

January 26<sup>th</sup>, 2018

City of Ottawa  
Planning and Growth Management Department  
110 Laurier Ave. W., 4<sup>th</sup> Floor  
Ottawa, Ontario K1P1J1

**Attention: Ms. Rosanna Baggs**  
**Project Manager, Infrastructure Approvals**

Dear Rosanna:

**Reference: Burnett Lands – 3370 Greenbank Road**  
**Community Transportation Study/Transportation Impact Study – Addendum**  
**Our File No. 111117 Ref: R-216-008**

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A Community Transportation Study/Transportation Impact Study (CTS/TIS) was prepared in December 2016 in support of a Draft Plan of Subdivision application for the Burnett Lands located at 3370 Greenbank Road. Following the initial submission, comments were received from the City of Ottawa in July 2017. The proposed Draft Plan of Subdivision has since been revised to address comments received from the City. This addendum has been prepared to provide a description of the revised Draft Plan of Subdivision, update the intersection capacity analysis based on the revised plan, and review the street network design.

## **1.0 REVISED DRAFT PLAN**

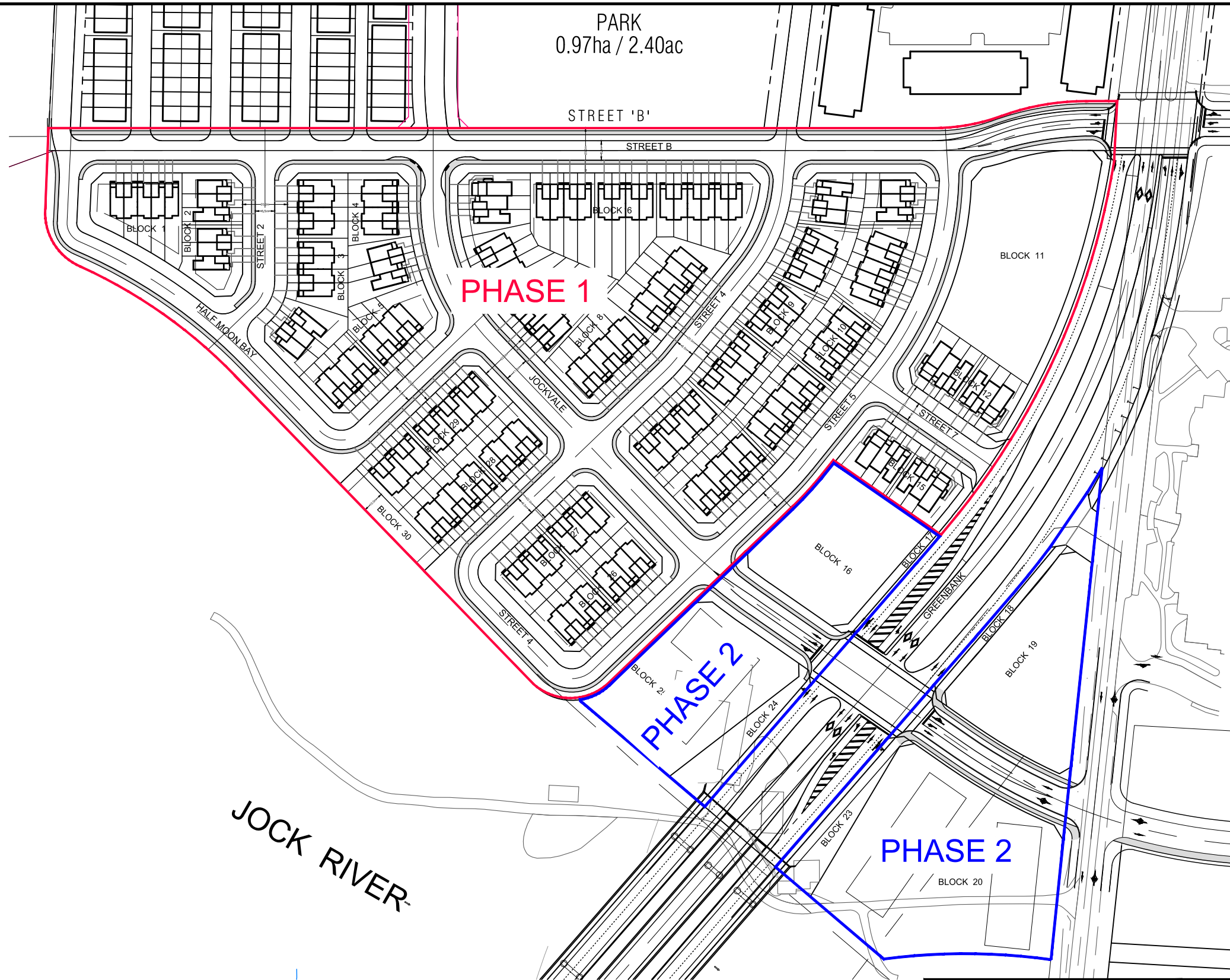
Following the initial submission, the proposed Draft Plan of Subdivision was revised to address City comments. A revised concept plan is included in **Figure 1**. The previously proposed public laneways have been removed from the revised Draft Plan of Subdivision, and the internal roadway network has been revised. New residential blocks have been introduced in the southwest corner of the Greenbank Road/Street B intersection (Block 11) and in the northwest corner of the Greenbank Road/Jockvale Road intersection (Block 16). The proposed density of the block in the southwest corner of the Greenbank Road/Jockvale Road intersection (Block 25) has been reduced, and the block in the southeast corner of this intersection (Block 20) is now anticipated to be a retirement home. The townhouse block in the northeast corner of this intersection (Block 19) is now anticipated to contain a condominium building.

Based on the revised draft plan, the proposed development will now consist of the following:

### *East of Greenbank Road Realignment*

- 225 retirement home units (Block 20)
- 60 condominium units (Block 19)

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<p><b>NOVATECH</b> Engineers, Planners &amp; Landscape Architects Suite 200, 240 Michael Cowpland Drive Ottawa, Ontario, Canada K2M 1P6</p> <p>Telephone (613) 254-9643 Facsimile (613) 254-5867 Website www.novatech-eng.com</p>	<p><b>BURNETT LANDS</b> 3370 GREENBANK ROAD</p>	
	<p><b>CONCEPT PLAN</b></p>	
<p>SCALE 1:2000</p>		<p>DATE <b>JAN 2018</b></p>
<p>FIGURE 1</p>		<p>JOB <b>111117</b></p>

### West of Greenbank Road Realignment

- 195 townhouse units (169 Two-storey Townhouse Units and 26 Three-Storey Townhouse Units at Block 11)
- 175 condominium units (Block 16 and 25)

The proposed Draft Plan of Subdivision will be constructed in two phases. Phase 1 of the proposed development will include the two-storey townhouse units west of the Greenbank Road realignment (169 townhouse units) and the three-storey residential block in the southwest corner of the Greenbank Road/Street B intersection (26 townhouse units). Phase 2 of the proposed development includes the residential blocks in all four corners of the future Greenbank Road/Jockvale Road intersection (175 condominium units west of Greenbank Road, and 60 condominium units and 225 retirement home units east of Greenbank Road). The phasing of the development is shown on **Figure 1**.

It is acknowledged that funding for the Greenbank Road realignment has been delayed, and is not anticipated to proceed within the timeframe identified in the City of Ottawa's Transportation Master Plan (TMP). The proponent would like to proceed with Phase 1 of development, while Phase 2 is not anticipated to proceed until post Greenbank Road realignment. Separate Transportation Impact Assessments (TIA) can be prepared in support of the Phase 2 blocks as they proceed to Site Plan Control, if required.

Phase 1 of the proposed development is anticipated to be constructed by 2022. Phase 1 of the development will be served through a new connection to the existing Greenbank Road at Street B. For the purposes of this analysis, it has been assumed that the funding for the Greenbank Road realignment will be obtained and Phase 2 of the development will be constructed by 2027 (five years beyond build-out of Phase 1).

## **2.0 TRAVEL DEMAND FORECASTING**

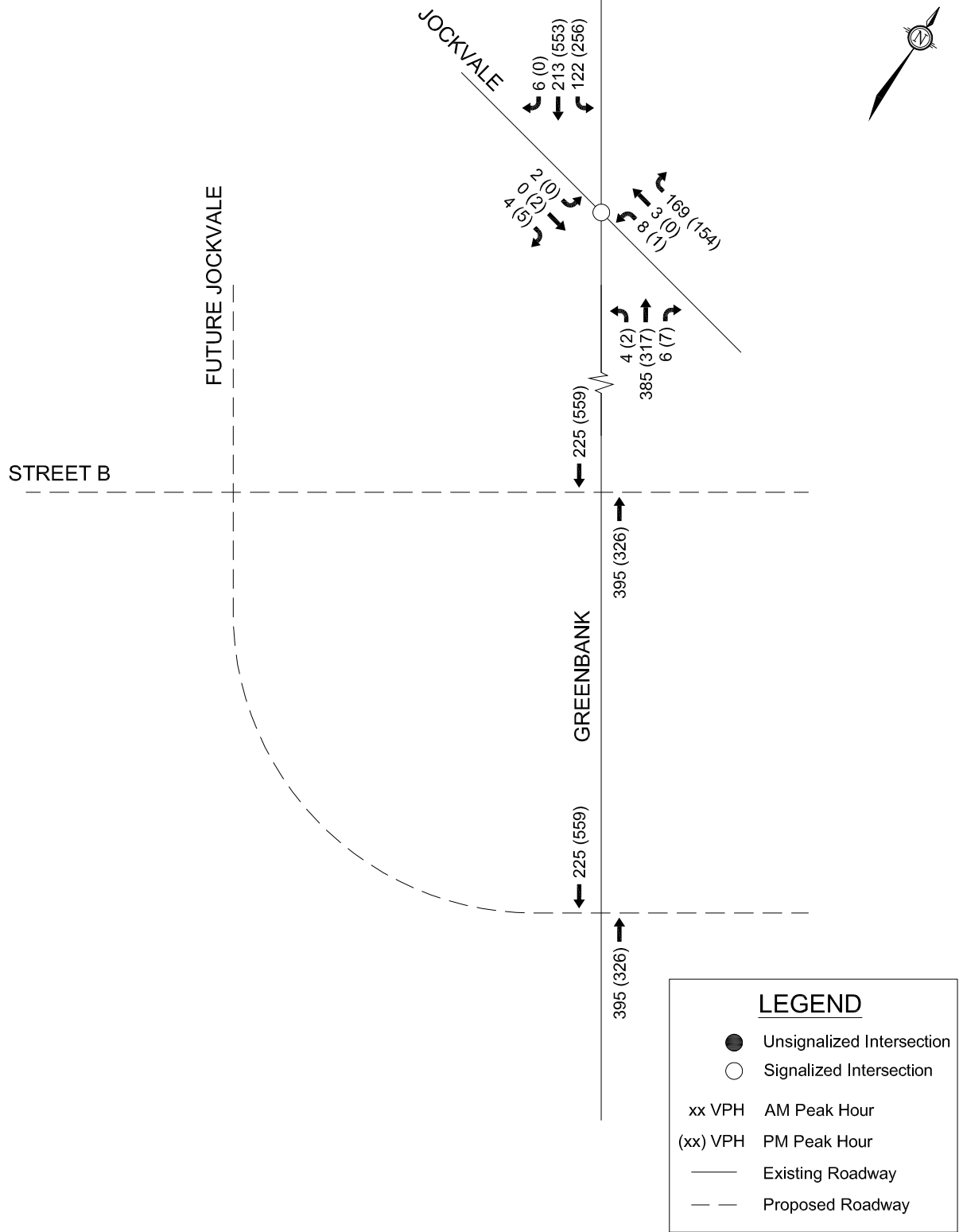
### **2.1 Existing Traffic Volumes**

The existing traffic volumes at the Greenbank Road/Jockvale Road intersection in the original report were based on a traffic count conducted by the City of Ottawa in 2012. Following the submission, a traffic count dated August 16, 2016 was obtained from the City of Ottawa. For the purposes of this analysis, the existing traffic volumes along the study area roadways have been updated to reflect the 2016 traffic count. Existing traffic volumes at the Greenbank Road/Jockvale Road are shown in **Figure 2**. Peak hour summary sheets of the 2016 traffic count are included in **Appendix A**.

### **2.2 Background Growth**

The background growth rate used in the original report was derived based on traffic projections presented in the Barrhaven South CTS. A review of the 2016 and 2012 traffic counts suggest traffic along Greenbank Road south of Jockvale Road has grown at a rate of 5% per year. This is consistent with the background growth rate utilized in the original report. Based on the foregoing, a 5% per annum growth rate was maintained and applied to the new through traffic volumes along Greenbank Road.

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Engineers, Planners & Landscape Architects  
 Suite 200, 240 Michael Cowpland Drive  
 Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643  
 Facsimile (613) 254-5867  
 Website www.novatech-eng.com

3370 GREENBANK ROAD  
 BURNETT LANDS

EXISTING TRAFFIC

JAN 2018 111117 FIGURE 2

## 2.3 Other Area Developments

The original CTS/TIS projected traffic volumes generated by other developments within the South Nepean Town Centre Community Design Plan (SNTC CDP) at the future Greenbank Road/Street B and Greenbank Road/Jockvale Road intersections. Since the original submission, a Transportation Impact Study (TIS) was prepared by Parsons in June 2017 for the development at 3311 Greenbank Road. The development at 3311 Greenbank Road will connect to the future Jockvale Road east of Greenbank Road, and was included in the other development traffic projections identified above.

The 3311 Greenbank Road development is assumed to be in place by 2022, consistent with the Parsons TIS, and is accounted for in the 2022 Phase 1 build-out year background traffic projections. For the 2027 background traffic projections, the traffic generated by other developments on the east leg of the future Jockvale Road/Greenbank Road intersection are now based the traffic projections in the 3311 Greenbank Road TIS. The traffic generated by other developments within the SNTC CDP (excluding the 3311 Greenbank Road site) at the Greenbank Road/Street B intersection have been derived based on a similar methodology used in the original CTS/TIS.

Background traffic at the study area intersections for the 2022 and 2027 build-out years are shown in **Figure 3** and **4**.

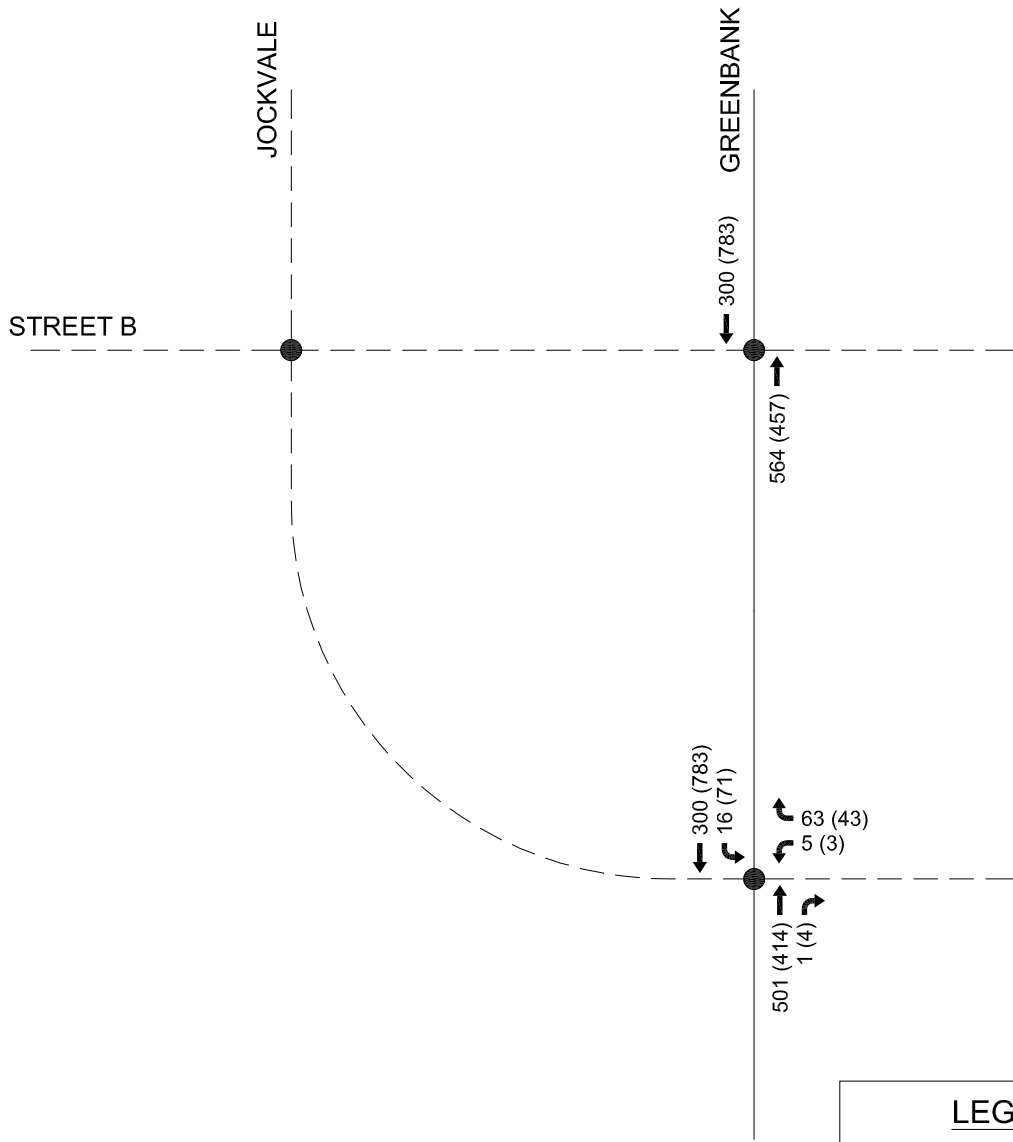
## 2.4 Revised Trip Generation

Trips generated by the revised Draft Plan of Subdivision have been estimated using the relevant peak hour rates identified in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9<sup>th</sup> Edition*. ITE trips generated by the revised plan during the weekday AM and PM peak hours are summarized in the following table.

**Table 1: ITE Trip Generation**

Land Use	ITE Code	Units	AM Peak			PM Peak		
			In	Out	Total	In	Out	Total
<i>Phase 1</i>								
Condo/Townhouse (West of Greenbank)	230	195	15	73	88	70	34	104
<i>Ultimate Build-out</i>								
Condo/Townhouse (West of Greenbank)	230	370	25	122	147	118	58	176
Condo/Townhouse (East of Greenbank)	230	60	6	28	34	27	13	40
Congregate Care (East of Greenbank)	253	225	8	6	14	21	17	38

Trips generated by the proposed development have been converted to person trips using a 1.42 ITE trip to person trip adjustment factor, consistent with the original CTS/TIS. The person trips generated by the proposed development are summarized in the following table.



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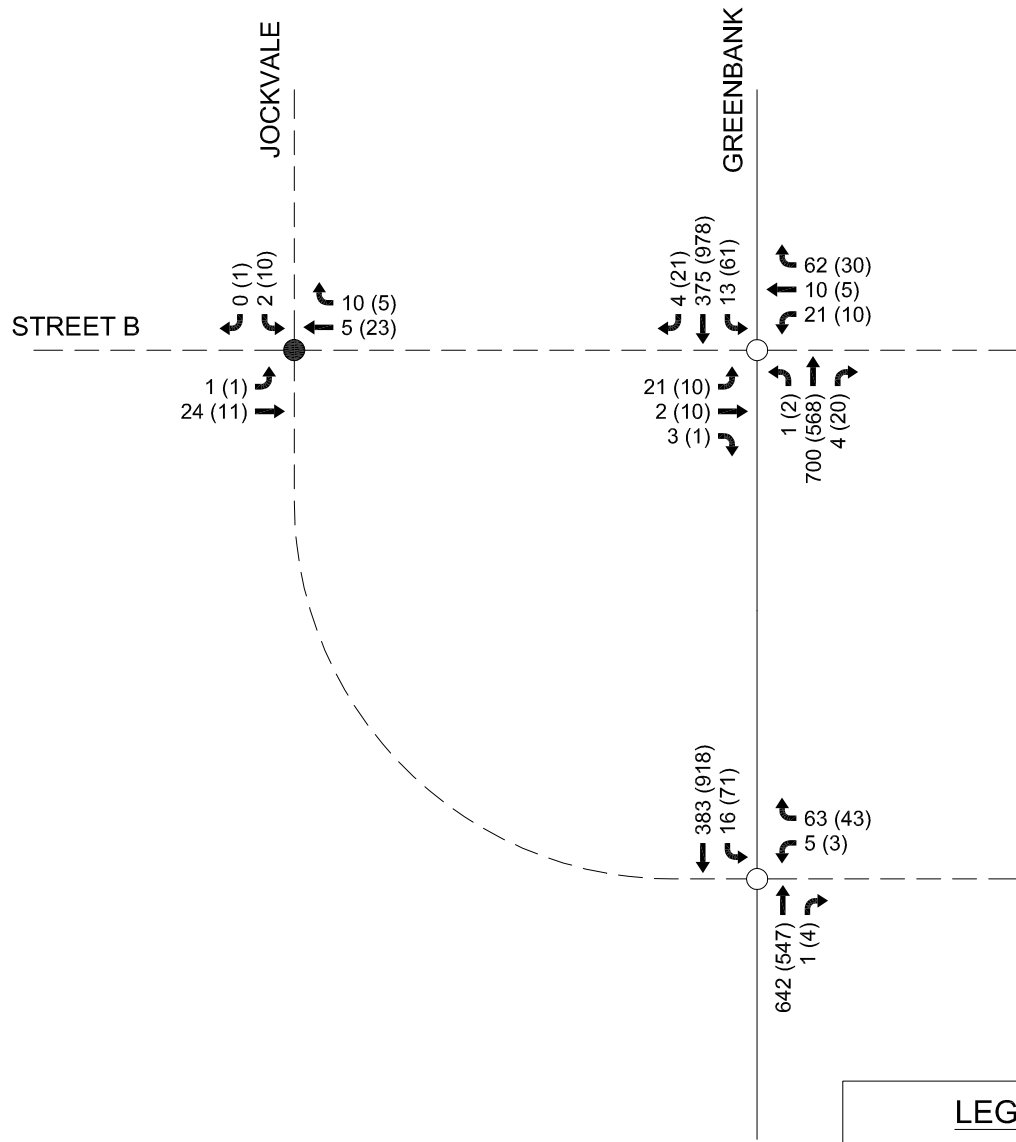


Engineers, Planners & Landscape Architects  
 Suite 200, 240 Michael Cowpland Drive  
 Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643  
 Facsimile (613) 254-5867  
 Website www.novatech-eng.com

## 3370 GREENBANK ROAD BURNETT LANDS 2022 BACKGROUND TRAFFIC

JAN 2018 111117 FIGURE 3



**LEGEND**

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour
- Existing Roadway
- - - Proposed Roadway



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**3370 GREENBANK ROAD  
 BURNETT LANDS  
 2027 BACKGROUND  
 TRAFFIC**

JAN 2018 111117 FIGURE 4

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**Table 2: Person Trips**

Land Use	ITE Code	Units	AM Peak			PM Peak		
			In	Out	Total	In	Out	Total
<i>Phase 1</i>								
Condo/Townhouse (West of Greenbank)	230	195	21	104	125	99	49	148
<i>Ultimate Build-out</i>								
Condo/Townhouse (West of Greenbank)	230	370	36	173	209	168	83	251
Condo/Townhouse (East of Greenbank)	230	60	8	40	48	38	19	57
Congregate Care (East of Greenbank)	253	225	12	8	20	30	24	54
<b>TOTAL</b>			<b>56</b>	<b>221</b>	<b>277</b>	<b>236</b>	<b>126</b>	<b>362</b>

The observed modal shares within the South Nepean district from City's TRANS O-D survey report were reviewed as part of the original CTS/TIS. Based on all trips within the district, all trips departing the district during the AM peak hour and all trips arriving to the district during the PM peak hour, the TRANS O-D survey suggests the following modal shares:

- 55% Auto Driver
- 15% Auto Passenger
- 20% Transit
- 10% Non-motorized

The aforementioned modal shares reflect the existing condition within the South Nepean District and are reflective of the modal shares following build-out of Phase 1 of the subdivision.

The above modal shares have been adjusted to reflect the effect of the future transit facilities along Greenbank Road and Chapman Mills Drive at full build-out of the development. To account for future transit availability in the vicinity of the subject subdivision when the Greenbank Road realignment proceeds, the transit modal share has been increased by 5%, reducing the auto modal share by 5%. It is noteworthy that the proposed modal shares are generally consistent with the City of Ottawa modal share targets identified in the City's 2013 TMP.

A full breakdown of the projected person trips by modal share and arrival/departure is shown in the following table for Phase 1 and full build-out.



**Table 3: Site Generated Person Trips by Modal Share**

Travel Mode	Modal Share	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
<i>Phase 1 Person Trips</i>		21	104	125	99	49	148
<b>Auto Driver</b>	<b>55%</b>	<b>12</b>	<b>57</b>	<b>69</b>	<b>54</b>	<b>27</b>	<b>81</b>
Auto Passenger	15%	3	16	19	15	7	22
Transit	20%	4	21	25	20	10	30
Non-Motorized	10%	2	10	12	10	5	15
<i>Ultimate Person Trips</i>		<i>56</i>	<i>221</i>	<i>277</i>	<i>236</i>	<i>126</i>	<i>362</i>
<b>Auto Driver</b>	<b>50%</b>	<b>31</b>	<b>122</b>	<b>153</b>	<b>130</b>	<b>69</b>	<b>199</b>
Auto Passenger	15%	8	33	41	35	19	54
Transit	25%	11	44	55	47	25	72
Non-Motorized	10%	6	22	28	24	13	37

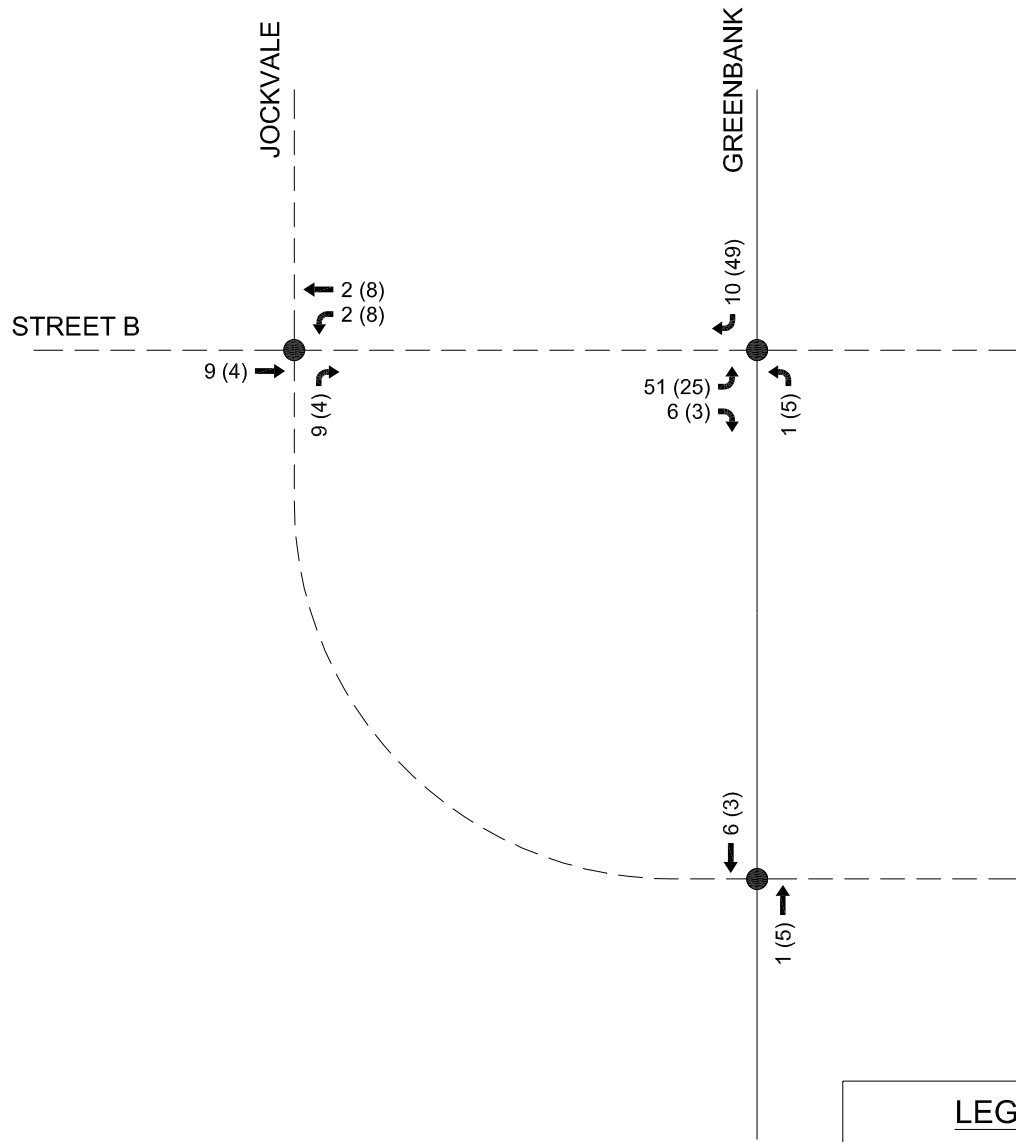
## 2.5 Trip Distribution

Trips generated by the proposed development have been distributed to the study area based on the distribution presented in the original CTS/TIS. For consistency and ease of read, the distribution is summarized as follows:

- 85% to/from the north via Greenbank Road
- 5% to/from the south via Greenbank Road
- 5% to/from the west via Jockvale Road/Strandherd Drive

As identified above, Phase 1 of the development is anticipated to be built-out prior to the Greenbank Road realignment and will be accessed through the Greenbank Road/Street B intersection. Traffic volumes generated by Phase 1 of the development are shown in **Figure 5**. Total traffic volumes for the 2022 Phase 1 build-out are shown in **Figure 6**.

Phase 2 of the proposed development is not anticipated to proceed until post Greenbank Road realignment. For the purposes of this analysis, it has been assumed that the funding for the Greenbank Road realignment will be obtained and Phase 2 of the development will be constructed by 2027. Traffic volumes generated by the ultimate development are shown in **Figure 7**. Total traffic volumes for the 2027 build-out are shown in **Figure 8**.



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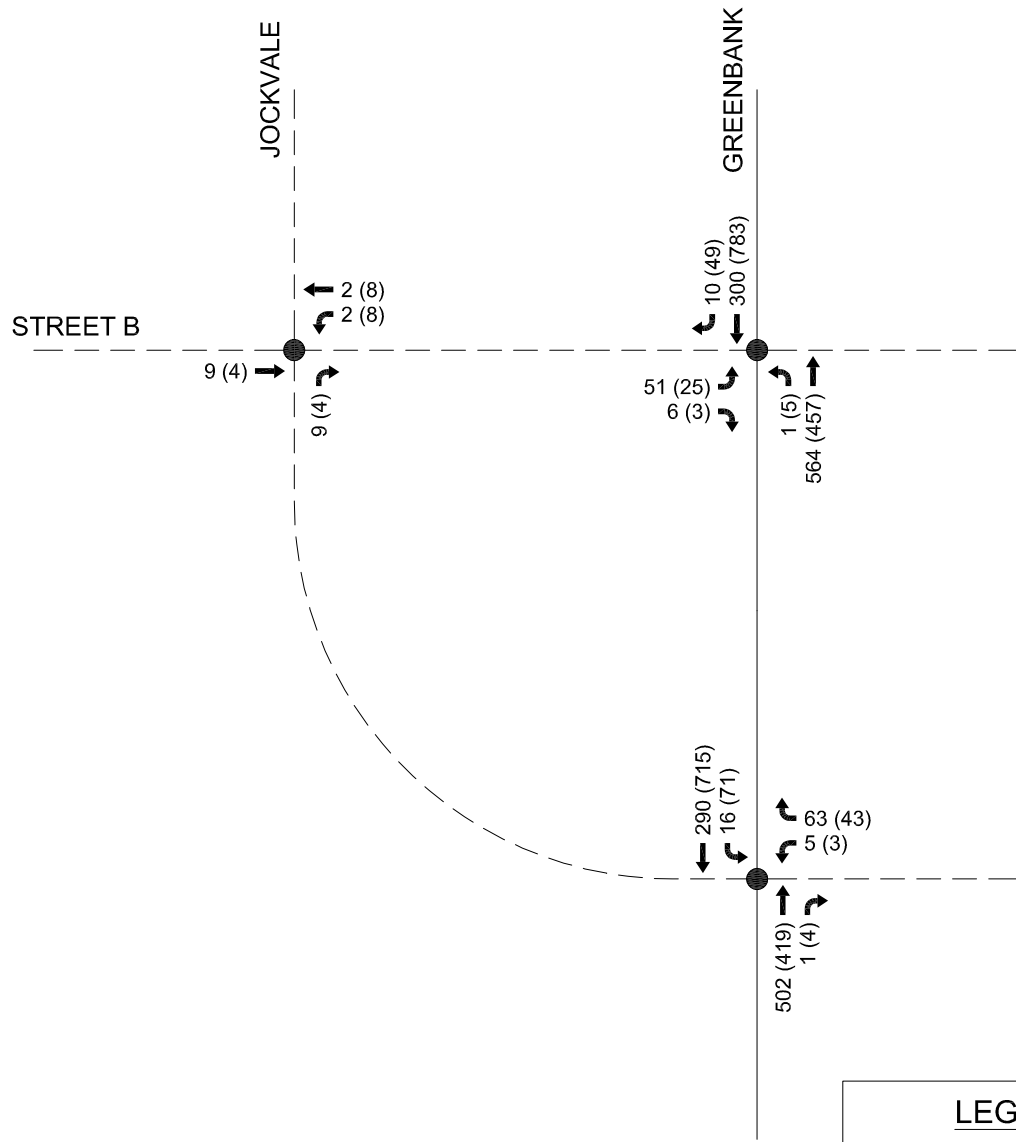
Engineers, Planners & Landscape Architects  
 Suite 200, 240 Michael Cowpland Drive  
 Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643  
 Facsimile (613) 254-5867  
 Website www.novatech-eng.com

3370 GREENBANK ROAD  
 BURNETT LANDS

PHASE 1 SITE  
 GENERATED TRAFFIC

JAN 2018 111117 FIGURE 5



**LEGEND**

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour
- Existing Roadway
- - Proposed Roadway



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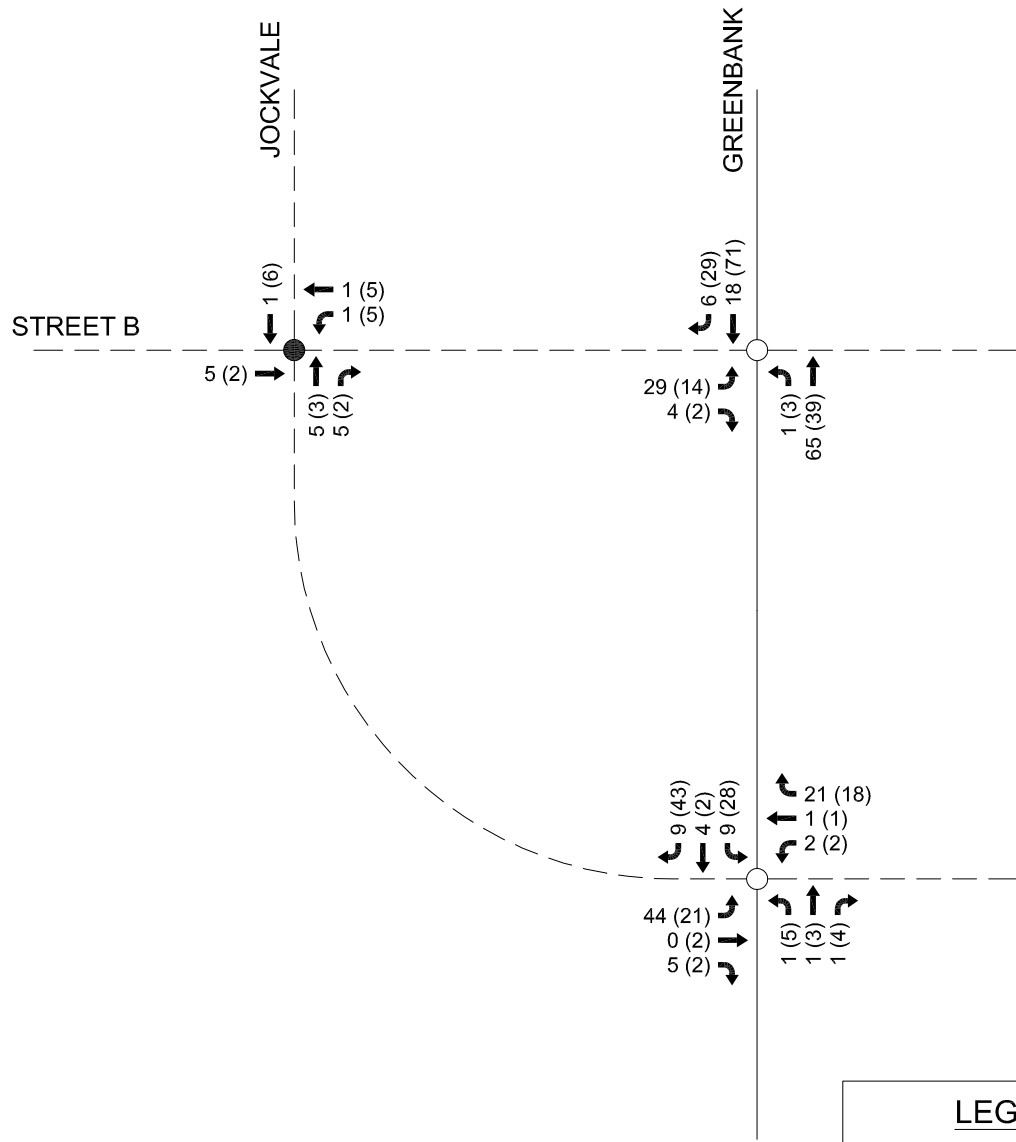
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 BURNETT LANDS

2022 TOTAL TRAFFIC

JAN 2018 111117 FIGURE 6

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**LEGEND**

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour
- Existing Roadway
- - - Proposed Roadway



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 Suite 200, 240 Michael Cowpland Drive  
 Ottawa, Ontario, Canada K2M 1P6

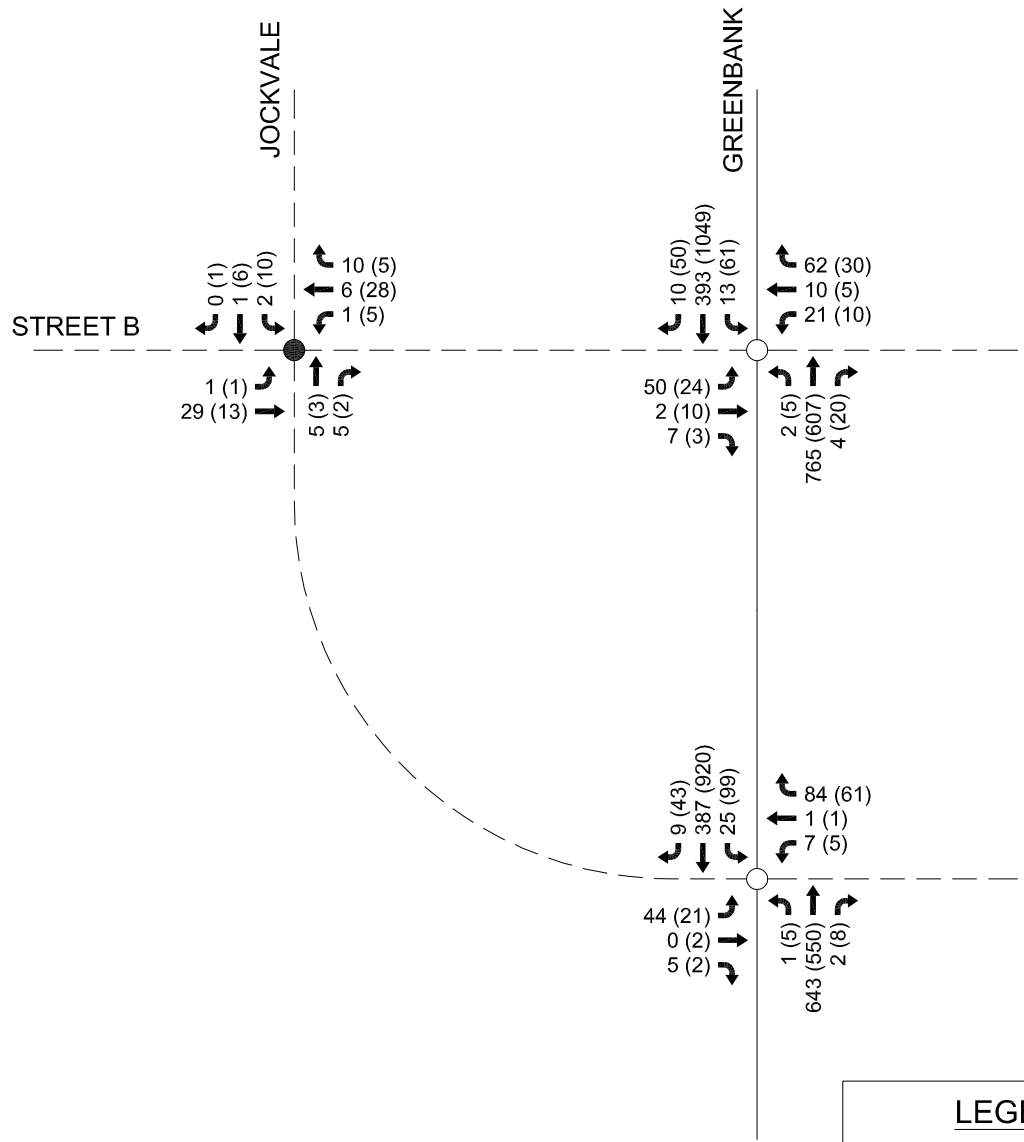
Telephone (613) 254-9643  
 Facsimile (613) 254-5867  
 Website www.novatech-eng.com

3370 GREENBANK ROAD  
 BURNETT LANDS

ULTIMATE SITE  
 GENERATED TRAFFIC

JAN 2018 111117 FIGURE 7

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**LEGEND**

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour
- Existing Roadway
- - Proposed Roadway



Engineers, Planners & Landscape Architects  
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 Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643  
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3370 GREENBANK ROAD  
 BURNETT LANDS

2027 TOTAL TRAFFIC

JAN 2018 111117 FIGURE 8

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### 3.0 INTERSECTION CAPACITY ANALYSIS

#### 3.1 2022 Total Traffic

Intersection capacity analysis has been completed for the 2022 total traffic conditions during the weekday AM and PM peak hours. A review of turn lane requirements at the proposed Greenbank Road/Street B intersection was conducted based on the projected traffic volumes.

##### Southbound Right Turn Lane

Right turn lanes should be considered for 60 vehicles per hour turning right or 10% of the approaching volumes making the right turn movement. Approximately 50 vehicles or 6% of the adjacent through traffic volumes are anticipated to make the southbound right turn movement at Street B during the PM peak hour. Based on the foregoing, a southbound right turn lane at Street B is not recommended for Phase 1 of the proposed development.

##### Northbound Left Turn Lane

Left turn lane warrants have been considered using MTO left turn lane storage graphs and advancing and opposing volumes along Greenbank Road. Based on the AM and PM peak hour advancing and opposing traffic volumes, the MTO graphs identify a requirement for a northbound left turn lane with a storage length of 15m at Street B. A copy of the MTO left turn lane storage graph is provided in **Appendix B**. A functional design of the northbound left turn lane was provided in Figure 17 of the original CTS/TIS.

The results of the analysis are summarized in the following table for the weekday AM and PM peak hours. Detailed reports are included in **Appendix C**.

**Table 4: Intersection Analysis – 2022 Total Traffic**

Intersection	AM Peak			PM Peak		
	Max V/C or Delay	LOS	Mvmt	Max V/C or Delay	LOS	Mvmt
Greenbank Road/ Street B	20 sec	C	EB	32 sec	D	EB
Future Jockvale Road/ Street B	8 sec	A	NB	8 sec	A	NB

The proposed Greenbank Road/Street B intersection is anticipated to operate with a critical delay of 20 seconds (LOS C) during the weekday AM peak hour and 32 seconds (LOS D) during the weekday PM peak hour. The future Jockvale Road/Street B intersection is anticipated to operate with a critical delay of 8 seconds (LOS A) during the weekday AM and PM peak hours.

#### 3.2 2027 Background Traffic

Intersection capacity analysis has been completed for the 2027 background traffic conditions during the weekday AM and PM peak hours. The lane configurations at the study area intersections reflect the full build-out of the Greenbank Road realignment as described in section 5.0 of the original CTS/TIS. Relevant excerpts from the Greenbank Road Environmental Assessment Study are included in **Appendix D**. As requested by the City of Ottawa through comments on the initial

submission, a separate left turn lane has been assumed on the westbound approach to the Greenbank Road/future Jockvale Road intersection. The signal timing plans have been developed using the methodologies in the Ontario Traffic Manual (OTM) *Book 12*, and with consideration to comments received from the City of Ottawa on the initial submission.

The results of the analysis are summarized in the following table for the weekday AM and PM peak hours. Detailed reports are included in **Appendix C**.

**Table 5: Intersection Analysis – 2027 Background Traffic**

Intersection	AM Peak			PM Peak		
	Max V/C or Delay	LOS	Mvmt	Max V/C or Delay	LOS	Mvmt
Greenbank Road/ Street B	0.32	A	NBT/R	0.51	A	SBL
Greenbank Road/ Future Jockvale Road	0.31	A	NBT/R	0.55	A	SBL
Future Jockvale Road/ Street B	9 sec	A	SB	9 sec	A	SB

Based on the foregoing, the Greenbank Road/future Jockvale Road, Greenbank Road/Street B and future Jockvale Road/Street B intersections are anticipated to operate with a LOS A during the weekday AM and PM peak hours.

### 3.3 2027 Total Traffic

Intersection capacity analysis has been completed for the 2027 total traffic conditions during the weekday AM and PM peak hours. The lane configurations at the study area intersections reflect the full build-out of the Greenbank Road realignment as described in section 5.0 of the original CTS/TIS. Relevant excerpts from the Greenbank Road Environmental Assessment Study are included in **Appendix D**. As requested by the City of Ottawa through comments on the initial submission, a separate left turn lane has been assumed on the eastbound and westbound approaches to the Greenbank Road/future Jockvale Road intersection. The signal timing plans have been developed using the methodologies in the Ontario Traffic Manual (OTM) *Book 12*, and with consideration to comments received from the City of Ottawa on the initial submission.

A review of the Ontario Traffic Manual *Book 5* criteria for all-way stop control was conducted for the future Jockvale Road/Street B intersection. Based on the minimum volume criteria, all-way stop control is not warranted at this intersection. Based on the projected traffic volumes, stop control is recommended on future Jockvale Road, maintaining free flow conditions on Street B.

The results of the analysis are summarized in the following table for the weekday AM and PM peak hours. Detailed reports are included in **Appendix C**.

**Table 6: Intersection Analysis – 2027 Total Traffic**

Intersection	AM Peak			PM Peak		
	Max V/C or Delay	LOS	Mvmt	Max V/C or Delay	LOS	Mvmt
Greenbank Road/ Street B	0.36	A	NBT/R	0.51	A	SBL
Greenbank Road/ Jockvale Road	0.35	A	NBT/R	0.63	B	SBL
Jockvale Road/ Street B	9 sec	A	SB	9 sec	A	SB

The Greenbank Road/Street B intersection is anticipated to operate with a LOS A during the weekday AM and PM peak hour. The 95<sup>th</sup> percentile queue length on the eastbound approach to this intersection is anticipated to be 20m during the AM peak hour. This queueing is not anticipated to extend through the Street B/Street 5 intersection.

The Greenbank Road/future Jockvale Road intersection is anticipated to operate with a LOS A during the AM peak hour and a LOS B during the PM peak hour. The 95<sup>th</sup> percentile queue length on the eastbound and westbound approaches are anticipated to be 15m and 10m respectively during the AM peak hour. This queueing is not anticipated to extend through the Jockvale Road/Street 4/Street 5 and Jockvale Road/existing Greenbank Road intersections.

The future Jockvale Road/Street B intersection is anticipated to operate with a critical delay of 9 seconds (LOS A) during the AM and PM peak hours.

#### 4.0 ON-SITE DESIGN

##### 4.1 Proposed Access

Left turn lane storage requirements at the ultimate signalized access intersections have been developed using the Synchro analysis results and equations identified in Transportation Association of Canada (TAC) *Geometric Design Guidelines* ( $S = 1.5NL/[3600/CL]$ ). The left turn lane storage lengths identified below are the greater of either the TAC equation or the 95<sup>th</sup> percentile queue length identified in the Synchro analysis.

**Table 7: Left Turn Lane Storage Requirements**

Intersection	Left Turn Storage Requirement			
	Northbound	Southbound	Eastbound	Westbound
Greenbank Road/ Street B	5m	30m	20m	10m
Greenbank Road/ Future Jockvale Road	5m	50m	15m	5m



Based on the foregoing, minimum storage (38m) is recommended for all left turn movements at the Greenbank Road/Street B and Greenbank Road/future Jockvale Road intersections, excluding the southbound left turn movement at the Greenbank Road/future Jockvale Road intersection for which 50m of storage is recommended.

## 4.2 Internal Roadways

The following table identifies the classification and right-of-way (ROW) widths for each roadway within the subject lands.

**Table 8: Internal Roadway Classification**

Roadway	Classification	ROW
Greenbank Road	Arterial	41.5m
Jockvale Road	Collector	22m
Street B (East of Jockvale Road)		
Street B (West of Jockvale Road)	Local	20m
Half Moon Bay		
Street 2		
Street 4		
Street 5		
Street 7		

TAC guidelines identify a minimum spacing of 60m between adjacent intersections along collector roadways. The distance between all adjacent intersections along future Jockvale Road and Street B exceed the minimum 60m requirement identified in TAC.

TAC guidelines identify a right-in right-out intersection without a median opening may be permitted at least 100m from an adjacent all-directional intersection on divided arterial roads. The curb-to-curb distance between future Jockvale Road and the Street 7 right-in right-out intersection is 100m, meeting the minimum requirements identified in TAC.

Sidewalks will be provided on both sides of future Jockvale Road and Street B and one side of all local roadways.

Curb extensions will be provided at the future Jockvale Road/Street B intersection to reduce the east-west crossing distance for pedestrians and to provide traffic calming. As identified above, all-way stop control is not warranted at this intersection. A review of the OTM *Book 15* criteria for a north-south pedestrian crossover (PXO) was conducted at this intersection. Based on the two-way traffic volumes along Street B, a PXO is not warranted. As future Jockvale Road is a pedestrian desire line, although unwarranted, a PXO D is recommended at this intersection to facilitate north-south crossing of pedestrians.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the foregoing analysis, the main conclusions and recommendations of this addendum are as follows:

- It is acknowledged that funding for the Greenbank Road realignment has been delayed, and is not anticipated to proceed within the timeframe identified in the City of Ottawa's Transportation Master Plan (TMP). The proponent would like to proceed with Phase 1 of development, while Phase 2 is not anticipated to proceed until post Greenbank Road realignment. Separate Transportation Impact Assessments can be prepared in support of the Phase 2 blocks as they proceed to Site Plan Control, if required.
- Based on the Phase 1 development, approximately 50 vehicles or 6% of the adjacent through traffic volumes are anticipated to make the southbound right turn movement at Street B during the PM peak hour. A southbound right turn lane at Street B is not recommended for Phase 1 of the proposed development.
- Based on the 2022 PM peak hour advancing and opposing traffic volumes along Greenbank Road, the MTO graphs identify a requirement for a northbound left turn lane with a storage length of 15m at Street B for Phase 1 of the development. A functional design of the northbound left turn lane was provided in Figure 17 of the original CTS/TIS.
- Under the 2022 Phase 1 build-out condition, the proposed Greenbank Road/Street B intersection is anticipated to operate with a critical delay of 20 seconds (LOS C) during the weekday AM peak hour and 32 seconds (LOS D) during the weekday PM peak hour.
- Based on the minimum volume criteria, all-way stop control is not warranted at the future Jockvale Road/Street B intersection. Based on the projected traffic volumes, stop control is recommended on future Jockvale Road, maintaining free flow conditions on Street B.
- All study area intersections are anticipated to operate under acceptable conditions during the weekday AM and PM peak hours under the 2027 background and total traffic conditions.
- Minimum storage (38m) is recommended for all left turn movements at the Greenbank Road/Street B and Greenbank Road/future Jockvale Road intersections based on the ultimate signalized configuration, excluding the southbound left turn movement at the Greenbank Road/future Jockvale Road intersection for which 50m of storage is recommended.
- The distance between all adjacent intersections along Jockvale Road and Street B exceed the minimum 60m requirement identified in TAC. The curb-to-curb distance between future Jockvale Road and the Street 7 right-in right-out intersection is 100m, meeting the minimum requirements identified in TAC.
- Sidewalks will be provided on both sides of future Jockvale Road and Street B, and one side of all local roadways.

- Curb extensions will be provided at the future Jockvale Road/Street B intersection to reduce the east-west crossing distance for pedestrians and to provide traffic calming. As future Jockvale Road is a pedestrian desire line, although unwarranted, a PXO D is recommended at this intersection to facilitate north-south crossing of pedestrians.

Yours truly,

**NOVATECH**



Brad Byvelds, P. Eng.  
Project Coordinator | Transportation/Traffic

# **Appendix A**

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Existing Traffic Data



# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram

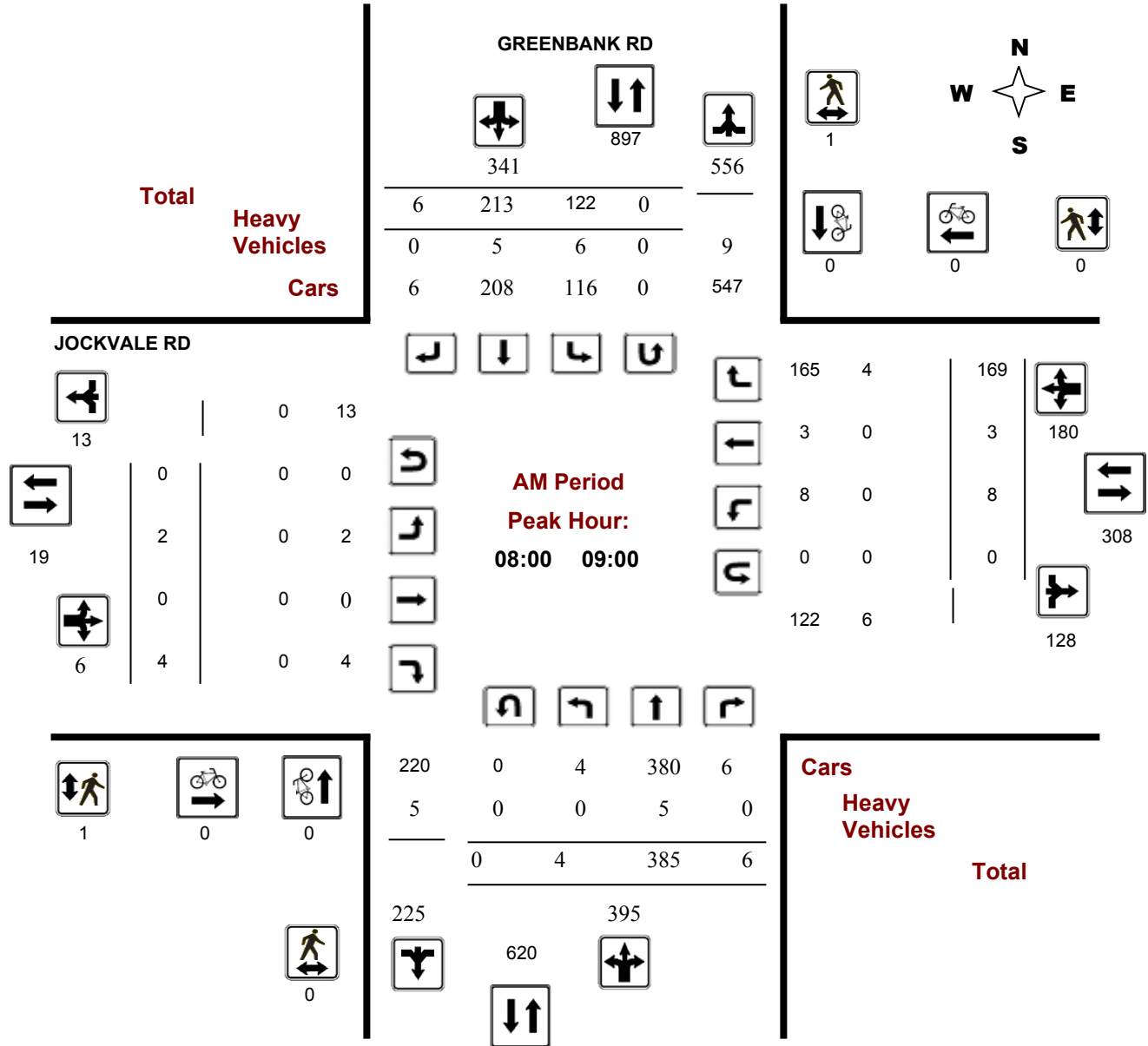
### GREENBANK RD @ JOCKVALE RD

**Survey Date:** Tuesday, August 16, 2016

**Start Time:** 07:00

**WO No:** 36178

**Device:** Miovision

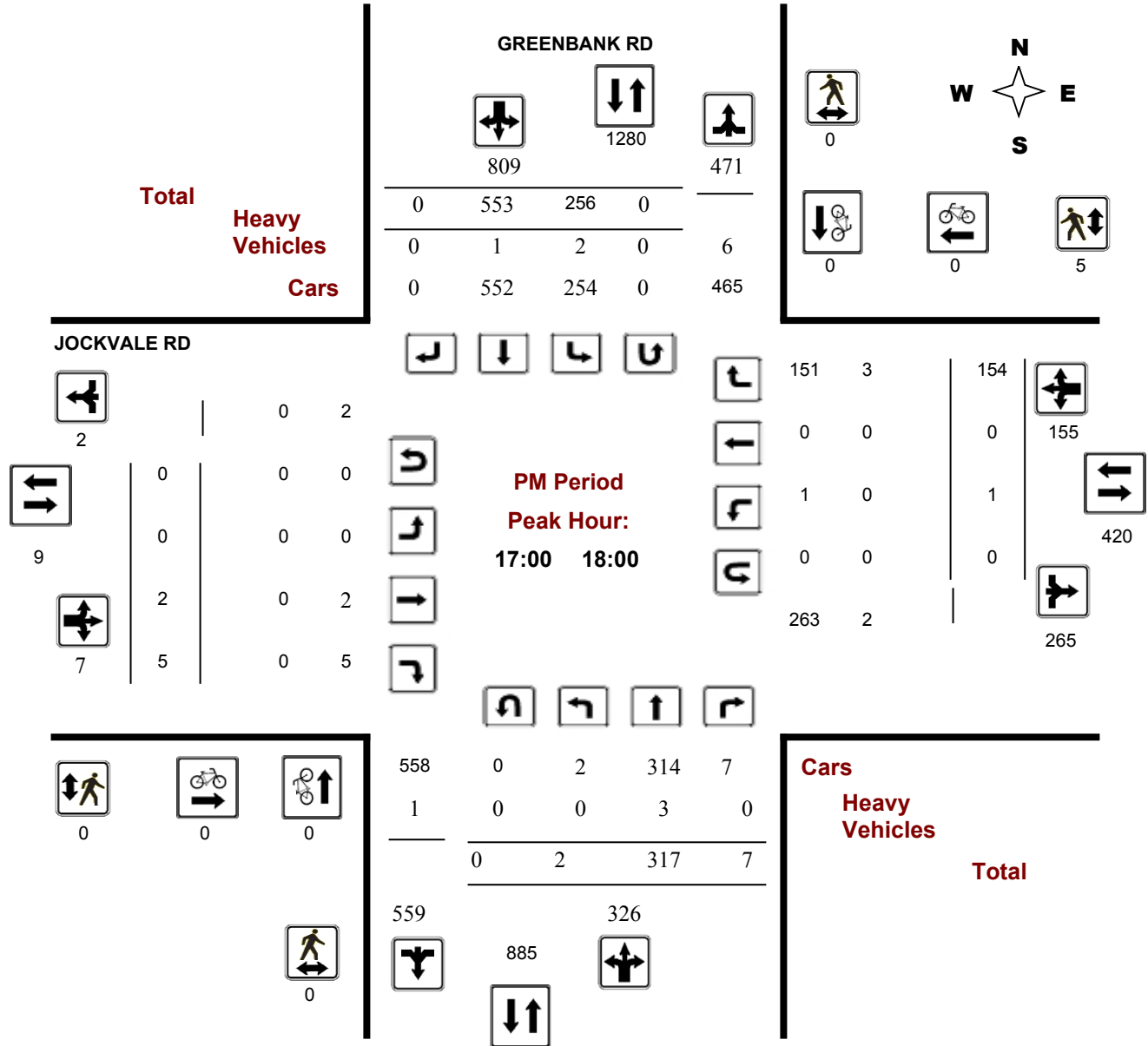


**Survey Date:** Tuesday, August 16, 2016

**Start Time:** 07:00

**WO No:** 36178

**Device:** Miovision



## **Appendix B**

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MTO Left Turn Lane Storage Graph

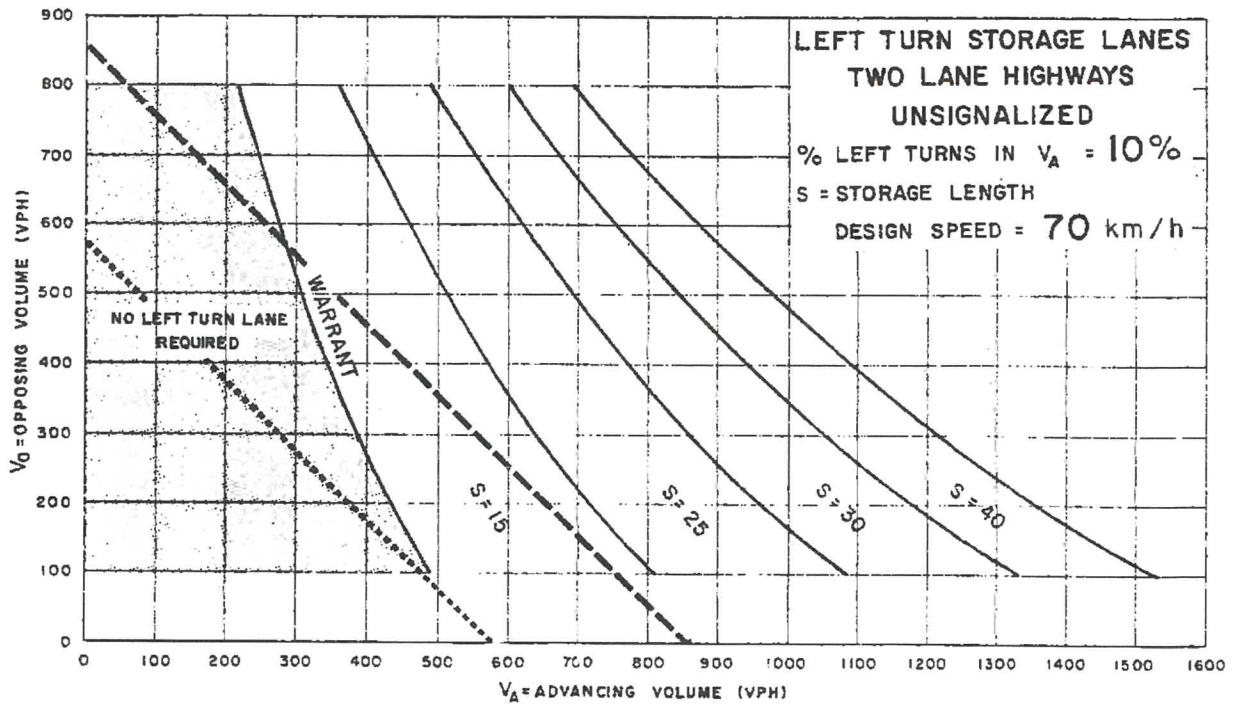
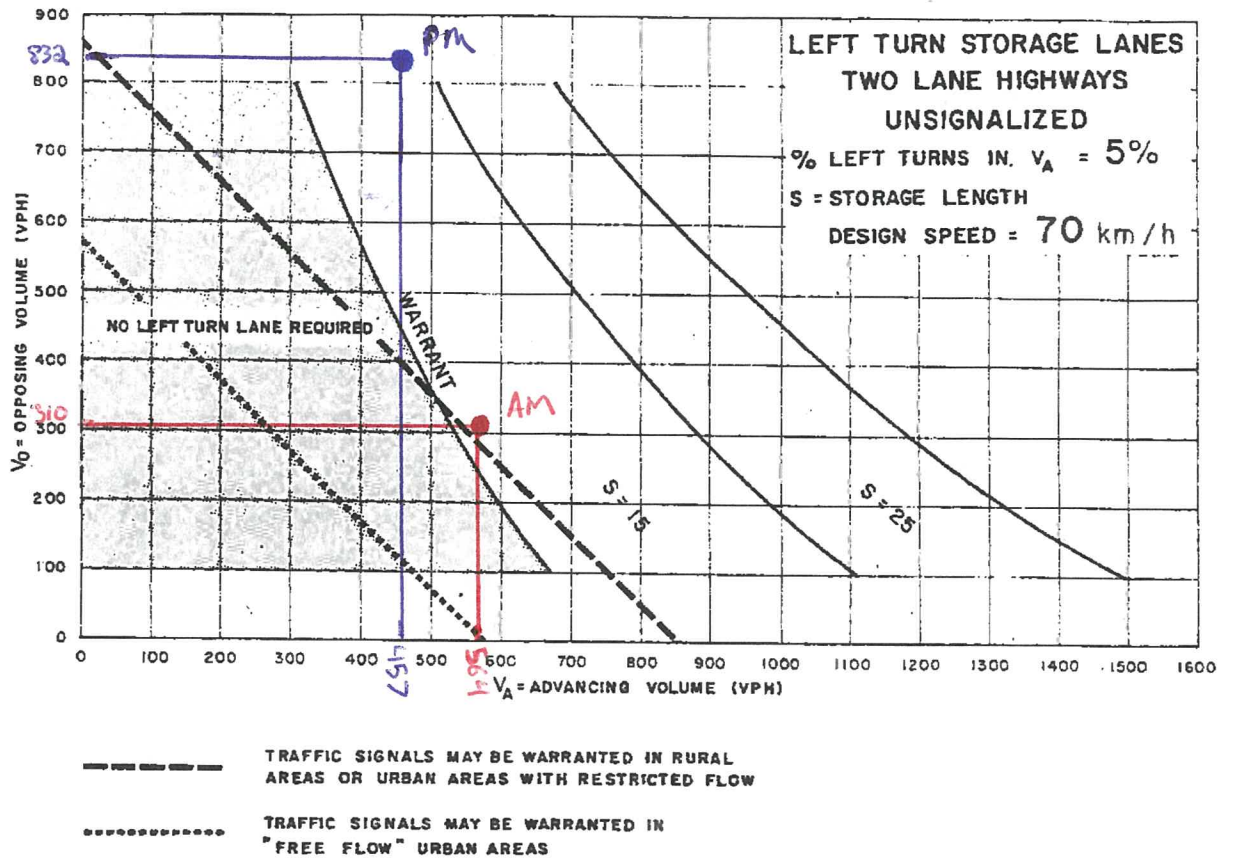


Figure EA-10



## **Appendix C**

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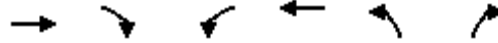
Synchro Analysis Reports



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	9	0	2	2	0	9
Future Volume (Veh/h)	9	0	2	2	0	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	2	2	0	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			10		16	10
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			10		16	10
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1610		1001	1071
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>			
Volume Total	10	4	10			
Volume Left	0	2	0			
Volume Right	0	0	10			
cSH	1700	1610	1071			
Volume to Capacity	0.01	0.00	0.01			
Queue Length 95th (m)	0.0	0.0	0.2			
Control Delay (s)	0.0	3.6	8.4			
Lane LOS		A	A			
Approach Delay (s)	0.0	3.6	8.4			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			4.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	51	6	1	564	300	10
Future Volume (Veh/h)	51	6	1	564	300	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	7	1	613	326	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	946	332	337			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	946	332	337			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	99	100			
cM capacity (veh/h)	290	710	1222			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	62	1	613	337		
Volume Left	55	1	0	0		
Volume Right	7	0	0	11		
cSH	311	1222	1700	1700		
Volume to Capacity	0.20	0.00	0.36	0.20		
Queue Length 95th (m)	5.6	0.0	0.0	0.0		
Control Delay (s)	19.5	7.9	0.0	0.0		
Lane LOS	C	A				
Approach Delay (s)	19.5	0.0		0.0		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			1.2			
Intersection Capacity Utilization			41.4%		ICU Level of Service	A
Analysis Period (min)			15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	4	0	8	8	0	4
Future Volume (Veh/h)	4	0	8	8	0	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	9	9	0	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			4		31	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			4		31	4
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	100
cM capacity (veh/h)			1618		978	1080
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>			
Volume Total	4	18	4			
Volume Left	0	9	0			
Volume Right	0	0	4			
cSH	1700	1618	1080			
Volume to Capacity	0.00	0.01	0.00			
Queue Length 95th (m)	0.0	0.1	0.1			
Control Delay (s)	0.0	3.6	8.3			
Lane LOS		A	A			
Approach Delay (s)	0.0	3.6	8.3			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			3.8			
Intersection Capacity Utilization			17.6%	ICU Level of Service		A
Analysis Period (min)			15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	3	5	457	783	49
Future Volume (Veh/h)	25	3	5	457	783	49
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	3	5	497	851	53
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1384	878	904			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1384	878	904			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	99	99			
cM capacity (veh/h)	157	347	752			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>		
Volume Total	30	5	497	904		
Volume Left	27	5	0	0		
Volume Right	3	0	0	53		
cSH	166	752	1700	1700		
Volume to Capacity	0.18	0.01	0.29	0.53		
Queue Length 95th (m)	4.8	0.2	0.0	0.0		
Control Delay (s)	31.4	9.8	0.0	0.0		
Lane LOS	D	A				
Approach Delay (s)	31.4	0.1		0.0		
Approach LOS	D					
<b>Intersection Summary</b>						
Average Delay			0.7			
Intersection Capacity Utilization			56.6%	ICU Level of Service		B
Analysis Period (min)			15			

3: Greenbank & Street B  
AM Peak

3370 Greenbank Road  
2027 Background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	2	3	21	10	62	1	700	4	13	375	4
Future Volume (vph)	21	2	3	21	10	62	1	700	4	13	375	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.98	0.98		0.98	0.97		0.98	1.00		0.99	1.00	
Fr t		0.910			0.871			0.999			0.999	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1574	0	1676	1493	0	1676	3349	0	1676	3348	0
Fit Permitted	0.706			0.754			0.950			0.950		
Satd. Flow (perm)	1225	1574	0	1306	1493	0	1646	3349	0	1658	3348	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			67			1			1	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		293.6			139.9			285.7			205.1	
Travel Time (s)		26.4			12.6			17.1			12.3	
Confl. Peds. (#/hr)	21		21	21		21	15		15	15		15
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	2	3	23	11	67	1	761	4	14	408	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	5	0	23	78	0	1	765	0	14	412	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	47.2	47.2		47.2	47.2		11.0	34.0		11.0	34.0	
Total Split (s)	49.0	49.0		49.0	49.0		13.0	58.0		13.0	58.0	
Total Split (%)	40.8%	40.8%		40.8%	40.8%		10.8%	48.3%		10.8%	48.3%	
Maximum Green (s)	42.8	42.8		42.8	42.8		7.0	52.0		7.0	52.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.2	3.2		3.2	3.2		2.3	2.3		2.3	2.3	

3: Greenbank & Street B  
AM Peak

3370 Greenbank Road  
2027 Background

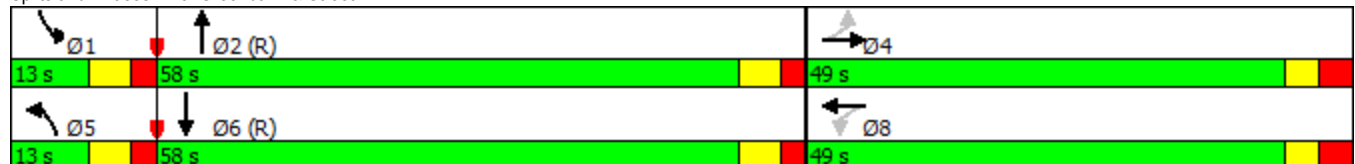


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	34.0	34.0		34.0	34.0			21.0			21.0	
Pedestrian Calls (#/hr)	14	14		14	14			5			5	
Act Effct Green (s)	22.4	22.4		22.4	22.4		5.6	84.4		6.6	87.4	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.05	0.70		0.06	0.73	
v/c Ratio	0.10	0.02		0.09	0.23		0.01	0.32		0.15	0.17	
Control Delay	34.1	21.2		33.9	10.7		96.0	2.0		57.2	9.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.1	21.2		33.9	10.7		96.0	2.0		57.2	9.8	
LOS	C	C		C	B		F	A		E	A	
Approach Delay		31.8			16.0			2.1			11.4	
Approach LOS		C			B			A			B	
Queue Length 50th (m)	5.4	0.5		5.4	2.6		0.1	1.3		3.4	8.9	
Queue Length 95th (m)	10.1	3.3		10.0	12.8		m1.0	8.4		10.4	44.1	
Internal Link Dist (m)		269.6			115.9			261.7			181.1	
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	436	563		465	575		97	2354		101	2439	
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	0.05	0.01		0.05	0.14		0.01	0.32		0.14	0.17	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 5 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.32  
 Intersection Signal Delay: 6.8  
 Intersection Capacity Utilization 54.8%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Greenbank & Street B





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	5	63	642	1	16	383
Future Volume (vph)	5	63	642	1	16	383
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0	0.0		0.0	50.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	50.0				50.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor	0.99	0.97	1.00		0.99	
Frt		0.850				
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1676	1500	3353	0	1676	3353
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1653	1458	3353	0	1656	3353
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		68				
Link Speed (k/h)	40		60			60
Link Distance (m)	303.9		192.6			285.7
Travel Time (s)	27.4		11.6			17.1
Confl. Peds. (#/hr)	21	21		15	15	
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	68	698	1	17	416
Shared Lane Traffic (%)						
Lane Group Flow (vph)	5	68	699	0	17	416
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2		1	2
Detector Template	Left	Right	Thru		Left	Thru
Leading Detector (m)	2.0	2.0	10.0		2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	2.0	0.6		2.0	0.6
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)			9.4			9.4
Detector 2 Size(m)			0.6			0.6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Detector Phase	8	8	2		1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	10.0		5.0	10.0
Minimum Split (s)	61.1	61.1	34.0		11.0	34.0
Total Split (s)	61.1	61.1	47.9		11.0	58.9
Total Split (%)	50.9%	50.9%	39.9%		9.2%	49.1%
Maximum Green (s)	54.0	54.0	41.9		5.0	52.9
Yellow Time (s)	3.0	3.0	3.7		3.7	3.7
All-Red Time (s)	4.1	4.1	2.3		2.3	2.3



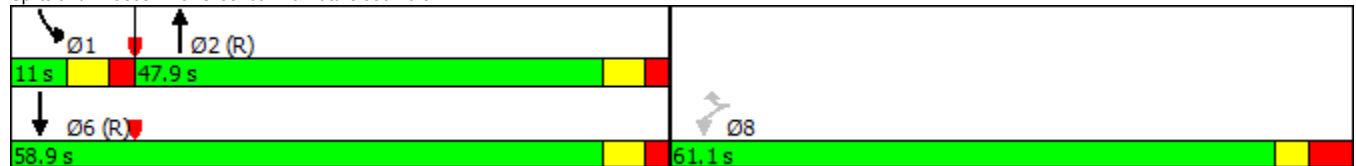


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	7.1	7.1	6.0		6.0	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Max		None	C-Max
Walk Time (s)	7.0	7.0	7.0			7.0
Flash Dont Walk (s)	47.0	47.0	21.0			21.0
Pedestrian Calls (#/hr)	14	14	5			5
Act Effct Green (s)	25.0	25.0	81.3		5.6	85.7
Actuated g/C Ratio	0.21	0.21	0.68		0.05	0.71
v/c Ratio	0.01	0.19	0.31		0.22	0.17
Control Delay	23.2	5.7	17.1		77.1	8.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	23.2	5.7	17.1		77.1	8.5
LOS	C	A	B		E	A
Approach Delay	6.9		17.1			11.2
Approach LOS	A		B			B
Queue Length 50th (m)	1.2	0.0	13.3		4.1	6.7
Queue Length 95th (m)	3.1	8.4	95.0		13.0	24.3
Internal Link Dist (m)	279.9		168.6			261.7
Turn Bay Length (m)	50.0				50.0	
Base Capacity (vph)	743	693	2270		77	2393
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.01	0.10	0.31		0.22	0.17

**Intersection Summary**

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 118 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.31  
 Intersection Signal Delay: 14.4  
 Intersection Capacity Utilization 59.9%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service B

**Splits and Phases: 5: Greenbank & Future Jockvale**



7: Street B & Future Jockvale  
AM Peak

3370 Greenbank Road  
2027 Background



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	24	5	10	2	0
Future Volume (Veh/h)	1	24	5	10	2	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	26	5	11	2	0
Pedestrians					25	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	41				64	36
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	41				64	36
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1536				922	1016
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	27	16	2			
Volume Left	1	0	2			
Volume Right	0	11	0			
cSH	1536	1700	922			
Volume to Capacity	0.00	0.01	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.3	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	0.3	0.0	8.9			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			0.6			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

3: Greenbank & Street B  
PM Peak

3370 Greenbank Road  
2027 Background



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	10	1	10	5	30	2	568	20	61	978	21
Future Volume (vph)	10	10	1	10	5	30	2	568	20	61	978	21
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.98	1.00		0.98	0.97		0.99	1.00		0.99	1.00	
Fr <sub>t</sub>		0.987			0.870			0.995			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1736	0	1676	1484	0	1676	3330	0	1676	3339	0
Flt Permitted	0.732			0.750			0.950			0.950		
Satd. Flow (perm)	1263	1736	0	1293	1484	0	1665	3330	0	1654	3339	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			33			4			2	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		293.6			139.9			285.7			205.1	
Travel Time (s)		26.4			12.6			17.1			12.3	
Confl. Peds. (#/hr)	27		27	27		27	15		15	15		15
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	11	1	11	5	33	2	617	22	66	1063	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	12	0	11	38	0	2	639	0	66	1086	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	47.2	47.2		47.2	47.2		11.0	34.0		11.0	34.0	
Total Split (s)	47.2	47.2		47.2	47.2		11.0	55.8		17.0	61.8	
Total Split (%)	39.3%	39.3%		39.3%	39.3%		9.2%	46.5%		14.2%	51.5%	
Maximum Green (s)	41.0	41.0		41.0	41.0		5.0	49.8		11.0	55.8	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.2	3.2		3.2	3.2		2.3	2.3		2.3	2.3	

3: Greenbank & Street B  
PM Peak

3370 Greenbank Road  
2027 Background

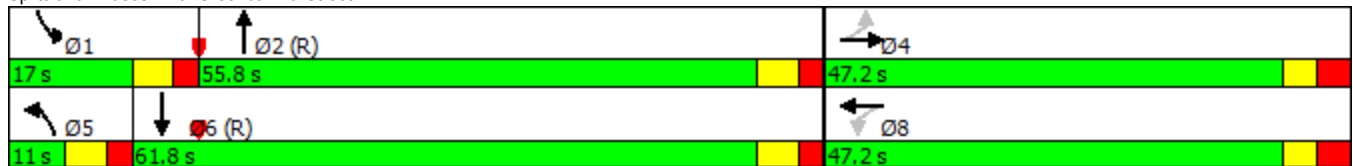


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	34.0	34.0		34.0	34.0			21.0			21.0	
Pedestrian Calls (#/hr)	18	18		18	18			5			5	
Act Effct Green (s)	22.4	22.4		22.4	22.4		5.3	76.9		9.3	87.6	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.04	0.64		0.08	0.73	
v/c Ratio	0.05	0.04		0.05	0.13		0.03	0.30		0.51	0.45	
Control Delay	31.3	29.2		31.3	11.9		87.0	2.3		66.3	12.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.3	29.2		31.3	11.9		87.0	2.3		66.3	12.5	
LOS	C	C		C	B		F	A		E	B	
Approach Delay		30.2			16.2			2.6			15.6	
Approach LOS		C			B			A			B	
Queue Length 50th (m)	2.6	2.6		2.6	1.2		0.5	1.6		15.9	30.3	
Queue Length 95th (m)	6.2	6.3		6.2	8.7		m1.5	6.0		30.9	135.0	
Internal Link Dist (m)		269.6			115.9			261.7			181.1	
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	431	593		441	528		74	2136		153	2439	
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	0.03	0.02		0.02	0.07		0.03	0.30		0.43	0.45	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.51  
 Intersection Signal Delay: 11.3      Intersection LOS: B  
 Intersection Capacity Utilization 72.3%      ICU Level of Service C  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Greenbank & Street B





Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	3	43	547	4	71	918
Future Volume (vph)	3	43	547	4	71	918
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0	0.0		0.0	50.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	50.0				50.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor	0.98	0.97	1.00		0.97	
Frt		0.850	0.999			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1676	1500	3348	0	1676	3353
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1646	1452	3348	0	1634	3353
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		47	1			
Link Speed (k/h)	40		60			60
Link Distance (m)	303.9		192.6			285.7
Travel Time (s)	27.4		11.6			17.1
Confl. Peds. (#/hr)	27	27		27	27	
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	47	595	4	77	998
Shared Lane Traffic (%)						
Lane Group Flow (vph)	3	47	599	0	77	998
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2		1	2
Detector Template	Left	Right	Thru		Left	Thru
Leading Detector (m)	2.0	2.0	10.0		2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	2.0	0.6		2.0	0.6
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)			9.4			9.4
Detector 2 Size(m)			0.6			0.6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Detector Phase	8	8	2		1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	10.0		5.0	10.0
Minimum Split (s)	61.1	61.1	34.0		11.0	34.0
Total Split (s)	61.1	61.1	40.9		18.0	58.9
Total Split (%)	50.9%	50.9%	34.1%		15.0%	49.1%
Maximum Green (s)	54.0	54.0	34.9		12.0	52.9
Yellow Time (s)	3.0	3.0	3.7		3.7	3.7
All-Red Time (s)	4.1	4.1	2.3		2.3	2.3

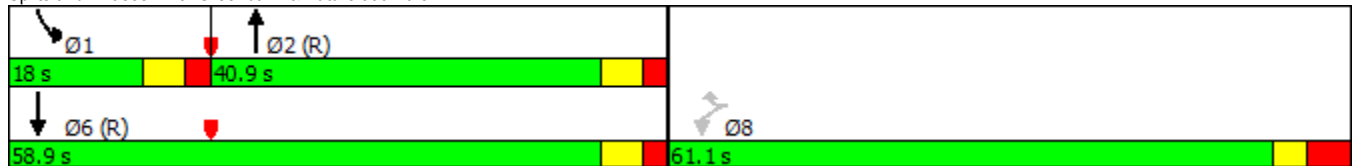


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	7.1	7.1	6.0		6.0	6.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	C-Max		None	C-Max
Walk Time (s)	7.0	7.0	7.0			7.0
Flash Dont Walk (s)	47.0	47.0	21.0			21.0
Pedestrian Calls (#/hr)	18	18	5			5
Act Effct Green (s)	34.6	34.6	62.4		10.1	76.0
Actuated g/C Ratio	0.29	0.29	0.52		0.08	0.63
v/c Ratio	0.01	0.10	0.34		0.55	0.47
Control Delay	18.3	5.8	27.1		74.4	20.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	18.3	5.8	27.1		74.4	20.9
LOS	B	A	C		E	C
Approach Delay	6.6		27.1			24.7
Approach LOS	A		C			C
Queue Length 50th (m)	0.4	0.0	66.3		15.8	102.2
Queue Length 95th (m)	2.3	7.0	87.4		37.0	108.5
Internal Link Dist (m)	279.9		168.6			261.7
Turn Bay Length (m)	50.0				50.0	
Base Capacity (vph)	740	679	1742		167	2124
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	0.00	0.07	0.34		0.46	0.47

**Intersection Summary**

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 118 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 25.0  
 Intersection Capacity Utilization 71.8%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service C

**Splits and Phases: 5: Greenbank & Future Jockvale**



7: Street B & Future Jockvale  
PM Peak

3370 Greenbank Road  
2027 Background



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	11	23	5	10	1
Future Volume (Veh/h)	1	11	23	5	10	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	12	25	5	11	1
Pedestrians					25	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					2	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)			294			
pX, platoon unblocked						
vC, conflicting volume	55				66	52
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55				66	52
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	1518				919	994
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>SB 1</b>			
Volume Total	13	30	12			
Volume Left	1	0	11			
Volume Right	0	5	1			
cSH	1518	1700	924			
Volume to Capacity	0.00	0.02	0.01			
Queue Length 95th (m)	0.0	0.0	0.3			
Control Delay (s)	0.6	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	0.6	0.0	8.9			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			2.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

3: Greenbank & Street B  
AM Peak

3370 Greenbank Road  
2027 Total



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	2	7	21	10	62	2	765	4	13	393	10
Future Volume (vph)	50	2	7	21	10	62	2	765	4	13	393	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.98	0.97		0.98	0.97		0.98	1.00		0.99	1.00	
Fr t		0.880			0.871			0.999			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1512	0	1676	1493	0	1676	3349	0	1676	3335	0
Flt Permitted	0.706			0.751			0.950			0.950		
Satd. Flow (perm)	1225	1512	0	1301	1493	0	1647	3349	0	1660	3335	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			67							3
Link Speed (k/h)		40			40			60				60
Link Distance (m)		293.6			139.9			285.7				205.1
Travel Time (s)		26.4			12.6			17.1				12.3
Confl. Peds. (#/hr)	21		21	21		21	15		15	15		15
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	2	8	23	11	67	2	832	4	14	427	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	10	0	23	78	0	2	836	0	14	438	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	47.2	47.2		47.2	47.2		11.0	34.0		11.0	34.0	
Total Split (s)	49.0	49.0		49.0	49.0		13.0	58.0		13.0	58.0	
Total Split (%)	40.8%	40.8%		40.8%	40.8%		10.8%	48.3%		10.8%	48.3%	
Maximum Green (s)	42.8	42.8		42.8	42.8		7.0	52.0		7.0	52.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.2	3.2		3.2	3.2		2.3	2.3		2.3	2.3	



3: Greenbank & Street B  
AM Peak

3370 Greenbank Road  
2027 Total

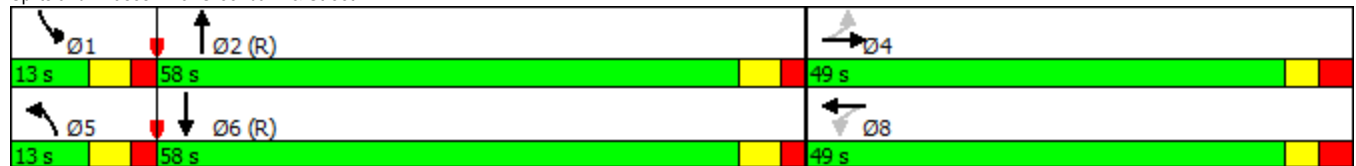


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	34.0	34.0		34.0	34.0			21.0			21.0	
Pedestrian Calls (#/hr)	14	14		14	14			5			5	
Act Effct Green (s)	22.5	22.5		22.5	22.5		5.8	84.2		6.6	87.3	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.05	0.70		0.06	0.73	
v/c Ratio	0.23	0.03		0.09	0.23		0.03	0.36		0.15	0.18	
Control Delay	38.4	16.7		33.8	10.6		81.5	3.8		57.2	9.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	38.4	16.7		33.8	10.6		81.5	3.8		57.2	9.9	
LOS	D	B		C	B		F	A		E	A	
Approach Delay		35.0			15.9			4.0			11.4	
Approach LOS		C			B			A			B	
Queue Length 50th (m)	13.0	0.5		5.4	2.6		0.5	8.8		3.4	9.8	
Queue Length 95th (m)	19.2	4.3		10.0	12.8		m2.1	19.2		10.4	46.9	
Internal Link Dist (m)		269.6			115.9			261.7			181.1	
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	436	544		464	575		97	2350		101	2425	
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	0.12	0.02		0.05	0.14		0.02	0.36		0.14	0.18	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 5 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 95  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.36  
 Intersection Signal Delay: 8.5  
 Intersection Capacity Utilization 55.5%  
 Analysis Period (min) 15  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Greenbank & Street B



5: Greenbank & Future Jockvale  
AM Peak

3370 Greenbank Road  
2027 Total



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	0	5	7	1	84	1	643	2	25	387	9
Future Volume (vph)	44	0	5	7	1	84	1	643	2	25	387	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor				0.99	0.97			1.00		0.99		
Fr <sub>t</sub>		0.850			0.852						0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1500	0	1676	1462	0	1676	3352	0	1676	3343	0
Flt Permitted	0.697			0.754			0.950			0.950		
Satd. Flow (perm)	1230	1500	0	1312	1462	0	1676	3352	0	1656	3343	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		318			91							2
Link Speed (k/h)		40			40			60				60
Link Distance (m)		307.2			303.9			192.6				285.7
Travel Time (s)		27.6			27.4			11.6				17.1
Confl. Peds. (#/hr)				21		21			15	15		
Confl. Bikes (#/hr)						5			5			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	0	5	8	1	91	1	699	2	27	421	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	5	0	8	92	0	1	701	0	27	431	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	61.1	61.1		61.1	61.1		11.0	34.0		11.0	34.0	
Total Split (s)	61.1	61.1		61.1	61.1		11.0	47.9		11.0	47.9	
Total Split (%)	50.9%	50.9%		50.9%	50.9%		9.2%	39.9%		9.2%	39.9%	
Maximum Green (s)	54.0	54.0		54.0	54.0		5.0	41.9		5.0	41.9	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7		3.7	3.7	
All-Red Time (s)	4.1	4.1		4.1	4.1		2.3	2.3		2.3	2.3	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	47.0	47.0		47.0	47.0			21.0			21.0	
Pedestrian Calls (#/hr)	14	14		14	14			5			5	
Act Effct Green (s)	27.6	27.6		27.6	27.6		5.3	72.2		5.8	77.1	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.04	0.60		0.05	0.64	
v/c Ratio	0.17	0.01		0.03	0.23		0.01	0.35		0.34	0.20	
Control Delay	31.1	0.0		23.6	5.4		56.0	18.8		80.2	10.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.1	0.0		23.6	5.4		56.0	18.8		80.2	10.1	
LOS	C	A		C	A		E	B		F	B	
Approach Delay		28.1			6.9			18.9			14.3	
Approach LOS		C			A			B			B	
Queue Length 50th (m)	11.6	0.0		1.9	0.2		0.3	31.5		6.4	9.3	
Queue Length 95th (m)	14.4	0.0		4.1	9.7		2.2	95.4		17.5	25.8	
Internal Link Dist (m)		283.2			279.9			168.6			261.7	
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	553	849		590	707		73	2017		80	2148	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.01		0.01	0.13		0.01	0.35		0.34	0.20	

Intersection Summary

















Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 118 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.35  
 Intersection Signal Delay: 16.7  
 Intersection Capacity Utilization 60.6%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service B

Splits and Phases: 5: Greenbank & Future Jockvale

11 s	47.9 s	61.1 s
11 s	47.9 s	61.1 s

7: Future Jockvale & Street B  
AM Peak

3370 Greenbank Road  
2027 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	29	0	1	6	10	0	5	5	2	1	0
Future Volume (Veh/h)	1	29	0	1	6	10	0	5	5	2	1	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	32	0	1	7	11	0	5	5	2	1	0
Pedestrians											25	
Lane Width (m)											3.6	
Walking Speed (m/s)											1.2	
Percent Blockage											2	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					294							
pX, platoon unblocked												
vC, conflicting volume	43			32			49	79	32	81	74	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	43			32			49	79	32	81	74	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	100	100	100
cM capacity (veh/h)	1533			1580			934	793	1042	865	799	1013
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	33	19	10	3								
Volume Left	1	1	0	2								
Volume Right	0	11	5	0								
cSH	1533	1580	901	842								
Volume to Capacity	0.00	0.00	0.01	0.00								
Queue Length 95th (m)	0.0	0.0	0.3	0.1								
Control Delay (s)	0.2	0.4	9.0	9.3								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.2	0.4	9.0	9.3								
Approach LOS			A	A								
<b>Intersection Summary</b>												
Average Delay			2.0									
Intersection Capacity Utilization			13.3%		ICU Level of Service				A			
Analysis Period (min)			15									

3: Greenbank & Street B  
PM Peak

3370 Greenbank Road  
2027 Total



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	10	3	10	5	30	5	607	20	61	1049	50
Future Volume (vph)	24	10	3	10	5	30	5	607	20	61	1049	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.98	0.99		0.98	0.97		0.99	1.00		0.99	1.00	
Fr t		0.968			0.870			0.995			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1694	0	1676	1484	0	1676	3330	0	1676	3321	0
Flt Permitted	0.732			0.748			0.950			0.950		
Satd. Flow (perm)	1263	1694	0	1289	1484	0	1666	3330	0	1656	3321	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			33			3			5	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		293.6			139.9			285.7			205.1	
Travel Time (s)		26.4			12.6			17.1			12.3	
Confl. Peds. (#/hr)	27		27	27		27	15		15	15		15
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	11	3	11	5	33	5	660	22	66	1140	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	14	0	11	38	0	5	682	0	66	1194	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	47.2	47.2		47.2	47.2		11.0	34.0		11.0	34.0	
Total Split (s)	47.2	47.2		47.2	47.2		11.0	55.8		17.0	61.8	
Total Split (%)	39.3%	39.3%		39.3%	39.3%		9.2%	46.5%		14.2%	51.5%	
Maximum Green (s)	41.0	41.0		41.0	41.0		5.0	49.8		11.0	55.8	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7		3.7	3.7	
All-Red Time (s)	3.2	3.2		3.2	3.2		2.3	2.3		2.3	2.3	

3: Greenbank & Street B  
PM Peak

3370 Greenbank Road  
2027 Total



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	34.0	34.0		34.0	34.0			21.0			21.0	
Pedestrian Calls (#/hr)	18	18		18	18			5			5	
Act Effct Green (s)	22.4	22.4		22.4	22.4		5.4	76.9		9.3	87.6	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.04	0.64		0.08	0.73	
v/c Ratio	0.11	0.04		0.05	0.13		0.07	0.32		0.51	0.49	
Control Delay	34.5	26.1		31.3	11.9		78.6	2.3		66.3	13.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.5	26.1		31.3	11.9		78.6	2.3		66.3	13.3	
LOS	C	C		C	B		E	A		E	B	
Approach Delay		31.5			16.2			2.9			16.1	
Approach LOS		C			B			A			B	
Queue Length 50th (m)	6.2	2.6		2.6	1.2		1.2	3.4		15.9	35.2	
Queue Length 95th (m)	11.1	6.7		6.2	8.7		m3.7	7.3		30.9	155.1	
Internal Link Dist (m)		269.6			115.9			261.7			181.1	
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	431	580		440	528		74	2135		153	2426	
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	0.02		0.03	0.07		0.07	0.32		0.43	0.49	

**Intersection Summary**

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.51

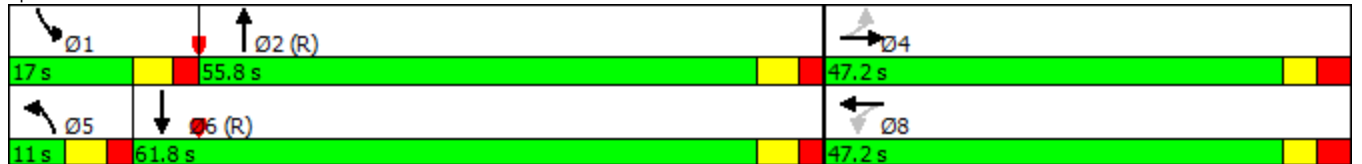
Intersection Signal Delay: 11.9      Intersection LOS: B

Intersection Capacity Utilization 75.4%      ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 3: Greenbank & Street B



5: Greenbank & Future Jockvale  
PM Peak

3370 Greenbank Road  
2027 Total



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	2	2	5	1	61	5	550	8	99	920	43
Future Volume (vph)	21	2	2	5	1	61	5	550	8	99	920	43
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.98	0.98		0.98	0.97			1.00		0.99		
Fr <sub>t</sub>		0.925			0.852			0.998			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1676	1608	0	1676	1456	0	1676	3343	0	1676	3329	0
Flt Permitted	0.713			0.755			0.950			0.950		
Satd. Flow (perm)	1238	1608	0	1308	1456	0	1676	3343	0	1653	3329	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			66			1			4	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		303.8			303.9			192.6			285.7	
Travel Time (s)		27.3			27.4			11.6			17.1	
Confl. Peds. (#/hr)	27		27	27		27			15	15		
Confl. Bikes (#/hr)						5			5			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	2	2	5	1	66	5	598	9	108	1000	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	4	0	5	67	0	5	607	0	108	1047	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	59.1	59.1		61.1	61.1		11.0	34.0		11.0	34.0	
Total Split (s)	61.1	61.1		61.1	61.1		11.0	37.9		21.0	47.9	
Total Split (%)	50.9%	50.9%		50.9%	50.9%		9.2%	31.6%		17.5%	39.9%	
Maximum Green (s)	54.0	54.0		54.0	54.0		5.0	31.9		15.0	41.9	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7		3.7	3.7	
All-Red Time (s)	4.1	4.1		4.1	4.1		2.3	2.3		2.3	2.3	

5: Greenbank & Future Jockvale  
PM Peak

3370 Greenbank Road  
2027 Total

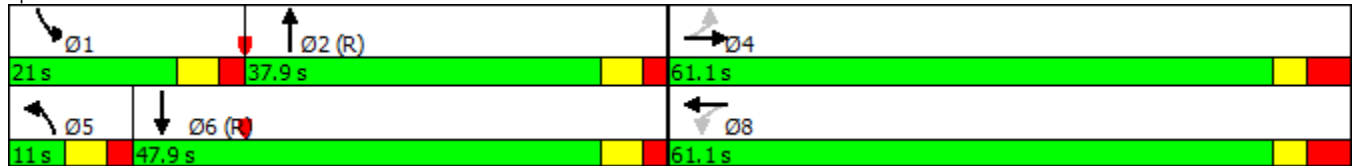


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	5.0	5.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	47.0	47.0		47.0	47.0			21.0			21.0	
Pedestrian Calls (#/hr)	18	18		18	18			5			5	
Act Effct Green (s)	36.4	36.4		35.5	35.5		5.2	55.6		12.4	72.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.04	0.46		0.10	0.61	
v/c Ratio	0.06	0.01		0.01	0.14		0.07	0.39		0.63	0.52	
Control Delay	20.7	15.2		18.4	5.3		57.4	29.8		72.7	26.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.7	15.2		18.4	5.3		57.4	29.8		72.7	26.3	
LOS	C	B		B	A		E	C		E	C	
Approach Delay		19.9			6.2			30.0			30.6	
Approach LOS		B			A			C			C	
Queue Length 50th (m)	3.2	0.3		0.7	0.1		1.2	69.3		21.0	108.9	
Queue Length 95th (m)	m7.3	m1.9		3.1	8.5		5.7	92.1		48.5	#133.0	
Internal Link Dist (m)		279.8			279.9			168.6			261.7	
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	557	724		588	691		72	1548		209	2024	
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	0.04	0.01		0.01	0.10		0.07	0.39		0.52	0.52	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 118 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.63  
 Intersection Signal Delay: 29.3      Intersection LOS: C  
 Intersection Capacity Utilization 77.7%      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.  
 m Volume for 95th percentile queue is metered by upstream signal.

















Splits and Phases: 5: Greenbank & Future Jockvale





7: Future Jockvale & Street B  
PM Peak

3370 Greenbank Road  
2027 Total

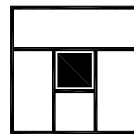
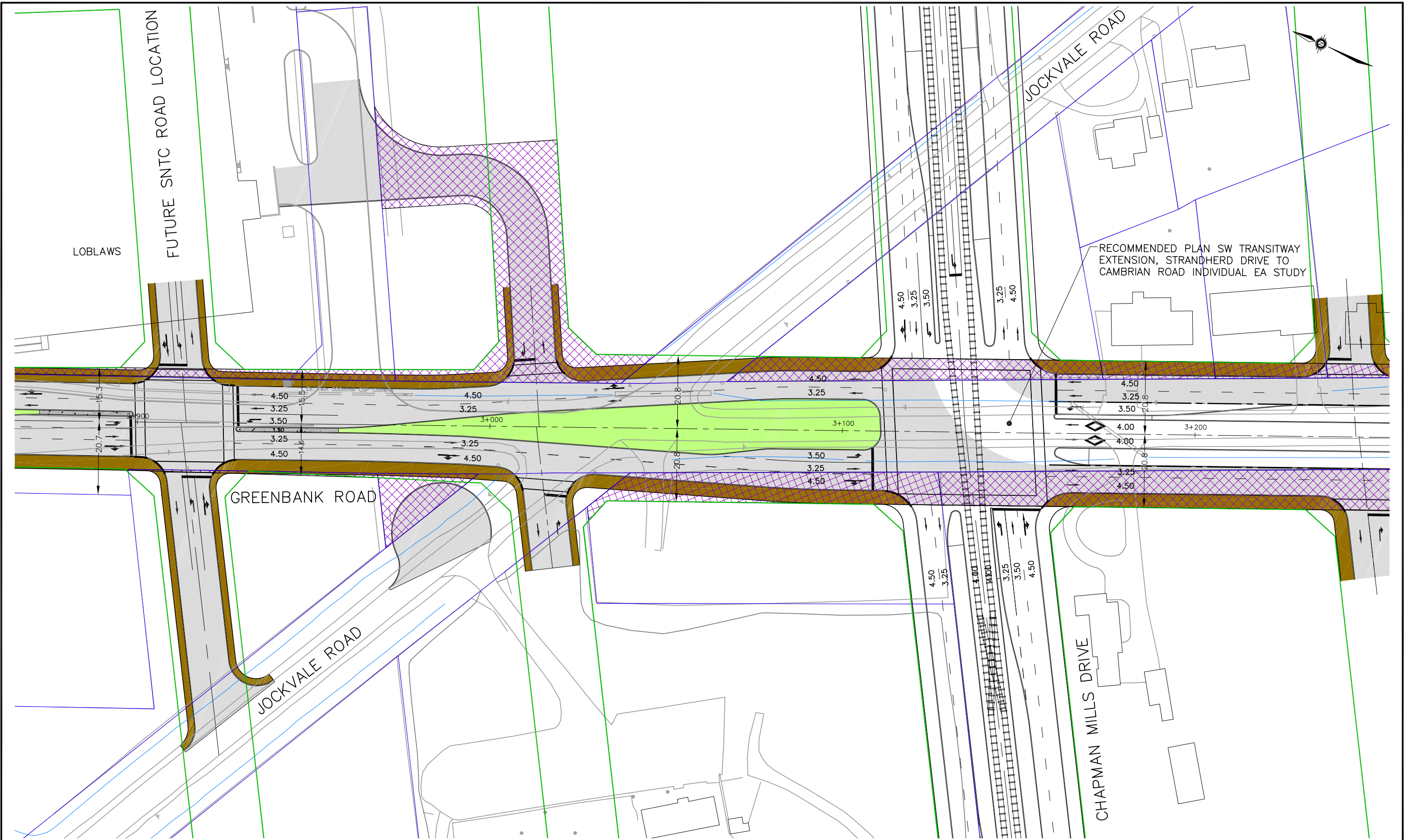
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	13	0	5	28	5	0	3	2	10	6	1
Future Volume (Veh/h)	1	13	0	5	28	5	0	3	2	10	6	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	14	0	5	30	5	0	3	2	11	7	1
Pedestrians												25
Lane Width (m)												3.6
Walking Speed (m/s)												1.2
Percent Blockage												2
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)					294							
pX, platoon unblocked												
vC, conflicting volume	60			14			63	86	14	87	84	58
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	60			14			63	86	14	87	84	58
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	99	100
cM capacity (veh/h)	1511			1604			907	784	1066	859	787	988
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	15	40	5	19								
Volume Left	1	5	0	11								
Volume Right	0	5	2	1								
cSH	1511	1604	877	837								
Volume to Capacity	0.00	0.00	0.01	0.02								
Queue Length 95th (m)	0.0	0.1	0.1	0.6								
Control Delay (s)	0.5	0.9	9.1	9.4								
Lane LOS	A	A	A	A								
Approach Delay (s)	0.5	0.9	9.1	9.4								
Approach LOS			A	A								
<b>Intersection Summary</b>												
Average Delay			3.4									
Intersection Capacity Utilization			17.8%		ICU Level of Service				A			
Analysis Period (min)			15									

## **Appendix D**

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Relevant Excerpts from  
Greenbank Road Environmental Assessment Study

ID - C:\Project\12915\CAD2\Drawings\11x17 for Report\12915\_Greenbank Road\_Ultimate\_Rev 2.dwg - Fri, 13 Oct 2006 - 11:19



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**GREENBANK ROAD**  
**CLASS ENVIRONMENTAL ASSESSMENT STUDY**  
 MALVERN DRIVE TO CAMBRIAN ROAD

**GREENBANK ROAD**

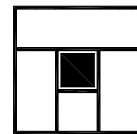
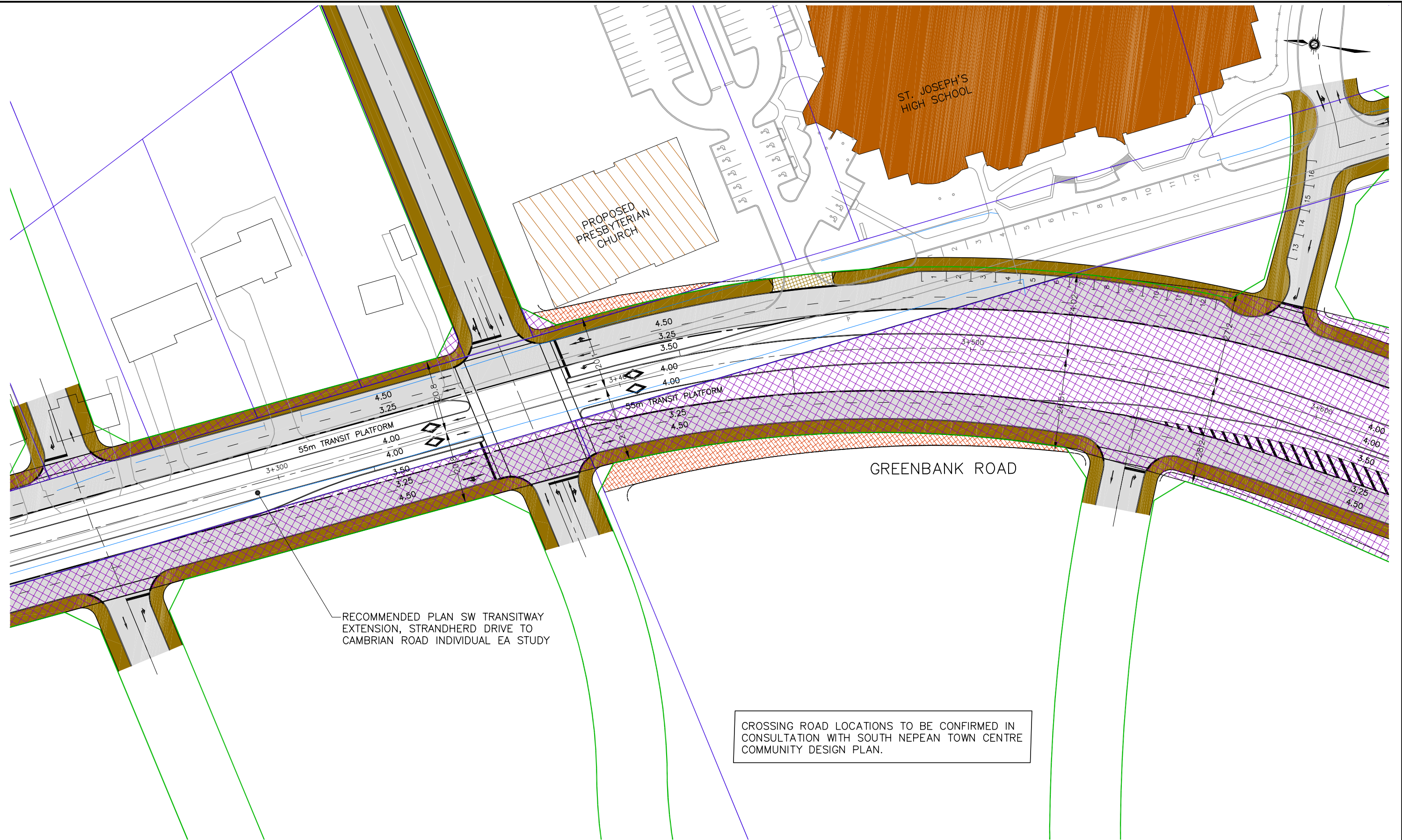
2+865 to 3+255

SCALE: 1:1000

PROJECT: 18-12915

**FIGURE 7**

ID - C:\Project\12915\CAD2\Drawings\11x17 for Report\12915\_Greenbank Road\_Ultimate\_Rev 2.dwg - Fri, 13 Oct 2006 - 11:19



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**GREENBANK ROAD**  
**CLASS ENVIRONMENTAL ASSESSMENT STUDY**  
 MALVERN DRIVE TO CAMBRIAN ROAD

**GREENBANK ROAD**

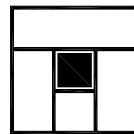
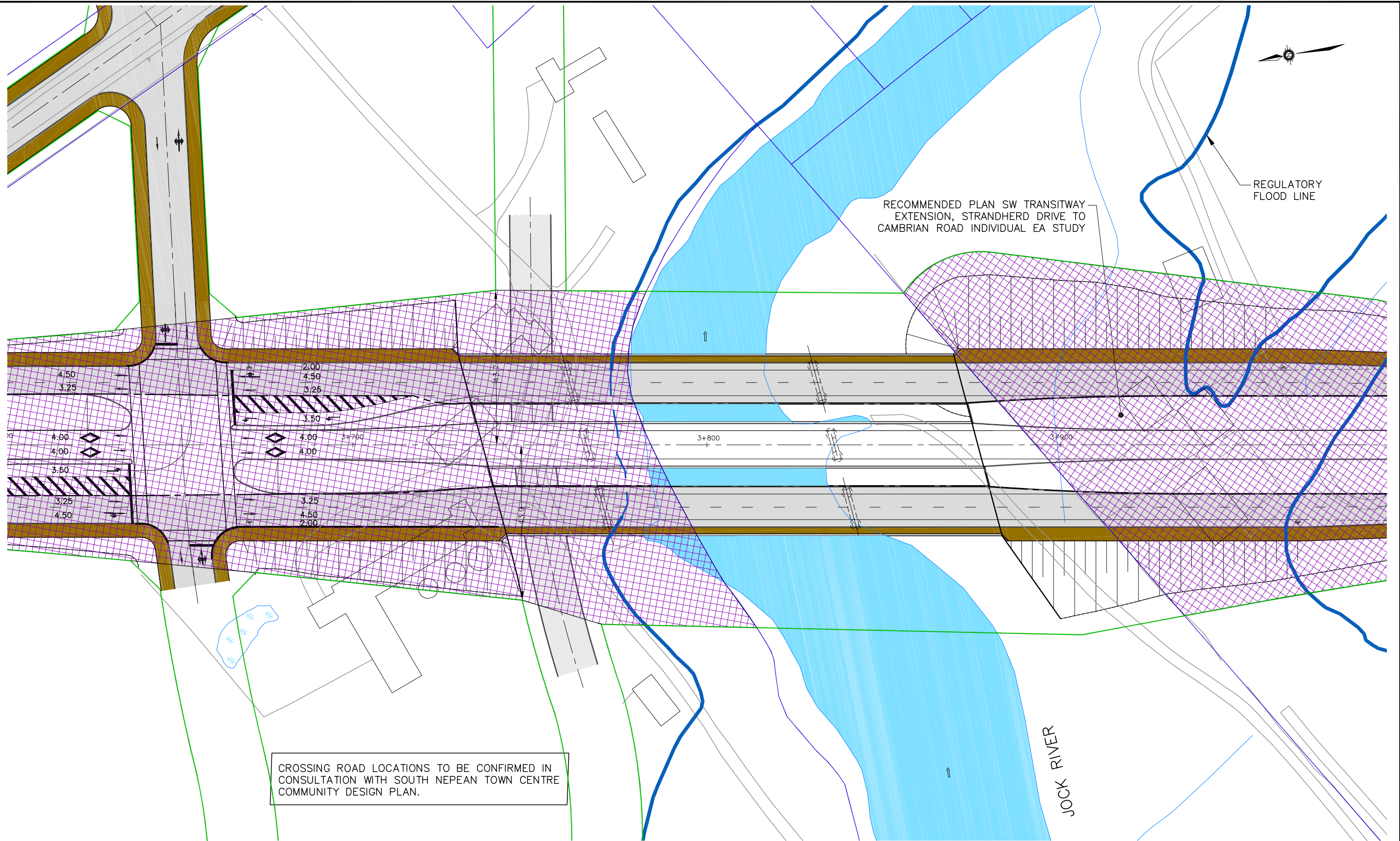
3+220 to 3+620

SCALE: 1:1000

PROJECT: 18-12915

FIGURE 8

ID - C:\Project\12915\CAD2\Drawings\11x17 for Report\12915\_Greenbank Road\_Ultimate\_Rev 2.dwg - Fri, 13 Oct 2006 - 11:19



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**GREENBANK ROAD**  
**CLASS ENVIRONMENTAL ASSESSMENT STUDY**  
 MALVERN DRIVE TO CAMBRIAN ROAD

**GREENBANK ROAD**

3+600 to 3+890

SCALE: 1:1000

PROJECT: 18-12915

**FIGURE 9**