8		23.2	39.1		8.5	19.3	
Queue Length 95th (m)	7.8	14.1		16.7	24.6		40.2	58.0		16.3	31.4	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	158	396		174	444		183	2111		239	1922	
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	0.08	0.08		0.21	0.29		0.54	0.31		0.27	0.21	

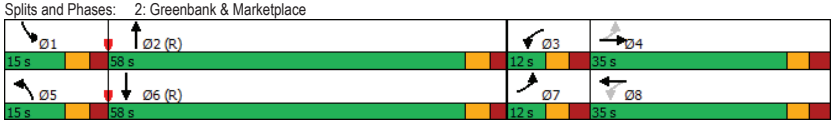
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 20.0	Intersection LOS: B
Intersection Capacity Utilization 49.6%	ICU Level of Service A
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 2: Greenbank & Marketplace



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	653	157	89	716	163	204	355	104	175	220	129
Future Volume (vph)	171	653	157	89	716	163	204	355	104	175	220	129
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3203	0	3216	3316	1483
Flt Permitted	0.157			0.254			0.950			0.950		
Satd. Flow (perm)	274	3316	1483	443	3316	1483	3216	3203	0	3216	3316	1483
Satd. Flow (RTOR)			157			163		30				149
Lane Group Flow (vph)	171	653	157	89	716	163	204	459	0	175	220	129
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)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (s)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (%)	15.8%	34.2%	34.2%	15.8%	34.2%	34.2%	20.0%	30.0%		20.0%	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?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	45.1	33.3	33.3	40.2	30.9	30.9	12.9	39.5		11.8	38.5	38.5
Actuated g/C Ratio	0.38	0.28	0.28	0.34	0.26	0.26	0.11	0.33		0.10	0.32	0.32
v/c Ratio	0.71	0.71	0.30	0.36	0.84	0.32	0.59	0.43		0.55	0.21	0.22
Control Delay	40.9	43.6	6.5	25.6	51.7	6.7	75.8	23.8		57.9	32.2	4.8
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	40.9	43.6	6.5	25.6	51.7	6.7	75.8	23.8		57.9	32.2	4.8
LOS	D	D	A	C	D	A	E	C		E	C	A
Approach Delay		37.2			41.8			39.8			34.1	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	26.9	75.5	0.0	13.3	88.0	0.0	27.6	37.7		21.7	21.2	0.0
Queue Length 95th (m)	#48.4	97.1	16.1	23.4	108.1	16.3	40.9	57.1		32.7	34.4	11.4
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	247	965	543	284	953	542	474	1075		474	1063	576
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	0.69	0.68	0.29	0.31	0.75	0.30	0.43	0.43		0.37	0.21	0.22

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

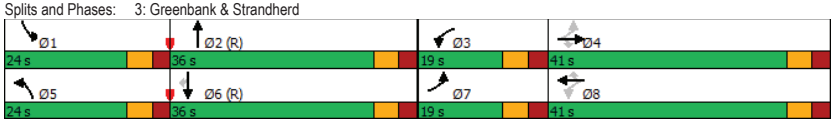
Maximum v/c Ratio: 0.84

Intersection Signal Delay: 38.6	Intersection LOS: D
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

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

Splits and Phases: 3: Greenbank & Strandherd



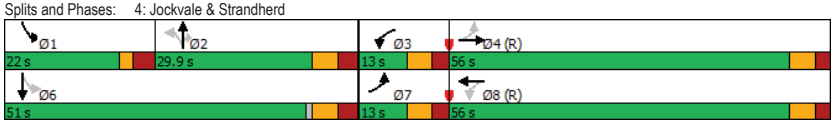
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	690	61	73	767	210	93	73	67	215	73	56
Future Volume (vph)	50	690	61	73	767	210	93	73	67	215	73	56
Satd. Flow (prot)	1658	3276	0	1658	3210	0	1658	1745	1483	1658	1632	0
Flt Permitted	0.205			0.295			0.674			0.529		
Satd. Flow (perm)	358	3276	0	515	3210	0	1176	1745	1483	923	1632	0
Satd. Flow (RTOR)		9			35				130		36	
Lane Group Flow (vph)	50	751	0	73	977	0	93	73	67	215	129	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	10.8%	46.3%		10.8%	46.3%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	66.5	60.6		67.4	61.0		15.2	15.2	15.2	37.8	36.1	
Actuated g/C Ratio	0.55	0.50		0.56	0.50		0.13	0.13	0.13	0.31	0.30	
v/c Ratio	0.18	0.46		0.20	0.60		0.63	0.33	0.22	0.56	0.25	
Control Delay	13.8	22.3		13.5	24.3		68.1	50.9	1.7	37.8	22.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	13.8	22.3		13.5	24.3		68.1	50.9	1.7	37.8	22.7	
LOS	B	C		B	C		E	D	A	D	C	
Approach Delay		21.8			23.5			43.6			32.1	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	5.0	64.7		7.4	89.7		22.5	17.0	0.0	41.9	17.1	
Queue Length 95th (m)	12.2	92.8		16.5	128.5		39.0	30.4	0.0	59.6	30.7	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	276	1646		359	1638		223	331	387	390	630	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.18	0.46		0.20	0.60		0.42	0.22	0.17	0.55	0.20	

Intersection Summary

Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 22 (18%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.63
Intersection Signal Delay: 26.1 Intersection LOS: C
Intersection Capacity Utilization 74.8% ICU Level of Service D
Analysis Period (min) 15
Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 4: Jockvale & Strandherd



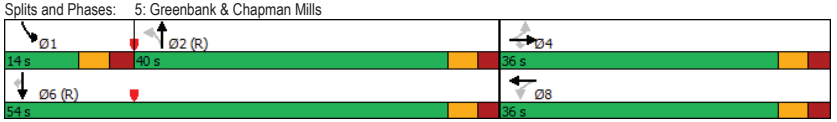
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	42	5	35	21	130	3	554	51	30	367	21
Future Volume (vph)	42	42	5	35	21	130	3	554	51	30	367	21
Satd. Flow (prot)	1658	1745	1483	1658	1520	0	1658	3273	0	1658	1745	1483
Flt Permitted	0.540			0.730			0.543			0.950		
Satd. Flow (perm)	942	1745	1483	1274	1520	0	948	3273	0	1658	1745	1483
Satd. Flow (RTOR)			105		130			12				34
Lane Group Flow (vph)	42	42	5	35	151	0	3	605	0	30	367	21
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Prot	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2					6
Detector Phase	4	4	4	8	8		2	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	23.8	23.8	23.8	33.8	33.8		33.8	33.8		10.9	33.8	33.8
Total Split (s)	36.0	36.0	36.0	36.0	36.0		40.0	40.0		14.0	54.0	54.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%		44.4%	44.4%		15.6%	60.0%	60.0%
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	2.5		2.5	2.5		2.6	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	0.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8		5.8	5.8		5.9	5.8	5.8
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None	None	None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	8.9	8.9	8.9	8.9	8.9		61.1	61.1		7.2	69.5	69.5
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.68	0.68		0.08	0.77	0.77
v/c Ratio	0.45	0.24	0.02	0.28	0.57		0.00	0.27		0.23	0.27	0.02
Control Delay	52.5	39.5	0.2	41.8	18.2		8.3	7.5		44.6	4.0	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	52.5	39.5	0.2	41.8	18.2		8.3	7.5		44.6	4.0	0.7
LOS	D	D	A	D	B		A	A		D	A	A
Approach Delay		43.4			22.7			7.5			6.7	
Approach LOS		D			C			A			A	
Queue Length 50th (m)	7.4	7.2	0.0	6.0	3.6		0.2	23.0		5.4	14.8	0.0
Queue Length 95th (m)	17.2	16.3	0.0	14.7	20.7		1.5	39.7		14.8	29.2	1.1
Internal Link Dist (m)		417.4			403.7			204.2			161.2	
Turn Bay Length (m)	38.0		60.0	38.0			38.0			38.0		
Base Capacity (vph)	316	585	567	427	596		643	2225		153	1347	1152
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	0.13	0.07	0.01	0.08	0.25		0.00	0.27		0.20	0.27	0.02

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

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 54.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	93	10	4	485	357	31
Future Vol, veh/h	93	10	4	485	357	31
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	-	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	93	10	4	485	357	31

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	866	373	388	0	-	0
Stage 1	373	-	-	-	-	-
Stage 2	493	-	-	-	-	-
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	324	673	1170	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	323	673	1170	-	-	-
Mov Cap-2 Maneuver	323	-	-	-	-	-
Stage 1	694	-	-	-	-	-
Stage 2	614	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.1	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1170	-	340	-	-
HCM Lane V/C Ratio	0.003	-	0.303	-	-
HCM Control Delay (s)	8.1	-	20.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	1.3	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	107	26	66	631	762	103
Future Volume (vph)	107	26	66	631	762	103
Satd. Flow (prot)	1658	1483	1658	3316	3256	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1658	1483	1658	3316	3256	0
Satd. Flow (RTOR)		26			19	
Lane Group Flow (vph)	107	26	66	631	865	0
Turn Type	Perm	Perm	Prot	NA	NA	
Protected Phases			5	2	6	
Permitted Phases	4	4				
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	10.8	30.8	30.8	
Total Split (s)	34.0	34.0	15.0	56.0	41.0	
Total Split (%)	37.8%	37.8%	16.7%	62.2%	45.6%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	11.2	11.2	8.9	70.9	58.4	
Actuated g/C Ratio	0.12	0.12	0.10	0.79	0.65	
v/c Ratio	0.52	0.13	0.40	0.24	0.41	
Control Delay	45.2	14.1	50.4	3.0	11.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	45.2	14.1	50.4	3.0	11.3	
LOS	D	B	D	A	B	
Approach Delay	39.2			7.5	11.3	
Approach LOS	D			A	B	
Queue Length 50th (m)	18.6	0.0	12.8	14.2	42.2	
Queue Length 95th (m)	33.4	7.1	26.7	21.5	70.5	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	519	482	185	2612	2120	
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	0.21	0.05	0.36	0.24	0.41	

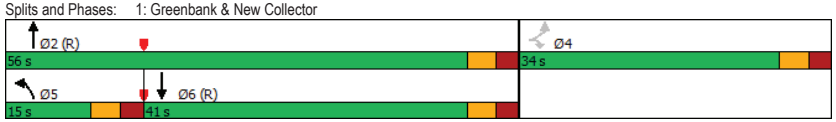
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 15 (17%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
1: Greenbank & New Collector

05-27-2019

Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 50.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Greenbank & New Collector



Lanes, Volumes, Timings
2: Greenbank & Marketplace

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	117	86	141	124	185	149	543	70	195	687	36
Future Volume (vph)	44	117	86	141	124	185	149	543	70	195	687	36
Satd. Flow (prot)	1658	1633	0	1658	1588	0	1658	3259	0	3216	3292	0
Flt Permitted	0.292			0.457			0.950			0.950		
Satd. Flow (perm)	510	1633	0	798	1588	0	1658	3259	0	3216	3292	0
Satd. Flow (RTOR)		29			59			13			5	
Lane Group Flow (vph)	44	203	0	141	309	0	149	613	0	195	723	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (%)	10.8%	29.2%		10.8%	29.2%		16.7%	43.3%		16.7%	43.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	29.3	22.8		30.8	25.4		13.9	53.2		12.0	51.3	
Actuated g/C Ratio	0.24	0.19		0.26	0.21		0.12	0.44		0.10	0.43	
v/c Ratio	0.24	0.61		0.56	0.81		0.78	0.42		0.61	0.51	
Control Delay	30.9	44.8		41.7	53.1		77.7	25.0		62.3	21.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.9	44.8		41.7	53.1		77.7	25.0		62.3	21.4	
LOS	C	D		D	D		E	C		E	C	
Approach Delay		42.3			49.5			35.3			30.1	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	7.6	38.9		26.1	60.5		35.3	54.7		25.5	44.0	
Queue Length 95th (m)	16.0	62.1		41.5	92.2		#71.4	76.4		m35.5	m54.8	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	188	409		251	422		200	1452		367	1409	
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	0.23	0.50		0.56	0.73		0.74	0.42		0.53	0.51	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
2: Greenbank & Marketplace

05-27-2019

Maximum v/c Ratio: 0.81

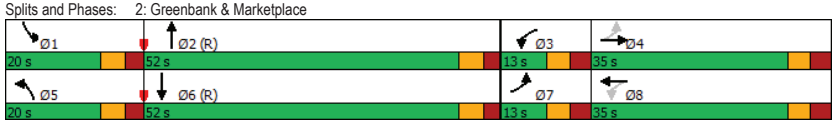
Intersection Signal Delay: 36.7	Intersection LOS: D
Intersection Capacity Utilization 74.2%	ICU Level of Service D
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Marketplace



Lanes, Volumes, Timings
3: Greenbank & Strandherd

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	919	252	215	800	184	258	365	113	251	460	174
Future Volume (vph)	190	919	252	215	800	184	258	365	113	251	460	174
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3200	0	3216	3316	1483
Flt Permitted	0.152			0.116			0.950			0.950		
Satd. Flow (perm)	265	3316	1483	202	3316	1483	3216	3200	0	3216	3316	1483
Satd. Flow (RTOR)			252			184		33				174
Lane Group Flow (vph)	190	919	252	215	800	184	258	478	0	251	460	174
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)	18.0	41.0	41.0	18.0	41.0	41.0	24.0	37.0		24.0	37.0	37.0
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%
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
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	45.7	34.5	34.5	45.9	34.6	34.6	14.6	33.8		14.4	33.6	33.6
Actuated g/C Ratio	0.38	0.29	0.29	0.38	0.29	0.29	0.12	0.28		0.12	0.28	0.28
v/c Ratio	0.82	0.96	0.42	1.00	0.84	0.33	0.66	0.52		0.65	0.50	0.32
Control Delay	52.0	64.2	6.2	93.0	49.1	6.3	74.7	23.4		58.3	38.9	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	52.0	64.2	6.2	93.0	49.1	6.3	74.7	23.4		58.3	38.9	6.9
LOS	D	E	A	F	D	A	E	C		E	D	A
Approach Delay		51.7			50.4			41.4			38.1	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	29.4	118.1	0.0	38.6	98.0	0.0	35.3	23.1		31.0	50.4	0.0
Queue Length 95th (m)	#65.9	#161.8	19.8	#90.8	123.8	17.2	m49.3	30.5		44.0	69.7	17.8
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	233	953	605	215	956	558	474	924		474	928	540
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	0.82	0.96	0.42	1.00	0.84	0.33	0.54	0.52		0.53	0.50	0.32

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: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

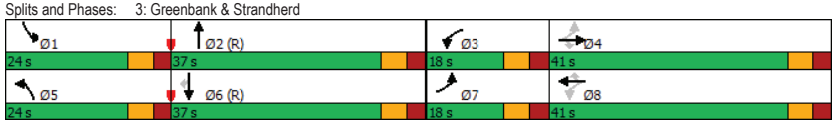
Intersection Signal Delay: 46.6	Intersection LOS: D
Intersection Capacity Utilization 83.0%	ICU Level of Service E
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	845	168	177	734	326	155	164	147	331	156	30
Future Volume (vph)	30	845	168	177	734	326	155	164	147	331	156	30
Satd. Flow (prot)	1658	3233	0	1658	3163	0	1658	1745	1483	1658	1703	0
Flt Permitted	0.174			0.131			0.640			0.437		
Satd. Flow (perm)	304	3233	0	229	3163	0	1117	1745	1483	763	1703	0
Satd. Flow (RTOR)		22			68				147		9	
Lane Group Flow (vph)	30	1013	0	177	1060	0	155	164	147	331	186	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	13.2%	43.8%		13.2%	43.8%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	56.1	49.5		63.8	57.7		20.2	20.2	20.2	43.9	42.2	
Actuated g/C Ratio	0.46	0.41		0.53	0.48		0.17	0.17	0.17	0.36	0.35	
v/c Ratio	0.14	0.76		0.74	0.69		0.83	0.56	0.40	0.83	0.31	
Control Delay	15.9	35.0		36.5	27.6		82.1	53.5	10.0	49.1	28.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	15.9	35.0		36.5	27.6		82.1	53.5	10.0	49.1	28.2	
LOS	B	D		D	C		F	D	B	D	C	
Approach Delay		34.5			28.9			49.3			41.6	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	3.5	114.6		22.7	111.4		36.9	37.1	0.0	63.1	31.0	
Queue Length 95th (m)	8.6	142.6		#54.3	143.5		#69.5	59.9	18.0	#101.0	49.6	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	260	1336		242	1546		212	331	401	401	639	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.12	0.76		0.73	0.69		0.73	0.50	0.37	0.83	0.29	

Intersection Summary

Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 82 (68%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
4: Jockvale & Strandherd

05-27-2019

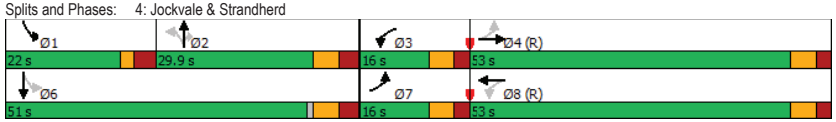
Maximum v/c Ratio: 0.83

Intersection Signal Delay: 35.6	Intersection LOS: D
Intersection Capacity Utilization 89.4%	ICU Level of Service E
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

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

Splits and Phases: 4: Jockvale & Strandherd



Lanes, Volumes, Timings
5: Greenbank & Chapman Mills

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	34	4	91	43	120	5	543	59	50	734	43
Future Volume (vph)	34	34	4	91	43	120	5	543	59	50	734	43
Satd. Flow (prot)	1658	1745	1483	1658	1553	0	1658	3266	0	1658	1745	1483
Flt Permitted	0.553			0.735			0.386			0.950		
Satd. Flow (perm)	965	1745	1483	1283	1553	0	674	3266	0	1658	1745	1483
Satd. Flow (RTOR)			104		120			15				43
Lane Group Flow (vph)	34	34	4	91	163	0	5	602	0	50	734	43
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Prot	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8			2					6
Detector Phase	4	4	4	8	8		2	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	33.8	33.8		33.8	33.8		10.8	33.8	33.8
Total Split (s)	22.5	22.5	22.5	33.8	33.8		41.3	41.3		14.9	56.2	56.2
Total Split (%)	25.0%	25.0%	25.0%	37.6%	37.6%		45.9%	45.9%		16.6%	62.4%	62.4%
Yellow Time (s)	3.5	3.5	3.5	3.3	3.3		3.3	3.3		3.3	3.3	3.3
All-Red Time (s)	1.0	1.0	1.0	2.5	2.5		2.5	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	0.0
Total Lost Time (s)	4.5	4.5	4.5	5.8	5.8		5.8	5.8		5.8	5.8	5.8
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None	None	None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.0	13.0	13.0	11.7	11.7		57.5	57.5		8.2	66.7	66.7
Actuated g/C Ratio	0.14	0.14	0.14	0.13	0.13		0.64	0.64		0.09	0.74	0.74
v/c Ratio	0.24	0.13	0.01	0.54	0.53		0.01	0.29		0.33	0.57	0.04
Control Delay	36.6	32.7	0.0	47.8	17.9		10.6	9.5		52.9	8.7	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	36.6	32.7	0.0	47.8	17.9		10.6	9.5		52.9	8.7	0.6
LOS	D	C	A	D	B		B	A		D	A	A
Approach Delay		32.7			28.6			9.5			11.0	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	5.6	5.5	0.0	15.8	7.1		0.4	26.1		9.9	26.8	0.0
Queue Length 95th (m)	13.8	13.2	0.0	29.4	24.3		2.3	45.7		22.1	59.2	0.6
Internal Link Dist (m)		271.9			403.7			204.2			161.2	
Turn Bay Length (m)	38.0		60.0	38.0			38.0			38.0		
Base Capacity (vph)	314	568	552	399	565		430	2091		175	1292	1109
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	0.11	0.06	0.01	0.23	0.29		0.01	0.29		0.29	0.57	0.04

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 14.9 (17%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Greenbank & Chapman Mills

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	59	7	10	547	737	92
Future Vol, veh/h	59	7	10	547	737	92
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	-	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	59	7	10	547	737	92

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1350	783	829	0	-	0
Stage 1	783	-	-	-	-	-
Stage 2	567	-	-	-	-	-
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	166	394	803	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	568	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	164	394	803	-	-	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	445	-	-	-	-	-
Stage 2	568	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	37.5	0.2	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	803	-	175	-	-
HCM Lane V/C Ratio	0.012	-	0.377	-	-
HCM Control Delay (s)	9.5	-	37.5	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q(veh)	0	-	1.6	-	-

Appendix J

Synchro Intersection Worksheets – 2030 Future Total Conditions

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	7	20	586	313	38
Future Volume (vph)	43	7	20	586	313	38
Satd. Flow (prot)	1658	1483	1658	3316	3263	0
Flt Permitted	0.950		0.541			
Satd. Flow (perm)	1658	1483	944	3316	3263	0
Satd. Flow (RTOR)		7			23	
Lane Group Flow (vph)	43	7	20	586	351	0
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	30.8	30.8	30.8	
Total Split (s)	35.0	35.0	55.0	55.0	55.0	
Total Split (%)	38.9%	38.9%	61.1%	61.1%	61.1%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	
Act Effct Green (s)	7.9	7.9	77.6	77.6	77.6	
Actuated g/C Ratio	0.09	0.09	0.86	0.86	0.86	
v/c Ratio	0.30	0.05	0.02	0.20	0.12	
Control Delay	43.1	21.9	1.7	1.4	2.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	43.1	21.9	1.7	1.4	2.0	
LOS	D	C	A	A	A	
Approach Delay	40.1			1.4	2.0	
Approach LOS	D			A	A	
Queue Length 50th (m)	7.5	0.0	0.5	8.3	5.6	
Queue Length 95th (m)	17.4	4.2	m1.5	11.0	10.3	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	537	485	814	2859	2816	
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	0.08	0.01	0.02	0.20	0.12	

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

Maximum v/c Ratio: 0.30

Intersection Signal Delay: 3.6	Intersection LOS: A
Intersection Capacity Utilization 31.4%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 1: Greenbank & New Collector

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	17	16	36	23	106	98	444	74	65	306	6
Future Volume (vph)	12	17	16	36	23	106	98	444	74	65	306	6
Satd. Flow (prot)	1658	1618	0	1658	1530	0	1658	3246	0	3216	3306	0
Flt Permitted	0.644			0.669			0.950			0.950		
Satd. Flow (perm)	1124	1618	0	1167	1530	0	1658	3246	0	3216	3306	0
Satd. Flow (RTOR)		16			106			20			2	
Lane Group Flow (vph)	12	33	0	36	129	0	98	518	0	65	312	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (s)	12.0	35.0		12.0	35.0		15.0	58.0		15.0	58.0	
Total Split (%)	10.0%	29.2%		10.0%	29.2%		12.5%	48.3%		12.5%	48.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	14.3	10.8		15.6	13.2		13.3	77.6		7.8	69.7	
Actuated g/C Ratio	0.12	0.09		0.13	0.11		0.11	0.65		0.06	0.58	
v/c Ratio	0.08	0.21		0.21	0.49		0.54	0.25		0.31	0.16	
Control Delay	40.3	34.2		43.8	20.5		60.5	10.6		65.0	9.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.3	34.2		43.8	20.5		60.5	10.6		65.0	9.9	
LOS	D	C		D	C		E	B		E	A	
Approach Delay		35.8			25.6			18.6			19.4	
Approach LOS		D			C			B			B	
Queue Length 50th (m)	2.5	4.0		7.5	4.8		23.2	29.5		8.6	11.4	
Queue Length 95th (m)	7.8	14.1		16.7	24.6		40.2	45.0		16.3	16.6	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	158	396		174	444		183	2105		239	1920	
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	0.08	0.08		0.21	0.29		0.54	0.25		0.27	0.16	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 46.0%	ICU Level of Service A
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 2: Greenbank & Marketplace

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	164	609	79	59	705	163	100	359	64	175	226	125
Future Volume (vph)	164	609	79	59	705	163	100	359	64	175	226	125
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3239	0	3216	3316	1483
Flt Permitted	0.162			0.336			0.950			0.950		
Satd. Flow (perm)	283	3316	1483	586	3316	1483	3216	3239	0	3216	3316	1483
Satd. Flow (RTOR)			149			163		16				149
Lane Group Flow (vph)	164	609	79	59	705	163	100	423	0	175	226	125
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)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (s)	19.0	41.0	41.0	19.0	41.0	41.0	24.0	36.0		24.0	36.0	36.0
Total Split (%)	15.8%	34.2%	34.2%	15.8%	34.2%	34.2%	20.0%	30.0%		20.0%	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?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	46.8	37.0	37.0	38.6	30.7	30.7	9.1	39.7		11.8	42.4	42.4
Actuated g/C Ratio	0.39	0.31	0.31	0.32	0.26	0.26	0.08	0.33		0.10	0.35	0.35
v/c Ratio	0.66	0.60	0.14	0.23	0.83	0.33	0.41	0.39		0.55	0.19	0.20
Control Delay	36.2	38.2	0.5	22.9	51.4	6.8	76.3	25.2		57.9	29.1	3.8
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	36.2	38.2	0.5	22.9	51.4	6.8	76.3	25.2		57.9	29.1	3.8
LOS	D	D	A	C	D	A	E	C		E	C	A
Approach Delay		34.3			41.7			34.9			32.7	
Approach LOS		C			D			C			C	
Queue Length 50th (m)	25.8	68.3	0.0	8.7	86.5	0.0	13.5	42.2		21.7	20.6	0.0
Queue Length 95th (m)	39.9	87.4	0.0	16.6	106.3	16.3	23.1	63.2		32.7	33.1	9.8
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	252	1026	561	320	953	542	474	1081		474	1171	620
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	0.65	0.59	0.14	0.18	0.74	0.30	0.21	0.39		0.37	0.19	0.20

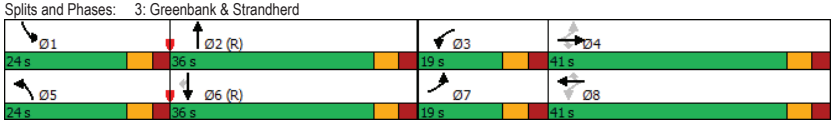
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 36.6	Intersection LOS: D
Intersection Capacity Utilization 69.6%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

Splits and Phases: 3: Greenbank & Strandherd



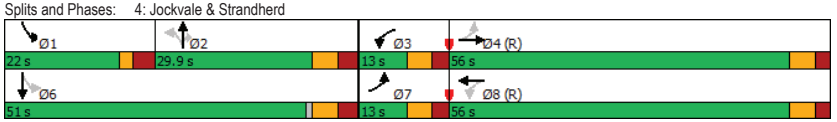
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	492	50	73	648	210	72	73	67	215	73	56
Future Volume (vph)	50	492	50	73	648	210	72	73	67	215	73	56
Satd. Flow (prot)	1658	3269	0	1658	3193	0	1658	1745	1483	1658	1632	0
Flt Permitted	0.259			0.407			0.674			0.510		
Satd. Flow (perm)	452	3269	0	710	3193	0	1176	1745	1483	890	1632	0
Satd. Flow (RTOR)		11			44				130		36	
Lane Group Flow (vph)	50	542	0	73	858	0	72	73	67	215	129	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	13.0	56.0		13.0	56.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	10.8%	46.3%		10.8%	46.3%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	68.2	62.2		69.5	62.9		13.3	13.3	13.3	35.9	34.2	
Actuated g/C Ratio	0.56	0.51		0.57	0.52		0.11	0.11	0.11	0.30	0.28	
v/c Ratio	0.15	0.32		0.16	0.51		0.56	0.38	0.24	0.59	0.27	
Control Delay	12.2	19.1		11.8	20.8		67.0	54.8	2.0	40.7	24.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	12.2	19.1		11.8	20.8		67.0	54.8	2.0	40.7	24.2	
LOS	B	B		B	C		E	D	A	D	C	
Approach Delay		18.5			20.1			42.3			34.5	
Approach LOS		B			C			D			C	
Queue Length 50th (m)	4.8	41.1		7.1	70.6		17.4	17.3	0.0	43.2	17.6	
Queue Length 95th (m)	11.5	62.4		15.5	102.5		32.1	31.3	0.0	62.2	32.1	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	329	1688		471	1682		223	331	387	370	630	
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	0.15	0.32		0.15	0.51		0.32	0.22	0.17	0.58	0.20	

Intersection Summary
Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 22 (18%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 24.3	Intersection LOS: C
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Jockvale & Strandherd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	142	52	35	160	40	78	494	51	30	255	45
Future Volume (vph)	62	142	52	35	160	40	78	494	51	30	255	45
Satd. Flow (prot)	1658	1745	1483	1658	1693	0	1658	3269	0	1658	1705	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1658	1745	1483	1658	1693	0	1658	3269	0	1658	1705	0
Satd. Flow (RTOR)			160		15			13			10	
Lane Group Flow (vph)	62	142	52	35	200	0	78	545	0	30	300	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Detector Phase	7	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	23.8	23.8	9.5	33.8		9.5	33.8		10.9	33.8	
Total Split (s)	9.5	32.7	32.7	10.6	33.8		12.0	35.7		11.0	34.7	
Total Split (%)	10.6%	36.3%	36.3%	11.8%	37.6%		13.3%	39.7%		12.2%	38.6%	
Yellow Time (s)	3.5	3.3	3.3	3.5	3.3		3.5	3.3		3.3	3.3	
All-Red Time (s)	1.0	2.5	2.5	1.0	2.5		1.0	2.5		2.6	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)	4.5	5.8	5.8	4.5	5.8		4.5	5.8		5.9	5.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	5.0	16.5	16.5	6.0	15.2		9.7	47.2		7.2	43.5	
Actuated g/C Ratio	0.06	0.18	0.18	0.07	0.17		0.11	0.52		0.08	0.48	
v/c Ratio	0.67	0.45	0.13	0.32	0.67		0.44	0.32		0.23	0.36	
Control Delay	77.0	36.7	0.7	48.1	42.8		44.6	15.7		40.2	17.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	77.0	36.7	0.7	48.1	42.8		44.6	15.7		40.2	17.8	
LOS	E	D	A	D	D		D	B		D	B	
Approach Delay		39.2			43.6			19.3			19.9	
Approach LOS		D			D			B			B	
Queue Length 50th (m)	11.3	24.0	0.0	6.2	31.8		13.5	32.2		4.7	34.6	
Queue Length 95th (m)	#32.1	39.3	0.0	15.9	50.5		26.5	53.5		10.2	68.1	
Internal Link Dist (m)		487.8			403.7			204.2			161.2	
Turn Bay Length (m)	38.0		60.0	38.0			38.0			38.0		
Base Capacity (vph)	92	521	555	112	537		184	1719		132	829	
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	0.67	0.27	0.09	0.31	0.37		0.42	0.32		0.23	0.36	

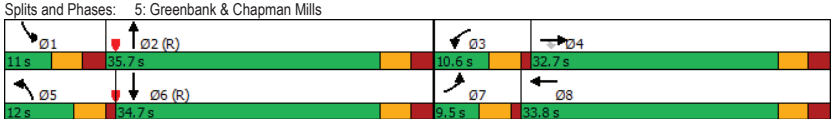
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 12 (13%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 26.9	Intersection LOS: C
Intersection Capacity Utilization 54.4%	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: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	61	9	4	511	286	22
Future Vol, veh/h	61	9	4	511	286	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	0	-	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	61	9	4	511	286	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	816	297	308	0	-	0
Stage 1	297	-	-	-	-	-
Stage 2	519	-	-	-	-	-
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	347	742	1253	-	-	-
Stage 1	754	-	-	-	-	-
Stage 2	597	-	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	346	742	1253	-	-	-
Mov Cap-2 Maneuver	346	-	-	-	-	-
Stage 1	752	-	-	-	-	-
Stage 2	597	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.9	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1253	-	371	-	-
HCM Lane V/C Ratio	0.003	-	0.189	-	-
HCM Control Delay (s)	7.9	-	16.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	107	26	66	553	659	103
Future Volume (vph)	107	26	66	553	659	103
Satd. Flow (prot)	1658	1483	1658	3316	3249	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1658	1483	1658	3316	3249	0
Satd. Flow (RTOR)		26			22	
Lane Group Flow (vph)	107	26	66	553	762	0
Turn Type	Perm	Perm	Prot	NA	NA	
Protected Phases			5	2	6	
Permitted Phases	4	4				
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	33.8	33.8	10.8	30.8	30.8	
Total Split (s)	34.0	34.0	16.0	56.0	40.0	
Total Split (%)	37.8%	37.8%	17.8%	62.2%	44.4%	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	11.2	11.2	8.9	70.9	58.4	
Actuated g/C Ratio	0.12	0.12	0.10	0.79	0.65	
v/c Ratio	0.52	0.13	0.40	0.21	0.36	
Control Delay	45.2	14.1	48.0	2.3	10.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	45.2	14.1	48.0	2.3	10.7	
LOS	D	B	D	A	B	
Approach Delay	39.2			7.2	10.7	
Approach LOS	D			A	B	
Queue Length 50th (m)	18.6	0.0	12.6	8.2	35.3	
Queue Length 95th (m)	33.4	7.1	m25.4	m11.8	59.9	
Internal Link Dist (m)	520.6			161.2	210.2	
Turn Bay Length (m)	38.0		38.0			
Base Capacity (vph)	519	482	196	2612	2117	
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	0.21	0.05	0.34	0.21	0.36	

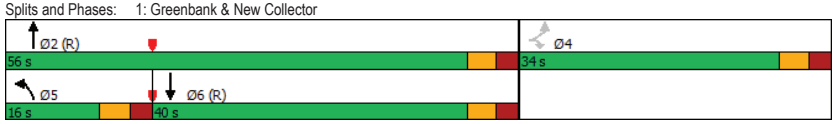
Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 16 (18%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 47.6%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 1: Greenbank & New Collector



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	117	86	141	124	185	149	444	70	195	565	36
Future Volume (vph)	44	117	86	141	124	185	149	444	70	195	565	36
Satd. Flow (prot)	1658	1633	0	1658	1588	0	1658	3249	0	3216	3286	0
Flt Permitted	0.292			0.457			0.950			0.950		
Satd. Flow (perm)	510	1633	0	798	1588	0	1658	3249	0	3216	3286	0
Satd. Flow (RTOR)		29			59			17			6	
Lane Group Flow (vph)	44	203	0	141	309	0	149	514	0	195	601	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (s)	13.0	35.0		13.0	35.0		20.0	52.0		20.0	52.0	
Total Split (%)	10.8%	29.2%		10.8%	29.2%		16.7%	43.3%		16.7%	43.3%	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.1	3.2		3.1	3.2		2.6	2.5		2.6	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.4	6.5		6.4	6.5		6.3	6.2		6.3	6.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	29.3	22.8		30.8	25.4		13.9	53.2		12.0	51.3	
Actuated g/C Ratio	0.24	0.19		0.26	0.21		0.12	0.44		0.10	0.43	
v/c Ratio	0.24	0.61		0.56	0.81		0.78	0.35		0.61	0.43	
Control Delay	30.9	44.8		41.7	53.1		77.7	23.7		68.3	16.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.9	44.8		41.7	53.1		77.7	23.7		68.3	16.8	
LOS	C	D		D	D		E	C		E	B	
Approach Delay		42.3			49.5			35.8			29.4	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	7.6	38.9		26.1	60.5		35.3	43.7		25.8	28.5	
Queue Length 95th (m)	16.0	62.1		41.5	92.2		#71.4	62.4		m38.1	37.5	
Internal Link Dist (m)		102.8			148.8			210.2			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	188	409		251	422		200	1449		367	1407	
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	0.23	0.50		0.56	0.73		0.74	0.35		0.53	0.43	

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
2: Greenbank & Marketplace

05-27-2019

Maximum v/c Ratio: 0.81

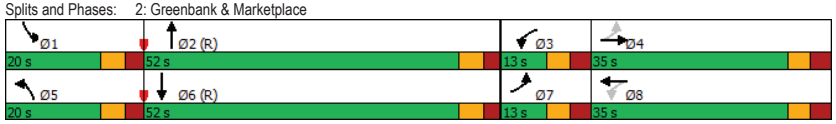
Intersection Signal Delay: 37.1	Intersection LOS: D
Intersection Capacity Utilization 70.6%	ICU Level of Service C
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

\# 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: Greenbank & Marketplace



Lanes, Volumes, Timings
3: Greenbank & Strandherd

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	186	959	130	159	805	184	146	400	75	251	495	168
Future Volume (vph)	186	959	130	159	805	184	146	400	75	251	495	168
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3236	0	3216	3316	1483
Flt Permitted	0.148			0.115			0.950			0.950		
Satd. Flow (perm)	258	3316	1483	201	3316	1483	3216	3236	0	3216	3316	1483
Satd. Flow (RTOR)			149			184		17				168
Lane Group Flow (vph)	186	959	130	159	805	184	146	475	0	251	495	168
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)	18.0	41.0	41.0	18.0	41.0	41.0	24.0	37.0		24.0	37.0	37.0
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%
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
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	46.1	35.0	35.0	45.5	34.7	34.7	10.8	33.8		14.4	37.4	37.4
Actuated g/C Ratio	0.38	0.29	0.29	0.38	0.29	0.29	0.09	0.28		0.12	0.31	0.31
v/c Ratio	0.81	0.99	0.24	0.76	0.84	0.33	0.51	0.51		0.65	0.48	0.29
Control Delay	51.0	70.1	4.7	49.4	49.4	6.3	70.4	27.0		58.3	35.8	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	51.0	70.1	4.7	49.4	49.4	6.3	70.4	27.0		58.3	35.8	6.2
LOS	D	E	A	D	D	A	E	C		E	D	A
Approach Delay		60.7			42.5			37.2			36.5	
Approach LOS		E			D			D			D	
Queue Length 50th (m)	28.7	~126.5	0.0	24.1	98.8	0.0	20.0	33.7		31.0	52.1	0.0
Queue Length 95th (m)	#64.4	#173.0	11.2	#56.3	#125.1	17.2	m30.4	44.4		44.0	71.9	16.8
Internal Link Dist (m)		396.5			415.8			171.8			236.6	
Turn Bay Length (m)	70.0		100.0	130.0			60.0			85.0		160.0
Base Capacity (vph)	232	966	537	215	958	559	474	923		474	1033	577
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	0.80	0.99	0.24	0.74	0.84	0.33	0.31	0.51		0.53	0.48	0.29

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: 120
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
3: Greenbank & Strandherd

05-27-2019

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 46.1	Intersection LOS: D
Intersection Capacity Utilization 80.6%	ICU Level of Service D
Analysis Period (min) 15	

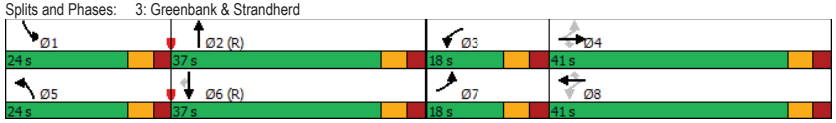
Description: As per timing plans provided 26-Nov-2018

~ 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: Greenbank & Strandherd



Lanes, Volumes, Timings
4: Jockvale & Strandherd

05-27-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	750	147	177	614	326	138	164	147	331	156	30
Future Volume (vph)	99	750	147	177	614	326	138	164	147	331	156	30
Satd. Flow (prot)	1658	3233	0	1658	3143	0	1658	1745	1483	1658	1703	0
Flt Permitted	0.194			0.194			0.640			0.422		
Satd. Flow (perm)	339	3233	0	339	3143	0	1117	1745	1483	736	1703	0
Satd. Flow (RTOR)		22			94				147		9	
Lane Group Flow (vph)	99	897	0	177	940	0	138	164	147	331	186	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	7	4		3	8		2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (s)	16.0	53.0		16.0	53.0		29.9	29.9	29.9	22.0	51.0	
Total Split (%)	13.2%	43.8%		13.2%	43.8%		24.7%	24.7%	24.7%	18.2%	42.2%	
Yellow Time (s)	3.7	3.7		3.7	3.7		3.7	3.7	3.7	2.0	3.7	
All-Red Time (s)	2.4	2.4		2.4	2.4		3.2	3.2	3.2	3.2	3.2	
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)	6.1	6.1		6.1	6.1		6.9	6.9	6.9	5.2	6.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	59.3	50.7		62.5	52.3		18.9	18.9	18.9	42.6	40.9	
Actuated g/C Ratio	0.49	0.42		0.52	0.43		0.16	0.16	0.16	0.35	0.34	
v/c Ratio	0.38	0.66		0.62	0.67		0.79	0.60	0.41	0.86	0.32	
Control Delay	18.6	31.0		25.4	28.2		78.3	56.2	10.3	53.5	28.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	18.6	31.0		25.4	28.2		78.3	56.2	10.3	53.5	28.9	
LOS	B	C		C	C		E	E	B	D	C	
Approach Delay		29.8			27.7			48.0			44.6	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	11.6	95.7		21.7	90.0		33.1	38.1	0.0	65.2	31.9	
Queue Length 95th (m)	21.7	120.7		36.7	121.0		#58.6	59.9	18.0	#103.2	49.6	
Internal Link Dist (m)		158.5			396.5			134.9			123.9	
Turn Bay Length (m)	63.0			115.0			70.0		60.0	45.0		
Base Capacity (vph)	278	1369		290	1413		212	331	401	387	639	
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	0.36	0.66		0.61	0.67		0.65	0.50	0.37	0.86	0.29	

Intersection Summary

Cycle Length: 120.9
Actuated Cycle Length: 120.9
Offset: 82 (68%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated

Lanes, Volumes, Timings
4: Jockvale & Strandherd

05-27-2019

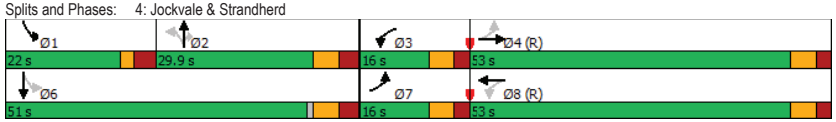
Maximum v/c Ratio: 0.86

Intersection Signal Delay: 34.2	Intersection LOS: C
Intersection Capacity Utilization 85.9%	ICU Level of Service E
Analysis Period (min) 15	

Description: As per timing plans provided 26-Nov-2018

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

Splits and Phases: 4: Jockvale & Strandherd



Lanes, Volumes, Timings
5: Greenbank & Chapman Mills

05-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	213	91	101	173	40	81	503	59	50	582	82
Future Volume (vph)	76	213	91	101	173	40	81	503	59	50	582	82
Satd. Flow (prot)	1658	1745	1483	1658	1696	0	1658	3263	0	1658	1712	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1658	1745	1483	1658	1696	0	1658	3263	0	1658	1712	0
Satd. Flow (RTOR)			157		12			14			8	
Lane Group Flow (vph)	76	213	91	101	213	0	81	562	0	50	664	0
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Detector Phase	7	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	13.0	24.0	24.0	11.0	33.8		11.0	33.8		10.8	33.8	
Total Split (s)	13.0	28.8	28.8	18.0	33.8		11.0	39.9		13.3	42.2	
Total Split (%)	13.0%	28.8%	28.8%	18.0%	33.8%		11.0%	39.9%		13.3%	42.2%	
Yellow Time (s)	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	2.5		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)	5.8	5.8	5.8	5.8	5.8		5.8	5.8		5.8	5.8	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	7.0	17.3	17.3	10.4	20.6		9.0	46.3		7.6	42.6	
Actuated g/C Ratio	0.07	0.17	0.17	0.10	0.21		0.09	0.46		0.08	0.43	
v/c Ratio	0.66	0.71	0.24	0.58	0.59		0.54	0.37		0.40	0.90	
Control Delay	71.9	51.5	1.9	56.2	39.7		60.0	21.4		53.1	47.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	71.9	51.5	1.9	56.2	39.7		60.0	21.4		53.1	47.3	
LOS	E	D	A	E	D		E	C		D	D	
Approach Delay		43.7			45.0			26.2			47.7	
Approach LOS		D			D			C			D	
Queue Length 50th (m)	15.4	41.3	0.0	19.7	36.8		15.6	42.0		9.8	~148.5	
Queue Length 95th (m)	#36.8	62.1	1.6	36.7	55.7		#46.9	62.8		22.2	#219.1	
Internal Link Dist (m)		499.8			403.7			204.2			161.2	
Turn Bay Length (m)	38.0		60.0	38.0			38.0			38.0		
Base Capacity (vph)	119	401	461	202	483		149	1516		134	734	
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	0.64	0.53	0.20	0.50	0.44		0.54	0.37		0.37	0.90	

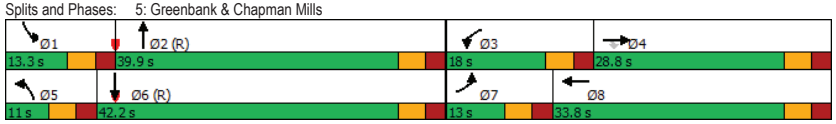
Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 39.8	Intersection LOS: D
Intersection Capacity Utilization 79.4%	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.

Splits and Phases: 5: Greenbank & Chapman Mills



Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	6	8	549	650	61
Future Vol, veh/h	40	6	8	549	650	61
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	-	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	40	6	8	549	650	61

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1246	681	711	0	-	0
Stage 1	681	-	-	-	-	-
Stage 2	565	-	-	-	-	-
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	192	450	888	-	-	-
Stage 1	503	-	-	-	-	-
Stage 2	569	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	190	450	888	-	-	-
Mov Cap-2 Maneuver	190	-	-	-	-	-
Stage 1	498	-	-	-	-	-
Stage 2	569	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.6	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	888	-	205	-	-
HCM Lane V/C Ratio	0.009	-	0.224	-	-
HCM Control Delay (s)	9.1	-	27.6	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Appendix K

TDM Checklists

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

Legend

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

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

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

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

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

			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	☐

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

Legend

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

		TDM-supportive design & infrastructure measures: *Residential developments*	Check if completed & add descriptions, explanations or plan/drawing references
	1.	**WALKING & CYCLING: ROUTES**	
	1.1	**Building location & access points**	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	☑
	1.2	**Facilities for walking & cycling**	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations *(see Official Plan policy 4.3.3)*	☑
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible *(see Official Plan policy 4.3.12)*	☑

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

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

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