Burnett Lands - 3370 Greenbank Road

Community Transportation Study/ Transportation Impact Study

BURNETT LANDS

3370 GREENBANK ROAD

COMMUNITY TRANSPORTATION STUDY/ TRANSPORTATION IMPACT STUDY

Prepared for:

Claridge Homes

Prepared By:

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December 9, 2016

Novatech File: 111117
Ref: R-2016-008

NOVATECH
Engineers, Planners & Landscape Architects

December 9th, 2016

City of Ottawa
Planning, Infrastructure and Economic Development Department
Planning Services Branch
110 Laurier Ave. W., 4th Floor,
Ottawa, Ontario K1P 1J1

Attention: **Mr. Don Herweyer, Manager of Development Review South**

Dear Sir:

Reference: **Burnett Lands – 3370 Greenbank Road**
Community Transportation Study/Transportation Impact Study
Our File No. : 111117

We are pleased to submit the following combined Community Transportation Study/Transportation Impact Study (CTS/TIS) in support of Zoning Amendment, Official Plan Amendment and Draft Plan of Subdivision applications for the lands located north of the Jock River and west of Greenbank Road. The subject lands will henceforth be referred to as the "Burnett" lands.

The structure and format of this report is in accordance with the 2006 City of Ottawa Transportation Impact Assessment (TIA) Guidelines. A checklist of the documentation requirements as outlined in Appendix D of the TIA Guidelines is attached overleaf with reference to corresponding report sections.

A PDF version of this report and copies of the electronic software files are provided on the enclosed disk. Please call if you have any questions as you complete your review.

Yours truly,

NOVATECH

B. Byvelds

Brad Byvelds, P. Eng.
Transportation Engineer

Documentation and Reporting Checklist

Report Context (Section 1.0)

Description of the development (include all of the following that are known at the time of the application):

- ☑ Municipal address;
- ☑ Location relative to major elements of the existing transportation system (e.g., the site is located in the southwest quadrant of the intersection of Main Street/ First Street, 600 metres from the Maple Street Rapid Transit Station); Existing land uses or permitted use provisions in the Official Plan, Zoning By-law, etc.;
- ☑ Proposed land uses and relevant planning regulations to be used in the analysis;
- ☑ Proposed development size (building size, number of residential units, etc.) and location on site;
- ☑ Estimated date of occupancy;
- ☑ Planned phasing of development;
- ☒ Proposed number of parking spaces (not relevant for Draft Plans of Subdivision); and
- ☑ Proposed access points and type of access (full turns, right-in/ right-out, turning restrictions, etc.).
- ☑ Study area;
- ☑ Time periods and phasing; and
- ☑ Horizon years (include reference to phased development).

The CTS must include a key plan that shows the general location of the development in relation to the surrounding area. The CTS must also provide a draft site plan or development concept of a suitable scale that shows the general location of the development and the proposed access locations. If the proposed development/ redevelopment is to be constructed in phases, a description must be provided for each phase, identifying the proposed timing of implementation.

Existing Conditions (Section 2.0)

- ☑ Existing roads and ramps in the study area, including jurisdiction, classification, number of lanes, and posted speed limit;
- ☑ Existing intersections, indicating type of control, lane configurations, turning restrictions, and any other relevant data (e.g., extraordinary lane widths, grades, etc.);
- ☑ Existing access points to adjacent developments (both sides of all roads bordering the site);
- ☑ Existing transit system, including stations and stops;
- ☑ Existing on- and off-road bicycle facilities and pedestrian sidewalks and pathway networks;
- ☑ Existing system operations (V/C, LOS); and
- ☑ Major trip generators/ attractors within the Study Area should be indicated.

The CTS report must include figures documenting the existing travel demands by mode. A photographic inventory of the transportation network elements in the vicinity of the proposed access points would be beneficial to staff in their review of the Consultant's report.

Demand Forecasting (Section 3.0)

- ☑ General background growth;
- ☑ Other study area developments;
- ☑ Changes to the study area road network;
- ☑ Trip generation rates;
- ☑ Trip distribution and assignment:
    - include figures documenting total future travel demands by mode for each horizon year.

Impact Analysis (Section 4.0, 6.0, 8.0 and 9.0)

- ☑ Network Capacity Analysis;
- ☑ Non-auto network connections and continuity;
- ☑ Potential for community impacts, and
- ☑ TDM.

Mitigation Measures and Site Design Characteristics (Section 5.0 and 7.0)

The CTS must identify all mitigation measures required to offset network impacts from the development. The CTS must also identify key site design features required to implement the Official Plan and Transportation Master Plan policies regarding site development.

The CTS must include all of the following, where they are required by the subject development:

- ☑ Major network elements required to bring the screenlines to or below acceptable operating guidelines, and comments regarding consistency of the requirements with the Transportation Master Plan and Capital Budget;
- ☑ Location and timing of proposed changes to existing traffic controls at intersections (e.g., new traffic signals, Stop signs, etc.);
- ☑ Location and timing of new intersections, including proposed traffic control measures (e.g., traffic signals, etc.);
- ☑ Requirements for new auxiliary lanes;
- ☑ Mitigation measures required to offset impacts on the surface and Rapid Transit networks;
- ☑ New or modified elements of the bicycle and pedestrian networks;
- ☑ Community impact mitigation measures;
- ☑ Demonstration that Official Plan policies regarding transit-supportive developments have been incorporated appropriately; and
- ☑ Proposed TDM features or programs to support the site development.

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EXECUTIVE SUMMARY

This Community Transportation Study/Transportation Impact Study (CTS/TIS) has been prepared in support of a Zoning By-law Amendment, Official Plan Amendment and Draft Plan of Subdivision applications for the lands located north of the Jock River and west of Greenbank Road (3370 Greenbank Road). The subject lands will henceforth be referred to as the "Burnett" lands.

The Burnett lands have a total area of approximately 15.5ha and currently consist of agricultural farmland. The Burnett lands will accommodate 247 townhouse units and 420 condominium units and will be served by two new all movement accesses on Greenbank Road, as well as the extension of Jockvale Road through the subject lands. The street layout and proposed residential developments conform to the initiatives identified in the South Nepean Town Centre Community Design Plan.

The Burnett lands are anticipated to be developed in three phases. Each phase is anticipated to contain the following number of units:

- Phase One 177 townhouse units;
- Phase Two 70 townhouse units;
- Phase Three 420 condominium units.

Phase One of the subject development is anticipated to be constructed prior to the Greenbank Road realignment, and would be accessed through the Street B/Greenbank Road intersection. This intersection will operate under side street stop control following build-out of Phase One of the subject lands.

Phase One of the Burnett lands is anticipated to be constructed prior to 2018, while full build-out is anticipated to be complete by 2020.

The study area for this report was confirmed with City staff, and includes the following intersections:

- Greenbank Road/Jockvale Road (Future Intersection);
- Greenbank Road/Street B (Future Intersection);
- Jockvale Road/Street B (Future Intersection).

The selected time periods for the analysis are the weekday AM and PM peak hours. The weekday AM and PM peak hours are considered to represent the 'worst case' combination of site-generated traffic and adjacent street traffic. Background and total traffic conditions have been examined at the Phase One build-out (2018), the ultimate build-out year (2020) and the five-year horizon (2025).

For the purposes of the analysis presented in this report, the background traffic volumes along Greenbank Road have been increased at a rate of 5% per year, consistent with the Jock River screenline analysis presented in the Barrhaven South CTS. Other developments within the South Nepean Town Centre CDP lands are assumed to be built-out prior to the 2020 ultimate build-out year. Blocks within the South Nepean Town Centre CDP lands have been assumed to meet the target densities identified in the CDP. Based on the foregoing, the projected units were converted to vehicle trips and distributed to the road network.

Intersection capacity analysis has been completed using the software package Synchro 8.0. This software uses methodology from the *Highway Capacity Manual 2010* (HCM), published by the Transportation Research Board, to evaluate signalized and unsignalized intersections.

The main conclusions and recommendations of this report are as follows:

Capacity Analysis

- The screenline analysis suggests that Greenbank Road will have capacity to accommodate the projected development traffic based on the 2020 and 2025 background and total traffic projections.

- Based on the Phase One PM peak hour advancing and opposing traffic volumes, a northbound left turn lane with a storage length of 15m is recommended at Street B prior to the reconstruction of Greenbank Road.

- All movements at the study area intersections are anticipated to operate at a LOS D or better under the 2018 Phase One total traffic condition.

- All movements at the study area intersections are anticipated to operate at a LOS A under the 2020 and 2025 background traffic condition.

- All movements at the study area intersections are anticipated to operate at a LOS A or better under the 2020 and 2025 total traffic condition.

Non-Auto Transportation, On-site Design, Community Impacts and TDM

- Sidewalks will be provided on both sides of Jockvale Road and Street B, and on one side of Street A, Street D and Street F. The proposed pedestrian network provides a linkage to open space/parkland and neighbouring developments.

- The roadway design for the Greenbank Road realignment suggests eastbound and westbound left turn lanes at the Greenbank Road/Street B intersection, but only suggests one lane eastbound and westbound approaches to the Greenbank Road/Jockvale Road intersection. The traffic volumes projected in this CTS suggest the two intersections will carry similar traffic volumes. The Greenbank Road/Street B intersection is anticipated to operate under acceptable conditions if single lane eastbound and westbound approaches are provided.

- Cyclists will be accommodated on-road through the provision of standard roadway cross-sections in accordance with OTM *Book 18 – Cycling Facilities*. Cyclists will also be accommodated along the proposed multi-use pathway travelling along the open space south of Half Moon Bay.

- The design of all roadways within the Burnett lands will generally be consistent with the cross-sections identified in the South Nepean Town Centre CDP.

- The proposed intersection spacing along Jockvale Road between Street B and Street D is approximately 45m. Although the two adjacent intersections along Jockvale Road do not meet minimum TAC standards, the location of Street D is consistent with the road network identified in the SNTC CDP.

- The location of the residential rear lanes (Street G and Street H) satisfy the minimum spacing requirement identified in the City's *Private Approach By-law*. The location of the residential rear lanes in the vicinity of the Greenbank Road realignment are also consistent with the spacing proposed in the CDP.

- The pedestrian network within the Burnett lands deviates from the CDP policy as it provides sidewalks on both sides of the collector roadways (Jockvale Road and Street B). All local streets within the subject lands will provide sidewalks on one side of the roadway. Although the proposed pedestrian network deviates from the transportation policy identified in the CDP, the pedestrian network will provide a linkage to open space/parkland and neighbouring developments.

- The Burnett lands are located adjacent to an arterial roadway and are not anticipated to have any measureable impact on the future residential communities in the site's vicinity.

- On-site parking for the proposed condominium buildings will be provided in accordance with the minimum requirements of the City of Ottawa's *Zoning By-law*. Parking infiltration onto adjacent roadways is not anticipated.

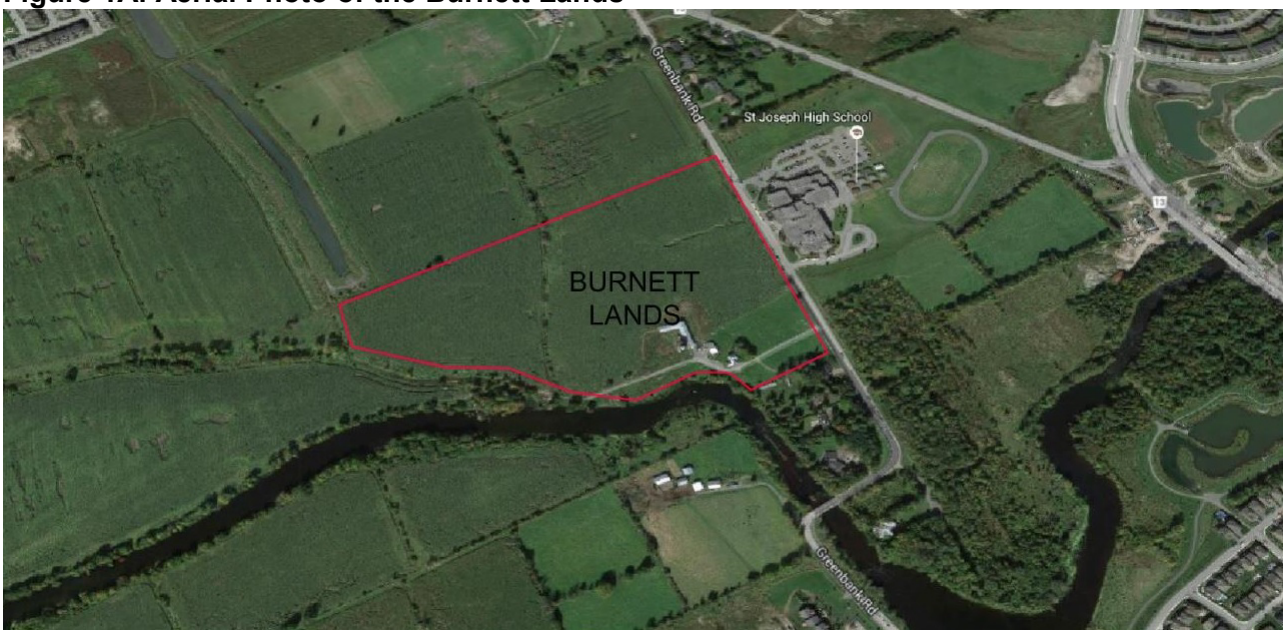
- The proposed development conforms to the City's TDM initiatives by providing easy access to the local pedestrian, bicycle and transit systems. Planned cycling routes are along the MUP under the future Greenbank Road, along the open corridor south of Half Moon Bay and along the west side of the Kennedy-Burnett pond to Strandherd Drive.

1.0 INTRODUCTION

This Community Transportation Study/Transportation Impact Study (CTS/TIS)) has been prepared in support of Zoning By-law Amendmend, Official Plan Amendment and Draft Plan of Subdivision applications for the lands located north of the Jock River and west of Greenbank Road (3370 Greenbank Road). The subject lands will henceforth be referred to as the "Burnett" lands.

An aerial photo of the Burnett lands is shown in **Figure 1A**. A key plan is also provided in **Figure 1B**.

Figure 1A: Aerial Photo of the Burnett Lands



The Burnett lands have a total area of approximately 15.5ha and currently consist of agricultural farmland. The Burnett lands are bounded by the following:

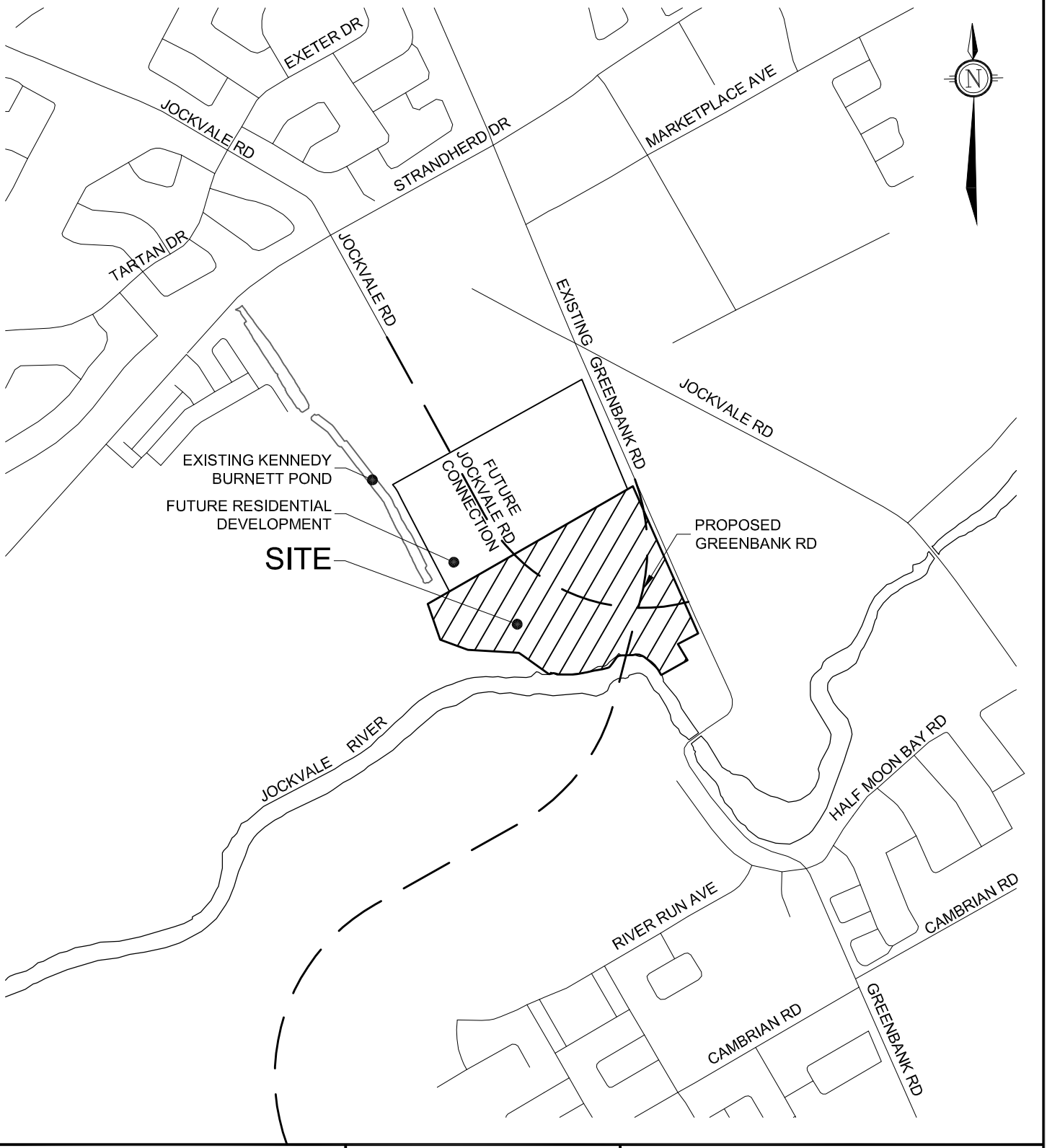
- To the north, vacant land planned for future residential development;
- To the south, the Jock River;
- To the east, St. Joseph High School;
- To the west, vacant land.

The Burnett lands are currently zoned Development Reserve (DR). A Zoning By-law Amendment will be required to permit the proposed development for the subject lands.

1.1 Proposed Development

The Burnett lands will accommodate 247 townhouse units and 420 condominium units, as shown in **Figure 2**. The Burnett lands will be served by two new all movement accesses on Greenbank Road, as well as the extension of Jockvale Road through the subject lands. The street layout and proposed residential developments generally conform to the initiatives identified in the South Nepean Town Centre Community Design Plan (SNTC CDP).

The Burnett lands are anticipated to be developed in three phases. Each phase is anticipated to contain the following number of units:



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3370 GREENBANK RD. BURNETT LANDS

KEY PLAN

SCALE: NTS

DATE: DEC 2016 | JOB: 111117 | FIGURE: FIGURE 1B

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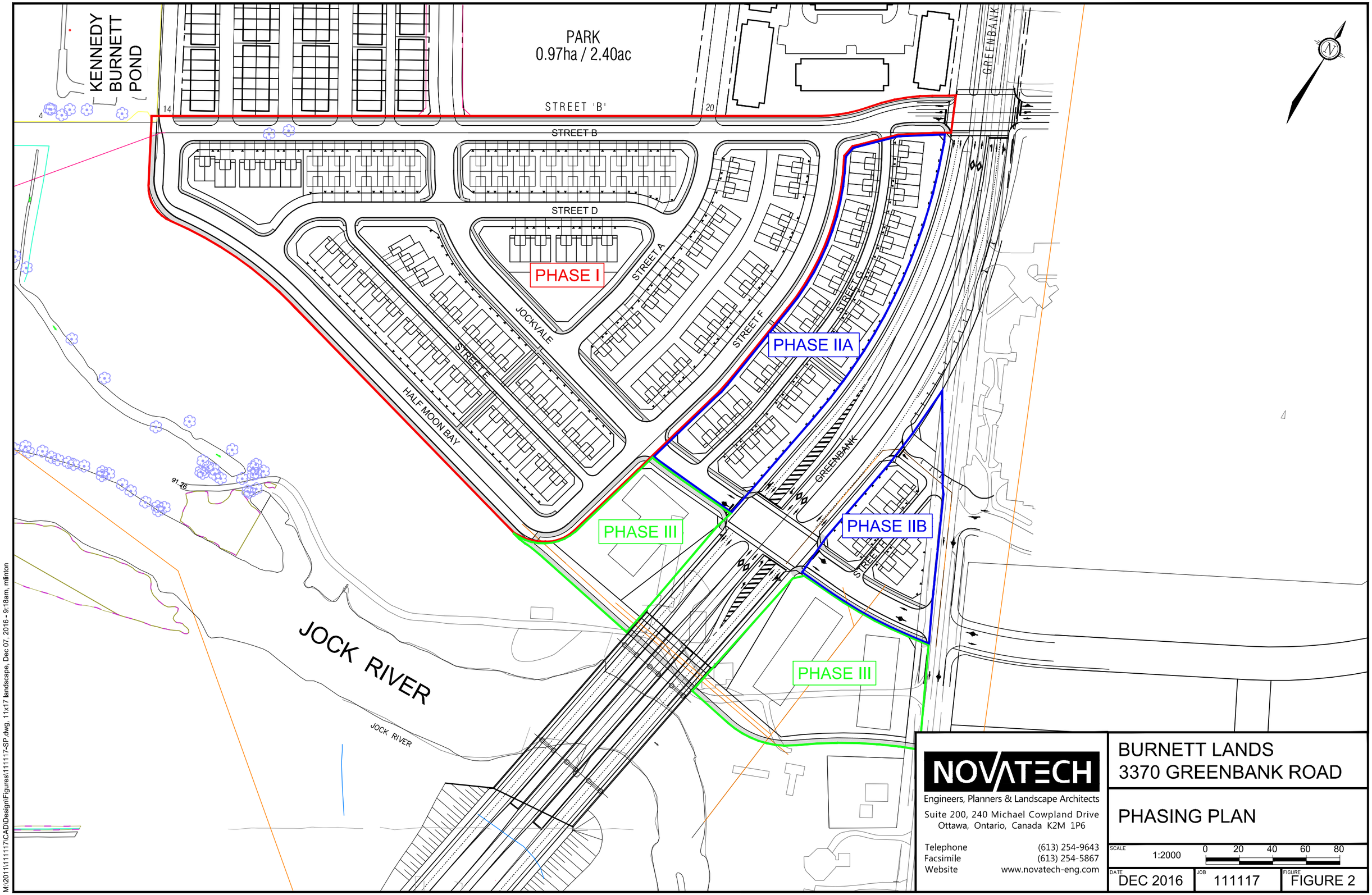

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BURNETT LANDS
3370 GREENBANK ROAD

PHASING PLAN

SCALE 1:2000 0 20 40 60 80

DATE DEC 2016 | JOB 111117 | FIGURE FIGURE 2

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- Phase One 177 townhouse units;
- Phase Two 70 townhouse units;
- Phase Three 420 condominium units.

Phase One of the subject development is anticipated to be constructed prior to the Greenbank Road realignment, and would be accessed through the Street B/Greenbank Road intersection. This intersection will operate under side street stop control following build-out of Phase One of the subject lands.

Phase One of the Burnett lands is anticipated to be constructed prior to 2018, while full build-out is anticipated to be complete by 2020.

1.2 Analysis Methods

The types of analysis undertaken to assess the transportation impacts of the revised development are consistent with the requirements of the City of Ottawa *Transportation Impact Assessment (TIA) Guidelines*, published in October 2006.

Intersection capacity analysis has been completed using the software package Synchro 8.0. This software uses methodology from the *Highway Capacity Manual 2010* (HCM), published by the Transportation Research Board, to evaluate signalized and unsignalized intersections.

Intersection operating conditions are commonly described in terms of a Level of Service (LOS). LOS is a qualitative measurement of speed, freedom to manoeuvre, interruptions, comfort and convenience. Letters are assigned to six levels, with LOS 'A' representing optimal operating conditions and LOS 'F' representing failing operating conditions.

The City of Ottawa has adopted criteria that directly relate the LOS of a signalized intersection to a volume to capacity (v/c) ratio. Vehicle capacity is defined as the maximum number of vehicles that can pass a given point during a specified period under prevailing traffic conditions. The City's criteria are as follows:

LOS	v/c ratio
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	**>1.00**

The LOS for an unsignalized intersection is based on average control delay and is defined for individual movements. Control delay includes initial deceleration, queue move-up time, stopped time and final acceleration. The HCM presents the following criteria relating the LOS for individual movements to average control delay:

LOS	Delay (sec/veh)
A	<10
B	10 to 15
C	15 to 25
D	25 to 35
E	35 to 50
F	**>50**

In this study, movements at signalized and unsignalized intersections have been evaluated in terms of the LOS as defined in the foregoing tables. Mitigation measures in the form of additional lane capacity and/or signal adjustments have been identified for movements with LOS F.

This CTS/TIS has been prepared to provide an assessment of the development proposal. The methodologies used to analyze the transportation impacts of the proposed development are described as follows:

- An operational evaluation of the site accesses and study area intersections under the background and total traffic conditions for the weekday AM and PM peak hours;
- An assessment of provisions for non-auto travel modes, including integration with local transit service, and connections with the local pedestrian and bicycle networks;
- A review of the proposed on-site design;
- Evaluation of potential community concerns, including neighbourhood infiltration and parking impacts; and
- An evaluation of conformance with Transportation Demand Management (TDM) principles.

1.3 Analysis Parameters

The study area for this report was confirmed with City staff, and includes the following intersections:

- Greenbank Road/Jockvale Road (Future Intersection);
- Greenbank Road/Street B (Future Intersection);
- Jockvale Road/Street B (Future Intersection).

The selected time periods for the analysis are the weekday AM and PM peak hours. The weekday AM and PM peak hours are considered to represent the 'worst case' combination of site-generated traffic and adjacent street traffic. Background and total traffic conditions have been examined at the Phase One build-out (2018), the ultimate build-out year (2020) and the five-year horizon (2025).

2.0 EXISTING CONDITIONS

2.1 Roadway Facilities

Greenbank Road

Greenbank Road is a two-way arterial roadway that runs on a north-south alignment between Highway 417 and Prince of Wales Drive. Greenbank Road has a two lane undivided cross section in the vicinity of the subject site. The east side is urbanized with a curb and sidewalk, and the west

side is rural with a paved shoulder. The posted speed limit along Greenbank Road is 60km/hr within the study area.

Jockvale Road
Jockvale Road is a discontinuous roadway travelling between Strandherd Drive to the north to Prince of Wales Drive to the south. Jockvale Road north of Strandherd Drive is a two lane major collector roadway bisecting the Barrhaven West/Old Barrhaven community. Jockvale Road terminates in a cul-de-sac approximately 200m to the south of Strandherd Drive. Jockvale Road then continues approximately 210m north of Greenbank Road, travelling in a northwest-southeast alignment to Prince of Wales Drive.

2.2 Study Area Intersections

All intersections within the proposed study area are to be constructed as part of the proposed development. None of the intersections exist currently. Lane configurations at the study area intersections are identified in **Section 3.0** below.

2.3 Existing Pedestrian and Bicycle Facilities

Greenbank Road is urbanized with a barrier curb and an asphalt sidewalk along the St. Joseph High School property to the east. South of the high school Greenbank Road is a rural cross section with paved shoulders on both sides of the roadway.

2.4 Existing Transit Facilities

A copy of the 2015 OC Transpo system map for the study area is included in **Appendix A**. It is noted that there are currently no transit facilities within a 400m walking distance of the subject site.

2.5 Existing Traffic Volumes

A weekday AM and PM peak hour traffic count was completed by the City of Ottawa at the existing Greenbank Road/Jockvale Road intersection on Tuesday, August 16th, 2012. This intersection is located approximately 500m north of the proposed study area. Traffic volumes approaching/departing this intersection to the south were used to determine the existing through volumes along Greenbank Road adjacent to the subject site.

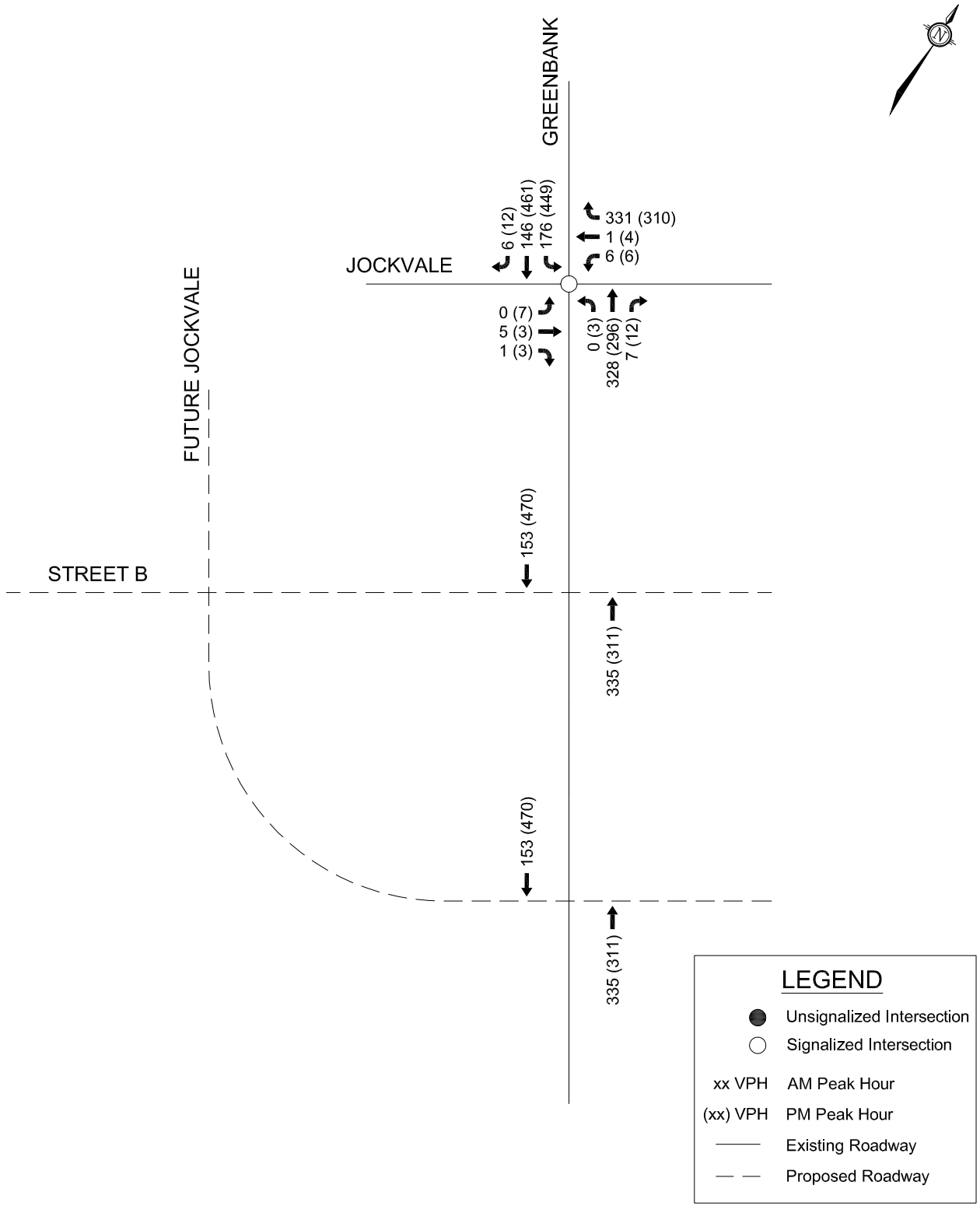
Peak hour summary sheets for the above traffic count is included in **Appendix B**. Existing weekday AM and PM peak hour traffic volumes along Greenbank Road are shown in **Figure 3**.

3.0 TRAVEL DEMAND FORECASTING

3.1 Planned Roadway and Transit Improvements

3.1.1 Greenbank Road/Southwest Transitway

The City of Ottawa's 2013 *Transportation Master Plan* (TMP) identifies the Greenbank Road extension as a Phase One (2014-2019) project in its list of 2031 Affordable Road Network projects. The Greenbank Road extension will be a new four lane roadway between Jockvale Road and Cambrian Road. The TMP's overall road network concept identifies a future extension of the realigned Greenbank Road from Cambrian Road to reconnect to the existing Greenbank Road south of the Barrhaven South community.



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3370 GREENBANK ROAD BURNETT LANDS

EXISTING TRAFFIC VOLUMES

DEC 2016 111117 FIGURE 3

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The Greenbank Road/Southwest Transitway extension *Environmental Assessment* (EA) was prepared for the City of Ottawa in March 2006. This EA suggests "A higher form of transit services, such as the extension of the Southwest Transitway, is required to serve the planned growth in transit ridership within the corridor and will assist in ensuring public transit remains an attractive alternative to auto based travel." This EA recommends the extension of the Southwest Transitway to service the projected transit ridership growth in Barrhaven South.

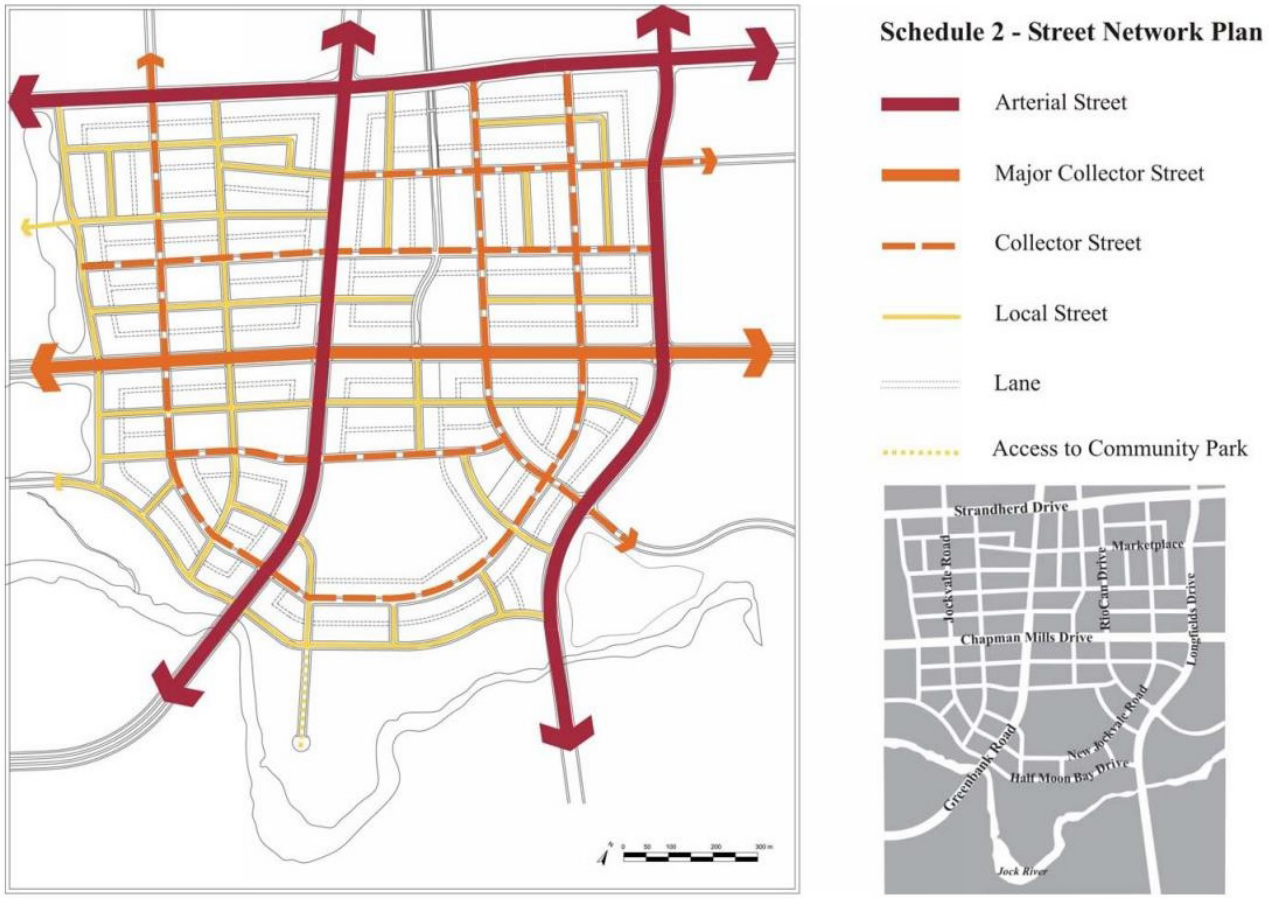
The City of Ottawa's 2013 TMP describes the Southwest Transitway extension as an at-grade bus rapid transitway following the Greenbank Road extension between Barrhaven Town Centre and Cambrian Road, with the possibility of a future extension to Barnsdale Road. The Southwest Transitway extension is identified in the TMP's 2031 Network Concept, but is not included in the list of 2031 affordable transit projects.

3.1.2 Jockvale Road

The SNTC CDP proposes the extension of existing Jockvale Road from north of Strandherd Drive to the south, travelling through the South Nepean community.

Figure 4 shows the proposed road network in the vicinity of the subject site.

Figure 4: Proposed Road Network (South Nepean Town Centre CDP)



3.2 Planned Pedestrian and Cycling Improvements

The City of Ottawa's *Ottawa Cycling Plan* (OCP) Ultimate Cycling Network identifies the future Greenbank Road extension as a spine cycling route. The realigned Greenbank Road will incorporate cycle tracks and sidewalks on both sides of the road within the study area.

A multi-use pathway (MUP) is planned along the Kennedy Burnett stormwater management facility, connecting to a future MUP along the Jock River. A conceptual alignment for the portion crossing the subject lands is shown in **Figure 2**.

3.3 Background Traffic Growth

The rate of general background growth has been established based on the traffic volumes presented in the Barrhaven South CTS prepared by Genivar in October 2010.

The analysis presented in the Barrhaven South CTS considered planned future development within the Barrhaven and Riverside South communities as well as background growth that would occur beyond these areas. The Barrhaven South CTS considered that most of the background growth could occur early in the planning horizon, suggesting that 65% of the anticipated background growth would occur by 2016, 90% would occur by 2022 and 100% would occur by 2031.

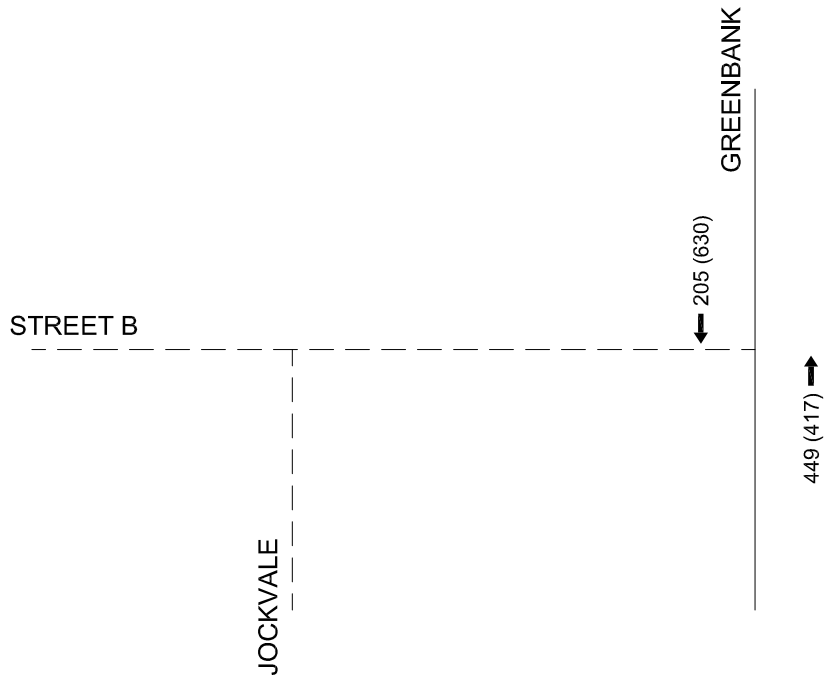
The background growth rate utilized in this study has been established based on the traffic volumes crossing the Jock River screenline, as presented in the Barrhaven South CTS. Since this study was released, the aggressive background growth assumed to occur early in the planning horizon has not been achieved. Therefore, an overall background growth rate was determined using the existing (2010) and projected 2031 traffic volumes presented in the Jock River screenline analysis in the Barrhaven South CTS. Relevant excerpts from the Barrhaven South CTS are included in **Appendix C**.

The screenline analysis presented in the Barrhaven South CTS suggests traffic volumes at the Jock River screenline will increase by approximately 5% per year from 2010 to the 2031 planning horizon. For the purposes of the analysis presented in this report, the background traffic volumes along Greenbank Road have been increased at a rate of 5% per year, consistent with the Jock River screenline analysis presented in the Barrhaven South CTS.

Background traffic volumes along the study area roadways for the 2018 Phase One build-out, 2020 full build-out and 2025 horizon years are shown in **Figures 5**, **6** and **7**.

3.4 Other Study Area Developments

For the purposes of this analysis, a portion of the SNTC CDP lands, as shown in **Figure 8**, are assumed to use the study area intersections. Although the traffic projections identified in **Section 3.3** above account for the development of all blocks within the SNTC CDP, traffic generated by the blocks in the vicinity of the subject lands are minor compared to the overall traffic growth. Based on the foregoing, the traffic growth projections identified in **Section 3.3** have not been adjusted downwards to compensate for the traffic generated by the blocks in the vicinity of the subject site at an intersection level.



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

2018 BACKGROUND TRAFFIC

DEC 2016 111117 FIGURE 5

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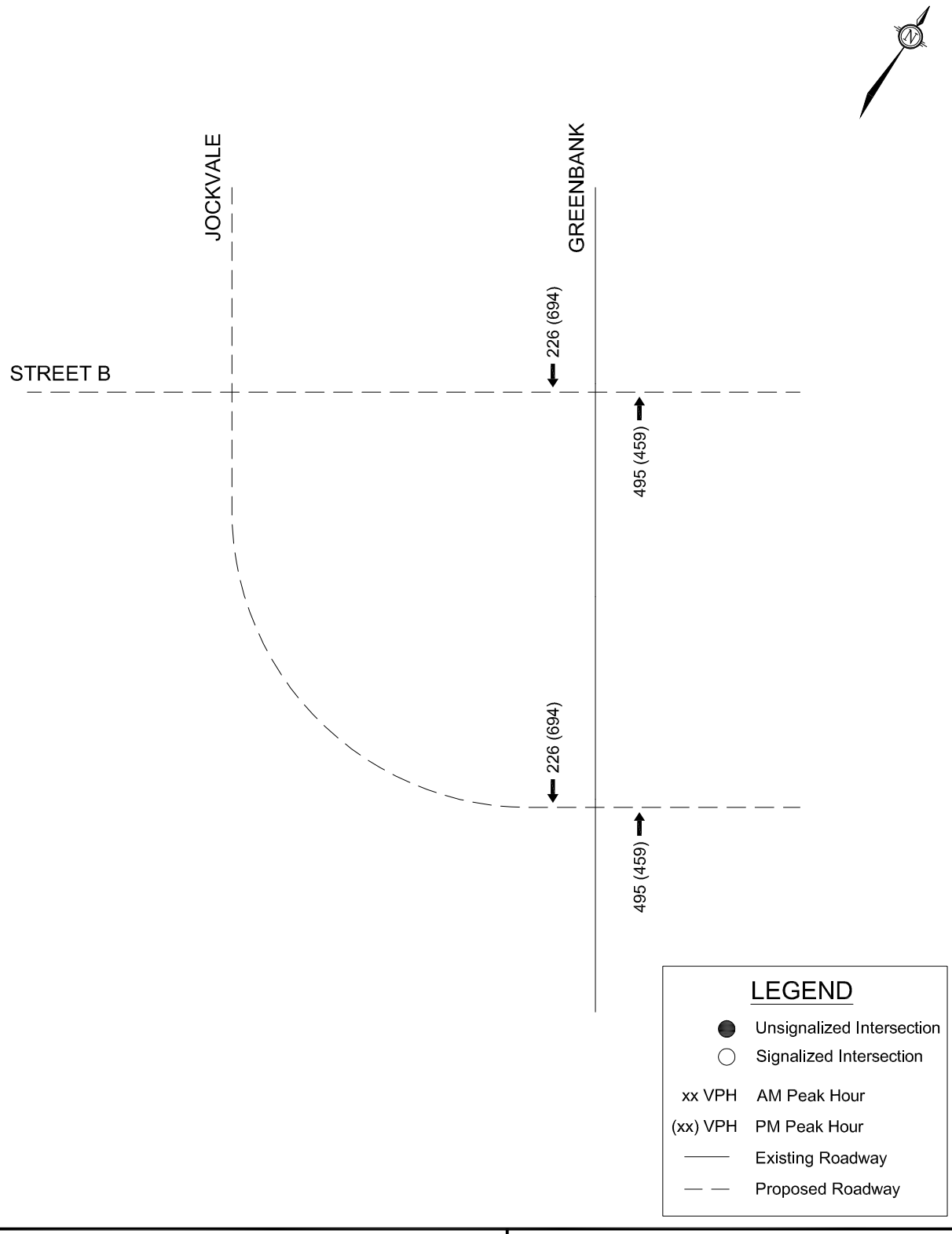

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3370 GREENBANK ROAD
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2020 BACKGROUND TRAFFIC VOLUMES

DEC 2016 111117 FIGURE 6

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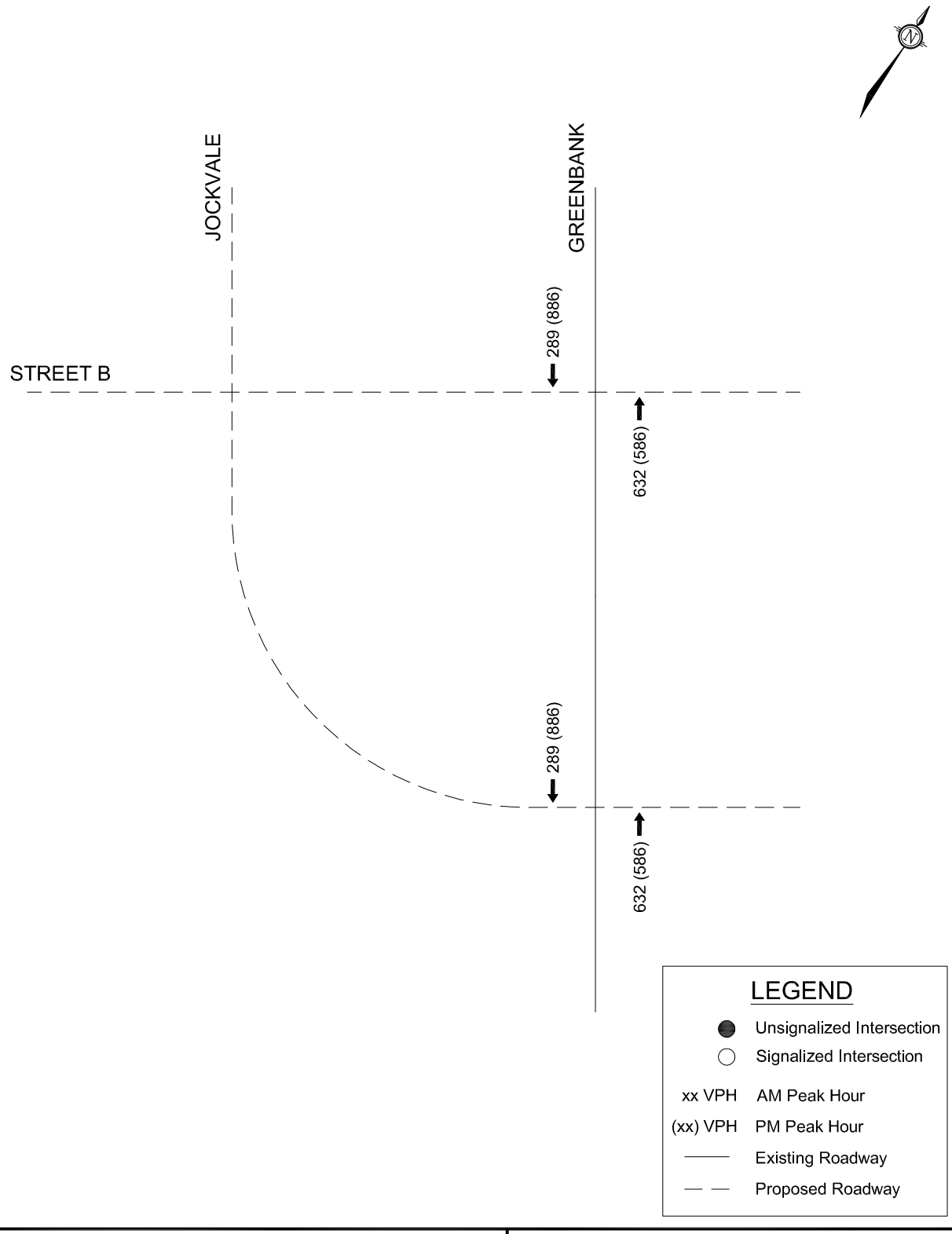

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3370 GREENBANK ROAD
BURNETT LANDS

2025 BACKGROUND TRAFFIC VOLUMES

DEC 2016 111117 FIGURE 7

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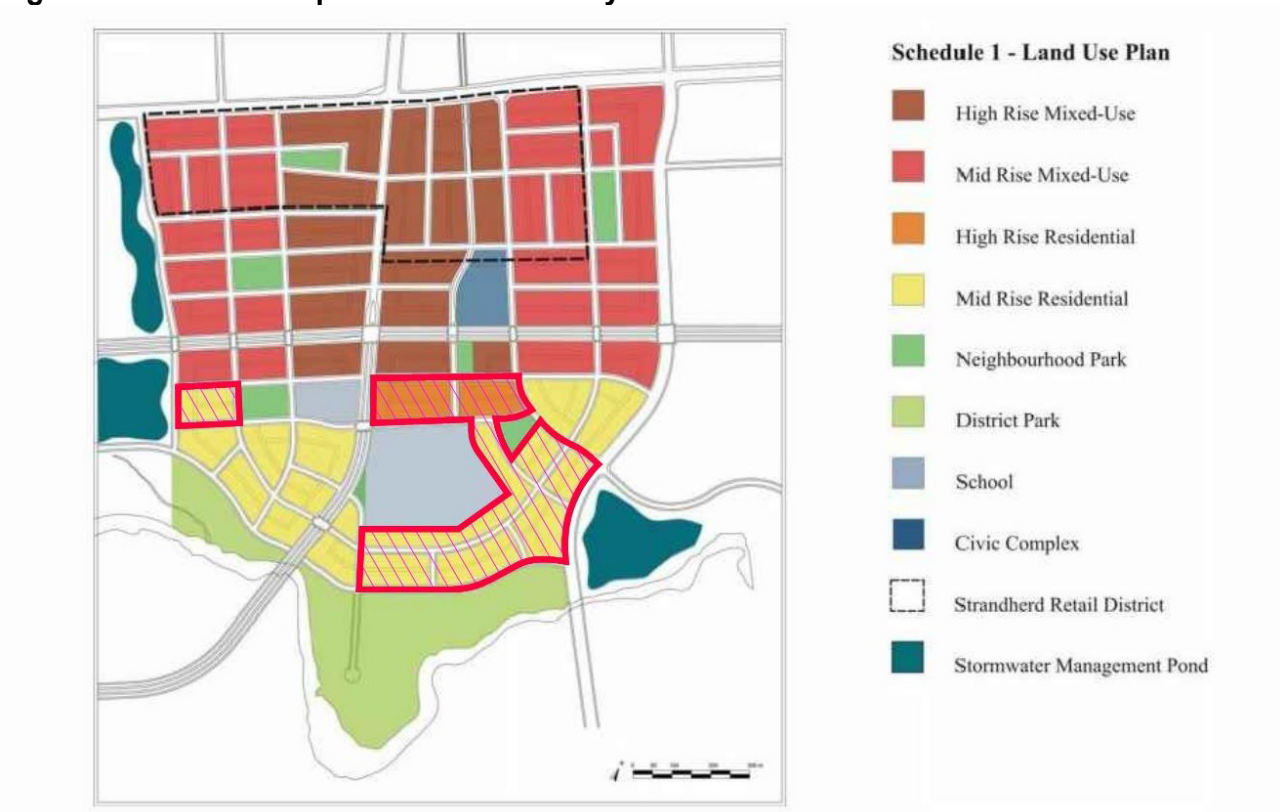
Figure 8: Other Developments in the Vicinity of the Burnett Lands



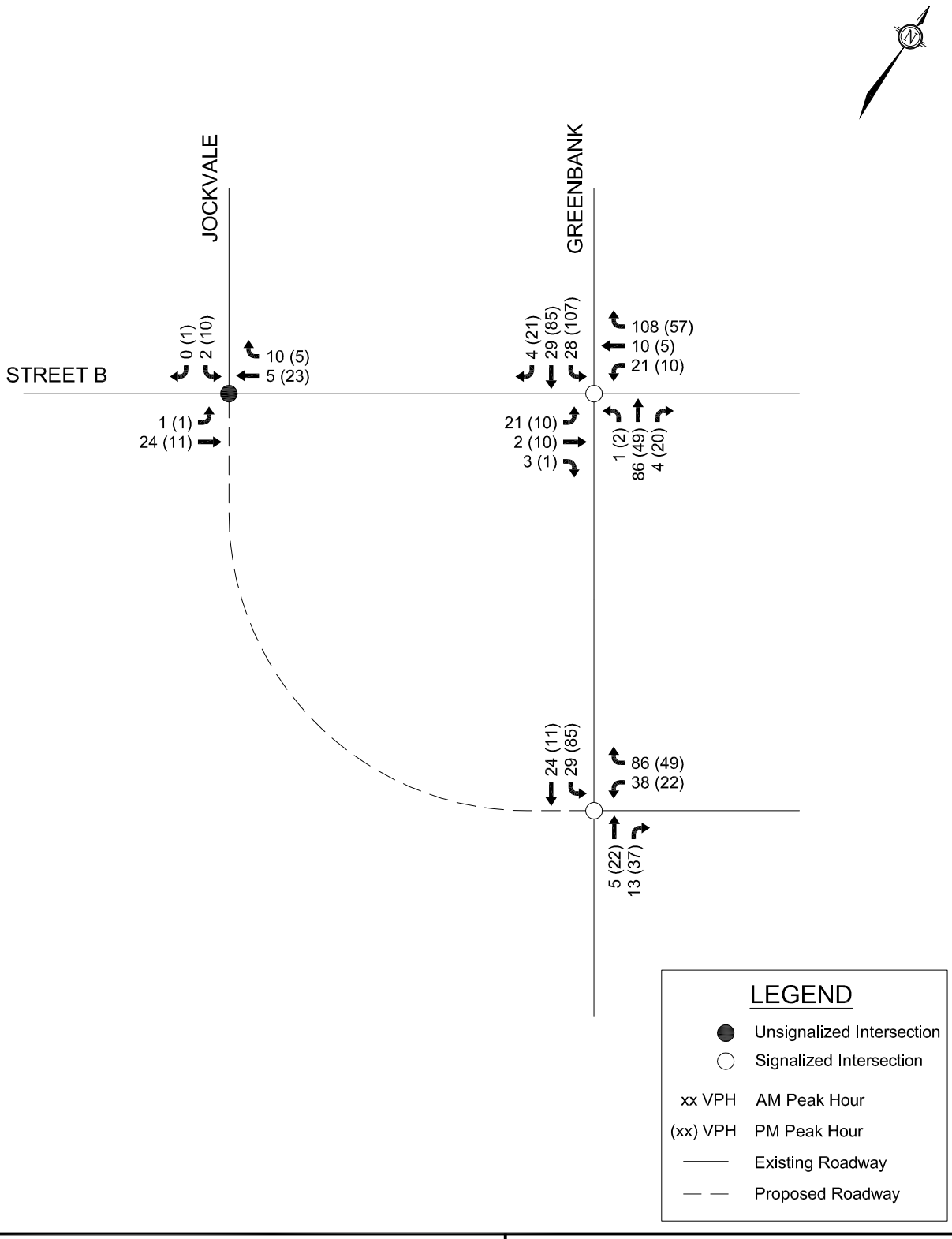
All blocks surrounding the subject site are identified as either High Rise Residential or Mid Rise Residential blocks within the SNTC CDP. The CDP identifies a target density of 300 and 100 units per hectare for High Rise and Mid Rise Residential blocks respectively. Assuming all blocks within the SNTC CDP lands meet target densities, the blocks in the vicinity of the subject lands are anticipated to contain approximately 2,200 condominium/townhouse units (2,100 units east of Greenbank Road and 100 units west of Greenbank Road).

Trips generated by the residential units east of Greenbank Road have been distributed to the study area intersections as follows:

- 55% to/from the north via Longfields Drive
- 30% to/from the north via Greenbank Road
- 10% to/from the south via Greenbank Road
- 5% to/from the west via Jockvale Road

Trips generated by the residential units west of Greenbank Road have been distributed to the study area intersections using the distribution presented in **Section 3.6** below.

Trips generated by other developments in the vicinity of the subject lands are shown in **Figure 9**. It has been assumed that other developments in the SNTC CDP lands will not be constructed prior to the projected 2018 Phase One build-out, but have been assumed to be in place prior to the 2020 ultimate build-out. Projected background traffic with the addition of other developments in the vicinity of the subject lands are shown in **Figures 10** and **11** for the 2020 build-out and 2025 horizon years.



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TRIPS GENERATED BY OTHER DEVELOPMENTS

DEC 2016 111117 FIGURE 9

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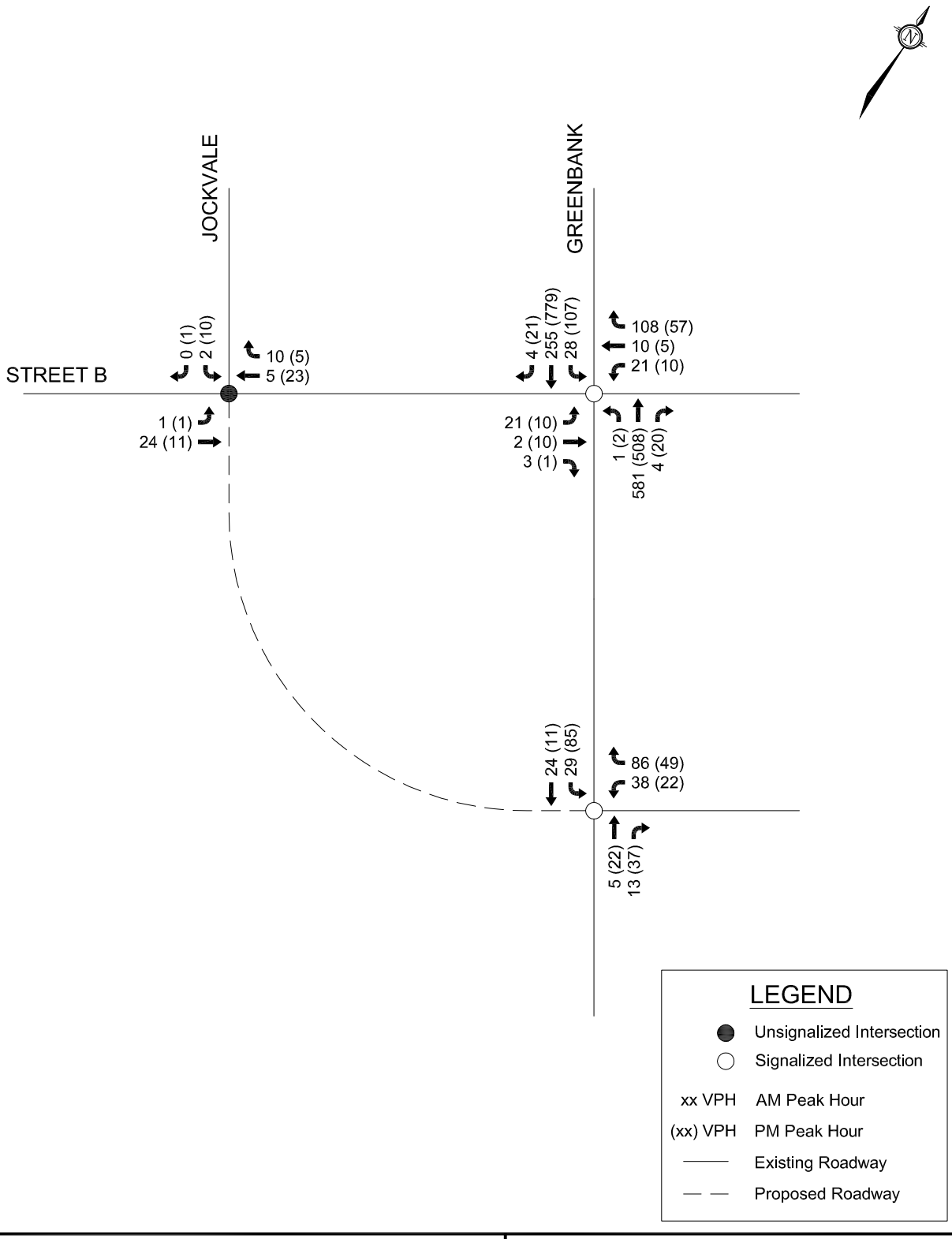

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3370 GREENBANK ROAD
BURNETT LANDS

2020 BACKGROUND + OTHER DEVELOPMENT TRAFFIC

DEC 2016 111117 FIGURE 10

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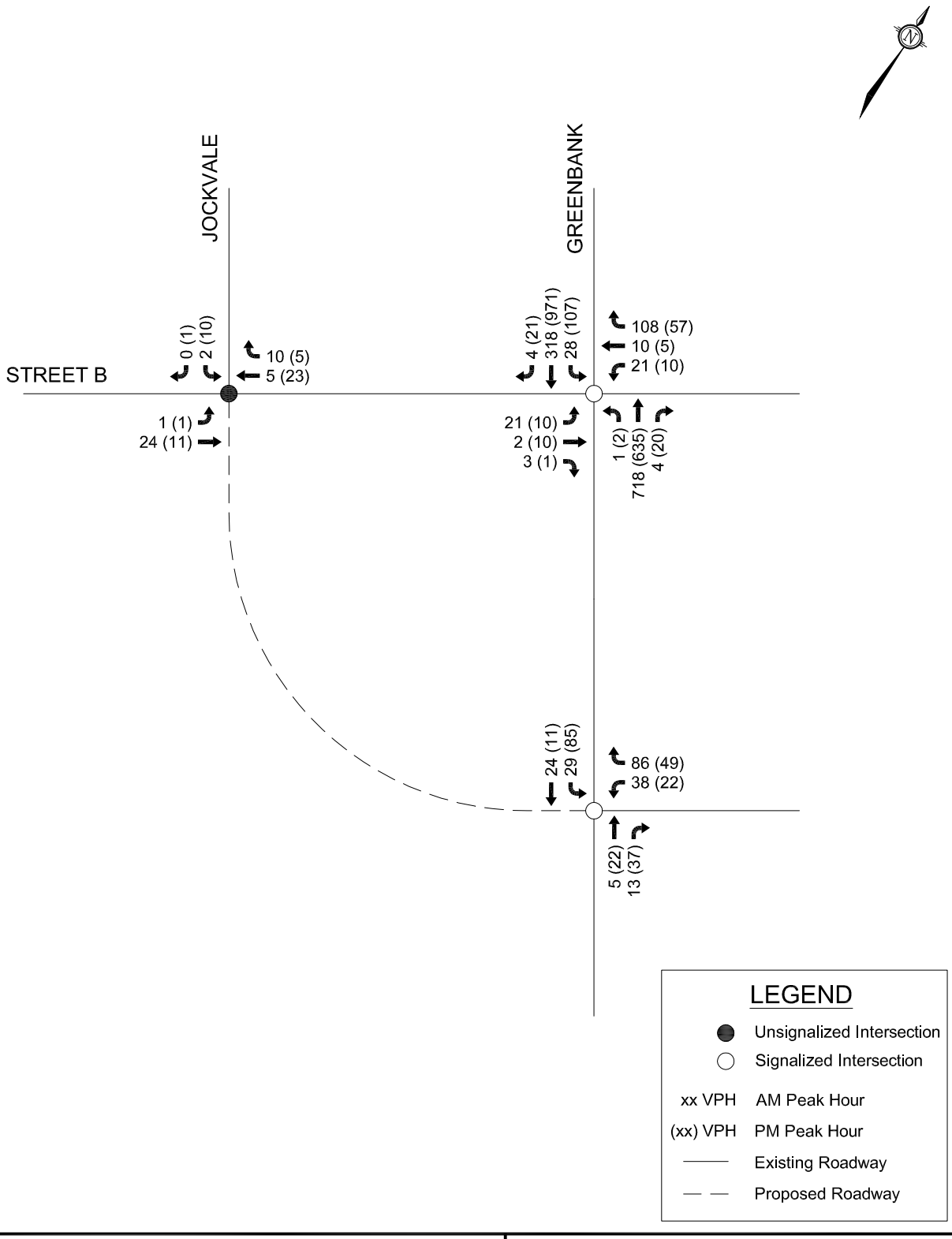

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3370 GREENBANK ROAD
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2025 BACKGROUND + OTHER DEVELOPMENT TRAFFIC

DEC 2016 111117 FIGURE 11

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3.5 Trip Generation

Trips generated by the Burnett lands have been estimated using the relevant peak hour rates identified in the Institute of Transportation Engineers (*ITE) Trip Generation Manual, 9th Edition*.

The trips generated by the Burnett lands during the weekday AM and PM peak hours are outlined in the following table.

Table 1: ITE Trip Generation

Land Use	ITE Code	GFA / Units	AM Peak (vph)			PM Peak (vph)		
			In	Out	Total	In	Out	Total
Phase One								
Condominium / Townhouse	230	177	14	68	82	64	32	96
Build-out								
Condominium / Townhouse (East of Greenbank)	230	292	21	101	122	97	48	145
Condominium / Townhouse (West of Greenbank)	230	375	25	124	149	119	59	178
		Total	**46**	**225**	**271**	**216**	**107**	**323**

The trip generation surveys compiled in the *ITE Trip Generation Manual* only record vehicle trips, and the sites surveyed are typically located in the suburban locations in the United States where non-auto modes of transportation typically have a modal share of 10% or less. For urban infill developments where multiple modes of transportation are readily available, it is considered good practice to express projected trip generation volumes in terms of person trips, instead of vehicle trips. To convert ITE vehicle trip rates to person trip rates, two adjustment factors have been applied:

- Vehicle occupancy factor: 1.29 (taken from the 2011 TRANS O-D Survey Report)
- Non-auto usage factor: 1.1 (non-auto trips not counted in ITE surveys, assumed 10%)

Combining the two factors gives an overall vehicle trip to person trip adjustment factor of approximately 1.42. Applying this factor to the vehicle trips projected by the ITE rates yields the following person trip generation:

Table 2: Person Trips

Land Use	In (vph)	Out (vph)	Total (vph)	Person Trip Factor	In (pph)	Out (pph)	Total (pph)
Phase One							
AM Peak							
Condominium / Townhouse	14	68	82	**x 1.42** →	20	96	116
PM Peak							
Condominium / Townhouse	64	32	96	**x 1.42** →	91	45	136

Land Use	In (vph)	Out (vph)	Total (vph)	Person Trip Factor	In (pph)	Out (pph)	Total (pph)
Build-out							
AM Peak							
Condominium / Townhouse (East of Greenbank)	21	101	122	x 1.42 →	30	143	173
Condominium / Townhouse (West of Greenbank)	25	124	149		36	176	212
				Total	**66**	**319**	**385**
PM Peak							
Condominium / Townhouse (East of Greenbank)	97	48	145	x 1.42 →	138	68	206
Condominium / Townhouse (West of Greenbank)	119	59	178		169	84	253
				Total	**307**	**152**	**459**

The number of car trips that the site will generate has been estimated by categorizing the person trips by modal share. The modal shares are based on observed percentages in the *2011 TRANS O-D Survey Report* that are specific to the region referred to as the South Nepean.

The modal share values applied to the trips generated by the proposed residential development are based on all observed trips within the South Nepean region, including those with an origin or destination beyond that area.

A full breakdown of the projected person trips by modal share and arrival/departure is shown in the following table.

Table 3: Site-Generated Person Trips by Modal Share

Travel Mode	Modal Share	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Phase One							
Phase One Person Trips		*20*	*96*	*116*	*91*	*45*	*136*
Auto Driver	**50%**	**10**	**48**	**58**	**46**	**22**	**68**
Auto Passenger	15%	3	14	17	13	7	20
Transit	25%	5	24	29	23	11	34
Non-Motorized	10%	2	10	12	9	5	14
Build-out							
East of Greenbank Person Trips		*30*	*143*	*173*	*138*	*68*	*206*
Auto Driver	**50%**	**15**	**72**	**87**	**69**	**34**	**103**
Auto Passenger	15%	5	21	26	21	10	31
Transit	25%	7	36	43	34	17	51
Non-Motorized	10%	3	14	17	14	7	21

Travel Mode	Modal Share	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
West of Greenbank Person Trips		*36*	*176*	*212*	*169*	*84*	*253*
Auto Driver	**50%**	**18**	**88**	**106**	**85**	**42**	**127**
Auto Passenger	15%	6	26	32	25	13	38
Transit	25%	9	44	53	42	21	63
Non-Motorized	10%	3	18	21	17	8	25

Based on the above calculations, the multi-modal trip generation characteristics of the proposed development at build-out can be summarized as follows:

- The proposed development is expected to generate a total of **193** and **230** vehicle trips in the weekday AM and PM peak hours respectively;
- The proposed development is expected to generate a total of **58** and **69** auto passenger trips in the weekday AM and PM peak hours respectively;
- The proposed development is expected to generate a total of **96** and **114** transit trips in the weekday AM and PM peak hours respectively;
- The proposed development is expected to generate a total of **38** and **46** non-motorized trips during the weekday AM and PM peak hours respectively.

3.6 Trip Distribution

The projected distribution of vehicular trips generated by the Burnett lands has been derived with appropriate consideration given to several key factors, including:

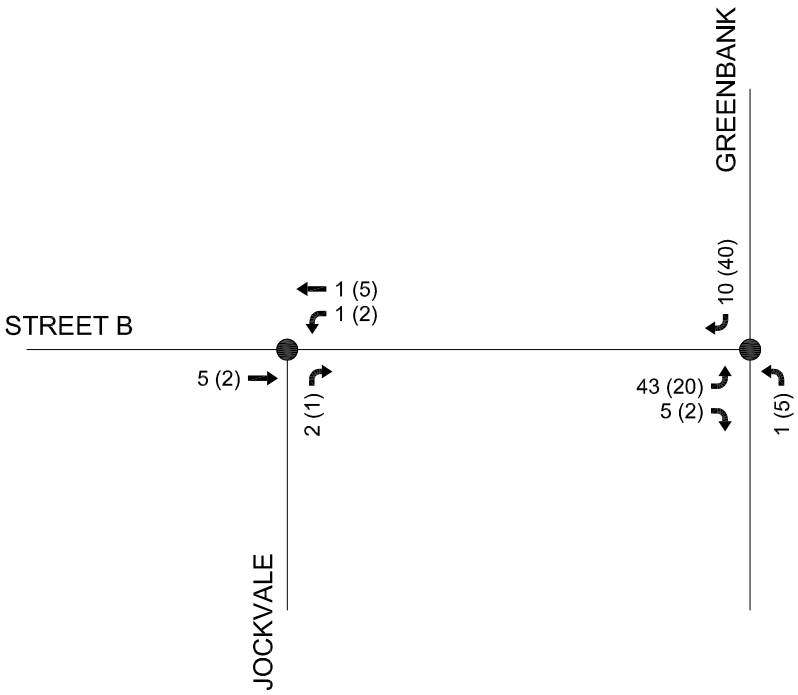
- the size and nature of the proposed development;
- projected traffic patterns;
- the location of the site accesses with respect to the adjacent roadway system; and
- the principles of logical trip routing.

The distribution of all trips generated by the Burnett lands during the weekday AM and PM peak hours can be summarized as follows:

- 85% to/from the north via Greenbank Road;
- 10% to/from the south via Greenbank Road;
- 5% to/from the west via Jockvale Road/Strandherd Drive.

Phase One is anticipated to be built-out prior to the Greenbank Road realignment and will be accessed only through the Greenbank Road/Street B intersection. Traffic volumes generated by Phase One of the Burnett lands are shown in **Figure 12**. Total traffic volumes for the 2018 Phase One development have been calculated by adding the Phase One site generated traffic volumes to the 2018 background traffic volumes. Total traffic volumes for the 2018 Phase One build-out condition are shown in **Figure 13**.

The assignment of all trips generated by the Burnett lands to the proposed access driveways under the full build-out condition can be summarized as follows:



LEGEND

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

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3370 GREENBANK ROAD BURNETT LANDS

SITE GENERATED TRAFFIC VOLUMES - PHASE ONE

DEC 2016 111117 FIGURE 12

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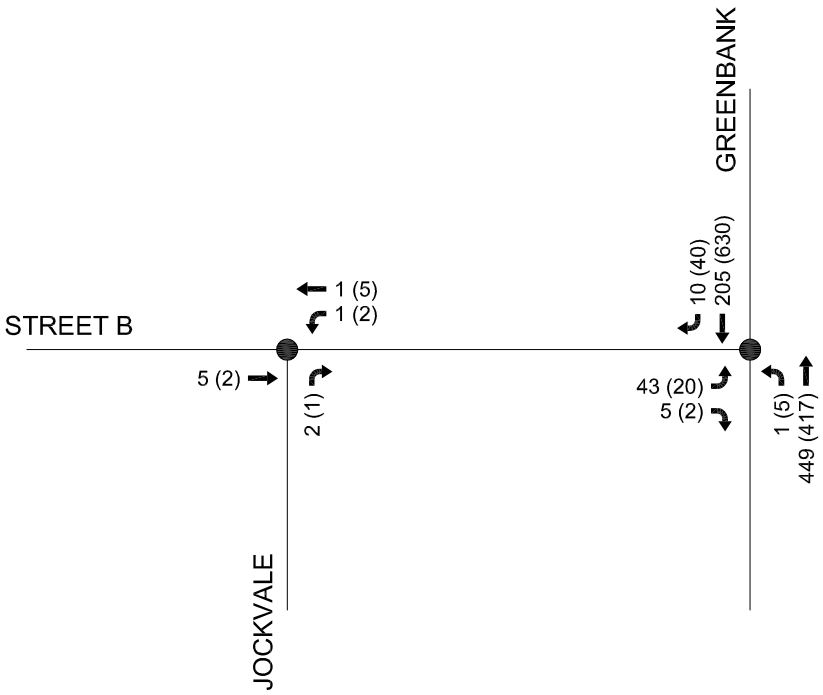

LEGEND

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

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3370 GREENBANK ROAD BURNETT LANDS

2018 TOTALTRAFFIC VOLUMES - PHASE ONE

DEC 2016 111117 FIGURE 13

M:\2011\111117\CAD\Design\Figures\Traffic\VOLUME FIGURES\111117 - VOLUME FIGURES.dwg, 2018 TOTAL, Nov 09, 2016 - 12:55pm, bbyvelds

SHT8X11.DWG - 216mmX278mm

North via Greenbank
- 50% utilize Jockvale Road access on Greenbank Road
- 50% utilize Street B access on Greenbank Road

South via Greenbank
- 75% utilize Jockvale Road access on Greenbank Road
- 25% utilize Street B access on Greenbank Road

All trips to/from the west via Jockvale Road/Strandherd Drive will arrive/depart the subject lands to the north using Jockvale Road to connect to Strandherd Drive.

Traffic volumes generated by the Burnett lands at full build-out are shown in **Figure 14**. Total traffic volumes for the 2020 build-out and 2025 horizon years are shown in **Figures 15** and **16**.

4.0 SCREENLINE ANALYSIS

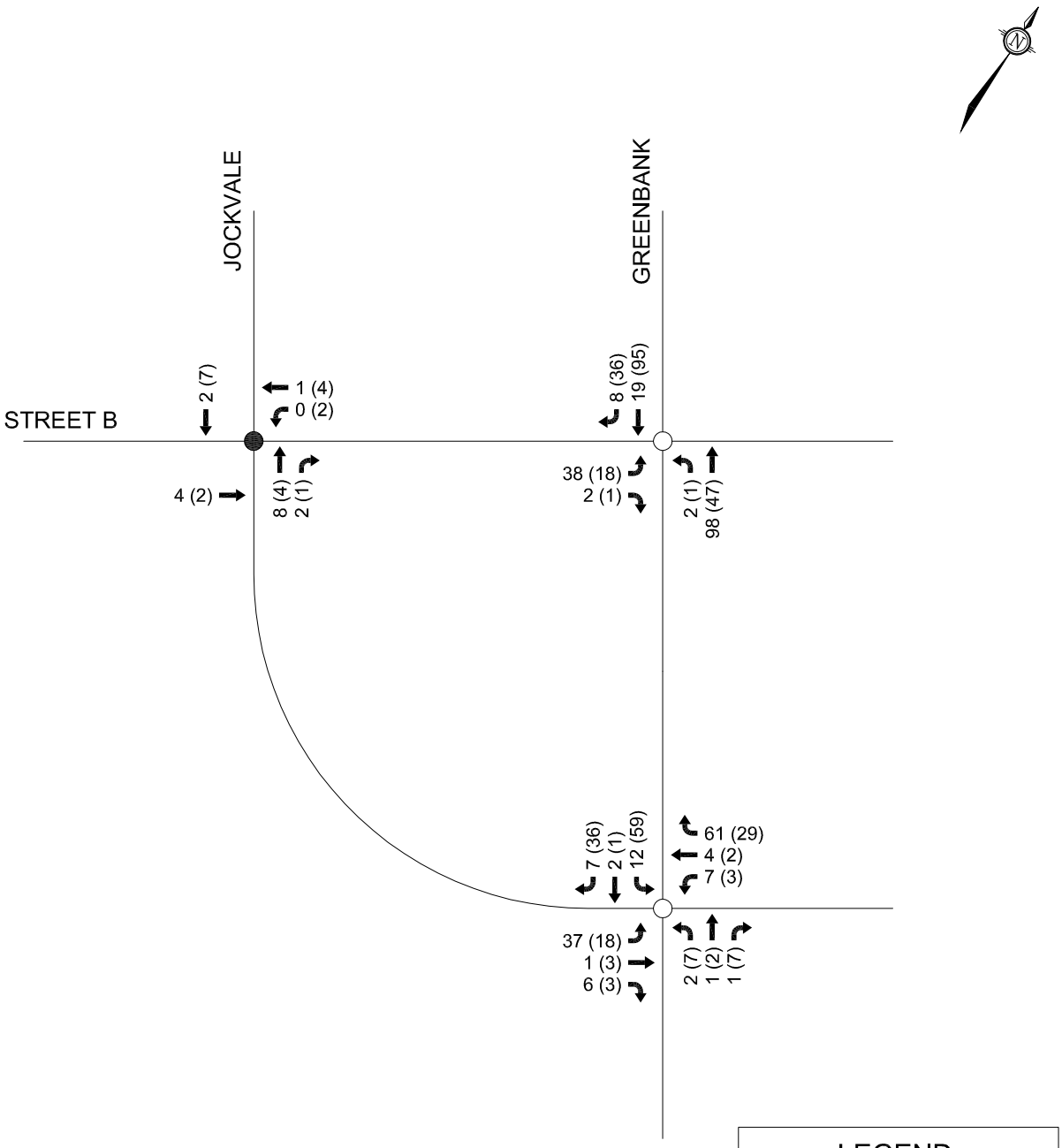
The City of Ottawa's 2006 *Transportation Impact Assessment (TIA) Guidelines* define screenline analysis as a comparison of forecasted demands and lane capacities on the major road network connecting a site to the area transportation network. Typical lane capacities are established based on roadway classification and general characteristics (i.e. suburban with limited access, urban with on-street parking, etc.). The typical lane capacities used in this study are based on the City's guidelines for the TRANS Long-Range Transportation Model. The TIA guidelines require the identification of mitigation measures in the form of an additional lane capacity where the volume to capacity ratio exceeds 0.9, except in the urban core where 1.0 is acceptable.

The screenline analysis should consider new capacity that is planned to occur within the horizon of the development. For the purposes of this report, the Greenbank Road realignment is assumed to be in place prior to build-out of the subject lands.

The screenline analysis presented in this report evaluates the lane capacity along Greenbank Road north of the subject lands. The majority of traffic generated by the subject lands is anticipated to use Greenbank Road as a means of access to the subdivision. The projected capacity along Greenbank Road is approximately 1,000 vehicles per hour per lane, which is the typical lane capacity for an urban arterial roadway with frequent signals, at grade intersections and a raised median.

4.1 Future Background Traffic

A screenline analysis has been completed for the projected 2020 and 2025 background plus other development traffic conditions. The projected background AM and PM peak hour traffic volumes and lane capacities are summarized in the following table for the proposed screenline.



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3370 GREENBANK ROAD
BURNETT LANDS

SITE GENERATED TRAFFIC VOLUMES - BUILD-OUT

DEC 2016 111117 FIGURE 14

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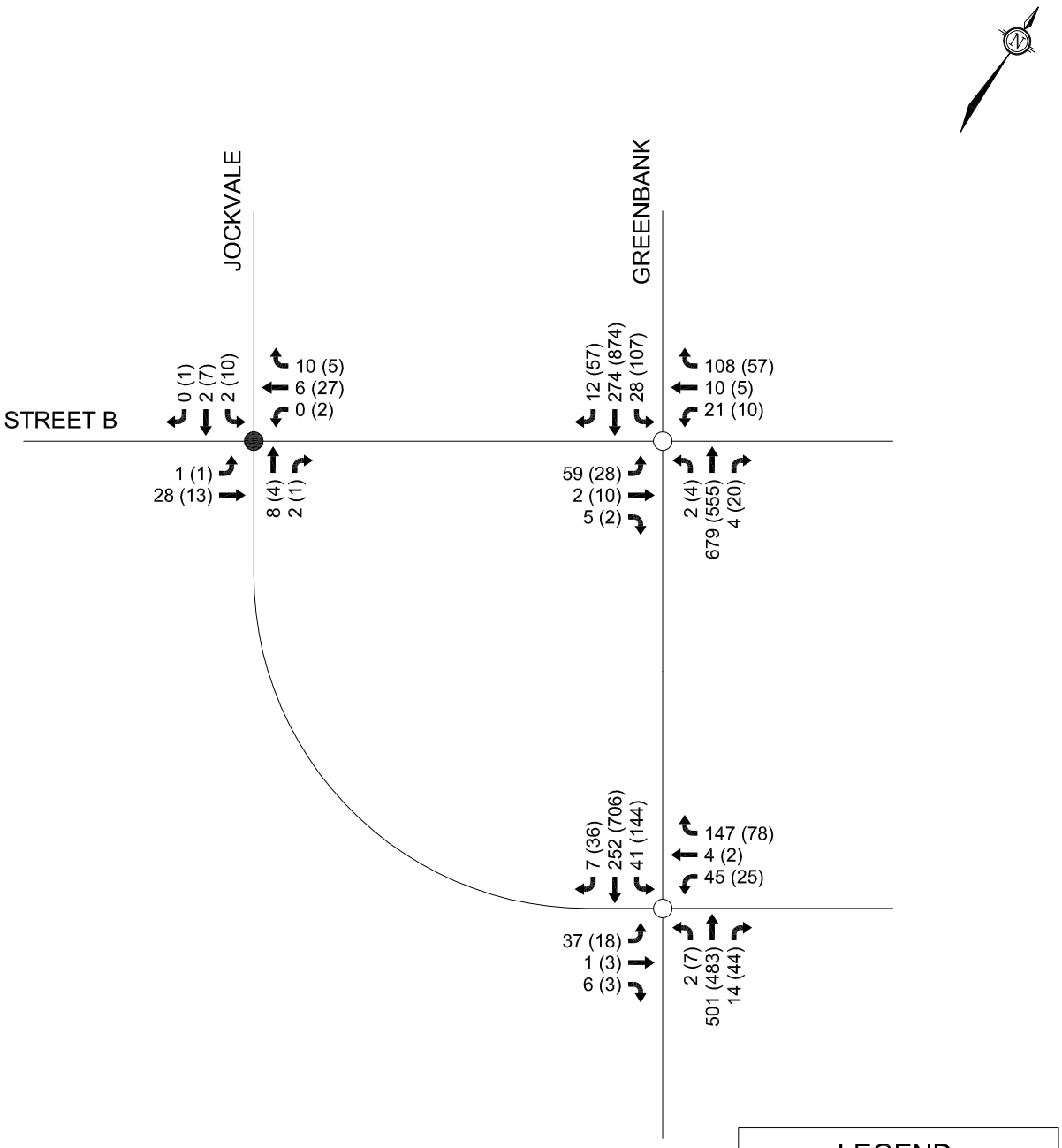

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2020 TOTAL TRAFFIC VOLUMES

DEC 2016 111117 FIGURE 15

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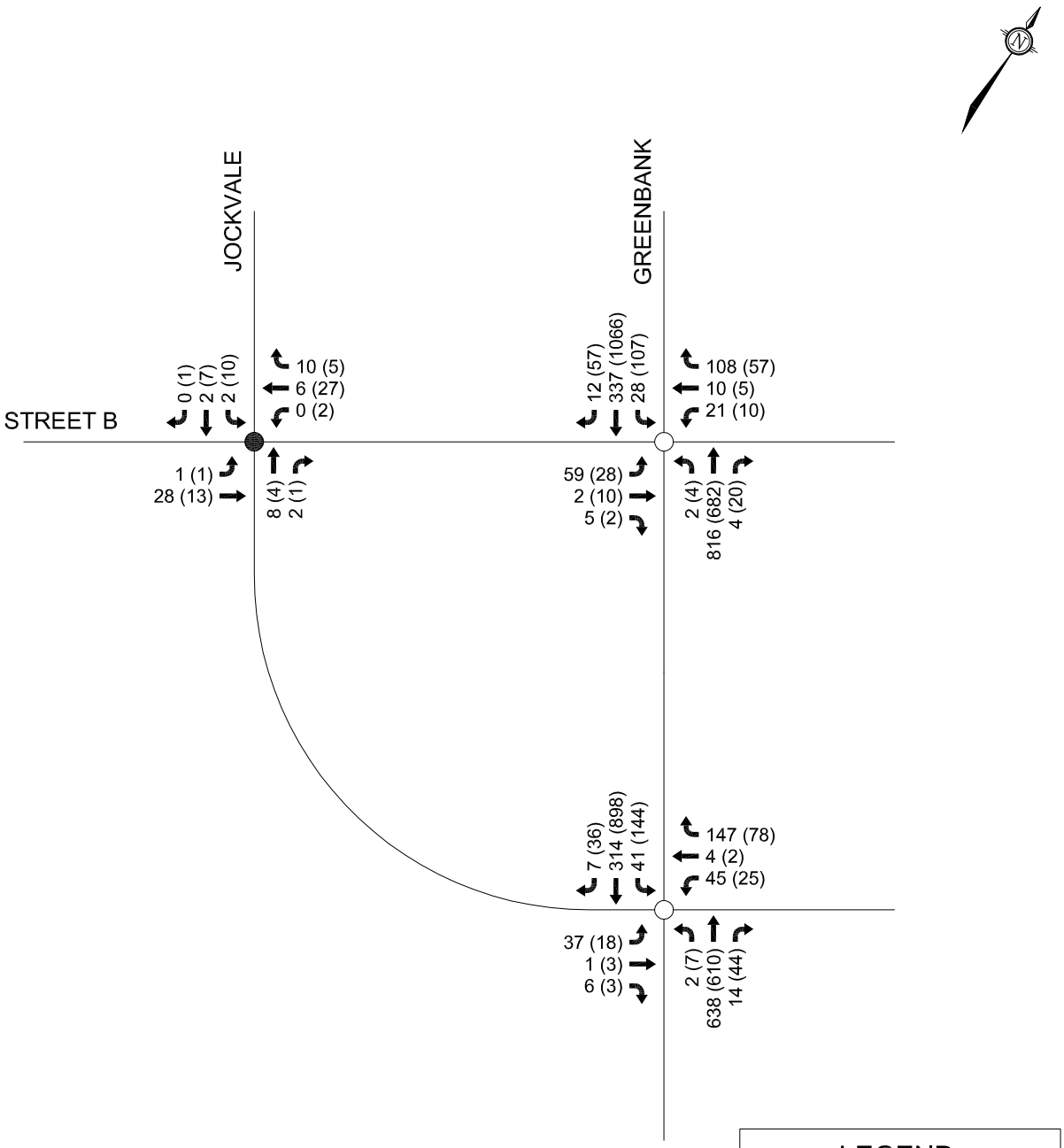

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2025 TOTAL TRAFFIC VOLUMES

DEC 2016 111117 FIGURE 16

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Table 4: Screenline Analysis – 2020 and 2025 Background Traffic

Road Segment	AM Peak			PM Peak		
	Volume (vph)	Capacity (vph)	v/c	Volume (vph)	Capacity (vph)	v/c
2020 Background Plus Other Development Traffic						
Greenbank Road						
Northbound	710	2,000	0.36	575	2,000	0.29
Southbound	287	2,000	0.14	907	2,000	0.45
2025 Background Plus Other Development Traffic						
Greenbank Road						
Northbound	847	2,000	0.42	702	2,000	0.35
Southbound	350	2,000	0.18	1,099	2,000	0.55

Greenbank Road north of the Burnett lands is projected to have maximum peak hour v/c ratios of 0.45 and 0.55 under the 2020 and 2025 background plus other development traffic conditions. This screenline analysis suggests the future Greenbank Road widening will have capacity to accommodate additional traffic based on the background traffic projections.

4.2 Total Future Traffic

A screenline analysis has been completed for the projected 2020 and 2025 total traffic conditions. The projected total AM and PM peak hour traffic volumes and lane capacities are summarized in the following table for the proposed screenline.

Table 5: Screenline Analysis – 2020 and 2025 Total Traffic

Road Segment	AM Peak			PM Peak		
	Volume (vph)	Capacity (vph)	v/c	Volume (vph)	Capacity (vph)	v/c
2020 Background Plus Other Development Traffic						
Greenbank Road						
Northbound	846	2,000	0.42	640	2,000	0.32
Southbound	314	2,000	0.16	1,038	2,000	0.52
2025 Background Plus Other Development Traffic						
Greenbank Road						
Northbound	983	2,000	0.49	767	2,000	0.38
Southbound	377	2,000	0.19	1,230	2,000	0.61

With the addition of site generated traffic, Greenbank Road north of the Burnett lands is projected to have maximum peak hour v/c ratios of 0.52 and 0.61 under the 2020 and 2025 total traffic conditions. This sceenline analysis suggests the future Greenbank Road widening will have capacity to accommodate the projected development traffic based on total traffic projections.

Additional analysis is provided in the following section to confirm if the study area intersections will have sufficient capacity to accommodate the projected total traffic volumes.

5.0 INTERSECTION ANALYSIS

Under the 2018 Phase One condition, all traffic generated by the Burnett lands will access the site through the Greenbank Road/Street B intersection. This intersection is anticipated to operate under side street stop control during this interim condition.

For the build-out condition, all intersections within the study area have been modeled based on the configuration proposed in the Greenbank Road realignment drawings received from the City of Ottawa, as shown on **Figure 2**. The Greenbank Road/Street B and Greenbank Road/Jockvale Road intersections will operate under traffic signal control, while the Jockvale Road/Street B intersection will operate under side street stop control. The lane configurations at the study area intersections are described as follows:

Greenbank Road/Street B

- Northbound/Southbound – One left turn lane, one through lane and one shared through/right turn lane
- Eastbound/Westbound – One left turn lane and one shared through/right turn lane

Greenbank Road/Jockvale Road

- Northbound/Southbound – One left turn lane, one through lane and one shared through/right turn lane
- Eastbound/Westbound – One shared left/through/right turn lane

Jockvale Road/Street B

- All approaches will consist of one shared left/through/right turn lane.

The signal timings at the Greenbank Road/Street B and Greenbank Road/Jockvale Road intersections have been developed using the methodology outlined in the Ontario Traffic Manual (OTM) *Book 12 – Traffic Signals*. The northbound and southbound left turn movements have been set to fully protected to account for the implementation of the future median BRT system.

5.1 2018 Total Traffic (Phase One)

Intersection capacity analysis has been completed for the 2018 total traffic conditions, assuming the Greenbank Road realignment has not been constructed. As identified in **Section 5.0** above, the Greenbank Road/Street B intersection will operate under side street stop control during this interim condition. The eastbound approach to this intersection will operate under stop control, maintaining free flow conditions along Greenbank Road. Single lane approaches are assumed for the analysis. A review of turn lane requirements is provided later in this section.

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 D**.

Table 6: Intersection Analysis – 2018 Phase One Total Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	Movement	max. v/c or delay	LOS	Movement
Greenbank Road / Street B[1]	16 sec	C	EB	24 sec	D	EB
Jockvale Road / Street B[1]	8 sec	A	NB	8 sec	A	NB

1. Unsignalized Intersection

All movements at the study area intersections are anticipated to operate at a LOS D or better under the 2018 Phase One total traffic condition.

A review of turn lane requirements 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. A total of 40 vehicles or approximately 6% of the approaching volumes are anticipated to make the southbound right turn movement at Street B in the PM peak hour. Based on the foregoing, a southbound right turn lane is not required at the Greenbank Road/Street B intersection following build-out of Phase One of the Burnett lands.

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 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 E**. A functional design of the northbound left turn lane along the existing Greenbank Road at Street B is shown in **Figure 17**.

5.2 2020 Background Traffic

Intersection capacity analysis has been completed for the 2020 background plus other development traffic conditions. The lane configurations at the study area intersections reflect the full build-out of the Greenbank Road realignment as described in the introduction of **Section 5.0**.

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 D**.

Table 7: Intersection Analysis – 2020 Background Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	Movement	max. v/c or delay	LOS	Movement
Greenbank Road / Street B[1]	0.30	A	NBT/R	0.49	A	SBL
Greenbank Road / Jockvale Road[1]	0.32	A	WB	0.41	A	SBL
Jockvale Road / Street B[2]	9 sec	A	SB	9 sec	A	SB

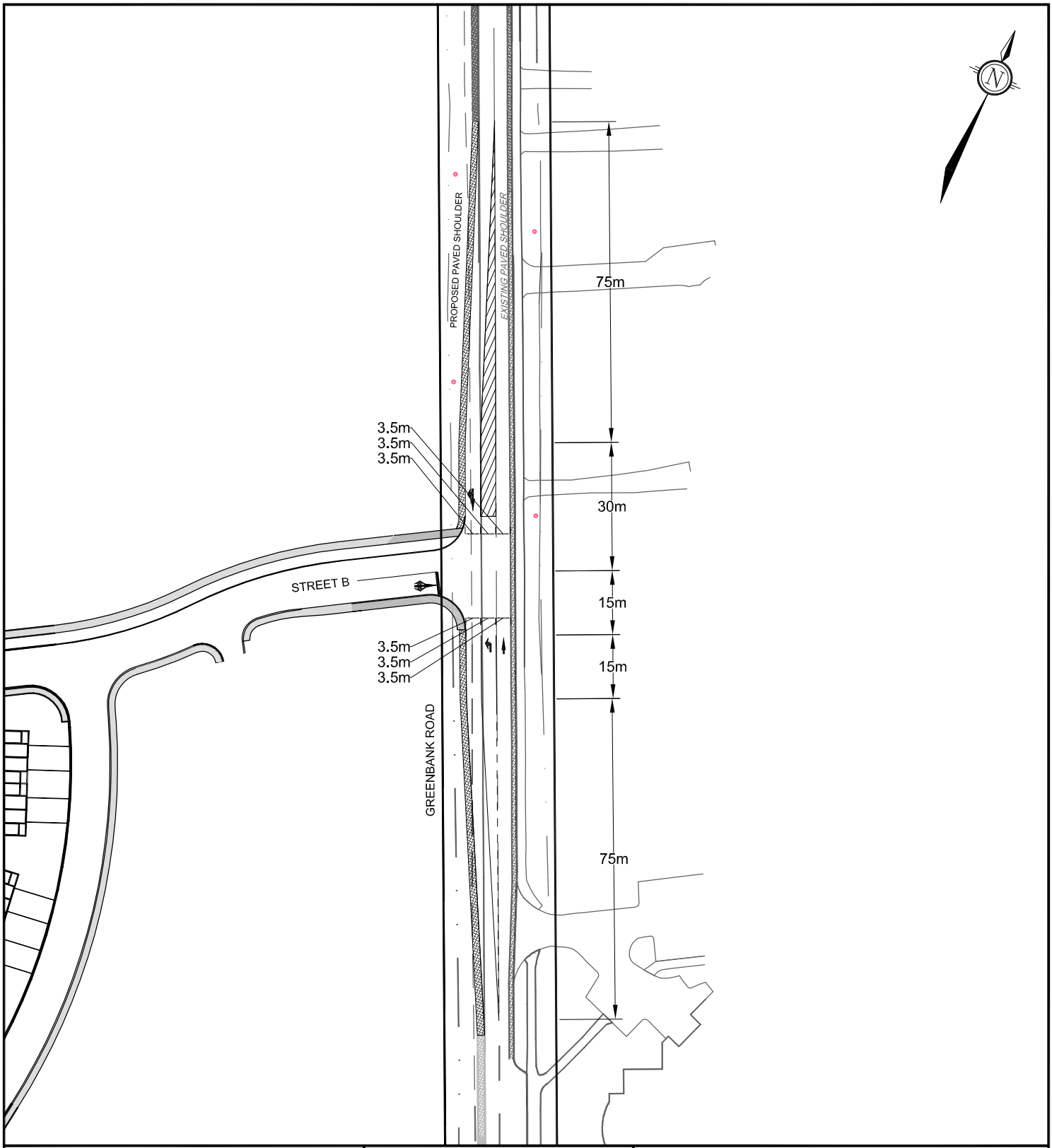
1. Signalized Intersection
2. Unsignalized Intersection

All movements at the study area intersections are anticipated to operate at a LOS A under the 2020 background traffic condition.

5.3 2025 Background Traffic

Intersection capacity analysis has been completed for the 2025 background plus other development traffic conditions. The lane configurations at the study area intersections reflect the Greenbank Road realignment as described in the introduction of **Section 5.0**.

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 D**.



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BURNETT LANDS
3370 GREENBANK ROAD

NORTHBOUND LEFT TURN LANE

SCALE 1 : 1250 (0, 12.5, 25, 37.5, 50)

DATE DEC 2016 | JOB 111117 | FIGURE FIGURE 17

SHT8X11.DWG - 216mmx279mm

M:\2011\111117\CAD\Design\Figures\Traffic\FunctionalLeftTurn.dwg, ROADLAYOUT, Dec 07, 2016 - 2:24pm, mliniton

Table 8: Intersection Analysis – 2025 Background Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	Movement	max. v/c or delay	LOS	Movement
Greenbank Road / Street B[1]	0.36	A	NBT/R	0.49	A	SBL
Greenbank Road / Jockvale Road[1]	0.38	A	WB	0.41	A	SBL
Jockvale Road / Street B[2]	9 sec	A	SB	9 sec	A	SB

1. Signalized Intersection
2. Unsignalized Intersection

All movements at the study area intersections are anticipated to operate at a LOS A under the 2025 background traffic condition.

5.4 2020 Total Traffic

Intersection capacity analysis has been completed for the 2020 total traffic conditions. The lane configurations at the study area intersections reflect the Greenbank Road realignment as described in the introduction of **Section 5.0**.

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 D**.

Table 9: Intersection Analysis – 2020 Total Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	Movement	max. v/c or delay	LOS	Movement
Greenbank Road / Street B[1]	0.35	A	NBT/R	0.48	A	SBL
Greenbank Road / Jockvale Road[1]	0.43	A	WB	0.55	A	SBL
Jockvale Road / Street B[2]	9 sec	A	NB	9 sec	A	NB

1. Signalized Intersection
2. Unsignalized Intersection

All movements at the study area intersections are anticipated to operate at a LOS A or better under the 2020 total traffic condition.

5.5 2025 Total Traffic

Intersection capacity analysis has been completed for the 2025 total traffic conditions. The lane configurations at the study area intersections reflect the Greenbank Road realignment as described in the introduction of **Section 5.0**.

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 D**.

Table 10: Intersection Analysis – 2025 Total Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	Movement	max. v/c or delay	LOS	Movement
Greenbank Road / Street B[1]	0.42	A	NBT/R	0.48	A	SBL
Greenbank Road / Jockvale Road[1]	0.44	A	NBT/R	0.55	A	SBL
Jockvale Road / Street B[2]	9 sec	A	NB	9 sec	A	NB

1. Signalized Intersection
2. Unsignalized Intersection

All movements at the study area intersections are anticipated to operate at a LOS A or better under the 2025 total traffic condition.

6.0 PROVISIONS FOR NON-AUTO MODES

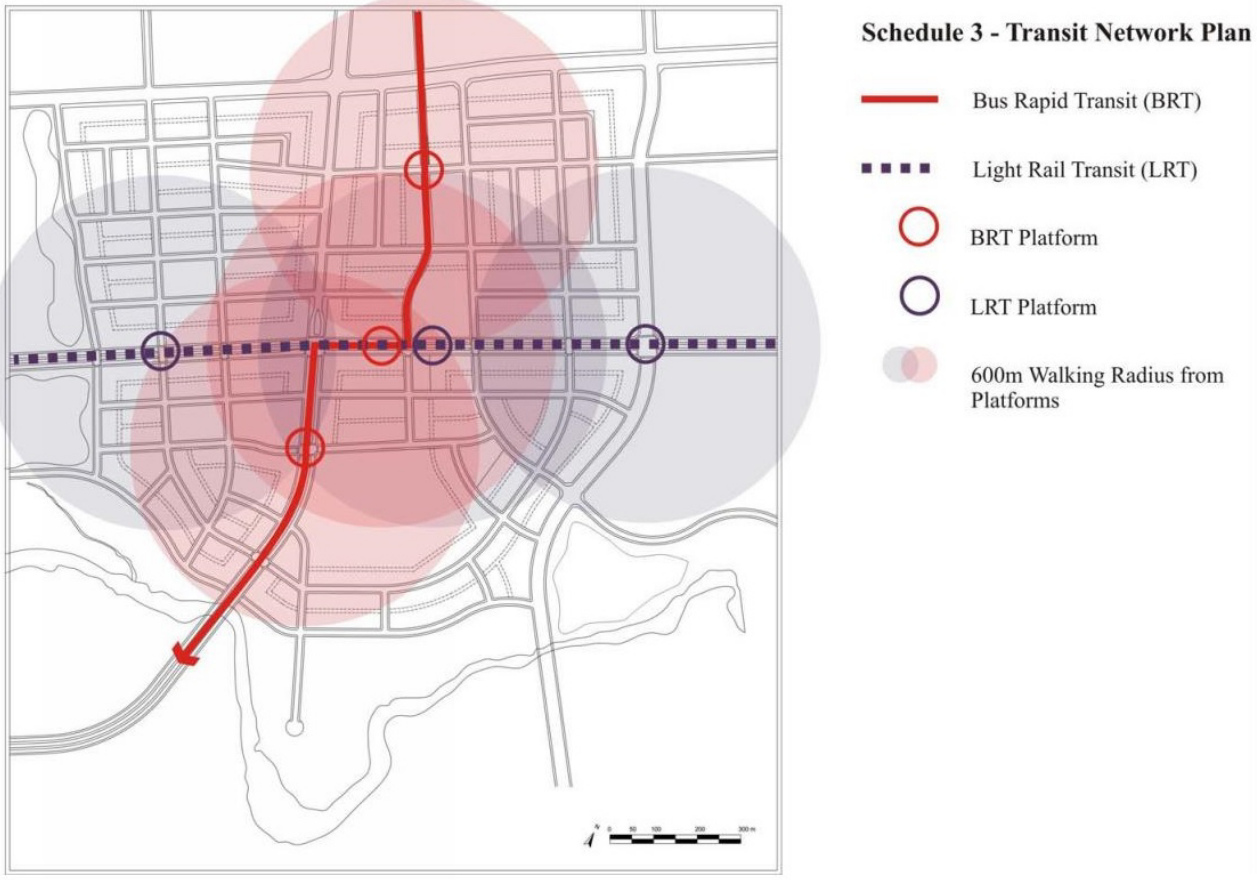
The layout and design of the internal sidewalks are shown in **Figure 2**. Sidewalks will be provided on both sides of Jockvale Road and Street B. Sidewalks will be provided on one side of Street A, Street D, Street F and Half Moon Bay. The proposed pedestrian network provides a linkage to open space/parkland and neighbouring developments.

Cyclists will be accommodated on-road through the provision of standard roadway cross-sections in accordance with OTM *Book 18 – Cycling Facilities*. Cyclists will also be accommodated along the proposed multi-use pathway travelling along the open corridor south of Half Moon Bay. The multi-use pathway will travel east west along the southern limits of the subject site, crossing under the future Greenbank Road. The multi-use pathway will be continued further north along the west side of the Kennedy Burnett Pond to Strandherd Drive through other development applications to the north. The proposed multi-use pathway will also provide a connection to the future bike lanes along the realigned Greenbank Road via Half Moon Bay and Jockvale Road. The proposed multi-use pathway is shown in **Figure 2**.

The SNTC CDP identifies a future BRT platform at the Greenbank Road/Street B intersection. This BRT platform is located within a 400m walking distance for a majority of the residential units within the proposed subdivision.

Figure 18 shows the proposed transit network identified in the SNTC CDP.

Figure 18: Transit Network Plan (South Nepean Town Centre CDP)



7.0 ON-SITE DESIGN

7.1 Proposed Access

At build-out the Burnett lands will be served by two new all movement accesses on Greenbank Road, as well as the extension of Jockvale Road through the subject lands. The two intersections along Greenbank Road (Street B and Jockvale Road) will be signalized.

Left turn lane storage requirements at the signalized intersections have been developed using the Synchro analysis results and equations identified in the 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 95th percentile queue length identified in the Synchro analysis.

Greenbank Road/Street B Left Turn Lane Storage

- Northbound – 15m
- Southbound – 45m
- Eastbound – 20m
- Westbound – 15m

Greenbank Road/Jockvale Road Left Turn Lane Storage

- Northbound – 15m
- Southbound – 50m

It is noteworthy that the functional roadway design for the Greenbank Road realignment suggests eastbound and westbound left turn lanes at the Greenbank Road/Street B intersection, and one lane eastbound and westbound approaches to the Greenbank Road/Jockvale Road intersection. The traffic volumes projected in this CTS suggest the two intersections will carry similar traffic volumes. The Greenbank Road/Street B intersection is anticipated to operate under acceptable conditions if single lane eastbound and westbound approaches are provided.

7.2 Internal Roadways

The design of all roadways within the Burnett lands will be generally consistent with the cross-sections identified in the SNTC CDP. The following table identifies the classification and right-of-way (ROW) for each roadway within the subject lands.

Table 11: Internal Roadway Classification

Street	Classification	ROW
Jockvale Road	Collector	22m
Street B	Collector/Local	20m
Street A	Local	20m
Street D		
Street F		
Half Moon Bay		
Street E	Residential Rear Lane	8.5m
Street G		
Street H		

TAC guidelines suggest the minimum spacing between adjacent intersections along a collector road to be 60m. The proposed intersection spacing along Jockvale Road between Street B and Street D is approximately 45m. Although the two adjacent intersections along Jockvale Road do not meet minimum TAC standards, the location of Street D is consistent with the road network identified in the SNTC CDP.

Street G, Street H and Street E are classified as residential rear lanes and will act as driveway connections for the residential developments along their length. Street G, Street H and Street E will be signed one-way northbound. Since Street G, Street H and Street E will act as driveway connections, the spacing requirements should adhere to the minimum requirements identified in the City of Ottawa's *Private Approach By-law*. The City's *Private Approach By-law* identifies a minimum spacing of 18m between the private approach (Street G/Street H) and the nearest intersecting arterial roadway street line (Greenbank Road) for residential parking areas containing 20-99 parking spaces. Street G and Street H are located approximately 30m from the Greenbank Road ROW limit, exceeding the minimum requirements identified in the City of Ottawa's *Private Approach By-law*.

It is noteworthy that the proposed road network within the Burnett lands is generally consistent with the road network identified in the SNTC CDP. The location of the residential rear lanes in the vicinity of the Greenbank Road realignment are consistent with the spacing proposed in the CDP.

The SNTC CDP identifies that all streets will have sidewalks on both sides. The pedestrian network within the Burnett lands deviates from the CDP policy as it only provides sidewalks on both sides of the collector roadways (Jockvale Road and Street B). All local streets within the subject lands will provide sidewalks on one side of the roadway. Although the proposed pedestrian

network deviates from the transportation policy identified in the CDP, the pedestrian network will provide a linkage to open space/parkland and neighbouring developments.

8.0 COMMUNITY IMPACTS

The proposed street layout and residential developments conform to the initiatives identified in the SNTC CDP. The Burnett lands are located adjacent to an arterial roadway and are not anticipated to have any measureable impact on the future residential communities in the site's vicinity.

On-site parking for the proposed condominium buildings will be provided in accordance with the minimum requirements of the City of Ottawa's *Zoning By-law*. Parking infiltration onto adjacent roadways is not anticipated. Details of the condo buildings will be assessed further as part of future Site Plan Control applications.

9.0 TRANSPORTATION DEMAND MANAGEMENT

The City of Ottawa has developed a comprehensive Transportation Demand Management (TDM) strategy as part of its efforts to reduce automobile dependency. TDM measures can reduce transportation infrastructure requirements by encouraging people to change their travel mode, timing or destination.

The proposed development conforms to the City's TDM initiatives by providing easy access to the local pedestrian, bicycle and transit systems as outlined in **Section 6.0**. Planned cycling routes are along the MUP under the future Greenbank Road, along the open corridor south of Half Moon Bay and along the west side of the Kennedy-Burnett pond to Strandherd Drive.

10.0 CONCLUSIONS AND RECOMMENDATIONS

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

Capacity Analysis

- The screenline analysis suggests that Greenbank Road will have capacity to accommodate the projected development traffic based on the 2020 and 2025 background and total traffic projections.

- Based on the Phase One PM peak hour advancing and opposing traffic volumes, a northbound left turn lane with a storage length of 15m is recommended at Street B prior to the reconstruction of Greenbank Road.

- All movements at the study area intersections are anticipated to operate at a LOS D or better under the 2018 Phase One total traffic condition.

- All movements at the study area intersections are anticipated to operate at a LOS A under the 2020 and 2025 background traffic condition.

- All movements at the study area intersections are anticipated to operate at a LOS A or better under the 2020 and 2025 total traffic condition.

Non-Auto Transportation, On-site Design, Community Impacts and TDM

- Sidewalks will be provided on both sides of Jockvale Road and Street B, and on one side of Street A, Street D and Street F. The proposed pedestrian network provides a linkage to open space/parkland and neighbouring developments.

- The roadway design for the Greenbank Road realignment suggests eastbound and westbound left turn lanes at the Greenbank Road/Street B intersection, but only suggests one lane eastbound and westbound approaches to the Greenbank Road/Jockvale Road intersection. The traffic volumes projected in this CTS suggest the two intersections will carry similar traffic volumes. The Greenbank Road/Street B intersection is anticipated to operate under acceptable conditions if single lane eastbound and westbound approaches are provided.

- Cyclists will be accommodated on-road through the provision of standard roadway cross-sections in accordance with OTM *Book 18 – Cycling Facilities*. Cyclists will also be accommodated along the proposed multi-use pathway travelling along the open space south of Half Moon Bay.

- The design of all roadways within the Burnett lands will generally be consistent with the cross-sections identified in the South Nepean Town Centre CDP.

- The proposed intersection spacing along Jockvale Road between Street B and Street D is approximately 45m. Although the two adjacent intersections along Jockvale Road do not meet minimum TAC standards, the location of Street D is consistent with the road network identified in the SNTC CDP.

- The location of the residential rear lanes (Street G and Street H) satisfy the minimum spacing requirement identified in the City's *Private Approach By-law*. The location of the residential rear lanes in the vicinity of the Greenbank Road realignment are also consistent with the spacing proposed in the CDP.

- The pedestrian network within the Burnett lands deviates from the CDP policy as it provides sidewalks on both sides of the collector roadways (Jockvale Road and Street B). All local streets within the subject lands will provide sidewalks on one side of the roadway. Although the proposed pedestrian network deviates from the transportation policy identified in the CDP, the pedestrian network will provide a linkage to open space/parkland and neighbouring developments.

- The Burnett lands are located adjacent to an arterial roadway and are not anticipated to have any measureable impact on the future residential communities in the site's vicinity.

- On-site parking for the proposed condominium buildings will be provided in accordance with the minimum requirements of the City of Ottawa's *Zoning By-law*. Parking infiltration onto adjacent roadways is not anticipated.

- The proposed development conforms to the City's TDM initiatives by providing easy access to the local pedestrian, bicycle and transit systems. Planned cycling routes are along the MUP under the future Greenbank Road, along the open corridor south of Half Moon Bay and along the west side of the Kennedy-Burnett pond to Strandherd Drive.

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Prepared by:

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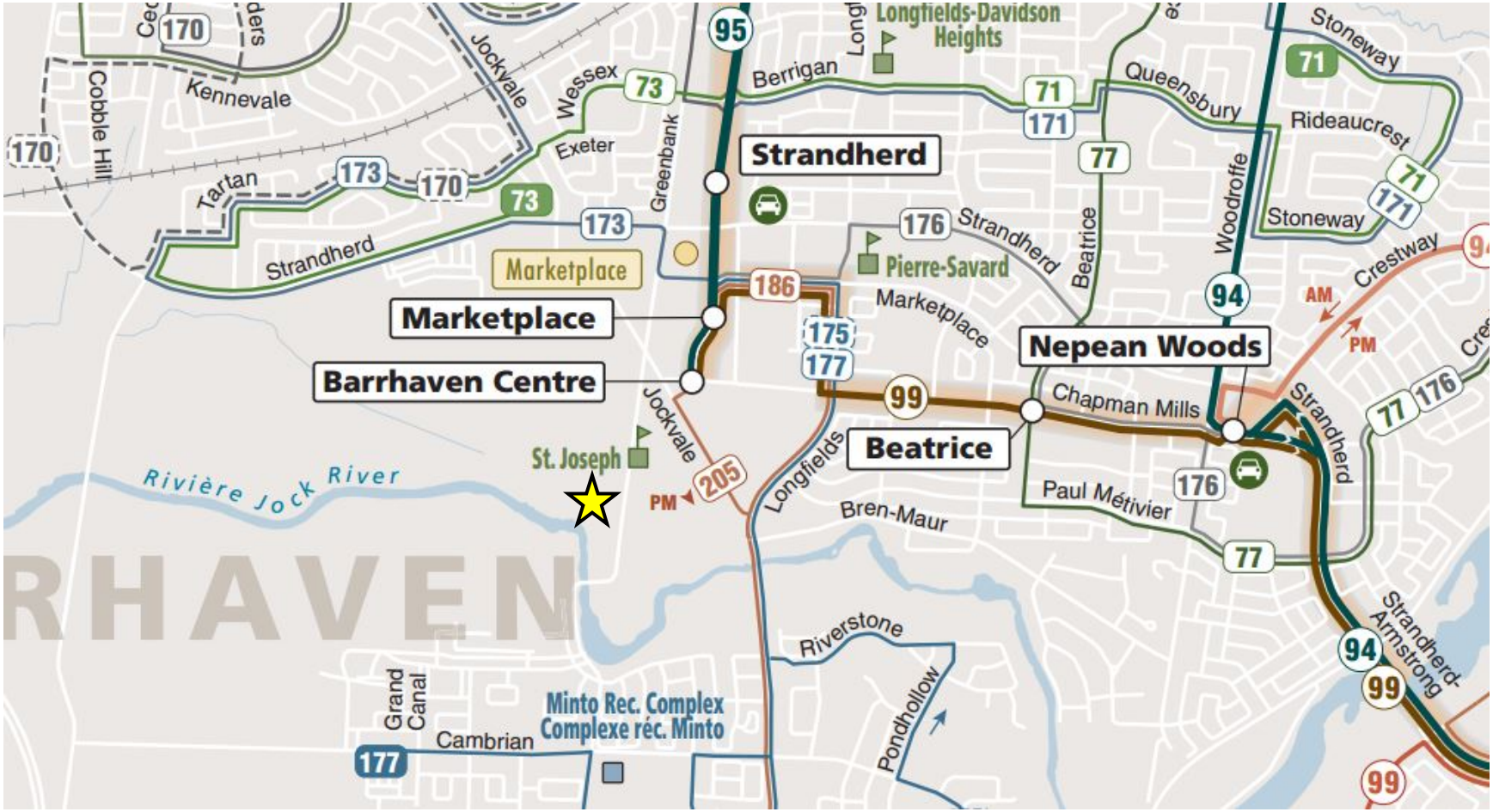
Project Manager

APPENDIX A

OC Transpo System Map



BURNETT LANDS

APPENDIX B

Traffic Count Data

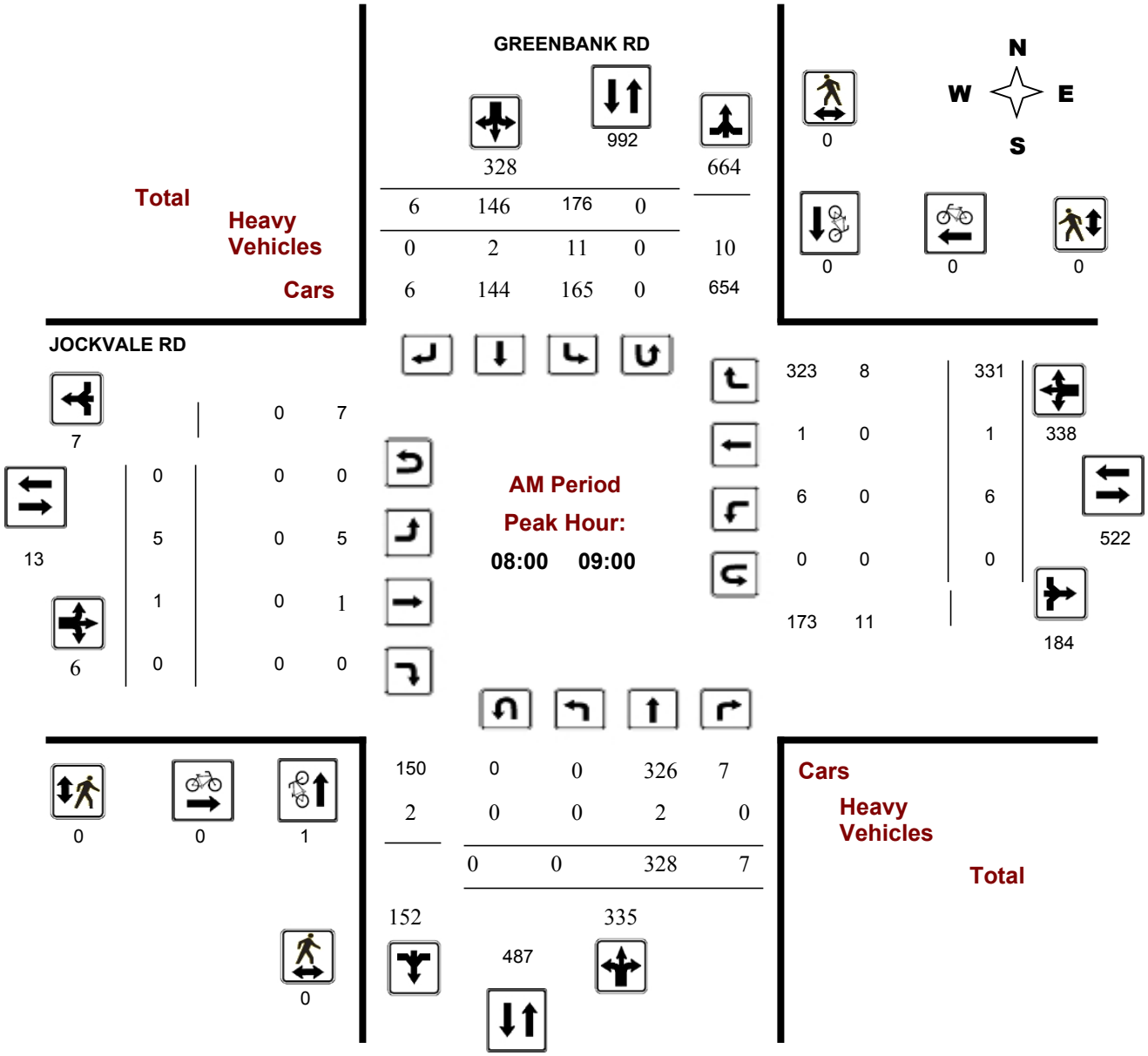
Public Works - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Thursday, August 16, 2012 **WO No:** 35628

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



Comments

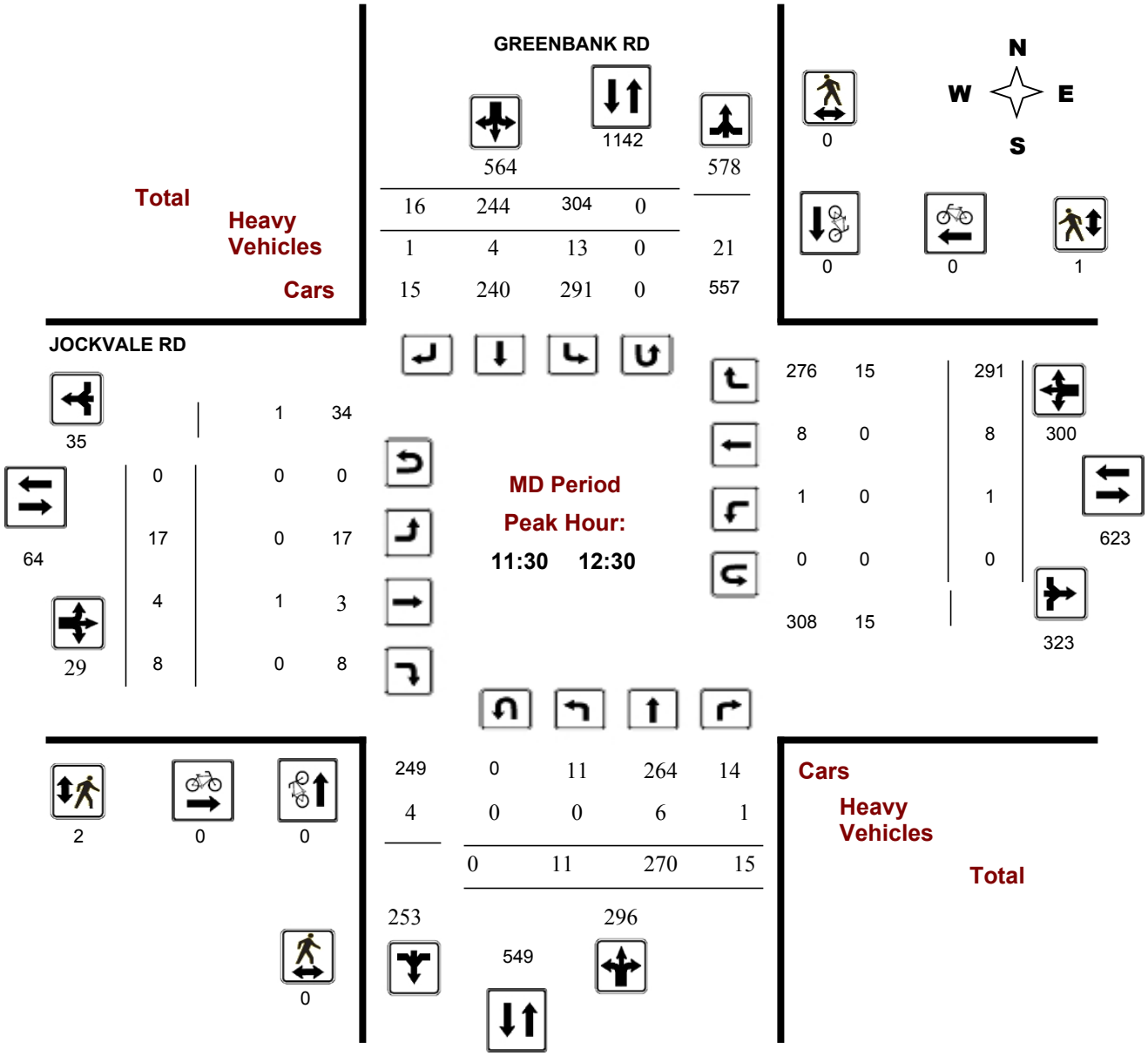
Public Works - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Thursday, August 16, 2012 **WO No:** 35628

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



Comments

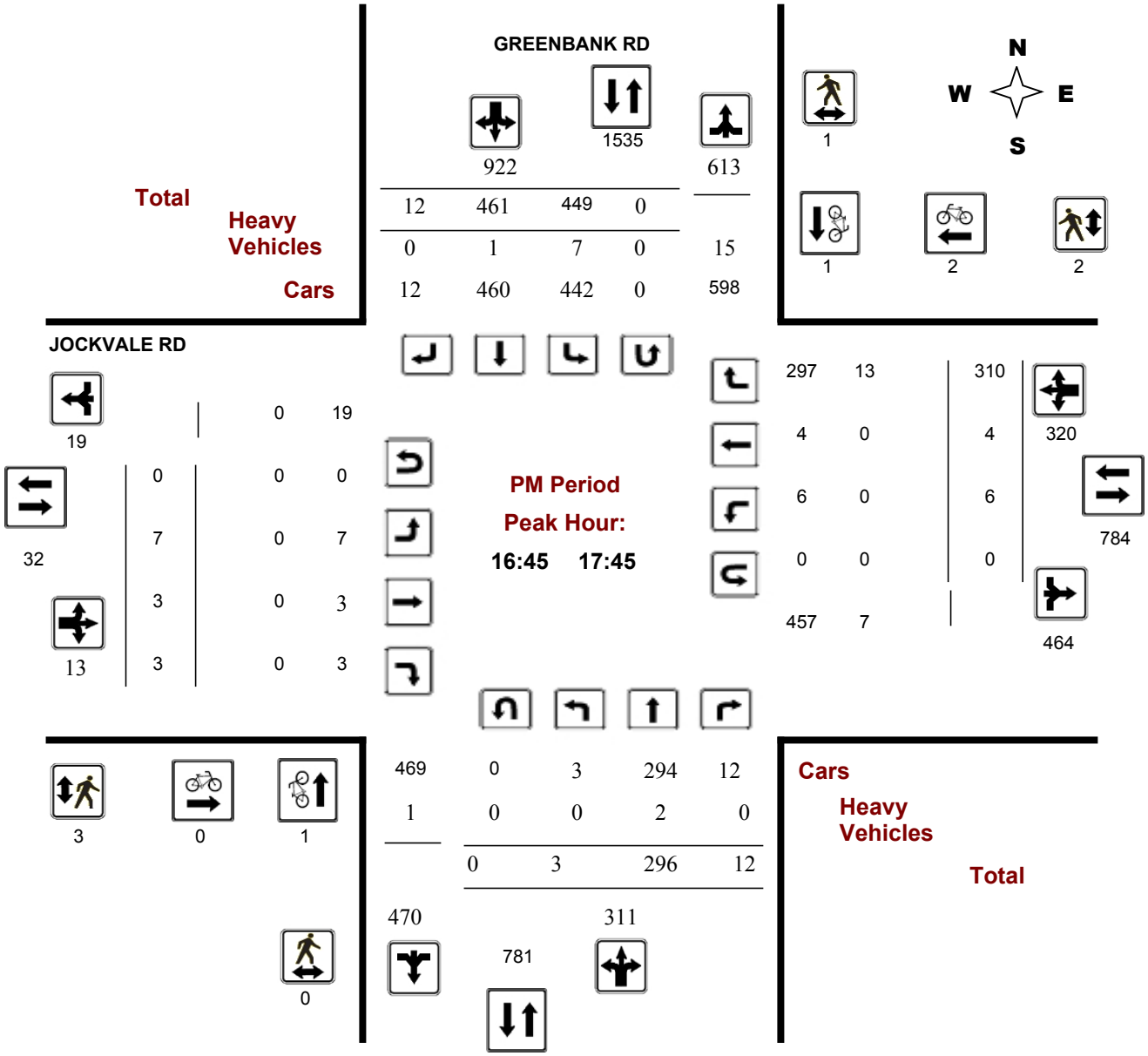
Public Works - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

GREENBANK RD @ JOCKVALE RD

Survey Date: Thursday, August 16, 2012 **WO No:** 35628

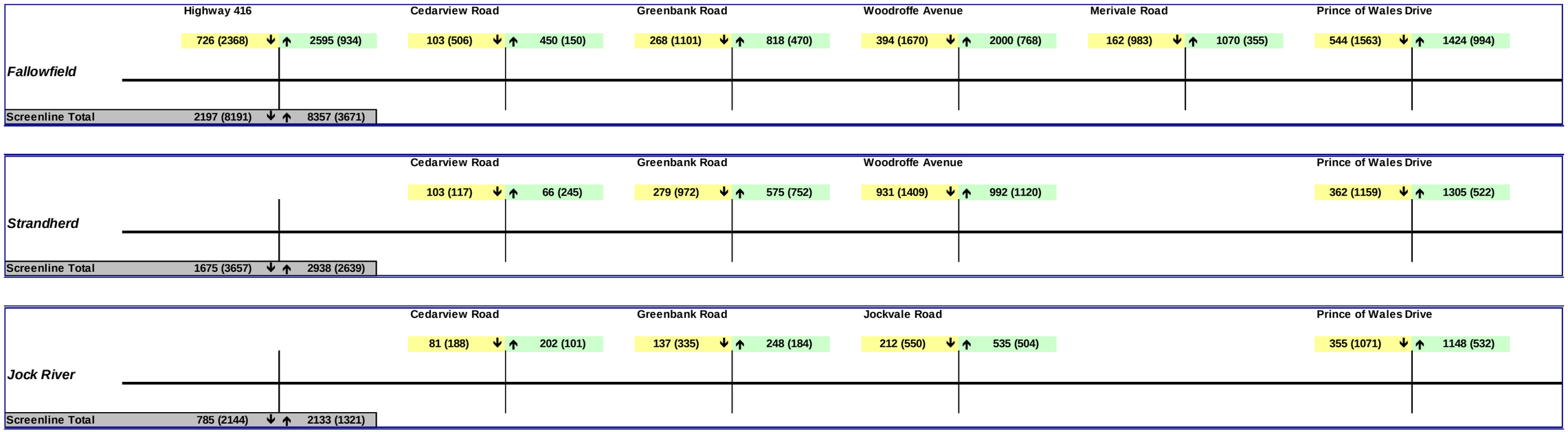
Start Time: 07:00 **Device:** Miovision



APPENDIX C

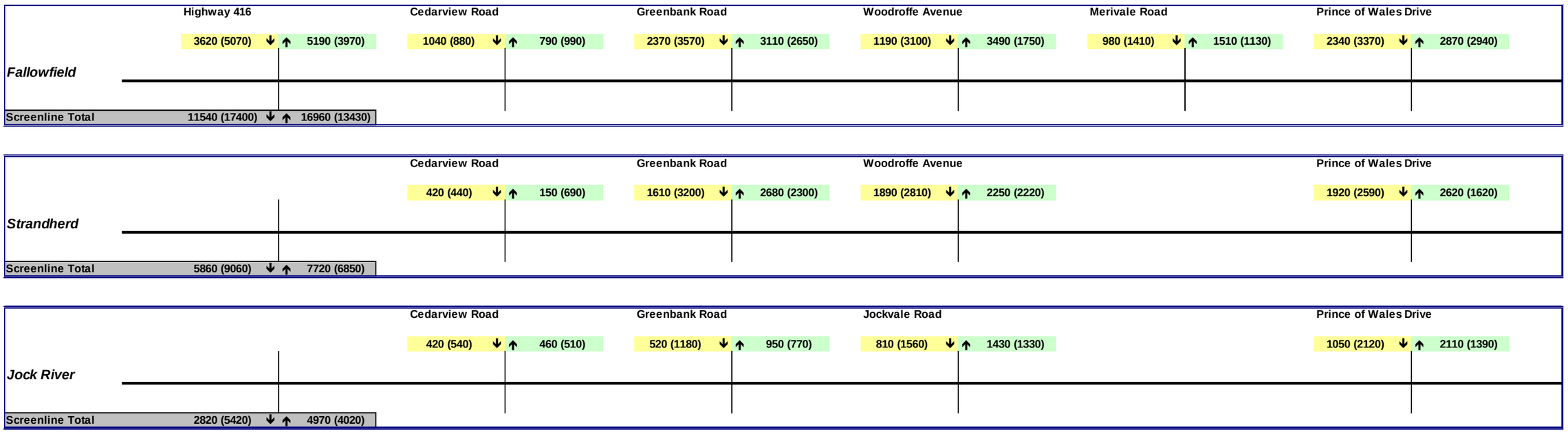
Relevant Excerpts from the Barrhaven South CTS

FIGURE 8
EXISTING SCREENLINE TRAFFIC VOLUMES
FALLOWFIELD, STRANDHERD, AND JOCK RIVER



FORMAT: AM peak hour volumes (PM Peak Hour Volumes)

FIGURE 13
SUC SCREENLINES
2031 TRAFFIC VOLUME FORECAST

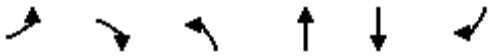


FORMAT: AM peak hour volumes (PM Peak Hour Volumes)

NOTE: Jock River Screenline – Greenbank / New Greenbank is interchangeable.

APPENDIX D

Synchro Analysis Reports



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	43	5	1	499	205	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)	47	5	1	542	223	11
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	793	248	244			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	793	248	244			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	99	100			
cM capacity (veh/h)	351	777	1312			

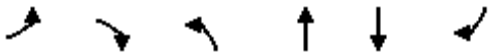
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	52	543	234
Volume Left	47	1	0
Volume Right	5	0	11
cSH	373	1312	1700
Volume to Capacity	0.14	0.00	0.14
Queue Length 95th (m)	3.9	0.0	0.0
Control Delay (s)	16.2	0.0	0.0
Lane LOS	C	A	
Approach Delay (s)	16.2	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	5	0	1	1	0	2
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)	5	0	1	1	0	2
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			5		9	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			5		9	5
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)			1616		1011	1078

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	5	2	2
Volume Left	0	1	0
Volume Right	0	0	2
cSH	1700	1616	1078
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
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

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	2	5	417	630	40
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)	22	2	5	453	685	43
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1191	727	738			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1191	727	738			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	99	99			
cM capacity (veh/h)	202	417	861			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	24	459	728
Volume Left	22	5	0
Volume Right	2	0	43
cSH	212	861	1700
Volume to Capacity	0.11	0.01	0.43
Queue Length 95th (m)	3.0	0.2	0.0
Control Delay (s)	24.1	0.2	0.0
Lane LOS	C	A	
Approach Delay (s)	24.1	0.2	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	0	2	5	0	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)	2	0	2	5	0	1
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			2		12	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2		12	2
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)			1620		1006	1082

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	2	8	1
Volume Left	0	2	0
Volume Right	0	0	1
cSH	1700	1620	1082
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	2.1	8.3
Lane LOS		A	A
Approach Delay (s)	0.0	2.1	8.3
Approach LOS			A

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

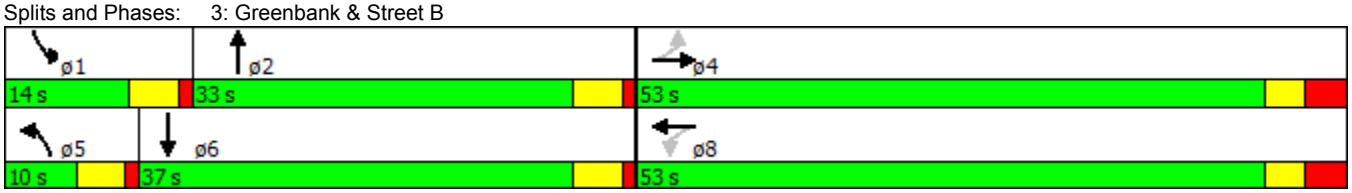
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	2	3	21	10	108	1	581	4	28	255	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		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	0.99		0.99	0.98		0.98	1.00		0.99	1.00	
Frt		0.910			0.863			0.999			0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1672	0	1770	1574	0	1770	3535	0	1770	3530	0
Flt Permitted	0.675			0.754			0.950			0.950		
Satd. Flow (perm)	1249	1672	0	1393	1574	0	1740	3535	0	1751	3530	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			117			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)	10		10	10		10	10		10	10		10
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	117	1	632	4	30	277	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	5	0	23	128	0	1	636	0	30	281	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.1	14.1		14.1	14.1		5.5	38.5		6.8	41.4	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.09	0.61		0.11	0.66	
v/c Ratio	0.08	0.01		0.07	0.29		0.01	0.30		0.16	0.12	
Control Delay	19.3	14.2		19.1	6.9		34.0	11.9		31.6	8.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.3	14.2		19.1	6.9		34.0	11.9		31.6	8.9	
LOS	B	B		B	A		C	B		C	A	
Approach Delay		18.4			8.8			12.0			11.1	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	2.0	0.2		2.0	0.9		0.1	13.4		2.8	5.3	
Queue Length 95th (m)	7.3	2.3		7.3	11.7		1.8	66.9		13.5	27.5	
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)	961	1287		1071	1238		154	2155		270	2315	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.02	0.00		0.02	0.10		0.01	0.30		0.11	0.12	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 63.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.30
Intersection Signal Delay: 11.5 Intersection LOS: B
Intersection Capacity Utilization 46.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Greenbank & Street B

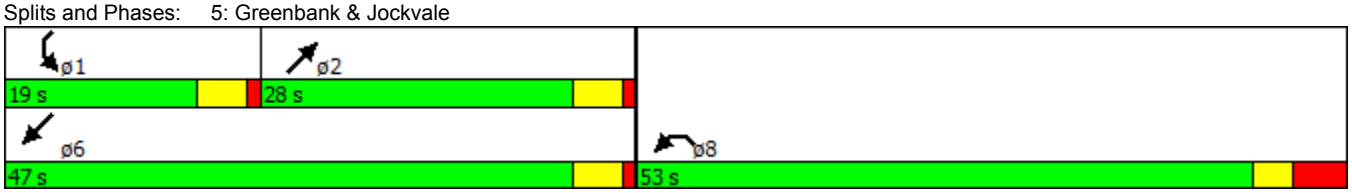


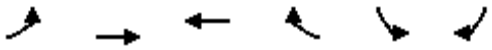
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	38	86	500	13	29	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0		0.0	50.0	
Storage Lanes	0	0		0	1	
Taper Length (m)	50.0				50.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor	0.98		1.00		0.99	
Frt	0.906		0.996			
Flt Protected	0.985				0.950	
Satd. Flow (prot)	1638	0	3520	0	1770	3539
Flt Permitted	0.985				0.950	
Satd. Flow (perm)	1635	0	3520	0	1749	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	93		2			
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)	10	10		10	10	
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	93	543	14	32	272
Shared Lane Traffic (%)						
Lane Group Flow (vph)	134	0	557	0	32	272
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	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			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		5.0	10.0
Minimum Split (s)	52.1		27.8		9.7	27.8
Total Split (s)	53.0		28.0		19.0	47.0
Total Split (%)	53.0%		28.0%		19.0%	47.0%
Maximum Green (s)	45.9		23.3		14.3	42.3
Yellow Time (s)	3.0		3.7		3.7	3.7
All-Red Time (s)	4.1		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0

Lane Group	NWL	NWR	NET	NER	SWL	SWT
Total Lost Time (s)	7.1		4.7		4.7	4.7
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		None	Max
Walk Time (s)	7.0		7.0			7.0
Flash Dont Walk (s)	38.0		13.0			13.0
Pedestrian Calls (#/hr)	2		2			2
Act Effct Green (s)	15.4		45.5		7.0	50.3
Actuated g/C Ratio	0.21		0.62		0.10	0.69
v/c Ratio	0.32		0.25		0.19	0.11
Control Delay	10.0		13.0		36.1	8.0
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	10.0		13.0		36.1	8.0
LOS	B		B		D	A
Approach Delay	10.0		13.0			10.9
Approach LOS	B		B			B
Queue Length 50th (m)	4.7		12.1		3.9	5.4
Queue Length 95th (m)	15.3		67.7		15.3	26.2
Internal Link Dist (m)	279.9		168.6			261.7
Turn Bay Length (m)	50.0				50.0	
Base Capacity (vph)	1095		2202		357	2447
Starvation Cap Reductn	0		0		0	0
Spillback Cap Reductn	0		0		0	0
Storage Cap Reductn	0		0		0	0
Reduced v/c Ratio	0.12		0.25		0.09	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 72.8			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.32			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 50.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: Greenbank & Jockvale





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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)	1535				921	1015

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	27	16	2
Volume Left	1	0	2
Volume Right	0	11	0
cSH	1535	1700	921
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

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

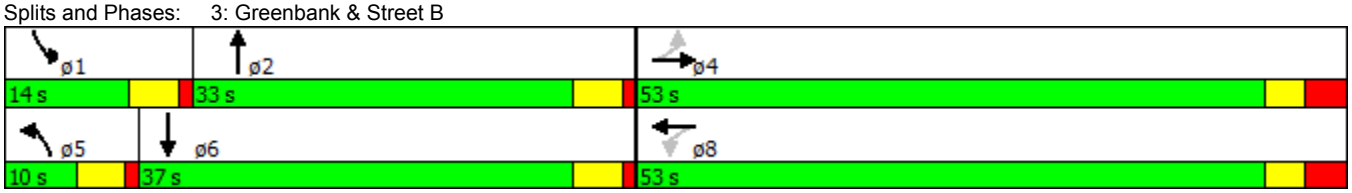
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	1	10	5	57	2	508	20	107	779	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	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	1.00		0.99	0.98		0.99	1.00		0.99	1.00	
Frt		0.987			0.861			0.994			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1835	0	1770	1570	0	1770	3511	0	1770	3520	0
Flt Permitted	0.713			0.750			0.950			0.950		
Satd. Flow (perm)	1318	1835	0	1386	1570	0	1756	3511	0	1750	3520	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			62			4			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)	10		10	10		10	10		10	10		10
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	62	2	552	22	116	847	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	12	0	11	67	0	2	574	0	116	870	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.2	14.2		14.2	14.2		5.5	33.8		8.8	48.3	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.08	0.52		0.13	0.74	
v/c Ratio	0.04	0.03		0.04	0.17		0.01	0.32		0.49	0.33	
Control Delay	19.6	18.7		19.6	7.5		34.5	13.7		37.3	9.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.6	18.7		19.6	7.5		34.5	13.7		37.3	9.2	
LOS	B	B		B	A		C	B		D	A	
Approach Delay		19.1			9.2			13.7			12.5	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	1.2	1.2		1.2	0.5		0.3	23.0		13.2	20.1	
Queue Length 95th (m)	4.4	4.5		4.4	8.4		2.6	60.0		#43.1	90.0	
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)	979	1363		1029	1182		149	1822		261	2606	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.01	0.06		0.01	0.32		0.44	0.33	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 65.2
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 12.9 Intersection LOS: B
Intersection Capacity Utilization 53.9% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Greenbank & Street B

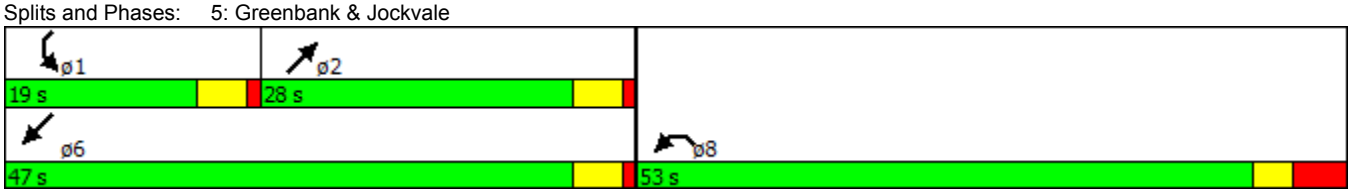


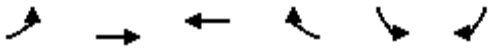
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	22	49	481	37	85	705
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0		0.0	50.0	
Storage Lanes	0	0		0	1	
Taper Length (m)	50.0				50.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor	0.98		1.00		0.99	
Frt	0.907		0.989			
Flt Protected	0.985				0.950	
Satd. Flow (prot)	1640	0	3487	0	1770	3539
Flt Permitted	0.985				0.950	
Satd. Flow (perm)	1637	0	3487	0	1749	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	53		7			
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)	10	10		10	10	
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	53	523	40	92	766
Shared Lane Traffic (%)						
Lane Group Flow (vph)	77	0	563	0	92	766
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	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			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		5.0	10.0
Minimum Split (s)	52.1		27.8		9.7	27.8
Total Split (s)	53.0		28.0		19.0	47.0
Total Split (%)	53.0%		28.0%		19.0%	47.0%
Maximum Green (s)	45.9		23.3		14.3	42.3
Yellow Time (s)	3.0		3.7		3.7	3.7
All-Red Time (s)	4.1		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0

Lane Group	NWL	NWR	NET	NER	SWL	SWT
Total Lost Time (s)	7.1		4.7		4.7	4.7
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		None	Max
Walk Time (s)	7.0		7.0			7.0
Flash Dont Walk (s)	38.0		13.0			13.0
Pedestrian Calls (#/hr)	2		2			2
Act Effct Green (s)	15.4		37.5		9.1	49.0
Actuated g/C Ratio	0.22		0.52		0.13	0.69
v/c Ratio	0.20		0.31		0.41	0.32
Control Delay	10.1		17.1		36.5	9.0
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	10.1		17.1		36.5	9.0
LOS	B		B		D	A
Approach Delay	10.1		17.1			12.0
Approach LOS	B		B			B
Queue Length 50th (m)	2.6		22.4		10.7	18.1
Queue Length 95th (m)	10.8		73.0		32.5	75.6
Internal Link Dist (m)	279.9		168.6			261.7
Turn Bay Length (m)	50.0				50.0	
Base Capacity (vph)	1103		1834		364	2425
Starvation Cap Reductn	0		0		0	0
Spillback Cap Reductn	0		0		0	0
Storage Cap Reductn	0		0		0	0
Reduced v/c Ratio	0.07		0.31		0.25	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 71.5			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.41			
Intersection Signal Delay: 13.8		Intersection LOS: B	
Intersection Capacity Utilization 51.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: Greenbank & Jockvale





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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				67	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55				67	53
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)	1517				918	994

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	13	30	12
Volume Left	1	0	11
Volume Right	0	5	1
cSH	1517	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

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

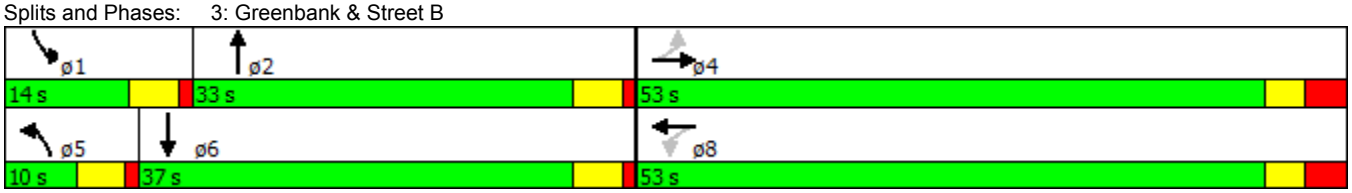
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	2	3	21	10	108	1	718	4	28	318	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		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	0.99		0.99	0.98		0.98	1.00		0.99	1.00	
Frt		0.910			0.863			0.999			0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1672	0	1770	1574	0	1770	3535	0	1770	3530	0
Flt Permitted	0.675			0.754			0.950			0.950		
Satd. Flow (perm)	1249	1672	0	1393	1574	0	1742	3535	0	1755	3530	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			117						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)	10		10	10		10	10		10	10		10
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	117	1	780	4	30	346	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	5	0	23	128	0	1	784	0	30	350	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.1	14.1		14.1	14.1		5.5	38.5		6.8	41.4	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.09	0.61		0.11	0.66	
v/c Ratio	0.08	0.01		0.07	0.29		0.01	0.36		0.16	0.15	
Control Delay	19.3	14.2		19.1	6.9		34.0	12.6		31.6	8.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.3	14.2		19.1	6.9		34.0	12.6		31.6	8.9	
LOS	B	B		B	A		C	B		C	A	
Approach Delay		18.4			8.8			12.6			10.7	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	2.0	0.2		2.0	0.9		0.1	17.5		2.8	6.7	
Queue Length 95th (m)	7.3	2.3		7.3	11.7		1.8	85.1		13.5	33.8	
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)	961	1287		1071	1238		154	2154		270	2315	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.02	0.00		0.02	0.10		0.01	0.36		0.11	0.15	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 63.1
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 11.8 Intersection LOS: B
Intersection Capacity Utilization 46.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Greenbank & Street B

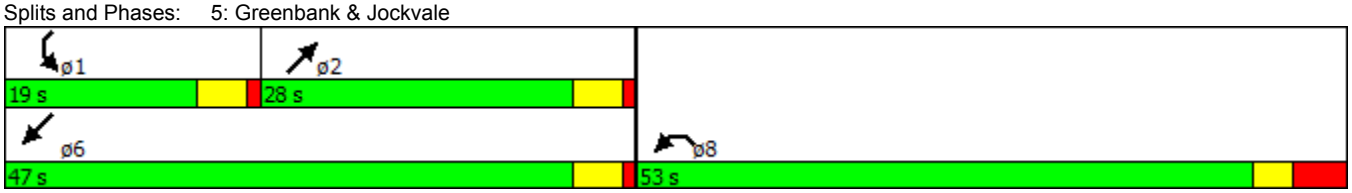


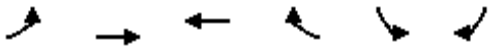
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	38	86	637	13	29	313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0		0.0	50.0	
Storage Lanes	0	0		0	1	
Taper Length (m)	50.0				50.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor	0.98		1.00		0.99	
Frt	0.906		0.997			
Flt Protected	0.985				0.950	
Satd. Flow (prot)	1638	0	3525	0	1770	3539
Flt Permitted	0.985				0.950	
Satd. Flow (perm)	1635	0	3525	0	1753	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	93		2			
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)	10	10		10	10	
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	93	692	14	32	340
Shared Lane Traffic (%)						
Lane Group Flow (vph)	134	0	706	0	32	340
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	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			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	4.0		4.0		4.0	4.0
Minimum Split (s)	52.1		27.8		8.7	27.8
Total Split (s)	53.0		28.0		19.0	47.0
Total Split (%)	53.0%		28.0%		19.0%	47.0%
Maximum Green (s)	45.9		23.3		14.3	42.3
Yellow Time (s)	3.0		3.7		3.7	3.7
All-Red Time (s)	4.1		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0

Lane Group	NWL	NWR	NET	NER	SWL	SWT
Total Lost Time (s)	7.1		4.7		4.7	4.7
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		None	Max
Walk Time (s)	7.0		7.0			7.0
Flash Dont Walk (s)	38.0		13.0			13.0
Pedestrian Calls (#/hr)	2		2			2
Act Effct Green (s)	12.6		43.9		7.0	48.8
Actuated g/C Ratio	0.17		0.60		0.10	0.66
v/c Ratio	0.38		0.34		0.19	0.14
Control Delay	11.1		13.3		35.6	7.7
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	11.1		13.3		35.6	7.7
LOS	B		B		D	A
Approach Delay	11.1		13.3			10.1
Approach LOS	B		B			B
Queue Length 50th (m)	4.7		13.1		3.7	5.6
Queue Length 95th (m)	15.3		88.1		15.3	32.3
Internal Link Dist (m)	279.9		168.6			261.7
Turn Bay Length (m)	50.0				50.0	
Base Capacity (vph)	1084		2105		354	2348
Starvation Cap Reductn	0		0		0	0
Spillback Cap Reductn	0		0		0	0
Storage Cap Reductn	0		0		0	0
Reduced v/c Ratio	0.12		0.34		0.09	0.14

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 73.6			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 50.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: Greenbank & Jockvale





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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)	1535				921	1015

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	27	16	2
Volume Left	1	0	2
Volume Right	0	11	0
cSH	1535	1700	921
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

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

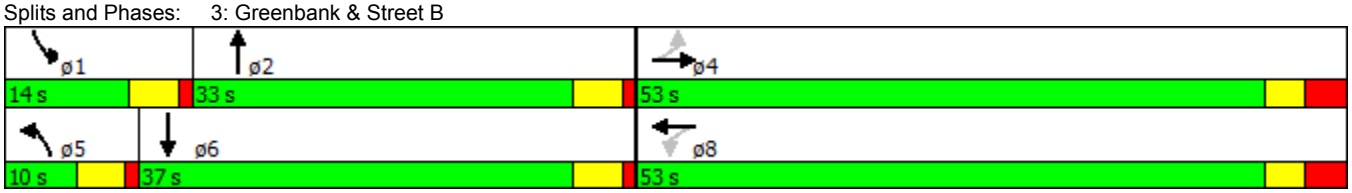
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	1	10	5	57	2	635	20	107	971	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	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	1.00		0.99	0.98		0.99	1.00		0.99	1.00	
Frt		0.987			0.861			0.995			0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1835	0	1770	1570	0	1770	3516	0	1770	3525	0
Flt Permitted	0.713			0.750			0.950			0.950		
Satd. Flow (perm)	1318	1835	0	1386	1570	0	1760	3516	0	1753	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			62			3			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)	10		10	10		10	10		10	10		10
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	62	2	690	22	116	1055	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	12	0	11	67	0	2	712	0	116	1078	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.2	14.2		14.2	14.2		5.5	33.8		8.8	48.3	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.08	0.52		0.13	0.74	
v/c Ratio	0.04	0.03		0.04	0.17		0.01	0.39		0.49	0.41	
Control Delay	19.6	18.7		19.6	7.5		34.5	14.4		37.3	10.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.6	18.7		19.6	7.5		34.5	14.4		37.3	10.3	
LOS	B	B		B	A		C	B		D	B	
Approach Delay		19.1			9.2			14.5			12.9	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	1.2	1.2		1.2	0.5		0.3	30.0		13.2	27.0	
Queue Length 95th (m)	4.4	4.5		4.4	8.4		2.6	76.5		#43.1	#119.5	
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)	979	1363		1029	1182		149	1824		261	2609	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.01		0.01	0.06		0.01	0.39		0.44	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 65.2
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 13.4 Intersection LOS: B
Intersection Capacity Utilization 59.2% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Greenbank & Street B



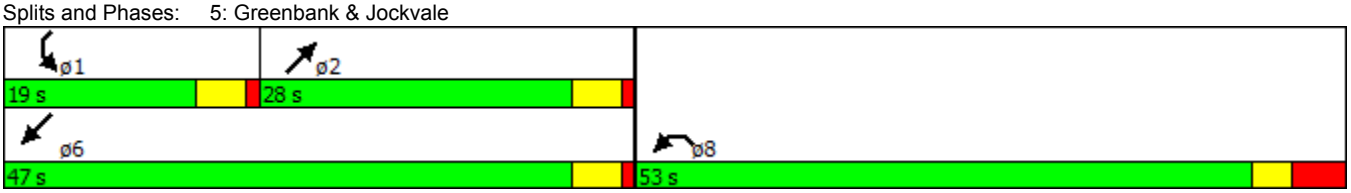
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	22	49	608	37	85	897
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0		0.0	50.0	
Storage Lanes	0	0		0	1	
Taper Length (m)	50.0				50.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor	0.98		1.00		0.99	
Frt	0.907		0.991			
Flt Protected	0.985				0.950	
Satd. Flow (prot)	1640	0	3497	0	1770	3539
Flt Permitted	0.985				0.950	
Satd. Flow (perm)	1637	0	3497	0	1753	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	53		6			
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)	10	10		10	10	
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	53	661	40	92	975
Shared Lane Traffic (%)						
Lane Group Flow (vph)	77	0	701	0	92	975
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	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			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		5.0	10.0
Minimum Split (s)	52.1		27.8		9.7	27.8
Total Split (s)	53.0		28.0		19.0	47.0
Total Split (%)	53.0%		28.0%		19.0%	47.0%
Maximum Green (s)	45.9		23.3		14.3	42.3
Yellow Time (s)	3.0		3.7		3.7	3.7
All-Red Time (s)	4.1		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0

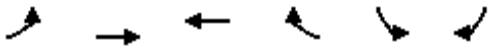
Lane Group	NWL	NWR	NET	NER	SWL	SWT
Total Lost Time (s)	7.1		4.7		4.7	4.7
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		None	Max
Walk Time (s)	7.0		7.0			7.0
Flash Dont Walk (s)	38.0		13.0			13.0
Pedestrian Calls (#/hr)	2		2			2
Act Effct Green (s)	15.4		37.5		9.1	49.0
Actuated g/C Ratio	0.22		0.52		0.13	0.69
v/c Ratio	0.20		0.38		0.41	0.40
Control Delay	10.1		18.2		36.5	9.8
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	10.1		18.2		36.5	9.8
LOS	B		B		D	A
Approach Delay	10.1		18.2			12.1
Approach LOS	B		B			B
Queue Length 50th (m)	2.6		29.4		10.7	24.9
Queue Length 95th (m)	10.8		#100.8		32.5	102.1
Internal Link Dist (m)	279.9		168.6			261.7
Turn Bay Length (m)	50.0				50.0	
Base Capacity (vph)	1103		1838		364	2425
Starvation Cap Reductn	0		0		0	0
Spillback Cap Reductn	0		0		0	0
Storage Cap Reductn	0		0		0	0
Reduced v/c Ratio	0.07		0.38		0.25	0.40

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 71.5	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 53.1%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 5: Greenbank & Jockvale





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
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				67	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	55				67	53
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)	1517				918	994

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	13	30	12
Volume Left	1	0	11
Volume Right	0	5	1
cSH	1517	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

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

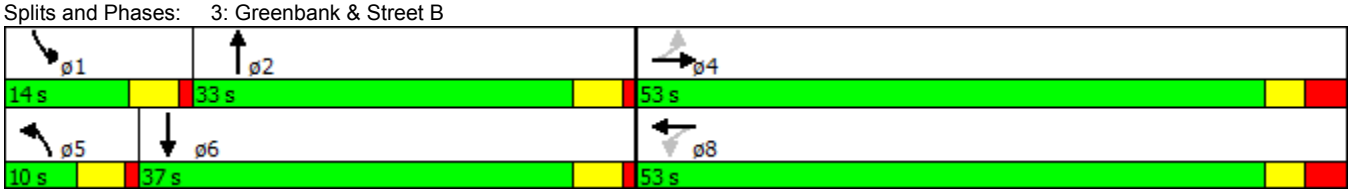
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	2	5	21	10	108	2	679	4	28	274	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	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	0.98		0.99	0.98		0.98	1.00		0.99	1.00	
Frt		0.893			0.863			0.999			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1637	0	1770	1574	0	1770	3535	0	1770	3511	0
Flt Permitted	0.675			0.753			0.950			0.950		
Satd. Flow (perm)	1249	1637	0	1391	1574	0	1741	3535	0	1754	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			117			1			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)	10		10	10		10	10		10	10		10
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)	64	2	5	23	11	117	2	738	4	30	298	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	7	0	23	128	0	2	742	0	30	311	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.0	14.0		14.0	14.0		5.5	37.7		6.8	40.5	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.09	0.61		0.11	0.65	
v/c Ratio	0.23	0.02		0.07	0.29		0.01	0.35		0.16	0.14	
Control Delay	21.5	13.0		19.0	6.9		33.5	12.5		31.6	8.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.5	13.0		19.0	6.9		33.5	12.5		31.6	8.9	
LOS	C	B		B	A		C	B		C	A	
Approach Delay		20.7			8.7			12.5			10.9	
Approach LOS		C			A			B			B	
Queue Length 50th (m)	5.6	0.2		2.0	0.9		0.2	16.3		2.8	5.8	
Queue Length 95th (m)	15.6	2.9		7.3	11.7		2.6	79.6		13.5	30.0	
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)	975	1279		1086	1255		156	2136		274	2286	
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	0.01		0.02	0.10		0.01	0.35		0.11	0.14	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 62.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 12.1 Intersection LOS: B
Intersection Capacity Utilization 48.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Greenbank & Street B

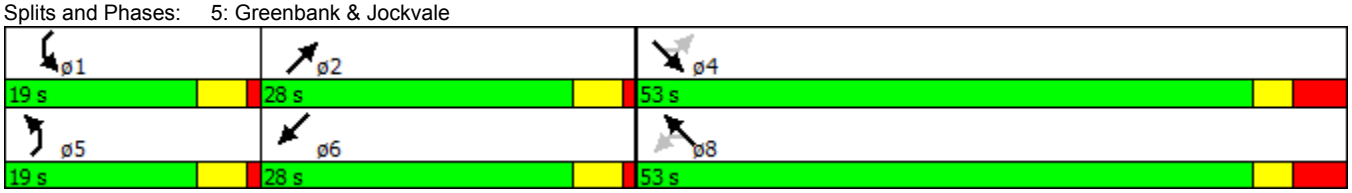


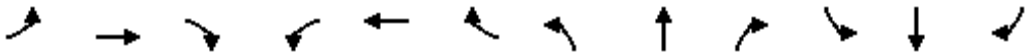
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	37	1	6	45	4	147	2	501	14	41	252	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	0		0	0		0	1		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			0.98		0.98	1.00		0.99	1.00	
Frt		0.980			0.899			0.996			0.996	
Flt Protected		0.960			0.989		0.950			0.950		
Satd. Flow (prot)	0	1747	0	0	1630	0	1770	3520	0	1770	3520	0
Flt Permitted		0.677			0.907		0.950			0.950		
Satd. Flow (perm)	0	1227	0	0	1493	0	1740	3520	0	1749	3520	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			160			3			3	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		272.1			303.9			192.6			285.7	
Travel Time (s)		24.5			27.4			11.6			17.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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)	40	1	7	49	4	160	2	545	15	45	274	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	213	0	2	560	0	45	282	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)		0.0			0.0			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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	27.8		9.7	27.8	
Total Split (s)	53.0	53.0		53.0	53.0		19.0	28.0		19.0	28.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		19.0%	28.0%		19.0%	28.0%	
Maximum Green (s)	45.9	45.9		45.9	45.9		14.3	23.3		14.3	23.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Total Lost Time (s)		7.1			7.1		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	38.0	38.0		38.0	38.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)		15.2			15.2		6.0	27.2		7.4	30.3	
Actuated g/C Ratio		0.26			0.26		0.10	0.46		0.12	0.51	
v/c Ratio		0.15			0.43		0.01	0.35		0.20	0.16	
Control Delay		15.5			8.3		33.5	15.8		30.5	11.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		15.5			8.3		33.5	15.8		30.5	11.9	
LOS		B			A		C	B		C	B	
Approach Delay		15.5			8.3			15.8			14.5	
Approach LOS		B			A			B			B	
Queue Length 50th (m)		2.8			3.6		0.2	12.3		3.3	5.5	
Queue Length 95th (m)		10.6			18.3		2.6	69.5		19.0	32.8	
Internal Link Dist (m)		248.1			279.9			168.6			261.7	
Turn Bay Length (m)							50.0			50.0		
Base Capacity (vph)		1013			1259		458	1610		458	1792	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.05			0.17		0.00	0.35		0.10	0.16	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 59.5	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 14.0	Intersection LOS: B
Intersection Capacity Utilization 53.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Greenbank & Jockvale





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	28	0	0	6	10	0	8	2	2	2	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	30	0	0	7	11	0	9	2	2	2	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					294							
pX, platoon unblocked												
vC, conflicting volume	17			30			46	50	30	51	45	12
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	17			30			46	50	30	51	45	12
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)	1600			1582			954	841	1044	938	847	1069

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	17	11	4
Volume Left	1	0	0	2
Volume Right	0	11	2	0
cSH	1600	1582	875	890
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)	0.3	0.0	9.2	9.1
Lane LOS	A		A	A
Approach Delay (s)	0.3	0.0	9.2	9.1
Approach LOS			A	A

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

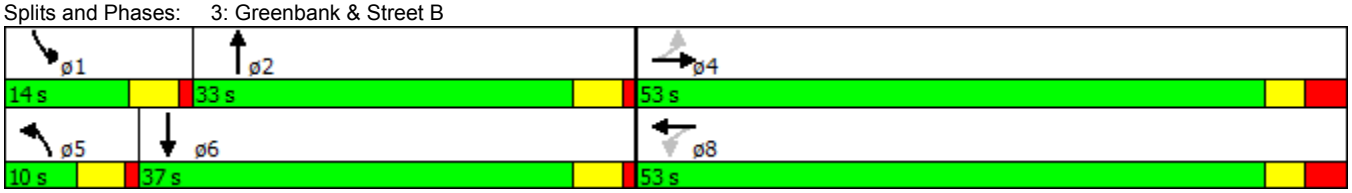
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	10	2	10	5	57	4	555	20	107	874	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	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	1.00		0.99	0.98		0.99	1.00		0.99	1.00	
Frt		0.977			0.861			0.995			0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1814	0	1770	1570	0	1770	3515	0	1770	3497	0
Flt Permitted	0.713			0.749			0.950			0.950		
Satd. Flow (perm)	1318	1814	0	1384	1570	0	1759	3515	0	1751	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			62			4			7	
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)	10		10	10		10	10		10	10		10
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)	30	11	2	11	5	62	4	603	22	116	950	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	13	0	11	67	0	4	625	0	116	1012	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.2	14.2		14.2	14.2		5.5	33.3		8.8	47.9	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.09	0.51		0.14	0.74	
v/c Ratio	0.10	0.03		0.04	0.17		0.03	0.34		0.48	0.39	
Control Delay	20.7	18.0		19.6	7.5		34.2	14.0		37.0	9.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.7	18.0		19.6	7.5		34.2	14.0		37.0	9.8	
LOS	C	B		B	A		C	B		D	A	
Approach Delay		19.9			9.2			14.1			12.6	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	3.2	1.2		1.2	0.5		0.5	25.4		13.2	24.6	
Queue Length 95th (m)	8.7	4.8		4.4	8.4		4.1	65.8		#43.1	109.5	
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)	991	1364		1040	1196		150	1813		264	2590	
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	0.01		0.01	0.06		0.03	0.34		0.44	0.39	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 64.7
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 57.7% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Greenbank & Street B



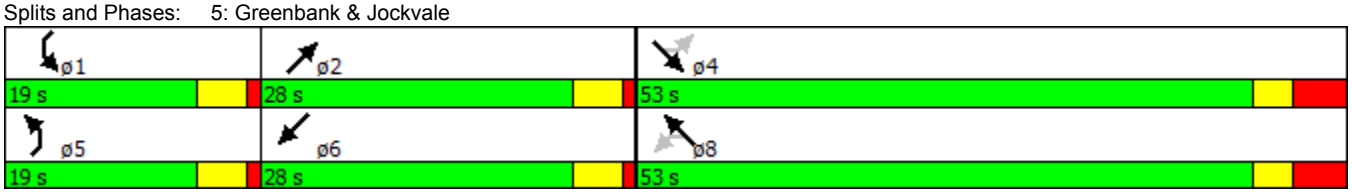
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	18	3	3	25	2	78	7	483	44	144	706	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	0		0	0		0	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			0.98		0.99	1.00		0.99	1.00	
Frt		0.984			0.899			0.987			0.993	
Flt Protected		0.963			0.988		0.950			0.950		
Satd. Flow (prot)	0	1761	0	0	1629	0	1770	3478	0	1770	3506	0
Flt Permitted		0.718			0.911		0.950			0.950		
Satd. Flow (perm)	0	1307	0	0	1499	0	1755	3478	0	1750	3506	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			85			9			5	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		272.1			303.9			192.6			285.7	
Travel Time (s)		24.5			27.4			11.6			17.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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)	20	3	3	27	2	85	8	525	48	157	767	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	26	0	0	114	0	8	573	0	157	806	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)		0.0			0.0			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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	27.8		9.7	27.8	
Total Split (s)	53.0	53.0		53.0	53.0		19.0	28.0		19.0	28.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		19.0%	28.0%		19.0%	28.0%	
Maximum Green (s)	45.9	45.9		45.9	45.9		14.3	23.3		14.3	23.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	

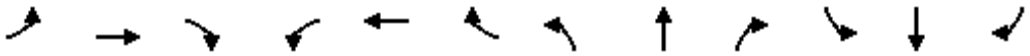
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Total Lost Time (s)		7.1			7.1		4.7	4.7		4.7	4.7	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	38.0	38.0		38.0	38.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)		15.2			15.2		6.1	27.6		10.7	42.8	
Actuated g/C Ratio		0.23			0.23		0.09	0.42		0.16	0.64	
v/c Ratio		0.09			0.28		0.05	0.40		0.55	0.36	
Control Delay		17.9			9.2		35.4	19.4		36.7	12.2	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		17.9			9.2		35.4	19.4		36.7	12.2	
LOS		B			A		D	B		D	B	
Approach Delay		17.9			9.2			19.6			16.2	
Approach LOS		B			A			B			B	
Queue Length 50th (m)		2.3			2.9		0.9	24.3		16.8	19.1	
Queue Length 95th (m)		7.4			13.1		6.2	74.2		51.7	98.8	
Internal Link Dist (m)		248.1			279.9			168.6			261.7	
Turn Bay Length (m)							50.0			50.0		
Base Capacity (vph)		949			1111		400	1448		400	2262	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.03			0.10		0.02	0.40		0.39	0.36	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 66.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 16.9 Intersection LOS: B
Intersection Capacity Utilization 55.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Greenbank & Jockvale





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	13	0	2	27	5	0	4	1	10	7	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	2	29	5	0	4	1	11	8	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					294							
pX, platoon unblocked												
vC, conflicting volume	35			14			58	55	14	56	53	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	35			14			58	55	14	56	53	32
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	99	99	100
cM capacity (veh/h)	1577			1604			930	834	1066	935	837	1042

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	15	37	5	20
Volume Left	1	2	0	11
Volume Right	0	5	1	1
cSH	1577	1604	872	899
Volume to Capacity	0.00	0.00	0.01	0.02
Queue Length 95th (m)	0.0	0.0	0.2	0.5
Control Delay (s)	0.5	0.4	9.2	9.1
Lane LOS	A	A	A	A
Approach Delay (s)	0.5	0.4	9.2	9.1
Approach LOS			A	A

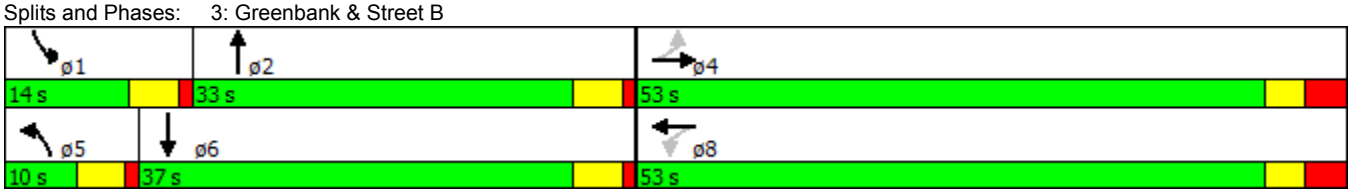
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	17.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	2	5	21	10	108	2	816	4	28	337	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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	0.98		0.99	0.98		0.99	1.00		0.99	1.00	
Frt		0.893			0.863			0.999			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1637	0	1770	1574	0	1770	3535	0	1770	3515	0
Flt Permitted	0.675			0.753			0.950			0.950		
Satd. Flow (perm)	1249	1637	0	1391	1574	0	1743	3535	0	1757	3515	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			117						4	
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)	10		10	10		10	10		10	10		10
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)	64	2	5	23	11	117	2	887	4	30	366	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	7	0	23	128	0	2	891	0	30	379	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.0	14.0		14.0	14.0		5.5	37.7		6.8	40.5	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.09	0.61		0.11	0.65	
v/c Ratio	0.23	0.02		0.07	0.29		0.01	0.42		0.16	0.17	
Control Delay	21.5	13.0		19.0	6.9		33.5	13.2		31.6	9.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.5	13.0		19.0	6.9		33.5	13.2		31.6	9.0	
LOS	C	B		B	A		C	B		C	A	
Approach Delay		20.7			8.7			13.3			10.6	
Approach LOS		C			A			B			B	
Queue Length 50th (m)	5.6	0.2		2.0	0.9		0.2	20.7		2.8	7.3	
Queue Length 95th (m)	15.6	2.9		7.3	11.7		2.6	99.6		13.5	36.3	
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)	975	1279		1086	1255		156	2136		274	2289	
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	0.01		0.02	0.10		0.01	0.42		0.11	0.17	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 62.3			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.42			
Intersection Signal Delay: 12.5		Intersection LOS: B	
Intersection Capacity Utilization 48.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Greenbank & Street B



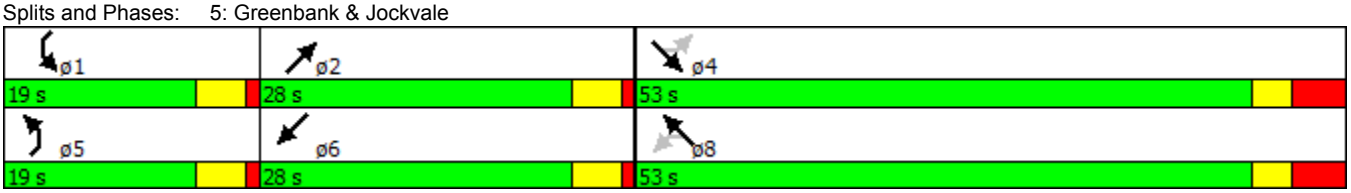
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	37	1	6	45	4	147	2	638	14	41	315	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	0		0	0		0	1		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			0.98		0.98	1.00		0.99	1.00	
Frt		0.980			0.899			0.997			0.997	
Flt Protected		0.960			0.989		0.950			0.950		
Satd. Flow (prot)	0	1747	0	0	1630	0	1770	3525	0	1770	3524	0
Flt Permitted		0.677			0.907		0.950			0.950		
Satd. Flow (perm)	0	1227	0	0	1493	0	1742	3525	0	1753	3524	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			160			2			2	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		272.1			303.9			192.6			285.7	
Travel Time (s)		24.5			27.4			11.6			17.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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)	40	1	7	49	4	160	2	693	15	45	342	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	213	0	2	708	0	45	350	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)		0.0			0.0			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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	27.8		9.7	27.8	
Total Split (s)	53.0	53.0		53.0	53.0		19.0	28.0		19.0	28.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		19.0%	28.0%		19.0%	28.0%	
Maximum Green (s)	45.9	45.9		45.9	45.9		14.3	23.3		14.3	23.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	

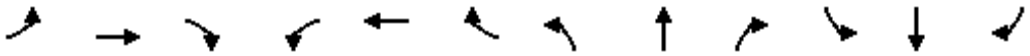
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Total Lost Time (s)		7.1			7.1		4.7	4.7		4.7	4.7	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	38.0	38.0		38.0	38.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)		15.2			15.2		6.0	27.2		7.4	30.3	
Actuated g/C Ratio		0.26			0.26		0.10	0.46		0.12	0.51	
v/c Ratio		0.15			0.43		0.01	0.44		0.20	0.20	
Control Delay		15.5			8.3		33.5	16.9		30.5	12.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		15.5			8.3		33.5	16.9		30.5	12.1	
LOS		B			A		C	B		C	B	
Approach Delay		15.5			8.3			16.9			14.2	
Approach LOS		B			A			B			B	
Queue Length 50th (m)		2.8			3.6		0.2	16.3		3.3	7.1	
Queue Length 95th (m)		10.6			18.3		2.6	#92.5		19.0	40.3	
Internal Link Dist (m)		248.1			279.9			168.6			261.7	
Turn Bay Length (m)							50.0			50.0		
Base Capacity (vph)		1013			1259		458	1612		458	1794	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.05			0.17		0.00	0.44		0.10	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 59.5
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.44
Intersection Signal Delay: 14.7 Intersection LOS: B
Intersection Capacity Utilization 55.2% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Jockvale





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	28	0	0	6	10	0	8	2	2	2	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	30	0	0	7	11	0	9	2	2	2	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					294							
pX, platoon unblocked												
vC, conflicting volume	17			30			46	50	30	51	45	12
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	17			30			46	50	30	51	45	12
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)	1600			1582			954	841	1044	938	847	1069

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	17	11	4
Volume Left	1	0	0	2
Volume Right	0	11	2	0
cSH	1600	1582	875	890
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)	0.3	0.0	9.2	9.1
Lane LOS	A		A	A
Approach Delay (s)	0.3	0.0	9.2	9.1
Approach LOS			A	A

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			

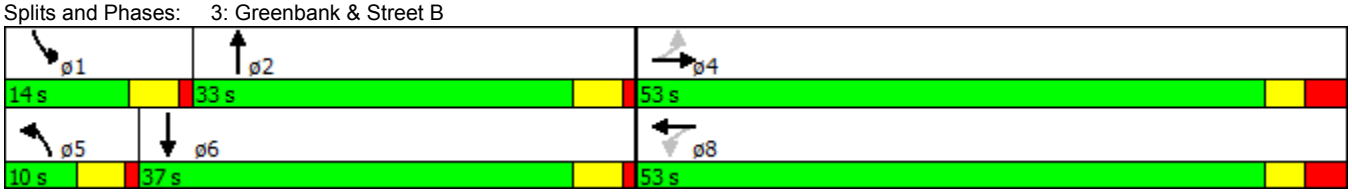
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	10	2	10	5	57	4	682	20	107	1066	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		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	1.00		0.99	0.98		1.00	1.00		0.99	1.00	
Frt		0.977			0.861			0.996			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1814	0	1770	1570	0	1770	3520	0	1770	3502	0
Flt Permitted	0.713			0.749			0.950			0.950		
Satd. Flow (perm)	1318	1814	0	1384	1570	0	1761	3520	0	1754	3502	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			62			3			6	
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)	10		10	10		10	10		10	10		10
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)	30	11	2	11	5	62	4	741	22	116	1159	62
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	13	0	11	67	0	4	763	0	116	1221	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	24.7		9.7	24.7	
Total Split (s)	53.0	53.0		53.0	53.0		10.0	33.0		14.0	37.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		10.0%	33.0%		14.0%	37.0%	
Maximum Green (s)	46.8	46.8		46.8	46.8		5.3	28.3		9.3	32.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.7	4.7		4.7	4.7	
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	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)	14.2	14.2		14.2	14.2		5.5	33.3		8.8	47.9	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.09	0.51		0.14	0.74	
v/c Ratio	0.10	0.03		0.04	0.17		0.03	0.42		0.48	0.47	
Control Delay	20.7	18.0		19.6	7.5		34.2	14.7		37.0	11.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.7	18.0		19.6	7.5		34.2	14.7		37.0	11.3	
LOS	C	B		B	A		C	B		D	B	
Approach Delay		19.9			9.2			14.8			13.5	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	3.2	1.2		1.2	0.5		0.5	32.8		13.2	32.6	
Queue Length 95th (m)	8.7	4.8		4.4	8.4		4.1	82.8		#43.1	#158.0	
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)	991	1364		1040	1196		150	1815		264	2593	
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	0.01		0.01	0.06		0.03	0.42		0.44	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 64.7
Natural Cycle: 100
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 13.9 Intersection LOS: B
Intersection Capacity Utilization 63.0% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Greenbank & Street B



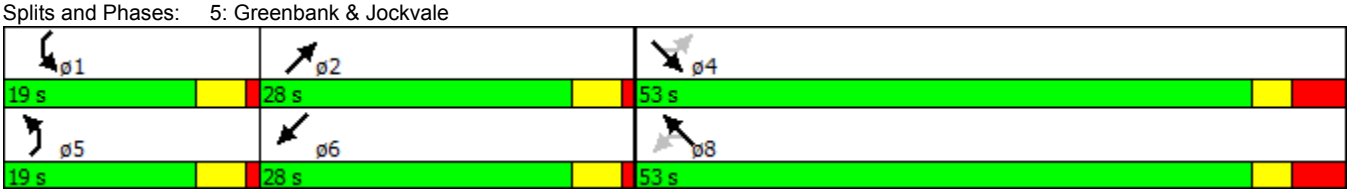
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	18	3	3	25	2	78	7	610	44	144	898	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	0		0	0		0	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			0.98		0.99	1.00		0.99	1.00	
Frt		0.984			0.899			0.990			0.994	
Flt Protected		0.963			0.988		0.950			0.950		
Satd. Flow (prot)	0	1761	0	0	1629	0	1770	3491	0	1770	3511	0
Flt Permitted		0.718			0.911		0.950			0.950		
Satd. Flow (perm)	0	1307	0	0	1499	0	1759	3491	0	1753	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			85			7			4	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		272.1			303.9			192.6			285.7	
Travel Time (s)		24.5			27.4			11.6			17.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
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)	20	3	3	27	2	85	8	663	48	157	976	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	26	0	0	114	0	8	711	0	157	1015	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)		0.0			0.0			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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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)	52.1	52.1		52.1	52.1		9.7	27.8		9.7	27.8	
Total Split (s)	53.0	53.0		53.0	53.0		19.0	28.0		19.0	28.0	
Total Split (%)	53.0%	53.0%		53.0%	53.0%		19.0%	28.0%		19.0%	28.0%	
Maximum Green (s)	45.9	45.9		45.9	45.9		14.3	23.3		14.3	23.3	
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		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	

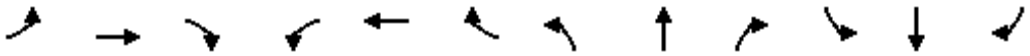
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Total Lost Time (s)		7.1			7.1		4.7	4.7		4.7	4.7	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	38.0	38.0		38.0	38.0			13.0			13.0	
Pedestrian Calls (#/hr)	2	2		2	2			2			2	
Act Effct Green (s)		15.2			15.2		6.1	27.6		10.7	42.8	
Actuated g/C Ratio		0.23			0.23		0.09	0.42		0.16	0.64	
v/c Ratio		0.09			0.28		0.05	0.49		0.55	0.45	
Control Delay		17.9			9.2		35.4	20.8		36.7	13.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		17.9			9.2		35.4	20.8		36.7	13.6	
LOS		B			A		D	C		D	B	
Approach Delay		17.9			9.2			21.0			16.7	
Approach LOS		B			A			C			B	
Queue Length 50th (m)		2.3			2.9		0.9	32.0		16.8	26.3	
Queue Length 95th (m)		7.4			13.1		6.2	#103.1		51.7	#146.3	
Internal Link Dist (m)		248.1			279.9			168.6			261.7	
Turn Bay Length (m)							50.0			50.0		
Base Capacity (vph)		949			1111		400	1453		400	2265	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.03			0.10		0.02	0.49		0.39	0.45	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 66.4
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 17.8 Intersection LOS: B
Intersection Capacity Utilization 60.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Greenbank & Jockvale





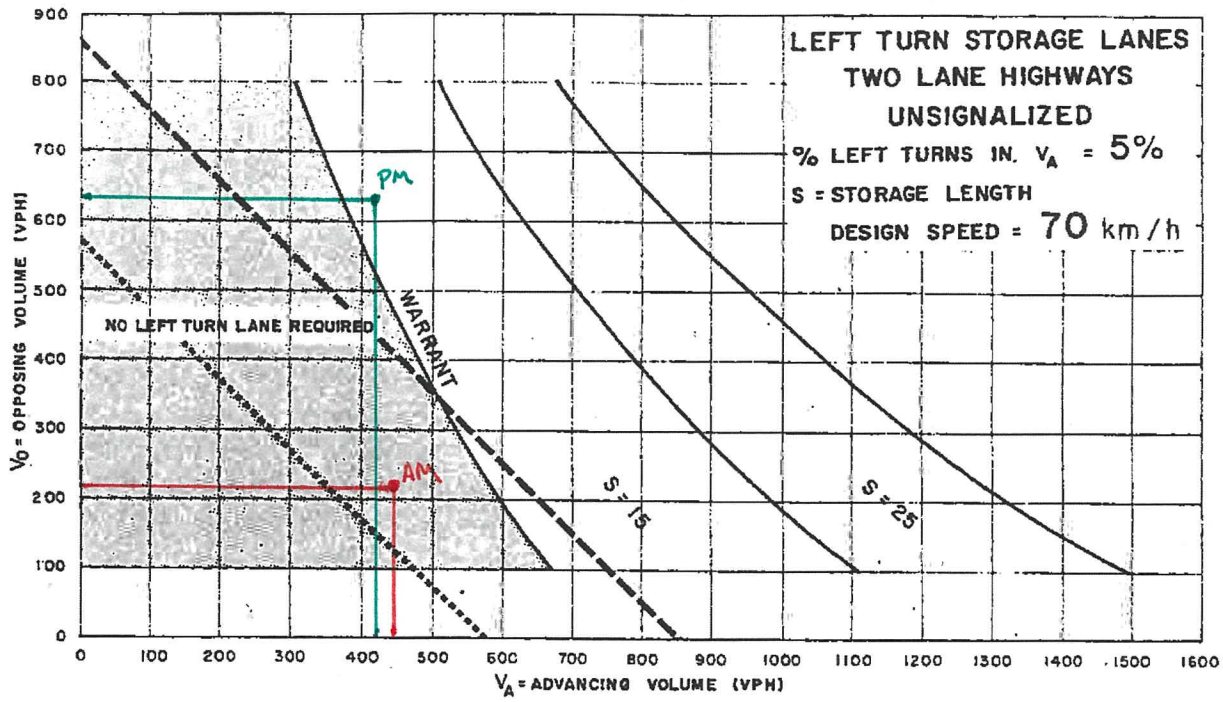
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	13	0	2	27	5	0	4	1	10	7	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	14	0	2	29	5	0	4	1	11	8	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)					294							
pX, platoon unblocked												
vC, conflicting volume	35			14			58	55	14	56	53	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	35			14			58	55	14	56	53	32
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	99	99	100
cM capacity (veh/h)	1577			1604			930	834	1066	935	837	1042

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	15	37	5	20
Volume Left	1	2	0	11
Volume Right	0	5	1	1
cSH	1577	1604	872	899
Volume to Capacity	0.00	0.00	0.01	0.02
Queue Length 95th (m)	0.0	0.0	0.2	0.5
Control Delay (s)	0.5	0.4	9.2	9.1
Lane LOS	A	A	A	A
Approach Delay (s)	0.5	0.4	9.2	9.1
Approach LOS			A	A

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	17.6%	ICU Level of Service	A	
Analysis Period (min)	15			

APPENDIX E

MTO Left Turn Lane Storage Graph



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

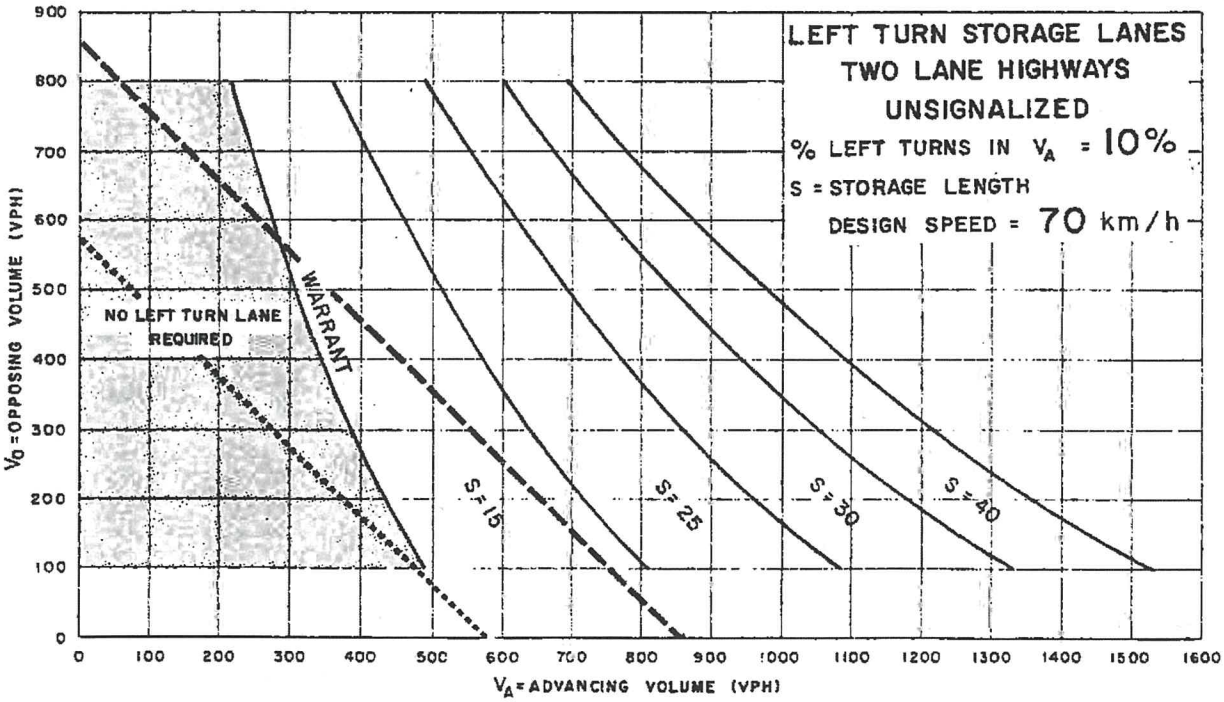


Figure EA-10