

3194 Jockvale Road

Transportation Impact Assessment

Step 1 & 2 Screening and Scoping Report

Step 3 Forecasting Report

Step 4: Strategy Report (Draft)

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Table of Contents

1	Screening	1
2	Existing and Planned Conditions	1
2.1	Proposed Development.....	1
2.2	Existing Conditions	3
2.2.1	Area Road Network	3
2.2.2	Existing Intersections.....	3
2.2.3	Existing Driveways	4
2.2.4	Cycling and Pedestrian Facilities.....	4
2.2.5	Existing Transit.....	6
2.2.6	Existing Area Traffic Management Measures.....	7
2.2.7	Existing Peak Hour Travel Demand.....	7
2.2.8	Existing Collision Analysis	9
2.3	Planned Conditions.....	12
2.3.1	Changes to the Area Transportation Network	12
2.3.2	Other Study Area Developments.....	13
3	Study Area and Time Periods	14
3.1	Study Area	14
3.2	Time Periods	14
3.3	Horizon Years.....	14
4	Exemption Review	14
5	Development-Generated Travel Demand	15
5.1	Trip Generation and Mode Shares	15
5.2	Trip Distribution.....	16
5.3	Trip Assignment.....	16
6	Background Network Travel Demands.....	19
6.1	Transportation Network Plans	19
6.2	Background Growth.....	21
6.3	Background Growth and Other Developments.....	26
7	Demand Rationalization	26
8	Development Design	26
8.1	Design for Sustainable Modes.....	26
8.2	New Street Networks	26
9	Boundary Streets Design	27
10	Access Intersections Design.....	28
10.1	Location and Design of Access.....	28
10.2	Intersection Control.....	28
10.3	Intersection Design.....	28
10.3.1	2026 Future Total Intersection Operations.....	28
10.3.2	2031 Future Total Intersection Operations	30
10.3.3	Intersection MMLOS.....	30
10.3.4	Recommended Design Elements.....	30
11	Transportation Demand Management.....	32

11.1	Context for TDM	32
11.2	Need and Opportunity	32
11.3	TDM Program	32
12	Transit	32
12.1	Route Capacity	32
12.2	Transit Priority	32
13	Intersection Design	32
13.1	Intersection Control	32
13.2	Intersection Design	32
13.2.1	2026 Future Total Intersection Operations	32
13.2.2	2031 Future Total Intersection Operations	34
13.2.3	14.2.3 Intersection MMLOS	35
13.2.4	Recommended Design Elements	36
14	Summary of Improvements Indicated and Modifications Options	36
15	Next Steps	38

List of Figures

Figure 1:	Area Context Plan	1
Figure 2:	Concept Plan	2
Figure 3:	Study Area Pedestrian Facilities	5
Figure 4:	Study Area Cycling Facilities	5
Figure 5:	Existing Study Area Transit Service	6
Figure 6:	Study Area Transit Stations	7
Figure 7:	Existing Traffic Counts	8
Figure 8:	Study Area Collision Records – Representation of 2014-2016	10
Figure 9:	City of Ottawa Affordable Network – Barrhaven Context	13
Figure 10:	New Site Generation Auto Volumes	17
Figure 11:	Pass-By Volumes	18
Figure 12:	Chapman Mills Extension – Traffic Redistribution	20
Figure 13:	Background 2026 Volumes	22
Figure 14:	Background 2031 Volumes	24
Figure 15:	South Nepean Town Centre CDP Concept Cross-Sections	27
Figure 16:	Future Total 2026 Volumes	29
Figure 17:	Future Total 2031 Volumes	31

Table of Tables

Table 1:	Intersection Count Date	7
Table 2:	Existing Intersection Operations	9
Table 3:	Study Area Collision Summary	10
Table 4:	Summary of Collision Locations	10
Table 5:	Greenbank Road at Strandherd Drive Collision Summary	11
Table 6:	Jockvale Road at Strandherd Drive Collision Summary	12
Table 7:	Exemption Review	14

Table 8: Trip Generation Person Trip Rates	15
Table 9: Total Person Trip Generation	15
Table 10: South Nepean Mode Share.....	15
Table 11: Internal Capture Rates.....	15
Table 12: Trip Generation by Mode	16
Table 13: OD Survey Existing Mode Share – Ottawa Inner	16
Table 14: 2026 Background Intersection Operations.....	23
Table 15: 2031 Background Intersection Operations.....	25
Table 16: 2031 Future Background Adjusted Greenbank Road and Strandherd Drive Intersection Operations ...	26
Table 17: Boundary Street MMLoS Analysis	27
Table 18: 2026 Future Total Site Intersection Operations	28
Table 19: 2031 Future Total Site Intersection Operations	30
Table 20: Site Access Intersection MMLoS Analysis	30
Table 21: 2026 Future Total Study Area Intersection Operations.....	33
Table 22: 2026 Future Total Adjusted Greenbank Road and Strandherd Drive Intersection Operations	34
Table 23: 2031 Future Total Study Area Intersection Operations.....	34
Table 24: 2031 Future Total Adjusted Greenbank Road and Strandherd Drive Intersection Operations	35
Table 25: Study Area Intersection MMLoS Analysis	35

List of Appendices

Appendix A – TIA Screening Form and Certification Form
Appendix B – Turning Movement Count Data
Appendix C – Synchro Intersection Worksheets – Existing Conditions
Appendix D – Collision Data
Appendix E – Synchro Intersection Worksheets – 2026 Background Conditions
Appendix F – Synchro Intersection Worksheets – 2031 Background Conditions
Appendix G – Background Development Volumes
Appendix H – MMLoS Analysis
Appendix I – Signal Warrant Analysis
Appendix J – Synchro Intersection Worksheets – 2026 Total Conditions
Appendix K – Synchro Intersection Worksheets – 2031 Total Conditions

1 Screening

This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines for a zoning by-law amendment and plan of subdivision application. 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 (zoning bylaw amendment and plan of subdivision application), located at 3194 Jockvale Road, is currently zoned as part Mixed-Use Centre (MC) and partially Development Reserve (DR). The existing land is currently a mix of farm fields and tree buffer areas. The proposed development would include a total of 210 stacked townhome units and approximately 200,000 sq. ft of retail space. Jockvale Road will be extended south from the Barrhaven Towncentre and a new east-west road will be constructed along the south frontage and the adjacent property with a new intersection at Greenbank Road. Two additional right-in/right-out accesses are proposed along Greenbank Road. The existing service road crossing of the Kennedy-Burnett SWM pond will be formalized into a pedestrian connection. The anticipated full build-out will be in a single phase and occupancy horizon is 2026. 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.

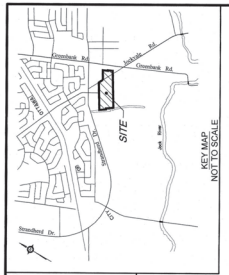
An ongoing OPA, and separate application, will rezone the whole area as MC with site specific exceptions. Separate TIAs may be required to support future site plan applications.

Figure 1: Area Context Plan



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: November 5, 2018

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN THIS PLAN
THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER
THE ZONING BY-LAW OF THE CITY OF OTTAWA AND
THE PLANNING ACT OF THE PROVINCE OF ONTARIO.



**DRAFT PLAN OF SUBDIVISION OF
PART OF LOT 15
CONCESSION 3 (RIDEAU FRONT)
Geographic Township of Nepean
CITY OF OTTAWA**

Prepared by Annis O'Sullivan, Vollebekk Ltd.

Scale 1:750

MEASUREMENTS SHOWN ON THIS PLAN ARE IN METRES AND
CAN BE CONVERTED TO FEET BY DIVIDING BY 3.048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:
1. I am a duly qualified and licensed Surveyor in the Province of Ontario;
2. I have personally supervised the execution of the survey and the preparation of this plan;
3. I have the accuracy to back this corporation.

Ann O'Sullivan
Surveyor

OWNER'S CERTIFICATE

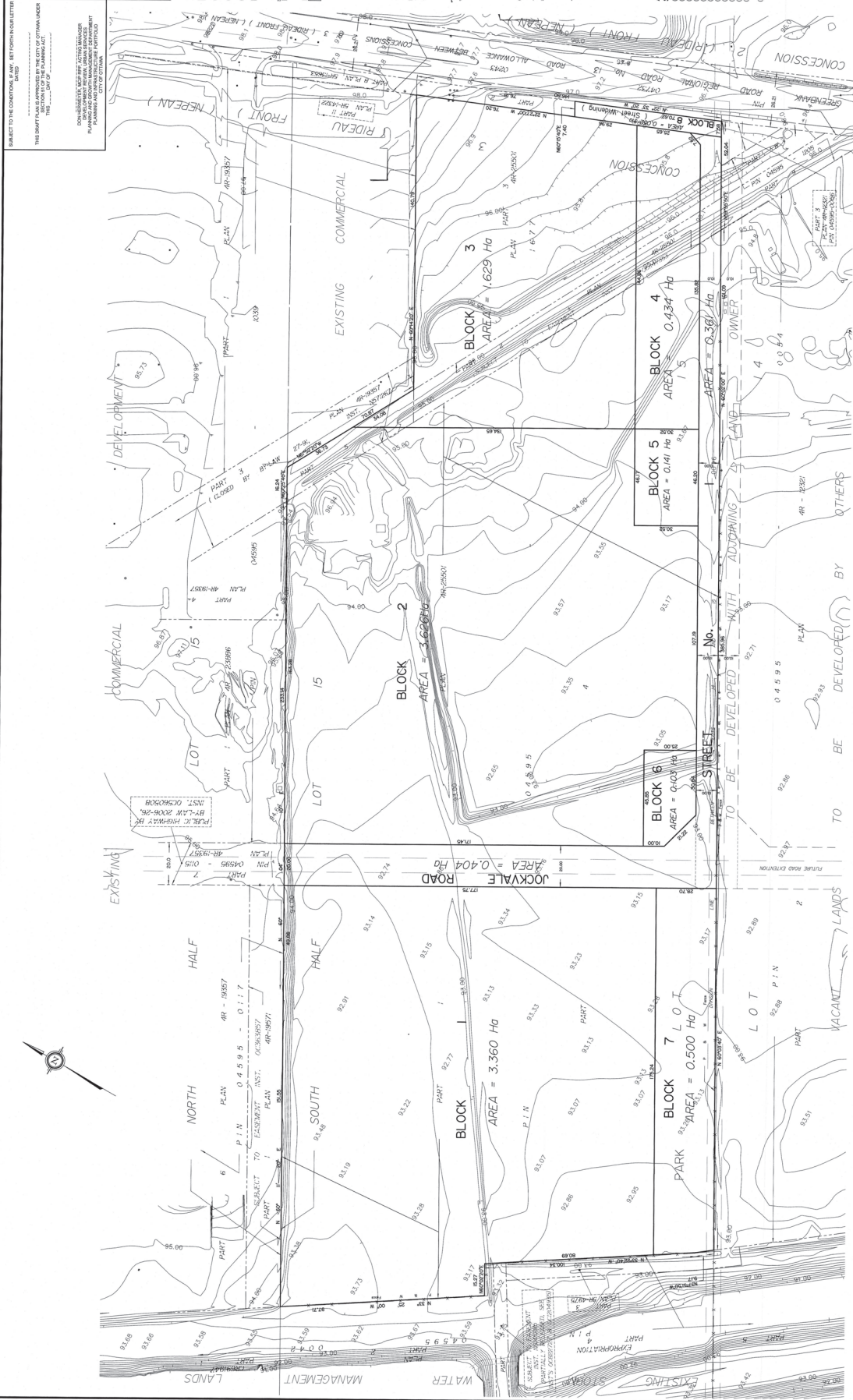
This is to certify that I am the owner of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

Ann O'Sullivan
Owner

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51.17 OF THE PLANNING ACT

- (a) site plan
- (b) site plan
- (c) site plan
- (d) site plan
- (e) site plan
- (f) site plan
- (g) site plan
- (h) site plan
- (i) site plan
- (j) site plan
- (k) site plan
- (l) site plan
- (m) site plan
- (n) site plan
- (o) site plan
- (p) site plan
- (q) site plan
- (r) site plan
- (s) site plan
- (t) site plan
- (u) site plan
- (v) site plan
- (w) site plan
- (x) site plan
- (y) site plan
- (z) site plan

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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.

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 access 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.

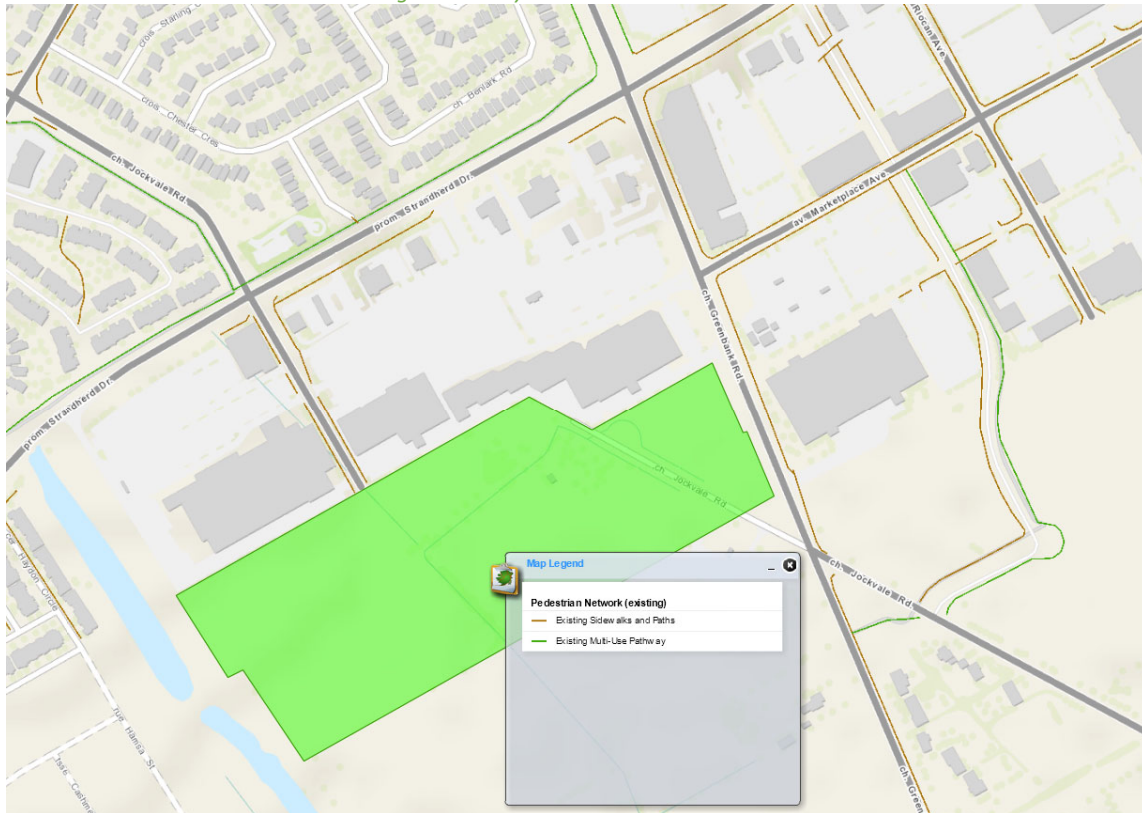
The On The Green golf range and mini putt access is located on Jockvale Road, west of Greenbank Road.

2.2.4 Cycling and Pedestrian Facilities

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

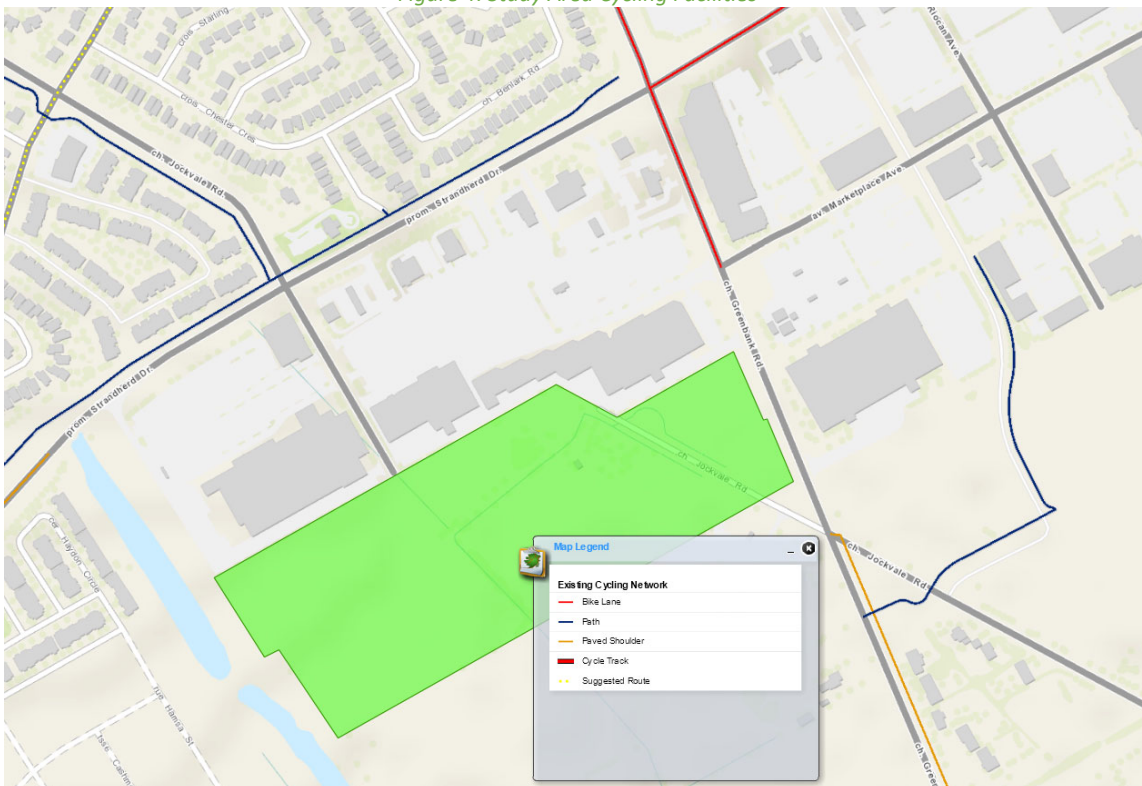
Sidewalks are provided along both sides of the roadways in the study area with a multi-use pathway on the north side of Strandherd Drive and along the Southwest Transitway. The cycling network consists of the bike lanes north and east of the Greenbank Road and Strandherd Drive intersection, the multi-use 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: November 5, 2018

Figure 4: Study Area Cycling Facilities



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: November 5, 2018

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, 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

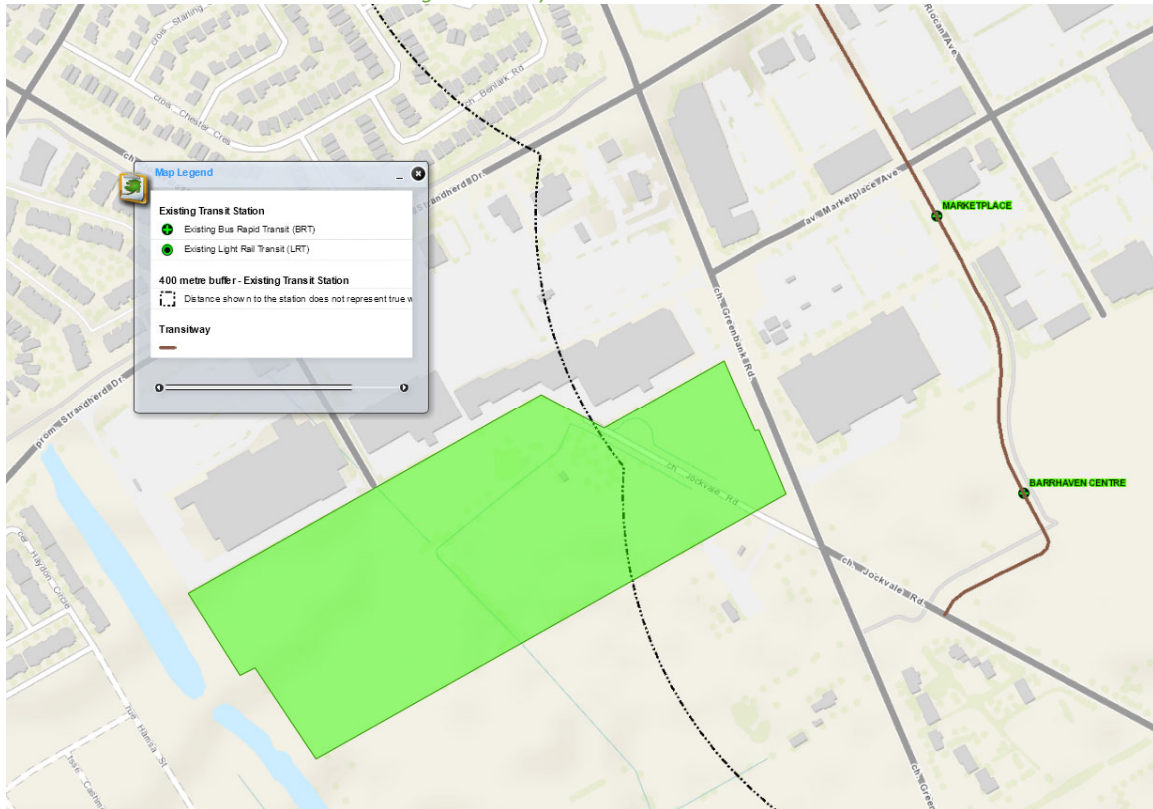
Figure 5 illustrates the transit system map in the study area and Figure 6 illustrates the walking distance for the Southwest Transitway. The Transitway stations will be beyond the 400m walk distance to the residential component and only encompass part of the retail component of the proposed site.

Figure 5: Existing Study Area Transit Service



Source: <http://www.octranspo.com/> Accessed: October 5, 2018

Figure 6: Study Area Transit Stations



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: November 5, 2018

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

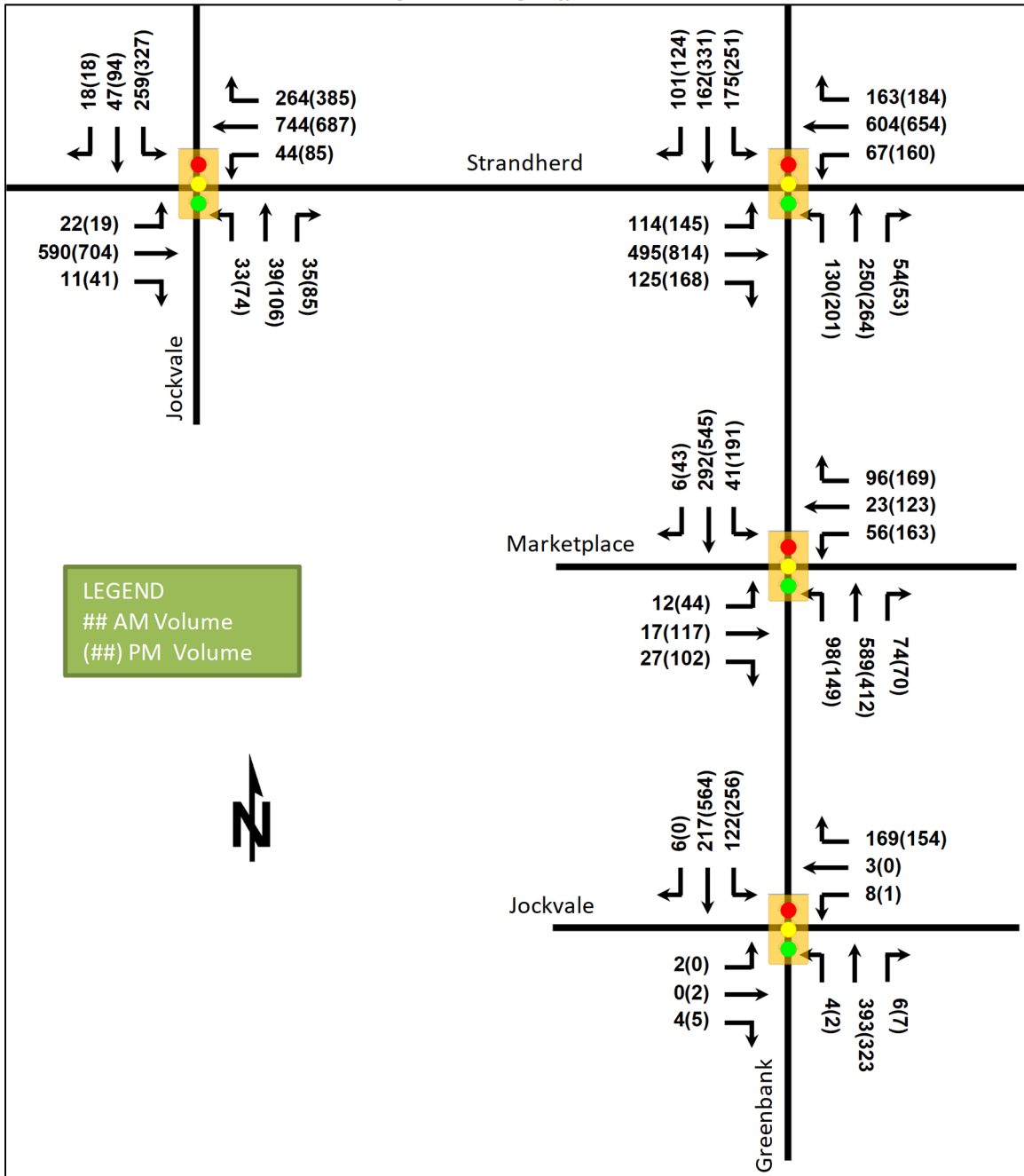


Table 2: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Greenbank Road & Jockvale Road <i>Signalized</i>	EB	A	0.2	0.02	0.0	C	29.0	0.05	5.5
	WBL/T	D	42.5	0.07	8.7	D	42.0	0.01	1.9
	WBR	B	13.8	0.59	18.0	B	12.5	0.55	16.5
	NB	A	5.9	0.34	65.4	A	6.0	0.29	57.7
	SBL	A	1.6	0.17	10.0	A	2.2	0.33	20.4
	SBT/R	A	1.1	0.15	17.4	A	1.9	0.38	54.7
	Overall	A	6.0	-	-	A	4.4	-	-
Greenbank Road & Marketplace Avenue <i>Signalized</i>	EBL	C	31.9	0.60	7.2	C	30.3	0.25	17.3
	EBT/R	C	25.4	0.25	15.0	D	46.5	0.69	74.5
	WBL	D	35.6	0.27	21.9	D	53.2	0.75	#57.7
	WBT/R	B	14.7	0.37	23.4	D	52.1	0.81	#108.0
	NBL	E	77.6	0.76	#53.7	F	87.5	0.86	#82.2
	NBT/R	B	13.2	0.38	66.2	C	25.0	0.40	65.4
	SBL	D	47.2	0.21	10.6	D	58.7	0.63	39.2
	SBT/R	B	13.7	0.19	28.8	C	27.8	0.50	82.9
Overall	C	20.8	-	-	D	41.4	-	-	
Greenbank Road & Strandherd Drive <i>Signalized</i>	EBL	C	25.6	0.48	30.7	C	32.5	0.63	40.0
	EBT	C	34.0	0.55	77.4	E	58.4	0.94	#157.7
	EBR	A	5.4	0.25	12.9	A	6.3	0.33	17.3
	WBL	C	21.0	0.25	19.5	E	55.3	0.82	#67.7
	WBT	D	44.6	0.80	98.2	D	42.9	0.74	110.2
	WBR	A	6.7	0.35	17.0	A	6.2	0.35	18.2
	NBL	D	51.5	0.46	27.7	E	56.3	0.60	39.5
	NBT/R	C	31.3	0.36	48.8	D	35.7	0.41	51.2
	SBL	D	51.2	0.54	34.8	E	57.3	0.68	48.4
	SBT	C	30.0	0.18	27.8	D	36.6	0.40	55.5
	SBR	A	3.1	0.20	7.0	A	6.0	0.27	13.8
Overall	C	32.9	-	-	D	44.2	-	-	
Jockvale Road & Strandherd Drive <i>Signalized</i>	EBL	B	11.1	0.10	6.0	B	13.4	0.10	6.4
	EBT/R	B	19.0	0.40	69.2	C	26.6	0.59	104.7
	WBL	B	10.9	0.12	10.2	B	14.9	0.31	19.6
	WBT/R	B	19.9	0.63	132.5	C	23.5	0.72	157.8
	NBL	D	51.7	0.29	18.7	E	60.9	0.57	34.6
	NBT	D	48.7	0.24	20.5	E	55.4	0.55	44.9
	NBR	A	1.0	0.14	0.0	A	4.1	0.30	4.0
	SBL	E	60.7	0.88	#79.4	E	75.1	0.97	#137.7
	SBT/R	C	22.8	0.15	19.9	C	26.2	0.22	34.1
	Overall	C	25.0	-	-	C	32.3	-	-

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 during the PM peak. The delay for this movement exceeds 80 seconds and has a LOS 'F'.

2.2.8 Existing Collision Analysis

Collision data has been acquired from the City of Ottawa open data website (data.ottawa.ca) for four years prior to the commencement of this TIA for the surrounding study area 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

		Number	%
Total Collisions		211	100%
Classification	Fatality	1	0%
	Non-Fatal Injury	39	18%
	Property Damage Only	171	81%
Initial Impact Type	Approaching	1	0%
	Angle	12	6%
	Rear end	104	49%
	Sideswipe	29	14%
	Turning Movement	49	23%
	SMV Other	12	6%
	Other	4	2%
Road Surface Condition	Dry	138	65%
	Wet	43	20%
	Loose Snow	16	8%
	Slush	2	1%
	Packed Snow	3	1%
	Ice	9	4%
Pedestrian Involved		1	0.5%
Cyclists Involved		0	0%

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

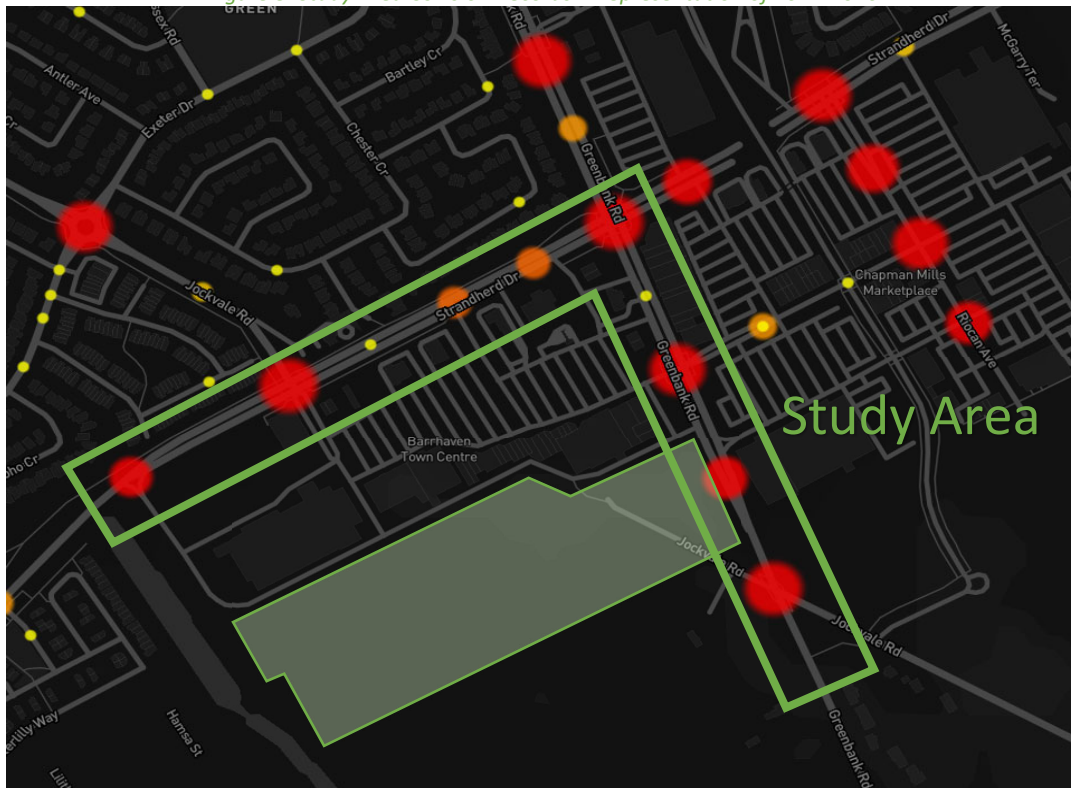


Table 4: Summary of Collision Locations

Intersections / Segments	Number	%
Greenbank Rd @ Jockvale Rd	19	9%
Greenbank Rd @ Marketplace Ave	14	7%
Greenbank Rd @ Strandherd Dr	101	48%

Strandherd Dr @ 215 W of Greenbank Rd/Barrhaven Mall SC	6	3%
Jockvale Rd @ Strandherd Dr	44	21%
Greenbank Rd btwn Marketplace Ave & Jockvale Rd	7	3%
Greenbank Rd btwn Strandherd Dr & Marketplace Ave	3	1%
Strandherd Dr btwn 215 W of Greenbank Rd/Barrhaven Mall SC & Greenbank Rd	5	2%
Strandherd Dr btwn Jockvale Rd & 215 W of Greenbank Rd/Barrhaven Mall SC	3	1%
Strandherd Dr btwn Andora Ave & Jockvale Rd	9	4%

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 The Greenbank Road at Strandherd Drive intersection had a total of 101 collisions during the 2014-2017 time period, with 89 involving property damage only, and the remaining 19 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 the area, although none were documented and is not considered a concern in the future. Weather conditions are not considered to have a major impact on the collisions.

Table 6 summarize the collision types and conditions for the Greenbank Road at Strandherd Drive, Jockvale Road at Strandherd Drive intersections.

Table 5: Greenbank Road at Strandherd Drive Collision Summary

		Number	%
Total Collisions		101	100%
Classification	Non-Fatal Injury	19	19%
	Property Damage Only	82	81%
Initial Impact Type	Angle	3	3%
	Rear end	54	53%
	Sideswipe	14	14%
	Turning Movement	26	26%
	SMV Other	2	2%
	Other	2	2%
Road Surface Condition	Dry	71	70%
	Wet	18	18%
	Loose Snow	8	8%
	Slush	1	1%
	Packed Snow	1	1%
	Ice	2	2%
Pedestrian Involved		0	0%
Cyclists Involved		0	0%

The Greenbank Road at Strandherd Drive intersection had a total of 101 collisions during the 2014-2017 time period, with 89 involving property damage only, and the remaining 19 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 the area, although none were documented and is not considered a concern in the future. 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		44	100%
Classification	Fatality	1	2%
	Non-Fatal Injury	9	20%
	Property Damage Only	34	77%
Initial Impact Type	Angle	1	2%
	Rear end	26	59%
	Sideswipe	1	2%
	Turning Movement	14	32%
	SMV Other	2	5%
Road Surface Condition	Dry	28	64%
	Wet	9	20%
	Loose Snow	5	11%
	Ice	2	5%
Pedestrian Involved		1	2%
Cyclists Involved		0	0%

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. The fatal collision was at night and likely contributed to the incident.

Collision data is included in Appendix D.

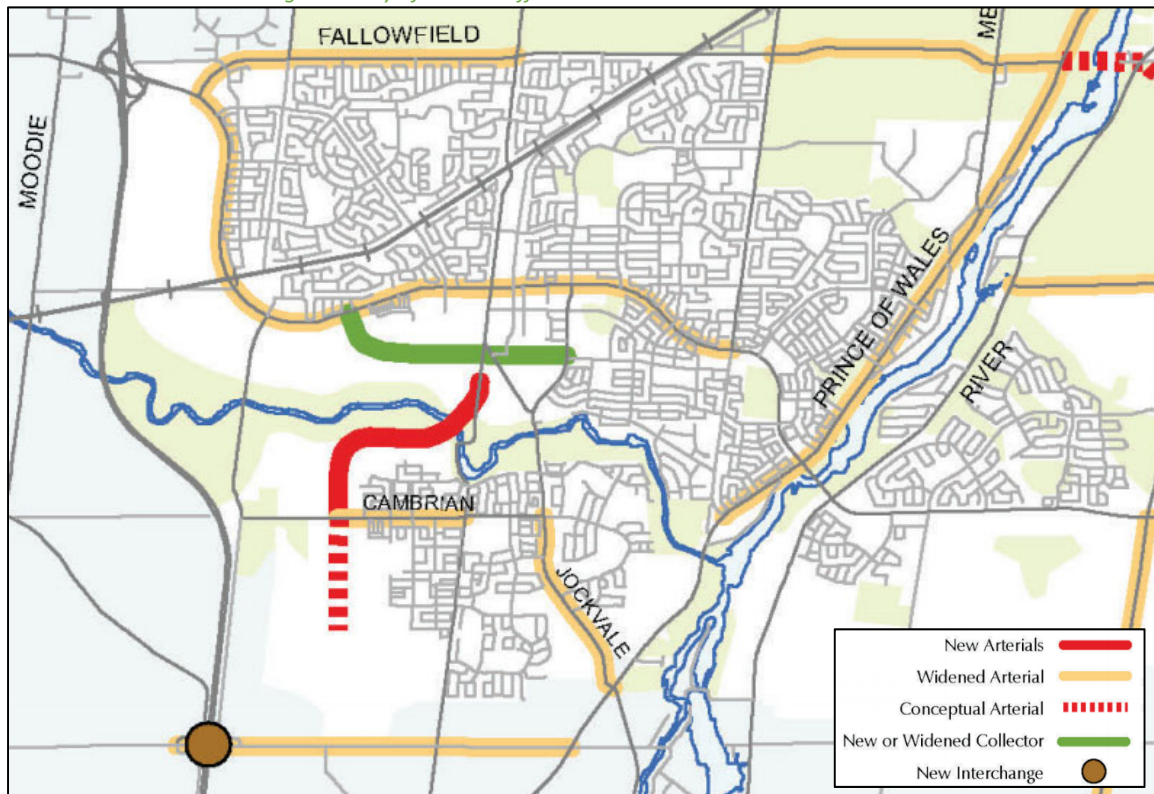
2.3 Planned Conditions

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 2020
- 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

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

Barrhaven Towncentre – 3777 Strandherd Drive

A new pad is proposed for the Barrhaven Towncentre, with a total of 5,025 ft². The new pad is located south of the existing BMO building.

Nepean Town Centre Development Corp. (NTCDC) – 3288 Greenbank Road

The proposed site is approximately 12.75-hectare site and is located south of the future Chapman Mills Drive corridor. The site is proposed to include 482 mid-rise mixed-use units, 343 high-rise units, and 496 mid-rise residential units. The file has completed an official plan amendment to adjust the land use (school and park), and

to modify policies related to building heights, street, density, to allow the development of a compact residential development.

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.

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of 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 roads for the site.

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 2026. As a result, the full build-out plus five years horizon year is 2031.

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
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	Exempt

Module	Element	Explanation	Exempt/Required
		excess of equivalent volume permitted by established zoning	

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) and the vehicle trip rates for the retail components using the ITE Trip Generation Manual (10th Edition). To estimate person trip generation for the retail components, a factor of 1.28 has been applied to the ITE rates. 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
Shopping Centre	820	AM	0.94	1.2
		PM	3.81	4.88

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	210	76	130	206	129	115	244
Shopping Centre	200,000	149	91	240	468	508	976
Total Person Trips		225	241	406	597	623	1,220

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

Table 10: South Nepean Mode Share

Travel Mode	Mode Share
Auto Driver	60%
Auto Passenger	15%
Transit	15%
Non-Auto	10%
Total	100%

Internal capture rates from the ITE Trip Generation Handbook 3rd Edition assigned to the development for the retail components for mixed-use developments. The rates summarized in Table 11 represent the percentage of trips to/from the retail uses based on the residential component. The pass-by reduction has also been included.

Table 11: Internal Capture Rates

Land Use	AM		PM	
	In	Out	In	Out
Residential to/from Shopping Centre	17%	14%	10%	26%
Pass-By Trips	20%			

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

Table 12: Trip Generation by Mode

Travel Mode	Mode Share	In	Out	Total	In	Out	Total
Auto Driver	60%	110	111	221	294	295	589
Auto Passenger	15%	27	28	55	73	73	148
Transit	15%	27	28	55	73	73	148
Non-Auto Modes	10%	19	19	37	49	50	98
Internal Capture	-	13	18	31	13	30	43
Pass-By	-	30	18	48	94	102	195
Total	100%	226	222	447	596	623	1221

As shown above, 221 AM and 589 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 and the retail travel patterns were applied based on the build-out of Barrhaven. Table 13 below summarizes the distributions.

Table 13: OD Survey Existing Mode Share – Ottawa Inner

To/From	Residential % of Trips	Retail % of Trips
North	80%	35%
South	5%	20%
East	10%	15%
West	5%	30%
Total	100%	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 illustrates the new site generated volumes and Figure 11 illustrates the pass-by volumes for the existing traffic.

Figure 10: New Site Generation Auto Volumes

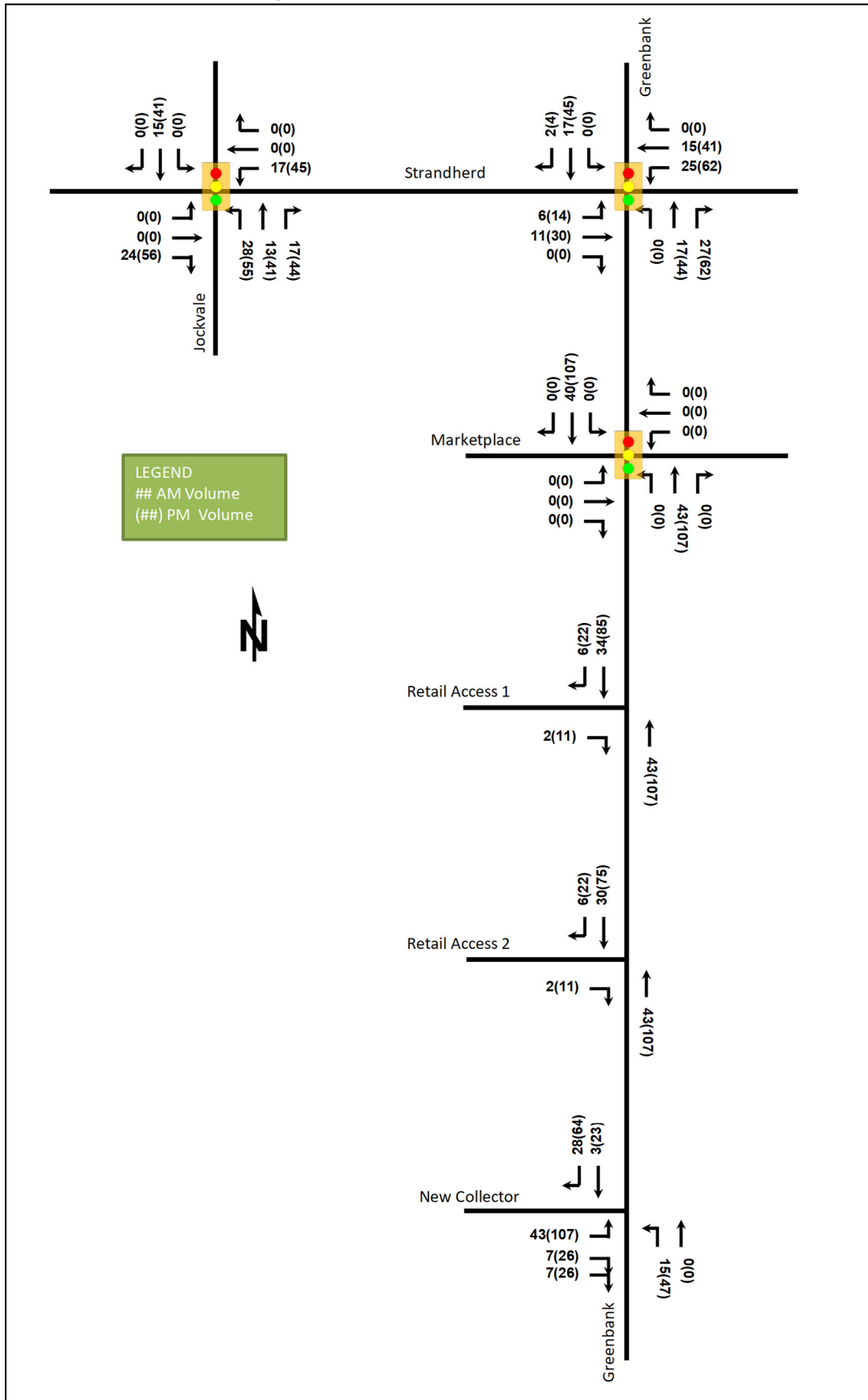
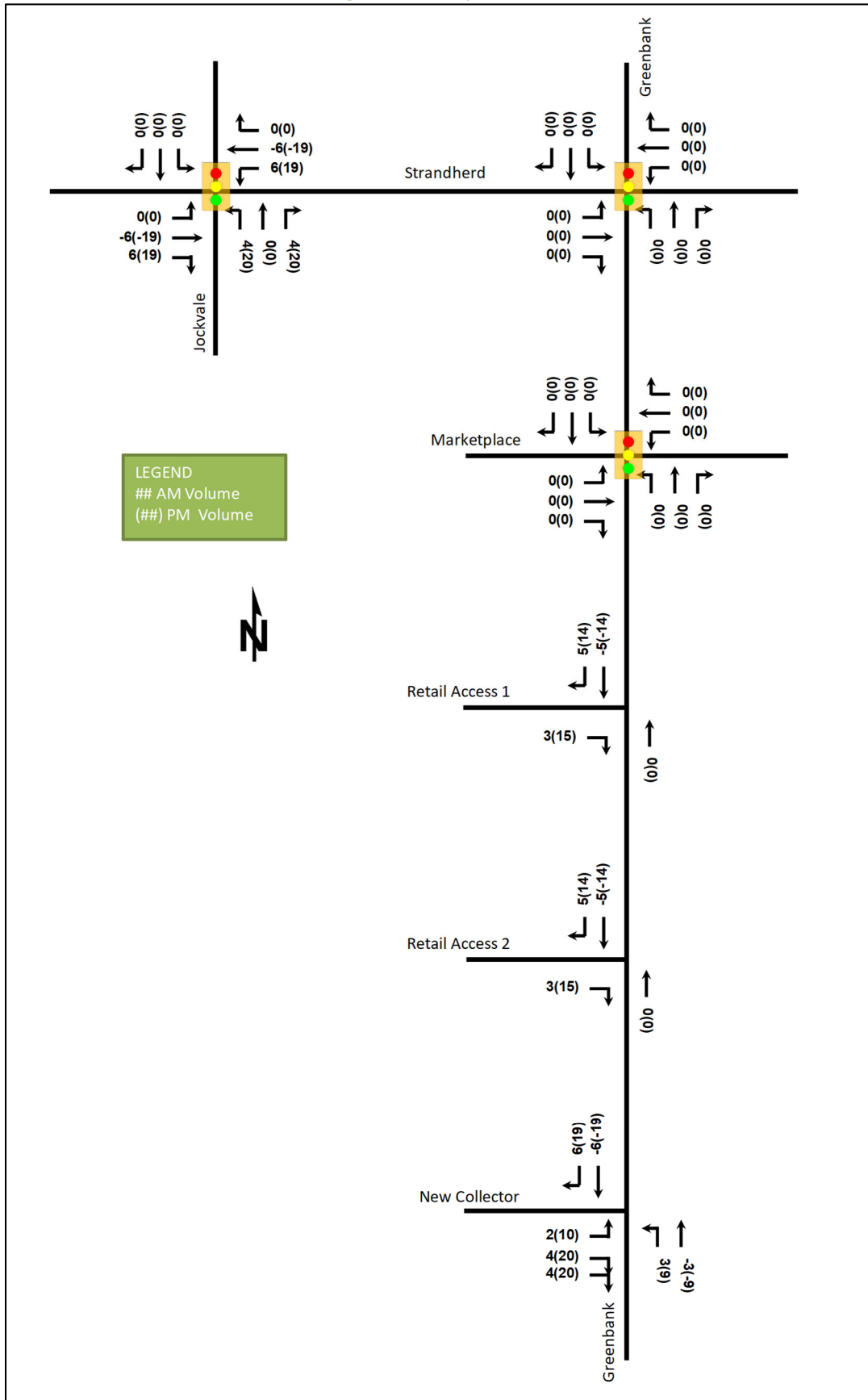


Figure 11: Pass-By Volumes



6 Background Network Travel Demands

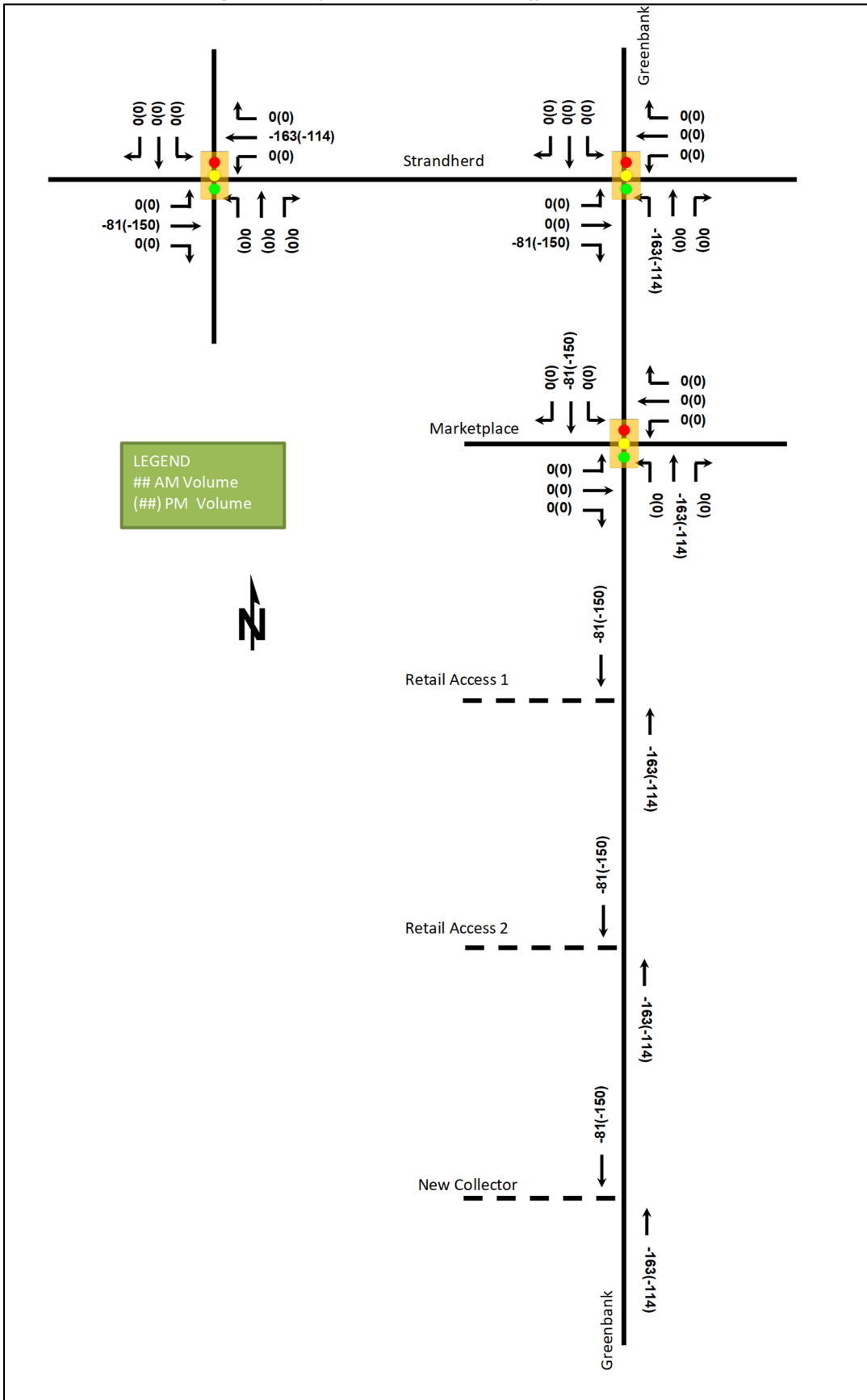
6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3.2. 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, a 25% shift from Greenbank Road has been assumed. The net trip reduction is illustrated in Figure 12 and will be incorporated within the 2031 horizon.

While the connection through to Strandherd Drive is not anticipated to be operational by 2031, an extension of Chapman Mills Drive from Longfields Drive to Greenbank Road will likely occur prior to 2026. Once extended to Greenbank Road, Jockvale Road will be decommissioned. Therefore, Jockvale Road is not considered during the future build-out horizons.

Figure 12: Chapman Mills Extension – 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 may not be realistic given the location of the growth areas and limits on the roadway capacity prior to reaching the adjacent road/intersections. For example, Greenbank Road is a two-lane roadway south of the proposed site and has a reduced growth capacity available prior to the four-lane section along Barrhaven Town Centre and Chapman Mills Marketplace. Therefore, 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 13 illustrates the 2026 background volumes and Table 14 summarizes the 2026 background intersection operations. Figure 14 illustrates the 2031 background volumes and Table 15 summarizes the 2031 background intersection operations. The level of service is based on the HCM criteria for average delay at signalized intersections.

The synchro worksheets for the 2026 and 2031 background horizons are provided in Appendix E and Appendix F, respectively.

Figure 13: Background 2026 Volumes

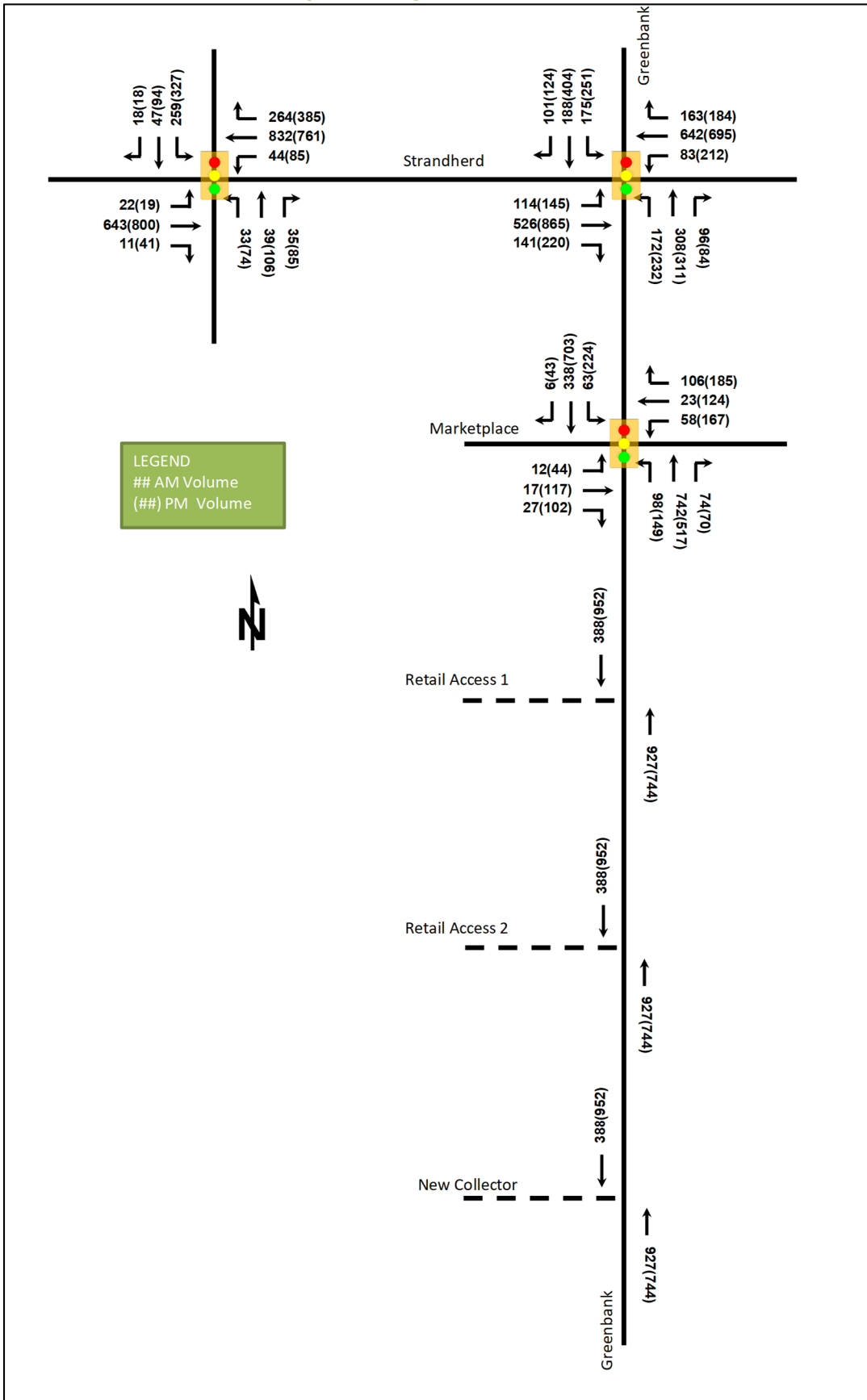


Table 14: 2026 Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Greenbank Road & Marketplace Avenue Signalized	EBL	C	32.0	0.07	6.9	C	29.8	0.22	16.0
	EBT/R	C	25.5	0.23	13.9	D	44.0	0.64	66.3
	WBL	D	36.6	0.29	20.9	D	45.8	0.66	48.5
	WBT/R	B	15.1	0.40	22.4	D	49.1	0.78	92.2
	NBL	E	67.9	0.67	#47.2	E	77.9	0.78	#71.4
	NBT/R	B	14.2	0.43	75.4	C	25.5	0.43	72.8
	SBL	D	46.9	0.27	13.4	E	58.6	0.65	41.2
	SBT/R	B	12.9	0.19	29.6	C	28.5	0.56	97.2
Overall	B	20.0	-	-	-	D	38.8	-	-
Greenbank Road & Strandherd Drive Signalized	EBL	C	24.2	0.43	27.6	C	28.4	0.55	36.2
	EBT	C	34.2	0.54	73.5	D	53.8	0.91	#146.6
	EBR	A	5.7	0.26	13.4	A	6.2	0.38	18.7
	WBL	C	21.2	0.27	21.1	E	77.6	0.95	#88.9
	WBT	D	43.6	0.78	92.6	D	41.1	0.70	104.6
	WBR	A	6.9	0.33	16.0	A	6.2	0.32	17.2
	NBL	D	50.1	0.51	31.7	D	55.8	0.61	40.8
	NBT/R	C	30.3	0.42	56.4	C	35.5	0.45	56.8
	SBL	D	50.0	0.51	32.0	D	56.2	0.64	44.0
	SBT	C	30.2	0.19	29.4	C	37.7	0.45	61.2
	SBR	A	2.3	0.19	4.6	A	4.5	0.24	10.2
Overall	C	32.5	-	-	-	D	41.6	-	-
Jockvale Road & Strandherd Drive Signalized	EBL	B	10.7	0.08	5.5	B	12.7	0.09	5.7
	EBT/R	B	18.6	0.39	66.7	C	25.0	0.57	104.8
	WBL	B	10.7	0.11	9.2	B	14.1	0.28	17.5
	WBT/R	B	19.1	0.61	126.8	C	22.7	0.70	146.7
	NBL	D	50.8	0.26	17.0	E	58.3	0.51	31.8
	NBT	D	48.4	0.22	18.9	D	53.6	0.50	41.0
	NBR	A	0.9	0.12	0.0	A	4.6	0.29	4.6
	SBL	D	51.8	0.80	#81.7	D	45.5	0.79	#98.1
	SBT/R	C	22.1	0.14	18.1	C	25.7	0.20	31.1
Overall	C	23.3	-	-	-	C	27.4	-	-

The intersection operations for the 2026 background horizon generally operate satisfactorily during the peak hours. The northbound left-turn movement at the Greenbank Road and Marketplace Avenue intersection sees a slight drop in delay due to the increased traffic along Marketplace Avenue (the 3201 Greenbank Road development) and additional triggering of the protected left-turn phase.

Figure 14: Background 2031 Volumes

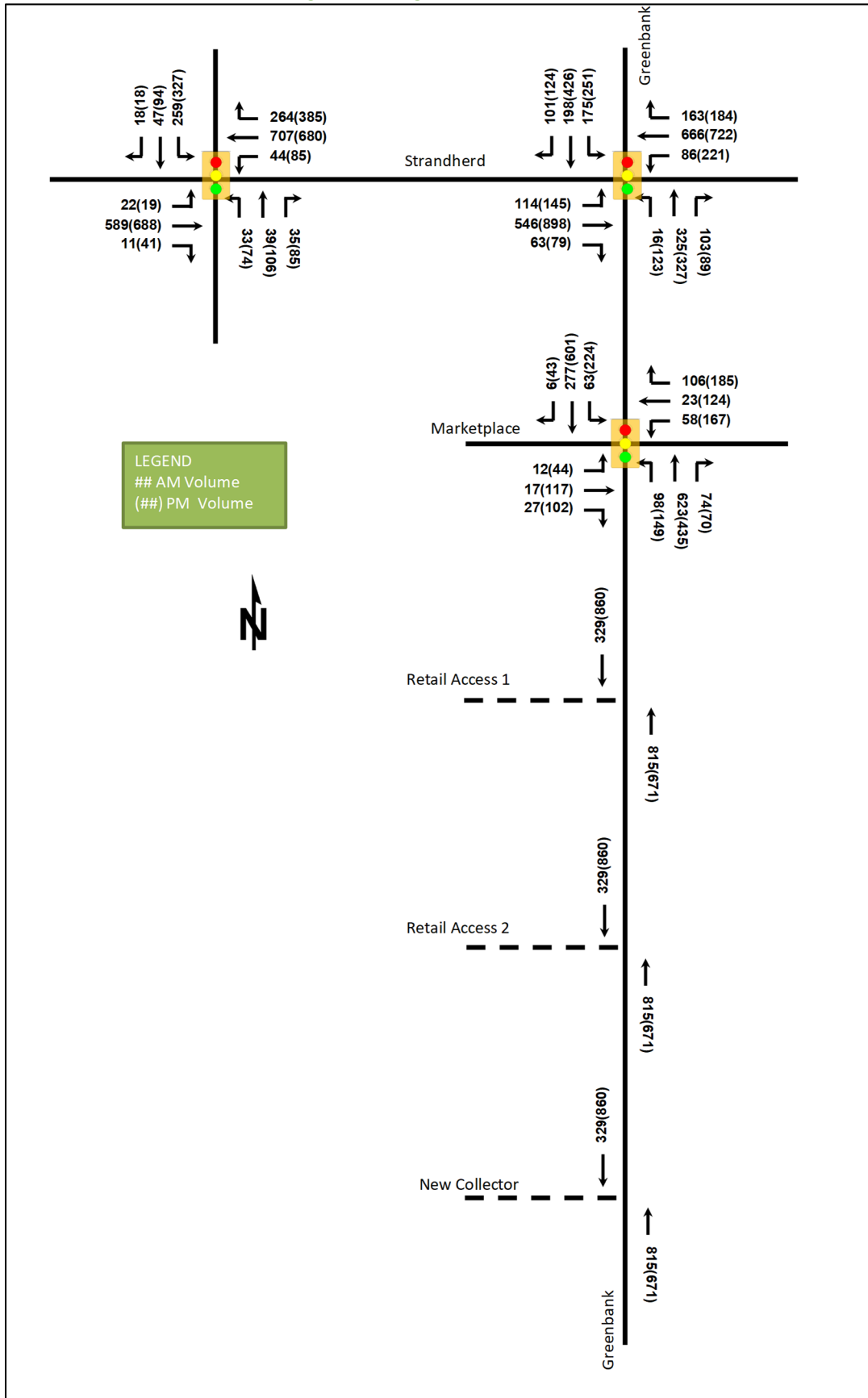


Table 15: 2031 Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Greenbank Road & Marketplace Avenue Signalized	EBL	C	32.0	0.07	6.9	C	29.8	0.22	16.0
	EBT/R	C	25.5	0.23	13.9	D	44.0	0.64	66.3
	WBL	D	36.6	0.29	20.9	D	45.8	0.66	48.5
	WBT/R	B	15.1	0.40	22.4	D	49.1	0.78	92.2
	NBL	E	67.9	0.67	#47.2	E	77.9	0.78	#71.4
	NBT/R	B	13.4	0.37	62.2	C	24.4	0.37	61.2
	SBL	D	46.9	0.27	13.4	E	58.6	0.65	41.2
	SBT/R	B	12.6	0.16	24.7	C	27.0	0.48	81.6
Overall	C	20.3	-	-	-	D	39.0	-	-
Greenbank Road & Strandherd Drive Signalized	EBL	B	24.7	0.45	27.6	C	29.0	0.56	36.2
	EBT	C	34.5	0.56	76.7	E	56.8	0.93	#155.8
	EBR	A	0.4	0.12	0.0	A	0.6	0.15	0.0
	WBL	C	21.4	0.29	21.9	F	88.5	0.99	#95.1
	WBT	D	44.1	0.80	96.5	D	41.7	0.72	109.4
	WBR	A	6.8	0.33	16.0	A	6.2	0.32	17.2
	NBL	D	51.0	0.08	5.7	E	56.1	0.45	24.8
	NBT/R	C	31.1	0.45	60.0	D	36.1	0.48	59.8
	SBL	D	50.4	0.51	32.0	E	56.4	0.64	44.0
	SBT	C	22.7	0.15	27.7	C	34.4	0.43	60.7
	SBR	A	1.7	0.14	4.2	A	4.0	0.23	9.6
Overall	C	31.9	-	-	-	D	43.8	-	-
Jockvale Road & Strandherd Drive Signalized	EBL	B	10.6	0.07	5.5	B	12.6	0.08	5.7
	EBT/R	B	18.2	0.36	60.6	C	23.5	0.49	87.6
	WBL	B	10.6	0.10	9.2	B	13.5	0.24	17.5
	WBT/R	B	17.5	0.55	105.6	C	20.8	0.65	128.8
	NBL	D	50.8	0.26	17.0	E	58.3	0.51	31.8
	NBT	D	48.4	0.22	18.9	D	53.6	0.50	41.0
	NBR	A	0.9	0.12	0.0	A	4.6	0.29	4.6
	SBL	D	51.8	0.80	#81.7	D	45.5	0.79	#98.1
	SBT/R	C	22.1	0.14	18.1	C	25.7	0.20	31.1
Overall	C	22.7	-	-	-	C	26.5	-	-

The overall intersection operations for the 2031 background horizon generally operate satisfactorily during the peak hours. Of note, the westbound left-turn movement at the Greenbank Road and Strandherd Drive is forecasted to be over capacity and have a delay exceeding 88 seconds during the PM peak hour. Signal timing adjustments, such as increasing the cycle length to 125 seconds and adjusting the phase splits would rectify the capacity constraint identified. Table 16 summarizes these adjustments and the synchro worksheet is provided within Appendix F. It is noted that the Strandherd Drive corridor would likely need similar adjustments to ensure the corridor progression remains intact and operations were as fluid as possible.

Table 16: 2031 Future Background Adjusted Greenbank Road and Strandherd Drive Intersection Operations

Intersection	Lane	PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)
Greenbank Road & Strandherd Drive Signalized	EBL	C	28.4	0.54	36.5
	EBT	E	57.4	0.92	#159.3
	EBR	A	0.6	0.15	0.0
	WBL	E	71.5	0.92	#93.1
	WBT	D	40.3	0.69	109.8
	WBR	A	5.9	0.31	17.2
	NBL	E	58.9	0.46	25.7
	NBT/R	D	38.1	0.48	62.4
	SBL	E	59.5	0.66	45.8
	SBT	D	36.3	0.43	63.4
	SBR	A	4.7	0.23	10.9
Overall	D	43.4	-	-	

6.3 Background Growth and Other Developments

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

- 3201 Greenbank Road
- 3311 Greenbank Road
- 3370 Greenbank Road (Phase 1 for 2026, ultimate with the Chapman Mills Drive reduction for 2031)

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. 3288 Greenbank Road has not proceeded in recent years with only zoning applications being completed. Therefore, both of these developments have not been included in the analysis.

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

7 Demand Rationalization

Given the background growth assumptions and future road network changes, no capacity constraints are currently noted for the area and rationalization for adjusted demand is not required for this TIA.

8 Development Design

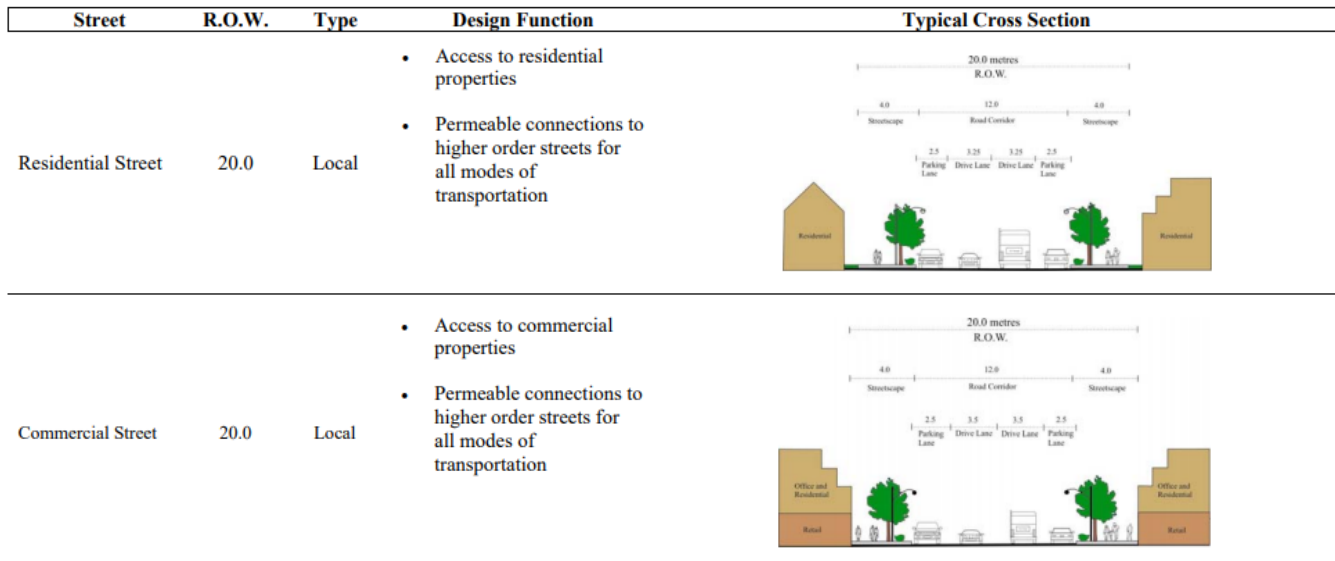
8.1 Design for Sustainable Modes

The bike and auto parking areas will be located near the main entrances for the residential and retail land-uses. Pedestrian connections will be made along Jockvale Road to the north, to Greenbank Road, and to the Kennedy-Burnett stormwater pond pathways. A cycling path will also be connected to the Kennedy-Burnett stormwater pond. The transit network is provided along the Southwest Transitway, while being beyond the 400m walking distance, is close enough in proximity for residents to walk to the transit routes.

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 15 illustrates the cross-sections included within the South Nepean Town Centre Community Design Plan (2006) for Jockvale Road and the new collector road.

Figure 15: South Nepean Town Centre CDP Concept Cross-Sections



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 will be recommended at the future intersection of Jockvale Road and the new collector road, including bulb-outs to narrow each approach to the intersection (e.g. reduced crossing distance). Within both of the residential and retail parts of the subdivision, narrowings should be considered at pedestrian crossing locations.

9 Boundary Streets Design

Table 17 summarizes the MMLOS analysis for the boundary road of Greenbank Road. The existing and future conditions have been summarized in separate rows. The future conditions are based on the existing four-lane divided cross section along Greenbank Road to the north. The MMLOS targets are based on the mixed-use centre land use. The MMLOS worksheet has been provided in Appendix F.

Table 17: 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	C	F	C	D	N/A	A	D
Greenbank Road (future)	E	C	C	C	D	N/A	A	D

Existing Greenbank Road does not meet the pedestrian and cycling MMLOS targets. The current cross-section is a transition location from a 4-lane divided urban cross section to a 2-lane rural cross-section. 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.

The MMLOS analysis is provided in Appendix H.

10 Access Intersections Design

10.1 Location and Design of Access

The residential accesses will connect via local roads to the extension of Jockvale Road and the new collector road. The retail accesses will connect to Greenbank Road and the new collector road. No turning lanes are proposed for the access locations (e.g. right-turn lanes) and no median breaks are proposed for the access locations. As the accesses will be private approaches, the curb and sidewalk will be depressed across the access.

10.2 Intersection Control

Based on the projected volumes, a minor street stop-control is recommended on the site accesses. No further traffic control or turn lanes are warranted to address operational issues.

The new intersection at Greenbank Road and the New Collector Road does not meet signal warrants but operationally will require signalization for eastbound operational requirements.

Signal warrants have been provided in Appendix I.

10.3 Intersection Design

10.3.1 2026 Future Total Intersection Operations

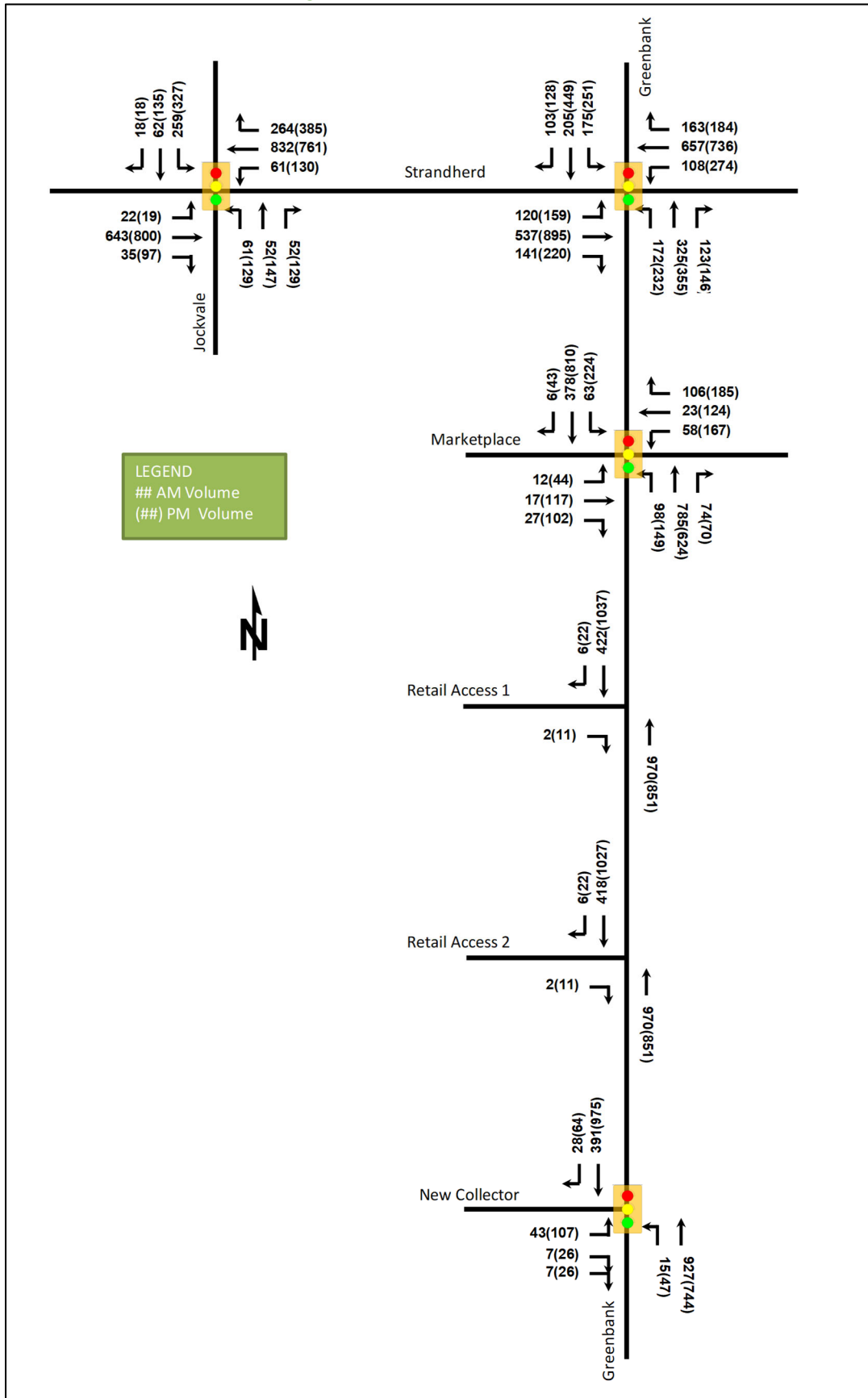
The 2026 future total intersection volumes are illustrated in Figure 16 and the operations are summarized below in Table 18. The level of service is based on the HCM criteria for average delay at signalized intersections. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix J.

Table 18: 2026 Future Total Site Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Greenbank Road & New Collector Road Signalized	EBL	B	15.6	0.13	9.2	B	16.3	0.31	16.2
	EBR	B	10.4	0.02	2.3	A	6.8	0.08	4.1
	NBL	A	3.0	0.02	1.8	A	6.4	0.15	6.0
	NBT	A	2.8	0.31	25.0	A	5.1	0.32	23.5
	SBT/R	A	2.2	0.14	10.0	A	5.9	0.46	35.7
	Overall	A	3.1	-	-	-	A	6.2	-

The 2026 future total conditions are forecasted to operate satisfactorily at the Greenbank Road and New Collector Road intersection. The minimum storage length of 37.5m (City of Ottawa) for signalized intersections is proposed for the left-turn lanes.

Figure 16: Future Total 2026 Volumes



10.3.2 2031 Future Total Intersection Operations

The 2031 future total intersection volumes are illustrated above in Figure 17 and the 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 K.

Table 19: 2031 Future Total Site Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Greenbank Road & New Collector Road <i>Signalized</i>	EBL	C	24.9	0.21	11.7	C	24.8	0.41	20.3
	EBR	B	14.3	0.04	3.0	A	8.8	0.10	4.9
	NBL	A	2.4	0.02	1.6	A	5.0	0.13	5.5
	NBT	A	2.1	0.28	22.2	A	4.1	0.28	22.1
	SBT/R	A	1.7	0.12	8.7	A	4.6	0.39	33.3
	Overall	A	2.9	-	-	-	A	5.7	-

The 2031 future total conditions are forecasted to operate satisfactorily at the Greenbank Road and New Collector Road intersection. The minimum storage length of 37.5m (City of Ottawa) for signalized intersections is proposed for the left-turn lanes.

10.3.3 Intersection MMLOS

The Greenbank Road and New Collector Road intersection has been assessed under the assumed signalization and auxiliary lane configuration of northbound and eastbound auxiliary left-turn. Table 20 summarizes the MMMLOS analysis for the site access intersection. No MMLOS analysis has been provided for the right-in/right-out intersections as they are private approaches. The MMLOS worksheet has been provided in Appendix H.

Table 20: Site 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
Greenbank Road & New Collector	D	C	F	C	C	N/A	E	D	A	D

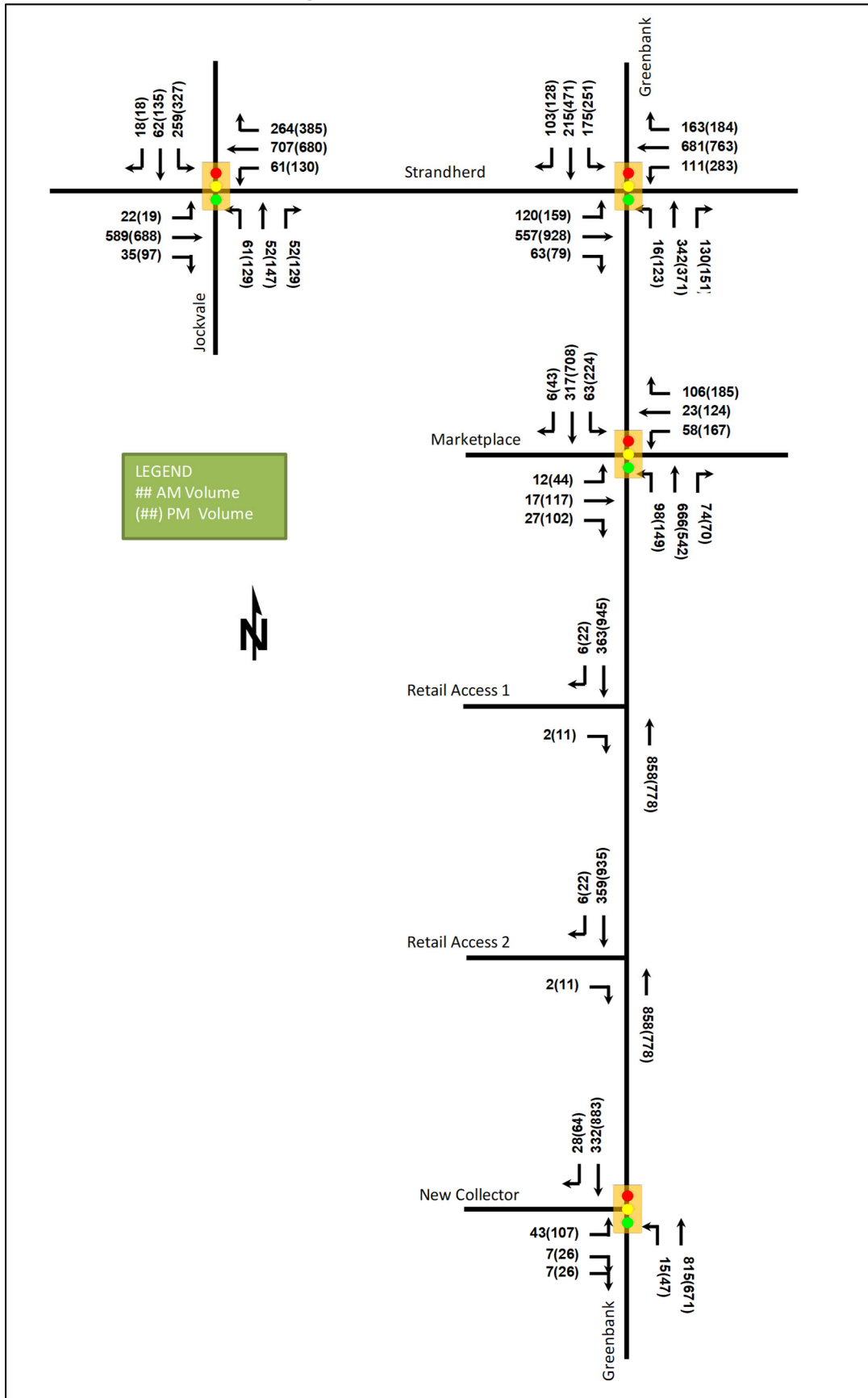
The MMLOS targets for a conceptual signalized intersection will not be met for the pedestrian, bicycle and truck levels of service. The pedestrian level of service would require a maximum of four lanes at a crossing to meet a LOS 'C'. A bike lane along Greenbank Road and the New Collector Road would satisfy the bicycle LOS, although a bike box or alternate left-turn configuration would be required on all approaches to meet the targets. The truck level of service is limited on the southbound right-turn due to the planned single receiving lane on the New Collector Road. It is likely that the bike lane, or similar facility, can be provided along the New Collector Road, but the restrictions of Greenbank Road as an arterial road, will limit the ability to address the other MMLOS targets.

10.3.4 Recommended Design Elements

The design elements for the site intersections, including the New Collector Road intersection, are summarized below:

- Yield or stop-control for the right-in/right-out accesses, typical for private approach accesses
- Signalization for the future Greenbank Road and New Collector Road intersection:
 - Does not meet signalization warrants, although operationally will be required to facilitate the eastbound movements
 - Northbound and westbound auxiliary left-turn lanes, with the City minimum storage of 37.5m
- Bike lanes along Greenbank Road and the New Collector Road

Figure 17: Future Total 2031 Volumes



11 Transportation Demand Management

11.1 Context for TDM

The mode shares used within the TIA represent this area of the City and have not been altered. The modal shares are likely to be achieved.

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 those assumptions have been carried through the analysis. A decrease in the low transit or non-auto mode shares will result in a slight increase in volumes along Jockvale Road and Greenbank Road. The study area intersections are anticipated to have residual capacity and will not significantly impact its operations should the auto mode share increase. Dependent on the final retail uses, an increase of transit use may be achievable.

11.3 TDM Program

Any “suite of post-occupancy TDM measures” are limited in their applicability to an increase in transit use. It is anticipated that this development will rely predominantly on auto travel due to the retail component of the plan of subdivision and those assumptions have been carried through the analysis.

12 Transit

12.1 Route Capacity

Overall, the forecasted new transit trips would result in the need for approximately half a single bus (55-person capacity) in each direction during the AM peak hour, and an additional articulated bus or double decker (75/95-person capacity) in each direction during the PM peak hour to accommodate the additional transit trips from the subject site.

As no transit routes are currently routed along the boundary roads, this capacity is considered to be required along the Southwest Transitway, at the Marketplace and Barrhaven Towncentre Stations.

12.2 Transit Priority

No transit priority is required/considered for the study area.

13 Intersection Design

13.1 Intersection Control

The study area intersections of Greenbank Road and Marketplace Avenue, Greenbank Road and Strandherd Drive, and Jockvale Road and Strandherd are currently signalized and are considered to remain signalized in the future.

13.2 Intersection Design

13.2.1 2026 Future Total Intersection Operations

The 2026 future total intersection volumes are illustrated above in Figure 16 and the operations are summarized below in Table 21. 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 21: 2026 Future Total Study Area Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Greenbank Road & Marketplace Avenue <i>Signalized</i>	EBL	C	32.0	0.13	6.9	C	29.8	0.22	16.0
	EBT/R	C	25.5	0.11	13.9	D	44.0	0.64	66.3
	WBL	D	36.6	0.17	20.9	D	45.8	0.66	48.5
	WBT/R	B	15.1	0.16	22.4	D	49.1	0.78	92.2
	NBL	E	67.9	0.09	#47.2	E	77.9	0.78	#71.4
	NBT/R	B	14.6	0.58	80.7	C	27.0	0.51	88.5
	SBL	D	46.9	0.07	13.4	E	58.6	0.65	41.2
	SBT/R	B	13.1	0.54	33.1	C	30.4	0.64	114.6
	Overall	B	19.9	-	-	D	38.8	-	-
Greenbank Road & Strandherd Drive <i>Signalized</i>	EBL	C	22.4	0.40	28.9	C	31.8	0.62	39.6
	EBT	C	33.9	0.51	75.8	E	56.5	0.93	#155.3
	EBR	A	5.5	0.25	13.5	A	6.2	0.37	18.7
	WBL	C	20.9	0.32	26.5	F	163.8	1.23	#127.0
	WBT	D	37.5	0.64	95.0	C	42.6	0.74	111.6
	WBR	A	6.1	0.29	16.0	A	6.2	0.32	17.2
	NBL	D	54.4	0.53	31.7	E	55.9	0.61	40.8
	NBT/R	C	34.6	0.51	62.1	D	36.6	0.57	70.6
	SBL	D	54.3	0.54	32.0	E	56.4	0.64	44.0
	SBT	C	33.9	0.23	31.6	D	38.8	0.51	68.1
	SBR	A	2.6	0.21	5.0	A	5.0	0.25	11.2
	Overall	C	32.2	-	-	D	49.1	-	-
Jockvale Road & Strandherd Drive <i>Signalized</i>	EBL	B	11.8	0.09	6.1	B	14.9	0.09	6.2
	EBT/R	B	19.8	0.41	74.2	C	30.6	0.66	121.3
	WBL	B	12.0	0.16	12.9	B	19.8	0.47	27.6
	WBT/R	C	20.3	0.62	135.8	C	25.4	0.71	158.0
	NBL	E	55.5	0.43	27.2	E	71.4	0.74	51.9
	NBT	D	48.2	0.26	23.3	D	53.3	0.56	54.1
	NBR	A	1.2	0.17	0.0	B	10.6	0.39	16.8
	SBL	D	48.4	0.78	#74.0	D	46.4	0.81	#96.0
	SBT/R	C	24.1	0.17	22.4	C	27.1	0.26	41.8
	Overall	C	24.2	-	-	C	31.6	-	-

The 2026 future total conditions are forecasted to operate similarly to the background conditions. Of note, the westbound left-turn movement at the Greenbank Road and Strandherd Drive is forecasted to be over capacity and have a delay exceeding 163 seconds during the PM peak hour. Signal timing adjustments, such as increasing the cycle length to 130 seconds and adjusting the phase splits would rectify the capacity constraint identified. Table 22 summarizes these adjustments and the synchro worksheet is provided within Appendix J. It is noted that the Strandherd Drive corridor would likely need similar adjustments to ensure the corridor progression remains intact and operations were as fluid as possible.

Table 22: 2026 Future Total Adjusted Greenbank Road and Strandherd Drive Intersection Operations

Intersection	Lane	PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)
Greenbank Road & Strandherd Drive Signalized	EBL	C	28.4	0.56	39.2
	EBT	E	63.5	0.95	#169.1
	EBR	A	6.5	0.38	19.3
	WBL	E	73.7	0.94	#114.7
	WBT	D	39.2	0.65	113.2
	WBR	A	5.6	0.29	16.7
	NBL	E	62.4	0.64	44.4
	NBT/R	D	42.1	0.61	77.8
	SBL	E	62.9	0.67	47.6
	SBT	D	44.0	0.53	74.3
	SBR	A	6.7	0.27	14.0
Overall	E	45.9	-	-	

13.2.2 2031 Future Total Intersection Operations

The 2031 future total intersection volumes are illustrated above in Figure 17 and the operations are summarized below in Table 23. 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 23: 2031 Future Total Study Area Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Greenbank Road & Marketplace Avenue Signalized	EBL	C	32.0	0.07	6.9	C	29.8	0.22	16.0
	EBT/R	C	25.5	0.23	13.9	D	44.0	0.64	66.3
	WBL	D	36.6	0.29	20.9	D	45.8	0.66	48.5
	WBT/R	B	15.1	0.40	22.4	D	49.1	0.78	92.2
	NBL	E	67.9	0.67	#47.2	E	77.9	0.78	#71.4
	NBT/R	B	13.7	0.39	66.7	C	25.9	0.45	76.4
	SBL	D	46.9	0.27	13.4	E	58.6	0.65	41.2
	SBT/R	B	12.8	0.18	28.0	C	28.6	0.56	97.7
	Overall	C	20.1	-	-	D	38.7	-	-
Greenbank Road & Strandherd Drive Signalized	EBL	C	25.8	0.48	28.9	C	32.8	0.64	39.6
	EBT	D	37.7	0.64	79.0	E	59.3	0.95	#164.3
	EBR	A	0.5	0.13	0.0	A	0.6	0.15	0.0
	WBL	C	23.0	0.39	27.0	F	182.3	1.27	#133.2
	WBT	D	44.2	0.80	99.0	D	43.2	0.76	116.8
	WBR	A	6.7	0.32	16.0	A	6.2	0.32	17.2
	NBL	D	51.4	0.09	5.7	E	56.3	0.46	24.8
	NBT/R	C	31.8	0.50	65.6	D	37.6	0.60	74.2
	SBL	D	50.8	0.51	32.0	E	56.7	0.64	44.0
	SBT	C	23.1	0.16	29.9	D	35.4	0.47	67.3
	SBR	A	1.9	0.15	4.5	A	4.4	0.23	10.6
Overall	C	32.8	-	-	D	52.4	-	-	

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)	LOS	Delay	V/C	Q (95 th)
Jockvale Road & Strandherd Drive Signalized	EBL	B	11.6	0.08	6.1	B	14.7	0.08	6.2
	EBT/R	B	19.3	0.38	67.5	C	28.5	0.58	102.2
	WBL	B	11.9	0.15	12.9	B	18.2	0.42	27.6
	WBT/R	B	18.5	0.55	112.8	C	23.3	0.66	138.4
	NBL	E	55.5	0.43	27.2	E	71.4	0.74	51.9
	NBT	D	48.2	0.26	23.3	D	53.3	0.56	54.1
	NBR	A	1.2	0.17	0.0	B	10.6	0.39	16.8
	SBL	D	48.4	0.78	#74.0	D	46.4	0.81	#96.0
	SBT/R	C	24.1	0.17	22.4	C	27.1	0.26	41.8
Overall	C	23.6	-	-	C	30.3	-	-	

In generally, the 2031 future total conditions are forecasted to operate similarly to the background conditions. As identified in the 2026 future total conditions, the Greenbank Road and Strandherd Drive intersection will require timing adjustments to improve the westbound left-turn movement. Table 22 summarizes the operations if similar adjustments, as shown in Section 13.2.1, were made, and the synchro worksheet is provided within Appendix J.

Table 24: 2031 Future Total Adjusted Greenbank Road and Strandherd Drive Intersection Operations

Intersection	Lane	PM Peak Hour			
		LOS	Delay	V/C	Q (95 th)
Greenbank Road & Strandherd Drive Signalized	EBL	C	26.8	0.54	38.2
	EBT	E	61.2	0.93	#174.9
	EBR	A	0.5	0.14	0.0
	WBL	E	72.8	0.93	#119.5
	WBT	D	37.7	0.63	117.3
	WBR	A	5.2	0.28	16.3
	NBL	E	64.6	0.48	27.4
	NBT/R	D	47.4	0.67	86.6
	SBL	E	65.7	0.68	49.5
	SBT	D	43.8	0.53	79.2
	SBR	A	2.1	0.24	3.4
	Overall	D	46.6	-	-

13.2.3 14.2.3 Intersection MMLOS

The signalization intersections have been assessed for the MMLOS targets for mixed-use arterial roads. Table 25 summarizes the MMLOS analysis and the worksheets have been provided in Appendix H.

Table 25: 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 & Marketplace Avenue	F	C	F	C	F	N/A	B	D	B	D
Greenbank Road & Strandherd Drive	F	C	F	C	F	N/A	B	D	C	D
Jockvale Road & Strandherd Drive	E	C	E	C	F	N/A	E	D	B	D

Throughout the study area, the arterial road intersections do not meet the pedestrian or bicycle MMLOS targets. This is a systemic issue with the targets and analysis, as any leg of an intersection with one of the following elements will not meet the targets set out in the MMLOS Guidelines:

- more than four lanes to cross
- on roadways with 60km/h or higher travel speeds
- multiple lanes needing to be crossed for a bike left-turn will not meet the targets set out in the MMLOS Guidelines.

Given these intersections, and recent City of Ottawa reconstruction along Greenbank Road, no improvements are recommended as part of this study.

The truck level of service at the Jockvale Road and Strandherd Drive intersection receives a LOS 'E' due to the single receiving lane on the north leg of the intersection. If Jockvale Road, heading north from Strandherd Drive, had a second receiving lane, the LOS would become a 'B'. As Jockvale Road is not a truck route, no mitigation is recommended as part of this study.

13.2.4 Recommended Design Elements

No study area intersection design elements are proposed as part of this 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 210 stacked townhome units and approximately 200,000 sq. ft. of retail space
- Accesses will be provided along Greenbank Road, the extension of Jockvale Road, and a New Collector Road
- The development is proposed to be completed as a single phase by 2026
- 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
- 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 area 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 447 two-way people trips during the AM peak hour and 1221 two-way people trips during the PM peak hour
- Of the forecasted people trips, 221 two-way trips will be vehicle trips during the AM peak hour and 586 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 west, and 5% to both the east and south

Background Conditions

- The background developments of 3201 Greenbank Road, 3311 Greenbank Road, and 3370 Greenbank Road (Phase 1 for 2026, ultimate with the Chapman Mills Drive reduction for 2031) were included in the background conditions, along with a total background growth of 10% along the mainline volumes
- By the 2031 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 and retail land-uses
- Pedestrian connections will be made along Jockvale Road to the north, to Greenbank Road, and to the Kennedy-Burnett stormwater pond
- A cycling connection will also be connected to the Kennedy-Burnett stormwater pond
- 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
- 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 the New Collector Road
- 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 intersection of Jockvale Road and the New Collector Road, including bulb-outs to narrow each approach to the intersection within both of the residential and retail parts of the subdivision at pedestrian crossing locations

Boundary Street Design

- The future widened Greenbank Road will not meet pedestrian MMLOS targets, due to auto volumes, and posted speed limits (60km/h)
- Due to the issues limiting the ability to meet the MMLOS targets, no improvements are recommended for the future Greenbank Road to meet the pedestrian MMLOS targets

Access Intersections Design

- Accesses are proposed along Greenbank Road, the Jockvale Road extension and the New Collector Road
- The accesses along Greenbank Road will be right-in/right-out, with a yield or stop control on the private approach, and will not require auxiliary turn lanes
- The accesses will have depressed curbs and sidewalks that carry across the access
- The design elements for the New Collector Road intersection, are summarized below:
 - Signalization for the future Greenbank Road and New Collector Road intersection
 - Does not meet signalization warrants, although operationally will be required to facilitate the eastbound movements
 - Northbound and westbound auxiliary left-turn lanes, with the City minimum storage of 37.5m
 - Bike lanes along Greenbank Road and the New Collector Road

TDM

- The retail land use limits the potential for TDM measures to reduce the auto reliance anticipated for the proposed development

Transit

- No transit service is provided on the boundary road network, nor do future route plans include the proposed development at this time
- To meet minimum area transit use, a single bus, or equivalent capacity, would be required to support the proposed development during the AM peak hours, and an articulated or double decker bus would be required to support the proposed development during the PM peak hours

Network Intersection Design

- Generally, the study area intersections will operate acceptably during the background horizons, with the northbound left-turn at Greenbank Road and Strandherd Drive exceeding the capacity in both horizons
- A revision to the signal timing and cycle length (up to 130 seconds) would provide the additional capacity required and would need to be completed as part of a corridor signal timing adjustments along Strandherd Drive to ensure the appropriate corridor progression
- The MMLOS analysis identified that the pedestrian and bicycle targets cannot be met on the study area intersections due to intersection legs having more than four lanes to cross, 60km/h or higher travel speeds, or multiple lanes needing to be crossed for a bike left-turn
- The Jockvale Road and Strandherd Drive intersection did not meet the truck LOS on the north leg of the intersection due to a single receiving lane, although no mitigation is recommended as Jockvale Road is not a truck route

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



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 licensed¹ or registered² professional in good standing, whose field of expertise [check appropriate field(s)] is either transportation engineering or transportation planning .

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


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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



City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date: November 5, 2018
Project Number: 2018-46
Project Reference: Richcraft Barrhaven Towncentre

1.1 Description of Proposed Development	
Municipal Address	3194 Jockvale Road
Description of Location	NEPEAN CON 3 RF PT LOT 15 RP; 4R25501 PARTS 1 TO 3
Land Use Classification	Residential and Commerical/Retail
Development Size	210 apartment units, 200,855 sq. ft retail
Accesses	2 RIRO & 1 Signal on Greenbank, Extend Jockvale
Phase of Development	2
Buildout Year	2022
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger	
Land Use Type	Townhomes or apartments
Development Size	210 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?	Yes
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

Appendix B

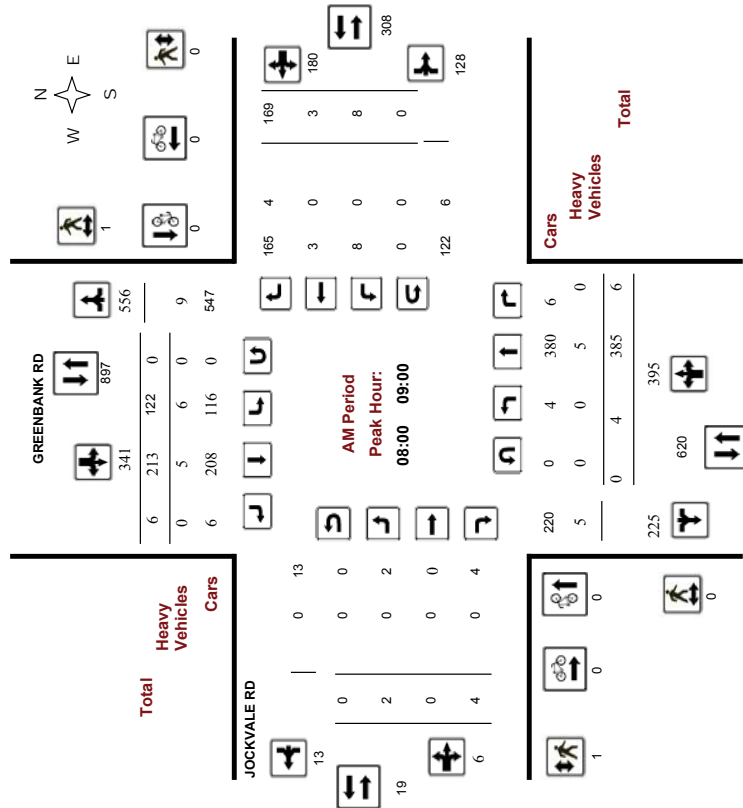
Turning Movement Counts



Transportation Services - Traffic Services
Turning Movement Count - Full Study Peak Hour Diagram
GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016
 Start Time: 07:00

WO No: 36178
 Device: Miovision



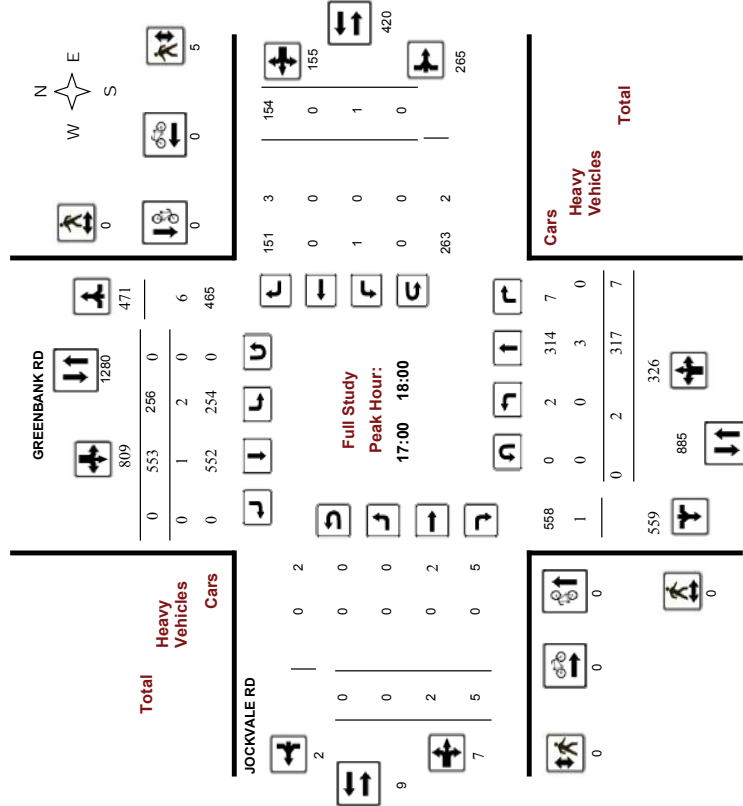
Comments



Transportation Services - Traffic Services
Turning Movement Count - Full Study Peak Hour Diagram
GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016
 Start Time: 07:00

WO No: 36178
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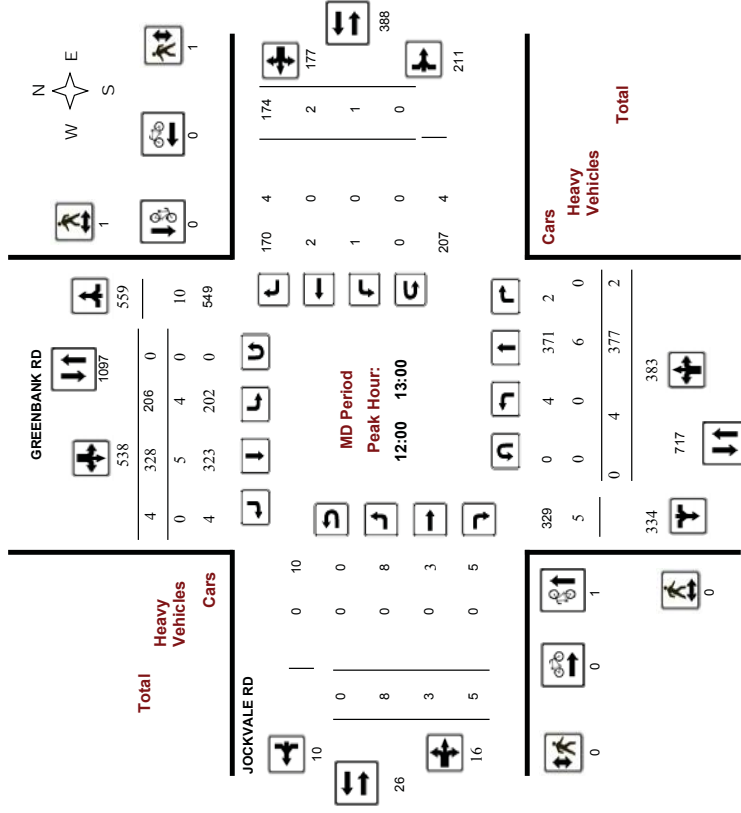
Comments



Transportation Services - Traffic Services
Turning Movement Count - Full Study Peak Hour Diagram
GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016
 Start Time: 07:00

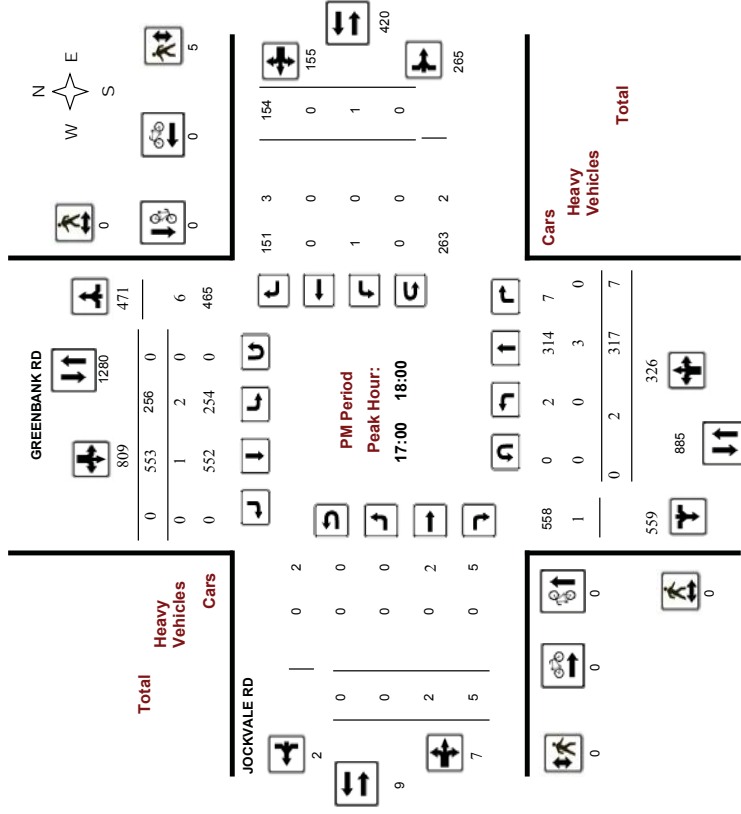
WO No: 36178
 Device: MiVision



Transportation Services - Traffic Services
Turning Movement Count - Full Study Peak Hour Diagram
GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016
 Start Time: 07:00

WO No: 36178
 Device: MiVision





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

AAADT Factor
0.90

WO#: 36178

Device: Miovision

Survey Date: Tuesday, August 16, 2016



Transportation Services - Traffic Services

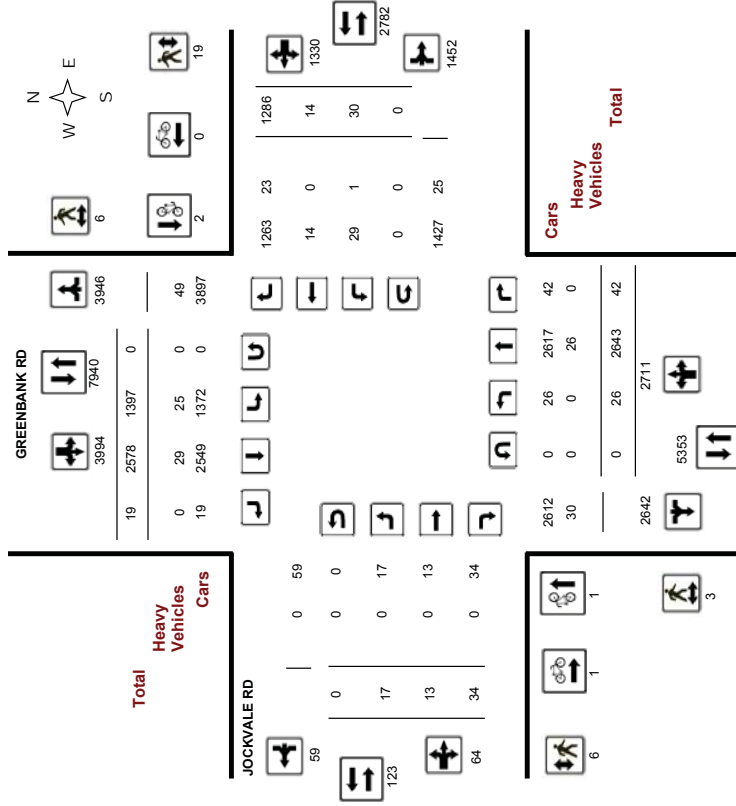
Turning Movement Count - Full Study Diagram

GREENBANK RD @ JOCKVALE RD

WO#: 36178

Device: Miovision

Survey Date: Tuesday, August 16, 2016



Survey Date: Tuesday, August 16, 2016

Total Observed U-Turns
Northbound: 0 Southbound: 0
Eastbound: 0 Westbound: 0

AAADT Factor
0.90

WO#: 36178

Device: Miovision

Survey Date: Tuesday, August 16, 2016



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

AAADT Factor
0.90

WO#: 36178

Device: Miovision

Survey Date: Tuesday, August 16, 2016



Transportation Services - Traffic Services

Turning Movement Count - Full Study Diagram

GREENBANK RD @ JOCKVALE RD

WO#: 36178

Device: Miovision

Survey Date: Tuesday, August 16, 2016

Period	Northbound				Southbound				Eastbound				Westbound				Grand Total	STR TOT	WB TOT
	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT			
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	0	0	0	0	0	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 volumes 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

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

TOTAL: 26 2843 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 Work Order 36178
Turning Movement Count - Cyclist Volume Report

GREENBANK RD @ JOCKVALE RD

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

Time Period	GREENBANK RD			JOCKVALE RD			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street 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:



Transportation Services - Traffic Services

W.O. 36178

Turning Movement Count - Heavy Vehicle Report

GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

Time Period	Northbound						Southbound						Eastbound						Westbound						Grand Total	
	GREENBANK RD			JOCKVALE RD			GREENBANK RD			JOCKVALE RD			GREENBANK RD			JOCKVALE RD			GREENBANK RD			JOCKVALE RD				
	LT	ST	RT	N	LT	ST	RT	LT	ST	RT	S	STR	TOT	LT	ST	RT	E	LT	ST	RT	LT	ST	RT	W		STR
07:00-08:00	0	2	0	2	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	7	14
08:00-09:00	0	5	0	5	0	6	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	20
09:00-10:00	0	5	0	5	0	4	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	19
11:30-12:30	0	5	0	5	0	5	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	16
12:30-13:30	0	6	0	6	0	6	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	19
15:00-16:00	0	0	0	0	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	6
16:00-17:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17:00-18:00	0	3	0	3	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	9
Sub Total	0	26	0	26	0	25	0	54	0	0	0	0	0	0	0	0	0	0	0	0	0	23	24	24	104	
U-Turns (Heavy Vehicles)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	26	0	26	0	25	0	54	0	0	0	0	0	0	0	0	0	0	0	0	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)	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Total	Grand Total
07:00-07:15	0	0	0	0	0	0	0
07:15-07:30	0	0	0	0	0	0	0
07:30-07:45	0	0	0	0	0	0	0
07:45-08:00	0	0	0	0	0	0	0
07:00-08:00	0	0	0	0	0	0	0
08:00-08:15	0	0	0	0	0	0	0
08:15-08:30	0	0	0	0	0	0	0
08:30-08:45	0	0	0	0	0	0	0
08:45-09:00	0	0	0	0	0	0	0
08:00-09:00	0	0	0	0	0	0	0
09:00-09:15	0	2	2	3	5	5	7
09:15-09:30	0	0	0	0	0	0	0
09:30-09:45	0	2	0	3	3	3	5
09:45-10:00	0	0	0	0	0	0	0
09:00-10:00	0	4	2	7	9	9	13
10:00-11:00	0	0	0	0	0	0	0
11:30-12:30	0	1	0	2	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	0	3	3	6
12:30-13:30	3	0	3	0	3	3	6
15:00-15:15	0	0	0	0	0	0	0
15:15-15:30	0	0	0	0	0	0	0
15:30-15:45	0	0	0	0	0	0	0
15:45-16:00	0	0	0	0	0	0	0
15:00-16:00	0	0	0	0	0	0	0
16:00-16:15	0	0	0	0	0	0	0
16:15-16:30	0	0	0	0	0	0	0
16:30-16:45	0	0	0	0	0	0	0
16:45-17:00	0	0	0	0	0	0	0
16:00-17:00	0	0	0	0	0	0	0
17:00-17:15	0	0	0	0	0	0	0
17:15-17:30	0	0	0	0	0	0	0
17:30-17:45	0	0	0	0	0	0	0
17:45-18:00	0	0	0	0	0	0	0
17:00-18:00	0	0	0	0	0	0	0
Total	3	6	6	19	25	25	34

Comment:

Transportation Services - Traffic Services



Turning Movement Count - 15 Min U-Turn Total Report
GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

Time Period	Northbound		Southbound		Eastbound		Westbound		Total
	U-Turn	Total	U-Turn	Total	U-Turn	Total	U-Turn	Total	
07:00	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0

Transportation Services - Traffic Services



Turning Movement Count - Pedestrian Volume Report
GREENBANK RD @ JOCKVALE RD

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

Time Period	SB Approach (E or W Crossing)		Total	EB Approach (N or S Crossing)		WB Approach (N or S Crossing)	Total	Grand Total
	(E or W Crossing)	(E or W Crossing)		(N or S Crossing)	(N or S Crossing)			
07:00	0	0	0	0	0	0	0	0
07:15	0	0	0	0	1	1	1	1
07:30	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0
07:00	0	0	0	0	1	1	1	1
08:00	0	0	0	1	0	0	1	1
08:15	0	0	0	0	0	0	0	0
08:30	1	0	1	0	0	0	1	1
08:45	0	0	0	0	0	0	0	0
08:00	0	1	1	1	0	0	2	2
09:00	2	2	4	3	5	7	11	11
09:15	0	0	0	0	0	0	0	0
09:30	2	2	4	3	3	6	10	10
09:45	0	0	0	1	1	2	3	3
09:00	0	4	4	7	9	13	21	21
11:30	0	0	0	1	1	2	3	3
11:45	0	0	0	0	0	0	0	0
12:00	1	1	2	1	1	2	4	4
12:15	0	0	0	0	0	0	0	0
12:30	1	1	2	2	2	4	6	6
12:45	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0
13:15	3	3	6	3	3	6	12	12
13:30	3	3	6	3	3	6	12	12
13:45	0	0	0	0	0	0	0	0
15:00	0	0	0	2	2	4	6	6
15:15	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0
15:00	0	0	0	0	1	1	2	2
16:00	0	0	0	0	3	3	6	6
16:15	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0
16:00	0	0	0	0	1	1	2	2
17:00	0	0	0	0	1	1	2	2
17:15	0	0	0	0	2	2	4	4
17:30	0	0	0	0	0	0	0	0
17:45	0	0	0	0	3	3	6	6
17:00	0	0	0	5	5	10	15	15
17:15	3	6	9	6	19	25	34	34

Comment:



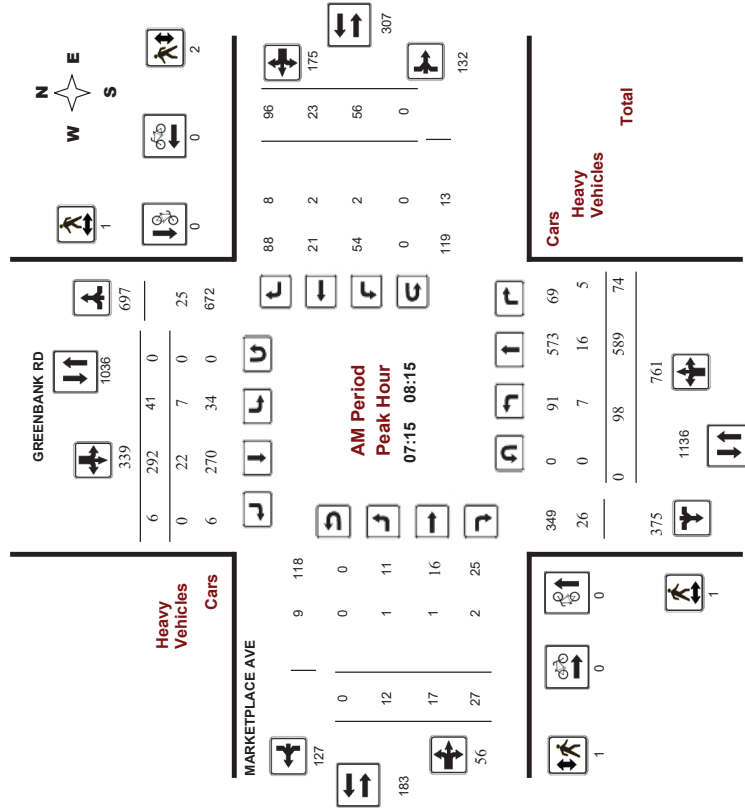
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016
Start Time: 07:00

WO No: 35721
Device: Miovision



Comments



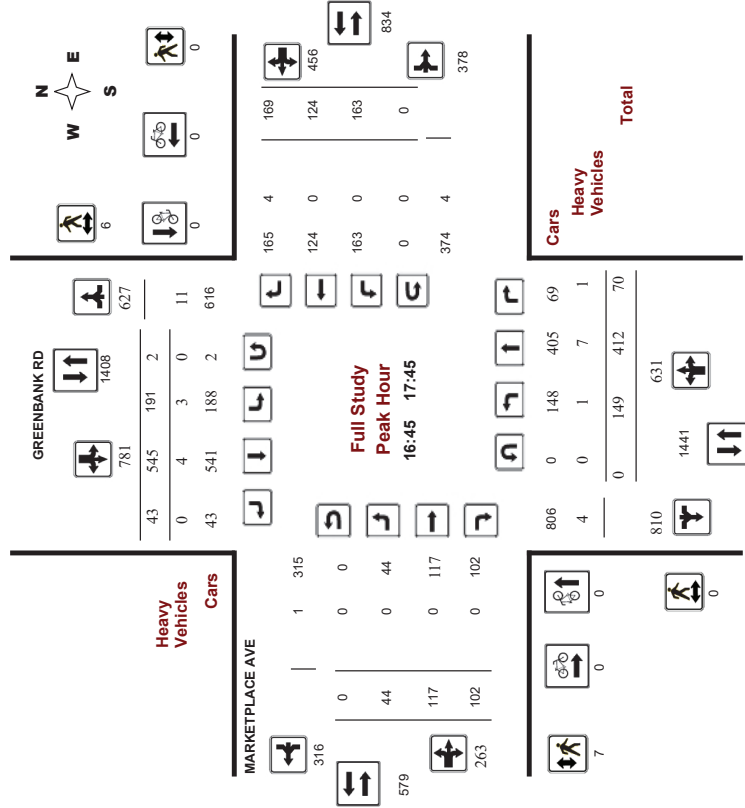
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016
Start Time: 07:00

WO No: 35721
Device: Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

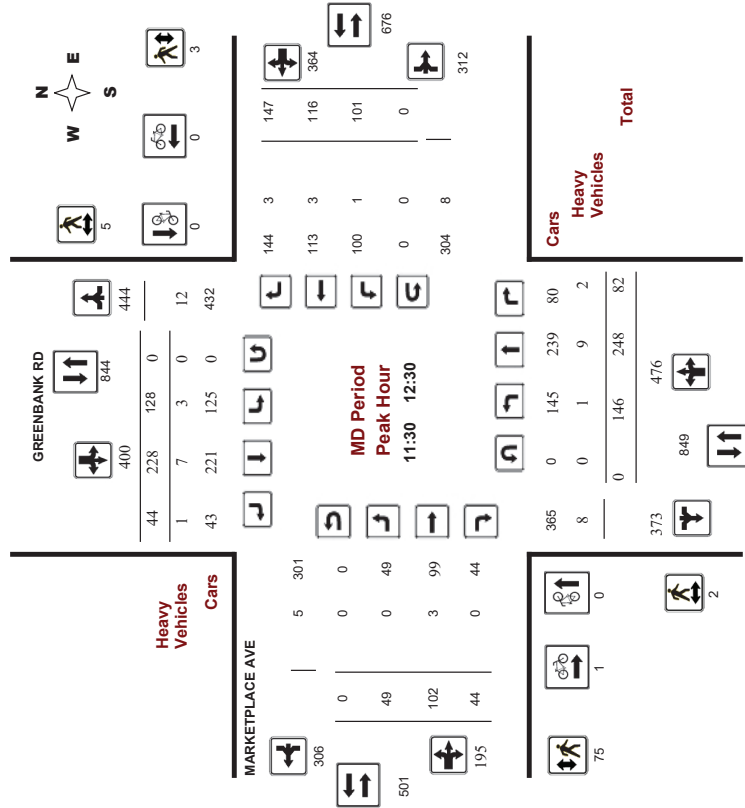
GREENBANK RD @ MARKETPLACE AVE

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

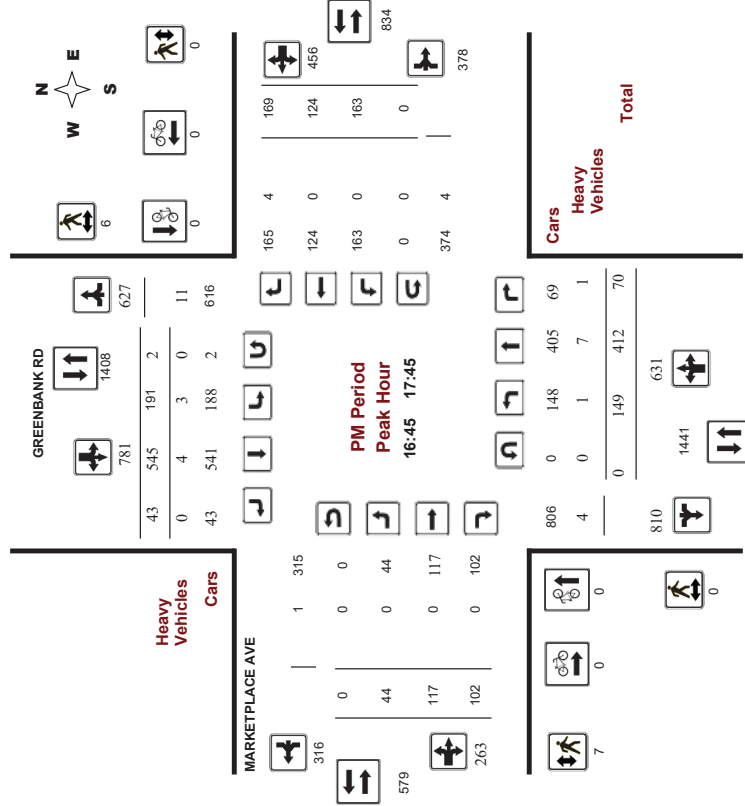
GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

WO No: 35721

Start Time: 07:00

Device: Miovision



Comments



Transportation Services - Traffic Services

Work Order 35721

Turning Movement Count - Full Study Summary Report

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

AA DT Factor

1.00

Total Observed U-Turns

1.00

Northbound: 0
Southbound: 7
Eastbound: 0
Westbound: 0

Full Study

Period	GREENBANK RD						MARKETPLACE AVE						Grand Total						
	Northbound			Southbound			Eastbound			Westbound									
	LT	ST	RT	LT	ST	RT	LT	ST	RT	LT	ST	RT							
07:00-08:00	75	543	78	696	34	281	6	321	1017	10	18	20	48	53	25	90	188	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	1435
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	282	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	1289	3638	338	5254	11186	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: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.

1.00

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

1.31

Comments:

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



Transportation Services - Traffic Services

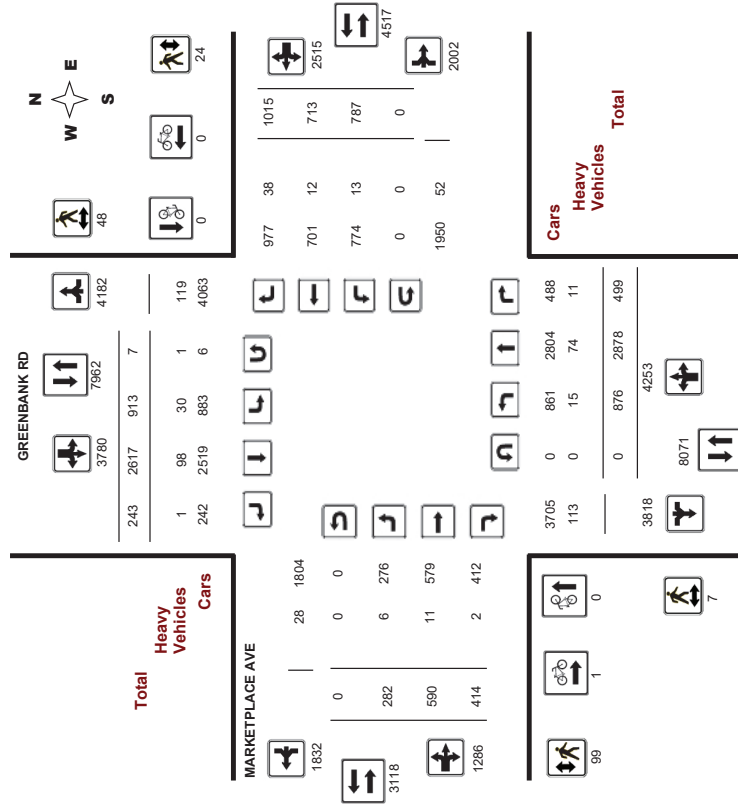
Turning Movement Count - Full Study Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

WO#: 35721

Device: Miovision



Comments



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

Time Period	Northbound				Southbound				Eastbound				Westbound				W STR TOT	R STR TOT	L STR TOT	Grand Total
	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT				
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	61	118	17	156	11	52	11	80	198	5	11	9	25	17	17	22	56	81	279	
09:30-09:45	27	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	288	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 Work Order 35721

Turning Movement Count - Cyclist Volume Report

GREENBANK RD @ MARKETPLACE AVE

Count Date: Wednesday, February 10, 2016

Start Time: 07:00

Time Period	GREENBANK RD			MARKETPLACE AVE			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street 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

Table with columns for Time Period, Northbound (LT, ST, RT, N, LT, ST, RT, S, STR, TOT), Eastbound (LT, ST, RT, E, LT, ST, RT, W, STR, TOT), and Grand Total. Includes sub-totals for U-Turns (Heavy Vehicles) and a final Total row.



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

Table with columns for 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, and Grand Total. Shows pedestrian counts across various time intervals.

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		Southbound		Eastbound		Westbound		Total
	U-Turn	Total	U-Turn	Total	U-Turn	Total	U-Turn	Total	
07:00	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0
08:55	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0
10:00	0	1	0	0	0	0	0	0	1
11:30	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0
13:00	0	1	0	0	0	0	0	0	1
13:15	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0
15:45	0	1	0	0	0	0	0	0	1
16:00	0	1	0	0	0	0	0	0	1
16:15	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0
16:55	0	0	0	0	0	0	0	0	0
17:00	0	2	0	0	0	0	0	0	2
17:15	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0
18:00	0	1	0	0	0	0	0	0	1
Total	0	7	0	0	0	0	0	0	7



Transportation Services - Traffic Services

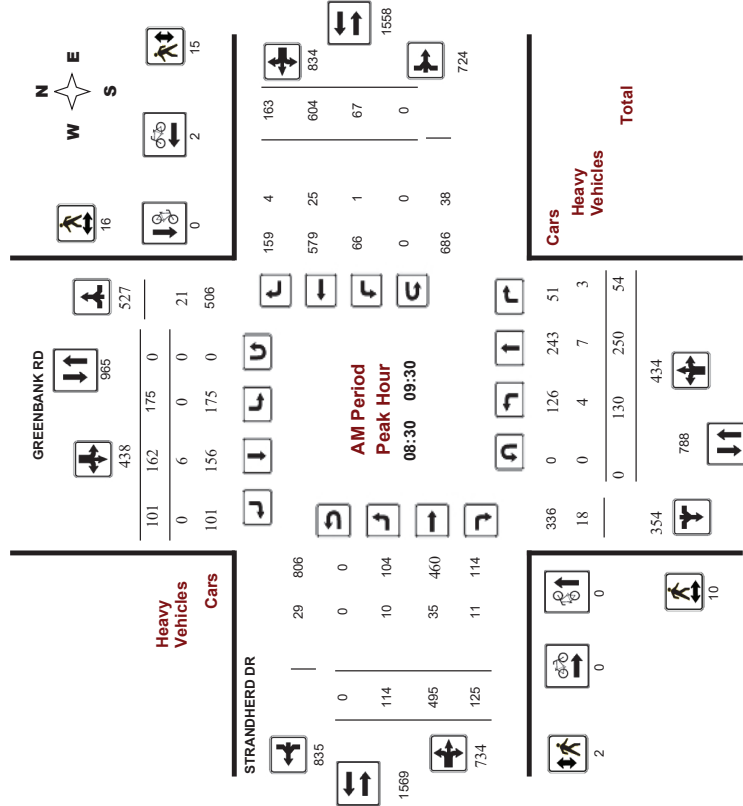
Turning Movement Count - Peak Hour Diagram GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Start Time: 07:00

WO No: 36175

Device: Miovision





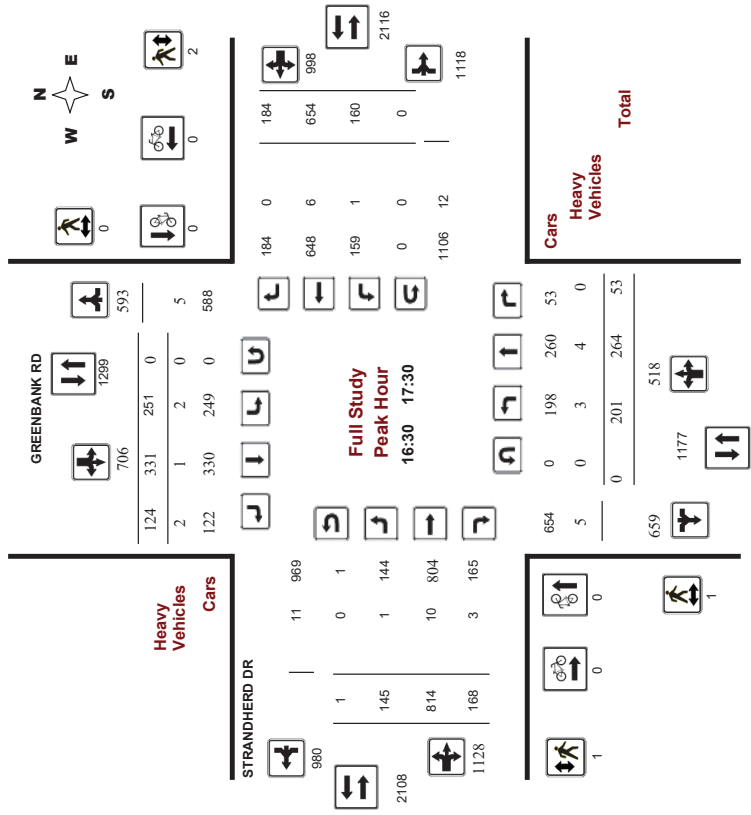
Transportation Services - Traffic Services
Turning Movement Count - Peak Hour Diagram
GREENBANK RD @ STRANDHERD DR



Transportation Services - Traffic Services
Turning Movement Count - Peak Hour Diagram
GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016
 Start Time: 07:00

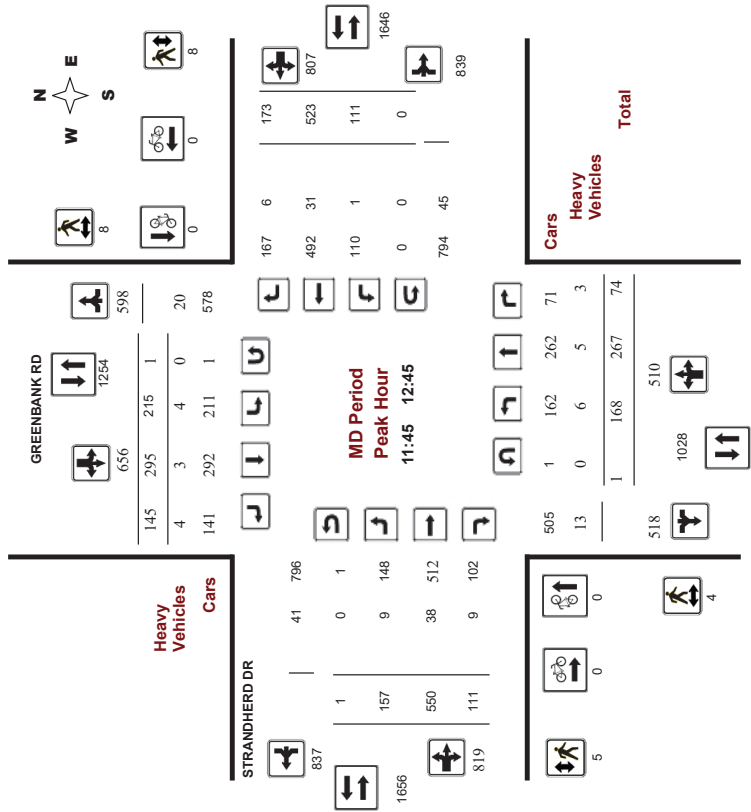
WO No: 36175
 Device: Miovision



Comments

Survey Date: Tuesday, August 16, 2016
 Start Time: 07:00

WO No: 36175
 Device: Miovision



Comments

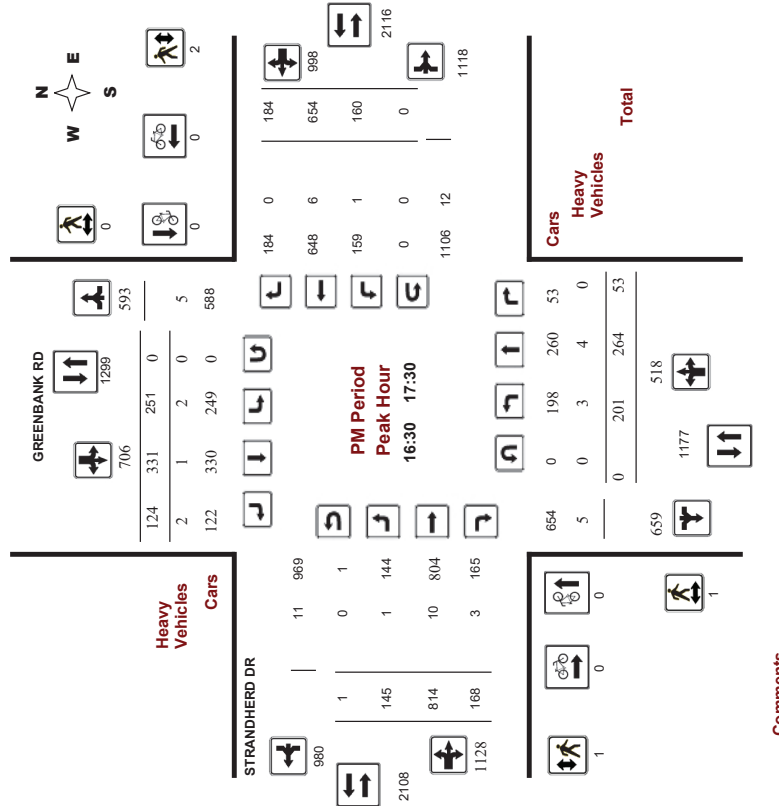


Transportation Services - Traffic Services
Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016
 Start Time: 07:00

WO No: 36175
 Device: Miovision



Comments

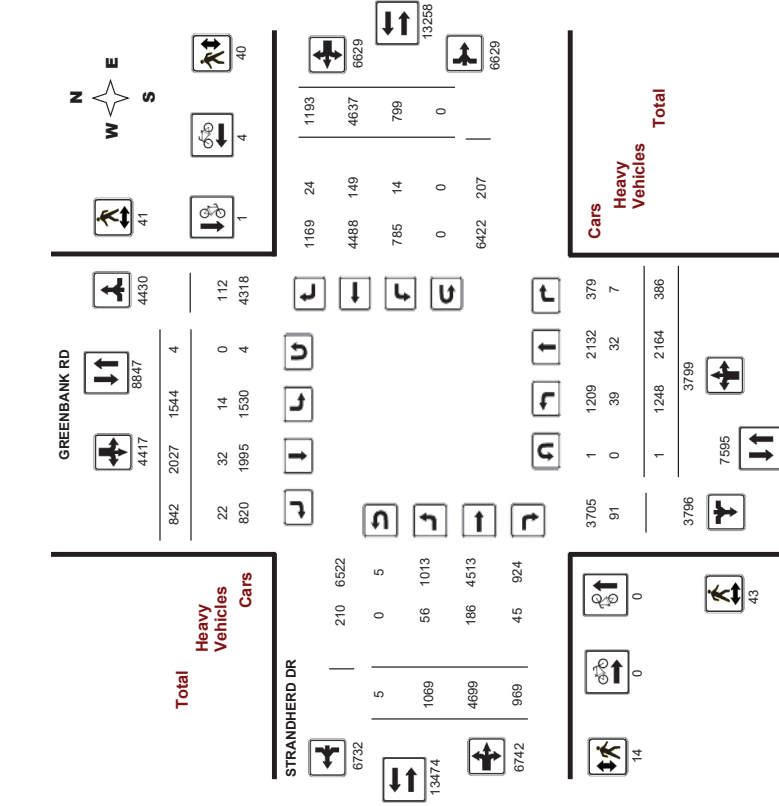


Transportation Services - Traffic Services
Turning Movement Count - Full Study Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

WO#: 36175
 Device: Miovision



Comments

Transportation Services - Traffic Services

Transportation Services - Traffic Services

Turning Movement Count - Full Study Summary Report

Turning Movement Count - 15 Minute Summary Report

GREENBANK RD @ STRANDHERD DR

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Survey Date: Tuesday, August 16, 2016

Total Observed U-Turns
Northbound: 1 Southbound: 4
Eastbound: 5 Westbound: 0

Total Observed U-Turns
Northbound: 1 Southbound: 4
Eastbound: 5 Westbound: 0

Period	GREENBANK RD								STRANDHERD DR								WB TOT	STR TOT	Grand Total
	Northbound				Southbound				Eastbound				Westbound						
	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT			
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	2386
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	695	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	1990	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	1	0	2	4	4	0	8	5	5	0	10	5	5	0	10	0	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	18595	30006
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.																			
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.																			
AVG 24hr	2045	3546	633	6226	2530	3322	1380	7239	13465	1752	7701	1588	11049	1309	7598	1955	10864	21913	35378
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.																			

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

GREENBANK RD

GREENBANK RD

Time Period	Northbound								Southbound								Eastbound								Westbound																							
	LT				ST				RT				TOT				LT				ST				RT				TOT				LT				ST				RT				TOT			
	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT	LT	ST	RT	TOT												
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.

2018-Nov-21

Page 1 of 1



Transportation Services - Traffic Services
Turning Movement Count - Cyclist Volume Report

Work Order
36175

Count Date: Tuesday, August 16, 2016

Start Time: 07:00

Time Period	GREENBANK RD		STRAHDHERD DR		Grand Total
	Northbound	Southbound	Street Total	Westbound	
07:00 08:00	0	1	1	0	1
08:00 09:00	0	0	0	2	2
09:00 10:00	0	0	0	1	1
11:30 12:30	0	0	0	1	1
12:30 13:30	0	0	0	0	0
15:00 16:00	0	0	0	0	0
16:00 17:00	0	0	0	0	0
17:00 18:00	0	0	0	0	0
Total	0	1	1	4	5

Comment:



Transportation Services - Traffic Services

W.O.
36175

Turning Movement Count - Heavy Vehicle Report

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Time Period	GREENBANK RD						STRAHDHERD DR						Grand Total						
	Northbound			Southbound			Eastbound			Westbound									
	LT	ST	RT	N	LT	ST	RT	S	STR	LT	ST	RT		E	LT	ST	RT	W	STR
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	0	0	0	0	0	0	0	0	0	0	0	0
Total	39	32	7	78	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



Turning Movement Count - 15 Min U-Turn Total Report
GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Time Period	Northbound		Southbound		Eastbound		Westbound		Total
	U-Turn	Total	U-Turn	Total	U-Turn	Total	U-Turn	Total	
07:00	0	0	0	0	0	0	0	0	0
07:15	0	0	1	1	0	0	0	0	1
07:30	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	1	1	0	0	1
08:15	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	1	1	0	0	1
11:30	0	0	0	0	1	1	0	0	1
11:45	1	1	0	0	1	1	0	0	2
12:00	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0
12:30	0	0	1	1	0	0	0	0	1
12:45	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0
15:30	0	0	1	1	0	0	0	0	1
15:45	0	0	1	1	0	0	0	0	1
16:00	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	1	1	0	0	1
17:15	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0
Total	1	1	4	4	5	5	0	0	10

Transportation Services - Traffic Services
Turning Movement Count - Pedestrian Volume Report



GREENBANK RD @ STRANDHERD DR

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

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

Comment:



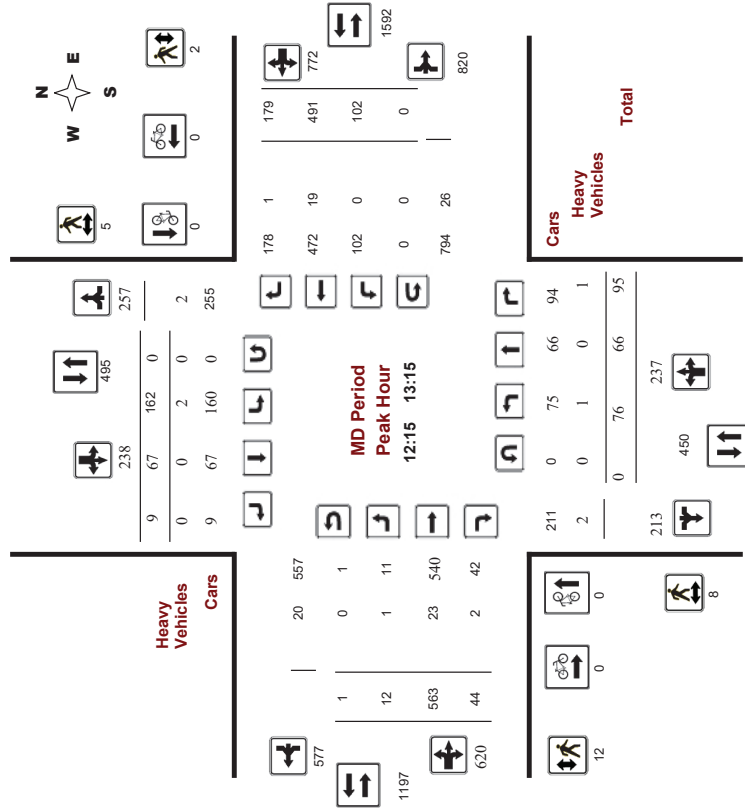
Transportation Services - Traffic Services
Turning Movement Count - Peak Hour Diagram
JOCKVALE RD @ STRANDHERD DR



Transportation Services - Traffic Services
Turning Movement Count - Peak Hour Diagram
JOCKVALE RD @ STRANDHERD DR

Survey Date: Thursday, January 18, 2018
 Start Time: 07:00

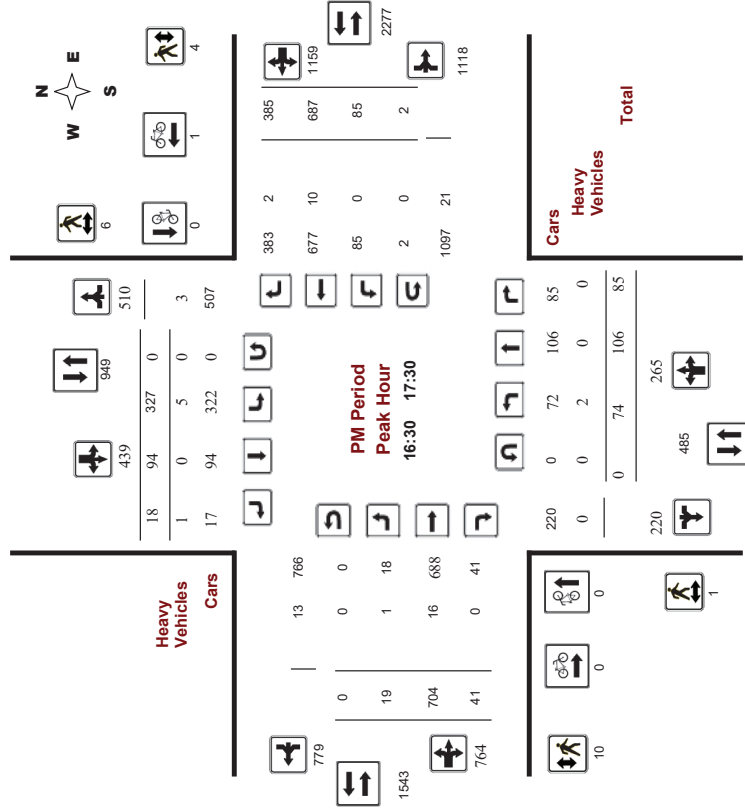
WO No: 37499
 Device: Miovision



Comments

Survey Date: Thursday, January 18, 2018
 Start Time: 07:00

WO No: 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

WO#: 37499

Device: Miovision

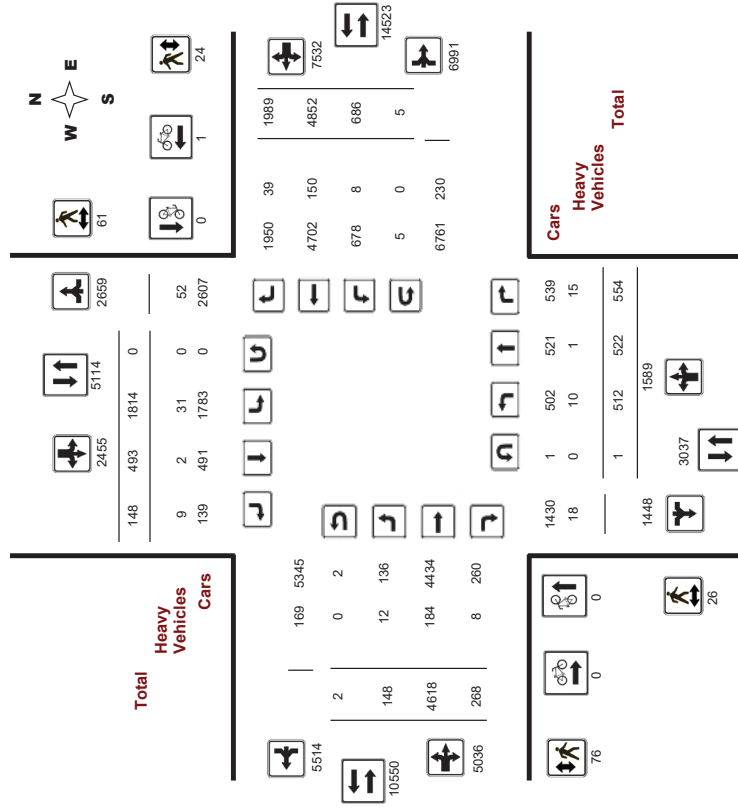
Survey Date: Thursday, January 18, 2018



Transportation Services - Traffic Services

Turning Movement Count - Full Study Diagram

JOCKVALE RD @ STRANDHERD DR



Comments

Period	Northbound					Southbound					Eastbound					Westbound					Grand Total				
	LT	ST	RT	TOT	STR	LT	ST	RT	TOT	STR	LT	ST	RT	TOT	STR	LT	ST	RT	TOT	STR					
07:00-08:00	36	18	20	74	251	42	9	302	376	16	504	9	529	33	599	176	808	1337	1713	808					
08:00-09:00	29	44	43	116	234	42	21	297	413	24	551	11	586	49	756	259	1064	1650	2063	1064					
09:00-10:00	65	40	52	157	209	38	14	261	418	15	439	26	480	97	557	153	807	1287	1705	807					
11:30-12:30	77	64	83	224	160	51	13	224	448	5	487	52	544	109	473	179	761	1305	1753	761					
12:30-13:30	82	67	98	247	158	75	12	245	492	13	552	39	604	110	472	186	768	1372	1864	768					
15:00-16:00	69	85	81	235	212	68	27	307	542	23	649	34	706	116	643	330	1089	1795	2337	1089					
16:00-17:00	81	101	88	270	297	84	26	407	677	29	727	51	807	88	650	356	1124	1931	2608	1124					
17:00-18:00	73	103	89	265	293	93	26	412	677	23	709	46	778	84	672	350	1106	1884	2561	1106					
Sub Total	512	522	554	1588	1814	483	148	2455	4043	148	4618	268	5034	686	4852	1989	7527	12561	16604	7527					
U-Turns	1					0					2					5					7				
Total	512	522	554	1589	1814	483	148	2455	4044	148	4618	268	5036	686	4852	1989	7532	12568	16612	7532					
EQ 12hr	712	726	770	2209	2521	685	206	3412	5621	206	6419	373	7000	954	6744	2765	10469	17469	23090	10469					
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	10469					
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	7963	269	8409	488	9170	1249	8835	3622	13715	22885	30248	13715					
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. 1.31																									

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

Comments:



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

Time Period	Northbound				Southbound				Eastbound				Westbound				W STR TOT	S TR TOT	E TR TOT	W STR TOT	S TR TOT	E TR TOT	Grand Total
	L	T	R	T	L	T	R	T	L	T	R	T	L	T	R	T							
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 12566 16812

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services W.O. 37499
Turning Movement Count - Cyclist Volume Report

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
	N	T	S	T	N	T	E	T	W	T	S	T	
07:00-08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00-09:00	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00-10:00	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30-12:30	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30-13:30	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00-16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-17:00	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00-18:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	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			W STR TOT	STR TOT	RT	Grand Total			
	LT	ST	RT	N TOT	LT	ST	RT	S STR TOT	LT	ST	RT	E TOT					LT	ST	RT
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	0	0	0	0	0	0	0	0	0	0	0	0
Total	10	1	15	26	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)	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Total	Grand Total
07:00-07:15	0	0	2	0	0	2	2
07:15-07:30	0	1	1	0	1	1	2
07:30-07:45	1	2	3	5	0	5	8
07:45-08:00	0	4	4	1	2	6	6
07:00-08:00	1	7	9	1	10	10	18
08:00-08:15	0	0	0	0	0	0	0
08:15-08:30	0	3	1	0	0	1	4
08:30-08:45	2	3	2	0	2	7	7
08:45-09:00	0	2	2	0	2	4	4
08:00-09:00	2	8	5	0	5	5	15
09:00-09:15	2	3	1	0	0	1	6
09:15-09:30	1	4	1	0	0	1	6
09:30-09:45	1	0	0	1	1	1	2
09:45-10:00	0	2	3	2	1	4	6
09:00-10:00	4	9	5	2	7	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	4	16	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		Southbound		Eastbound		Westbound		Total
	U-Turn	Total	U-Turn	Total	U-Turn	Total	U-Turn	Total	
07:00	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	1	1	1
09:30	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	1	1	1
12:00	0	0	0	0	0	0	1	1	1
12:15	0	0	0	0	1	0	0	0	1
12:30	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0
15:30	1	0	0	0	0	0	0	0	1
15:45	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	1	0	0	0	1
16:15	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	1	1	1
16:45	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	1	1	1
17:15	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0
Total	1	0	0	2	2	5	8	8	8

Appendix C

Synchro Intersection Worksheets – Existing Conditions

Lanes, Volumes, Timings
1: Greenbank & Jockvale

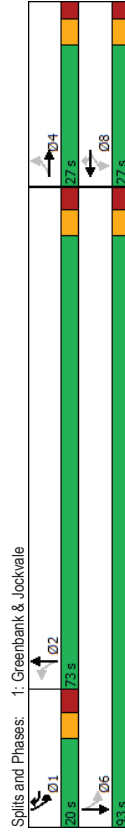
01-28-2019

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2	0	4	8	3	169	4	393	6	122	217	6
Traffic Volume (vph)	2	0	4	8	3	169	4	393	6	122	217	6
Future Volume (vph)	0	1563	0	0	1682	1483	0	1742	0	1658	1738	0
Satd. Flow (prot)	0	1563	0	0	1682	1483	0	1742	0	1658	1738	0
Flt Permitted							0.998			0.472		
Satd. Flow (perm)	0	1568	0	0	1745	1483	0	1738	0	824	1738	0
Satd. Flow (RTOR)	102			188			1			3		
Lane Group Flow (vph)	0	6	0	0	12	188	0	448	0	136	248	0
Turn Type	Perm	NA	Perm	NA	pm-ov	Perm	NA	pm-pt	NA			
Protected Phases	4	4	8	8	2	2	1	6				
Permitted Phases	4	4	8	8	2	2	1	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	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0	27.0	20.0	73.0	73.0	20.0	93.0	20.0	93.0	20.0
Total Split (s)	27.0	27.0	27.0	27.0	20.0	73.0	73.0	20.0	93.0	20.0	93.0	20.0
Total Split (%)	22.5%	22.5%	22.5%	22.5%	16.7%	60.8%	60.8%	16.7%	77.5%	16.7%	77.5%	16.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.7	2.7	2.7	2.7	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.0	10.0	10.0	9.6	73.0	73.0	9.6	86.8	92.6	9.6	86.8	92.6
Actuated G/C Ratio	0.10	0.10	0.10	0.10	0.75	0.75	0.10	0.90	0.96	0.10	0.90	0.96
v/c Ratio	0.02	0.02	0.02	0.07	0.59	0.59	0.02	0.34	0.17	0.15	0.34	0.17
Control Delay	0.2	0.2	0.2	42.5	13.8	13.8	5.9	1.6	1.1	1.6	1.1	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.2	0.2	0.2	42.5	13.8	13.8	5.9	1.6	1.1	1.6	1.1	1.1
LOS	A	A	A	D	B	B	A	A	A	A	A	A
Approach Delay	0.2	0.2	0.2	15.5	5.9	5.9	1.3	1.3	1.3	1.3	1.3	1.3
Approach LOS	A	A	A	B	A	A	A	A	A	A	A	A
Queue Length 50th (m)	0.0	0.0	0.0	2.1	0.0	18.3	0.4	0.4	0.0	0.4	0.0	0.0
Queue Length 95th (m)	0.0	0.0	0.0	8.7	18.0	65.4	10.0	17.4	10.0	17.4	10.0	17.4
Internal Link Dist (m)	194.4			396.8			294.1			283.1		
Turn Bay Length (m)												
Base Capacity (vph)	419			372	399	1310	850	1663	850	1663	850	1663
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	0.01			0.03	0.47	0.34	0.16	0.15	0.16	0.15	0.16	0.15
Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 96.8												
Natural Cycle: 120												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.59												

Lanes, Volumes, Timings
1: Greenbank & Jockvale

01-28-2019

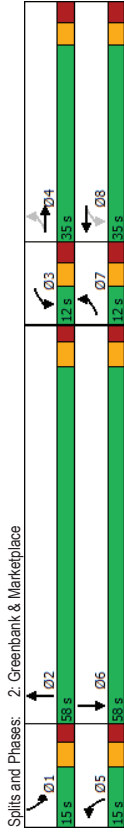
Intersection Signal Delay: 6.0	Intersection LOS: A
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	12	17	27	56	23	96	98	98	74	41	292	6
Traffic Volume (vph)	12	17	27	56	23	96	98	98	74	41	292	6
Future Volume (vph)	1688	1585	0	1658	1534	0	1688	3259	0	3216	3306	0
Satd. Flow (prot)	0.672			0.590			0.950					
Flt Permitted	1173	1685	0	1030	1534	0	1658	3259	0	3216	3306	0
Satd. Flow (perm)	30			107			14					
Satd. Flow (RTOR)	13	49	0	62	133	0	109	736	0	46	331	0
Lane Group Flow (vph)	pm-pt	NA	pm+pt	NA	Prot	NA	Prot	NA	Prot	NA		
Turn Types	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	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	15.1	10.6		18.9	17.7		8.7	59.3		6.9	52.4	
Actuated G/C Ratio	0.15	0.11		0.19	0.18		0.09	0.59		0.07	0.52	
v/c Ratio	0.06	0.25		0.27	0.37		0.76	0.38		0.21	0.19	
Control Delay	31.9	25.4		35.6	14.7		77.6	13.2		47.2	13.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.9	25.4		35.6	14.7		77.6	13.2		47.2	13.7	
LOS	C	C		D	B		E	B		D	B	
Approach Delay	26.7			21.3			21.5			17.7		
Approach LOS	C			C			C			B		
Queue Length 50th (m)	2.2	3.7		10.5	4.3		22.5	45.6		4.7	18.6	
Queue Length 95th (m)	7.2	15.0		21.9	23.4		45.7	66.2		10.6	28.8	
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)	204	473		229	513		144	1934		279	1730	
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	0.06	0.10		0.27	0.26		0.76	0.38		0.16	0.19	

Intersection Signal Delay: 20.8
Intersection Capacity Utilization 49.6%
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection LOS: C
ICU Level of Service A



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	0.195			0.382			0.950			0.950		
Satd. Flow (perm)	340	3316	1483	667	3316	1483	3216	3226	0	3216	3316	1483
Satd. Flow (RTOR)	149			181			220			220		149
Lane Group Flow (vph)	127	550	139	74	671	181	144	388	0	194	180	112
Turn Type	pm-pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4	3	8	8	5	2			1	6	
Permitted Phases	4	4	4	8	8	8	5	2		1	6	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	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	40.6	31.9	31.9	34.8	26.6	26.6	10.1	29.8	11.7	31.4	31.4	31.4
Actuated G/C Ratio	0.39	0.30	0.30	0.33	0.25	0.25	0.10	0.28	0.11	0.30	0.30	0.30
v/c Ratio	0.48	0.55	0.25	0.25	0.80	0.35	0.46	0.36	0.54	0.18	0.20	0.20
Control Delay	25.6	34.0	5.4	21.0	44.6	6.7	51.5	31.3	51.2	30.0	3.1	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	34.0	5.4	21.0	44.6	6.7	51.5	31.3	51.2	30.0	3.1	3.1
LOS	C	C	A	C	D	A	D	C	D	C	C	A
Approach Delay	27.8			35.3			37.3			32.2		
Approach LOS	C			D			D			C		
Queue Length 50th (m)	16.7	53.4	0.0	9.4	71.2	0.0	15.4	28.8	20.7	15.2	0.0	0.0
Queue Length 95th (m)	30.7	77.4	12.9	19.5	98.2	17.0	27.7	48.8	34.8	27.8	7.0	7.0
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)	291	1109	595	366	1101	613	547	930	547	991	547	547
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.50	0.23	0.20	0.61	0.30	0.26	0.36	0.35	0.18	0.20	0.20

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	104.9
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.80

Intersection Signal Delay: 32.9
Intersection LOS: C
ICU Level of Service B
Intersection Capacity Utilization 60.3%
Analysis Period (min) 15



Splits and Phases: 3: Greenbank & Strandherd

Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019

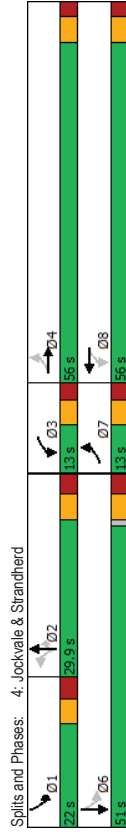
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2	2	2	2	2	2	2	2	2	2	2	2
Traffic Volume (vph)	22	590	11	44	744	264	33	33	35	259	47	18
Future Volume (vph)	22	590	11	44	744	264	33	33	35	259	47	18
Satd. Flow (prot)	1658	3306	0	1658	3186	0	1658	1745	1483	1658	1672	0
Flt Permitted	0.177			0.330			0.710			0.391		
Satd. Flow (perm)	309	3306	0	576	3186	0	1239	1745	1483	682	1672	0
Satd. Flow (RTOR)	2			50			145			18		
Lane Group Flow (vph)	24	668	0	49	1120	0	37	43	39	288	72	0
Turn Type	pm-pt	NA		pm-pt	NA		Perm	NA	Perm	pm-pt	NA	
Protected Phases	7	4		3	8		2	2	2	1	6	
Permitted Phases	4			8			2	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	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max		None	Max		None	None	None	None	None	
Act Effct Green (s)	55.7	51.0		58.4	55.8		10.7	10.7	10.7	27.9	27.9	
Actuated G/C Ratio	0.55	0.50		0.57	0.55		0.11	0.11	0.11	0.27	0.27	
v/c Ratio	0.10	0.40		0.12	0.63		0.29	0.24	0.14	0.88	0.15	
Control Delay	11.0	19.0		10.9	19.6		51.7	48.7	1.0	60.7	22.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	11.0	19.0		10.9	19.6		51.7	48.7	1.0	60.7	22.8	
LOS	B	B		B	B		D	D	A	E	C	
Approach Delay	18.7			19.2			34.0			53.1		
Approach LOS	B			B			C			D		
Queue Length 50th (m)	2.1	50.6		4.4	74.8		7.8	9.0	0.0	54.1	8.7	
Queue Length 95th (m)	6.0	69.2		10.2	132.5		18.7	20.5	0.0	79.4	19.9	
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)	263	1656		405	1769		286	402	453	339	764	
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	0.40		0.12	0.63		0.13	0.11	0.09	0.85	0.09	

Intersection Summary	
Cycle Length:	120.9
Actuated Cycle Length:	101.8
Natural Cycle:	125
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.88

Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019

Intersection Signal Delay: 250
Intersection LOS: C
ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Splits and Phases: 4: Jockvale & Strandherd

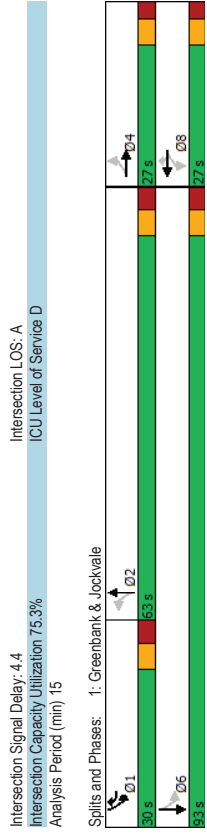
Lanes, Volumes, Timings
1: Greenbank & Jockvale

01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (vph)	0	2	5	1	0	154	2	323	7	256	564
Future Volume (vph)	0	2	5	1	0	154	2	323	7	256	564
Satd. Flow (prot)	0	1569	0	0	1658	1483	0	1740	0	1658	1745
Flt Permitted							0.998			0.512	
Satd. Flow (perm)	0	1569	0	0	1745	1483	0	1736	0	893	1745
Satd. Flow (RTOR)	6			171			1				
Lane Group Flow (vph)	0	8	0	0	1	171	0	369	0	284	627
Turn Type	NA	Perm	NA	pm-ov	Perm	NA	NA	pm-pt	NA		
Protected Phases	4	4	8	8	2	2	6				
Permitted Phases	4	4	8	8	2	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	10.0	5.0	10.0	10.0
Minimum Split (s)	27.0	27.0	27.0	27.0	30.0	63.0	63.0	63.0	30.0	93.0	93.0
Total Split (s)	27.0	27.0	27.0	27.0	30.0	63.0	63.0	63.0	30.0	93.0	93.0
Total Split (%)	22.5%	22.5%	22.5%	22.5%	25.0%	52.5%	52.5%	52.5%	25.0%	77.5%	77.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.7	2.7	2.7	2.7	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.4	6.4	6.4	6.4	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.0	10.0	10.0	10.2	71.8	86.3	92.2	86.3	92.2	86.3	92.2
Actuated g/C Ratio	0.10	0.10	0.10	0.11	0.75	0.90	0.96	0.90	0.96	0.90	0.96
v/c Ratio	0.05	0.01	0.01	0.55	0.29	0.33	0.38	0.33	0.38	0.33	0.38
Queue Delay	0.0	0.0	0.0	0.0	6.0	2.2	1.9	2.2	1.9	2.2	1.9
Queue Length	0.0	0.0	0.0	0.0	6.0	2.2	1.9	2.2	1.9	2.2	1.9
Approach Delay	29.0	29.0	29.0	12.7	6.0	2.0	2.0	6.0	2.0	2.0	2.0
Approach LOS	C	C	C	D	B	A	A	D	B	A	A
Queue Length 50th (m)	0.3	0.2	0.2	0.0	14.3	0.9	0.0	14.3	0.9	0.0	0.0
Queue Length 95th (m)	5.5	1.9	1.9	16.5	57.7	20.4	54.7	57.7	20.4	54.7	54.7
Internal Link Dist (m)	194.4			396.8		294.1	283.1				
Turn Bay Length (m)											
Base Capacity (vph)	342	374	524	1294	983	1670	1670	983	1670	983	1670
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	0.02	0.00	0.33	0.29	0.29	0.29	0.38	0.29	0.29	0.38	0.38
Intersection Summary											
Cycle Length: 120											
Actuated Cycle Length: 96.3											
Natural Cycle: 120											
Control Type: Actuated-Uncoordinated											
Maximum v/c Ratio: 0.55											

Lanes, Volumes, Timings
1: Greenbank & Jockvale

01-28-2019



Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	44	117	102	163	124	169	149	412	70	191	545	43
Future Volume (vph)	44	117	102	163	124	169	149	412	70	191	545	43
Sat'd. Flow (prot)	1658	1623	0	1658	1593	0	1658	3243	0	3216	3279	0
Flt Permitted	0.290			0.391			0.950			0.950		
Sat'd. Flow (perm)	506	1623	0	682	1593	0	1658	3243	0	3216	3279	0
Sat'd. Flow (RTOR)	34			54			19			8		
Lane Group Flow (vph)	49	243	0	181	326	0	166	536	0	212	654	0
Turn Type	pm-pt	NA		pm-pt	NA		Prot	NA		Prot	NA	
Permitted Phases	7	4		3	8		5	2		1	6	
Detector 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	Max		None	Max	
Act Effct Green (s)	23.6	23.1		31.3	26.0		13.4	47.4		12.0	46.0	
Actuated G/C Ratio	0.26	0.20		0.27	0.23		0.12	0.41		0.10	0.40	
v/c Ratio	0.25	0.69		0.75	0.81		0.86	0.40		0.63	0.50	
Control Delay	30.3	46.5		53.2	52.1		87.5	25.0		58.7	27.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.3	46.5		53.2	52.1		87.5	25.0		58.7	27.8	
LOS	C	D		D	D		F	C		E	C	
Approach Delay		43.8			52.5			39.8			35.4	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	8.1	46.2		32.7	64.1		40.2	47.2		25.7	62.3	
Queue Length 95th (m)	17.3	74.5		#57.7	#108.0		#82.2	65.4		38.2	82.9	
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)	198	430		242	438		199	1351		386	1320	
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	0.25	0.57		0.75	0.74		0.83	0.40		0.65	0.50	

Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019



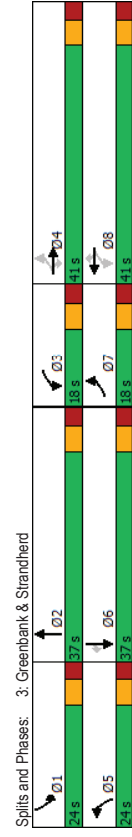
Lanes, Volumes, Timings
2: Greenbank & Marketplace

3195 Jockvale Road PM Peak Hour 2018 Existing

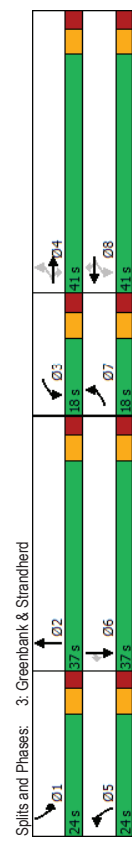
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	145	814	168	160	654	184	201	264	53	251	331	124
Future Volume (vph)	145	814	168	160	654	184	201	264	53	251	331	124
Sat'd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3233	0	3216	3316	1483
Flt Permitted	0.209			0.116			0.950			0.950		
Sat'd. Flow (perm)	365	3316	1483	202	3316	1483	3216	3233	0	3216	3316	1483
Sat'd. Flow (RTOR)	187			204			204	19				149
Lane Group Flow (vph)	161	904	187	178	727	204	223	362	0	279	368	138
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4	4	3	8	8	5	2	1	6		6
Permitted Phases	4	4	4	3	8	8	5	2	1	6		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	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	Max	Max	Max
Act Effct Green (s)	44.3	33.8	33.8	45.4	34.4	34.4	13.3	30.5	14.9	32.1	32.1	32.1
Actuated G/C Ratio	0.38	0.29	0.29	0.39	0.30	0.30	0.11	0.26	0.13	0.28	0.28	0.28
v/c Ratio	0.63	0.94	0.33	0.82	0.74	0.35	0.60	0.41	0.68	0.40	0.27	0.27
Control Delay	32.5	58.4	6.3	55.3	42.9	6.2	56.3	35.7	57.3	36.6	6.0	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	58.4	6.3	55.3	42.9	6.2	56.3	35.7	57.3	36.6	6.0	6.0
LOS	C	E	A	E	D	A	E	D	E	D	D	A
Approach Delay	47.3			38.2			43.7					38.6
Approach LOS	D			D			D					D
Queue Length 50th (m)	23.5	112.2	0.0	27.1	84.0	0.0	27.0	35.3	33.7	38.3	0.0	38.3
Queue Length 95th (m)	40.0	#157.7	17.3	#57.7	110.2	18.2	39.5	51.2	48.4	55.5	13.8	55.5
Internal Link Dist (m)	396.5			415.8			171.8			236.6		236.6
Turn Bay Length (m)	70.0	100.0	130.0	60.0			60.0		85.0		160.0	160.0
Base Capacity (vph)	268	984	571	222	989	585	489	862	489	915	517	517
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.92	0.33	0.80	0.74	0.35	0.46	0.41	0.57	0.40	0.27	0.27

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	116.3
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.94

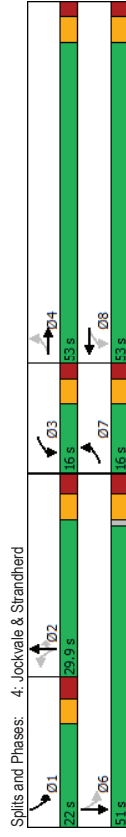
Intersection Signal Delay: 42.2
Intersection LOS: D
ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Intersection Signal Delay: 42.2
Intersection LOS: D
ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Intersection Signal Delay: 32.3 Intersection LOS: C
 Intersection Capacity Utilization 78.9% ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	19	704	41	85	687	385	74	106	85	327	94	18
Future Volume (vph)	19	704	41	85	687	385	74	106	85	327	94	18
Satd. Flow (prot)	1658	3289	0	1658	3137	0	1658	1745	1483	1658	1703	0
Flt Permitted	0.149		0.222		0.677					0.448		
Satd. Flow (perm)	260	3289	0	387	3137	0	1181	1745	1483	782	1703	0
Satd. Flow (RTOR)	6			105					145		9	
Lane Group Flow (vph)	21	828	0	94	1191	0	82	118	94	363	124	0
Turn Type	pm-pt	NA		pm-pt	NA		Perm	NA	Perm	pm-pt	NA	
Protected Phases	7	4		3	8		2	2	2	1	6	
Permitted Phases	4			8			2	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 (%)	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		Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max		None	Max		None	None	None	None	None	
Act Effct Green (s)	53.2	47.0		60.0	56.3		13.6	13.6	13.6	35.6	35.6	
Actuated G/C Ratio	0.48	0.43		0.55	0.51		0.12	0.12	0.12	0.32	0.32	
v/c Ratio	1.0	0.59		0.31	0.72		0.57	0.55	0.30	0.97	0.22	
Control Delay	13.4	26.6		14.9	23.5		60.9	55.4	4.1	75.1	26.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	13.4	26.6		14.9	23.5		60.9	55.4	4.1	75.1	26.2	
LOS	B	C		B	C		E	E	A	E	C	
Approach Delay	26.3			22.9			40.5			62.7		
Approach LOS	C			C			D			E		
Queue Length 50th (m)	2.0	72.1		9.3	84.4		17.7	25.4	0.0	70.6	18.7	
Queue Length 95th (m)	6.4	104.7		19.6	157.8		34.6	44.9	4.0	137.7	34.1	
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)	260	1409		326	1659		247	365	425	373	703	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.08	0.59		0.29	0.72		0.33	0.32	0.22	0.97	0.18	

Intersection Summary
 Cycle Length: 120.9
 Actuated Cycle Length: 109.9
 Natural Cycle: 125
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.97

Appendix D

Collision Data

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition
2014-08-07	2014	21:46	JOCKVALE RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	01 - Fatal injury	07 - SMV other	01 - Dry
2014-01-11	2014	8:22	GREENBANK RD @ STRANDHERD DR	04 - Freezing Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	06 - Ice
2014-01-23	2014	17:49	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	06 - Ice
2014-03-12	2014	19:20	GREENBANK RD @ STRANDHERD DR	05 - Drifting Snow	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	03 - Loose snow
2014-05-09	2014	21:00	GREENBANK RD @ STRANDHERD DR	02 - Rain	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	02 - Wet
2014-06-23	2014	13:50	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-11-03	2014	8:22	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2014-09-05	2014	11:43	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	07 - SMV other	01 - Dry
2014-12-21	2014	0:13	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	02 - Angle	01 - Dry
2014-01-07	2014	15:45	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	06 - Strong wind	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	03 - Rear end	06 - Ice
2014-01-03	2014	8:58	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	01 - Approaching	06 - Ice
2014-01-07	2014	15:00	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	01 - Dry
2014-01-11	2014	18:30	GREENBANK RD @ JOCKVALE RD	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	07 - SMV other	02 - Wet
2014-01-23	2014	14:19	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL S	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	05 - Turning movement	01 - Dry
2014-01-24	2014	18:15	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-01-31	2014	18:41	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-02-11	2014	12:35	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	04 - Sideswipe	02 - Wet
2014-02-01	2014	15:10	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	06 - Ice
2014-02-09	2014	10:01	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-02-21	2014	6:14	GREENBANK RD @ MARKETPLACE AVE	02 - Rain	03 - Dawn	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2014-02-11	2014	8:25	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2014-02-18	2014	7:29	GREENBANK RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	03 - Loose snow
2014-02-14	2014	16:44	JOCKVALE RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	03 - Loose snow
2014-03-04	2014	14:07	GREENBANK RD @ MARKETPLACE AVE	03 - Snow	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	02 - Wet
2014-03-26	2014	18:40	JOCKVALE RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2014-04-03	2014	13:14	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-03-05	2014	21:25	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	02 - Wet
2014-03-28	2014	9:00	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	02 - Wet
2014-04-14	2014	8:35	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-05-03	2014	9:53	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-04-27	2014	15:15	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-06-11	2014	17:27	GREENBANK RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2014-07-03	2014	16:50	JOCKVALE RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2014-07-23	2014	10:47	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	01 - Dry
2014-07-07	2014	14:15	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-07-12	2014	14:19	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-07-28	2014	14:30	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-07-14	2014	7:45	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-07-08	2014	13:54	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-07-18	2014	13:58	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-08-07	2014	21:30	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	01 - Dry
2014-10-14	2014	14:06	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL S	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-11-25	2014	18:29	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-11-08	2014	21:51	GREENBANK RD @ STRANDHERD DR	02 - Rain	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2014-10-14	2014	16:37	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-09-30	2014	10:20	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-11-06	2014	9:12	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-09-17	2014	15:30	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2014-10-29	2014	16:10	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	03 - Rear end	01 - Dry
2014-10-04	2014	1:30	GREENBANK RD @ STRANDHERD DR	02 - Rain	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2014-09-20	2014	16:40	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-10-30	2014	16:16	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-12-09	2014	7:48	GREENBANK RD @ STRANDHERD DR	01 - Clear	03 - Dawn	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2014-12-09	2014	16:45	JOCKVALE RD @ STRANDHERD DR	01 - Clear	05 - Dusk	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2014-09-13	2014	13:55	GREENBANK RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2014-09-26	2014	19:50	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2014-11-01	2014	16:13	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2015-03-02	2015	15:28	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2015-05-07	2015	9:20	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-01-16	2015	10:00	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	05 - Packed snow
2015-01-07	2015	15:51	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-04-17	2015	16:50	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	02 - Non-fatal injury	03 - Rear end	01 - Dry
2015-09-01	2015	20:05	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2015-01-30	2015	16:05	STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BARRHAVE	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	02 - Non-fatal injury	03 - Rear end	06 - Ice
2015-05-18	2015	13:39	GREENBANK RD @ MARKETPLACE AVE	02 - Rain	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	02 - Angle	02 - Wet

2015-12-06	2015	10:30	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-10-20	2015	19:58	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-10-17	2015	16:15	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-03-01	2015	12:49	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2015-02-08	2015	10:20	GREENBANK RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	03 - Loose snow
2015-05-12	2015	14:00	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2015-05-14	2015	10:46	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-05-18	2015	18:34	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2015-07-10	2015	13:20	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-03-17	2015	23:57	GREENBANK RD @ JOCKVALE RD	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	02 - Angle	01 - Dry
2015-10-01	2015	12:39	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2015-09-19	2015	9:45	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2015-05-05	2015	14:53	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2015-04-29	2015	13:06	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	01 - Dry
2015-04-16	2015	20:44	GREENBANK RD @ JOCKVALE RD	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-07-16	2015	21:00	GREENBANK RD @ STRANDHERD DR	01 - Clear	05 - Dusk	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-07-26	2015	13:00	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-02-14	2015	11:00	GREENBANK RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	03 - Loose snow
2015-03-01	2015	17:17	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	07 - SMV other	01 - Dry
2015-02-21	2015	12:38	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	02 - Intersection related	06 - Ice
2015-03-18	2015	22:11	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-03-21	2015	15:19	GREENBANK RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2015-02-26	2015	18:52	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL S	01 - Clear	07 - Dark	10 - No control	01 - Non intersection	03 - P.D. only	03 - Rear end	02 - Wet
2015-02-21	2015	15:00	GREENBANK RD @ JOCKVALE RD	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	03 - Loose snow
2015-05-20	2015	13:15	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-06-05	2015	18:39	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-06-06	2015	16:29	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2015-08-15	2015	12:00	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-07-29	2015	11:01	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	05 - Turning movement	01 - Dry
2015-08-15	2015	11:40	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	04 - At/near private drive	03 - P.D. only	02 - Angle	01 - Dry
2015-08-01	2015	13:34	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-06-11	2015	18:52	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-10-25	2015	17:44	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-10-17	2015	14:20	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-11-16	2015	16:29	GREENBANK RD @ STRANDHERD DR	01 - Clear	05 - Dusk	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-10-10	2015	9:38	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	01 - Dry
2015-12-21	2015	9:31	GREENBANK RD @ JOCKVALE RD	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2015-11-27	2015	7:02	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	01 - Clear	03 - Dawn	10 - No control	01 - Non intersection	03 - P.D. only	03 - Rear end	01 - Dry
2015-12-10	2015	11:35	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2015-12-30	2015	14:00	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2015-12-28	2015	19:13	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-05-28	2016	13:29	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-03-05	2016	9:00	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-08-11	2016	12:54	GREENBANK RD @ JOCKVALE RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2016-11-18	2016	17:42	GREENBANK RD @ JOCKVALE RD	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-05-05	2016	18:31	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	07 - SMV other	01 - Dry
2016-03-18	2016	18:43	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2016-08-23	2016	12:36	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-06-28	2016	23:01	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-12-23	2016	14:09	GREENBANK RD @ MARKETPLACE AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	02 - Angle	02 - Wet
2016-04-12	2016	9:58	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-02-17	2016	20:45	GREENBANK RD @ STRANDHERD DR	03 - Snow	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	99 - Other	05 - Packed snow
2016-08-22	2016	10:28	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-01-26	2016	0:38	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2016-10-25	2016	18:42	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2016-09-11	2016	10:15	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2016-08-10	2016	18:09	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-07-25	2016	17:39	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-06-04	2016	13:10	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-06-20	2016	19:40	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-05-31	2016	13:15	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-09-22	2016	21:17	GREENBANK RD @ STRANDHERD DR	02 - Rain	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2016-07-21	2016	13:18	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-08-25	2016	19:20	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-12-30	2016	16:05	GREENBANK RD @ STRANDHERD DR	01 - Clear	05 - Dusk	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	02 - Wet
2016-12-21	2016	18:36	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry

2016-12-03	2016	18:12	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	99 - Other	01 - Dry
2016-06-14	2016	20:53	GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD	01 - Clear	05 - Dusk	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-03-24	2016	15:44	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	04 - Freezing Rain	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	03 - Rear end	06 - Ice
2016-09-07	2016	10:22	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2016-01-13	2016	13:50	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	02 - Wet
2016-08-17	2016	11:32	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2016-07-14	2016	0:05	JOCKVALE RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-10-20	2016	18:50	JOCKVALE RD @ STRANDHERD DR	02 - Rain	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	07 - SMV other	02 - Wet
2016-05-14	2016	15:03	JOCKVALE RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2016-08-31	2016	16:41	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-01-12	2016	12:22	JOCKVALE RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	03 - Loose snow
2016-08-05	2016	8:40	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-08-05	2016	8:39	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-07-20	2016	7:46	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-10-06	2016	15:52	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-10-06	2016	20:15	JOCKVALE RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2016-12-14	2016	14:47	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-12-14	2016	18:55	JOCKVALE RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-11-09	2016	16:45	JOCKVALE RD @ STRANDHERD DR	01 - Clear	05 - Dusk	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-11-25	2016	7:30	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2016-12-09	2016	18:41	JOCKVALE RD @ STRANDHERD DR	03 - Snow	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	06 - Ice
2016-12-10	2016	12:43	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2016-06-23	2016	14:34	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL S	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-01-12	2016	15:58	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	03 - Snow	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	07 - SMV other	03 - Loose snow
2016-06-24	2016	10:30	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2016-09-17	2016	20:30	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	02 - Rain	07 - Dark	10 - No control	01 - Non intersection	03 - P.D. only	07 - SMV other	02 - Wet
2017-06-23	2017	8:09	GREENBANK RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2017-06-09	2017	17:50	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-05-17	2017	21:42	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2017-05-13	2017	16:26	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-07-20	2017	12:02	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2017-08-05	2017	15:10	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2017-07-12	2017	9:25	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-08-10	2017	11:39	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	03 - Rear end	01 - Dry
2017-08-25	2017	16:47	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-07-11	2017	5:07	GREENBANK RD @ STRANDHERD DR	01 - Clear	03 - Dawn	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-07-24	2017	22:10	GREENBANK RD @ STRANDHERD DR	02 - Rain	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2017-09-12	2017	16:29	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-09-12	2017	8:17	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-10-28	2017	11:20	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-10-08	2017	10:30	GREENBANK RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2017-11-09	2017	21:44	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	02 - Wet
2017-11-18	2017	15:56	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-11-03	2017	15:29	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-11-18	2017	18:44	GREENBANK RD @ STRANDHERD DR	02 - Rain	07 - Dark	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	02 - Wet
2017-12-08	2017	17:58	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-11-30	2017	7:20	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-12-09	2017	16:15	GREENBANK RD @ STRANDHERD DR	01 - Clear	05 - Dusk	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-02-14	2017	23:00	GREENBANK RD @ STRANDHERD DR	03 - Snow	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	03 - Loose snow
2017-01-04	2017	19:05	GREENBANK RD @ STRANDHERD DR	03 - Snow	07 - Dark	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	03 - Loose snow
2017-02-15	2017	18:57	GREENBANK RD @ STRANDHERD DR	03 - Snow	07 - Dark	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	04 - Slush
2017-03-02	2017	12:08	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-03-24	2017	9:00	GREENBANK RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	03 - Loose snow
2017-04-08	2017	11:26	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry
2017-02-21	2017	12:50	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-03-24	2017	12:07	GREENBANK RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2017-02-22	2017	18:44	GREENBANK RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2017-03-12	2017	15:12	GREENBANK RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	01 - Dry
2017-12-22	2017	12:35	GREENBANK RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	04 - Sideswipe	03 - Loose snow
2017-05-13	2017	19:15	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	01 - Dry
2017-01-19	2017	17:50	GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE	01 - Clear	07 - Dark	10 - No control	01 - Non intersection	02 - Non-fatal injury	04 - Sideswipe	02 - Wet
2017-06-12	2017	17:46	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	01 - Dry
2017-05-11	2017	16:55	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2017-05-25	2017	18:40	JOCKVALE RD @ STRANDHERD DR	02 - Rain	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	03 - Rear end	02 - Wet
2017-10-11	2017	8:47	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	03 - Rear end	01 - Dry
2017-11-23	2017	9:18	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	01 - Dry

2017-01-29	2017	15:56	JOCKVALE RD @ STRANDHERD DR	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	02 - Wet
2017-02-03	2017	17:30	JOCKVALE RD @ STRANDHERD DR	01 - Clear	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2017-03-15	2017	19:52	JOCKVALE RD @ STRANDHERD DR	03 - Snow	07 - Dark	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	03 - Loose snow
2017-12-28	2017	13:00	JOCKVALE RD @ STRANDHERD DR	01 - Clear	01 - Daylight	01 - Traffic signal	03 - At intersection	03 - P.D. only	05 - Turning movement	01 - Dry
2017-12-23	2017	22:03	JOCKVALE RD @ STRANDHERD DR	07 - Fog, mist, smoke, dust	07 - Dark	01 - Traffic signal	02 - Intersection related	02 - Non-fatal injury	03 - Rear end	03 - Loose snow
2017-12-30	2017	16:29	JOCKVALE RD @ STRANDHERD DR	01 - Clear	05 - Dusk	01 - Traffic signal	03 - At intersection	03 - P.D. only	03 - Rear end	03 - Loose snow
2017-09-30	2017	12:21	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	05 - Turning movement	01 - Dry
2017-03-14	2017	16:45	STRANDHERD DR @ 215 W OF GREENBANK RD/BARRHAVE	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Intersection related	03 - P.D. only	07 - SMV other	03 - Loose snow
2017-05-25	2017	17:45	STRANDHERD DR btwn 215 W OF GREENBANK RD/BARRHAVEN MALL S	02 - Rain	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	99 - Other	02 - Wet
2017-06-29	2017	14:11	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	02 - Rain	01 - Daylight	10 - No control	01 - Non intersection	02 - Non-fatal injury	07 - SMV other	02 - Wet
2017-03-24	2017	9:07	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	03 - Snow	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	07 - SMV other	04 - Slush
2017-12-19	2017	7:54	STRANDHERD DR btwn ANDORA AVE & JOCKVALE RD	03 - Snow	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	04 - Sideswipe	05 - Packed snow
2017-06-01	2017	9:25	STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BAR	01 - Clear	01 - Daylight	10 - No control	01 - Non intersection	03 - P.D. only	99 - Other	01 - Dry
2017-08-12	2017	8:30	STRANDHERD DR btwn JOCKVALE RD & 215 W OF GREENBANK RD/BAR	02 - Rain	01 - Daylight	10 - No control	01 - Non intersection	02 - Non-fatal injury	07 - SMV other	02 - Wet

Appendix E

Synchro Intersection Worksheets – 2026 Background Conditions

Lanes, Volumes, Timings
2: Greenbank & Marketplace

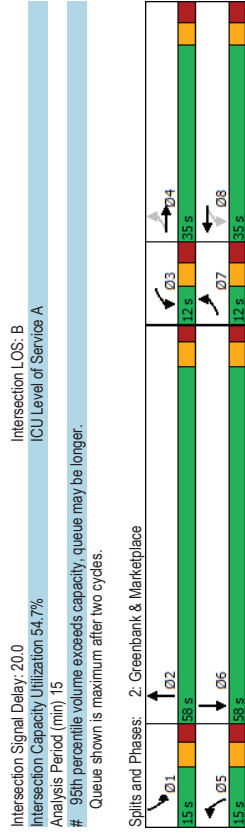
01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	12	17	27	58	23	106	98	742	74	63	338	6
Traffic Volume (vph)	12	17	27	58	23	106	98	742	74	63	338	6
Future Volume (vph)	1658	1585	0	1658	1530	0	1658	3269	0	3216	3306	0
Satd. Flow (prot)	0.674			0.522			0.950					
Flt Permitted	1176	1585	0	911	1530	0	1658	3269	0	3216	3306	0
Satd. Flow (perm)	27			106			11					2
Satd. Flow (RTOR)	12	44	0	58	129	0	98	816	0	63	344	0
Lane Group Flow (vph)	pm-pt	NA	pm+pt	NA	Prot	NA	Prot	NA	Prot	NA	Prot	NA
Turn Types	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	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	12.9	10.6		16.4	15.2		8.6	56.7		7.2	52.8	
Actuated G/C Ratio	0.13	0.11		0.17	0.16		0.09	0.56		0.07	0.54	
v/c Ratio	0.07	0.23		0.29	0.40		0.67	0.43		0.27	0.19	
Control Delay	32.0	25.5		36.6	15.1		67.9	14.2		46.9	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.0	25.5		36.6	15.1		67.9	14.2		46.9	12.9	
LOS	C	C		D	B		E	B		D	B	
Approach Delay	26.9			21.8			20.0			18.1		
Approach LOS	C			C			B			B		
Queue Length 50th (m)	2.0	3.3		9.8	3.8		20.1	53.0		6.4	19.5	
Queue Length 95th (m)	6.9	13.9		20.9	22.4		#47.2	75.4		13.4	29.6	
Internal Link Dist (m)	102.8			148.8			92.5			171.8		
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	182	481		202	521		148	1897		286	1782	
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	0.07	0.09		0.29	0.25		0.66	0.43		0.22	0.19	

3195 Jockvale Road AM Peak Hour 2026 Background
Page 1

Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019



3195 Jockvale Road AM Peak Hour 2026 Background
Page 2

Lanes, Volumes, Timings
3: Greenbank & Strandherd

01-28-2019

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	114	526	141	83	642	163	172	308	96	175	188	101
Future Volume (vph)	114	526	141	83	642	163	172	308	96	175	188	101
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3196	0	3216	3316	1483
Flt Permitted	0.213			0.390			0.950			0.950		
Satd. Flow (perm)	372	3316	1483	681	3316	1483	3216	3196	0	3216	3316	1483
Satd. Flow (RTOR)	149			163			33					149
Lane Group Flow (vph)	114	526	141	83	642	163	172	404	0	175	188	101
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4	3	8	8	5	2			1	6	
Permitted Phases	4	4	4	8	8	8						6
Detector Phase	7	4	4	3	8	8	5	2	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	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	None	Max	Max
Act Effct Green (s)	38.3	29.9	29.9	33.9	25.4	25.4	10.9	29.8	11.0	29.9	29.9	29.9
Actuated G/C Ratio	0.37	0.29	0.29	0.33	0.25	0.25	0.11	0.29	0.11	0.29	0.29	0.29
v/c Ratio	0.43	0.54	0.26	0.27	0.78	0.33	0.51	0.42	0.51	0.19	0.19	0.19
Control Delay	24.2	34.2	5.7	21.2	43.6	6.9	50.1	30.3	50.0	30.2	2.3	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	34.2	5.7	21.2	43.6	6.9	50.1	30.3	50.0	30.2	2.3	2.3
LOS	C	C	A	C	D	A	D	C	D	C	C	A
Approach Delay		27.6			34.7			36.2				31.6
Approach LOS		C			C			D				C
Queue Length 50th (m)	14.7	50.4	0.0	10.5	66.0	0.0	17.8	32.9	18.1	15.5	0.0	0.0
Queue Length 95th (m)	27.6	73.5	13.4	21.1	92.6	16.0	31.7	56.4	32.0	29.4	4.6	4.6
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)	300	1131	603	370	1127	611	560	952	560	967	538	0
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.47	0.23	0.22	0.57	0.27	0.31	0.42	0.31	0.19	0.19	0.19
Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 102.5												
Natural Cycle: 120												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.78												

Lanes, Volumes, Timings
3: Greenbank & Strandherd

01-28-2019

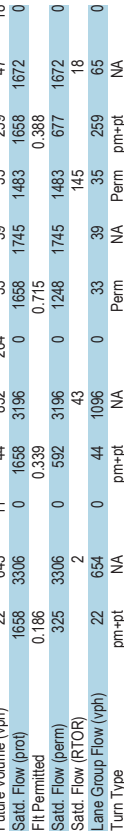
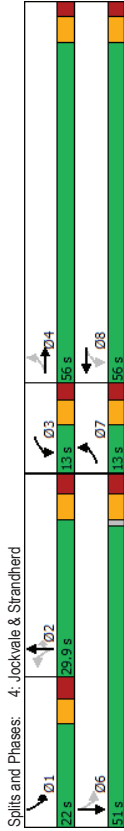
Intersection Signal Delay: 32.5
Intersection Capacity Utilization 64.5%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service C



Splits and Phases: 3: Greenbank & Strandherd

Intersection Signal Delay: 23.3
 Intersection Capacity Utilization 71.2%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: C
 ICU Level of Service C



Splits and Phases: 4: Jockvale & Strandherd

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)	22	643	11	44	832	264	33	39	35	259	47	18
Future Volume (vph)	22	643	11	44	832	264	33	39	35	259	47	18
Satd. Flow (prot)	1658	3306	0	1658	3196	0	1658	1745	1483	1658	1672	0
Flt Permitted	0.186			0.339			0.715			0.388		
Satd. Flow (perm)	325	3306	0	592	3196	0	1248	1745	1483	677	1672	0
Satd. Flow (RTOR)	2			43			145			18		
Lane Group Flow (vph)	22	654	0	44	1096	0	33	39	35	259	65	0
Turn Type	pm-pt	NA		pm-pt	NA		Perm	NA	Perm	pm-pt	NA	
Protected Phases	7	4		3	8		2	2	2	1	6	
Permitted Phases	4			8			2	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	Lead		Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Recall Mode	None	Max		None	Max		None	None	None	None	None	
Act Effct Green (s)	56.1	51.4		58.8	56.2		10.5	10.5	10.5	27.5	27.5	
Actuated G/C Ratio	0.55	0.50		0.58	0.55		0.10	0.10	0.10	0.27	0.27	
v/c Ratio	0.08	0.39		0.11	0.61		0.26	0.22	0.12	0.80	0.14	
Control Delay	10.7	18.6		10.7	19.1		50.8	48.4	0.9	51.8	22.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	10.7	18.6		10.7	19.1		50.8	48.4	0.9	51.8	22.1	
LOS	B	B		B	B		D	D	A	D	C	
Approach Delay	18.4			18.8			33.6			45.8		
Approach LOS	B			B			C			D		
Queue Length 50th (m)	1.9	49.2		3.9	72.6		6.9	8.1	0.0	47.6	7.5	
Queue Length 95th (m)	5.5	66.7		9.2	126.8		17.0	16.9	0.0	81.7	18.1	
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)	272	1669		415	1784		287	401	453	337	763	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.08	0.39		0.11	0.61		0.11	0.10	0.08	0.77	0.09	

Intersection Summary	
Cycle Length:	120.9
Actuated Cycle Length:	101.8
Natural Cycle:	125
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.80

Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019

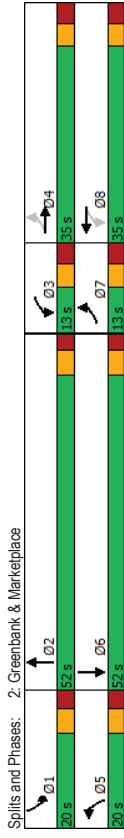
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Traffic Volume (vph)	44	117	102	167	124	185	149	517	70	224	703	43
Future Volume (vph)	44	117	102	167	124	185	149	517	70	224	703	43
Satd. Flow (prot)	1658	1623	0	1658	1588	0	1658	3256	0	3216	3286	0
Flt Permitted	0.313			0.431			0.950			0.950		
Satd. Flow (perm)	546	1623	0	752	1588	0	1658	3256	0	3216	3286	0
Satd. Flow (RTOR)	34			59			14			6		
Lane Group Flow (vph)	44	219	0	167	309	0	149	587	0	224	746	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	Max		None	Max	
Act Effct Green (s)	28.3	21.8		30.0	24.8		12.9	46.8		12.2	46.1	
Actuated g/C Ratio	0.25	0.19		0.27	0.22		0.11	0.41		0.11	0.41	
v/c Ratio	0.22	0.64		0.66	0.78		0.78	0.43		0.65	0.56	
Control Delay	29.8	44.0		45.8	49.1		77.9	25.5		58.6	28.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.8	44.0		45.8	49.1		77.9	25.5		58.6	28.5	
LOS	C	D		D	D		E	C		E	C	
Approach Delay		41.6			48.0			36.1			35.5	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	7.3	40.1		29.9	58.0		34.9	51.6		26.5	71.4	
Queue Length 95th (m)	16.0	66.3		48.5	92.2		#71.4	72.8		41.2	97.2	
Internal Link Dist (m)		102.8			148.8			92.5			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	203	437		253	446		202	1357		392	1342	
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	0.22	0.50		0.66	0.69		0.74	0.43		0.57	0.56	

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	113
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.78

Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019

Intersection Signal Delay: 38.8
Intersection Capacity Utilization 74.9%
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
3: Greenbank & Strandherd

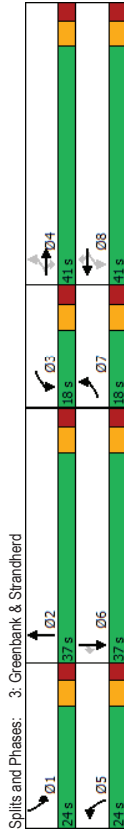
01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	145	865	220	212	695	184	232	311	84	251	404	124
Future Volume (vph)	145	865	220	212	695	184	232	311	84	251	404	124
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3210	0	3216	3316	1483
Flt P/Permitted	0.235			0.117			0.950			0.950		
Satd. Flow (perm)	410	3316	1483	204	3316	1483	3216	3210	0	3216	3316	1483
Satd. Flow (RTOR)		220				184		27				149
Lane Group Flow (vph)	145	865	220	212	695	184	232	395	0	251	404	124
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	NA
Protected Phases	7	4	4	4	8	8	5	2	1	6	6	6
Detector Phase	7	4	4	4	3	8	5	2	1	6	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	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	Max	Max	Max
Act Effct Green (s)	43.4	33.2	33.2	45.6	34.3	34.3	13.6	30.6	14.1	31.1	31.1	31.1
Actuated g/C Ratio	0.38	0.29	0.29	0.40	0.30	0.30	0.12	0.27	0.12	0.27	0.27	0.27
v/c Ratio	0.55	0.91	0.38	0.95	0.70	0.32	0.61	0.45	0.64	0.45	0.45	0.45
Control Delay	28.4	53.8	6.2	77.6	41.1	6.2	55.8	35.5	56.2	37.7	4.5	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	53.8	6.2	77.6	41.1	6.2	55.8	35.5	56.2	37.7	4.5	4.5
LOS	C	D	A	E	D	A	E	D	E	D	D	A
Approach Delay		42.3		42.3		43.0		38.4		38.4		38.4
Approach LOS		D		D		D		D		D		D
Queue Length 50th (m)	20.6	104.1	0.0	35.7	78.2	0.0	27.7	39.1	30.0	42.7	0.0	0.0
Queue Length 95th (m)	36.2	#146.6	18.7	#88.9	104.6	17.2	40.8	56.8	44.0	61.2	10.2	10.2
Internal Link Dist (m)		396.5		415.8		171.8		236.6		236.6		160.0
Turn Bay Length (m)	70.0	100.0	130.0	60.0	60.0	60.0	85.0	85.0	85.0	85.0	85.0	85.0
Base Capacity (vph)	282	995	599	224	1004	577	495	871	495	893	508	508
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.87	0.37	0.95	0.69	0.32	0.47	0.45	0.51	0.45	0.24	0.24
Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 115.2												
Natural Cycle: 120												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.95												

Lanes, Volumes, Timings
3: Greenbank & Strandherd

01-28-2019

Intersection Signal Delay: 41.6
Intersection Capacity Utilization: 78.7%
Analysis Period (min): 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
4: Jockvale & Strandherd

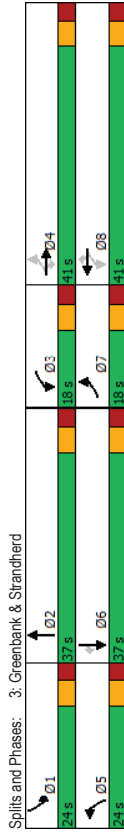
01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	19	800	41	85	761	385	74	106	85	327	94	18
Future Volume (vph)	19	800	41	85	761	385	74	106	85	327	94	18
Satd. Flow (prot)	1658	3292	0	1658	3150	0	1658	1745	1483	1658	1703	0
FltP/Permitted	0.158			0.227			0.685				0.491	
Satd. Flow (perm)	276	3292	0	396	3150	0	1195	1745	1483	857	1703	0
Satd. Flow (RTOR)	5			86			130			9		
Lane Group Flow (vph)	19	841	0	85	1146	0	74	106	85	327	112	0
Turn Type	pm-pt	NA		pm-pt	NA		Perm	NA	Perm	pm-pt	NA	
Permitted Phases	7	4		3	8		2	2	2	1	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	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max		None	Max		None	None	None	None	None	
Act Effct Green (s)	52.1	47.3		57.2	53.7		12.8	12.8	12.8	35.9	34.2	
Actuated g/C Ratio	0.49	0.45		0.54	0.51		0.12	0.12	0.12	0.34	0.32	
v/c Ratio	0.09	0.57		0.28	0.70		0.51	0.50	0.29	0.79	0.20	
Control Delay	12.7	25.0		14.1	22.7		58.3	53.6	4.6	45.5	25.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	12.7	25.0		14.1	22.7		58.3	53.6	4.6	45.5	25.7	
LOS	B	C		B	C		E	D	A	D	C	
Approach Delay	24.7	22.1		22.1	39.2					40.4		
Approach LOS	C	C		C	D					D		
Queue Length 50th (m)	1.8	72.3		8.2	79.0		15.8	22.6	0.0	60.1	16.6	
Queue Length 95th (m)	5.7	104.8		17.5	146.7		31.8	41.0	4.6	98.1	31.1	
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)	273	1474		334	1642		261	382	426	418	735	
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	0.57		0.25	0.70		0.28	0.28	0.20	0.78	0.15	
Intersection Summary												
Cycle Length	120.9											
Actuated Cycle Length	105.8											
Natural Cycle	125											
Control Type	Actuated-Uncoordinated											
Maximum v/c Ratio	0.79											

Lanes, Volumes, Timings
3: Greenbank & Strandherd

01-28-2019

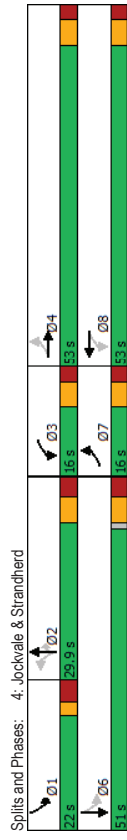
Intersection Signal Delay: 41.6
Intersection Capacity Utilization: 78.7%
Analysis Period (min): 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
 4: Jockvale & Strandherd

01-28-2019

Intersection Signal Delay: 27.4	Intersection LOS: C
Intersection Capacity Utilization 81.1%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

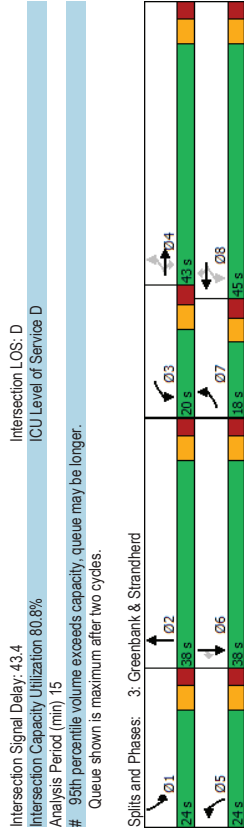


Appendix F

Synchro Intersection Worksheets – 2031 Background Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	145	898	79	221	722	184	123	327	89	251	426	124
Future Volume (vph)	145	898	79	221	722	184	123	327	89	251	426	124
Sat'd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3210	0	3216	3316	1483
Flt Permitted	0.244			0.104			0.950			0.950		
Sat'd. Flow (perm)	426	3316	1483	181	3316	1483	3216	3210	0	3216	3316	1483
Sat'd. Flow (RTOR)	143			184			26					143
Lane Group Flow (vph)	145	898	79	221	722	184	123	416	0	251	426	124
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4	4	3	8	8	5	2	1	6		
Permitted Phases	4	4	4	3	8	8	5	2	1	6		
Detector Phase	7	4	4	3	8	8	5	2	1	6		
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	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	37.0
Total Split (s)	18.0	43.0	43.0	20.0	45.0	45.0	24.0	38.0	24.0	38.0	38.0	38.0
Total Split (%)	14.4%	34.4%	34.4%	16.0%	36.0%	36.0%	19.2%	30.4%	19.2%	30.4%	30.4%	30.4%
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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	45.6	35.4	35.4	51.7	38.4	38.4	10.0	31.6	14.4	36.0	36.0	36.0
Actuated G/C Ratio	0.38	0.29	0.29	0.43	0.32	0.32	0.08	0.26	0.12	0.30	0.30	0.30
v/c Ratio	0.54	0.92	0.15	0.92	0.69	0.31	0.46	0.48	0.66	0.43	0.23	0.23
Control Delay	28.4	57.4	0.6	71.5	40.3	5.9	58.9	38.1	59.5	36.3	4.7	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	57.4	0.6	71.5	40.3	5.9	58.9	38.1	59.5	36.3	4.7	4.7
LOS	C	E	A	E	D	A	E	D	E	D	D	A
Approach Delay		49.7			40.8			42.8			38.6	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	21.0	114.5	0.0	40.3	83.6	0.0	15.5	44.1	31.5	45.6	0.0	0.0
Queue Length 95th (m)	36.5	#159.3	0.0	#93.1	109.8	17.2	25.7	62.4	45.8	63.4	10.9	10.9
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)	281	1004	548	241	1067	602	472	858	472	988	542	542
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.89	0.14	0.92	0.68	0.31	0.26	0.48	0.63	0.43	0.23	0.23

Intersection Summary	
Cycle Length:	125
Actuated Cycle Length:	120.7
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.92

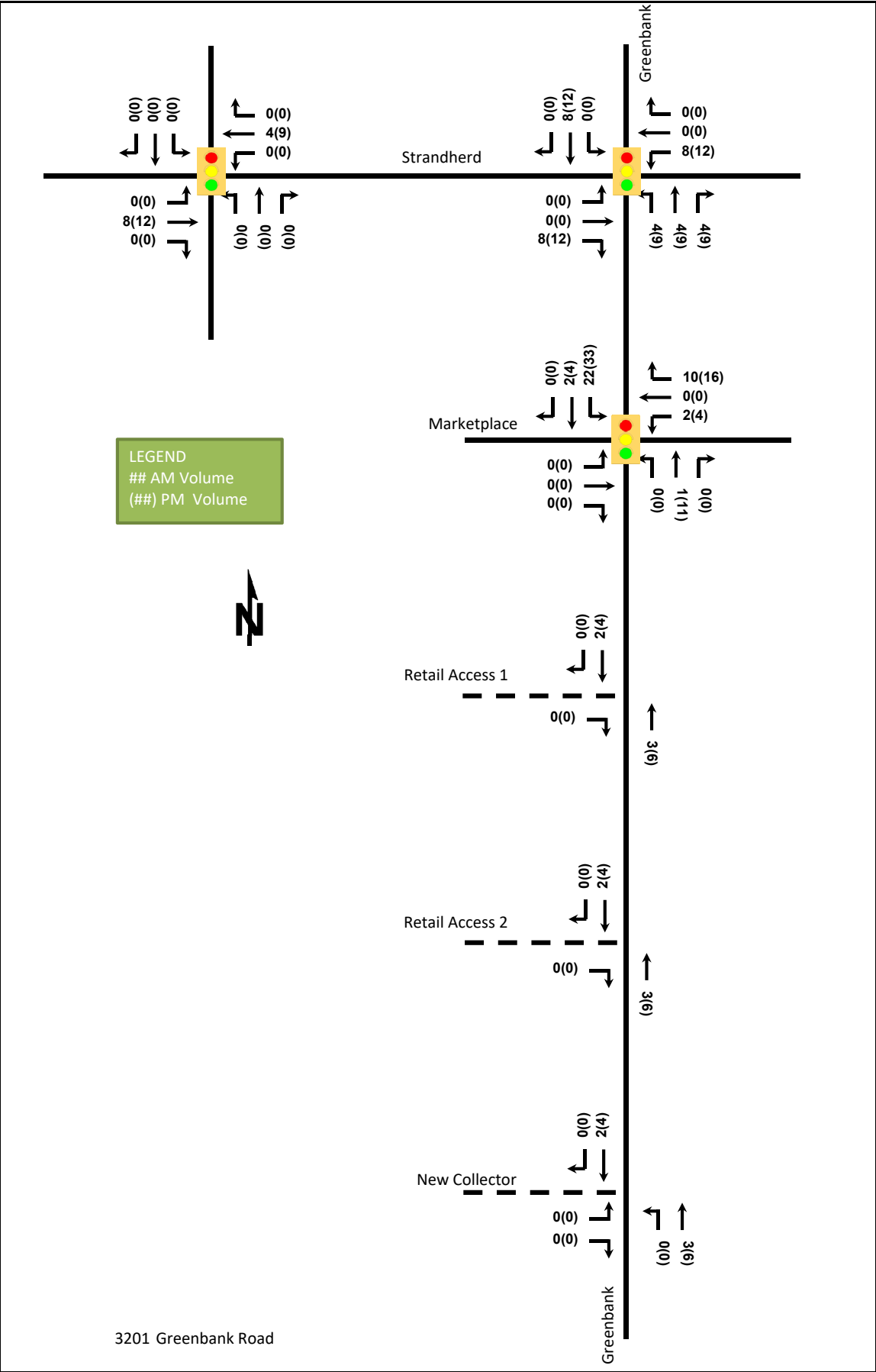


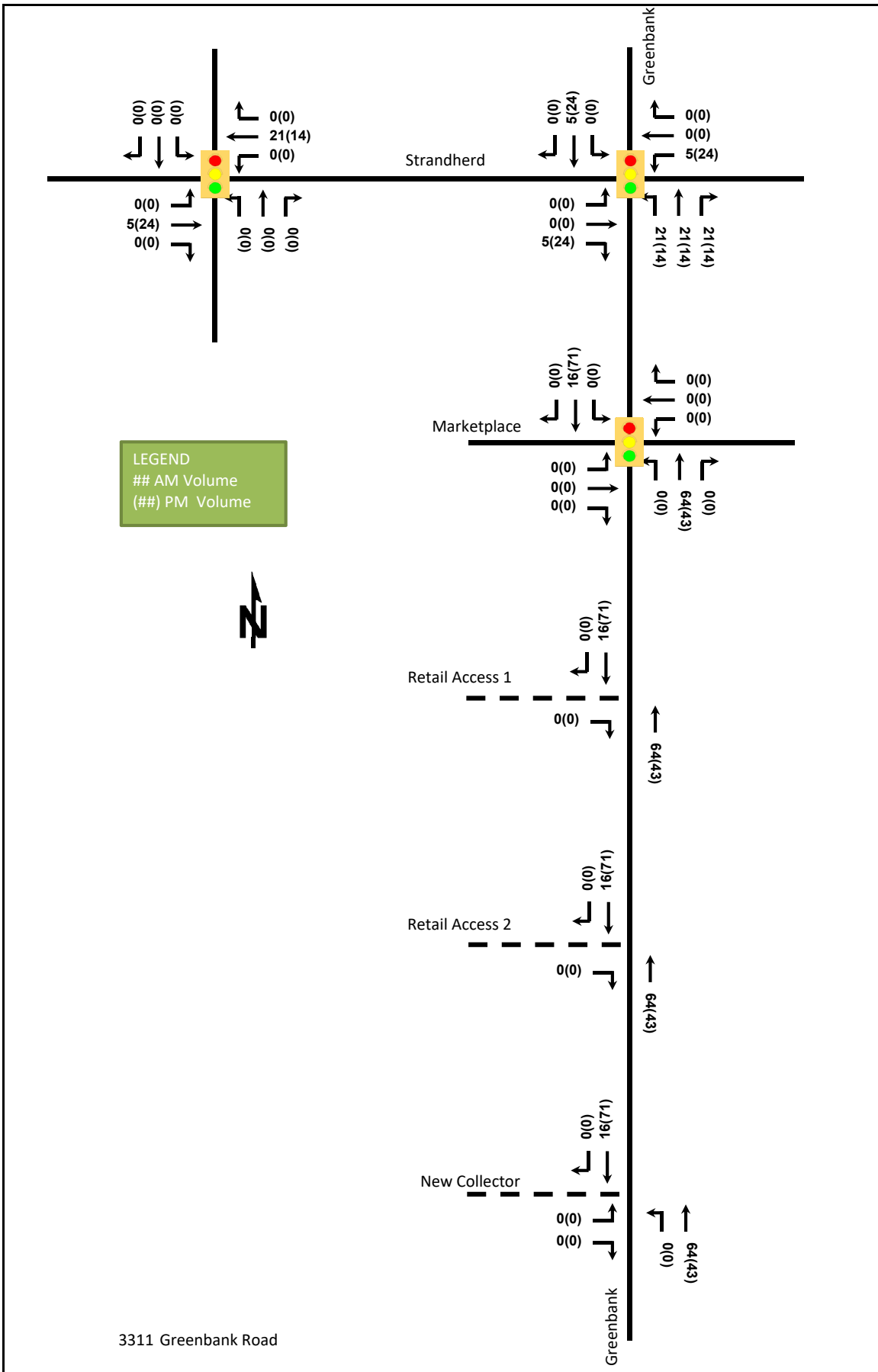
Intersection Signal Delay: 43.4
Intersection LOS: D
ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

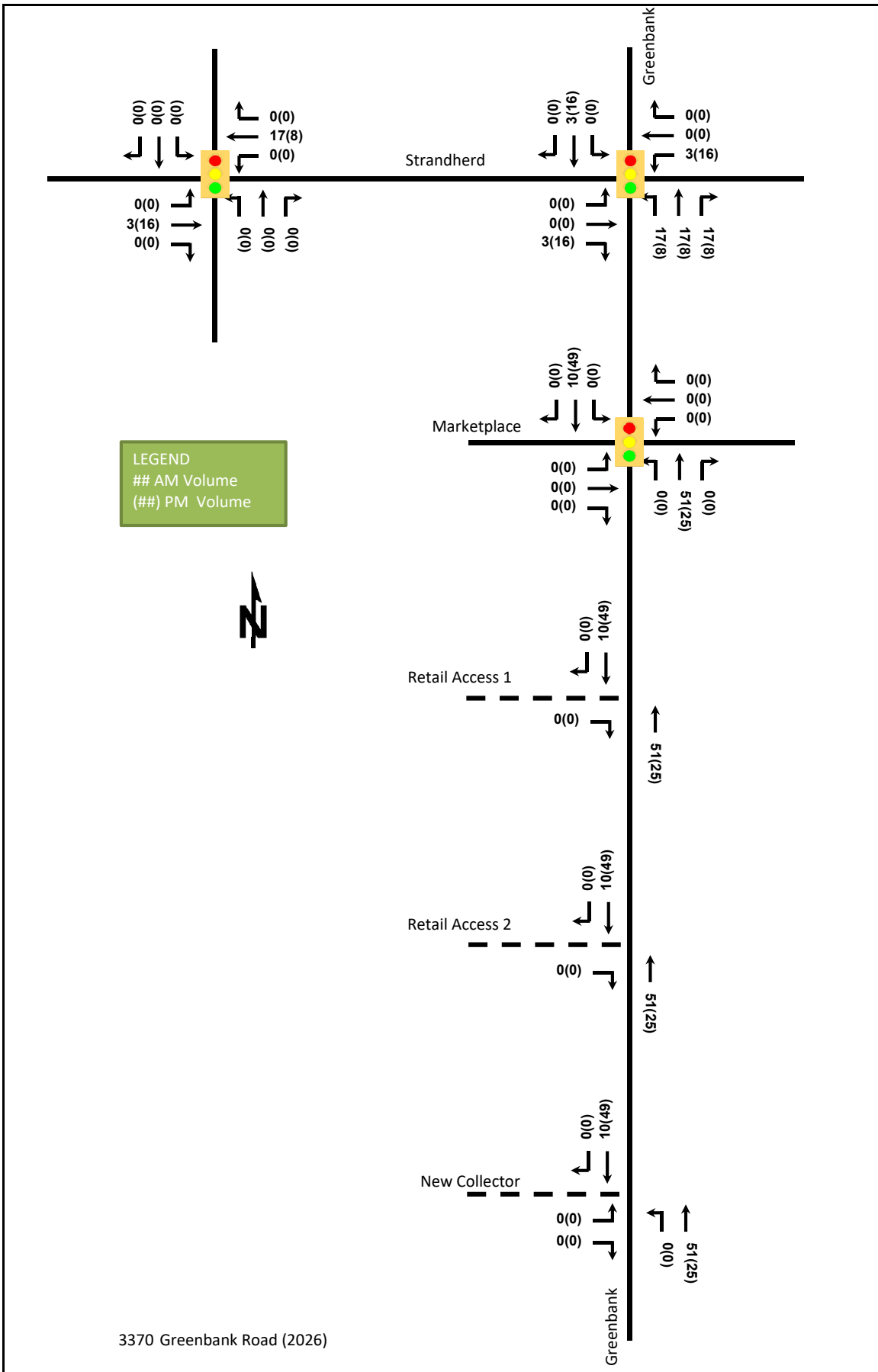
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	145	898	79	221	722	184	123	327	89	251	426	124
Future Volume (vph)	145	898	79	221	722	184	123	327	89	251	426	124
Sat'd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3210	0	3216	3316	1483
Flt Permitted	0.244			0.104			0.950			0.950		
Sat'd. Flow (perm)	426	3316	1483	181	3316	1483	3216	3210	0	3216	3316	1483
Sat'd. Flow (RTOR)	143			184			26					143
Lane Group Flow (vph)	145	898	79	221	722	184	123	416	0	251	426	124
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4	4	3	8	8	5	2	1	6		
Permitted Phases	4	4	4	3	8	8	5	2	1	6		
Detector Phase	7	4	4	3	8	8	5	2	1	6		
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	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	37.0
Total Split (s)	18.0	43.0	43.0	20.0	45.0	45.0	24.0	38.0	24.0	38.0	38.0	38.0
Total Split (%)	14.4%	34.4%	34.4%	16.0%	36.0%	36.0%	19.2%	30.4%	19.2%	30.4%	30.4%	30.4%
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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	45.6	35.4	35.4	51.7	38.4	38.4	10.0	31.6	14.4	36.0	36.0	36.0
Actuated G/C Ratio	0.38	0.29	0.29	0.43	0.32	0.32	0.08	0.26	0.12	0.30	0.30	0.30
v/c Ratio	0.54	0.92	0.15	0.92	0.69	0.31	0.46	0.48	0.66	0.43	0.23	0.23
Control Delay	28.4	57.4	0.6	71.5	40.3	5.9	58.9	38.1	59.5	36.3	4.7	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	57.4	0.6	71.5	40.3	5.9	58.9	38.1	59.5	36.3	4.7	4.7
LOS	C	E	A	E	D	A	E	D	E	D	D	A
Approach Delay		49.7			40.8			42.8			38.6	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	21.0	114.5	0.0	40.3	83.6	0.0	15.5	44.1	31.5	45.6	0.0	0.0
Queue Length 95th (m)	36.5	#159.3	0.0	#93.1	109.8	17.2	25.7	62.4	45.8	63.4	10.9	10.9
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)	281	1004	548	241	1067	602	472	858	472	988	542	542
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.89	0.14	0.92	0.68	0.31	0.26	0.48	0.63	0.43	0.23	0.23

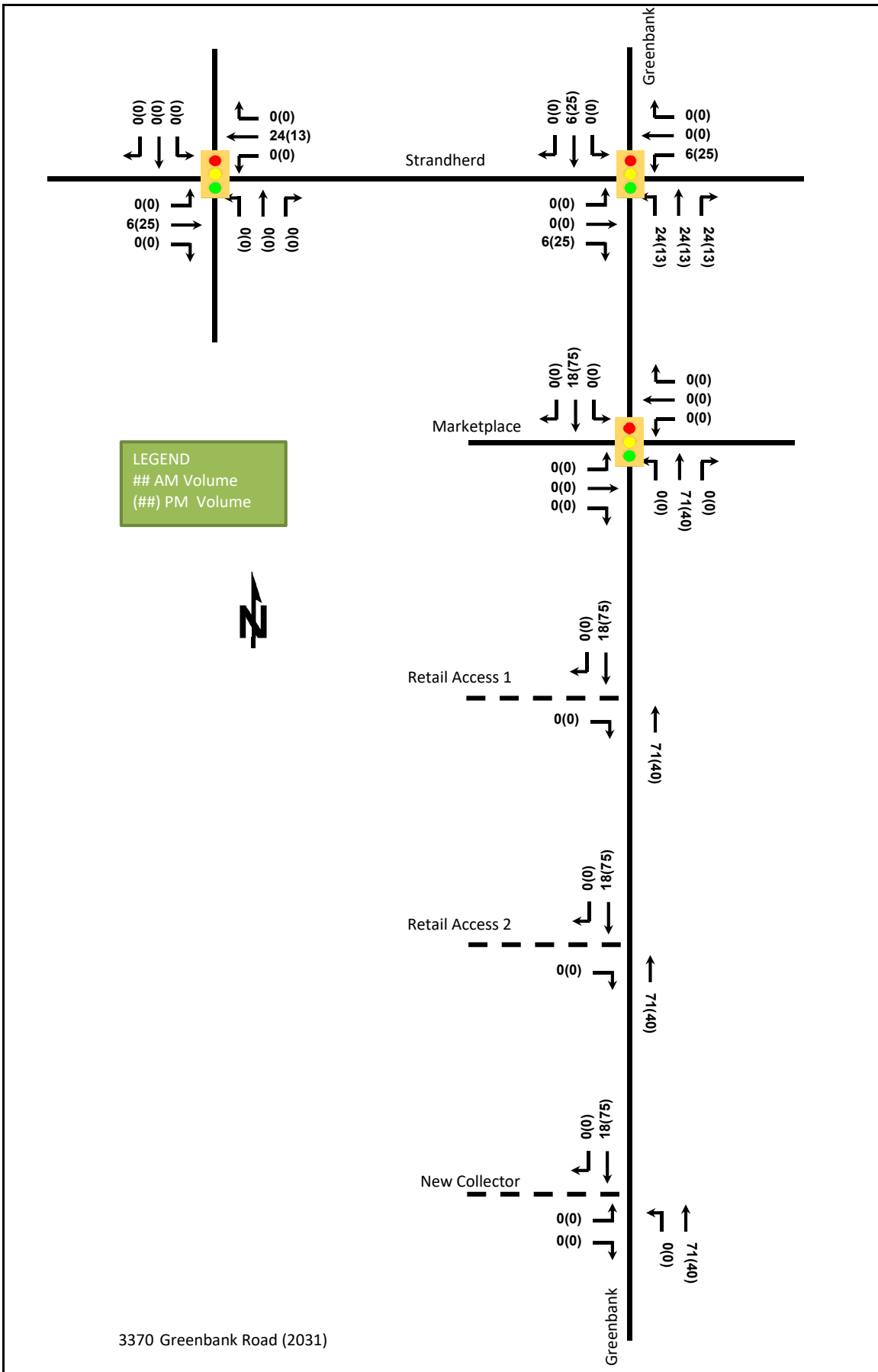
Appendix G

Background Development 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 Drive				Greenbank Road & New Collector				
Crossing Side		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	
Pedestrian	Lanes	6	5	4	4	7	6	6	4	3	5	5	5	4	5	3	3	4
	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	Median > 2.4 m	Median > 2.4 m	Median > 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected	Protected	Permissive	Permissive	Protected	Protected	Protected/Permissive	Protected/Permissive	Protected/Permissive	Permissive	Permissive	No left turn / Prohib.	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	No right turn	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	RTOR allowed	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	No	No	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	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m	10-15m	15-25m	15-25m	>25m	>25m	10-15m	10-15m	10-15m	10-15m	10-15m	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	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSIScore		25	40	61	61	16	23	37	66	70	37	40	40	63	48	70	
	Ped. Exposure to Traffic LoS		F	E	C	C	F	F	E	C	C	E	E	E	C	D	C	
	Cycle Length		120	120	120	120	120	120	120	120	120	120	120	120	120	60	60	60
Effective Walk Time		28	28	25	25	27	27	29	29	30	30	23	23	18	18	18	18	
Average Pedestrian Delay		35	35	38	38	36	36	35	35	34	34	39	39	15	15	15	15	
Pedestrian Delay LoS		D	D	D	D	D	D	D	D	D	D	D	D	B	B	B		
Level of Service		F	E	D	D	F	F	E	D	D	E	E	E	C	D	C		
		F				F				E				D				
Approach From		NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	
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	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic	
	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	≤ 50 m	Not Applicable	Not Applicable	Not Applicable	≤ 50 m	
	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	≤ 25 km/h	Not Applicable	Not Applicable	Not Applicable	≤ 25 km/h	
	Cyclist relative to RT motorists	Not Applicable	Not Applicable	D	D	D	Not Applicable	F	C	Not Applicable	F	Not Applicable	D	Not Applicable	Not Applicable	-	D	
	Separated or Mixed Traffic	Separated	Separated	Mixed Traffic	Mixed Traffic	Separated	Separated	Separated	Separated	Separated	Mixed Traffic	Separated	Mixed Traffic	Separated	Separated	-	Mixed Traffic	
	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	One lane crossed	Other LT config	One lane crossed	≥ 2 lanes crossed	One lane crossed	
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	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h		
Left Turning Cyclist		F	F	B	B	F	F	F	F	F	D	F	F	-	F	-	D	
Level of Service		F	F	D	D	F	F	F	F	F	F	F	F	-	F	-	D	
		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	≤ 30 sec	≤ 10 sec	≤ 10 sec	-	≤ 20 sec	
	Level of Service	D	D	F	F	F	F	E	E	D	F	D	D	B	B	-	C	
		F				F				F				C				
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	< 10 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	≥ 2	1	-	≥ 2	≥ 2	
	Level of Service	B	B	B	B	A	B	A	A	B	B	E	D	E	-	-	B	
		B				B				E				E				
Auto	Volume to Capacity Ratio	0.61 - 0.70				0.71 - 0.80				0.61 - 0.70				0.0 - 0.60				
	Level of Service	B				C				B				A				

Multi-Modal Level of Service - Segments Form

Consultant	CGH Transportation
Scenario	
Comments	

Project	3194 Jockvale Road
Date	Dec. 2018

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

Appendix I

Signal Warrant Analysis

City of Ottawa Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Greenbank Road	Direction (EW or NS)	NS	
Side Street (name)	New Collector Road	Direction (EW or NS)	EW	
Quadrant / Int #		Comments	2026 Scenario	
CHECK SHEET				

press 'CHECK SHEET' button to calculate results

Road Authority:	City of Ottawa
City:	Ottawa
Analysis Date:	2018 Dec 19, Wed
Count Date:	
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Greenbank Road	NB		1	1					2
Greenbank Road	SB			1		1			2
New Collector Road	WB								
New Collector Road	EB	1					1		

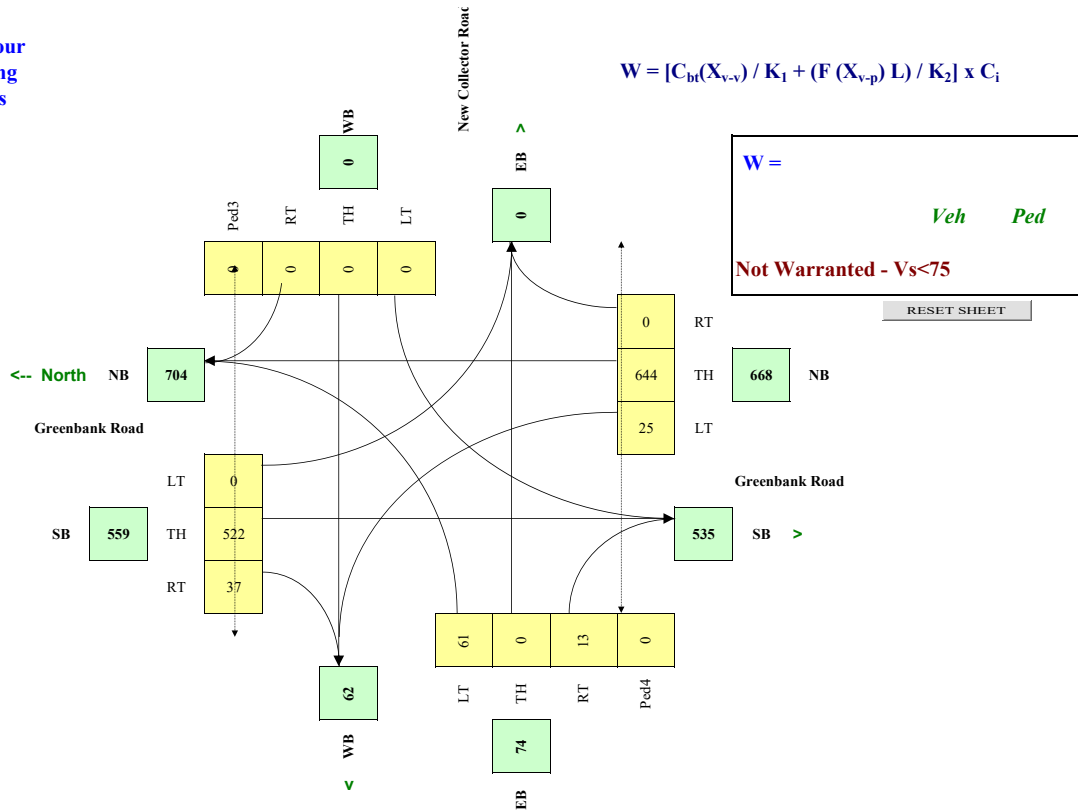
Demographics		
Elem. School/Mobility Impaired	(y/n)	
Senior's Complex	(y/n)	
Pathway to School	(y/n)	
Metro Area Population	(#)	
Central Business District	(y/n)	

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Greenbank Road	NS	60	2.0%	y	5.0
New Collector Road	EW	50	2.0%	y	0.0

Traffic Input	NB				SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT		LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
	press 'Set Peak Hours' Button to set the peak hour periods																
	13	761	0	0	320	24	0	0	0	0	37	0	6				
	15	879	0	0	370	28	0	0	0	0	43	0	7				
	9	532	0	0	224	17	0	0	0	0	26	0	4				
	21	321	0	0	421	29	0	0	0	0	49	0	12				
	44	663	0	0	871	60	0	0	0	0	101	0	24				
	47	705	0	0	926	64	0	0	0	0	107	0	26				
Total (6-hour peak)	149	3,861	0	0	3,132	222	0	0	0	0	363	0	79	0	0	0	0
Average (6-hour peak)	25	644	0	0	522	37	0	0	0	0	61	0	13	0	0	0	0

Average 6-hour Peak Turning Movements

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



City of Ottawa Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Greenbank Road	Direction (EW or NS)	NS
Side Street (name)	New Collector Road	Direction (EW or NS)	EW
Quadrant / Int #		Comments	2031 Scenario
	CHECK SHEET		

press 'CHECK SHEET' button to calculate results

Road Authority:	City of Ottawa
City:	Ottawa
Analysis Date:	2018 Dec 19, Wed
Count Date:	
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Greenbank Road	NB		1	1					2
Greenbank Road	SB			1		1			2
New Collector Road	WB								
New Collector Road	EB	1					1		

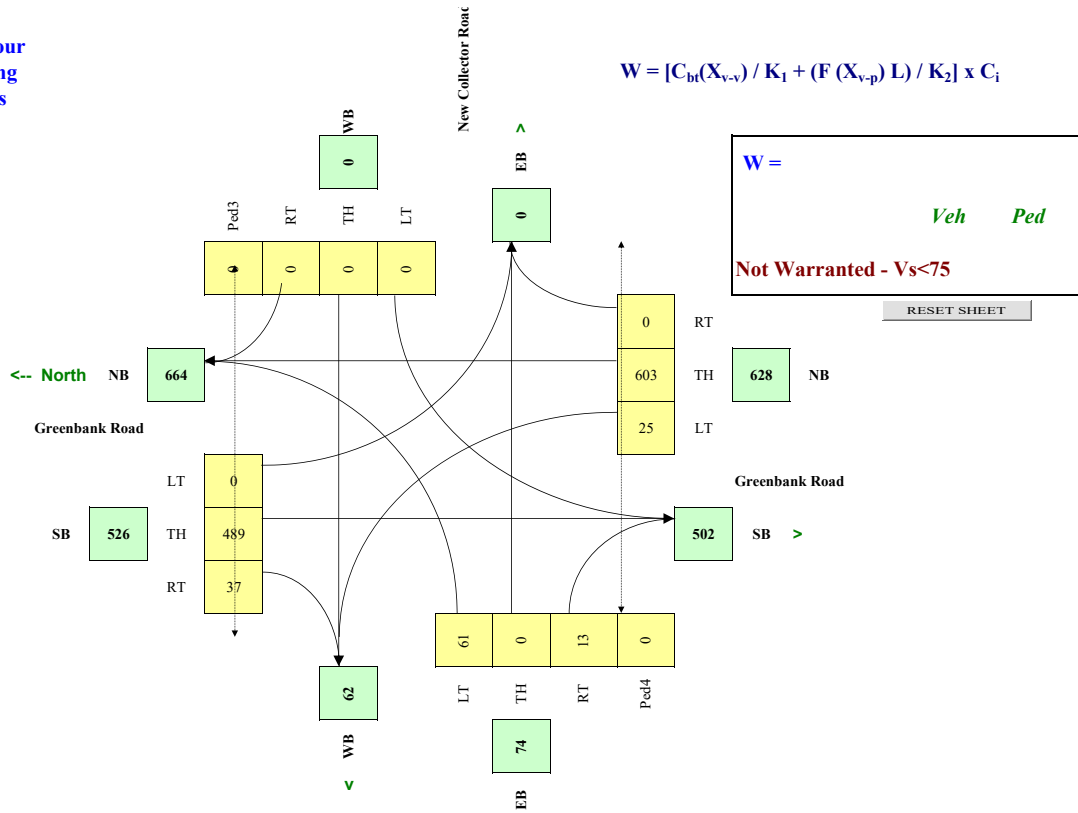
Demographics		
Elem. School/Mobility Impaired	(y/n)	
Senior's Complex	(y/n)	
Pathway to School	(y/n)	
Metro Area Population	(#)	
Central Business District	(y/n)	

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Greenbank Road	NS	60	2.0%	y	5.0
New Collector Road	EW	50	2.0%	y	0.0

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
	13	705	0	0	287	24	0	0	0	37	0	6				
	15	815	0	0	332	28	0	0	0	43	0	7				
	9	493	0	0	201	17	0	0	0	26	0	4				
	21	305	0	0	402	29	0	0	0	49	0	12				
	44	631	0	0	830	60	0	0	0	101	0	24				
	47	671	0	0	883	64	0	0	0	107	0	26				
Total (6-hour peak)	149	3,620	0	0	2,935	222	0	0	0	363	0	79	0	0	0	0
Average (6-hour peak)	25	603	0	0	489	37	0	0	0	61	0	13	0	0	0	0

Average 6-hour Peak Turning Movements

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



Appendix J

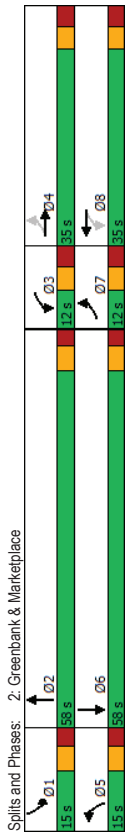
Synchro Intersection Worksheets – 2026 Total Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	SBT	SBR
Lane Configurations	12	17	27	58	23	106	98	785	74	63	378	6	6
Traffic Volume (vph)	12	17	27	58	23	106	98	785	74	63	378	6	6
Future Volume (vph)	1658	1585	0	1658	1530	0	1658	3273	0	3216	3309	0	0
Satd. Flow (prot)	0.674			0.522		0.950				0.950			
Flt Permitted	1176	1585	0	911	1530	0	1658	3273	0	3216	3309	0	0
Satd. Flow (perm)	27			106		10				2			
Satd. Flow (RTOR)	12	44	0	58	129	0	98	859	0	63	384	0	0
Lane Group Flow (vph)	pm-pt	NA	pm-pt	NA	Prot	NA	Prot	NA	Prot	NA	Prot	NA	NA
Turn Types	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	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	12.0	35.0	12.0	35.0	15.0	58.0	15.0	58.0	15.0	58.0	15.0	58.0	58.0
Total Split (s)	12.0	35.0	12.0	35.0	15.0	58.0	15.0	58.0	15.0	58.0	15.0	58.0	58.0
Total Split (%)	10.0%	29.2%	10.0%	29.2%	12.5%	48.3%	12.5%	48.3%	12.5%	48.3%	12.5%	48.3%	48.3%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7	3.7	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	2.6	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	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	6.3	6.2	6.3	6.2	6.2
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	12.9	10.6	16.4	15.2	8.6	56.7	7.2	52.8	7.2	52.8	7.2	52.8	52.8
Actuated G/C Ratio	0.13	0.11	0.17	0.16	0.09	0.56	0.07	0.54	0.07	0.54	0.07	0.54	0.54
v/c Ratio	0.07	0.23	0.29	0.40	0.67	0.45	0.27	0.22	0.27	0.22	0.27	0.22	0.22
Control Delay	32.0	25.5	36.6	15.1	67.9	14.6	46.9	13.1	46.9	13.1	46.9	13.1	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	25.5	36.6	15.1	67.9	14.6	46.9	13.1	46.9	13.1	46.9	13.1	13.1
LOS	C	C	D	B	E	B	D	B	D	B	D	B	B
Approach Delay	26.9	21.8	21.8	20.0	20.0	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
Approach LOS	C	C	C	C	C	C	C	C	C	C	C	C	C
Queue Length 50th (m)	2.0	3.3	9.8	3.8	20.1	57.0	6.4	22.0	6.4	22.0	6.4	22.0	22.0
Queue Length 95th (m)	6.9	13.9	20.9	22.4	#47.2	80.7	13.4	33.1	13.4	33.1	13.4	33.1	33.1
Internal Link Dist (m)	102.8		148.8		60.0	92.5		171.8		171.8		171.8	171.8
Turn Bay Length (m)	25.0		55.0		60.0	92.5		171.8		171.8		171.8	171.8
Base Capacity (vph)	182	481	202	521	148	1899	286	1784	286	1784	286	1784	1784
Starvation Cap Reductn	0	0	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	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.09	0.29	0.25	0.66	0.45	0.22	0.22	0.22	0.22	0.22	0.22	0.22

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 98
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.67

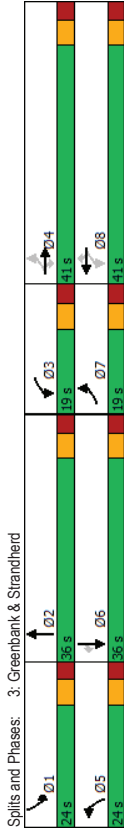
Intersection Signal Delay: 19.9
Intersection LOS: B
ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	120	537	141	108	657	163	172	325	123	175	205	103
Traffic Volume (vph)	120	537	141	108	657	163	172	325	123	175	205	103
Future Volume (vph)	1658	3316	1483	1658	3316	1483	3216	3180	0	3216	3316	1483
Satd. Flow (prot)	0.256			0.364			0.950					
Flt Permitted	447	3316	1483	635	3316	1483	3216	3180	0	3216	3316	1483
Satd. Flow (RTOR)	149			163			4.3					149
Lane Group Flow (vph)	120	537	141	108	657	163	172	448	0	175	205	103
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4	3	8	8	5	2			1	6	
Permitted Phases	4	4	4	8	8	8	2			1	6	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	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	46.1	35.5	35.5	44.0	34.5	34.5	11.3	29.5	11.4	29.7	29.7	29.7
Actuated G/C Ratio	0.41	0.32	0.32	0.39	0.31	0.31	0.10	0.26	0.10	0.27	0.27	0.27
v/c Ratio	0.40	0.51	0.25	0.32	0.64	0.29	0.53	0.51	0.54	0.23	0.21	0.21
Control Delay	22.4	33.9	5.5	20.9	37.5	6.1	54.4	34.6	54.3	33.9	2.6	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	33.9	5.5	20.9	37.5	6.1	54.4	34.6	54.3	33.9	2.6	2.6
LOS	C	C	A	C	D	A	D	C	D	C	C	A
Approach Delay	27.1			30.0			40.1			34.6		
Approach LOS	C			C			D			C		
Queue Length 50th (m)	15.6	52.8	0.0	14.0	69.0	0.0	19.8	42.1	20.2	19.6	0.0	0.0
Queue Length 95th (m)	28.9	75.8	13.5	26.5	95.0	16.0	31.7	62.1	32.0	31.6	5.0	5.0
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)	325	1052	572	378	1022	570	508	870	508	877	502	502
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.51	0.25	0.29	0.64	0.29	0.34	0.51	0.34	0.23	0.23	0.21

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	112
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.64

Intersection Signal Delay: 32.2
Intersection Capacity Utilization 66.7%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service C



Splits and Phases: 3: Greenbank & Strandherd

Lanes, Volumes, Timings
4: Jockvale & Strandherd

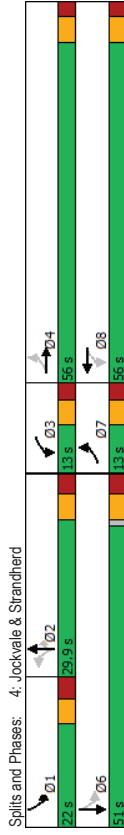
01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	22	643	35	61	832	264	61	52	52	259	62	18
Future Volume (vph)	22	643	35	61	832	264	61	52	52	259	62	18
Satd. Flow (prot)	1658	3289	0	1658	3196	0	1658	1745	1483	1658	1686	0
Flt Permitted	0.183			0.323			0.705			0.413		
Satd. Flow (perm)	319	3289	0	564	3196	0	1230	1745	1483	721	1686	0
Satd. Flow (RTOR)	6			43			145			14		
Lane Group Flow (vph)	22	678	0	61	1096	0	61	52	52	259	80	0
Turn Type	pm-pt	NA	pm-pt	NA	pm-pt	NA	pm-pt	NA	pm-pt	pm-pt	NA	NA
Permitted Phases	7	4	3	8	8	2	2	2	2	6	6	
Detector Phase	7	4	3	8	8	2	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	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	29.9	22.0	51.0		
Total Split (s)	13.0	56.0	13.0	56.0	29.9	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%	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	3.7		
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	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	0.0		
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.9	6.9	6.9	6.9		
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	None	None	None	None	None	None	None		
Act Effct Green (s)	56.0	51.2	58.7	56.2	12.0	12.0	12.0	12.0	28.9	28.9		
Actuated G/C Ratio	0.54	0.50	0.57	0.55	0.12	0.12	0.12	0.12	0.28	0.28		
v/c Ratio	0.09	0.41	0.16	0.62	0.43	0.26	0.17	0.78	0.17	0.17		
Control Delay	11.8	19.8	12.0	20.3	55.5	48.2	1.2	48.4	24.1	24.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	11.8	19.8	12.0	20.3	55.5	48.2	1.2	48.4	24.1	24.1		
LOS	B	B	B	C	E	D	A	D	C	C		
Approach Delay	19.6	19.9		36.1					42.6			
Approach LOS	B	B		D					D			
Queue Length 50th (m)	2.0	52.1	5.6	74.0	13.1	11.0	0.0	47.7	10.7			
Queue Length 95th (m)	6.1	74.2	12.9	135.8	27.2	23.3	0.0	74.0	22.4			
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)	266	1637	396	1761	281	398	450	349	761			
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0			
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0			
Storage Cap Reductn	0	0	0	0	0	0	0	0	0			
Reduced v/c Ratio	0.08	0.41	0.15	0.62	0.22	0.13	0.12	0.74	0.11			
Intersection Summary												
Cycle Length	120.9											
Actuated Cycle Length	103.1											
Natural Cycle	125											
Control Type	Actuated-Uncoordinated											
Maximum v/c Ratio	0.78											

Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019

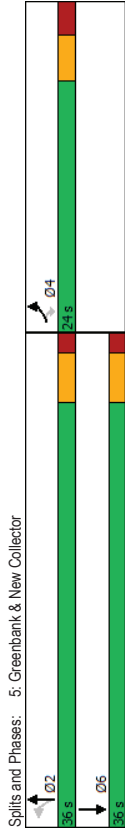
Intersection Signal Delay: 24.2
Intersection LOS: C
ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



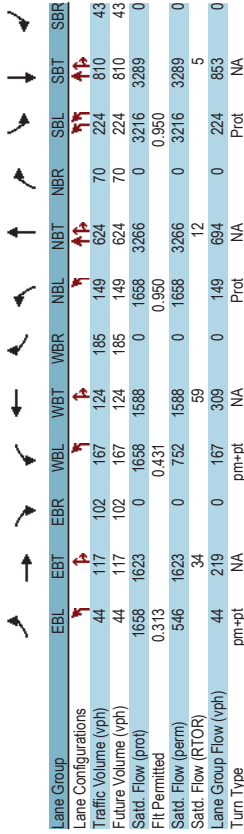
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	43	7	15	879	370	28
Future Volume (vph)	43	7	15	879	370	28
Satd. Flow (prot)	1658	1483	1658	3316	3279	0
Flt Permitted	0.950		0.517			
Satd. Flow (perm)	1658	1483	902	3316	3279	0
Satd. Flow (RTOR)	7				19	
Lane Group Flow (vph)	43	7	15	879	398	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases	4	4	2	2	6	
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)	24.0	24.0	23.2	23.2	23.2	
Total Split (s)	24.0	24.0	36.0	36.0	36.0	
Total Split (%)	40.0%	40.0%	60.0%	60.0%	60.0%	
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	
All-Red Time (s)	2.5	2.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.2	5.2	5.2	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Max	Max	Max	
Act Effct Green (s)	7.0	7.0	47.6	47.6	47.6	
Actuated G/C Ratio	0.13	0.13	0.87	0.87	0.87	
v/c Ratio	0.20	0.04	0.02	0.30	0.14	
Control Delay	24.3	13.9	3.0	2.7	2.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.3	13.9	3.0	2.7	2.2	
LOS	C	B	A	A	A	
Approach Delay	22.8		2.7	2.2		
Approach LOS	C		A	A		
Queue Length 50th (m)	3.8	0.0	0.0	0.0	0.0	
Queue Length 95th (m)	11.4	2.9	2.0	28.4	11.4	
Internal Link Dist (m)	164.5			457.8	30.3	
Turn Bay Length (m)	37.5			37.5		
Base Capacity (vph)	566	502	784	2882	2853	
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	0.30	0.14	

Intersection Summary	
Cycle Length:	60
Actuated Cycle Length:	54.7
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.30

Intersection Signal Delay: 3.3	Intersection LOS: A
Intersection Capacity Utilization 39.0%	ICU Level of Service A
Analysis Period (min) 15	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	117	102	167	124	185	149	624	70	224	810	43
Traffic Volume (vph)	44	117	102	167	124	185	149	624	70	224	810	43
Future Volume (vph)	44	117	102	167	124	185	149	624	70	224	810	43
Satd. Flow (prot)	1658	1623	0	1658	1588	0	1658	3266	0	3216	3289	0
Flt Permitted	0.313			0.431			0.950			0.950		
Satd. Flow (perm)	546	1623	0	752	1588	0	1658	3266	0	3216	3289	0
Satd. Flow (RTOR)	34			59			12			5		
Lane Group Flow (vph)	44	219	0	167	309	0	149	694	0	224	853	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	Max		None	Max	
Act Effct Green (s)	28.3	21.8		30.0	24.8		12.9	46.8		12.2	46.1	
Actuated G/C Ratio	0.25	0.19		0.27	0.22		0.11	0.41		0.11	0.41	
v/c Ratio	0.22	0.64		0.66	0.78		0.78	0.51		0.65	0.64	
Control Delay	29.8	44.0		45.8	49.1		77.9	27.0		58.6	30.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.8	44.0		45.8	49.1		77.9	27.0		58.6	30.4	
LOS	C	D		D	D		E	C		E	C	
Approach Delay		41.6			48.0			36.0			36.3	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	7.3	40.1		29.9	58.0		34.9	64.1		26.5	85.3	
Queue Length 95th (m)	16.0	66.3		48.5	92.2		71.4	88.5		41.2	114.6	
Internal Link Dist (m)		102.8			148.8			92.5			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	203	437		253	446		202	1360		392	1343	
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	0.22	0.50		0.66	0.69		0.74	0.51		0.57	0.64	
Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 113												
Natural Cycle: 120												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.78												

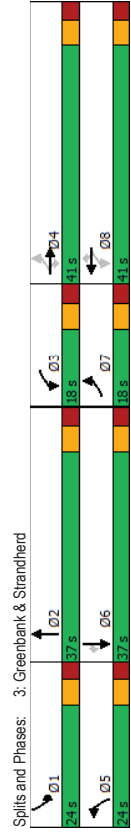


Intersection Signal Delay: 38.8
 Intersection LOS: D
 ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	159	895	220	274	736	184	232	355	146	251	449	128
Future Volume (vph)	159	895	220	274	736	184	232	355	146	251	449	128
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3170	0	3216	3316	1483
Flt Permitted	0.208			0.116			0.950					
Satd. Flow (perm)	363	3316	1483	202	3316	1483	3216	3170	0	3216	3316	1483
Satd. Flow (RTOR)	220			184			50					149
Lane Group Flow (vph)	159	895	220	274	736	184	232	501	0	251	449	128
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases	4	4	4	8	8	8		2		1		6
Detector Phase	7	4	4	3	8	8	5	2		1		6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	None	Max	Max
Act Effct Green (s)	44.1	33.6	33.6	45.8	34.5	34.5	13.6	30.5	14.1	31.0	31.0	31.0
Actuated G/C Ratio	0.38	0.29	0.29	0.40	0.30	0.30	0.12	0.26	0.12	0.27	0.27	0.27
v/c Ratio	0.62	0.93	0.37	1.23	0.74	0.32	0.61	0.57	0.64	0.51	0.25	0.25
Control Delay	31.8	56.5	6.2	163.8	42.6	6.2	55.9	36.6	56.4	38.8	5.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	56.5	6.2	163.8	42.6	6.2	55.9	36.6	56.4	38.8	5.0	5.0
LOS	C	E	A	F	D	A	E	D	E	D	D	A
Approach Delay		44.8			64.8			42.7			38.9	
Approach LOS		D			E			D			D	
Queue Length 50th (m)	22.8	109.1	0.0	-66.7	84.2	0.0	27.7	49.7	30.0	48.3	0.0	0.0
Queue Length 95th (m)	38.6	#155.3	18.7	#127.0	111.6	17.2	40.8	70.6	44.0	68.1	11.2	0.0
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)	269	991	597	223	996	574	493	874	483	889	507	0
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.90	0.37	1.23	0.74	0.32	0.47	0.57	0.51	0.51	0.25	0.25

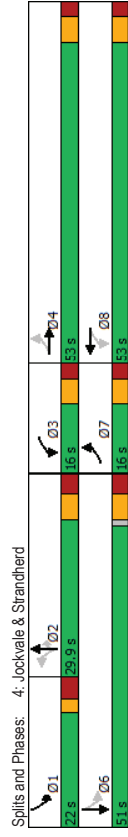
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 115.6
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.23

Intersection Signal Delay: 49.1	Intersection LOS: D
Capacity Utilization 86.6%	ICU Level of Service E
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	
# Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	



Intersection Signal Delay: 31.6
 Intersection Capacity Utilization 87.1%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: C
 ICU Level of Service E

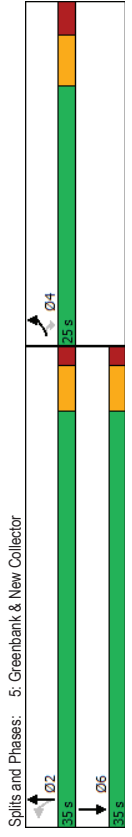


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	19	800	97	130	761	385	129	147	129	327	135	18
Future Volume (vph)	19	800	97	130	761	385	129	147	129	327	135	18
Satd. Flow (prot)	1658	3263	0	1658	3150	0	1658	1745	1483	1658	1714	0
Flt Permitted	0.160			0.184			0.660			0.450		
Satd. Flow (perm)	279	3263	0	321	3150	0	1152	1745	1483	785	1714	0
Satd. Flow (RTOR)	13			86			130			6		
Lane Group Flow (vph)	19	897	0	130	1146	0	129	147	129	327	153	0
Turn Type	pm-pt	NA		pm-pt	NA		Perm	NA	Perm	pm-pt	NA	
Permitted Phases	7	4		3	8		2	2	2	1	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	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max		None	Max		None	None	None	None	None	
Act Effct Green (s)	53.2	47.0		61.0	57.2		17.3	17.3	17.3	40.7	39.0	
Actuated G/C Ratio	0.47	0.41		0.53	0.50		0.15	0.15	0.15	0.36	0.34	
v/c Ratio	0.09	0.66		0.47	0.71		0.74	0.56	0.39	0.81	0.26	
Control Delay	14.9	30.6		19.8	25.4		71.4	53.3	10.6	46.4	27.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	14.9	30.6		19.8	25.4		71.4	53.3	10.6	46.4	27.1	
LOS	B	C		B	C		E	D	B	D	C	
Approach Delay	30.3			24.8			45.5			40.2		
Approach LOS	C			C			D			D		
Queue Length 50th (m)	2.0	89.8		14.8	90.8		29.7	32.8	0.0	61.8	25.0	
Queue Length 95th (m)	6.2	121.3		27.6	158.0		51.9	54.1	16.8	96.0	41.8	
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)	259	1352		287	1621		232	352	403	409	681	
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	0.66		0.45	0.71		0.56	0.42	0.32	0.80	0.22	
Intersection Summary												
Cycle Length:	120.9											
Actuated Cycle Length:	114.2											
Natural Cycle:	125											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.81											

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	107	26	47	705	926	64
Traffic Volume (vph)	107	26	47	705	926	64
Future Volume (vph)	1658	1483	1658	3316	3283	0
Satd. Flow (prot)	0.950	0.261				
Flt Permitted						
Satd. Flow (perm)	1658	1483	455	3316	3283	0
Satd. Flow (RTOR)	26				17	
Lane Group Flow (vph)	107	26	47	705	990	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases	4	4	2	2	6	
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)	24.2	24.2	23.0	23.0	23.0	
Total Split (s)	25.0	25.0	35.0	35.0	35.0	
Total Split (%)	41.7%	41.7%	58.3%	58.3%	58.3%	
Yellow Time (s)	3.7	3.7	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.2	6.2	4.8	4.8	4.8	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Min	Min	Min	
Act Effct Green (s)	8.4	8.4	26.4	26.4	26.4	
Actuated G/C Ratio	0.20	0.20	0.64	0.64	0.64	
v/c Ratio	0.32	0.08	0.16	0.33	0.47	
Control Delay	17.5	7.3	7.5	6.1	7.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	17.5	7.3	7.5	6.1	7.0	
LOS	B	A	A	A	A	
Approach Delay	15.5		6.1	7.0		
Approach LOS	B		A	A		
Queue Length 50th (m)	7.4	0.0	1.6	14.0	21.5	
Queue Length 95th (m)	17.8	4.4	6.8	27.0	41.1	
Internal Link Dist (m)	164.5		457.8	30.3		
Turn Bay Length (m)	37.5		37.5			
Base Capacity (vph)	787	717	337	2461	2441	
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	0.14	0.04	0.14	0.29	0.41	

Intersection Summary	
Cycle Length:	60
Actuated Cycle Length:	41.3
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.47

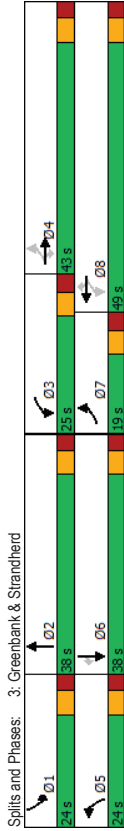
Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 52.8%	ICU Level of Service A
Analysis Period (min) 15	



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	159	895	220	274	736	184	232	355	146	251	449	128
Future Volume (vph)	159	895	220	274	736	184	232	355	146	251	449	128
Sat'd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3170	0	3216	3316	1483
Flt Permitted	0.276			0.094			0.950			0.950		
Sat'd. Flow (perm)	482	3316	1483	164	3316	1483	3216	3170	0	3216	3316	1483
Sat'd. Flow (RTOR)	220			184			45					138
Lane Group Flow (vph)	159	895	220	274	736	184	232	501	0	251	449	128
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Permitted Phases	7	4	4	3	8	8	5	2	1	6	6	6
Detector Phase	7	4	4	3	8	8	5	2	1	6	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	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	37.0
Total Split (s)	19.0	43.0	43.0	25.0	49.0	49.0	24.0	38.0	24.0	38.0	38.0	38.0
Total Split (%)	14.6%	33.1%	33.1%	19.2%	37.7%	37.7%	18.5%	29.2%	18.5%	29.2%	29.2%	29.2%
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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	None	Max	Max
Act Effct Green (s)	47.2	36.1	36.1	60.4	43.0	43.0	14.2	31.5	14.7	32.1	32.1	32.1
Actuated G/C Ratio	0.37	0.29	0.29	0.48	0.34	0.34	0.11	0.25	0.12	0.25	0.25	0.25
v/c Ratio	0.56	0.95	0.95	0.38	0.94	0.94	0.62	0.61	0.67	0.53	0.53	0.27
Control Delay	28.4	63.5	63.5	73.7	39.2	39.2	5.6	62.4	42.1	62.9	44.0	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	63.5	63.5	73.7	39.2	39.2	5.6	62.4	42.1	62.9	44.0	6.7
LOS	C	E	A	E	D	A	E	D	E	D	D	A
Approach Delay		49.3		42.0		48.5		44.0		44.0		44.0
Approach LOS		D		D		D		D		D		D
Queue Length 50th (m)	23.5	121.8	0.0	56.7	87.4	0.0	30.6	56.6	33.1	54.2	0.0	0.0
Queue Length 95th (m)	38.2	#169.1	19.3	#114.7	113.2	16.7	44.4	77.8	47.6	74.3	14.0	14.0
Internal Link Dist (m)		396.5		415.8		171.8		236.6		236.6		236.6
Turn Bay Length (m)	70.0	100.0	130.0	60.0	60.0	60.0	60.0	85.0	60.0	60.0	160.0	160.0
Base Capacity (vph)	299	958	585	296	1128	625	450	824	450	841	478	478
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.93	0.38	0.93	0.65	0.29	0.52	0.61	0.56	0.53	0.27	0.27

Intersection Summary	
Cycle Length:	130
Actuated Cycle Length:	126.4
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.95

Intersection Signal Delay: 45.9
Intersection LOS: D
ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Splits and Phases: 3: Greenbank & Strandherd

Appendix K

Synchro Intersection Worksheets – 2031 Total Conditions

Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019

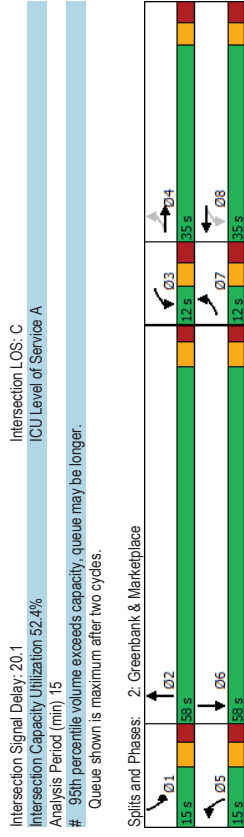
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	12	17	27	58	23	106	98	666	74	63	317	6
Traffic Volume (vph)	12	17	27	58	23	106	98	666	74	63	317	6
Future Volume (vph)	1658	1585	0	1658	1530	0	1658	3266	0	3216	3306	0
Sat'd. Flow (prot)	0.674			0.522		0.950				0.950		
Flt Permitted	1176	1685	0	911	1530	0	1658	3266	0	3216	3306	0
Sat'd. Flow (perm)	27	106										
Lane Group Flow (vph)	12	44	0	58	129	0	98	740	0	63	323	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	Max		None	Max	
Act Effct Green (s)	12.9	10.6		16.4	15.2		8.6	56.7		7.2	52.8	
Actuated G/C Ratio	0.13	0.11		0.17	0.16		0.09	0.56		0.07	0.54	
v/c Ratio	0.07	0.23		0.29	0.40		0.67	0.39		0.27	0.18	
Control Delay	32.0	25.5		36.6	15.1		67.9	13.7		46.9	12.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.0	25.5		36.6	15.1		67.9	13.7		46.9	12.8	
LOS	C	C		D	B		E	B		D	B	
Approach Delay	26.9	21.8		21.8	20.0		20.0	18.4		18.4	18.4	
Approach LOS	C	C		C	C		C	B		B	B	
Queue Length 50th (m)	2.0	3.3		9.8	3.8		20.1	46.6		6.4	18.2	
Queue Length 95th (m)	6.9	13.9		20.9	22.4		#47.2	66.7		13.4	28.0	
Internal Link Dist (m)	102.8			148.8			92.5			171.8		
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	182	481		202	521		148	1896		286	1782	
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	0.07	0.09		0.29	0.25		0.66	0.39		0.22	0.18	
Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 98												
Natural Cycle: 120												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.67												

3195 Jockvale Road AM Peak Hour 2031 Future Total

Synchro 10 Light Report
Page 1

Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019



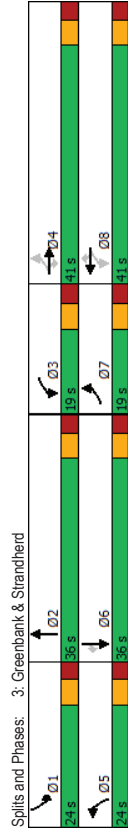
3195 Jockvale Road AM Peak Hour 2031 Future Total

Synchro 10 Light Report
Page 2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	120	557	63	111	681	163	16	342	130	175	215	103
Traffic Volume (vph)	120	557	63	111	681	163	16	342	130	175	215	103
Future Volume (vph)	1658	3316	1483	1658	3316	1483	3216	3180	0	3216	3316	1483
Satd. Flow (prot)	0.187			0.303			0.950			0.950		
Flt Permitted												
Satd. Flow (perm)	326	3316	1483	529	3316	1483	3216	3180	0	3216	3316	1483
Satd. Flow (RTOR)	149			163			44			44		149
Lane Group Flow (vph)	120	557	63	111	681	163	16	472	0	175	215	103
Turn Type	pm-pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4	3	8	8	5	2			1		6
Permitted Phases	4	4	4	8	8	8	2			1		6
Detector Phase	7	4	4	3	8	8	5	2		1		6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	37.6	27.4	27.4	36.2	26.7	26.7	6.1	29.8	11.1	42.5	42.5	42.5
Actuated G/C Ratio	0.36	0.26	0.26	0.35	0.26	0.26	0.06	0.29	0.11	0.41	0.41	0.41
v/c Ratio	0.48	0.64	0.13	0.39	0.80	0.32	0.09	0.50	0.51	0.16	0.15	0.15
Control Delay	25.8	37.7	0.5	23.0	44.2	6.7	51.4	31.8	50.8	23.1	1.9	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	37.7	0.5	23.0	44.2	6.7	51.4	31.8	50.8	23.1	1.9	1.9
LOS	C	D	A	C	D	A	D	C	D	C	C	A
Approach Delay	32.6			35.3			32.4			28.5		
Approach LOS	C			D			C			C		
Queue Length 50th (m)	15.5	54.8	0.0	14.3	71.4	0.0	1.7	40.0	18.5	13.8	0.0	0.0
Queue Length 95th (m)	28.9	79.0	0.0	27.0	99.0	16.0	5.7	65.6	32.0	29.9	4.5	4.5
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)	284	1110	595	335	1110	605	552	941	552	1355	694	694
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.50	0.11	0.33	0.61	0.27	0.03	0.50	0.32	0.16	0.15	0.15

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	104
Natural Cycle:	120
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.80

Intersection Signal Delay: 32.8	Intersection LOS: C
Intersection Capacity Utilization 68.1%	ICU Level of Service C
Analysis Period (min) 15	



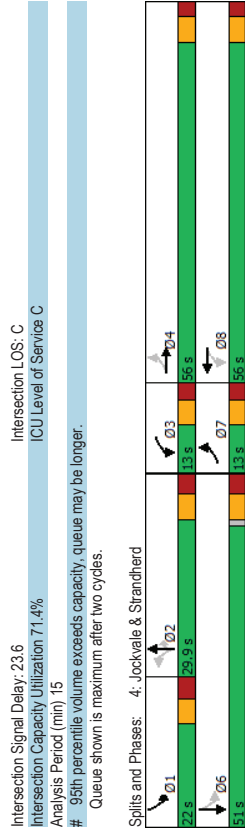
Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	22	589	35	61	707	264	61	52	52	259	62	18
Future Volume (vph)	22	589	35	61	707	264	61	52	52	259	62	18
Satd. Flow (prot)	1658	3289	0	1658	3180	0	1658	1745	1483	1658	1686	0
Flt Permitted	0.229		0.351			0.705				0.413		
Satd. Flow (perm)	400	3289	0	613	3180	0	1230	1745	1483	721	1686	0
Satd. Flow (RTOR)	6			54					145		14	
Lane Group Flow (vph)	22	624	0	61	971	0	61	52	52	259	80	0
Turn Type	pm-pt	NA	pm+pt	NA	pm+pt	NA	pm	NA	pm	pm-pt	NA	
Permitted Phases	7	4	3	8	2	2	2	2	2	6	6	
Detector Phase	7	4	3	8	2	2	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	5.0	10.0	10.0	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	29.9	22.0	51.0		
Total Split (s)	13.0	56.0	13.0	56.0	29.9	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%	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	3.7		
All-Red Time (s)	2.4	2.4	2.4	2.4	2.4	2.4	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	0.0		
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.9	6.9	6.9	6.9		
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	Max	None	Max	None	None	None	None	None	None		
Act Effct Green (s)	56.0	51.2	58.7	56.2	12.0	12.0	12.0	12.0	28.9	28.9		
Actuated G/C Ratio	0.54	0.50	0.57	0.55	0.12	0.12	0.12	0.12	0.28	0.28		
v/c Ratio	0.08	0.38	0.15	0.55	0.43	0.26	0.17	0.78	0.17	0.17		
Control Delay	11.6	19.3	11.9	18.5	55.5	48.2	1.2	48.4	24.1	24.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	11.6	19.3	11.9	18.5	55.5	48.2	1.2	48.4	24.1	24.1		
LOS	B	B	B	B	E	D	A	D	C	C		
Approach Delay	19.1		18.1		36.1				42.6			
Approach LOS	B		B		D				D			
Queue Length 50th (m)	2.0	47.0	5.6	60.7	13.1	11.0	0.0	47.7	10.7			
Queue Length 95th (m)	6.1	67.5	12.9	112.8	27.2	23.3	0.0	74.0	22.4			
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)	305	1637	420	1757	281	398	450	349	761			
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	0.07	0.38	0.15	0.55	0.22	0.13	0.12	0.74	0.11			
Intersection Summary												
Cycle Length	120.9											
Actuated Cycle Length	103.1											
Natural Cycle	125											
Control Type	Actuated-Uncoordinated											
Maximum v/c Ratio	0.78											

Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019



Lanes, Volumes, Timings
5: Greenbank & New Collector

01-28-2019

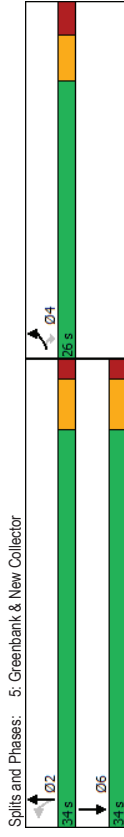
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	4	7	14	815	332	28
Traffic Volume (vph)	43	7	14	815	332	28
Future Volume (vph)	43	7	14	815	332	28
Satd. Flow (prot)	1658	1483	1658	3316	3276	0
Flt Permitted	0.950		0.537			
Satd. Flow (perm)	1658	1483	937	3316	3276	0
Satd. Flow (RTOR)	7			20		
Lane Group Flow (vph)	43	7	14	815	360	0
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4		2	2	6	
Permitted Phases	4	4	2	2	6	
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)	24.2	24.2	23.2	23.2	23.2	
Total Split (s)	26.0	26.0	34.0	34.0	34.0	
Total Split (%)	43.3%	43.3%	56.7%	56.7%	56.7%	
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	
All-Red Time (s)	2.5	2.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.2	5.2	5.2	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Max	Max	Max	
Act Effct Green (s)	6.9	6.9	45.5	45.5	45.5	
Actuated G/C Ratio	0.13	0.13	0.87	0.87	0.87	
v/c Ratio	0.20	0.03	0.02	0.28	0.13	
Control Delay	23.2	13.6	3.1	2.7	2.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.2	13.6	3.1	2.7	2.2	
LOS	C	B	A	A	A	
Approach Delay	21.8		2.7	2.2		
Approach LOS	C		A	A		
Queue Length 50th (m)	3.6	0.0	0.0	0.0	0.0	
Queue Length 95th (m)	11.0	2.8	1.9	25.7	10.2	
Internal Link Dist (m)	164.5		457.8	30.3		
Turn Bay Length (m)	37.5		37.5			
Base Capacity (vph)	642	579	811	2870	2838	
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	0.07	0.01	0.02	0.28	0.13	

Intersection Summary	
Cycle Length:	60
Actuated Cycle Length:	52.6
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.28

Lanes, Volumes, Timings
5: Greenbank & New Collector

01-28-2019

Intersection Signal Delay: 3.3	Intersection LOS: A
Intersection Capacity Utilization 37.1%	ICU Level of Service A
Analysis Period (min) 15	



Lanes, Volumes, Timings

7: Greenbank & Retail Access #1

01-28-2019

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	2	0	827	345	6
Future Volume (vph)	0	2	0	827	345	6
Satd. Flow (prot)	0	1510	0	3316	3306	0
Flt Permitted						
Satd. Flow (perm)	0	1510	0	3316	3306	0
Lane Group Flow (vph)	0	2	0	827	351	0
Sign Control	Yield		Free	Free	Free	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 27.5%	ICU Level of Service A					
Analysis Period (min) 15						

Lanes, Volumes, Timings

8: Greenbank & Retail Access #2

01-28-2019

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	2	0	827	341	6
Future Volume (vph)	0	2	0	827	341	6
Satd. Flow (prot)	0	1510	0	3316	3306	0
Flt Permitted						
Satd. Flow (perm)	0	1510	0	3316	3306	0
Lane Group Flow (vph)	0	2	0	827	347	0
Sign Control	Yield		Free	Free	Free	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 27.5%	ICU Level of Service A					
Analysis Period (min) 15						

Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	44	117	102	167	124	185	149	542	70	224	708	42
Traffic Volume (vph)	44	117	102	167	124	185	149	542	70	224	708	42
Future Volume (vph)	1658	1623	0	1658	1588	0	1658	3259	0	3216	3289	0
Satd. Flow (prot)	0.313						0.950			0.950		
Satd. Flow (perm)	546	1623	0	752	1588	0	1658	3259	0	3216	3289	0
Satd. Flow (RTOR)	34						59	13		6		
Lane Group Flow (vph)	44	219	0	167	309	0	149	612	0	224	750	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	Max		None	Max	
Act Effct Green (s)	28.3	21.8		30.0	24.8		12.9	46.8		12.2	46.1	
Actuated g/C Ratio	0.25	0.19		0.27	0.22		0.11	0.41		0.11	0.41	
v/c Ratio	0.22	0.64		0.66	0.78		0.78	0.45		0.65	0.56	
Control Delay	29.8	44.0		45.8	49.1		77.9	25.9		58.6	28.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.8	44.0		45.8	49.1		77.9	25.9		58.6	28.6	
LOS	C	D		D	D		E	C		E	C	
Approach Delay		41.6			48.0			36.1			35.5	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	7.3	40.1		29.9	58.0		34.9	54.6		26.5	71.8	
Queue Length 95th (m)	16.0	66.3		48.5	92.2		#71.4	76.4		41.2	97.7	
Internal Link Dist (m)		102.8			148.8			92.5			171.8	
Turn Bay Length (m)	25.0			55.0			60.0			56.0		
Base Capacity (vph)	203	437		253	446		202	1358		392	1344	
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	0.22	0.50		0.66	0.69		0.74	0.45		0.57	0.56	

Intersection Summary	
Cycle Length:	120
Actuated Cycle Length:	113
Natural Cycle:	120
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.78

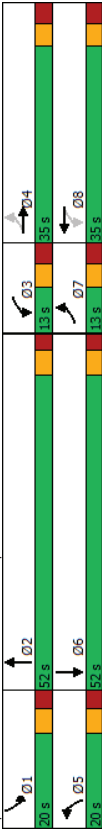
Lanes, Volumes, Timings
2: Greenbank & Marketplace

01-28-2019

Intersection Signal Delay: 38.7
Intersection Capacity Utilization 75.0%
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection LOS: D
ICU Level of Service D

Splits and Phases: 2: Greenbank & Marketplace



Lanes, Volumes, Timings
3: Greenbank & Strandherd

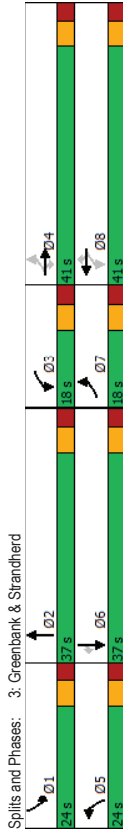
01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	159	928	79	283	763	184	123	371	151	251	471	128
Future Volume (vph)	159	928	79	283	763	184	123	371	151	251	471	128
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3173	0	3216	3316	1483
Flt P Permitted	0.194											
Satd. Flow (perm)	339	3316	1483	199	3316	1483	3216	3173	0	3216	3316	1483
Satd. Flow (RTOR)	149											
Lane Group Flow (vph)	159	928	79	283	763	184	123	522	0	251	471	128
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	NA
Protected Phases	7	4	4	4	3	8	5	2	1	6	6	6
Detector Phase	7	4	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	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	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	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%	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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	Max	Max	Max
Act Effct Green (s)	44.8	34.4	34.4	46.5	35.2	35.2	9.8	30.5	14.1	34.8	34.8	34.8
Actuated g/C Ratio	0.39	0.30	0.30	0.40	0.30	0.30	0.08	0.26	0.12	0.30	0.30	0.30
v/c Ratio	0.64	0.95	0.15	1.27	0.76	0.32	0.46	0.60	0.64	0.47	0.23	0.23
Control Delay	32.8	59.3	0.6	182.3	43.2	6.2	56.3	37.6	56.7	35.4	4.4	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	59.3	0.6	182.3	43.2	6.2	56.3	37.6	56.7	35.4	4.4	4.4
LOS	C	E	A	F	D	A	E	D	E	D	D	A
Approach Delay	51.7											
Approach LOS	D											
Queue Length 50th (m)	22.8	114.7	0.0	-71.8	88.2	0.0	14.7	52.6	30.0	48.5	0.0	0.0
Queue Length 95th (m)	39.6	#164.3	0.0	#133.2	116.8	17.2	24.8	74.2	44.0	67.3	10.6	10.6
Internal Link Dist (m)	396.5											
Turn Bay Length (m)	70.0											
Base Capacity (vph)	262	984	544	222	1004	577	489	868	489	993	548	548
Starvation Cap Reductn	0											
Spillback Cap Reductn	0											
Storage Cap Reductn	0											
Reduced v/c Ratio	0.61	0.94	0.15	1.27	0.76	0.32	0.25	0.60	0.51	0.47	0.23	0.23
Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 116.3												
Natural Cycle: 120												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 1.27												

Lanes, Volumes, Timings
3: Greenbank & Strandherd

01-28-2019

Intersection Signal Delay: 52.4
 Intersection Capacity Utilization 88.7%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 # 96th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	19	688	97	130	680	385	129	147	129	327	135	18
Future Volume (vph)	19	688	97	130	680	385	129	147	129	327	135	18
Satd. Flow (prot)	1688	3253	0	1658	3137	0	1658	1745	1483	1658	1714	0
Flt Permitted	0.190			0.230			0.660			0.450		
Satd. Flow (perm)	332	3253	0	401	3137	0	1152	1745	1483	785	1714	0
Satd. Flow (RTOR)	15			106			130			6		
Lane Group Flow (vph)	19	785	0	130	1065	0	129	147	129	327	153	0
Turn Type	pm-pt	NA	pm-pt	NA	pm-pt	NA	Perm	NA	Perm	pm-pt	NA	
Protected Phases	7	4		3	8		2	2	2	1	6	
Permitted Phases	4			8			2	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	Lead	Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max	None	Max	None	None	None	None	None	None	None	
Act Effct Green (s)	53.2	47.0		61.0	57.2		17.3	17.3	17.3	40.7	39.0	
Actuated g/C Ratio	0.47	0.41		0.53	0.50		0.15	0.15	0.15	0.36	0.34	
v/c Ratio	0.08	0.58		0.42	0.66		0.74	0.56	0.39	0.81	0.26	
Control Delay	14.7	28.5		18.2	23.3		71.4	53.3	10.6	46.4	27.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	14.7	28.5		18.2	23.3		71.4	53.3	10.6	46.4	27.1	
LOS	B	C		B	C		E	D	B	D	C	
Approach Delay	28.1			22.7			45.5			40.2		
Approach LOS	C			C			D			D		
Queue Length 50th (m)	2.0	74.7		14.8	78.7		29.7	32.8	0.0	61.8	25.0	
Queue Length 95th (m)	6.2	102.2		27.6	138.4		51.9	54.1	16.8	86.0	41.8	
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)	280	1349		323	1624		232	352	403	409	681	
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	0.58		0.40	0.66		0.56	0.42	0.32	0.80	0.22	
Intersection Summary												
Cycle Length	120.9											
Actuated Cycle Length	114.2											
Natural Cycle	125											
Control Type	Actuated-Uncoordinated											
Maximum v/c Ratio	0.81											

Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019

Intersection Signal Delay: 30.3
 Intersection Capacity Utilization 84.7%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
5: Greenbank & New Collector

01-28-2019

Intersection LOS: C
 ICU Level of Service E

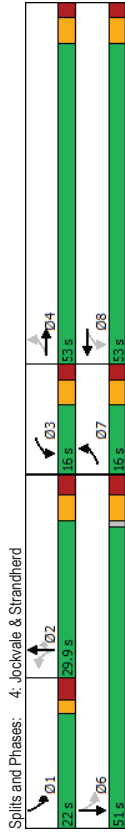
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	107	26	47	67.1	883	64
Traffic Volume (vph)	107	26	47	67.1	883	64
Future Volume (vph)	1658	1483	1658	3316	3283	0
Satd. Flow (prot)	0.950		0.287			
Flt Permitted	1658	1483	501	3316	3283	0
Satd. Flow (perm)	26		18			
Satd. Flow (RTOR)	107	26	47	67.1	947	0
Lane Group Flow (vph)	Prot	Perm	Perm	NA	NA	NA
Turn Type	4	2	2	2	6	
Protected Phases	4	4	2	2	6	
Detector Phase	4	4	2	2	6	
Switch Phase	5.0	5.0	5.0	5.0	5.0	
Minimum Initial (s)	23.8	23.8	23.2	23.2	23.2	
Minimum Split (s)	24.0	24.0	36.0	36.0	36.0	
Total Split (%)	40.0%	40.0%	60.0%	60.0%	60.0%	
Yellow Time (s)	3.3	3.3	3.7	3.7	3.7	
All-Red Time (s)	2.5	2.5	1.5	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.2	5.2	5.2	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	Max	Max	Max	
Act Effct Green (s)	8.9	8.9	39.1	39.1	39.1	
Actuated g/C Ratio	0.16	0.16	0.70	0.70	0.70	
v/c Ratio	0.40	0.10	0.13	0.29	0.41	
Control Delay	24.6	8.8	6.0	4.9	5.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.6	8.8	6.0	4.9	5.6	
LOS	C	A	A	A	A	
Approach Delay	21.5		5.0	5.6		
Approach LOS	C		A	A		
Queue Length 50th (m)	10.6	0.0	1.6	13.6	21.1	
Queue Length 95th (m)	20.3	5.0	6.3	25.1	38.0	
Internal Link Dist (m)	164.5		457.8	30.3		
Turn Bay Length (m)	37.5		37.5			
Base Capacity (vph)	547	507	353	2338	2320	
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	0.20	0.05	0.13	0.29	0.41	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 55.5	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.41	

Lanes, Volumes, Timings
4: Jockvale & Strandherd

01-28-2019

Intersection LOS: C
 ICU Level of Service E



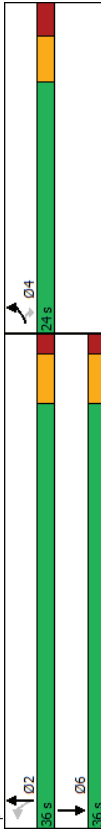
Lanes, Volumes, Timings
5: Greenbank & New Collector

01-28-2019

Intersection Signal Delay: 6.5
Intersection Capacity Utilization 51.8%
Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service A

Splits and Phases: 5: Greenbank & New Collector



Lanes, Volumes, Timings
3: Greenbank & Strandherd

01-28-2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	←	←	←	←	←	←	←	←	←	←	←	←
Traffic Volume (vph)	159	928	79	283	763	184	123	371	151	251	471	128
Future Volume (vph)	159	928	79	283	763	184	123	371	151	251	471	128
Satd. Flow (prot)	1658	3316	1483	1658	3316	1483	3216	3173	0	3216	3316	1483
Flt Permitted	0.279			0.087			0.950			0.950		
Satd. Flow (perm)	487	3316	1483	152	3316	1483	3216	3173	0	3216	3316	1483
Satd. Flow (RTOR)		186		184		184	42					186
Lane Group Flow (vph)	159	928	79	283	763	184	123	522	0	251	471	128
Turn Type	pm-pt	NA	Perm	pm-pt	NA	Perm	Prot	NA	Prot	NA	Perm	Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases	4		4	8	8	8		2				6
Detector Phase	7	4	4	3	8	8	5	2		1		6
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	5.0	10.0	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	37.0
Total Split (s)	20.0	47.0	47.0	27.0	64.0	64.0	34.0	52.0	34.0	52.0	52.0	52.0
Total Split (%)	14.8%	34.8%	20.0%	40.0%	40.0%	40.0%	17.8%	27.4%	17.8%	27.4%	27.4%	27.4%
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	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	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	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	6.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	None	None	Yes	Yes
Act Effct Green (s)	50.7	39.2	39.2	65.6	47.5	47.5	10.4	30.6	15.0	35.2	35.2	35.2
Actuated g/C Ratio	0.39	0.30	0.30	0.50	0.36	0.36	0.08	0.23	0.11	0.27	0.27	0.27
v/c Ratio	0.54	0.93	0.14	0.93	0.63	0.28	0.48	0.67	0.68	0.53	0.24	0.24
Control Delay	26.8	61.2	0.5	72.8	37.7	5.2	64.6	47.4	65.7	43.8	2.1	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	61.2	0.5	72.8	37.7	5.2	64.6	47.4	65.7	43.8	2.1	2.1
LOS	C	E	A	E	D	A	E	D	E	D	D	A
Approach Delay		52.4		40.9		50.6				44.0		
Approach LOS		D		D		D				D		
Queue Length 50th (m)	23.3	130.3	0.0	61.6	90.8	0.0	17.0	64.4	34.7	58.5	0.0	0.0
Queue Length 95th (m)	38.2	#174.9	0.0	#119.5	117.3	16.3	27.4	86.6	49.5	79.2	3.4	3.4
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)	316	1030	589	312	1228	665	436	774	436	894	535	535
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.90	0.13	0.91	0.62	0.28	0.28	0.67	0.68	0.53	0.24	0.24
Intersection Summary												
Cycle Length: 135												
Actuated Cycle Length: 130.6												
Natural Cycle: 120												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.93												

3195 Jockvale Road PM Peak Hour 2031 Total Future - Greenbank-Strandherd Adjusted

3195 Jockvale Road PM Peak Hour 2031 Total Future

Lanes, Volumes, Timings
 3: Greenbank & Strandherd

01-28-2019

Intersection Signal Delay: 46.6 Intersection LOS: D
 Intersection Capacity Utilization 88.7% ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

