

# 3288 Greenbank Road

## Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report (revised)

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## 1 Screening

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

## 2 Existing and Planned Conditions

### 2.1 Proposed Development

The proposed development, located at 3288 Greenbank Road, is currently zoned as [Development Reserve \(DR\)](#). The existing land is currently a mix of farm fields and a private dwelling. The proposed development is for a zoning by-law amendment and plan of subdivision application and includes a total of 328 apartment units and 429 townhome units within a single development phase. Jockvale Road will be extended south from the adjacent development to the north, Chapman Mills Drive will be extended west of Greenbank Road with the adjacent development to the north, and a new east-west road Street 'B' will be constructed along the south frontage with the adjacent project owner to connect to Greenbank Road. Two right-in/right-out accesses are proposed along Chapman Mills Road, with a signalized full movement intersection at Jockvale Road and Chapman Mills. Three local road intersections will connect to Street 'B'. The anticipated full build-out and occupancy horizon is 2025. The development is located within the Nepean Towncentre Design Priority and Community Design Plan area, and the Nepean Area 7 Secondary Plan area. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

Figure 1: Area Context Plan



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



NORTH

scale | 1:2000

### legend

- Rear Lane Town
- Back to Back Town
- Stacked Back to Back Town
- Apartment
- Park
- School
- Utility Corridor

### unit count

|                  |     |
|------------------|-----|
| Rear Lane Town   | 41  |
| B2B Town         | 76  |
| Stacked B2B Town | 312 |
| TOTAL            | 429 |

### parking count

|                  |     |
|------------------|-----|
| Parking Required | 312 |
| Parking Provided | 320 |



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MATTAMY | BARRHAVEN TOWN CENTRE

due diligence plan

VERSION 5 - SERVICED BLOCK / 4ac. SCHOOL SITE

date | 04 September 2019

## 2.2 Existing Conditions

### 2.2.1 Area Road Network

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

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

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

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

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

### 2.2.2 Existing Intersections

#### *Greenbank Road / Jockvale Road*

The intersection of Greenbank Road and Jockvale Road is a signalized intersection with shared all movement lanes on the north and east bound approaches. The southbound approach consists of an auxiliary left-turn lane and a shared through/right-turn lane, and the westbound approach consists of a shared left-turn/through lane and an auxiliary right-turn lane. No turn restrictions were noted.

#### *Greenbank Road / Marketplace Avenue*

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

#### *Strandherd Drive / Greenbank Road*

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

### 2.2.3 Existing Driveways

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

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

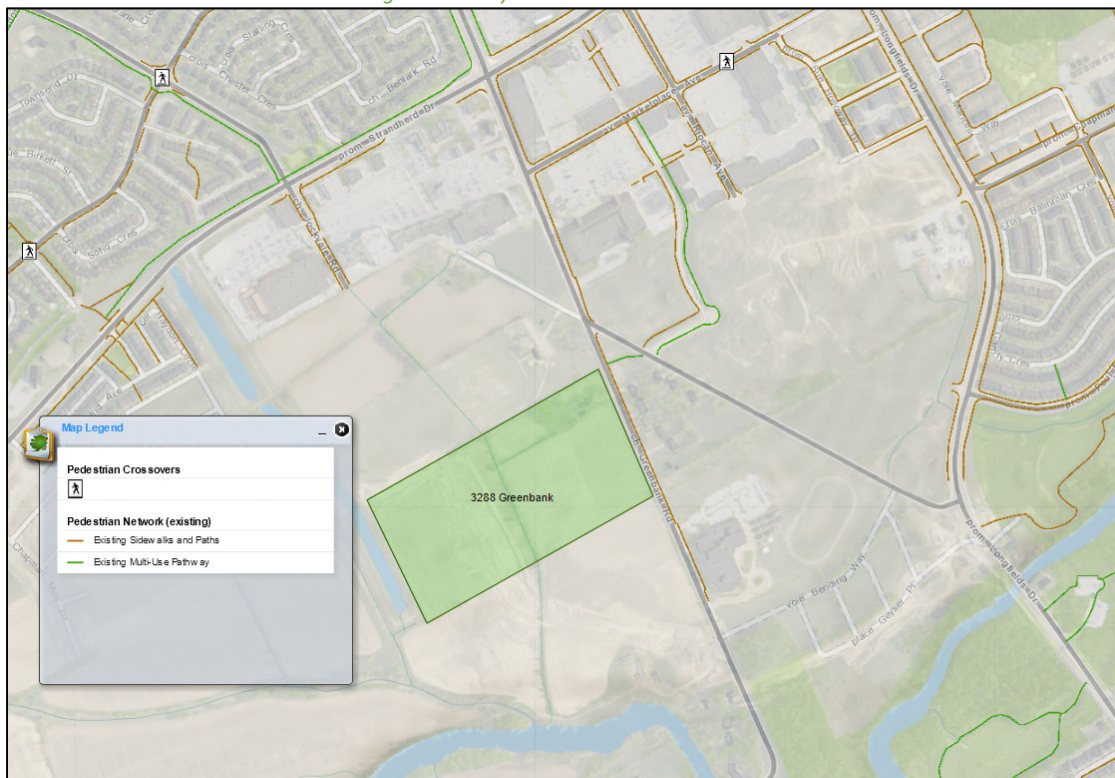
The On The Green golf range and mini putt access is located on Jockvale Road, west of Greenbank Road.

### 2.2.4 Cycling and Pedestrian Facilities

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

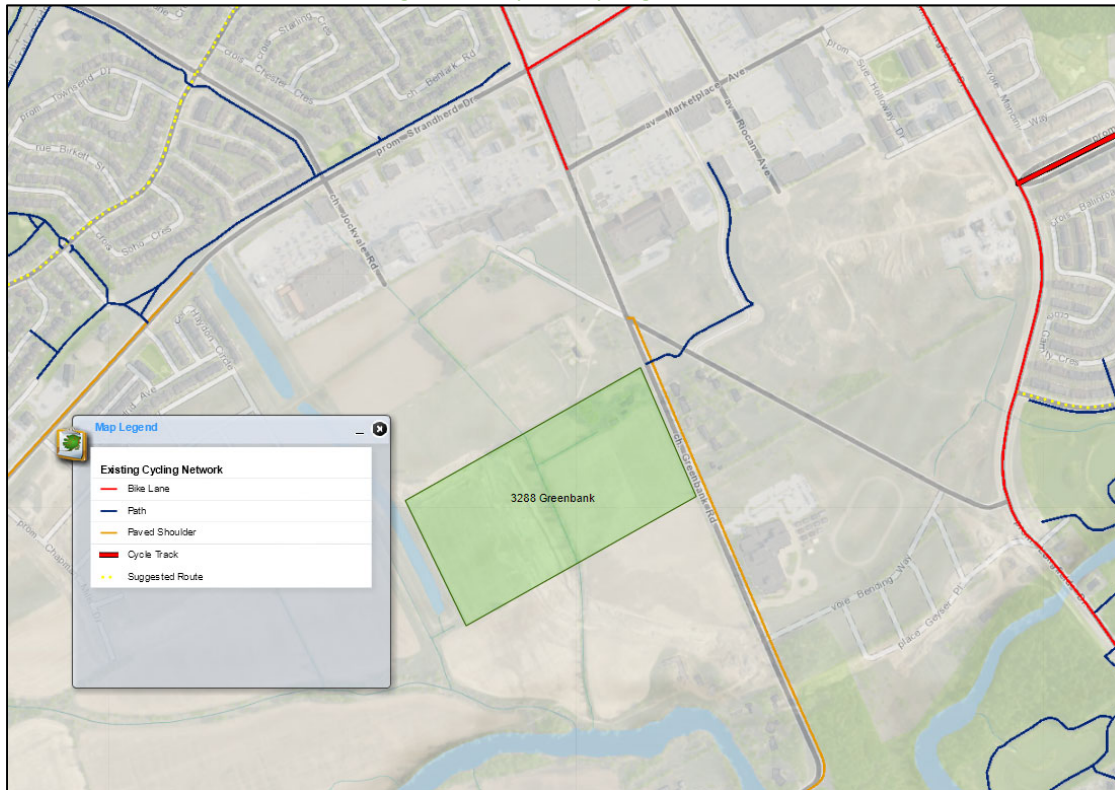
Sidewalks are provided along both sides of the roadways in the study area with a multi-use pathway on the north side of Strandherd Drive and along the Southwest Transitway. The cycling network consists of the bike lanes north and east of the Greenbank Road and Strandherd Drive intersection, the multi-use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

Figure 3: Study Area Pedestrian Facilities



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

Figure 4: Study Area Cycling Facilities



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

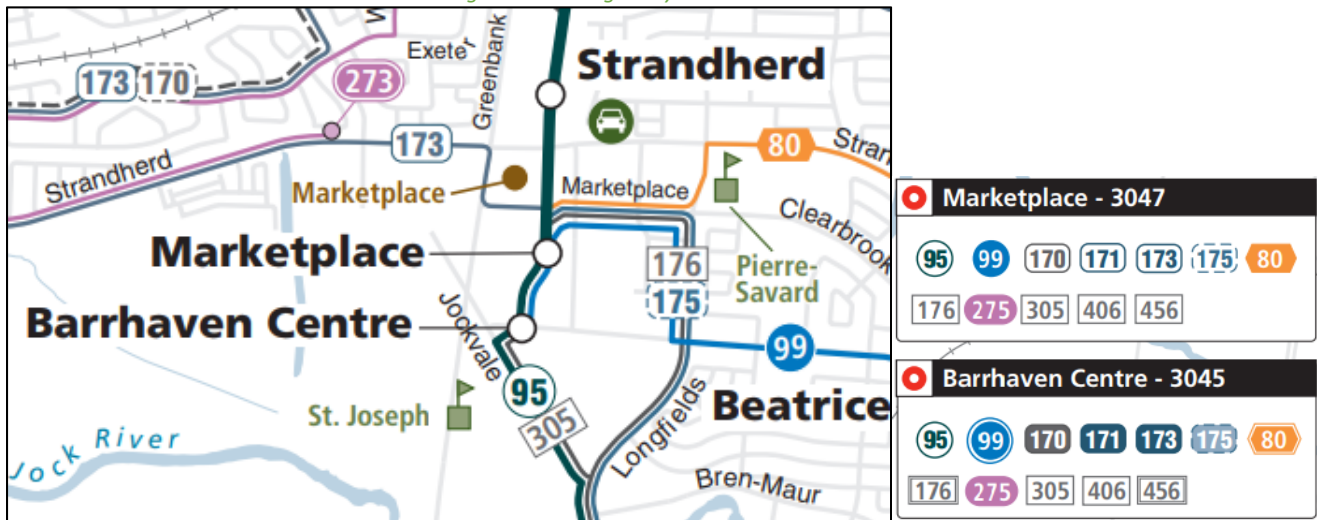
### 2.2.5 Existing Transit

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

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

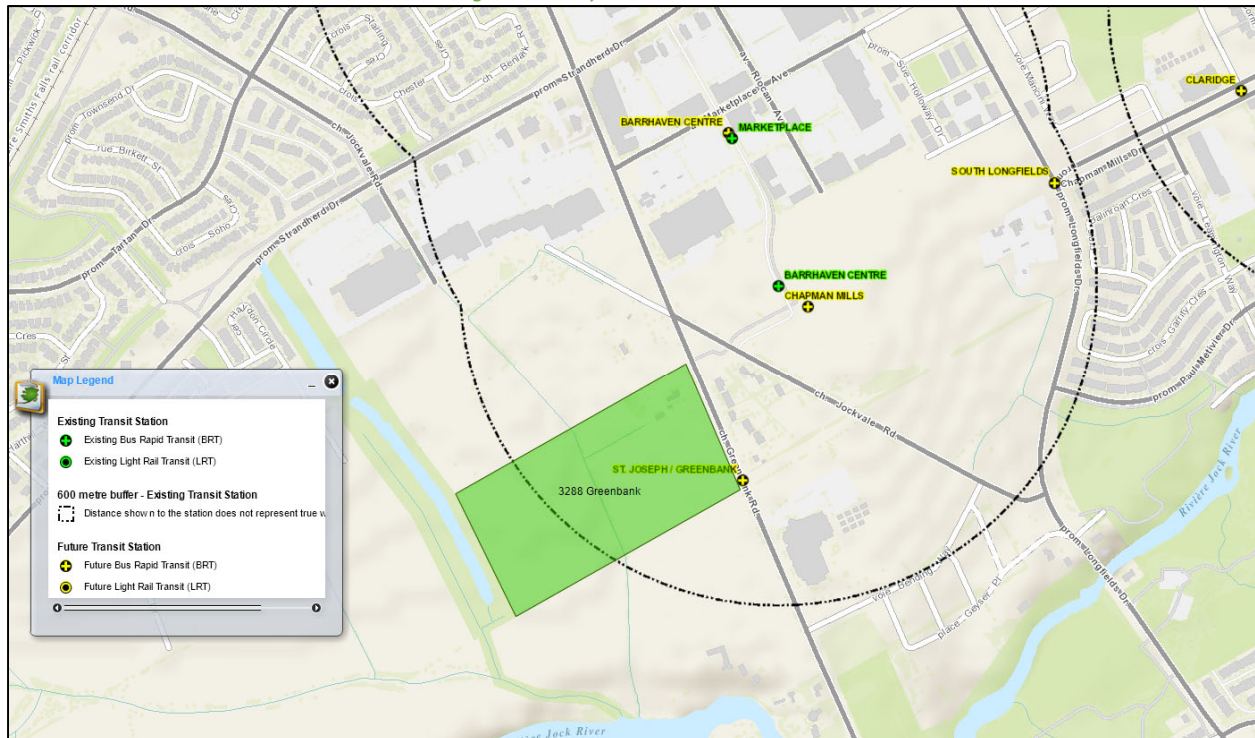
Figure 5 illustrates the transit system map in the study area and Figure 6 illustrates the walking distance for the Southwest Transitway. The existing Transitway stations are within the 600m walk distance for half the site, and the future Greenbank-St Joseph station will be directly adjacent to the proposed site.

Figure 5: Existing Study Area Transit Service



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

Figure 6: Study Area Transit Stations



Source: <http://maps.ottawa.ca/geoOttawa/> Accessed: August 21, 2019

## 2.2.6 Existing Area Traffic Management Measures

Greenbank Road has a school zone south of Jockvale Road for St. Joseph Highschool. The posted speed limit is 40km/h between the hours of 7:00-9:00AM, 11:30AM-1:00PM and 2:00-3:30PM on school days.

## 2.2.7 Existing Peak Hour Travel Demand

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

Table 1: Intersection Count Date

| Intersection                          | Count Date        |
|---------------------------------------|-------------------|
| Greenbank Road and Jockvale Road      | August 16, 2016   |
| Greenbank Road and Marketplace Avenue | February 10, 2016 |
| Strandherd Drive and Greenbank Road   | August 16, 2016   |

Figure 7 illustrates the existing traffic counts and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection. Detailed turning movement count data is included in Appendix B and the synchro worksheets are provided in Appendix C.

Figure 7: Existing Traffic Counts

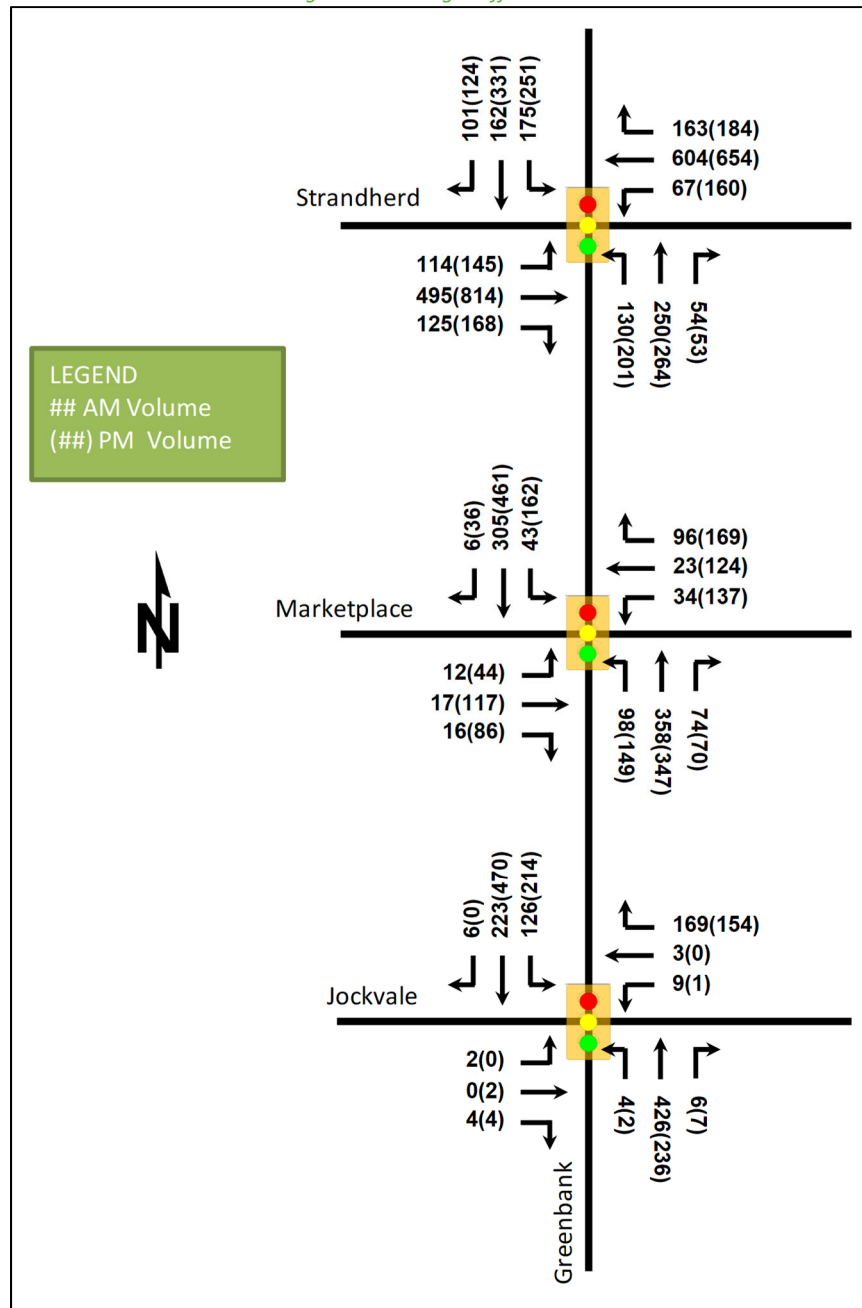


Table 2: Existing Intersection Operations

| Intersection                                                  | Lane           | AM Peak Hour |          |             |                       | PM Peak Hour |          |             |                       |
|---------------------------------------------------------------|----------------|--------------|----------|-------------|-----------------------|--------------|----------|-------------|-----------------------|
|                                                               |                | LOS          | V/C      | Delay       | Q (95 <sup>th</sup> ) | LOS          | V/C      | Delay       | Q (95 <sup>th</sup> ) |
| <b>Greenbank Road &amp; Jockvale Road<br/>Signalized</b>      | EB             | A            | 0.03     | 0.2         | 0.0                   | A            | 0.04     | 37.0        | 4.9                   |
|                                                               | WBL/T          | A            | 0.10     | 48.5        | 8.8                   | A            | 0.01     | 51.0        | 2.1                   |
|                                                               | WBR            | A            | 0.57     | 12.0        | 17.0                  | A            | 0.58     | 14.7        | 18.1                  |
|                                                               | NB             | A            | 0.37     | 8.6         | 95.5                  | A            | 0.20     | 4.6         | 38.8                  |
|                                                               | SBL            | A            | 0.19     | 3.2         | 6.9                   | A            | 0.25     | 1.7         | 13.4                  |
|                                                               | SBT/R          | A            | 0.16     | 1.9         | 11.0                  | A            | 0.31     | 1.6         | 36.2                  |
|                                                               | <b>Overall</b> | <b>A</b>     | <b>-</b> | <b>7.3</b>  | <b>-</b>              | <b>A</b>     | <b>-</b> | <b>4.3</b>  | <b>-</b>              |
| <b>Greenbank Road &amp; Marketplace Avenue<br/>Signalized</b> | EBL            | A            | 0.07     | 35.1        | 6.9                   | A            | 0.27     | 31.1        | 17.3                  |
|                                                               | EBT/R          | A            | 0.19     | 29.2        | 13.0                  | B            | 0.65     | 46.4        | 69.8                  |
|                                                               | WBL            | A            | 0.19     | 38.7        | 14.7                  | B            | 0.62     | 44.3        | 44.5                  |
|                                                               | WBT/R          | A            | 0.45     | 17.2        | 21.9                  | D            | 0.84     | 56.2        | #109.1                |
|                                                               | NBL            | B            | 0.61     | 65.6        | #64.2                 | D            | 0.84     | 85.5        | #83.8                 |
|                                                               | NBT/R          | A            | 0.24     | 11.7        | 41.1                  | A            | 0.33     | 21.7        | 45.1                  |
|                                                               | SBL            | A            | 0.25     | 62.2        | 13.1                  | A            | 0.58     | 63.5        | m34.3                 |
|                                                               | SBT/R          | A            | 0.19     | 14.6        | 28.6                  | A            | 0.41     | 21.2        | m44.3                 |
|                                                               | <b>Overall</b> | <b>C</b>     | <b>-</b> | <b>21.7</b> | <b>-</b>              | <b>D</b>     | <b>-</b> | <b>39.9</b> | <b>-</b>              |
| <b>Greenbank Road &amp; Strandherd Drive<br/>Signalized</b>   | EBL            | A            | 0.46     | 25.8        | 31.7                  | B            | 0.64     | 34.3        | 40.0                  |
|                                                               | EBT            | A            | 0.49     | 34.4        | 79.2                  | E            | 0.94     | 60.4        | #157.7                |
|                                                               | EBR            | A            | 0.24     | 5.2         | 13.2                  | A            | 0.34     | 6.3         | 17.3                  |
|                                                               | WBL            | A            | 0.23     | 21.7        | 20.1                  | D            | 0.84     | 59.4        | #68.2                 |
|                                                               | WBT            | B            | 0.67     | 40.8        | 100.4                 | C            | 0.75     | 44.3        | 110.2                 |
|                                                               | WBR            | A            | 0.32     | 6.3         | 17.2                  | A            | 0.35     | 6.2         | 18.2                  |
|                                                               | NBL            | A            | 0.50     | 70.6        | 30.6                  | B            | 0.61     | 69.4        | m42.5                 |
|                                                               | NBT/R          | A            | 0.36     | 30.6        | 34.4                  | A            | 0.39     | 25.8        | m28.2                 |
|                                                               | SBL            | A            | 0.58     | 57.9        | 35.3                  | B            | 0.69     | 58.9        | 48.4                  |
|                                                               | SBT            | A            | 0.18     | 31.9        | 27.8                  | A            | 0.38     | 36.3        | 55.5                  |
|                                                               | SBR            | A            | 0.20     | 3.0         | 6.8                   | A            | 0.26     | 5.9         | 13.8                  |
|                                                               | <b>Overall</b> | <b>C</b>     | <b>-</b> | <b>33.5</b> | <b>-</b>              | <b>D</b>     | <b>-</b> | <b>43.1</b> | <b>-</b>              |

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

The existing intersection operations generally operate satisfactorily during the peak hours, with the exception of the northbound left-turn movement at the Greenbank Road and Marketplace Avenue intersection.

The northbound left-turn at the Greenbank Road and Marketplace Avenue intersection may experience high delays with residual volume-to-capacity available for this movement. Greenbank Road provides space for a dual left-turn movement, but this will require modification to the Barrhaven Town Centre access, limiting the feasibility of this modification until redevelopment occurs.

### 2.2.8 Collision Analysis

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

Table 3: Study Area Collision Summary, 2013-2017

|                               |                             | Number     | %           |
|-------------------------------|-----------------------------|------------|-------------|
| <b>Total Collisions</b>       |                             | <b>224</b> | <b>100%</b> |
| <b>Classification</b>         | <b>Fatality</b>             | 0          | 0%          |
|                               | <b>Non-Fatal Injury</b>     | 47         | 21%         |
|                               | <b>Property Damage Only</b> | 177        | 79%         |
| <b>Initial Impact Type</b>    | <b>Approaching</b>          | 6          | 3%          |
|                               | <b>Angle</b>                | 16         | 7%          |
|                               | <b>Rear end</b>             | 114        | 51%         |
|                               | <b>Sideswipe</b>            | 28         | 13%         |
|                               | <b>Turning Movement</b>     | 40         | 18%         |
|                               | <b>SMV Unattended</b>       | 1          | 0%          |
|                               | <b>SMV Other</b>            | 17         | 8%          |
|                               | <b>Other</b>                | 2          | 1%          |
| <b>Road Surface Condition</b> | <b>Dry</b>                  | 146        | 65%         |
|                               | <b>Wet</b>                  | 44         | 20%         |
|                               | <b>Loose Snow</b>           | 16         | 7%          |
|                               | <b>Slush</b>                | 3          | 1%          |
|                               | <b>Packed Snow</b>          | 6          | 3%          |
|                               | <b>Ice</b>                  | 8          | 4%          |
|                               | <b>Unknown</b>              | 1          | 0%          |
| <b>Pedestrian Involved</b>    |                             | 2          | 1%          |
| <b>Cyclists Involved</b>      |                             | 5          | 2%          |

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

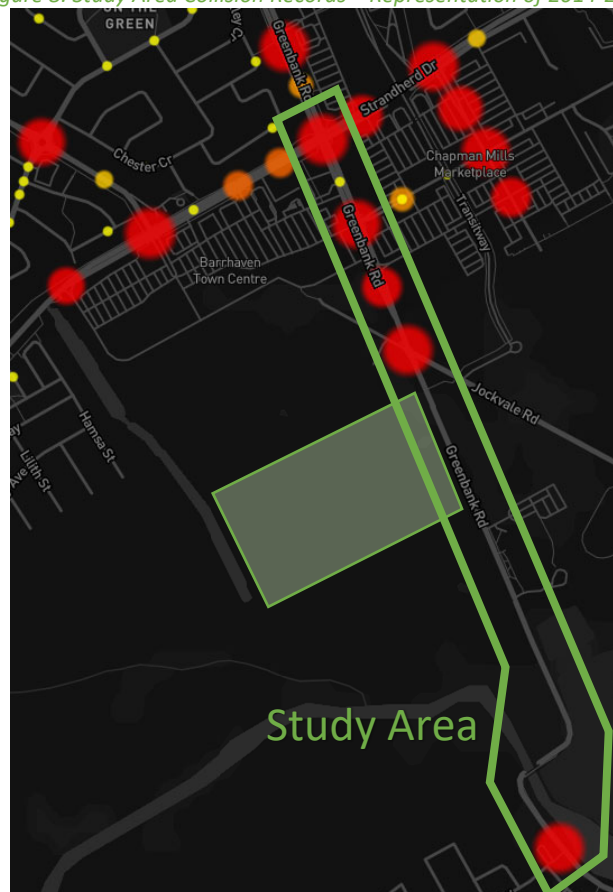


Table 4: Summary of Collision Locations

|                                                   | Number     | %           |
|---------------------------------------------------|------------|-------------|
| <b>Intersections / Segments</b>                   | <b>224</b> | <b>100%</b> |
| Greenbank Rd @ Jockvale Rd                        | 33         | 15%         |
| Greenbank Rd @ Marketplace Ave                    | 23         | 10%         |
| Greenbank Rd @ Strandherd Dr                      | 127        | 57%         |
| Greenbank Rd btwn Jockvale Rd & Cambrian Rd       | 29         | 13%         |
| Greenbank Rd btwn Marketplace Ave & Jockvale Rd   | 7          | 3%          |
| Greenbank Rd btwn Strandherd Dr & Marketplace Ave | 5          | 2%          |

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

Table 5: Greenbank Road at Strandherd Drive Collision Summary

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

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

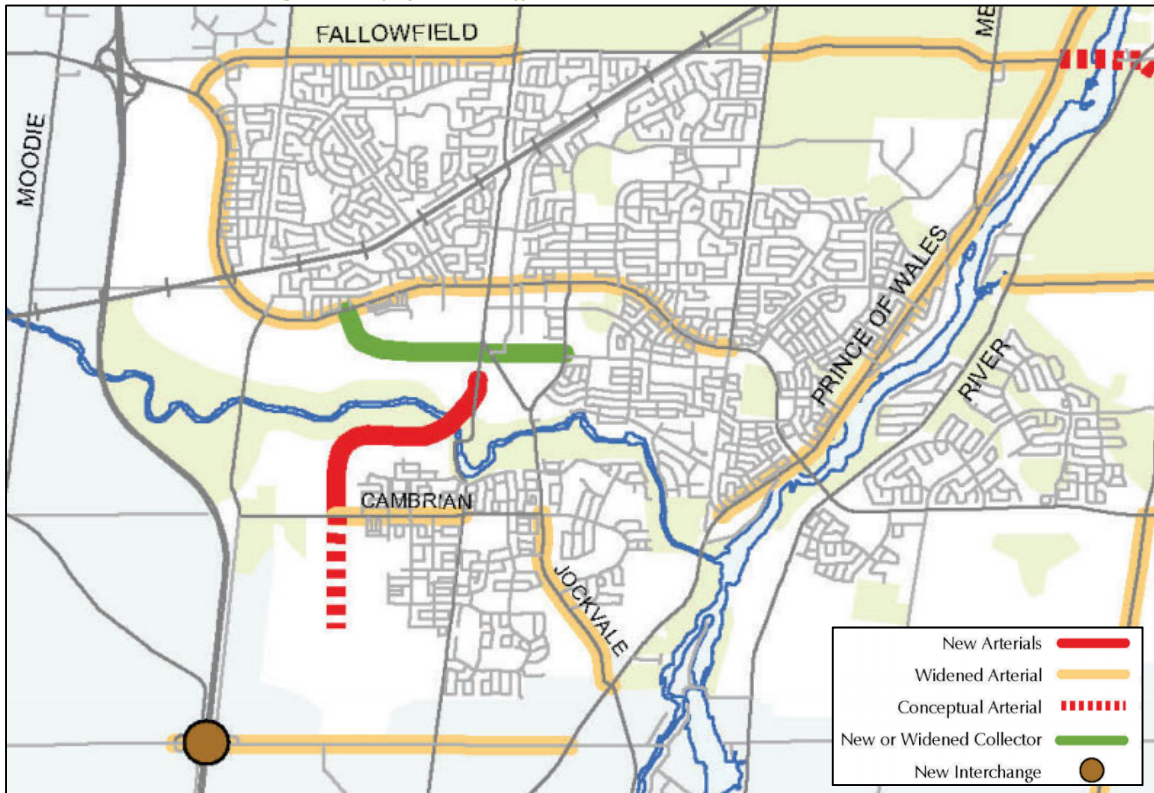
## 2.3 Planned Conditions

### 2.3.1 Changes to the Area Transportation Network

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

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

Figure 9: City of Ottawa Affordable Network – Barrhaven Context



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

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

### 2.3.2 Other Study Area Developments

#### 3195 Jockvale Road (Richcraft)

The development is proposed to be a mix of 210 stacked townhome units and approximately 200,000 sq. ft. of retail space, located between the Barrhaven Towncentre and the On The Green golf range. The development will extend Jockvale Road south of the Barrhaven Towncentre and include a new signalized intersection on Greenbank Road. It is estimated that the development will be constructed by 2026.

### *3311 Greenbank Road*

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

### *3201 Greenbank Road*

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

### *Barrhaven Towncentre – 3777 Strandherd Drive*

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

### *Burnett Lands – 3370 Greenbank Road (Claridge)*

The Burnett Lands are located south of the 3288 Greenbank Road development and is proposed to include 177 townhomes in Phase 1, 70 townhomes in Phase 2 and 720 condo units in Phase 3. Originally proposed to be completed by 2020, the plan of subdivision application is currently pending, and the Official Plan and Zoning By-Law Amendment have been adopted.

### *Barrhaven South – South of the Jock River*

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

## 3 Study Area and Time Periods

### 3.1 Study Area

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

The TIA guidelines requirement for all signals within a 1.0km radius of the site to be analyzed is recommended to be waived for this site at the signalized intersections located at:

- Strandherd Drive and Barrhaven Town Centre Access 210 metres west of Greenbank Road
- Strandherd Drive and Riocan Avenue
- Strandherd Drive and Jockvale Road
- Strandherd Drive and Andora Avenue
- Greenbank Road and Village Square Access
- Marketplace Avenue and SW Transitway
- Future Chapman Mills Drive signals:
  - At Strandherd Drive
  - On west side of Kennedy Burnett SWM Pond
  - Between Greenbank Road and Longfields Drive

The impact to these intersections is to be minimal (e.g. south of the site), will not be impacted by the site trips (e.g. Marketplace Avenue), or have through traffic only and with no turning movements having an undue effect on signal operations (e.g. Greenbank Road north of Strandherd Drive, or Strandherd Drive east and west of Greenbank Road).

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

### 3.2 Time Periods

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

### 3.3 Horizon Years

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

## 4 Exemption Review

Table 6 summarizes the exemptions for this TIA.

*Table 6: Exemption Review*

| Module                                      | Element                       | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                         | Exempt/Required |
|---------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Design Review Component</b>              |                               |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |
| <b>4.1 Development Design</b>               | 4.1.2 Circulation and Access  | Only required for site plans                                                                                                                                                                                                                                                                                                                                                                                                        | Exempt          |
|                                             | 4.2.3 New Street Networks     | Only required for plans of subdivision                                                                                                                                                                                                                                                                                                                                                                                              | Required        |
| <b>4.2 Parking</b>                          | 4.2.1 Parking Supply          | Only required for site plans                                                                                                                                                                                                                                                                                                                                                                                                        | Exempt          |
|                                             | 4.2.2 Spillover Parking       | Only required for site plans where parking supply is 15% below unconstrained demand                                                                                                                                                                                                                                                                                                                                                 | Exempt          |
| <b>Network Impact Component</b>             |                               |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |
| <b>4.5 Transportation Demand Management</b> | All Elements                  | Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time                                                                                                                                                                                                                                                                                                                  | Required        |
| <b>4.6 Neighbourhood Traffic Management</b> | 4.6.1 Adjacent Neighbourhoods | Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds                                                                                                                                                                                                                                                                                                 | Exempt          |
| <b>4.8 Network Concept</b>                  |                               | Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning<br><br>(Official Plan Amendment has been adopted to revise the land use designations, minimum building heights, permit 18.0m local roads, and realign the east-west local road. The area land-use designations are High Rise Residential and Mid Rise Residential) | Exempt          |

## 5 Development-Generated Travel Demand

### 5.1 Trip Generation and Mode Shares

This TIA has been prepared using the vehicle and person trip rates for the residential components using the TRANS Trip Generation Study Report (2009). Table 7 summarizes the person trip rates for the proposed land uses.

*Table 7: Trip Generation Person Trip Rates*

| Dwelling Type       | Land Use Code  | Peak Hour | Vehicle Trip Rate | Person Trip Rates |
|---------------------|----------------|-----------|-------------------|-------------------|
| Townhomes           | 224<br>(TRANS) | AM        | 0.54              | 0.98              |
|                     |                | PM        | 0.71              | 1.16              |
| Mid-Rise Apartments | 223<br>(TRANS) | AM        | 0.29              | 0.66              |
|                     |                | PM        | 0.37              | 0.84              |

Using the above Person Trip rates, the total person trip generation has been estimates. Table 8 below illustrates the total person trip generation by dwelling type.

*Table 8: Total Person Trip Generation*

| Land Use            | Units / GFA | AM Peak Hour |            |            | PM Peak Hour |            |            |
|---------------------|-------------|--------------|------------|------------|--------------|------------|------------|
|                     |             | In           | Out        | Total      | In           | Out        | Total      |
| Townhomes           | 429         | 155          | 265        | 420        | 264          | 234        | 498        |
| Mid-Rise Apartments | 328         | 52           | 164        | 216        | 171          | 105        | 276        |
| <b>Total</b>        |             | <b>207</b>   | <b>429</b> | <b>636</b> | <b>435</b>   | <b>339</b> | <b>774</b> |

Using the most recent National Capital Region Origin-Destination survey (OD Survey), the existing mode shares for South Nepean and target BRT area mode shares have been summarized in Table 9.

*Table 9: Mode Share*

| Travel Mode    | South Nepean | BRT Area    |
|----------------|--------------|-------------|
| Auto Driver    | 60%          | 40%         |
| Auto Passenger | 15%          | 15%         |
| Transit        | 15%          | 35%         |
| Non-Auto       | 10%          | 10%         |
| <b>Total</b>   | <b>100%</b>  | <b>100%</b> |

Using the above mode shares for a BRT area and person trip rates the person trips by mode have been projected. Table 10 summarizes the trip generation by mode.

*Table 10: Trip Generation by Mode*

| Travel Mode    | Mode Share  | AM Peak Hour |            |            | PM Peak Hour |            |            |
|----------------|-------------|--------------|------------|------------|--------------|------------|------------|
|                |             | In           | Out        | Total      | In           | Out        | Total      |
| Auto Driver    | 40%         | 83           | 172        | 254        | 174          | 136        | 309        |
| Auto Passenger | 15%         | 31           | 65         | 95         | 66           | 51         | 116        |
| Transit        | 35%         | 72           | 150        | 223        | 152          | 119        | 271        |
| Non-Auto Modes | 10%         | 21           | 43         | 64         | 43           | 34         | 78         |
| <b>Total</b>   | <b>100%</b> | <b>207</b>   | <b>429</b> | <b>636</b> | <b>435</b>   | <b>339</b> | <b>774</b> |

As shown above, 254 AM and 309 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

## 5.2 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the travel for the residential component patterns were applied based on the build-out of Barrhaven. Table 11 below summarizes the distributions.

*Table 11: OD Survey Existing Mode Share – South Nepean*

| To/From | Residential % of Trips |
|---------|------------------------|
| North   | 80%                    |
| South   | 5%                     |
| East    | 10%                    |
| West    | 5%                     |
| Total   | 100%                   |

## 5.3 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the Study Area road network. Figure 10 and Figure 11 illustrate the new site generated volumes.

Figure 10: 2025 New Site Generation Auto Volumes

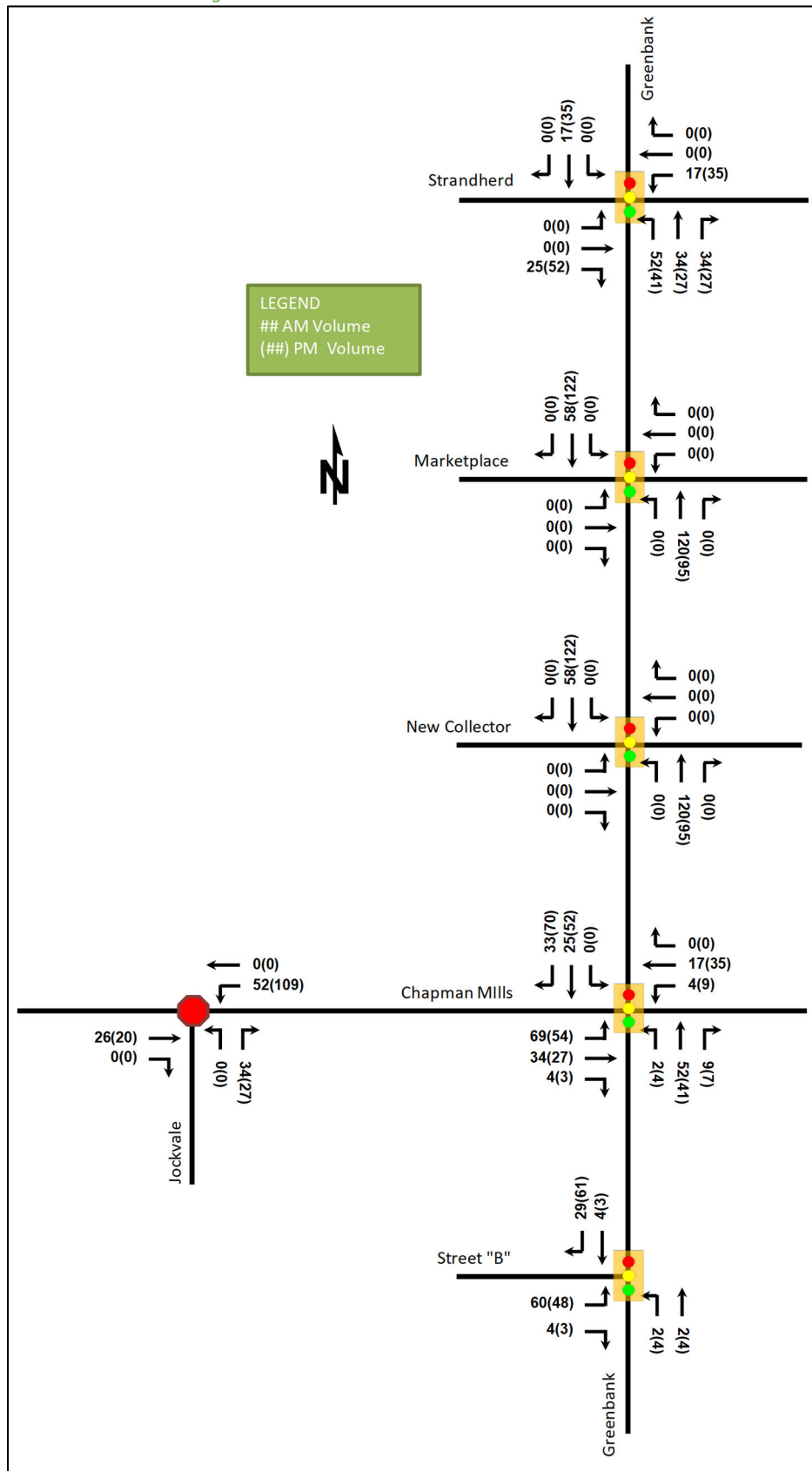
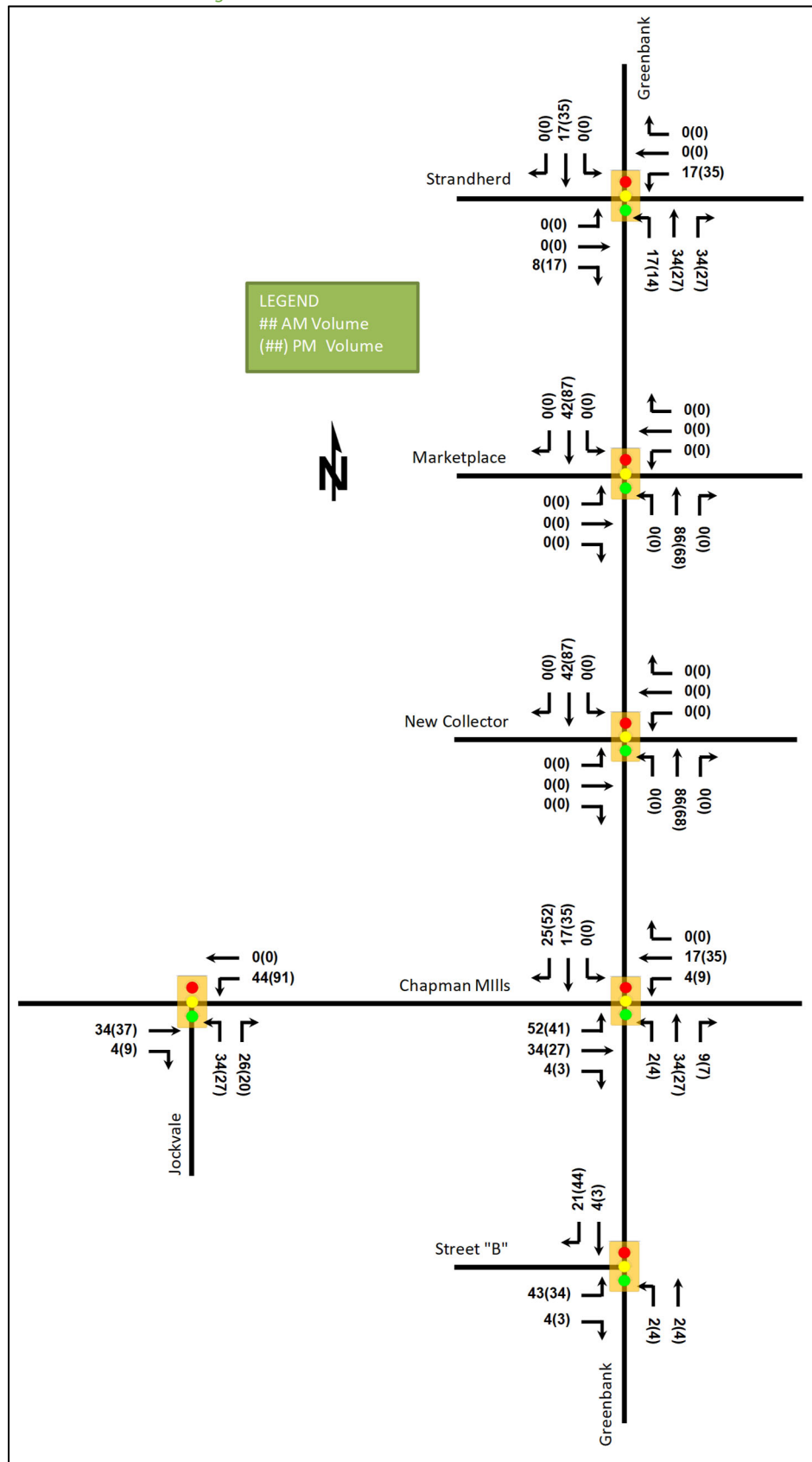


Figure 11: 2030 New Site Generation Auto Volumes



## 6 Background Network Travel Demands

### 6.1 Transportation Network Plans

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

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

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

*Figure 12: Chapman Mills Extension to Greenbank Road –2025 and 2030 Background Traffic Redistribution*

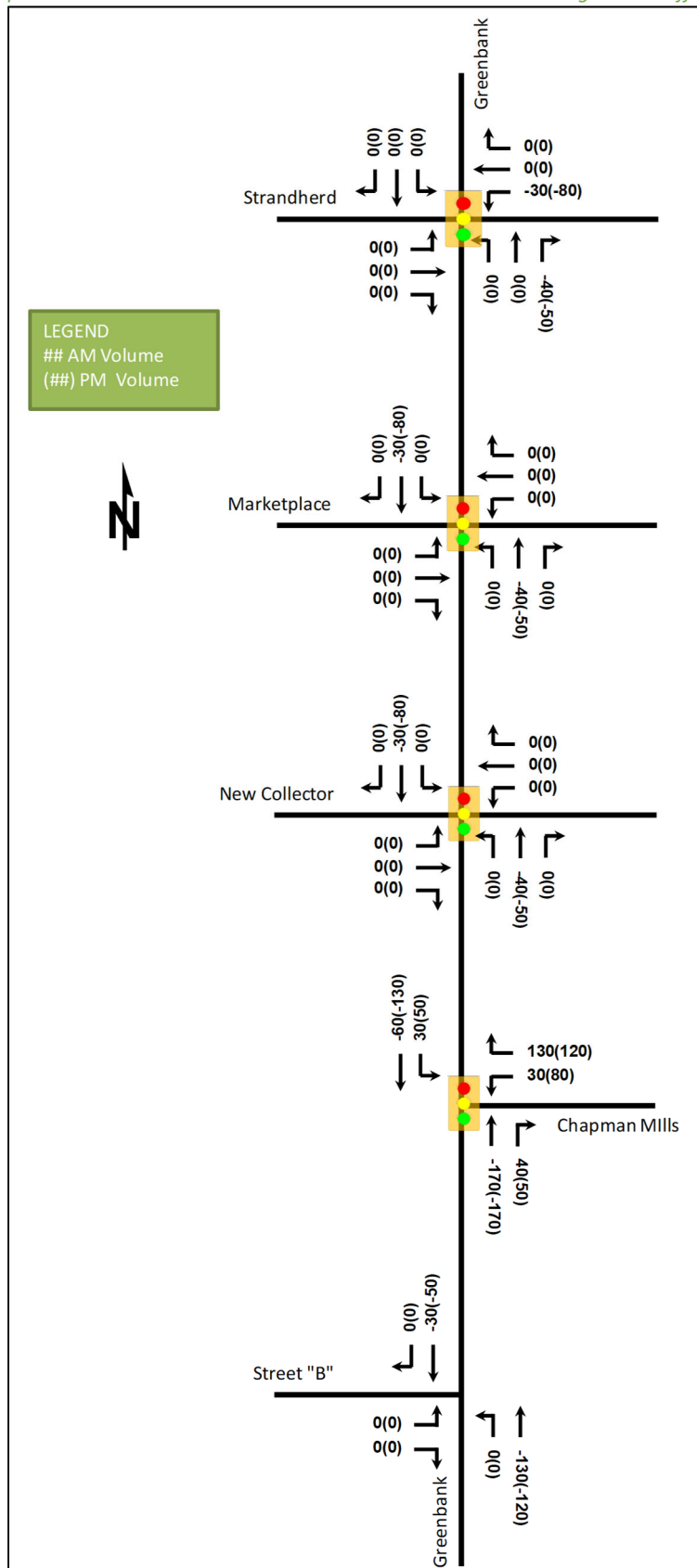
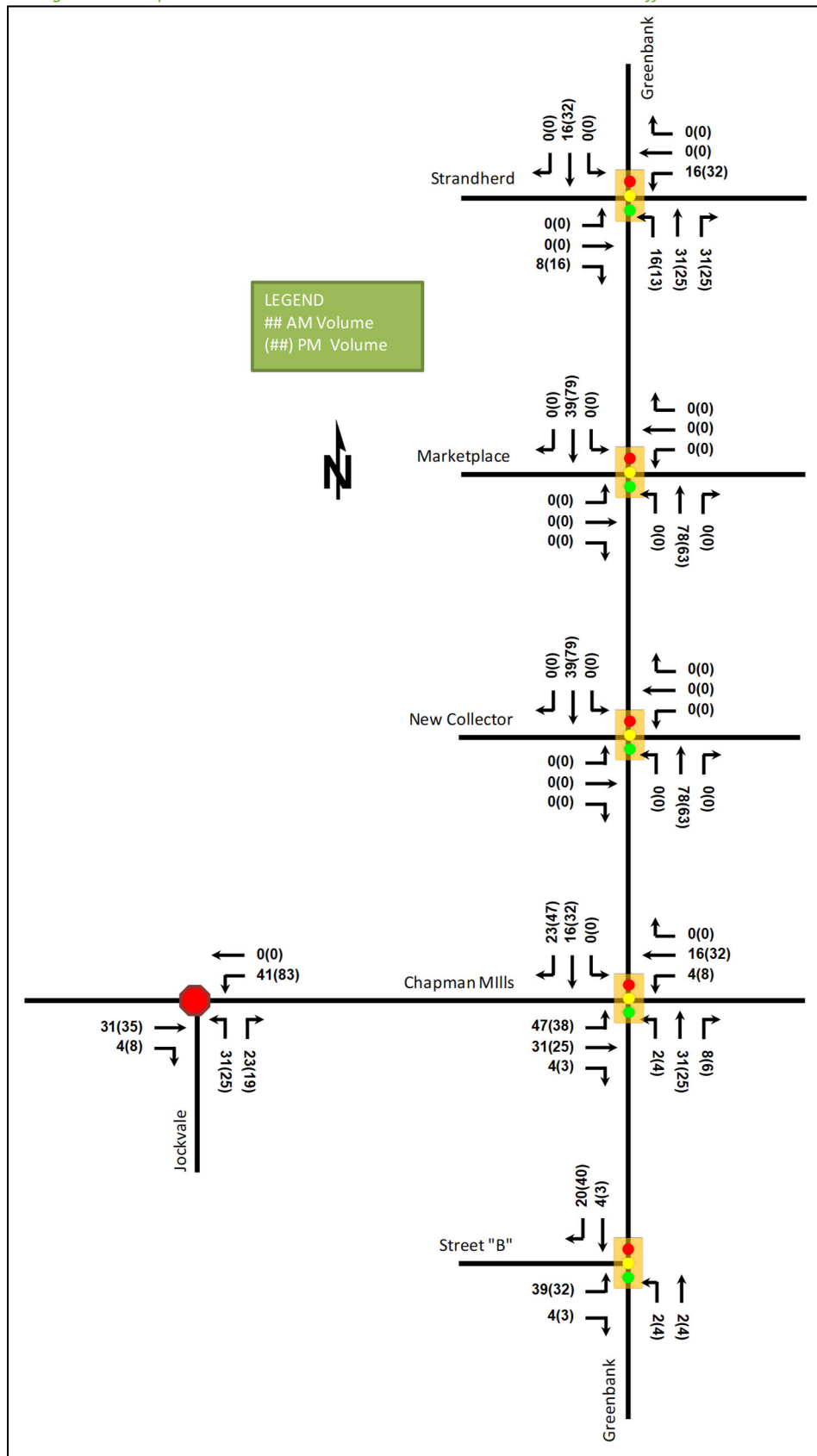


Figure 13: Chapman Mills Extension to Strandherd Drive – 2030 Total Traffic Redistribution



## 6.2 Background Growth

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

Figure 14 illustrates the 2025 background volumes and Table 12 summarizes the 2025 background intersection operations. Figure 15 illustrates the 2030 background volumes and Table 13 summarizes the 2030 background intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection, and for unsignalized intersections the level of service is based on HCM average delay

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

Figure 14: 2025 Future Background Volumes

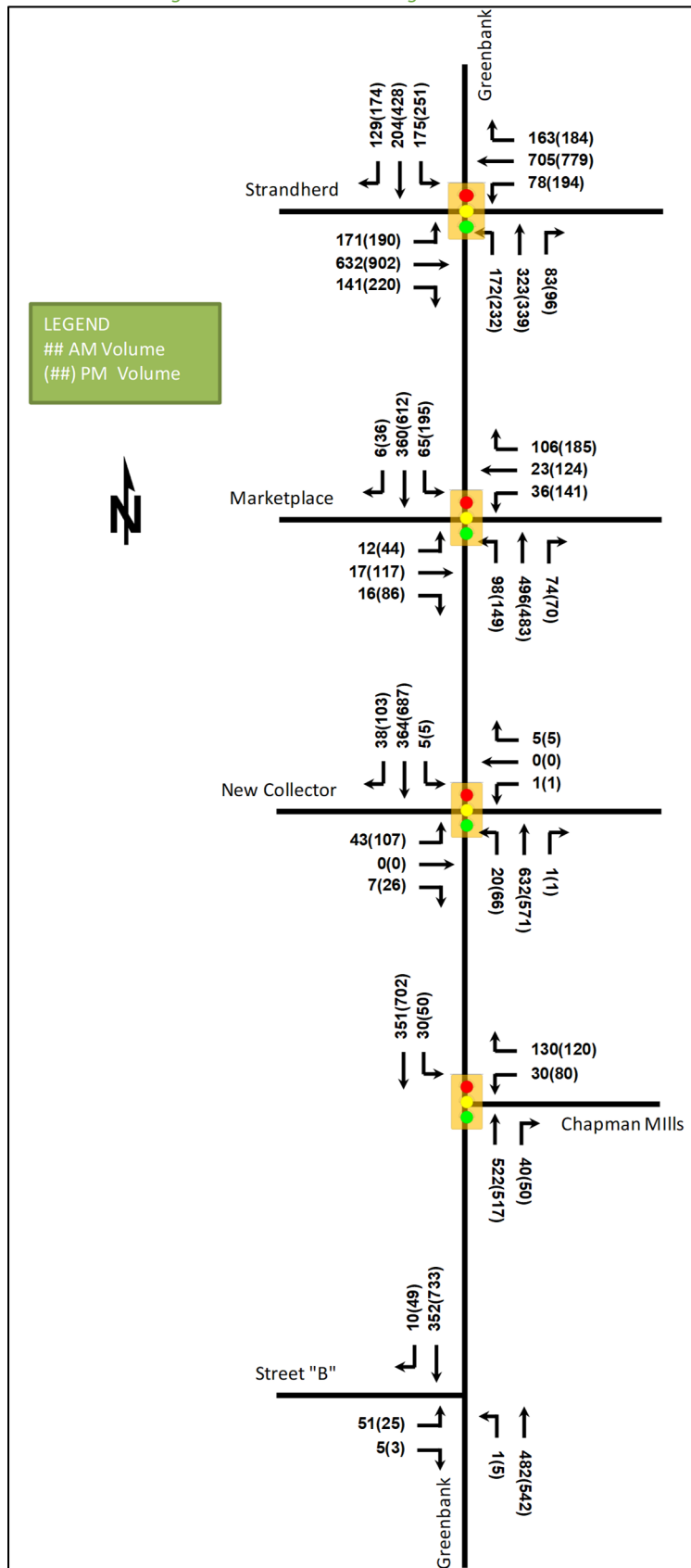


Table 12: 2025 Future Background Intersection Operations

| Intersection                                              | Lane           | AM Peak Hour |      |             |                       | PM Peak Hour |      |             |                       |
|-----------------------------------------------------------|----------------|--------------|------|-------------|-----------------------|--------------|------|-------------|-----------------------|
|                                                           |                | LOS          | V/C  | Delay       | Q (95 <sup>th</sup> ) | LOS          | V/C  | Delay       | Q (95 <sup>th</sup> ) |
| Greenbank Road & Strandherd Drive<br><i>Signalized</i>    | EBL            | B            | 0.63 | 31.7        | 41.5                  | C            | 0.80 | 48.1        | #61.4                 |
|                                                           | EBT            | A            | 0.56 | 36.0        | 92.7                  | E            | 0.95 | 61.0        | #157.2                |
|                                                           | EBR            | A            | 0.24 | 5.4         | 13.7                  | A            | 0.38 | 6.3         | 18.8                  |
|                                                           | WBL            | A            | 0.27 | 22.4        | 20.9                  | D            | 0.90 | 70.3        | #77.8                 |
|                                                           | WBT            | C            | 0.72 | 43.1        | 106.3                 | D            | 0.81 | 47.7        | 119.6                 |
|                                                           | WBR            | A            | 0.30 | 6.5         | 16.4                  | A            | 0.33 | 6.3         | 17.2                  |
|                                                           | NBL            | A            | 0.55 | 73.8        | 35.4                  | B            | 0.62 | 72.6        | m44.8                 |
|                                                           | NBT/R          | A            | 0.42 | 25.1        | 25.2                  | A            | 0.47 | 23.9        | 31.5                  |
|                                                           | SBL            | A            | 0.55 | 57.9        | 32.7                  | B            | 0.65 | 58.3        | 44.0                  |
|                                                           | SBT            | A            | 0.21 | 33.1        | 31.5                  | A            | 0.45 | 37.6        | 64.8                  |
|                                                           | SBR            | A            | 0.24 | 4.8         | 11.2                  | A            | 0.32 | 6.8         | 17.8                  |
|                                                           | <b>Overall</b> | <b>C</b>     | -    | <b>34.4</b> | -                     | <b>D</b>     | -    | <b>44.3</b> | -                     |
| Greenbank Road & Marketplace Avenue<br><i>Signalized</i>  | EBL            | A            | 0.06 | 34.8        | 6.6                   | A            | 0.24 | 30.8        | 16.0                  |
|                                                           | EBT/R          | A            | 0.17 | 29.1        | 12.1                  | B            | 0.61 | 44.6        | 62.1                  |
|                                                           | WBL            | A            | 0.18 | 38.6        | 14.0                  | A            | 0.56 | 41.5        | 41.5                  |
|                                                           | WBT/R          | A            | 0.44 | 16.9        | 21.0                  | D            | 0.82 | 53.6        | #93.5                 |
|                                                           | NBL            | B            | 0.61 | 68.2        | #53.9                 | C            | 0.78 | 77.7        | #71.4                 |
|                                                           | NBT/R          | A            | 0.28 | 13.2        | 63.9                  | A            | 0.38 | 24.3        | 68.1                  |
|                                                           | SBL            | A            | 0.32 | 63.1        | 16.5                  | B            | 0.61 | 63.4        | m36.1                 |
|                                                           | SBT/R          | A            | 0.19 | 13.7        | 28.9                  | A            | 0.46 | 20.7        | m49.7                 |
|                                                           | <b>Overall</b> | <b>C</b>     | -    | <b>21.6</b> | -                     | <b>D</b>     | -    | <b>37.3</b> | -                     |
| Greenbank Road & New Collector<br><i>Signalized</i>       | EBL            | A            | 0.22 | 33.6        | 13.5                  | A            | 0.48 | 39.5        | 28.4                  |
|                                                           | EBT/R          | A            | 0.01 | 0.0         | 0.0                   | A            | 0.05 | 0.2         | 0.0                   |
|                                                           | WB             | A            | 0.02 | 0.2         | 0.0                   | A            | 0.02 | 0.2         | 0.0                   |
|                                                           | NBL            | A            | 0.03 | 2.3         | 1.6                   | A            | 0.42 | 68.9        | 26.9                  |
|                                                           | NBT/R          | A            | 0.23 | 1.6         | 11.4                  | A            | 0.23 | 1.8         | 10.0                  |
|                                                           | SBL            | A            | 0.01 | 6.2         | 1.9                   | A            | 0.01 | 14.2        | 2.9                   |
|                                                           | SBT/R          | A            | 0.15 | 4.1         | 24.6                  | A            | 0.39 | 13.2        | 79.0                  |
|                                                           | <b>Overall</b> | <b>A</b>     | -    | <b>3.7</b>  | -                     | <b>B</b>     | -    | <b>13.0</b> | -                     |
| Greenbank Road & Chapman Mills Drive<br><i>Signalized</i> | WBL            | A            | 0.12 | 31.0        | 10.2                  | A            | 0.32 | 35.0        | 21.4                  |
|                                                           | WBR            | A            | 0.39 | 8.9         | 12.5                  | A            | 0.37 | 8.7         | 12.1                  |
|                                                           | NBT/R          | A            | 0.28 | 11.6        | 55.2                  | A            | 0.31 | 13.1        | 55.4                  |
|                                                           | SBL            | A            | 0.23 | 50.3        | 15.4                  | A            | 0.41 | 42.5        | 25.0                  |
|                                                           | SBT            | A            | 0.29 | 6.4         | 29.2                  | A            | 0.58 | 18.5        | 147.2                 |
|                                                           | <b>Overall</b> | <b>B</b>     | -    | <b>11.2</b> | -                     | <b>B</b>     | -    | <b>17.5</b> | -                     |
| Greenbank Road & Street "B"<br><i>Unsignalized</i>        | EBL/R          | C            | 0.16 | 17.3        | 0.6                   | D            | 0.15 | 27.9        | 0.5                   |
|                                                           | NBL            | A            | 0.00 | 8.0         | 0.0                   | A            | 0.01 | 9.3         | 0.0                   |
|                                                           | NBT            | -            | -    | -           | -                     | -            | -    | -           | -                     |
|                                                           | SBT/R          | -            | -    | -           | -                     | -            | -    | -           | -                     |
|                                                           | <b>Overall</b> | <b>A</b>     | -    | <b>1.1</b>  | -                     | <b>A</b>     | -    | <b>0.6</b>  | -                     |

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

The intersection operations for the 2025 future background horizon generally operate satisfactorily during the peak hours. The peak hour factor adjustments for future horizons account for the increase in intersection operations (e.g. lower delays and volume-to-capacity ratios). The eastbound through and westbound left-turn movements at the Greenbank Road and Strandherd Drive intersection are noted to have a volume-to-capacity ratio of 0.90 or higher during the PM peak.

Figure 15: 2030 Future Background Volumes

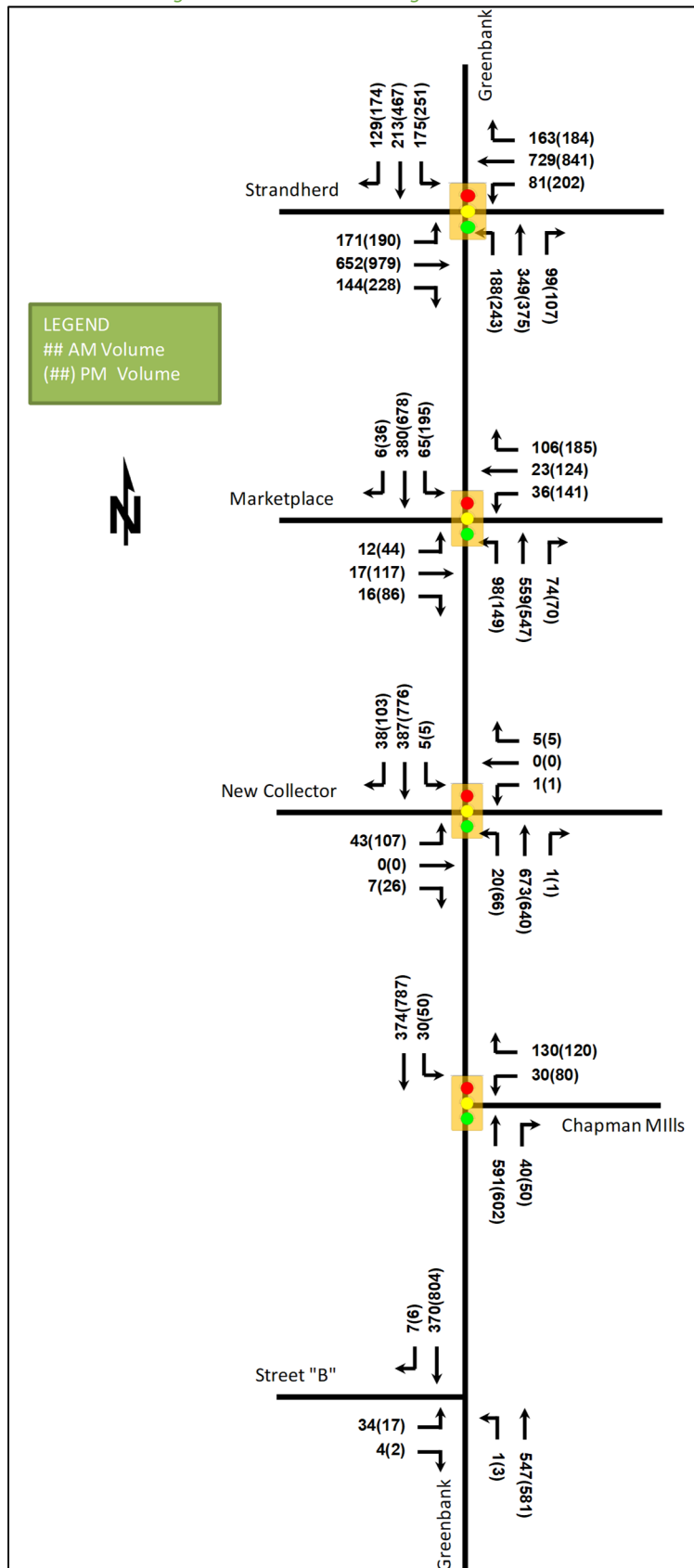


Table 13: 2030 Future Background Intersection Operations

| Intersection                                              | Lane           | AM Peak Hour |      |             |                       | PM Peak Hour |             |             |                       |
|-----------------------------------------------------------|----------------|--------------|------|-------------|-----------------------|--------------|-------------|-------------|-----------------------|
|                                                           |                | LOS          | V/C  | Delay       | Q (95 <sup>th</sup> ) | LOS          | V/C         | Delay       | Q (95 <sup>th</sup> ) |
| Greenbank Road & Strandherd Drive<br><i>Signalized</i>    | EBL            | B            | 0.65 | 32.8        | 41.5                  | E            | 0.86        | 60.7        | #72.4                 |
|                                                           | EBT            | A            | 0.58 | 36.5        | 96.3                  | <b>F</b>     | <b>1.03</b> | <b>78.5</b> | <b>#178.6</b>         |
|                                                           | EBR            | A            | 0.25 | 5.7         | 14.5                  | A            | 0.39        | 6.3         | 19.0                  |
|                                                           | WBL            | A            | 0.29 | 22.7        | 21.6                  | E            | 0.94        | 78.2        | #82.9                 |
|                                                           | WBT            | C            | 0.74 | 44.0        | 110.5                 | D            | 0.88        | 52.9        | #139.8                |
|                                                           | WBR            | A            | 0.30 | 6.5         | 16.4                  | A            | 0.33        | 6.3         | 17.2                  |
|                                                           | NBL            | A            | 0.57 | 73.4        | 38.0                  | B            | 0.64        | 74.2        | m46.7                 |
|                                                           | NBT/R          | A            | 0.47 | 25.1        | 26.2                  | A            | 0.52        | 23.7        | 30.9                  |
|                                                           | SBL            | A            | 0.55 | 57.9        | 32.7                  | B            | 0.65        | 58.3        | 44.0                  |
|                                                           | SBT            | A            | 0.22 | 33.7        | 33.0                  | A            | 0.50        | 38.6        | 71.0                  |
|                                                           | SBR            | A            | 0.24 | 4.9         | 11.3                  | A            | 0.32        | 6.9         | 17.8                  |
|                                                           | <b>Overall</b> | <b>C</b>     | -    | <b>35.0</b> | -                     | <b>D</b>     | -           | <b>50.6</b> | -                     |
| Greenbank Road & Marketplace Avenue<br><i>Signalized</i>  | EBL            | A            | 0.06 | 34.8        | 6.6                   | A            | 0.24        | 30.8        | 16.0                  |
|                                                           | EBT/R          | A            | 0.17 | 29.2        | 12.1                  | B            | 0.61        | 44.6        | 62.1                  |
|                                                           | WBL            | A            | 0.18 | 38.6        | 14.0                  | A            | 0.56        | 41.5        | 41.5                  |
|                                                           | WBT/R          | A            | 0.44 | 16.8        | 21.0                  | D            | 0.82        | 53.6        | #93.5                 |
|                                                           | NBL            | B            | 0.61 | 68.2        | #53.9                 | C            | 0.78        | 77.7        | #71.4                 |
|                                                           | NBT/R          | A            | 0.31 | 13.6        | 72.4                  | A            | 0.43        | 25.1        | 77.2                  |
|                                                           | SBL            | A            | 0.32 | 62.4        | 16.8                  | B            | 0.61        | 63.2        | m35.9                 |
|                                                           | SBT/R          | A            | 0.20 | 13.8        | 30.5                  | A            | 0.51        | 20.7        | m53.2                 |
|                                                           | <b>Overall</b> | <b>C</b>     | -    | <b>21.3</b> | -                     | <b>D</b>     | -           | <b>36.7</b> | -                     |
| Greenbank Road & New Collector<br><i>Signalized</i>       | EBL            | A            | 0.28 | 41.4        | 17.3                  | A            | 0.55        | 46.1        | 33.2                  |
|                                                           | EBT/R          | A            | 0.03 | 0.3         | 0.0                   | A            | 0.05        | 0.2         | 0.0                   |
|                                                           | WB             | A            | 0.03 | 0.3         | 0.0                   | A            | 0.02        | 0.2         | 0.0                   |
|                                                           | NBL            | A            | 0.03 | 3.0         | 2.6                   | A            | 0.40        | 61.6        | 26.9                  |
|                                                           | NBT/R          | A            | 0.24 | 2.8         | 24.1                  | A            | 0.25        | 1.4         | 8.3                   |
|                                                           | WBL            | A            | 0.01 | 3.2         | 1.0                   | A            | 0.01        | 11.8        | 2.4                   |
|                                                           | SBT/R          | A            | 0.15 | 2.5         | 14.2                  | A            | 0.43        | 12.5        | 77.1                  |
|                                                           | <b>Overall</b> | <b>A</b>     | -    | <b>4.1</b>  | -                     | <b>B</b>     | -           | <b>12.1</b> | -                     |
| Greenbank Road & Chapman Mills Drive<br><i>Signalized</i> | WBL            | A            | 0.16 | 36.4        | 11.3                  | A            | 0.31        | 35.0        | 21.4                  |
|                                                           | WBR            | A            | 0.46 | 11.4        | 13.4                  | A            | 0.37        | 8.7         | 12.1                  |
|                                                           | NBT/R          | A            | 0.29 | 9.6         | 60.1                  | A            | 0.32        | 10.7        | 59.3                  |
|                                                           | SBL            | A            | 0.24 | 46.1        | 14.6                  | A            | 0.37        | 44.7        | 22.3                  |
|                                                           | SBT            | A            | 0.29 | 6.0         | 56.7                  | B            | 0.63        | 17.1        | 123.7                 |
|                                                           | <b>Overall</b> | <b>B</b>     | -    | <b>10.3</b> | -                     | <b>B</b>     | -           | <b>15.7</b> | -                     |
| Greenbank Road & Street "B"<br><i>Unsignalized</i>        | EBL/R          | C            | 0.12 | 17.9        | 0.4                   | D            | 0.12        | 29.6        | 0.4                   |
|                                                           | NBL            | A            | 0.00 | 8.1         | 0.0                   | A            | 0.00        | 9.4         | 0.0                   |
|                                                           | NBT            | -            | -    | -           | -                     | -            | -           | -           | -                     |
|                                                           | SBT/R          | -            | -    | -           | -                     | -            | -           | -           | -                     |
|                                                           | <b>Overall</b> | <b>A</b>     | -    | <b>0.7</b>  | -                     | <b>A</b>     | -           | <b>0.4</b>  | -                     |

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

The intersection operations for the 2030 future background horizon generally operate satisfactorily during the peak hours with the exception of the eastbound through movement during the PM peak at the Greenbank Road and Strandherd Drive intersection. An additional 2 seconds of green time is required to reduce the volume-to-capacity to below 1.00, potentially coming from the westbound left (0.5 seconds) and north/south bound through (1.5 seconds) movements. Any changes will need to be coordinated along the Strandherd Drive and

Greenbank Road corridors. The Greenbank Road and Strandherd Drive intersection westbound left-turn movement is also noted to have a volume-to-capacity ratio higher than 0.90 during the PM peak.

### 6.3 Other Developments

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

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

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

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

## 7 Demand Rationalization

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

## 8 Development Design

### 8.1 Design for Sustainable Modes

The proposed development is a residential subdivision and the auto parking areas will be located adjacent to the stacked townhomes with a total of 320 parking spaces or one per unit. The apartments will include meet bylaw requirements with a combination of surface and underground parking, and bicycle parking. Bicycle parking for the townhomes is assumed to be within the individual units. Figure 16 illustrates the pedestrian and cycling network.

Figure 16: Concept Pedestrian and Cycling Network



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

## 8.2 New Street Networks

The new streets proposed as part of the plan of subdivision include the extension of Jockvale Road, Chapman Mills Drive, and a new collector road along the southern edge of the property. The Jockvale Road is proposed as a 24.0 metre collector road to support pedestrian, cycling, and transit modes. Chapman Mills Drive cross-section will be consistent with the Chapman Mills Drive Environmental Assessment.

Traffic calming elements are recommended at the internal intersections, including bulb-outs to narrow each approach to the intersection (e.g. reduced crossing distance). Figure 17 illustrates the proposed locations.

Figure 17: Concept Traffic Calming Plan



## 9 Boundary Street Design

Table 14 summarizes the MMLOS analysis for the boundary road of Greenbank Road, existing and future, and the future collector roads of Chapman Mills Drive and Street B. The existing and future conditions have been summarized in separate rows. The future conditions of Greenbank Road are based on the existing four-lane divided cross section to the north. The MMLOS targets are based on the policy area of within 600m of a rapid transit station and 300m of a school. The MMLOS worksheet has been provided in Appendix H.

Table 14: Boundary Street MMLOS Analysis

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

Existing Greenbank Road does not meet the pedestrian and cycling MMLOS targets. The current cross-section is a two-lane rural cross-section, and as such, it is understandable why these targets are not met in this location. With the extension of the urban cross-section of Greenbank Road, the bicycle level of service will increase although it will be below the target, and the pedestrian target will continue to not be met. The City would need to provide separated cycling facilities would be required to reach a level of service A. The travel speed and volumes along Greenbank Road are the primary influence on the pedestrian LOS and will not be met along any arterial.

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

## 10 Access Intersections Design

### 10.1 Location and Design of Access

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

### 10.2 Intersection Control

The Greenbank Road and Chapman Mills Drive intersection will be signalized, as per the Chapman Mills Drive EA Study, and the Greenbank Road and Street B intersection will be signalized, based on operational constraints.

### 10.3 Access Intersection Design

#### 10.3.1 2025 Future Total Access Intersection Operations

The 2025 future total intersection volumes are illustrated above in Figure 18 and the access intersection operations are summarized below in Table 15. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection, and for unsignalized intersections the level of service is based on HCM average delay. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix I.

Figure 18: 2025 Future Total Volumes

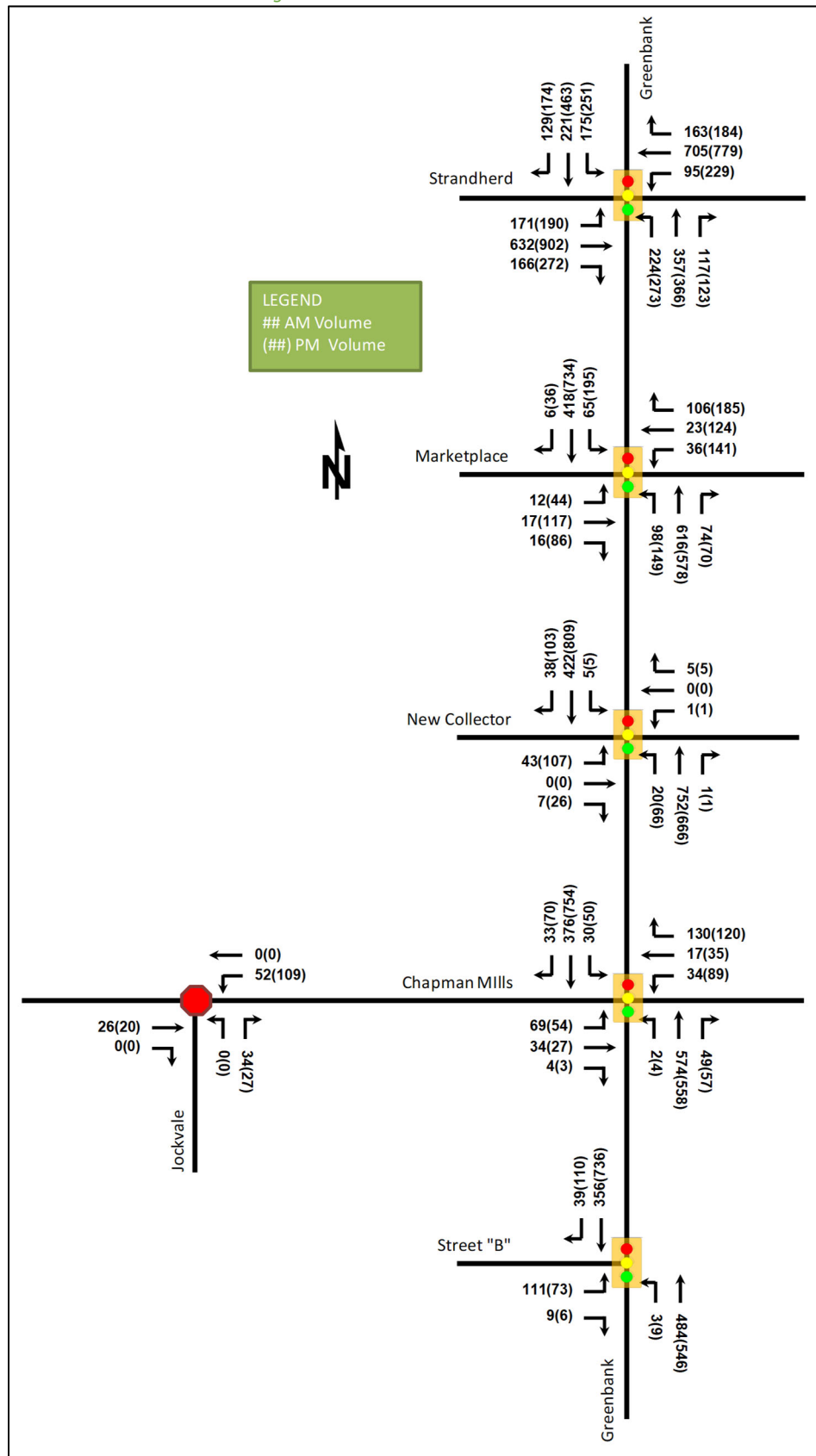


Table 15: 2025 Future Total Access Intersection Operations

| Intersection                                                    | Lane           | AM Peak Hour |          |             |                       | PM Peak Hour |          |             |                       |
|-----------------------------------------------------------------|----------------|--------------|----------|-------------|-----------------------|--------------|----------|-------------|-----------------------|
|                                                                 |                | LOS          | V/C      | Delay       | Q (95 <sup>th</sup> ) | LOS          | V/C      | Delay       | Q (95 <sup>th</sup> ) |
| <b>Greenbank Road &amp; Chapman Mills Drive<br/>Signalized</b>  | EBL            | A            | 0.38     | 37.8        | 19.9                  | A            | 0.34     | 37.1        | 16.7                  |
|                                                                 | EBT            | A            | 0.12     | 30.2        | 11.3                  | A            | 0.10     | 30.0        | 9.7                   |
|                                                                 | EBR            | A            | 0.01     | 0.0         | 0.0                   | A            | 0.01     | 0.0         | 0.0                   |
|                                                                 | WBL            | A            | 0.17     | 31.5        | 11.5                  | A            | 0.42     | 37.9        | 24.1                  |
|                                                                 | WBT/R          | A            | 0.43     | 11.0        | 15.7                  | A            | 0.44     | 13.0        | 18.7                  |
|                                                                 | NBL            | A            | 0.00     | 14.5        | 1.7                   | A            | 0.01     | 13.8        | 2.6                   |
|                                                                 | NBT/R          | A            | 0.32     | 12.2        | 61.2                  | A            | 0.32     | 11.9        | 57.4                  |
|                                                                 | SBL            | A            | 0.23     | 49.6        | 15.5                  | A            | 0.36     | 60.2        | 22.2                  |
|                                                                 | SBT            | A            | 0.31     | 6.9         | 32.9                  | B            | 0.62     | 10.7        | 66.0                  |
|                                                                 | SBR            | A            | 0.03     | 1.6         | 1.9                   | A            | 0.07     | 0.4         | 0.5                   |
|                                                                 | <b>Overall</b> | <b>B</b>     | <b>-</b> | <b>13.4</b> | <b>-</b>              | <b>B</b>     | <b>-</b> | <b>14.6</b> | <b>-</b>              |
| <b>Greenbank Road &amp; Street "B"<br/>Signalized</b>           | EBL/R          | A            | 0.49     | 37.7        | 31.7                  | A            | 0.39     | 40.3        | 25.1                  |
|                                                                 | NBL            | A            | 0.00     | 3.7         | 0.9                   | A            | 0.02     | 3.0         | 1.5                   |
|                                                                 | NBT            | A            | 0.35     | 4.9         | 44.9                  | A            | 0.39     | 4.3         | 46.2                  |
|                                                                 | SBT/R          | A            | 0.29     | 4.4         | 34.1                  | A            | 0.61     | 7.2         | 98.4                  |
|                                                                 | <b>Overall</b> | <b>A</b>     | <b>-</b> | <b>8.6</b>  | <b>-</b>              | <b>A</b>     | <b>-</b> | <b>7.8</b>  | <b>-</b>              |
| <b>Jockvale Road &amp; Chapman Mills Drive<br/>Unsignalized</b> | EBT/R          | A            | 0.03     | 7.2         | 0.1                   | A            | 0.02     | 7.2         | 0.1                   |
|                                                                 | WBL            | A            | 0.06     | 7.5         | 0.2                   | A            | 0.13     | 7.8         | 0.4                   |
|                                                                 | NBR            | A            | 0.03     | 6.6         | 0.1                   | A            | 0.03     | 6.7         | 0.1                   |
|                                                                 | <b>Overall</b> | <b>A</b>     | <b>-</b> | <b>7.2</b>  | <b>-</b>              | <b>A</b>     | <b>-</b> | <b>7.5</b>  | <b>-</b>              |

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

The access intersection operations for the 2025 future total horizon generally operate satisfactorily during the peak hour. No capacity issues are noted.

### 10.3.2 2030 Future Total Access Intersection Operations

The 2030 future total intersection volumes are illustrated above in Figure 19 and the access intersection operations are summarized below in Table 16. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix J.

Figure 19: 2030 Future Total Volumes

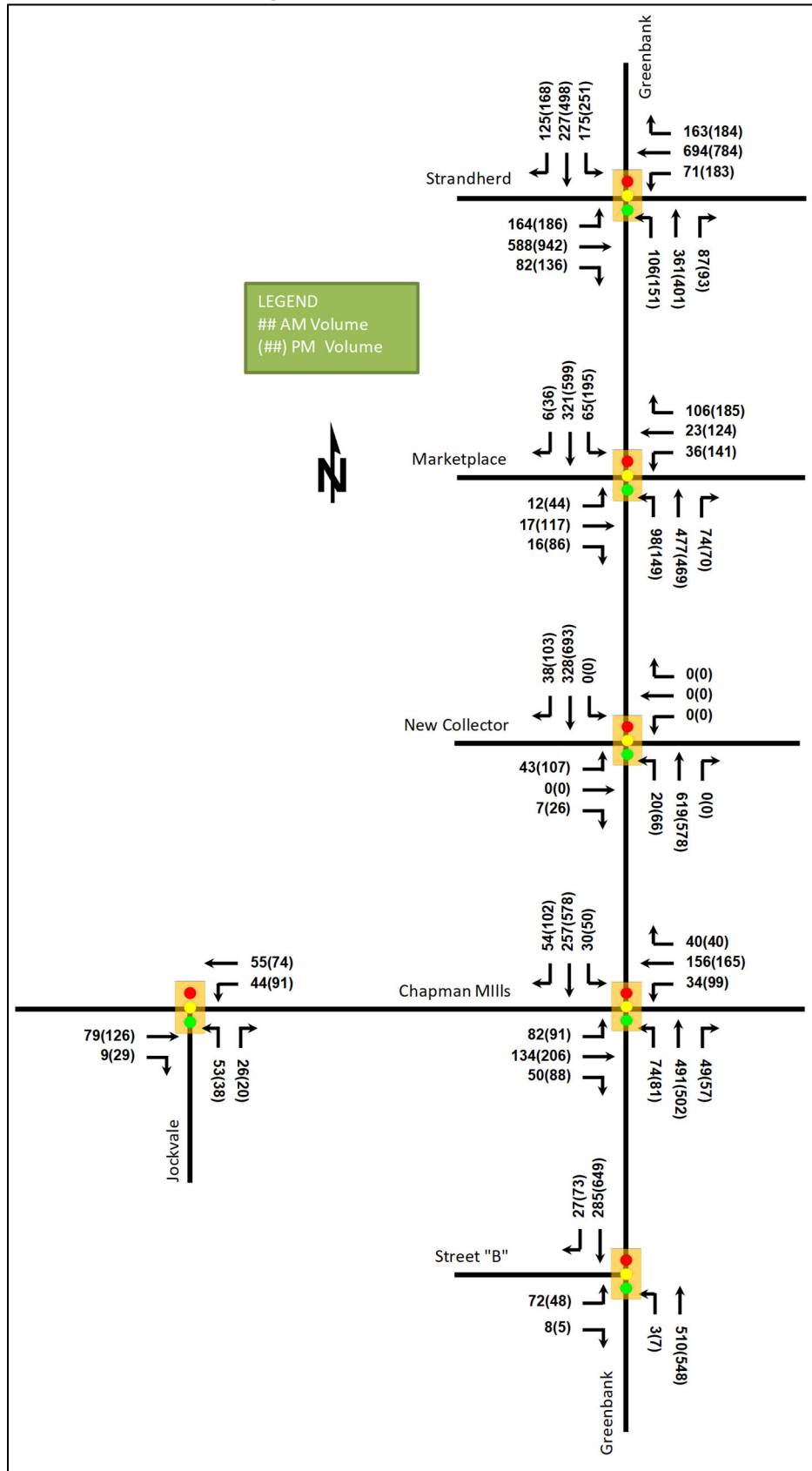


Table 16: 2030 Future Total Access Intersection Operations

| Intersection                                       | Lane    | AM Peak Hour |      |       |                       | PM Peak Hour |      |       |                       |
|----------------------------------------------------|---------|--------------|------|-------|-----------------------|--------------|------|-------|-----------------------|
|                                                    |         | LOS          | V/C  | Delay | Q (95 <sup>th</sup> ) | LOS          | V/C  | Delay | Q (95 <sup>th</sup> ) |
| Greenbank Road & Chapman Mills Drive<br>Signalized | EBL     | A            | 0.54 | 64.5  | 35.9                  | B            | 0.65 | 73.2  | #48.1                 |
|                                                    | EBT     | A            | 0.37 | 41.9  | 42.8                  | B            | 0.70 | 56.9  | 71.5                  |
|                                                    | EBR     | A            | 0.12 | 0.6   | 0.0                   | A            | 0.27 | 5.6   | 8.3                   |
|                                                    | WBL     | A            | 0.35 | 64.1  | 19.4                  | B            | 0.65 | 70.6  | #49.0                 |
|                                                    | WBT/R   | C            | 0.71 | 58.6  | 64.6                  | B            | 0.67 | 52.2  | 68.5                  |
|                                                    | NBL     | A            | 0.51 | 63.5  | 33.0                  | B            | 0.61 | 71.2  | #42.8                 |
|                                                    | NBT/R   | A            | 0.30 | 18.0  | 66.1                  | A            | 0.35 | 19.9  | 64.3                  |
|                                                    | SBL     | A            | 0.30 | 60.9  | 17.4                  | A            | 0.41 | 61.6  | 25.5                  |
|                                                    | SBT     | A            | 0.36 | 23.2  | 89.9                  | D            | 0.83 | 41.3  | #237.6                |
|                                                    | Overall | C            | -    | 33.1  | -                     | D            | -    | 41.1  | -                     |
| Greenbank Road & Street "B"<br>Signalized          | EBL/R   | A            | 0.44 | 40.5  | 24.1                  | A            | 0.34 | 40.3  | 19.1                  |
|                                                    | NBL     | A            | 0.00 | 3.0   | 0.8                   | A            | 0.01 | 2.4   | 1.2                   |
|                                                    | NBT     | A            | 0.36 | 4.1   | 41.9                  | A            | 0.36 | 3.2   | 41.5                  |
|                                                    | SBT/R   | A            | 0.22 | 3.2   | 22.6                  | A            | 0.48 | 4.1   | 63.9                  |
|                                                    | Overall | A            | -    | -     | -                     | A            | -    | 5.1   | -                     |
| Jockvale Road & Chapman Mills Drive<br>Signalized  | EBT/R   | A            | 0.07 | 5.4   | 13.3                  | A            | 0.12 | 5.2   | 21.3                  |
|                                                    | WBL     | A            | 0.05 | 5.9   | 8.3                   | A            | 0.10 | 6.2   | 15.5                  |
|                                                    | WBT     | A            | 0.04 | 5.7   | 9.5                   | A            | 0.05 | 5.8   | 12.3                  |
|                                                    | NBL     | A            | 0.20 | 29.7  | 16.6                  | A            | 0.13 | 26.1  | 11.3                  |
|                                                    | NBR     | A            | 0.10 | 11.2  | 6.1                   | A            | 0.07 | 10.9  | 4.8                   |
|                                                    | Overall | B            | -    | 10.9  | -                     | A            | -    | 8.0   | -                     |

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

The access intersection operations for the 2030 future total horizon generally operate satisfactorily during the peak hours. No capacity issues are noted.

### 10.3.3 Access Intersection MMLOS

Table 17 summarizes the MMLOS analysis for the site access intersections of Greenbank Road and Chapman Mills Drive and Chapman Mills Drive and Jockvale Road. The concept Chapman Mills Drive and Jockvale Road intersection is based on the EA configuration. The Chapman Mills Drive intersections analysis is based on the policy area of within 600m of a rapid transit station and 300m of a school. The MMLOS worksheets has been provided in Appendix H.

Table 17: Access Intersection MMLOS Analysis

| Intersection                                               | Pedestrian LOS |        | Bicycle LOS |        | Transit LOS |        | Truck LOS |        | Auto LOS |        |
|------------------------------------------------------------|----------------|--------|-------------|--------|-------------|--------|-----------|--------|----------|--------|
|                                                            | PLOS           | Target | BLOS        | Target | TLOS        | Target | TrLOS     | Target | ALOS     | Target |
| Greenbank Road & Chapman Mills Drive                       | D              | A      | E           | C      | F           | A      | E         | E      | C        | E      |
| Greenbank Road & Street B                                  | C              | A      | D           | C      | F           | A      | E         | E      | A        | E      |
| Chapman Mills Drive & Jockvale Road<br>(future conceptual) | D              | A      | B           | B      | B or worse  | A      | N/A       | N/A    | A        | E      |

The MMLOS targets for the pedestrian, bicycle and transit LOS will not be met at the signalized access intersections of Greenbank Road and Chapman Mills Drive, and Greenbank Road and Street B. The pedestrian level of service would require a maximum of two lanes at a crossing to meet a LOS A. The speeds along the arterial roads drive

the LOS E for the intersection and would require travel speeds under 50 km/h to meet a LOS C. The transit LOS will not be met and would require a delay of zero seconds to meet a LOS A target.

The concept intersection for Chapman Mills Drive and Jockvale Road will not meet the pedestrian level of service, similar to physical limitations of the Chapman Mills Drive cross-section. The transit level of service can only achieve the target if there is zero seconds delay.

#### 10.3.4 Recommended Design Elements

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

## 11 Transportation Demand Management

### 11.1 Context for TDM

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

The subject site is within a design priority area.

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

### 11.2 Need and Opportunity

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

### 11.3 TDM Program

The “suite of post occupancy TDM measures” has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix K.

The key TDM measures recommended include:

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

## 12 Transit

### 12.1 Route Capacity

Overall, the forecasted new transit trips would result in the need for approximately 3 single buses (55-person capacity) during the AM and PM peak hours for local service.

### 12.2 Transit Priority

No transit priority is required explicitly for this study. The planned BRT corridors along Chapman Mills and Greenbank Road may not be implemented prior to the 2030 horizon, given the current funding obligations, and were not considered.

## 13 Network Intersection Design

### 13.1 Network Intersection Control

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

### 13.2 Network Intersection Design

#### 13.2.1 2025 Future Total Network Intersection Operations

The 2025 future total network intersection operations are summarized below in Table 18. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix I.

Table 18: 2025 Future Total Network Intersection Operations

| Intersection                                             | Lane           | AM Peak Hour |      |             |                       | PM Peak Hour |             |              |                       |
|----------------------------------------------------------|----------------|--------------|------|-------------|-----------------------|--------------|-------------|--------------|-----------------------|
|                                                          |                | LOS          | V/C  | Delay       | Q (95 <sup>th</sup> ) | LOS          | V/C         | Delay        | Q (95 <sup>th</sup> ) |
| Greenbank Road & Strandherd Drive<br><i>Signalized</i>   | EBL            | B            | 0.64 | 32.5        | 41.5                  | C            | 0.80        | 48.2         | #61.5                 |
|                                                          | EBT            | B            | 0.61 | 38.6        | 93.6                  | E            | 0.95        | 61.0         | #157.2                |
|                                                          | EBR            | A            | 0.29 | 6.2         | 16.6                  | A            | 0.44        | 6.2          | 20.5                  |
|                                                          | WBL            | A            | 0.34 | 23.5        | 24.7                  | <b>F</b>     | <b>1.07</b> | <b>110.6</b> | <b>#99.9</b>          |
|                                                          | WBT            | C            | 0.72 | 43.1        | 106.3                 | D            | 0.81        | 47.7         | 119.6                 |
|                                                          | WBR            | A            | 0.30 | 6.5         | 16.4                  | A            | 0.33        | 6.4          | 17.1                  |
|                                                          | NBL            | B            | 0.61 | 72.0        | 44.0                  | B            | 0.68        | 75.4         | m51.7                 |
|                                                          | NBT/R          | A            | 0.49 | 25.7        | 29.1                  | A            | 0.53        | 22.6         | 29.8                  |
|                                                          | SBL            | A            | 0.55 | 57.9        | 32.7                  | B            | 0.65        | 58.3         | 44.0                  |
|                                                          | SBT            | A            | 0.24 | 34.9        | 34.8                  | A            | 0.51        | 39.3         | 70.2                  |
|                                                          | SBR            | A            | 0.25 | 5.1         | 11.5                  | A            | 0.33        | 7.0          | 17.8                  |
|                                                          | <b>Overall</b> | <b>D</b>     | -    | <b>35.3</b> | -                     | <b>D</b>     | -           | <b>46.4</b>  | -                     |
| Greenbank Road & Marketplace Avenue<br><i>Signalized</i> | EBL            | A            | 0.06 | 34.8        | 6.6                   | A            | 0.24        | 30.8         | 16.0                  |
|                                                          | EBT/R          | A            | 0.17 | 29.2        | 12.1                  | B            | 0.61        | 44.6         | 62.1                  |
|                                                          | WBL            | A            | 0.18 | 38.6        | 14.0                  | A            | 0.56        | 41.5         | 41.5                  |
|                                                          | WBT/R          | A            | 0.44 | 16.8        | 21.0                  | D            | 0.82        | 53.6         | #93.5                 |
|                                                          | NBL            | B            | 0.61 | 68.2        | #53.9                 | C            | 0.78        | 77.7         | #71.4                 |
|                                                          | NBT/R          | A            | 0.34 | 13.9        | 80.1                  | A            | 0.45        | 25.5         | 81.5                  |
|                                                          | SBL            | A            | 0.32 | 60.8        | 16.5                  | B            | 0.61        | 61.5         | m34.8                 |
|                                                          | SBT/R          | A            | 0.22 | 14.7        | 34.8                  | A            | 0.55        | 22.4         | m59.1                 |
|                                                          | <b>Overall</b> | <b>C</b>     | -    | <b>21.1</b> | -                     | <b>D</b>     | -           | <b>36.7</b>  | -                     |
| Greenbank Road & New Collector<br><i>Signalized</i>      | EBL            | A            | 0.22 | 33.6        | 13.5                  | A            | 0.58        | 47.8         | 33.2                  |
|                                                          | EBT/R          | A            | 0.01 | 0.0         | 0.0                   | A            | 0.09        | 0.7          | 0.0                   |
|                                                          | WB             | A            | 0.02 | 0.2         | 0.0                   | A            | 0.02        | 0.2          | 0.0                   |
|                                                          | NBL            | A            | 0.03 | 4.3         | 2.5                   | A            | 0.34        | 44.9         | 26.4                  |
|                                                          | NBT/R          | A            | 0.28 | 3.1         | 20.7                  | A            | 0.26        | 3.4          | 23.8                  |
|                                                          | SBL            | A            | 0.01 | 6.2         | 1.9                   | A            | 0.01        | 11.2         | 2.4                   |
|                                                          | SBT/R          | A            | 0.17 | 4.2         | 28.4                  | A            | 0.44        | 12.3         | 78.3                  |
|                                                          | <b>Overall</b> | <b>A</b>     | -    | <b>4.5</b>  | -                     | <b>B</b>     | -           | <b>12.1</b>  | -                     |

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

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

additional 2 seconds in green time to reduce the volume-to-capacity to below 1.00, potentially coming from the eastbound through and north/south bound through (1 second each) movements. Any changes will need to be coordinated along the Greenbank Road and Strandherd Drive corridors.

### 13.2.2 2030 Future Total Network Intersection Operations

The 2030 future total network intersection operations are summarized below in Table 19. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection. The signal timing has been optimized for the horizon. The synchro worksheets have been provided in Appendix J.

*Table 19: 2030 Future Total Network Intersection Operations*

| Intersection                                                  | Lane           | AM Peak Hour |      |             |                       | PM Peak Hour |      |             |                       |
|---------------------------------------------------------------|----------------|--------------|------|-------------|-----------------------|--------------|------|-------------|-----------------------|
|                                                               |                | LOS          | V/C  | Delay       | Q (95 <sup>th</sup> ) | LOS          | V/C  | Delay       | Q (95 <sup>th</sup> ) |
| <b>Greenbank Road &amp; Strandherd Drive<br/>Signalized</b>   | EBL            | A            | 0.60 | 30.2        | 39.9                  | C            | 0.79 | 47.4        | #59.9                 |
|                                                               | EBT            | A            | 0.52 | 34.9        | 84.8                  | E            | 0.99 | 68.7        | #168.3                |
|                                                               | EBR            | A            | 0.14 | 0.5         | 0.0                   | A            | 0.26 | 5.4         | 12.6                  |
|                                                               | WBL            | A            | 0.24 | 21.8        | 19.3                  | D            | 0.86 | 61.9        | #71.5                 |
|                                                               | WBT            | C            | 0.71 | 42.5        | 104.3                 | D            | 0.82 | 47.9        | 120.6                 |
|                                                               | WBR            | A            | 0.30 | 6.5         | 16.4                  | A            | 0.33 | 6.3         | 17.2                  |
|                                                               | NBL            | A            | 0.43 | 76.1        | 24.4                  | A            | 0.52 | 71.2        | m31.3                 |
|                                                               | NBT/R          | A            | 0.47 | 27.5        | 66.2                  | A            | 0.54 | 26.4        | 44.7                  |
|                                                               | SBL            | A            | 0.55 | 57.9        | 32.7                  | B            | 0.65 | 58.3        | 44.0                  |
|                                                               | SBT            | A            | 0.22 | 31.3        | 33.4                  | A            | 0.48 | 36.0        | 72.5                  |
|                                                               | SBR            | A            | 0.22 | 4.0         | 9.8                   | A            | 0.29 | 6.2         | 16.9                  |
|                                                               | <b>Overall</b> | <b>C</b>     | -    | <b>33.7</b> | -                     | <b>D</b>     | -    | <b>45.7</b> | -                     |
| <b>Greenbank Road &amp; Marketplace Avenue<br/>Signalized</b> | EBL            | A            | 0.08 | 40.2        | 7.8                   | A            | 0.24 | 30.8        | 16.0                  |
|                                                               | EBT/R          | A            | 0.21 | 34.2        | 14.1                  | B            | 0.61 | 44.6        | 62.1                  |
|                                                               | WBL            | A            | 0.21 | 43.8        | 16.6                  | A            | 0.56 | 41.5        | 41.5                  |
|                                                               | WBT/R          | A            | 0.49 | 20.6        | 24.6                  | D            | 0.82 | 53.6        | #93.5                 |
|                                                               | NBL            | A            | 0.54 | 60.5        | 40.2                  | C            | 0.78 | 77.7        | #71.4                 |
|                                                               | NBT/R          | A            | 0.26 | 10.8        | 48.4                  | A            | 0.37 | 24.1        | 65.9                  |
|                                                               | SBL            | A            | 0.31 | 63.7        | 16.4                  | B            | 0.61 | 67.1        | m36.9                 |
|                                                               | SBT/R          | A            | 0.17 | 10.6        | 18.6                  | A            | 0.45 | 18.1        | m41.6                 |
|                                                               | <b>Overall</b> | <b>C</b>     | -    | <b>20.3</b> | -                     | <b>D</b>     | -    | <b>37.0</b> | -                     |
| <b>Greenbank Road &amp; New Collector<br/>Signalized</b>      | EBL            | A            | 0.22 | 33.6        | 13.5                  | A            | 0.50 | 40.4        | 28.4                  |
|                                                               | EBT/R          | A            | 0.01 | 0.0         | 0.0                   | A            | 0.05 | 0.2         | 0.0                   |
|                                                               | WB             | A            | 0.02 | 0.2         | 0.0                   | A            | 0.02 | 0.2         | 0.0                   |
|                                                               | NBL            | A            | 0.03 | 5.7         | 4.7                   | A            | 0.41 | 45.2        | 23.9                  |
|                                                               | NBT/R          | A            | 0.23 | 4.5         | 40.3                  | A            | 0.23 | 5.6         | 37.3                  |
|                                                               | SBL            | A            | 0.01 | 6.2         | 1.9                   | A            | 0.01 | 14.0        | 2.8                   |
|                                                               | SBT/R          | A            | 0.14 | 4.0         | 22.2                  | A            | 0.39 | 13.0        | 79.3                  |
|                                                               | <b>Overall</b> | <b>A</b>     | -    | <b>5.5</b>  | -                     | <b>B</b>     | -    | <b>13.2</b> | -                     |

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

The network intersection operations for the 2030 future total horizon generally operate satisfactorily during the peak hours. The eastbound through at the Strandherd Drive and Greenbank Road intersection is noted to have a volume-to-capacity ratio of 0.99.

### 13.2.3 Network Intersection MMLOS

Table 20 summarizes the MMLOS analysis for the network intersections of Greenbank Road and Marketplace Avenue, and Greenbank Road and Strandherd Drive. The existing and future conditions for both intersections will be the same and are considered in one row. The analysis is based on the policy area of within 600m of a rapid transit station. The MMLOS worksheets has been provided in Appendix H.

*Table 20: Study Area Intersection MMLOS Analysis*

| Intersection                                   | Pedestrian LOS |        | Bicycle LOS |        | Transit LOS |        | Truck LOS |        | Auto LOS |        |
|------------------------------------------------|----------------|--------|-------------|--------|-------------|--------|-----------|--------|----------|--------|
|                                                | PLOS           | Target | BLOS        | Target | TLOS        | Target | TrLOS     | Target | ALOS     | Target |
| <b>Greenbank Road &amp; Strandherd Drive</b>   | <b>F</b>       | A      | <b>F</b>    | C      | <b>F</b>    | A      | B         | E      | C        | E      |
| <b>Greenbank Road &amp; New Collector</b>      | <b>F</b>       | A      | <b>F</b>    | C      | <b>E</b>    | A      | <b>F</b>  | E      | A        | E      |
| <b>Greenbank Road &amp; Marketplace Avenue</b> | <b>F</b>       | A      | <b>F</b>    | C      | <b>F</b>    | A      | B         | E      | A        | E      |

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

### 13.2.4 Recommended Design Elements

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

## 14 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

### Proposed Site and Screening

- The proposed site includes 250 apartment units and 429 stacked townhome units
- Accesses will be provided along the internal road network, connecting to Chapman Mills Drive and Street B, and a right-in/right-out on Greenbank Road
- The development is proposed to be completed as a single phase by 2025
- The Trip Generation, Location, and Safety triggers were met for the TIA Screening

### Existing Conditions

- Greenbank Road and Strandherd Drive are arterial roads, and Jockvale Road and Marketplace Avenue are collector roads in the study area
- Future roadways include Chapman Mills Drive and Street B as collector roads
- Sidewalks/MUPS are generally provided on both sides of the study area roadways, and on-street bike lanes on both sides of the roadway on Greenbank Road and on Strandherd Drive, east of Greenbank Road
- The high volumes roadways have produced a high number of collisions at the study are intersections, primarily at the Greenbank Road and Strandherd Drive intersection

- The collisions are predominantly rear end and turning movement collisions indicating that they are lower speed and a result of congestion
- The northbound left-turn at the Greenbank Road and Marketplace Avenue intersection may experience high delays during the PM peak hour

#### **Development Generated Travel Demand**

- The proposed development is forecasted produce 585 two-way people trips during the AM peak hour and 708 two-way people trips during the PM peak hour
- Of the forecasted people trips, 234 two-way trips will be vehicle trips during the AM peak hour and 283 two-way trips will be vehicle trips during the PM peak hour
- Of the forecasted trips, 80% are anticipated to travel north, 10% to the east, and 5% to both the west and south

#### **Background Conditions**

- The background developments of 3195 Greenbank, 3201 Greenbank Road, 3311 Greenbank Road, 3370 Greenbank Road (Phase 1 for 2026, ultimate with the Chapman Mills Drive reduction for 2031), and 4005 Strandherd Drive (during 2030) were included in the background conditions, along with a total background growth of 10% along the mainline volumes
- By the 2030 horizon, the Chapman Mills Drive Extension to the west of the Kennedy-Burnett stormwater pond as been assumed to be constructed and an 25% diversion from Greenbank Road was assumed to use Chapman Mills Drive.
- Generally, the study area intersections will operate acceptably during the background horizons
- By 2030, the eastbound through movement at the Greenbank Road and Strandherd Drive intersection may have a volume-to-capacity ratio over 1.00 and would require an additional 2 seconds of green time to lower the ratio below 1.00

#### **Development Design**

- The bike and auto parking areas are to be located near the main entrances for the stacked town home and apartment units
- Pedestrian connections will be made along Jockvale Road and to Chapman Mills Drive to the north, Street B to the south, Greenbank Road to the east, and the Kennedy-Burnett stormwater pond to the west
- The new streets proposed as part of the plan of subdivision include the extension of Jockvale Road, Chapman Mills Drive along the north edge of the property and Street B along the southern edge of the property
- The Chapman Mills Drive cross-section is consistent with the associated EA study, Jockvale Road will be a 24.0 metre collector road and the remaining local roads will be 18.0 metres
- Traffic calming elements are recommended at the future local road intersections with Jockvale Road, Street A and Street B, including bulb-outs to narrow each approach to the intersection and reduce pedestrian crossing distances

#### **Boundary Street Design**

- The boundary streets will not meet pedestrian MMLOS targets, due to auto volumes and/or posted speed limits (e.g. 60km/h)

- Existing and future Greenbank Road will not meet bicycle MMLOS targets and require the addition of cycle tracks in the future City design
- Due to the issues limiting the ability to meet the MMLOS targets, no improvements are recommended for the boundary streets to meet the pedestrian MMLOS targets

### Access Intersections Design

- Townhome and apartment accesses are proposed as private approach, the access will require a depressed curb and sidewalk through the access
- The new intersections along Chapman Mills Drive are consistent with the EA study recommendations and no changes to the Greenbank Road and Chapman Mills Drive intersection are recommended
- The intersections along Street B are assumed to be minor stop-controlled, with Street B operating as a free flow corridor, and the intersection of Greenbank Road and Street B will be signalized for operational constraints
- No specific recommendations or design elements are required outside of typical plan of subdivision design
- Generally, the access intersections are expected to operate acceptably during the 2025 and 2030 horizons
- The MMLOS targets for pedestrians, bicycles and transit cannot be met at the signalized access intersections due to the nature of arterial roadways or restrictions on limiting transit delay
- The MMLOS targets for pedestrian and transit will not be met at the concept intersection for Chapman Mills Drive and Jockvale Road due to the crossing distance and restrictions of limiting transit delay

### TDM

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

### Transit

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

### Network Intersection Design

- Generally, the network intersections will operate acceptably during the background horizons
- During the 2025 horizon, the westbound left-turn at the Greenbank Road and Strandherd Drive intersection may have a volume-to-capacity ratio above 1.00 during the PM peak, requiring an additional 2 seconds in green time to reduce the ratio to below 1.00
- The MMLOS targets for pedestrians, bicycles and transit cannot be met due to the nature of arterial roadways at all signalized network intersections and truck movements may be limited along New Collector for 3195 Jockvale Road development

## 15 Next Steps

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

Prepared By:



Andrew Harte, P.Eng.  
Senior Transportation Engineer

Reviewed By:

A handwritten signature in blue ink, which appears to read "Chris Gordon".

Christopher Gordon, P.Eng.  
Senior Transportation Engineer

# Appendix A

TIA Screening Form and PM Certification Form

City of Ottawa 2017 TIA Guidelines  
Step 1 - Screening FormDate: 03-Mar-19  
Project Number: 2019-09  
Project Reference: Caivan Barrhaven Towncentre

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

| 1.2 Trip Generation Trigger |                         |
|-----------------------------|-------------------------|
| Land Use Type               | Townhomes or apartments |
| Development Size            | 913 Units               |
| Trip Generation Trigger     | Yes                     |

| 1.3 Location Triggers                                                                                                                                                |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Does the development propose a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit or Spine Bicycle Networks? | Yes |
| Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?                                                                       | Yes |
| Location Trigger                                                                                                                                                     | Yes |

| 1.4. Safety Triggers                                                                                                                                                                                                      |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Are posted speed limits on a boundary street are 80 km/hr or greater?                                                                                                                                                     | No  |
| Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?                                                                                                              | No  |
| Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)? | Yes |
| Is the proposed driveway within auxiliary lanes of an intersection?                                                                                                                                                       | No  |
| Does the proposed driveway make use of an existing median break that serves an existing site?                                                                                                                             | No  |
| Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?                                                                                        | No  |
| Does the development include a drive-thru facility?                                                                                                                                                                       | No  |
| Safety Trigger                                                                                                                                                                                                            | Yes |



## **TIA Plan Reports**

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

### **CERTIFICATION**

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed<sup>1</sup> or registered<sup>2</sup> professional in good standing, whose field of expertise [check ☒ appropriate field(s)] is either transportation engineering ☒ or transportation planning ☐.

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

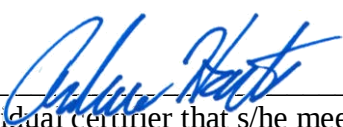
City Of Ottawa  
Infrastructure Services and Community  
Sustainability  
Planning and Growth Management  
110 Laurier Avenue West, 4th fl.  
Ottawa, ON K1P 1J1  
Tel. : 613-580-2424  
Fax: 613-560-6006

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

Dated at Ottawa this 20 day of September, 2018.  
(City)

Name: Andrew Harte  
(Please Print)

Professional Title: Professional Engineer

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

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



# Appendix B

Turning Movement Counts



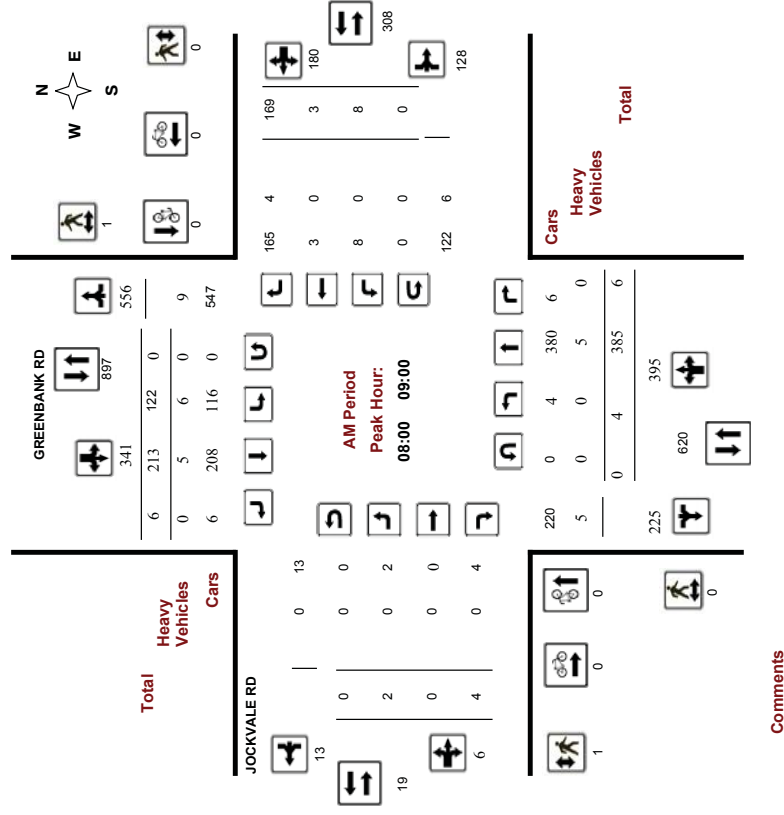
## Transportation Services - Traffic Services

### Turning Movement Count - Full Study Peak Hour Diagram

#### GREENBANK RD @ JOCKVALE RD

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

WO No: 36178  
Device: Miovision



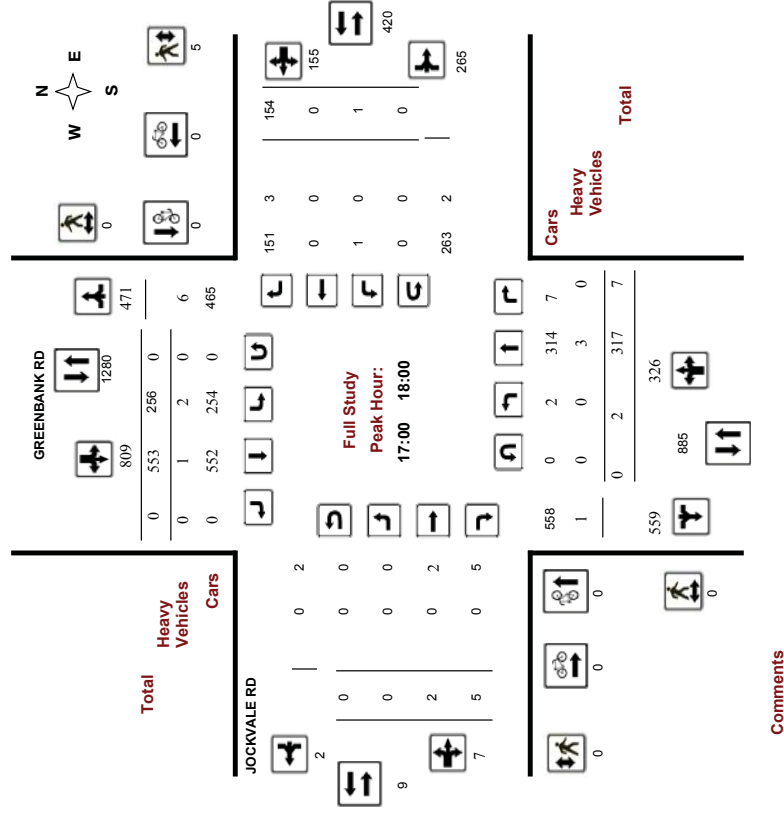
## Transportation Services - Traffic Services

### Turning Movement Count - Full Study Peak Hour Diagram

#### GREENBANK RD @ JOCKVALE RD

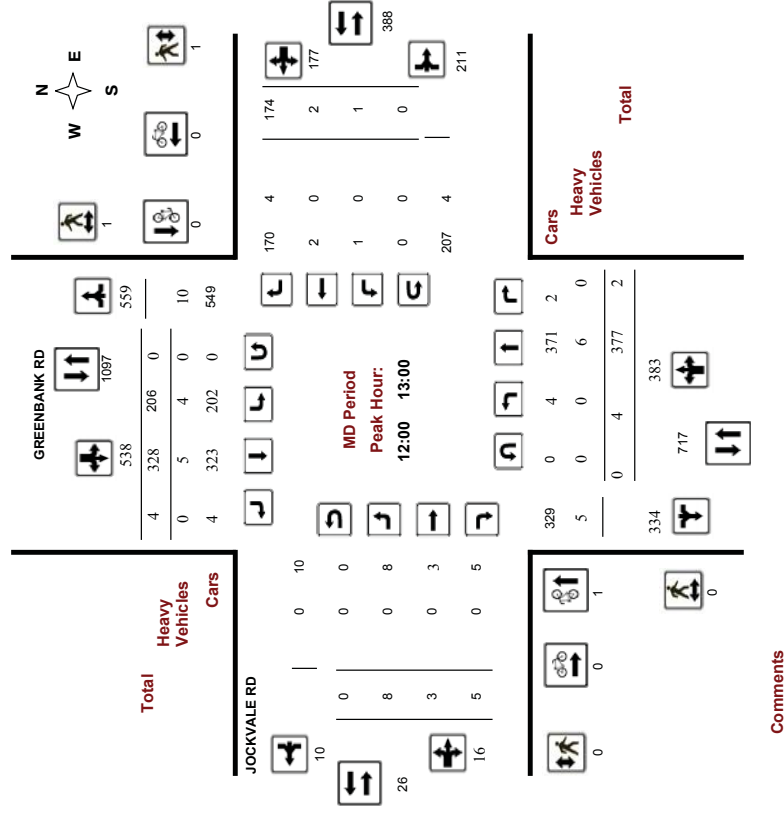
Survey Date: Tuesday, August 16, 2016  
Start Time: 07:00

WO No: 36178  
Device: Miovision



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

|         |           |
|---------|-----------|
| WO No:  | 36178     |
| Device: | Miovision |

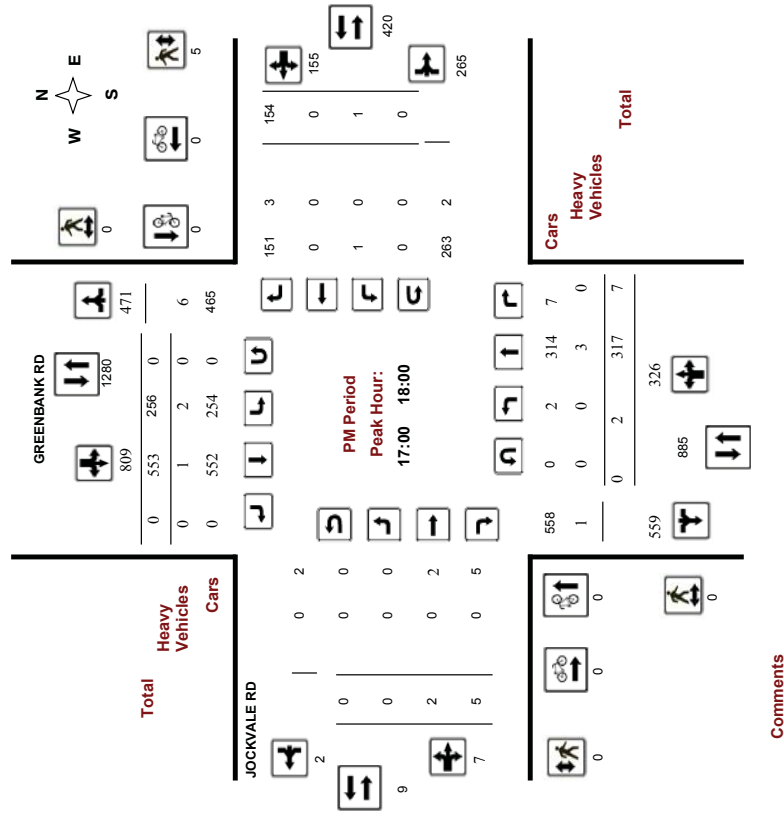


2017-Feb-17

Page 3 of 4

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

**WO No:** 36178  
**Device:** Miovision



2017-Feb-17

Page 4 of 4



# Transportation Services - Traffic Services

Work Order  
36178

## Turning Movement Count - Full Study Summary Report

### GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

AADT Factor  
90

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

### Full Study

| Period                                                                                                               | GREENBANK RD |      |    |           |           |            |    |      |           |            | JOCKVALE RD |    |     |           |    |           |      |           |       |  | Grand<br>Total |
|----------------------------------------------------------------------------------------------------------------------|--------------|------|----|-----------|-----------|------------|----|------|-----------|------------|-------------|----|-----|-----------|----|-----------|------|-----------|-------|--|----------------|
|                                                                                                                      | Northbound   |      |    |           |           | Southbound |    |      |           |            | Eastbound   |    |     |           |    | Westbound |      |           |       |  |                |
|                                                                                                                      | LT           | ST   | RT | NB<br>TOT | SB<br>TOT | LT         | ST | RT   | SB<br>TOT | STR<br>TOT | LT          | ST | RT  | EB<br>TOT | LT | ST        | RT   | WB<br>TOT |       |  |                |
| 07:00-08:00                                                                                                          | 4            | 415  | 2  | 421       | 85        | 162        | 0  | 247  | 688       | 0          | 1           | 3  | 4   | 5         | 1  | 160       | 166  | 170       | 838   |  |                |
| 08:00-09:00                                                                                                          | 4            | 385  | 6  | 395       | 122       | 213        | 6  | 341  | 736       | 2          | 0           | 4  | 6   | 8         | 3  | 169       | 180  | 186       | 922   |  |                |
| 09:00-10:00                                                                                                          | 8            | 313  | 5  | 326       | 109       | 197        | 2  | 308  | 634       | 6          | 2           | 1  | 9   | 4         | 1  | 179       | 184  | 193       | 827   |  |                |
| 11:30-12:30                                                                                                          | 7            | 328  | 7  | 342       | 193       | 317        | 9  | 519  | 861       | 8          | 4           | 5  | 17  | 0         | 3  | 155       | 158  | 175       | 1036  |  |                |
| 12:30-13:30                                                                                                          | 0            | 318  | 2  | 320       | 210       | 316        | 2  | 528  | 848       | 1          | 3           | 6  | 10  | 2         | 3  | 201       | 206  | 216       | 1064  |  |                |
| 15:00-16:00                                                                                                          | 0            | 238  | 1  | 239       | 194       | 363        | 0  | 557  | 796       | 0          | 0           | 4  | 4   | 5         | 0  | 140       | 145  | 149       | 945   |  |                |
| 16:00-17:00                                                                                                          | 1            | 329  | 12 | 342       | 228       | 457        | 0  | 685  | 1027      | 0          | 1           | 6  | 7   | 5         | 3  | 128       | 136  | 143       | 1110  |  |                |
| 17:00-18:00                                                                                                          | 2            | 317  | 7  | 326       | 256       | 553        | 0  | 809  | 1135      | 0          | 2           | 5  | 7   | 1         | 0  | 154       | 155  | 162       | 1297  |  |                |
| Sub Total                                                                                                            | 26           | 2643 | 42 | 2711      | 1397      | 2578       | 19 | 3994 | 6705      | 17         | 13          | 34 | 64  | 30        | 14 | 1286      | 1330 | 1394      | 8099  |  |                |
| U Turns                                                                                                              | 0            |      |    |           |           | 0          |    |      |           |            | 0           |    |     |           |    | 0         |      |           |       |  | 0              |
| Total                                                                                                                | 26           | 2643 | 42 | 2711      | 1397      | 2578       | 19 | 3994 | 6705      | 17         | 13          | 34 | 64  | 30        | 14 | 1286      | 1330 | 1394      | 8099  |  |                |
| EQ 12hr                                                                                                              | 36           | 3674 | 58 | 3768      | 1942      | 3583       | 26 | 5552 | 9320      | 24         | 18          | 47 | 89  | 42        | 19 | 1788      | 1849 | 1938      | 11258 |  |                |
| Note: These values are calculated by multiplying the totals by the appropriate expansion factor. 1.39                |              |      |    |           |           |            |    |      |           |            |             |    |     |           |    |           |      |           |       |  |                |
| AVG 12hr                                                                                                             | 33           | 3306 | 53 | 3391      | 1748      | 3225       | 24 | 4996 | 8387      | 21         | 16          | 43 | 80  | 38        | 18 | 1609      | 1664 | 1744      | 10131 |  |                |
| Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. .90               |              |      |    |           |           |            |    |      |           |            |             |    |     |           |    |           |      |           |       |  |                |
| AVG 24hr                                                                                                             | 43           | 4331 | 69 | 4443      | 2289      | 4225       | 31 | 6545 | 10988     | 28         | 21          | 56 | 105 | 49        | 23 | 2108      | 2180 | 2285      | 13273 |  |                |
| Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. 1.31 |              |      |    |           |           |            |    |      |           |            |             |    |     |           |    |           |      |           |       |  |                |

### Comments:

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



# Transportation Services - Traffic Services

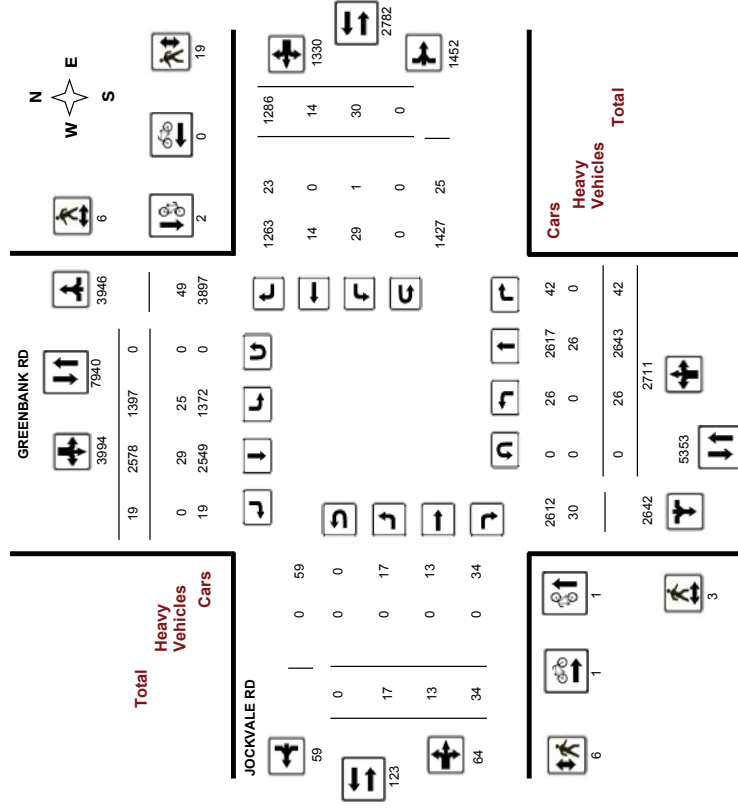
## Turning Movement Count - Full Study Diagram

### GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

WO#: 36178

Device: Miovision



### Comments



Transportation Services - Traffic Services W.O. 36178  
Turning Movement Count - 15 Minute Summary Report

| GREENBANK RD @ JOCKVALE RD                                                       |       |   |     |    |     |    |     |     |     |             |     |     |    |    |    |     |    |    |     |
|----------------------------------------------------------------------------------|-------|---|-----|----|-----|----|-----|-----|-----|-------------|-----|-----|----|----|----|-----|----|----|-----|
| Survey Date: Tuesday, August 16, 2016                                            |       |   |     |    |     |    |     |     |     |             |     |     |    |    |    |     |    |    |     |
| GREENBANK RD                                                                     |       |   |     |    |     |    |     |     |     | JOCKVALE RD |     |     |    |    |    |     |    |    |     |
| Northbound                                                                       |       |   |     |    |     |    |     |     |     | Eastbound   |     |     |    |    |    |     |    |    |     |
| Time Period                                                                      | L     | T | ST  | RT | N   | L  | T   | ST  | RT  | S           | STR | TOT | LT | ST | RT | TOT | E  | LT | ST  |
| 07:00                                                                            | 07:15 | 0 | 112 | 22 | 39  | 0  | 61  | 173 | 0   | 0           | 0   | 0   | 0  | 0  | 0  | 0   | 0  | 0  | 0   |
| 07:15                                                                            | 07:30 | 0 | 107 | 18 | 36  | 0  | 54  | 161 | 0   | 1           | 0   | 1   | 0  | 1  | 0  | 1   | 0  | 1  | 0   |
| 07:30                                                                            | 07:45 | 2 | 108 | 0  | 110 | 16 | 40  | 0   | 56  | 166         | 0   | 0   | 1  | 1  | 0  | 0   | 40 | 40 | 41  |
| 07:45                                                                            | 08:00 | 2 | 88  | 2  | 92  | 29 | 47  | 0   | 76  | 168         | 0   | 0   | 2  | 2  | 4  | 0   | 47 | 51 | 53  |
| 08:00                                                                            | 08:15 | 1 | 107 | 3  | 111 | 29 | 46  | 1   | 76  | 187         | 0   | 0   | 1  | 1  | 4  | 0   | 46 | 50 | 51  |
| 08:15                                                                            | 08:30 | 2 | 96  | 2  | 100 | 30 | 44  | 1   | 75  | 175         | 0   | 0   | 2  | 2  | 0  | 0   | 37 | 37 | 39  |
| 08:30                                                                            | 08:45 | 1 | 85  | 0  | 86  | 25 | 60  | 0   | 85  | 171         | 0   | 0   | 0  | 0  | 0  | 0   | 40 | 40 | 40  |
| 08:45                                                                            | 09:00 | 0 | 97  | 1  | 98  | 38 | 63  | 4   | 105 | 203         | 2   | 0   | 1  | 3  | 4  | 3   | 46 | 53 | 56  |
| 09:00                                                                            | 09:15 | 3 | 88  | 1  | 92  | 23 | 43  | 2   | 68  | 160         | 3   | 1   | 0  | 4  | 0  | 0   | 41 | 41 | 45  |
| 09:15                                                                            | 09:30 | 1 | 77  | 1  | 79  | 29 | 51  | 0   | 80  | 159         | 1   | 0   | 0  | 1  | 3  | 1   | 38 | 42 | 43  |
| 09:30                                                                            | 09:45 | 4 | 81  | 2  | 87  | 29 | 55  | 0   | 84  | 171         | 1   | 1   | 0  | 2  | 1  | 0   | 40 | 41 | 43  |
| 09:45                                                                            | 10:00 | 0 | 67  | 1  | 68  | 28 | 48  | 0   | 76  | 144         | 1   | 0   | 1  | 2  | 0  | 0   | 60 | 60 | 62  |
| 10:00                                                                            | 10:15 | 1 | 73  | 5  | 79  | 44 | 66  | 2   | 112 | 191         | 1   | 0   | 2  | 3  | 0  | 1   | 36 | 37 | 40  |
| 10:15                                                                            | 10:30 | 2 | 76  | 1  | 79  | 52 | 76  | 3   | 131 | 210         | 0   | 2   | 1  | 3  | 0  | 2   | 39 | 41 | 44  |
| 10:30                                                                            | 10:45 | 3 | 86  | 1  | 90  | 56 | 87  | 2   | 145 | 235         | 3   | 2   | 0  | 5  | 0  | 0   | 40 | 40 | 45  |
| 10:45                                                                            | 11:00 | 1 | 93  | 0  | 94  | 41 | 88  | 2   | 131 | 225         | 4   | 0   | 2  | 6  | 0  | 0   | 40 | 40 | 46  |
| 11:00                                                                            | 11:15 | 0 | 112 | 1  | 113 | 51 | 88  | 0   | 139 | 252         | 1   | 1   | 2  | 4  | 1  | 1   | 50 | 52 | 56  |
| 11:15                                                                            | 11:30 | 0 | 86  | 0  | 86  | 58 | 65  | 0   | 123 | 209         | 0   | 0   | 1  | 1  | 0  | 1   | 44 | 45 | 46  |
| 11:30                                                                            | 11:45 | 0 | 60  | 1  | 61  | 44 | 79  | 1   | 124 | 185         | 0   | 0   | 3  | 3  | 0  | 1   | 54 | 55 | 58  |
| 11:45                                                                            | 12:00 | 0 | 60  | 0  | 60  | 57 | 84  | 1   | 142 | 202         | 0   | 2   | 0  | 2  | 1  | 0   | 53 | 54 | 56  |
| 12:00                                                                            | 12:15 | 0 | 50  | 1  | 51  | 44 | 86  | 0   | 130 | 181         | 0   | 0   | 0  | 0  | 0  | 0   | 34 | 34 | 34  |
| 12:15                                                                            | 12:30 | 0 | 46  | 0  | 46  | 58 | 74  | 0   | 132 | 178         | 0   | 0   | 1  | 3  | 0  | 39  | 42 | 43 | 221 |
| 12:30                                                                            | 12:45 | 0 | 63  | 0  | 63  | 47 | 95  | 0   | 142 | 205         | 0   | 0   | 2  | 2  | 0  | 0   | 27 | 27 | 29  |
| 12:45                                                                            | 13:00 | 0 | 79  | 0  | 79  | 45 | 108 | 0   | 153 | 232         | 0   | 0   | 1  | 1  | 2  | 0   | 40 | 42 | 43  |
| 13:00                                                                            | 13:15 | 0 | 65  | 2  | 67  | 59 | 120 | 0   | 179 | 246         | 0   | 0   | 0  | 0  | 0  | 2   | 31 | 33 | 33  |
| 13:15                                                                            | 13:30 | 0 | 79  | 3  | 83  | 64 | 111 | 0   | 175 | 258         | 0   | 0   | 3  | 3  | 1  | 0   | 30 | 31 | 34  |
| 13:30                                                                            | 13:45 | 0 | 93  | 4  | 97  | 55 | 119 | 0   | 174 | 271         | 0   | 0   | 2  | 2  | 2  | 0   | 28 | 30 | 32  |
| 13:45                                                                            | 14:00 | 0 | 92  | 3  | 95  | 50 | 107 | 0   | 157 | 252         | 0   | 1   | 1  | 2  | 2  | 1   | 39 | 42 | 44  |
| 14:00                                                                            | 14:15 | 0 | 91  | 3  | 94  | 53 | 145 | 0   | 198 | 292         | 0   | 1   | 2  | 3  | 1  | 0   | 34 | 35 | 38  |
| 14:15                                                                            | 14:30 | 1 | 73  | 1  | 75  | 70 | 135 | 0   | 205 | 280         | 0   | 0   | 1  | 1  | 0  | 0   | 36 | 36 | 37  |
| 14:30                                                                            | 14:45 | 1 | 77  | 2  | 80  | 66 | 140 | 0   | 206 | 286         | 0   | 0   | 2  | 2  | 0  | 0   | 46 | 46 | 48  |
| 14:45                                                                            | 15:00 | 0 | 76  | 1  | 77  | 67 | 133 | 0   | 200 | 277         | 0   | 1   | 0  | 1  | 0  | 0   | 38 | 38 | 39  |
| TOTAL: 26 2843 42 2711 1397 2578 19 3994 6705 17 13 64 30 14 1286 1330 1394 8099 |       |   |     |    |     |    |     |     |     |             |     |     |    |    |    |     |    |    |     |
| Note: U-Turns are included in Totals.                                            |       |   |     |    |     |    |     |     |     |             |     |     |    |    |    |     |    |    |     |
| Comment:                                                                         |       |   |     |    |     |    |     |     |     |             |     |     |    |    |    |     |    |    |     |



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

Work Order  
36178

| GREENBANK RD @ JOCKVALE RD           |            |            |              |           |             |              |             |   |   |
|--------------------------------------|------------|------------|--------------|-----------|-------------|--------------|-------------|---|---|
| Count Date: Tuesday, August 16, 2016 |            |            |              |           |             |              |             |   |   |
| Start Time: 07:00                    |            |            |              |           |             |              |             |   |   |
| GREENBANK RD                         |            |            |              |           | JOCKVALE RD |              |             |   |   |
| Time Period                          | Northbound | Southbound | Street Total | Eastbound | Westbound   | Street Total | Grand Total |   |   |
| 07:00 08:00                          | 0          | 1          | 1            | 1         | 0           | 1            | 2           | 1 | 4 |
| 08:00 09:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| 09:00 10:00                          | 0          | 1          | 1            | 0         | 0           | 1            | 1           | 0 | 1 |
| 10:00 11:00                          | 1          | 0          | 1            | 0         | 0           | 1            | 1           | 0 | 1 |
| 11:00 12:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| 12:00 13:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| 13:00 14:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| 14:00 15:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| 15:00 16:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| 16:00 17:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| 17:00 18:00                          | 0          | 0          | 0            | 0         | 0           | 0            | 0           | 0 | 0 |
| Total                                | 1          | 2          | 3            | 1         | 0           | 1            | 4           | 1 | 4 |

Comment:

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



## Transportation Services - Traffic Services

W.O.  
36178

### Turning Movement Count - Heavy Vehicle Report

#### GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

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

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.



## Transportation Services - Traffic Services

Work Order  
36178

### Turning Movement Count - Pedestrian Volume Report

#### GREENBANK RD @ JOCKVALE RD

Count Date: Tuesday, August 16, 2016

Start Time: 07:00

| Time Period | NB Approach<br>(E or W Crossing) | SB Approach<br>(E or W Crossing) | Total | EB Approach<br>(N or S Crossing) | WB Approach<br>(N or S Crossing) | Total | Grand Total |
|-------------|----------------------------------|----------------------------------|-------|----------------------------------|----------------------------------|-------|-------------|
| 07:00 07:15 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 07:15 07:30 | 0                                | 0                                | 0     | 0                                | 1                                | 1     | 1           |
| 07:30 07:45 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 07:45 08:00 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 07:00 08:00 | 0                                | 0                                | 0     | 0                                | 1                                | 1     | 1           |
| 08:00 08:15 | 0                                | 0                                | 0     | 1                                | 0                                | 1     | 1           |
| 08:15 08:30 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 08:30 08:45 | 0                                | 1                                | 1     | 0                                | 0                                | 0     | 1           |
| 08:45 09:00 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 08:00 09:00 | 0                                | 1                                | 1     | 0                                | 1                                | 2     | 2           |
| 09:00 09:15 | 0                                | 2                                | 2     | 2                                | 3                                | 5     | 7           |
| 09:15 09:30 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 09:30 09:45 | 0                                | 2                                | 2     | 0                                | 3                                | 3     | 5           |
| 09:45 10:00 | 0                                | 0                                | 0     | 0                                | 1                                | 1     | 1           |
| 09:00 10:00 | 0                                | 4                                | 4     | 2                                | 7                                | 9     | 13          |
| 11:30 11:45 | 0                                | 0                                | 0     | 0                                | 1                                | 1     | 1           |
| 11:45 12:00 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 12:00 12:15 | 0                                | 1                                | 1     | 0                                | 1                                | 1     | 2           |
| 12:15 12:30 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 11:30 12:30 | 0                                | 1                                | 1     | 0                                | 2                                | 2     | 3           |
| 12:30 12:45 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 12:45 13:00 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 13:00 13:15 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 13:15 13:30 | 3                                | 0                                | 3     | 3                                | 0                                | 3     | 6           |
| 12:30 13:30 | 3                                | 0                                | 3     | 3                                | 0                                | 3     | 6           |
| 15:00 15:15 | 0                                | 0                                | 0     | 0                                | 2                                | 2     | 2           |
| 15:15 15:30 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 15:30 15:45 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 15:45 16:00 | 0                                | 0                                | 0     | 0                                | 1                                | 1     | 1           |
| 15:00 16:00 | 0                                | 0                                | 0     | 0                                | 3                                | 3     | 3           |
| 16:00 16:15 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 16:15 16:30 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 16:30 16:45 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 16:45 17:00 | 0                                | 0                                | 0     | 0                                | 1                                | 1     | 1           |
| 16:00 17:00 | 0                                | 0                                | 0     | 0                                | 1                                | 1     | 1           |
| 17:00 17:15 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 17:15 17:30 | 0                                | 0                                | 0     | 0                                | 2                                | 2     | 2           |
| 17:30 17:45 | 0                                | 0                                | 0     | 0                                | 0                                | 0     | 0           |
| 17:45 18:00 | 0                                | 0                                | 0     | 0                                | 3                                | 3     | 3           |
| 17:00 18:00 | 0                                | 0                                | 0     | 0                                | 5                                | 5     | 5           |
| Total       | 3                                | 6                                | 9     | 6                                | 19                               | 25    | 34          |

Comment:



## Transportation Services - Traffic Services

Work Order  
36178

### Turning Movement Count - 15 Min U-Turn Total Report

#### GREENBANK RD @ JOCKVALE RD

Survey Date: Tuesday, August 16, 2016

| Time Period | Northbound<br>U-Turn Total | Southbound<br>U-Turn Total | Eastbound<br>U-Turn Total | Westbound<br>U-Turn Total | Total |
|-------------|----------------------------|----------------------------|---------------------------|---------------------------|-------|
| 07:00 07:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:15 07:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:30 07:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:45 08:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:00 08:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:15 08:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:30 08:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:45 09:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:00 09:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:15 09:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:30 09:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:45 10:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 11:30 11:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 11:45 12:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:00 12:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:15 12:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:30 12:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:45 13:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 13:00 13:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 13:15 13:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:00 15:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:15 15:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:30 15:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:45 16:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:00 16:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:15 16:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:30 16:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:45 17:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:00 17:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:15 17:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:30 17:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:45 18:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| Total       | 0                          | 0                          | 0                         | 0                         | 0     |

2017-Feb-17

Page 1 of 1



## Transportation Services - Traffic Services

Work Order  
36178

### Turning Movement Count - Pedestrian Volume Report

#### GREENBANK RD @ JOCKVALE RD

Count Date: Tuesday, August 16, 2016

Start Time: 07:00

| Time Period | NB Approach<br>(E or W Crossing) | SB Approach<br>(E or W Crossing) | EB Approach<br>(N or S Crossing) | WB Approach<br>(N or S Crossing) | Total | Grand Total |
|-------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-------|-------------|
| 07:00 07:15 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 07:15 07:30 | 0                                | 0                                | 0                                | 1                                | 1     | 1           |
| 07:30 07:45 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 07:45 08:00 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 07:00 08:00 | 0                                | 0                                | 0                                | 1                                | 1     | 1           |
| 08:00 08:15 | 0                                | 0                                | 1                                | 0                                | 1     | 1           |
| 08:15 08:30 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 08:30 08:45 | 0                                | 1                                | 0                                | 0                                | 1     | 1           |
| 08:45 09:00 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 08:00 09:00 | 0                                | 1                                | 1                                | 0                                | 2     | 2           |
| 09:00 09:15 | 0                                | 2                                | 2                                | 3                                | 5     | 7           |
| 09:15 09:30 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 09:30 09:45 | 0                                | 2                                | 0                                | 3                                | 3     | 5           |
| 09:45 10:00 | 0                                | 0                                | 0                                | 1                                | 1     | 1           |
| 09:00 10:00 | 0                                | 4                                | 2                                | 7                                | 9     | 13          |
| 11:30 11:45 | 0                                | 0                                | 0                                | 1                                | 1     | 1           |
| 11:45 12:00 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 12:00 12:15 | 0                                | 1                                | 0                                | 1                                | 1     | 2           |
| 12:15 12:30 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 12:30 12:30 | 0                                | 1                                | 0                                | 2                                | 2     | 3           |
| 12:30 12:45 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 12:45 13:00 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 13:00 13:15 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 13:15 13:30 | 3                                | 0                                | 3                                | 0                                | 3     | 6           |
| 12:30 13:30 | 3                                | 0                                | 3                                | 0                                | 3     | 6           |
| 15:00 15:15 | 0                                | 0                                | 0                                | 2                                | 2     | 2           |
| 15:15 15:30 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 15:30 15:45 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 15:45 16:00 | 0                                | 0                                | 0                                | 1                                | 1     | 1           |
| 15:00 16:00 | 0                                | 0                                | 0                                | 3                                | 3     | 3           |
| 16:00 16:15 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 16:15 16:30 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 16:30 16:45 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 16:45 17:00 | 0                                | 0                                | 0                                | 1                                | 1     | 1           |
| 16:00 17:00 | 0                                | 0                                | 0                                | 1                                | 1     | 1           |
| 17:00 17:15 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 17:15 17:30 | 0                                | 0                                | 0                                | 2                                | 2     | 2           |
| 17:30 17:45 | 0                                | 0                                | 0                                | 0                                | 0     | 0           |
| 17:45 18:00 | 0                                | 0                                | 0                                | 3                                | 3     | 3           |
| 17:00 18:00 | 0                                | 0                                | 0                                | 5                                | 5     | 5           |
| Total       | 3                                | 6                                | 9                                | 19                               | 25    | 34          |

Comment:

2017-Feb-17

Page 1 of 1



## Transportation Services - Traffic Services

### Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE



## Transportation Services - Traffic Services

### Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

Start Time: 07:00

WO No: 35721

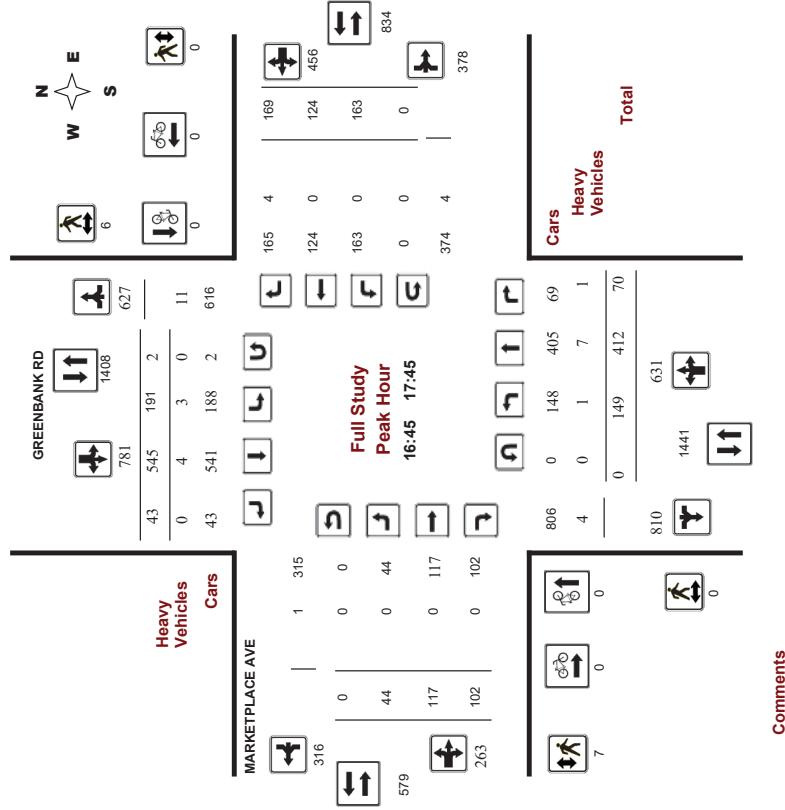
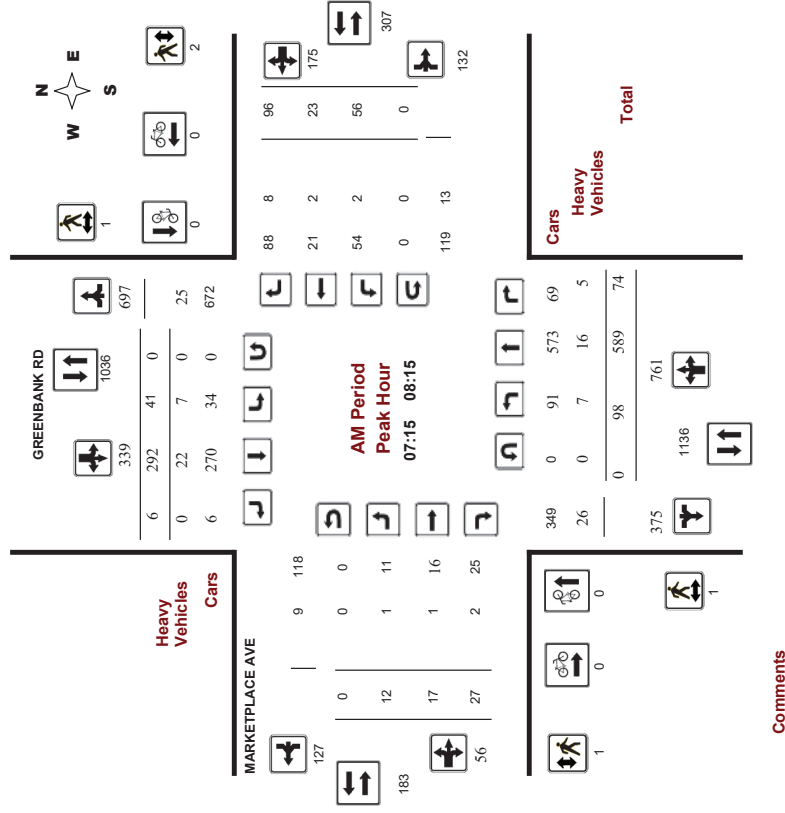
Device: Miovision

Survey Date: Wednesday, February 10, 2016

Start Time: 07:00

WO No: 35721

Device: Miovision





## Transportation Services - Traffic Services

### Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE



## Transportation Services - Traffic Services

### Turning Movement Count - Peak Hour Diagram

GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

Start Time: 07:00

WO No: 35721

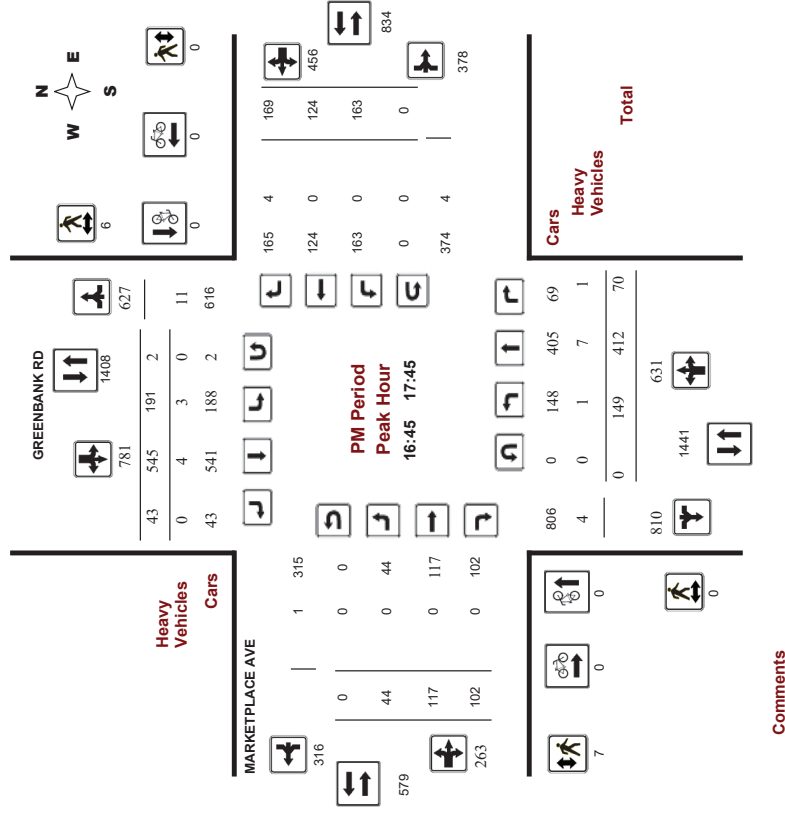
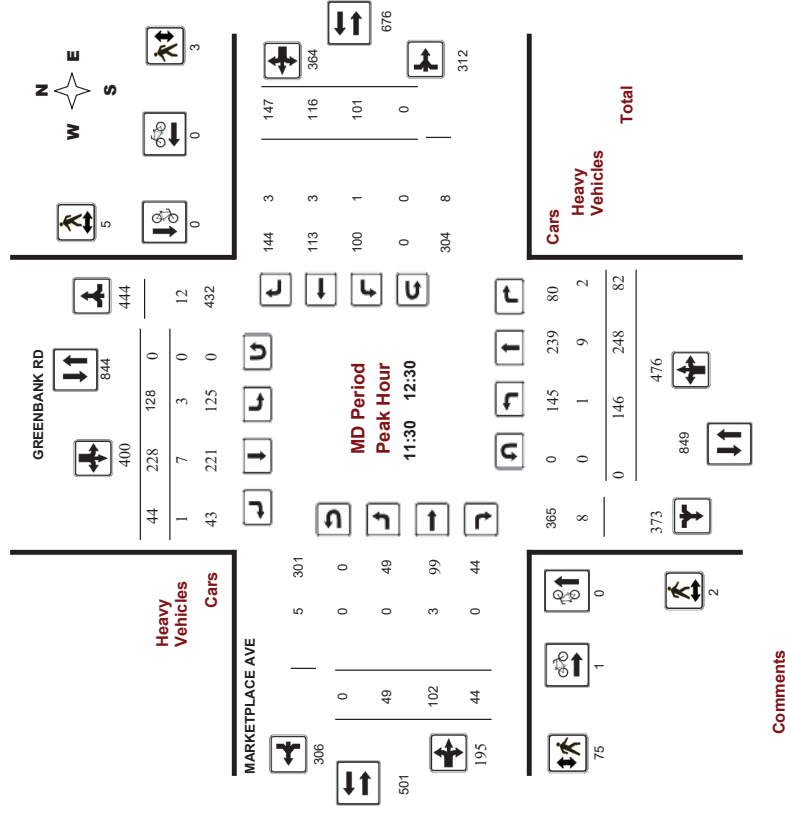
Device: Miovision

Survey Date: Wednesday, February 10, 2016

Start Time: 07:00

WO No: 35721

Device: Miovision





# Transportation Services - Traffic Services

Work Order  
35721

## Turning Movement Count - Full Study Summary Report

### GREENBANK RD @ MARKETPLACE AVE

**Survey Date:** Wednesday, February 10, 2016 **Total Observed U-Turns** **AADT Factor**

Northbound: 0 Southbound: 7 1.00  
Eastbound: 0 Westbound: 0

#### Full Study

| Period                                                                                                          | GREENBANK RD |      |     |           |      |            |     |      |           |            | MARKETPLACE AVE |     |      |           |      |           |      |           |       |      | Grand<br>TOT |  |
|-----------------------------------------------------------------------------------------------------------------|--------------|------|-----|-----------|------|------------|-----|------|-----------|------------|-----------------|-----|------|-----------|------|-----------|------|-----------|-------|------|--------------|--|
|                                                                                                                 | Northbound   |      |     |           |      | Southbound |     |      |           |            | Eastbound       |     |      |           |      | Westbound |      |           |       |      |              |  |
|                                                                                                                 | LT           | ST   | RT  | NB<br>TOT | RT   | LT         | ST  | RT   | SB<br>TOT | STR<br>TOT | LT              | ST  | RT   | EB<br>TOT | LT   | ST        | RT   | WB<br>TOT |       |      |              |  |
| 07:00-08:00                                                                                                     | 75           | 543  | 78  | 696       | 34   | 281        | 6   | 321  | 1017      | 10         | 18              | 20  | 48   | 53        | 25   | 90        | 168  | 216       | 1233  |      |              |  |
| 08:00-09:00                                                                                                     | 90           | 514  | 45  | 649       | 57   | 231        | 11  | 299  | 948       | 8          | 22              | 23  | 53   | 39        | 40   | 118       | 197  | 250       | 1198  |      |              |  |
| 09:00-10:00                                                                                                     | 104          | 300  | 62  | 466       | 82   | 226        | 37  | 345  | 811       | 29         | 52              | 27  | 108  | 66        | 69   | 81        | 216  | 324       | 1135  |      |              |  |
| 11:30-12:30                                                                                                     | 146          | 248  | 82  | 476       | 128  | 228        | 44  | 400  | 876       | 49         | 102             | 44  | 195  | 101       | 116  | 147       | 364  | 559       | 1435  |      |              |  |
| 12:30-13:30                                                                                                     | 93           | 226  | 57  | 376       | 140  | 237        | 39  | 416  | 792       | 52         | 86              | 46  | 184  | 90        | 110  | 144       | 344  | 528       | 1320  |      |              |  |
| 15:00-16:00                                                                                                     | 101          | 302  | 45  | 448       | 134  | 385        | 30  | 549  | 997       | 31         | 86              | 72  | 189  | 114       | 111  | 140       | 365  | 554       | 1551  |      |              |  |
| 16:00-17:00                                                                                                     | 113          | 324  | 64  | 501       | 149  | 491        | 39  | 679  | 1180      | 57         | 109             | 81  | 247  | 157       | 128  | 124       | 409  | 656       | 1836  |      |              |  |
| 17:00-18:00                                                                                                     | 154          | 421  | 66  | 641       | 189  | 538        | 37  | 764  | 1405      | 46         | 115             | 101 | 262  | 167       | 114  | 171       | 452  | 714       | 2119  |      |              |  |
| Sub Total                                                                                                       | 876          | 2878 | 499 | 4253      | 913  | 2617       | 243 | 3773 | 8026      | 282        | 590             | 414 | 1286 | 787       | 713  | 1015      | 2515 | 3801      | 11827 |      |              |  |
| U Turns                                                                                                         | 0            |      |     |           |      | 7          |     |      |           |            | 7               | 0   |      |           |      |           | 0    | 7         |       |      |              |  |
| Total                                                                                                           | 876          | 2878 | 499 | 4253      | 913  | 2617       | 243 | 3780 | 8033      | 282        | 590             | 414 | 1286 | 787       | 713  | 1015      | 2515 | 3801      | 11834 |      |              |  |
| EQ 12hr                                                                                                         | 1218         | 4000 | 694 | 5912      | 1269 | 3638       | 338 | 5254 | 11166     | 392        | 820             | 575 | 1788 | 1094      | 991  | 1411      | 3496 | 5284      | 16450 |      |              |  |
| Note: These values are calculated by multiplying the totals by the appropriate expansion factor.                |              |      |     |           |      |            |     |      |           |            |                 |     |      |           |      |           |      |           |       | 1.39 |              |  |
| AVG 12hr                                                                                                        | 1218         | 4000 | 694 | 5912      | 1269 | 3638       | 338 | 5254 | 11166     | 392        | 820             | 575 | 1788 | 1094      | 991  | 1411      | 3496 | 5284      | 16450 |      |              |  |
| Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.              |              |      |     |           |      |            |     |      |           |            |                 |     |      |           |      |           |      |           |       | 1.00 |              |  |
| AVG 24hr                                                                                                        | 1595         | 5241 | 909 | 7744      | 1662 | 4765       | 442 | 6883 | 14627     | 513        | 1074            | 754 | 2342 | 1433      | 1298 | 1848      | 4580 | 6922      | 21549 |      |              |  |
| Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. |              |      |     |           |      |            |     |      |           |            |                 |     |      |           |      |           |      |           |       | 1.31 |              |  |

#### Comments:

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

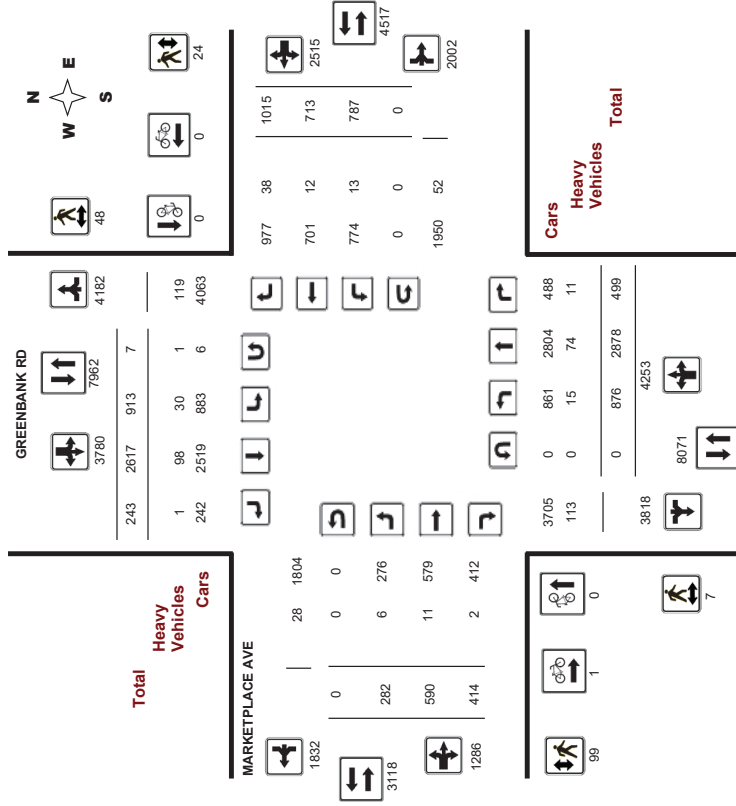


# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Diagram

### GREENBANK RD @ MARKETPLACE AVE

**Survey Date:** Wednesday, February 10, 2016 **WO#:** 35721 **Device:** Miovision



#### Comments





## Transportation Services - Traffic Services

W.O.  
35721

### Turning Movement Count - Heavy Vehicle Report

#### GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

| GREENBANK RD             |    |    |    |       |            |    |    |       |         | MARKETPLACE AVE |    |    |       |    |           |    |       |         |             |
|--------------------------|----|----|----|-------|------------|----|----|-------|---------|-----------------|----|----|-------|----|-----------|----|-------|---------|-------------|
| Northbound               |    |    |    |       | Southbound |    |    |       |         | Eastbound       |    |    |       |    | Westbound |    |       |         |             |
| Time Period              | LT | ST | RT | N TOT | LT         | ST | RT | S TOT | STR TOT | LT              | ST | RT | E TOT | LT | ST        | RT | W TOT | STR TOT | Grand Total |
| 07:00 08:00              | 7  | 14 | 5  | 26    | 6          | 22 | 0  | 28    | 54      | 2               | 4  | 2  | 8     | 2  | 2         | 9  | 13    | 21      | 75          |
| 08:00 09:00              | 3  | 17 | 2  | 22    | 4          | 15 | 0  | 19    | 41      | 2               | 1  | 0  | 3     | 5  | 1         | 6  | 12    | 15      | 56          |
| 09:00 10:00              | 2  | 12 | 1  | 15    | 6          | 9  | 0  | 15    | 30      | 0               | 1  | 0  | 1     | 3  | 2         | 5  | 10    | 11      | 41          |
| 11:30 12:30              | 1  | 9  | 2  | 12    | 3          | 7  | 1  | 11    | 23      | 0               | 3  | 0  | 3     | 1  | 3         | 7  | 10    | 33      |             |
| 12:30 13:30              | 1  | 6  | 0  | 7     | 2          | 16 | 0  | 18    | 25      | 2               | 1  | 0  | 3     | 1  | 2         | 2  | 5     | 8       | 33          |
| 15:00 16:00              | 0  | 7  | 0  | 7     | 3          | 15 | 0  | 19    | 26      | 0               | 0  | 0  | 0     | 0  | 2         | 3  | 5     | 5       | 31          |
| 16:00 17:00              | 0  | 5  | 0  | 5     | 4          | 12 | 0  | 16    | 21      | 0               | 1  | 0  | 1     | 1  | 0         | 6  | 7     | 8       | 29          |
| 17:00 18:00              | 1  | 4  | 1  | 6     | 2          | 2  | 0  | 4     | 10      | 0               | 0  | 0  | 0     | 0  | 0         | 4  | 4     | 4       | 14          |
| Sub Total                | 15 | 74 | 11 | 100   | 30         | 98 | 1  | 130   | 230     | 6               | 11 | 2  | 19    | 13 | 12        | 38 | 63    | 82      | 312         |
| U-Turns (Heavy Vehicles) |    |    |    | 0     |            |    |    | 1     | 1       |                 |    |    | 0     |    |           | 0  | 0     | 0       | 1           |
| Total                    | 15 | 74 | 11 | 0     | 30         | 98 | 1  | 131   | 231     | 6               | 11 | 2  | 19    | 13 | 12        | 38 | 63    | 82      | 313         |

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.



## Transportation Services - Traffic Services

Work Order  
35721

### Turning Movement Count - Pedestrian Volume Report

#### GREENBANK RD @ MARKETPLACE AVE

Count Date: Wednesday, February 10, 2016

Start Time: 07:00

| Time Period | NB Approach<br>(E or W Crossing) |    | SB Approach<br>(E or W Crossing) |    | Total | EB Approach<br>(N or S Crossing) |    | WB Approach<br>(N or S Crossing) |     | Total | Grand Total |
|-------------|----------------------------------|----|----------------------------------|----|-------|----------------------------------|----|----------------------------------|-----|-------|-------------|
| 07:00 07:15 | 1                                | 2  | 0                                | 0  | 3     | 0                                | 0  | 0                                | 0   | 0     | 3           |
| 07:15 07:30 | 0                                | 0  | 0                                | 0  | 0     | 0                                | 0  | 1                                | 1   | 1     | 1           |
| 07:30 07:45 | 0                                | 1  | 1                                | 0  | 1     | 0                                | 0  | 0                                | 0   | 0     | 1           |
| 07:45 08:00 | 1                                | 0  | 1                                | 1  | 1     | 1                                | 1  | 1                                | 1   | 2     | 3           |
| 07:00 08:00 | 2                                | 3  | 3                                | 1  | 5     | 2                                | 2  | 3                                | 3   | 8     | 8           |
| 08:00 08:15 | 0                                | 0  | 0                                | 0  | 0     | 0                                | 0  | 0                                | 0   | 0     | 0           |
| 08:15 08:30 | 0                                | 0  | 0                                | 0  | 0     | 0                                | 0  | 0                                | 0   | 0     | 0           |
| 08:30 08:45 | 0                                | 1  | 1                                | 1  | 1     | 1                                | 1  | 1                                | 1   | 2     | 3           |
| 08:45 09:00 | 0                                | 1  | 1                                | 1  | 1     | 1                                | 1  | 1                                | 1   | 2     | 3           |
| 08:00 09:00 | 0                                | 2  | 2                                | 2  | 2     | 2                                | 2  | 4                                | 4   | 6     | 6           |
| 09:00 09:15 | 0                                | 1  | 1                                | 0  | 1     | 0                                | 1  | 1                                | 1   | 2     | 2           |
| 09:15 09:30 | 0                                | 0  | 0                                | 0  | 0     | 0                                | 0  | 0                                | 0   | 0     | 0           |
| 09:30 09:45 | 0                                | 1  | 1                                | 0  | 1     | 0                                | 1  | 1                                | 1   | 1     | 2           |
| 09:45 10:00 | 0                                | 0  | 0                                | 0  | 0     | 0                                | 0  | 1                                | 1   | 1     | 1           |
| 09:00 10:00 | 0                                | 2  | 2                                | 0  | 2     | 0                                | 3  | 3                                | 3   | 5     | 5           |
| 11:30 11:45 | 1                                | 0  | 1                                | 16 | 1     | 16                               | 1  | 17                               | 17  | 18    | 18          |
| 11:45 12:00 | 0                                | 3  | 3                                | 33 | 3     | 33                               | 1  | 34                               | 34  | 37    | 37          |
| 12:00 12:15 | 1                                | 0  | 0                                | 22 | 0     | 22                               | 0  | 22                               | 22  | 23    | 23          |
| 12:15 12:30 | 0                                | 2  | 2                                | 4  | 2     | 4                                | 1  | 5                                | 5   | 7     | 7           |
| 11:30 12:30 | 2                                | 5  | 7                                | 75 | 7     | 75                               | 3  | 78                               | 78  | 85    | 85          |
| 12:30 12:45 | 0                                | 1  | 1                                | 1  | 1     | 1                                | 2  | 3                                | 3   | 4     | 4           |
| 12:45 13:00 | 0                                | 1  | 1                                | 1  | 1     | 1                                | 0  | 1                                | 1   | 2     | 2           |
| 13:00 13:15 | 0                                | 2  | 2                                | 1  | 2     | 1                                | 2  | 3                                | 3   | 5     | 5           |
| 13:15 13:30 | 0                                | 1  | 1                                | 2  | 1     | 2                                | 1  | 3                                | 3   | 4     | 4           |
| 12:30 13:30 | 0                                | 5  | 5                                | 5  | 5     | 5                                | 5  | 10                               | 10  | 15    | 15          |
| 15:00 15:15 | 0                                | 5  | 5                                | 2  | 5     | 2                                | 1  | 3                                | 3   | 8     | 8           |
| 15:15 15:30 | 0                                | 5  | 5                                | 0  | 5     | 0                                | 1  | 1                                | 1   | 6     | 6           |
| 15:30 15:45 | 1                                | 1  | 2                                | 1  | 2     | 1                                | 0  | 1                                | 1   | 3     | 3           |
| 15:45 16:00 | 1                                | 4  | 5                                | 1  | 5     | 1                                | 5  | 6                                | 6   | 11    | 11          |
| 15:00 16:00 | 2                                | 15 | 17                               | 4  | 17    | 4                                | 7  | 11                               | 11  | 28    | 28          |
| 16:00 16:15 | 1                                | 1  | 2                                | 0  | 2     | 0                                | 0  | 0                                | 0   | 2     | 2           |
| 16:15 16:30 | 0                                | 4  | 4                                | 0  | 4     | 0                                | 0  | 0                                | 0   | 4     | 4           |
| 16:30 16:45 | 0                                | 4  | 4                                | 4  | 4     | 4                                | 0  | 4                                | 4   | 8     | 8           |
| 16:45 17:00 | 0                                | 5  | 5                                | 3  | 5     | 3                                | 0  | 3                                | 3   | 8     | 8           |
| 16:00 17:00 | 1                                | 14 | 15                               | 7  | 15    | 7                                | 0  | 7                                | 7   | 22    | 22          |
| 17:00 17:15 | 0                                | 1  | 1                                | 4  | 1     | 4                                | 0  | 4                                | 4   | 5     | 5           |
| 17:15 17:30 | 0                                | 0  | 0                                | 0  | 0     | 0                                | 0  | 0                                | 0   | 0     | 0           |
| 17:30 17:45 | 0                                | 0  | 0                                | 0  | 0     | 0                                | 0  | 0                                | 0   | 0     | 0           |
| 17:45 18:00 | 0                                | 1  | 1                                | 1  | 1     | 1                                | 2  | 3                                | 3   | 4     | 4           |
| 17:00 18:00 | 0                                | 2  | 2                                | 5  | 2     | 5                                | 2  | 7                                | 7   | 9     | 9           |
| Total       | 7                                | 48 | 55                               | 99 | 24    | 123                              | 24 | 123                              | 123 | 178   | 178         |

Comment:



## Transportation Services - Traffic Services

Work Order  
35721

### Turning Movement Count - 15 Min U-Turn Total Report

#### GREENBANK RD @ MARKETPLACE AVE

Survey Date: Wednesday, February 10, 2016

| Time Period | Northbound<br>U-Turn Total | Southbound<br>U-Turn Total | Eastbound<br>U-Turn Total | Westbound<br>U-Turn Total | Total |
|-------------|----------------------------|----------------------------|---------------------------|---------------------------|-------|
| 07:00       | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:15       | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:00       | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:15       | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:00       | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:15       | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 10:00       | 0                          | 1                          | 0                         | 0                         | 1     |
| 11:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 11:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:00       | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:15       | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 13:00       | 0                          | 1                          | 0                         | 0                         | 1     |
| 13:15       | 0                          | 0                          | 0                         | 0                         | 0     |
| 13:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:00       | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:15       | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:30       | 0                          | 1                          | 0                         | 0                         | 1     |
| 15:45       | 0                          | 1                          | 0                         | 0                         | 1     |
| 16:00       | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:15       | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:00       | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:15       | 0                          | 2                          | 0                         | 0                         | 2     |
| 17:30       | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:45       | 0                          | 0                          | 0                         | 0                         | 0     |
| 18:00       | 0                          | 1                          | 0                         | 0                         | 1     |
| Total       | 0                          | 7                          | 0                         | 0                         | 7     |



## Transportation Services - Traffic Services

### Turning Movement Count - Peak Hour Diagram

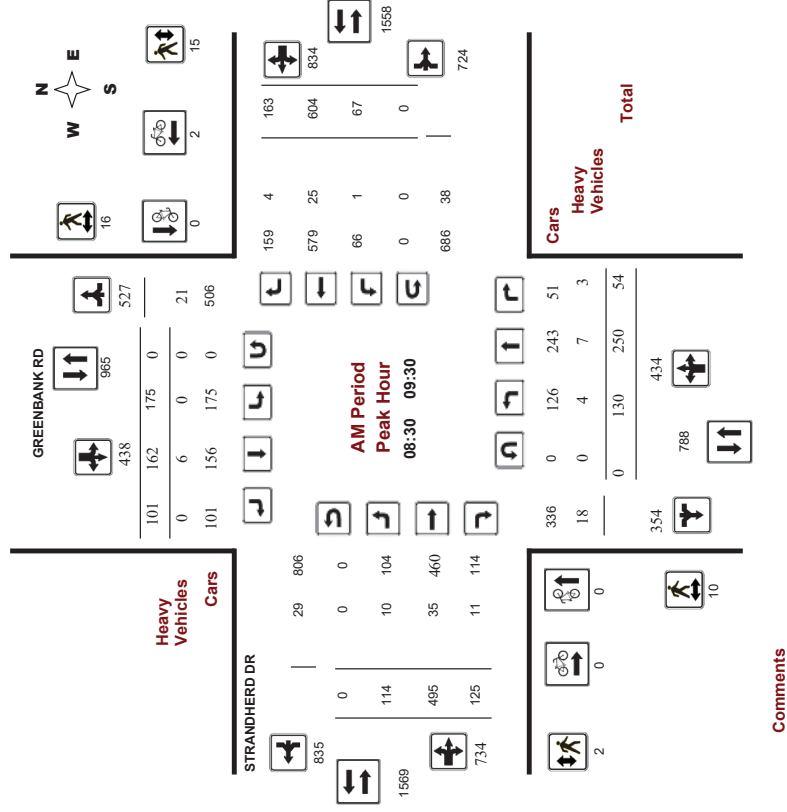
#### GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Start Time: 07:00

WO No: 36175

Device: Miovision





## Transportation Services - Traffic Services

### Turning Movement Count - Peak Hour Diagram

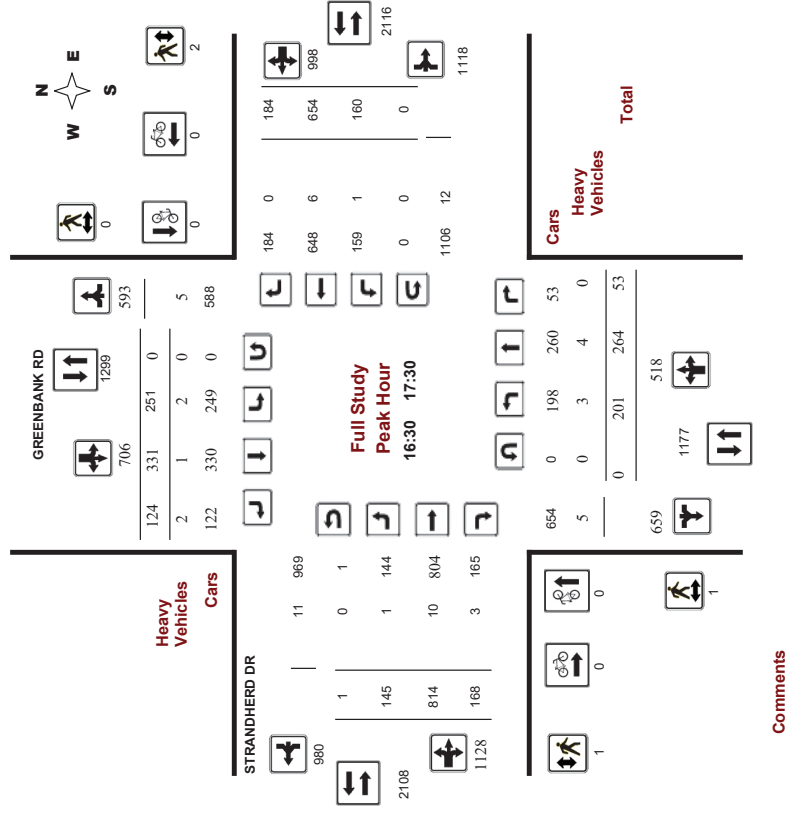
#### GREENBANK RD @ STRANDHERD DR

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

**Start Time:** 07:00

**WO No:** 36175

**Device:** Miovision



## Transportation Services - Traffic Services

### Turning Movement Count - Peak Hour Diagram

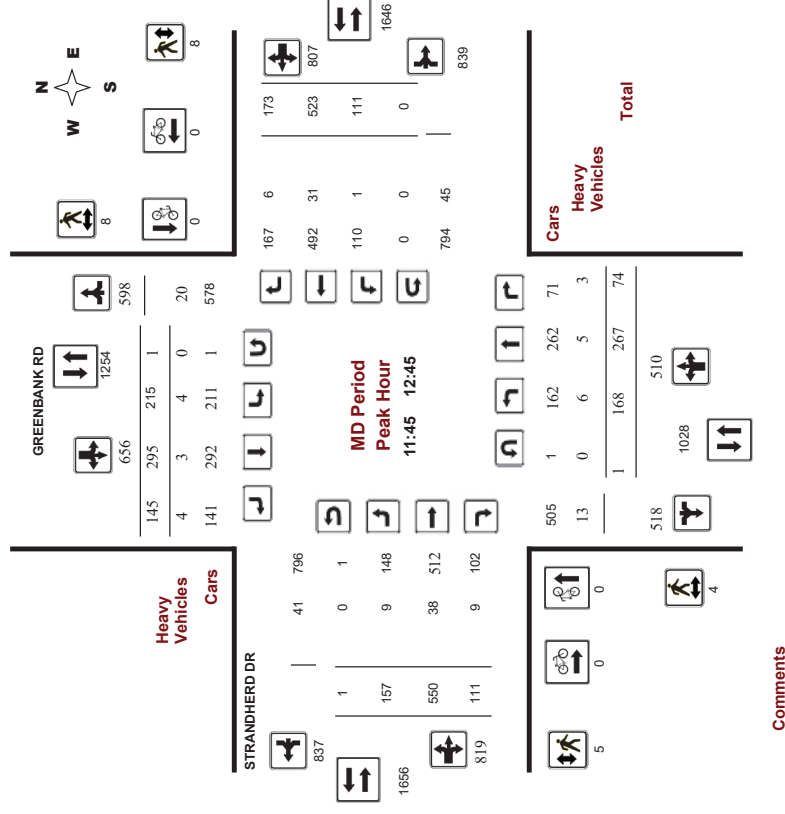
#### GREENBANK RD @ STRANDHERD DR

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

**Start Time:** 07:00

**WO No:** 36175

**Device:** Miovision





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

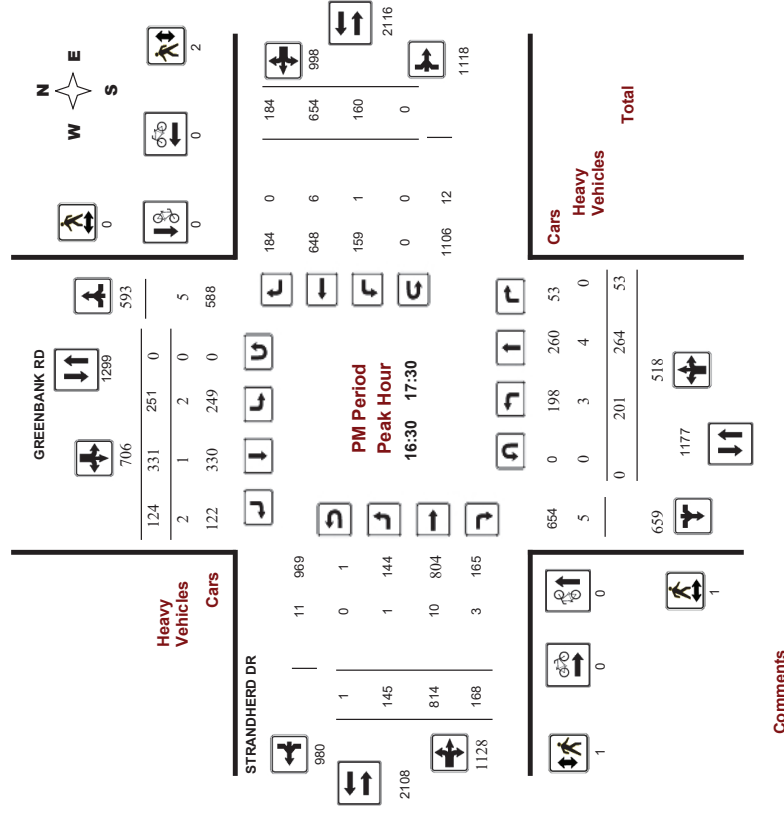
GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

Start Time: 07:00

WO No: 36175

Device: Miovision



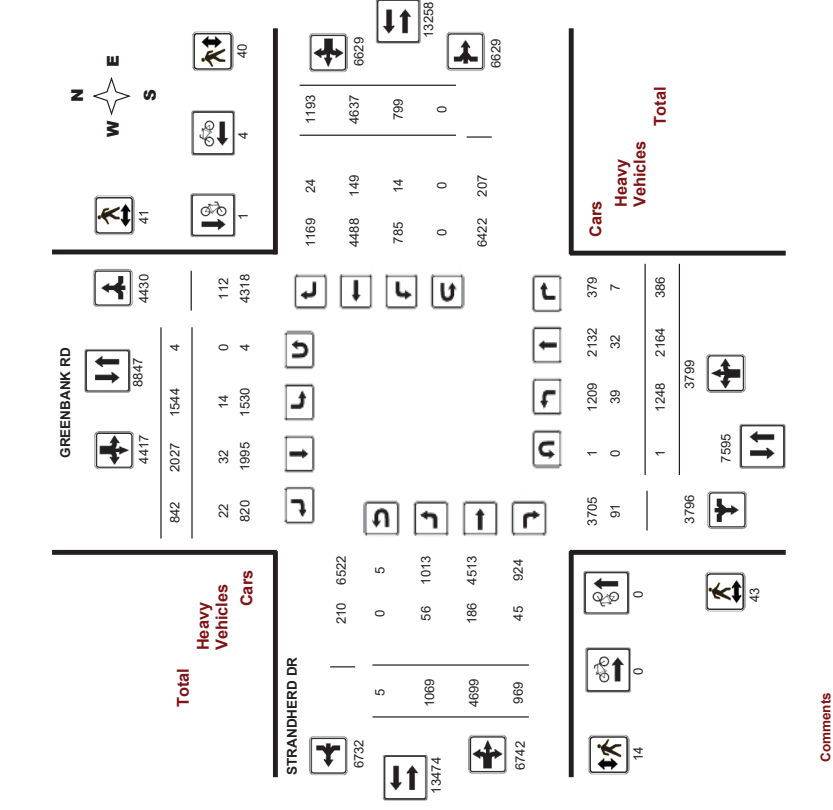
Transportation Services - Traffic Services  
Turning Movement Count - Full Study Diagram

GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

WO#: 36175

Device: Miovision





## Transportation Services - Traffic Services

Work Order  
36175

### Turning Movement Count - Full Study Summary Report

#### GREENBANK RD @ STRANDHERD DR

|                                              |  |                               |  |                    |  |
|----------------------------------------------|--|-------------------------------|--|--------------------|--|
| <b>Survey Date:</b> Tuesday, August 16, 2016 |  | <b>Total Observed U-Turns</b> |  | <b>AADT Factor</b> |  |
| Northbound: 1                                |  | Southbound: 4                 |  | .90                |  |
| Eastbound: 5                                 |  | Westbound: 0                  |  |                    |  |

#### Full Study

| Period                                                                                                          | GREENBANK RD |      |     |           |      | STRANDHERD DR |      |      |           |            |           |      |       |           |      | WB<br>TOT | STR<br>TOT | Grand<br>TOT |           |    |  |  |  |
|-----------------------------------------------------------------------------------------------------------------|--------------|------|-----|-----------|------|---------------|------|------|-----------|------------|-----------|------|-------|-----------|------|-----------|------------|--------------|-----------|----|--|--|--|
|                                                                                                                 | Northbound   |      |     |           |      | Southbound    |      |      |           |            | Eastbound |      |       |           |      |           |            |              | Westbound |    |  |  |  |
|                                                                                                                 | LT           | ST   | RT  | NB<br>TOT |      | LT            | ST   | RT   | SB<br>TOT | STR<br>TOT | LT        | ST   | RT    | EB<br>TOT | LT   |           |            |              | ST        | RT |  |  |  |
| 07:00-08:00                                                                                                     | 108          | 379  | 19  | 506       | 95   | 120           | 69   | 284  | 790       | 112        | 471       | 77   | 660   | 36        | 526  | 120       | 682        | 1342         | 2132      |    |  |  |  |
| 08:00-09:00                                                                                                     | 129          | 257  | 49  | 435       | 149  | 139           | 95   | 383  | 818       | 109        | 472       | 116  | 697   | 47        | 684  | 188       | 919        | 1616         | 2434      |    |  |  |  |
| 09:00-10:00                                                                                                     | 146          | 247  | 38  | 431       | 181  | 207           | 106  | 494  | 925       | 110        | 518       | 99   | 727   | 77        | 512  | 125       | 714        | 1441         | 2366      |    |  |  |  |
| 11:30-12:30                                                                                                     | 181          | 262  | 69  | 512       | 213  | 287           | 135  | 635  | 1147      | 155        | 581       | 116  | 852   | 101       | 518  | 169       | 788        | 1640         | 2787      |    |  |  |  |
| 12:30-13:30                                                                                                     | 153          | 287  | 58  | 498       | 198  | 250           | 135  | 583  | 1081      | 170        | 551       | 115  | 836   | 108       | 521  | 172       | 801        | 1637         | 2718      |    |  |  |  |
| 15:00-16:00                                                                                                     | 151          | 222  | 45  | 418       | 240  | 322           | 97   | 659  | 1077      | 123        | 605       | 123  | 851   | 126       | 590  | 116       | 832        | 1683         | 2760      |    |  |  |  |
| 16:00-17:00                                                                                                     | 190          | 259  | 56  | 505       | 228  | 322           | 96   | 646  | 1151      | 147        | 708       | 164  | 1019  | 142       | 658  | 161       | 961        | 1980         | 3131      |    |  |  |  |
| 17:00-18:00                                                                                                     | 190          | 251  | 52  | 493       | 240  | 380           | 109  | 729  | 1222      | 143        | 793       | 159  | 1095  | 162       | 628  | 142       | 932        | 2027         | 3249      |    |  |  |  |
| Sub Total                                                                                                       | 1248         | 2164 | 386 | 3798      | 1544 | 2027          | 842  | 4413 | 8211      | 1069       | 4699      | 969  | 6737  | 799       | 4637 | 1193      | 6629       | 13366        | 21577     |    |  |  |  |
| U Turns                                                                                                         |              |      |     | 1         |      |               |      | 4    |           | 5          |           |      | 5     |           |      |           | 0          | 5            | 10        |    |  |  |  |
| Total                                                                                                           | 1248         | 2164 | 386 | 3799      | 1544 | 2027          | 842  | 4417 | 8216      | 1069       | 4699      | 969  | 6742  | 799       | 4637 | 1193      | 6629       | 13371        | 21587     |    |  |  |  |
| EQ 12hr                                                                                                         | 1735         | 3008 | 537 | 5281      | 2146 | 2818          | 1170 | 6140 | 11421     | 1486       | 6532      | 1347 | 9371  | 1111      | 6445 | 1658      | 9214       | 18585        | 30006     |    |  |  |  |
| Note: These values are calculated by multiplying the totals by the appropriate expansion factor.                |              |      |     |           |      |               |      |      |           |            |           |      |       |           |      |           |            |              | 1.39      |    |  |  |  |
| AVG 12hr                                                                                                        | 1561         | 2707 | 483 | 4753      | 1932 | 2536          | 1053 | 5526 | 10279     | 1337       | 5878      | 1212 | 8434  | 1000      | 5801 | 1492      | 8293       | 16727        | 27006     |    |  |  |  |
| Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.              |              |      |     |           |      |               |      |      |           |            |           |      |       |           |      |           |            |              | .90       |    |  |  |  |
| AVG 24hr                                                                                                        | 2045         | 3546 | 633 | 6226      | 2530 | 3322          | 1380 | 7239 | 13465     | 1752       | 7701      | 1588 | 11049 | 1309      | 7599 | 1955      | 10864      | 21913        | 35378     |    |  |  |  |
| Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. |              |      |     |           |      |               |      |      |           |            |           |      |       |           |      |           |            |              | 1.31      |    |  |  |  |

#### Comments:

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



## Transportation Services - Traffic Services

W.O.  
36175

### Turning Movement Count - 15 Minute Summary Report

#### GREENBANK RD @ STRANDHERD DR

|                                              |  |                               |  |  |  |
|----------------------------------------------|--|-------------------------------|--|--|--|
| <b>Survey Date:</b> Tuesday, August 16, 2016 |  | <b>Total Observed U-Turns</b> |  |  |  |
| Northbound: 1                                |  | Southbound: 4                 |  |  |  |
| Eastbound: 5                                 |  | Westbound: 0                  |  |  |  |

#### STRANDHERD DR

#### GREENBANK RD

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

Note: U-Turns are included in Totals.

Comment:



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

Work Order  
36175

Count Date: Tuesday, August 16, 2016

Start Time: 07:00

GREENBANK RD @ STRANDHERD DR

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

Comment:



Transportation Services - Traffic Services  
Turning Movement Count - Heavy Vehicle Report

W.O.  
36175

Survey Date: Tuesday, August 16, 2016

GREENBANK RD @ STRANDHERD DR

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

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.



## Transportation Services - Traffic Services

Work Order  
36175

### Turning Movement Count - 15 Min U-Turn Total Report

#### GREENBANK RD @ STRANDHERD DR

Survey Date: Tuesday, August 16, 2016

| Time Period | Northbound<br>U-Turn Total | Southbound<br>U-Turn Total | Eastbound<br>U-Turn Total | Westbound<br>U-Turn Total | Total |
|-------------|----------------------------|----------------------------|---------------------------|---------------------------|-------|
| 07:00 07:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:15 07:30 | 0                          | 1                          | 0                         | 0                         | 1     |
| 07:30 07:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 07:45 08:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:00 08:15 | 0                          | 0                          | 1                         | 0                         | 1     |
| 08:15 08:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:30 08:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 08:45 09:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:00 09:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:15 09:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:30 09:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 09:45 10:00 | 0                          | 0                          | 1                         | 0                         | 1     |
| 11:30 11:45 | 0                          | 0                          | 1                         | 0                         | 1     |
| 11:45 12:00 | 1                          | 0                          | 1                         | 0                         | 2     |
| 12:00 12:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:15 12:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 12:30 12:45 | 0                          | 1                          | 0                         | 0                         | 1     |
| 12:45 13:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| 13:00 13:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 13:15 13:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:00 15:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:15 15:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 15:30 15:45 | 0                          | 1                          | 0                         | 0                         | 1     |
| 15:45 16:00 | 0                          | 1                          | 0                         | 0                         | 1     |
| 16:00 16:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:15 16:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:30 16:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 16:45 17:00 | 0                          | 0                          | 1                         | 0                         | 1     |
| 17:00 17:15 | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:15 17:30 | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:30 17:45 | 0                          | 0                          | 0                         | 0                         | 0     |
| 17:45 18:00 | 0                          | 0                          | 0                         | 0                         | 0     |
| Total       | 1                          | 4                          | 5                         | 0                         | 10    |

2016-Nov-21

Page 1 of 1



## Transportation Services - Traffic Services

Work Order  
36175

### Turning Movement Count - Pedestrian Volume Report

#### GREENBANK RD @ STRANDHERD DR

Count Date: Tuesday, August 16, 2016

Start Time: 07:00

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

Comment:

2018-Nov-21

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# Appendix C

Synchro Intersection Worksheets – Existing Conditions

Lanes, Volumes, Timings  
1: Greenbank & Jockvale

09-09-2019

| Lane Group                                                               | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR |
|--------------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-----|
| Lane Configurations                                                      | 2     | 0     | 4     | 9     | 3     | 169   | 4     | 426   | 6     | 126   | 223  | 6   |
| Traffic Volume (vph)                                                     | 2     | 0     | 4     | 9     | 3     | 169   | 4     | 426   | 6     | 126   | 223  | 6   |
| Future Volume (vph)                                                      | 0     | 1563  | 0     | 0     | 1681  | 1483  | 0     | 1742  | 0     | 1658  | 1737 | 0   |
| Satd. Flow (prot)                                                        | 0.884 |       |       | 0.772 |       |       | 0.998 |       | 0.453 |       |      |     |
| Flt Permitted                                                            | 0     | 1403  | 0     | 0     | 1347  | 1463  | 0     | 1738  | 0     | 791   | 1737 | 0   |
| Satd. Flow (perm)                                                        | 102   |       |       | 188   |       |       | 1     |       |       | 3     |      |     |
| Lane Group Flow (vph)                                                    | 0     | 6     | 0     | 0     | 13    | 188   | 0     | 484   | 0     | 140   | 255  | 0   |
| Turn Type                                                                | Perm  | NA    | Perm  | NA    | pm-ov | Perm  | NA    | pm-pt | NA    |       |      |     |
| Protected Phases                                                         | 4     | 4     |       | 8     | 8     | 1     | 2     | 1     | 6     |       |      |     |
| Permitted Phases                                                         | 4     | 4     |       | 8     | 8     | 2     | 2     | 6     |       |       |      |     |
| Detector Phase                                                           | 4     | 4     |       | 8     | 8     | 1     | 2     | 2     | 1     | 6     |      |     |
| Switch Phase                                                             |       |       |       |       |       |       |       |       |       |       |      |     |
| Minimum Initial (s)                                                      | 10.0  | 10.0  | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |       |      |     |
| Minimum Split (s)                                                        | 27.0  | 27.0  | 27.0  | 27.0  | 20.0  | 73.0  | 73.0  | 20.0  | 93.0  |       |      |     |
| Total Split (s)                                                          | 27.0  | 27.0  | 27.0  | 27.0  | 20.0  | 73.0  | 73.0  | 20.0  | 93.0  |       |      |     |
| Total Split (%)                                                          | 22.5% | 22.5% | 22.5% | 22.5% | 16.7% | 60.8% | 60.8% | 16.7% | 77.5% |       |      |     |
| Yellow Time (s)                                                          | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |       |      |     |
| All-Red Time (s)                                                         | 2.7   | 2.7   | 2.7   | 2.7   | 3.4   | 3.4   | 3.4   | 3.4   | 3.4   |       |      |     |
| Lost Time Adjust (s)                                                     | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |      |     |
| Total Lost Time (s)                                                      | 6.4   |       |       | 6.4   | 7.1   |       | 7.1   |       | 7.1   |       |      |     |
| Lead/Lag                                                                 |       |       |       |       |       |       |       |       |       |       |      |     |
| Lead-Lag Optimize?                                                       |       |       |       |       |       |       |       |       |       |       |      |     |
| Recall Mode                                                              | None  | None  | None  | None  | None  | None  | None  | None  | None  | C-Max |      |     |
| Act Effct Green (s)                                                      | 12.0  | 12.0  | 13.0  | 13.0  | 89.9  | 104.3 | 108.6 |       |       |       |      |     |
| Actuated g/C Ratio                                                       | 0.10  | 0.10  | 0.10  | 0.11  | 0.75  | 0.87  | 0.90  |       |       |       |      |     |
| v/c Ratio                                                                | 0.03  | 0.10  | 0.57  | 0.37  | 0.19  | 0.16  |       |       |       |       |      |     |
| Control Delay                                                            | 0.2   | 48.5  | 12.0  | 8.6   | 3.2   | 1.9   |       |       |       |       |      |     |
| Queue Delay                                                              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |      |     |
| Total Delay                                                              | 0.2   | 48.5  | 12.0  | 8.6   | 3.2   | 1.9   |       |       |       |       |      |     |
| LOS                                                                      | A     | D     | B     | A     | A     | A     |       |       |       |       |      |     |
| Approach Delay                                                           | 0.2   | 14.3  | 8.6   | 2.4   |       |       |       |       |       |       |      |     |
| Approach LOS                                                             | A     | B     | A     |       |       |       |       |       |       |       |      |     |
| Queue Length 50th (m)                                                    | 0.0   | 3.1   | 0.0   | 21.3  | 2.4   | 0.0   |       |       |       |       |      |     |
| Queue Length 95th (m)                                                    | 0.0   | 8.8   | 17.0  | 95.5  | 6.9   | 11.0  |       |       |       |       |      |     |
| Internal Link Dist (m)                                                   | 194.4 |       | 396.8 | 294.1 |       | 283.1 |       |       |       |       |      |     |
| Turn Bay Length (m)                                                      |       |       |       |       |       |       |       |       |       |       |      |     |
| Base Capacity (vph)                                                      | 325   | 231   | 388   | 1302  | 781   | 1572  |       |       |       |       |      |     |
| Starvation Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |      |     |
| Spillback Cap Reductn                                                    | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |      |     |
| Storage Cap Reductn                                                      | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |      |     |
| Reduced v/c Ratio                                                        | 0.02  | 0.06  | 0.48  | 0.37  | 0.18  | 0.16  |       |       |       |       |      |     |
| Intersection Summary                                                     |       |       |       |       |       |       |       |       |       |       |      |     |
| Cycle Length: 120                                                        |       |       |       |       |       |       |       |       |       |       |      |     |
| Actuated Cycle Length: 120                                               |       |       |       |       |       |       |       |       |       |       |      |     |
| Offset: 100 (83%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green |       |       |       |       |       |       |       |       |       |       |      |     |
| Natural Cycle: 120                                                       |       |       |       |       |       |       |       |       |       |       |      |     |
| Control Type: Actuated-Coordinated                                       |       |       |       |       |       |       |       |       |       |       |      |     |

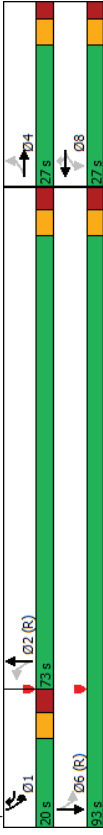
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Lanes, Volumes, Timings  
1: Greenbank & Jockvale

09-09-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.57                               | Intersection LOS: A    |
| Intersection Signal Delay: 7.3                        | ICU Level of Service C |
| Intersection Capacity Utilization 72.6%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |
| Splits and Phases: 1: Greenbank & Jockvale            |                        |



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## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

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|                                                                       | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR  | SBL   | SBT   | SBR |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-----|-------|-------|------|-------|-------|-----|
| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR  | SBL   | SBT   | SBR |
| Lane Configurations                                                   | 12    | 17    | 16    | 34    | 23    | 96  | 98    | 358   | 74   | 43    | 305   | 6   |
| Traffic Volume (vph)                                                  | 12    | 17    | 16    | 34    | 23    | 96  | 98    | 358   | 74   | 43    | 305   | 6   |
| Future Volume (vph)                                                   | 1658  | 1607  | 0     | 1658  | 1518  | 0   | 1658  | 3221  | 0    | 3216  | 3304  | 0   |
| Satd. Flow (prot)                                                     | 0.645 |       |       | 0.678 |       |     | 0.950 |       |      | 0.950 |       |     |
| Flt Permitted                                                         | 1124  | 1607  | 0     | 1182  | 1518  | 0   | 1655  | 3221  | 0    | 3208  | 3304  | 0   |
| Satd. Flow (perm)                                                     | 18    |       |       | 107   |       |     | 25    |       |      | 2     |       |     |
| Lane Group Flow (vph)                                                 | 13    | 37    | 0     | 38    | 133   | 0   | 109   | 480   | 0    | 48    | 346   | 0   |
| Turn Type                                                             | pm-pt | NA    | pm-pt | NA    | NA    | NA  | Prot  | NA    | Prot | NA    | NA    | NA  |
| Protected Phases                                                      | 7     | 4     |       | 3     | 8     |     | 5     | 2     |      | 1     | 6     |     |
| Permitted Phases                                                      | 4     |       |       | 8     |       |     |       |       |      |       |       |     |
| Detector Phase                                                        | 7     | 4     |       | 3     | 8     |     | 5     | 2     |      | 1     | 6     |     |
| Switch Phase                                                          |       |       |       |       |       |     |       |       |      |       |       |     |
| Minimum Initial (s)                                                   | 5.0   | 10.0  |       | 5.0   | 10.0  |     | 5.0   | 10.0  |      | 5.0   | 10.0  |     |
| Minimum Split (s)                                                     | 12.0  | 35.0  |       | 12.0  | 35.0  |     | 15.0  | 58.0  |      | 15.0  | 58.0  |     |
| Total Split (s)                                                       | 12.0  | 35.0  |       | 12.0  | 35.0  |     | 15.0  | 58.0  |      | 15.0  | 58.0  |     |
| Total Split (%)                                                       | 10.0% | 29.2% |       | 10.0% | 29.2% |     | 12.5% | 48.3% |      | 12.5% | 48.3% |     |
| Yellow Time (s)                                                       | 3.3   | 3.3   |       | 3.3   | 3.3   |     | 3.7   | 3.7   |      | 3.7   | 3.7   |     |
| All-Red Time (s)                                                      | 3.1   | 3.2   |       | 3.1   | 3.2   |     | 2.6   | 2.5   |      | 2.6   | 2.5   |     |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   |       | 0.0   | 0.0   |     | 0.0   | 0.0   |      | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                   | 6.4   | 6.5   |       | 6.4   | 6.5   |     | 6.3   | 6.2   |      | 6.3   | 6.2   |     |
| Lead/Lag                                                              | Lead  | Lag   |       | Lead  | Lag   |     | Lead  | Lag   |      | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                    | Yes   | Yes   |       | Yes   | Yes   |     | Yes   | Yes   |      | Yes   | Yes   |     |
| Recall Mode                                                           | None  | None  |       | None  | None  |     | None  | C-Max |      | None  | C-Max |     |
| Act Effct Green (s)                                                   | 17.1  | 13.7  |       | 18.4  | 16.1  |     | 12.9  | 75.3  |      | 7.2   | 67.2  |     |
| Act Effct Green Ratio                                                 | 0.14  | 0.11  |       | 0.15  | 0.13  |     | 0.11  | 0.63  |      | 0.06  | 0.56  |     |
| v/c Ratio                                                             | 0.07  | 0.19  |       | 0.19  | 0.45  |     | 0.61  | 0.24  |      | 0.25  | 0.19  |     |
| Control Delay                                                         | 35.1  | 29.2  |       | 38.7  | 17.2  |     | 65.6  | 11.7  |      | 62.2  | 14.6  |     |
| Queue Delay                                                           | 0.0   | 0.0   |       | 0.0   | 0.0   |     | 0.0   | 0.0   |      | 0.0   | 0.0   |     |
| Total Delay                                                           | 35.1  | 29.2  |       | 38.7  | 17.2  |     | 65.6  | 11.7  |      | 62.2  | 14.6  |     |
| LOS                                                                   | D     | C     |       | D     | B     |     | E     | B     |      | E     | B     |     |
| Approach Delay                                                        |       | 30.7  |       |       | 22.0  |     |       | 21.7  |      |       | 20.4  |     |
| Approach LOS                                                          |       | C     |       |       | C     |     |       | C     |      |       | C     |     |
| Queue Length 50th (m)                                                 | 2.7   | 4.5   |       | 8.0   | 5.4   |     | 26.8  | 23.7  |      | 6.2   | 16.9  |     |
| Queue Length 95th (m)                                                 | 6.9   | 13.0  |       | 14.7  | 21.9  |     | #64.2 | 41.1  |      | 13.1  | 28.6  |     |
| Internal Link Dist (m)                                                |       | 102.8 |       |       | 148.8 |     |       | 283.1 |      |       | 171.8 |     |
| Turn Bay Length (m)                                                   |       | 25.0  |       |       | 55.0  |     |       | 60.0  |      |       | 56.0  |     |
| Base Capacity (vph)                                                   | 185   | 395   |       | 203   | 442   |     | 178   | 2029  |      | 235   | 1851  |     |
| Starvation Cap Reductn                                                | 0     | 0     |       | 0     | 0     |     | 0     | 0     |      | 0     | 0     |     |
| Spillback Cap Reductn                                                 | 0     | 0     |       | 0     | 0     |     | 0     | 0     |      | 0     | 0     |     |
| Storage Cap Reductn                                                   | 0     | 0     |       | 0     | 0     |     | 0     | 0     |      | 0     | 0     |     |
| Reduced v/c Ratio                                                     | 0.07  | 0.09  |       | 0.19  | 0.30  |     | 0.61  | 0.24  |      | 0.20  | 0.19  |     |
| Intersection Summary                                                  |       |       |       |       |       |     |       |       |      |       |       |     |
| Cycle Length: 120                                                     |       |       |       |       |       |     |       |       |      |       |       |     |
| Actuated Cycle Length: 120                                            |       |       |       |       |       |     |       |       |      |       |       |     |
| Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |     |       |       |      |       |       |     |
| Natural Cycle: 120                                                    |       |       |       |       |       |     |       |       |      |       |       |     |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |     |       |       |      |       |       |     |

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## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

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|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.61                                         | Intersection LOS: C    |
| Intersection Signal Delay: 21.7                                 | ICU Level of Service A |
| Intersection Capacity Utilization 51.5%                         |                        |
| Analysis Period (min) 15                                        |                        |
| Description: As per timing plans provided 26-Nov-2018           |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |
| Splits and Phases: 2: Greenbank & Marketplace                   |                        |
| Ø1 15 s                                                         | Ø2 (R) 58 s            |
| Ø3 12 s                                                         | Ø4 35 s                |
| Ø5 15 s                                                         | Ø6 (R) 58 s            |
| Ø7 12 s                                                         | Ø8 35 s                |

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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-09-2019

| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR   |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| Lane Configurations                                                   | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                  | 114   | 495   | 125   | 67    | 604   | 163   | 130   | 250   | 54   | 175   | 162   | 101   |
| Future Volume (vph)                                                   | 114   | 495   | 125   | 67    | 604   | 163   | 130   | 250   | 54   | 175   | 162   | 101   |
| Satd. Flow (prot)                                                     | 1658  | 3316  | 1483  | 1658  | 3316  | 1483  | 3216  | 3209  | 0    | 3216  | 3316  | 1483  |
| Flt Permitted                                                         | 0.234 |       |       | 0.380 |       |       | 0.950 |       |      |       |       |       |
| Satd. Flow (perm)                                                     | 406   | 3316  | 1446  | 660   | 3316  | 1432  | 3206  | 3209  | 0    | 3154  | 3316  | 1462  |
| Satd. Flow (RTOR)                                                     |       |       | 149   |       |       | 181   |       | 20    |      |       |       | 149   |
| Lane Group Flow (vph)                                                 | 127   | 550   | 139   | 74    | 671   | 181   | 144   | 338   | 0    | 194   | 180   | 112   |
| Turn Type                                                             | pm-pt | NA    | Perm  | pm-pt | NA    | Perm  | Prot  | NA    | Prot | NA    | Perm  | NA    |
| Protected Phases                                                      | 7     | 4     |       | 3     | 8     |       | 5     | 2     |      | 1     |       | 6     |
| Permitted Phases                                                      | 4     |       | 4     | 8     |       | 8     |       |       |      |       |       | 6     |
| Detector Phase                                                        | 7     | 4     | 4     | 3     | 8     | 8     | 5     | 2     |      | 1     |       | 6     |
| Switch Phase                                                          |       |       |       |       |       |       |       |       |      |       |       |       |
| Minimum Initial (s)                                                   | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |      | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                     | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (s)                                                       | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (%)                                                       | 15.8% | 34.2% | 34.2% | 15.8% | 34.2% | 34.2% | 20.0% | 30.0% |      | 20.0% | 30.0% | 30.0% |
| Yellow Time (s)                                                       | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |      | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                      | 2.9   | 2.8   | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   |      | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                   | 6.6   | 6.5   | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   |      | 6.3   | 6.5   | 6.5   |
| Lead/Lag                                                              | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   |      | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?                                                    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |      | Yes   | Yes   | Yes   |
| Recall Mode                                                           | None  | Max   | Max   | None  | Max   | Max   | None  | C-Max |      | None  | C-Max | C-Max |
| Act Effct Green (s)                                                   | 49.8  | 40.8  | 40.8  | 44.9  | 36.4  | 36.4  | 10.7  | 34.7  |      | 12.5  | 36.5  | 36.5  |
| Actuated g/C Ratio                                                    | 0.42  | 0.34  | 0.34  | 0.37  | 0.30  | 0.30  | 0.09  | 0.29  |      | 0.10  | 0.30  | 0.30  |
| v/c Ratio                                                             | 0.46  | 0.49  | 0.24  | 0.23  | 0.67  | 0.32  | 0.50  | 0.36  |      | 0.58  | 0.18  | 0.20  |
| Control Delay                                                         | 25.8  | 34.4  | 5.2   | 21.7  | 40.8  | 6.3   | 70.6  | 30.6  |      | 57.9  | 31.9  | 3.0   |
| Queue Delay                                                           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Delay                                                           | 25.8  | 34.4  | 5.2   | 21.7  | 40.8  | 6.3   | 70.6  | 30.6  |      | 57.9  | 31.9  | 3.0   |
| LOS                                                                   | C     | C     | A     | C     | D     | A     | E     | C     |      | E     | C     | A     |
| Approach Delay                                                        |       | 28.1  |       |       | 32.6  |       |       | 42.6  |      |       | 35.6  |       |
| Approach LOS                                                          |       | C     |       |       | C     |       |       | D     |      |       | D     |       |
| Queue Length 50th (m)                                                 | 18.5  | 58.3  | 0.0   | 10.4  | 76.8  | 0.0   | 19.4  | 30.2  |      | 24.0  | 17.2  | 0.0   |
| Queue Length 95th (m)                                                 | 31.7  | 79.2  | 13.2  | 20.1  | 100.4 | 17.2  | 30.6  | 34.4  |      | 35.3  | 27.8  | 6.8   |
| Internal Link Dist (m)                                                |       | 186.3 |       |       | 415.8 |       |       | 171.8 |      |       | 236.6 |       |
| Turn Bay Length (m)                                                   | 70.0  |       | 100.0 | 130.0 |       | 60.0  |       |       |      | 85.0  |       | 160.0 |
| Base Capacity (vph)                                                   | 300   | 1127  | 589   | 370   | 1004  | 559   | 474   | 941   |      | 474   | 1008  | 548   |
| Starvation Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Spillback Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Storage Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Reduced v/c Ratio                                                     | 0.42  | 0.49  | 0.24  | 0.20  | 0.67  | 0.32  | 0.30  | 0.36  |      | 0.41  | 0.18  | 0.20  |
| Intersection Summary                                                  |       |       |       |       |       |       |       |       |      |       |       |       |
| Cycle Length: 120                                                     |       |       |       |       |       |       |       |       |      |       |       |       |
| Actuated Cycle Length: 120                                            |       |       |       |       |       |       |       |       |      |       |       |       |
| Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |       |       |       |      |       |       |       |
| Natural Cycle: 120                                                    |       |       |       |       |       |       |       |       |      |       |       |       |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |       |       |       |      |       |       |       |

### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-09-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.67                               | Intersection LOS: C    |
| Intersection Signal Delay: 33.5                       | ICU Level of Service D |
| Intersection Capacity Utilization 80.2%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |
| Splits and Phases: 3: Greenbank & Strandherd          |                        |
|                                                       |                        |

Lanes, Volumes, Timings  
1: Greenbank & Jockvale

09-09-2019

| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| Lane Configurations                                                   | 4     | 4     | 4     | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2   |
| Traffic Volume (vph)                                                  | 0     | 2     | 4     | 1     | 0     | 154   | 2     | 236   | 7     | 214   | 470   | 0   |
| Future Volume (vph)                                                   | 0     | 2     | 4     | 1     | 0     | 154   | 2     | 236   | 7     | 214   | 470   | 0   |
| Satd. Flow (prot)                                                     | 0     | 1588  | 0     | 0     | 1658  | 1483  | 0     | 1737  | 0     | 1658  | 1745  | 0   |
| Flt Permitted                                                         |       |       |       |       |       |       |       |       |       |       |       |     |
| Satd. Flow (perm)                                                     | 0     | 1588  | 0     | 0     | 1745  | 1483  | 0     | 1733  | 0     | 987   | 1745  | 0   |
| Satd. Flow (RTOR)                                                     | 4     |       |       |       |       | 171   |       | 2     |       |       |       |     |
| Lane Group Flow (vph)                                                 | 0     | 6     | 0     | 0     | 1     | 171   | 0     | 272   | 0     | 238   | 522   | 0   |
| Turn Type                                                             | NA    | NA    | NA    | Perm  | NA    | pm-ov | Perm  | NA    | pm-pt | NA    |       |     |
| Protected Phases                                                      | 4     | 4     |       | 8     | 8     | 1     | 2     | 2     | 1     | 6     |       |     |
| Permitted Phases                                                      | 4     | 4     |       | 8     | 8     | 2     | 2     | 2     | 6     |       |       |     |
| Detector Phase                                                        | 4     | 4     |       | 8     | 8     | 1     | 2     | 2     | 1     | 6     |       |     |
| Switch Phase                                                          |       |       |       |       |       |       |       |       |       |       |       |     |
| Minimum Initial (s)                                                   | 10.0  | 10.0  | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 10.0  | 5.0   | 10.0  |       |     |
| Minimum Split (s)                                                     | 27.0  | 27.0  | 27.0  | 27.0  | 30.0  | 63.0  | 63.0  | 63.0  | 30.0  | 93.0  |       |     |
| Total Split (s)                                                       | 27.0  | 27.0  | 27.0  | 27.0  | 30.0  | 63.0  | 63.0  | 63.0  | 30.0  | 93.0  |       |     |
| Total Split (%)                                                       | 22.5% | 22.5% | 22.5% | 22.5% | 25.0% | 52.5% | 52.5% | 52.5% | 25.0% | 77.5% |       |     |
| Yellow Time (s)                                                       | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |       |     |
| All-Red Time (s)                                                      | 2.7   | 2.7   | 2.7   | 2.7   | 3.4   | 3.4   | 3.4   | 3.4   | 3.4   | 3.4   |       |     |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |     |
| Total Lost Time (s)                                                   | 6.4   |       |       | 6.4   | 7.1   | 7.1   | 7.1   | 7.1   | 7.1   | 7.1   |       |     |
| Lead/Lag                                                              |       |       |       |       |       |       |       |       |       |       |       |     |
| Lead/Lag Optimize?                                                    |       |       |       |       |       |       |       |       |       |       |       |     |
| Recall Mode                                                           | None  | None  | None  | None  | None  | None  | None  | None  | None  | None  | C-Max |     |
| Act Effct Green (s)                                                   | 10.0  | 10.0  | 10.0  | 11.2  | 10.0  | 11.2  | 94.6  | 109.6 | 115.3 |       |       |     |
| Actuated g/C Ratio                                                    | 0.08  | 0.08  | 0.08  | 0.09  | 0.09  | 0.09  | 0.79  | 0.91  | 0.96  |       |       |     |
| v/c Ratio                                                             | 0.04  | 0.04  | 0.01  | 0.58  | 0.20  | 0.25  | 0.31  |       |       |       |       |     |
| Control Delay                                                         | 37.0  | 37.0  | 51.0  | 14.7  | 4.6   | 1.7   | 1.6   |       |       |       |       |     |
| Queue Delay                                                           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |     |
| Total Delay                                                           | 37.0  | 37.0  | 51.0  | 14.7  | 4.6   | 1.7   | 1.6   |       |       |       |       |     |
| LOS                                                                   | D     | D     | D     | B     | A     | A     | A     | A     | A     | A     |       |     |
| Approach Delay                                                        | 37.0  | 14.9  | 4.6   |       |       |       |       |       |       |       |       |     |
| Approach LOS                                                          | D     | B     | A     |       |       |       |       |       |       |       |       |     |
| Queue Length 50th (m)                                                 | 0.5   | 0.2   | 0.0   | 10.5  | 0.0   | 2.8   |       |       |       |       |       |     |
| Queue Length 95th (m)                                                 | 4.9   | 2.1   | 18.1  | 38.8  | 13.4  | 36.2  |       |       |       |       |       |     |
| Internal Link Dist (m)                                                | 194.4 | 396.8 | 294.1 |       |       |       |       |       |       |       |       |     |
| Turn Bay Length (m)                                                   |       |       |       |       |       |       |       |       |       |       |       |     |
| Base Capacity (vph)                                                   | 275   | 299   | 457   | 1366  | 1029  | 1677  |       |       |       |       |       |     |
| Starvation Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |       |     |
| Spillback Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |       |     |
| Storage Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |       |     |
| Reduced v/c Ratio                                                     | 0.02  | 0.00  | 0.37  | 0.20  | 0.23  | 0.31  |       |       |       |       |       |     |
| Intersection Summary                                                  |       |       |       |       |       |       |       |       |       |       |       |     |
| Cycle Length: 120                                                     |       |       |       |       |       |       |       |       |       |       |       |     |
| Actuated Cycle Length: 120                                            |       |       |       |       |       |       |       |       |       |       |       |     |
| Offset: 10 (8%), Referenced to phase 2/NBTL and 6/SBTL Start of Green |       |       |       |       |       |       |       |       |       |       |       |     |
| Natural Cycle: 120                                                    |       |       |       |       |       |       |       |       |       |       |       |     |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |       |       |       |       |       |       |     |

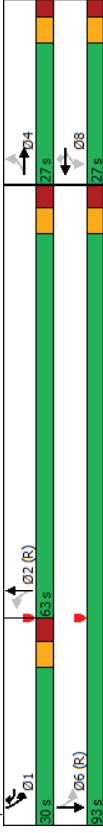
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Lanes, Volumes, Timings  
1: Greenbank & Jockvale

09-09-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.58                               | Intersection LOS: A    |
| Intersection Signal Delay: 4.3                        | ICU Level of Service D |
| Intersection Capacity Utilization 74.1%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |
| Splits and Phases: 1: Greenbank & Jockvale            |                        |



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## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-09-2019

| Lane Group                                                             | EBL   | EBT   | EBR   | WBL    | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
|------------------------------------------------------------------------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations                                                    | ↔     | ↔     | ↔     | ↔      | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                   | 44    | 117   | 86    | 137    | 124   | 169   | 149   | 347   | 70    | 162   | 461   | 36    |
| Future Volume (vph)                                                    | 44    | 117   | 86    | 137    | 124   | 169   | 149   | 347   | 70    | 162   | 461   | 36    |
| Satd. Flow (prot)                                                      | 1658  | 1633  | 0     | 1658   | 1575  | 0     | 1658  | 3233  | 0     | 3216  | 3271  | 0     |
| Flt Permitted                                                          | 0.275 |       |       | 0.421  |       |       | 0.950 |       |       |       |       |       |
| Satd. Flow (perm)                                                      | 478   | 1633  | 0     | 735    | 1575  | 0     | 1645  | 3233  | 0     | 3216  | 3271  | 0     |
| Satd. Flow (RTOR)                                                      | 29    |       |       | 54     |       |       | 23    |       |       |       |       | 8     |
| Lane Group Flow (vph)                                                  | 49    | 226   | 0     | 152    | 326   | 0     | 166   | 464   | 0     | 180   | 552   | 0     |
| Turn Type                                                              | pm-pt | NA    | pm-pt | NA     | NA    | NA    | Prot  | NA    | Prot  | NA    | NA    | NA    |
| Protected Phases                                                       | 7     | 4     |       | 3      | 8     |       | 5     | 2     |       | 1     | 6     |       |
| Permitted Phases                                                       | 4     |       |       | 8      |       |       |       |       |       |       |       |       |
| Detector Phase                                                         | 7     | 4     |       | 3      | 8     |       | 5     | 2     |       | 1     | 6     |       |
| Switch Phase                                                           |       |       |       |        |       |       |       |       |       |       |       |       |
| Minimum Initial (s)                                                    | 5.0   | 10.0  | 5.0   | 10.0   | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   |
| Minimum Split (s)                                                      | 13.0  | 35.0  | 13.0  | 35.0   | 20.0  | 52.0  | 20.0  | 52.0  | 20.0  | 52.0  | 20.0  | 52.0  |
| Total Split (s)                                                        | 13.0  | 35.0  | 13.0  | 35.0   | 20.0  | 52.0  | 20.0  | 52.0  | 20.0  | 52.0  | 20.0  | 52.0  |
| Total Split (%)                                                        | 10.8% | 29.2% | 10.8% | 29.2%  | 16.7% | 43.3% | 16.7% | 43.3% | 16.7% | 43.3% | 16.7% | 43.3% |
| Yellow Time (s)                                                        | 3.3   | 3.3   | 3.3   | 3.3    | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |
| All-Red Time (s)                                                       | 3.1   | 3.2   | 3.1   | 3.2    | 3.1   | 3.2   | 2.6   | 2.5   | 2.6   | 2.5   | 2.6   | 2.5   |
| Lost Time Adjust (s)                                                   | 0.0   | 0.0   | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                    | 6.4   | 6.5   | 6.4   | 6.5    | 6.3   | 6.2   | 6.3   | 6.2   | 6.3   | 6.2   | 6.3   | 6.2   |
| Lead/Lag                                                               | Lead  | Lag   | Lead  | Lag    | Lead  | Lag   | Lead  | Lag   | Lead  | Lag   | Lead  | Lag   |
| Lead-Lag Optimize?                                                     | Yes   | Yes   | Yes   | Yes    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode                                                            | None  | None  | None  | None   | None  | None  | None  | C-Max | None  | C-Max | None  | C-Max |
| Act Effct Green (s)                                                    | 30.4  | 23.9  | 31.9  | 26.5   | 14.4  | 52.4  | 11.7  | 49.7  | 11.7  | 49.7  | 11.7  | 49.7  |
| Actuated g/C Ratio                                                     | 0.25  | 0.20  | 0.27  | 0.22   | 0.12  | 0.44  | 0.10  | 0.41  | 0.10  | 0.41  | 0.10  | 0.41  |
| v/c Ratio                                                              | 0.27  | 0.65  | 0.62  | 0.84   | 0.84  | 0.33  | 0.58  | 0.41  | 0.58  | 0.41  | 0.58  | 0.41  |
| Control Delay                                                          | 31.1  | 46.4  | 44.3  | 56.2   | 85.5  | 21.7  | 63.5  | 21.2  | 63.5  | 21.2  | 63.5  | 21.2  |
| Queue Delay                                                            | 0.0   | 0.0   | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay                                                            | 31.1  | 46.4  | 44.3  | 56.2   | 85.5  | 21.7  | 63.5  | 21.2  | 63.5  | 21.2  | 63.5  | 21.2  |
| LOS                                                                    | C     | D     | D     | E      | F     | C     | E     | C     | E     | C     | E     | C     |
| Approach Delay                                                         | 43.7  | 52.4  | 38.5  | 31.6   |       |       |       |       |       |       |       |       |
| Approach LOS                                                           | D     | D     | D     | C      |       |       |       |       |       |       |       |       |
| Queue Length 50th (m)                                                  | 8.3   | 43.7  | 27.4  | 65.3   | 38.0  | 39.1  | 23.5  | 32.9  | 23.5  | 32.9  | 23.5  | 32.9  |
| Queue Length 95th (m)                                                  | 17.3  | 69.8  | 44.5  | #109.1 | #83.8 | 45.1  | m34.3 | m44.3 | m34.3 | m44.3 | m34.3 | m44.3 |
| Internal Link Dist (m)                                                 | 102.8 |       | 148.8 | 283.1  | 171.8 |       |       |       |       |       |       |       |
| Turn Bay Length (m)                                                    | 25.0  |       | 55.0  | 60.0   | 56.0  |       |       |       |       |       |       |       |
| Base Capacity (vph)                                                    | 187   | 409   | 246   | 415    | 201   | 1424  | 367   | 1358  | 367   | 1358  | 367   | 1358  |
| Starvation Cap Reductn                                                 | 0     | 0     | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Spillback Cap Reductn                                                  | 0     | 0     | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Storage Cap Reductn                                                    | 0     | 0     | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Reduced v/c Ratio                                                      | 0.26  | 0.55  | 0.62  | 0.79   | 0.83  | 0.33  | 0.49  | 0.41  | 0.49  | 0.41  | 0.49  | 0.41  |
| Intersection Summary                                                   |       |       |       |        |       |       |       |       |       |       |       |       |
| Cycle Length: 120                                                      |       |       |       |        |       |       |       |       |       |       |       |       |
| Actuated Cycle Length: 120                                             |       |       |       |        |       |       |       |       |       |       |       |       |
| Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT. Start of Green |       |       |       |        |       |       |       |       |       |       |       |       |
| Natural Cycle: 120                                                     |       |       |       |        |       |       |       |       |       |       |       |       |
| Control Type: Actuated-Coordinated                                     |       |       |       |        |       |       |       |       |       |       |       |       |

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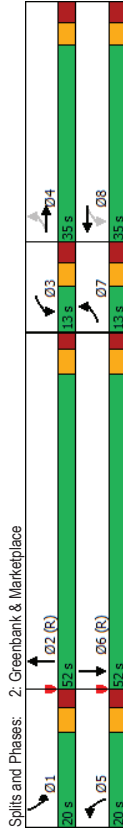
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## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-09-2019

|                                                                   |                        |
|-------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.84                                           | Intersection LOS: D    |
| Intersection Signal Delay: 39.9                                   | ICU Level of Service D |
| Intersection Capacity Utilization 74.0%                           |                        |
| Analysis Period (min) 15                                          |                        |
| Description: As per timing plans provided 26-Nov-2018             |                        |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |
| Queue shown is maximum after two cycles.                          |                        |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |



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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-09-2019

| Lane Group                                                          | EBL   | EBT    | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SEB   |
|---------------------------------------------------------------------|-------|--------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| Lane Configurations                                                 | ↔     | ↔      | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                | 145   | 814    | 168   | 160   | 654   | 184   | 201   | 264   | 53   | 251   | 331   | 124   |
| Future Volume (vph)                                                 | 145   | 814    | 168   | 160   | 654   | 184   | 201   | 264   | 53   | 251   | 331   | 124   |
| Satd. Flow (prot)                                                   | 1658  | 3316   | 1483  | 1658  | 3316  | 1483  | 3216  | 3225  | 0    | 3216  | 3316  | 1483  |
| Flt Permitted                                                       | 0.203 |        |       | 0.114 |       |       | 0.950 |       |      |       |       |       |
| Satd. Flow (perm)                                                   | 354   | 3316   | 1464  | 199   | 3316  | 1483  | 3212  | 3225  | 0    | 3208  | 3316  | 1464  |
| Satd. Flow (RTOR)                                                   | 187   |        |       | 204   |       |       | 204   | 19    |      |       |       | 149   |
| Lane Group Flow (vph)                                               | 161   | 904    | 187   | 178   | 727   | 204   | 223   | 362   | 0    | 279   | 368   | 138   |
| Turn Type                                                           | pm-pt | NA     | Perm  | pm-pt | NA    | Perm  | Prot  | NA    | Prot | NA    | Perm  | NA    |
| Protected Phases                                                    | 7     | 4      |       | 3     | 8     |       | 5     | 2     |      | 1     | 6     |       |
| Permitted Phases                                                    | 4     |        | 4     | 8     |       | 8     |       |       |      |       |       | 6     |
| Detector Phase                                                      | 7     | 4      | 4     | 3     | 8     | 8     | 5     | 2     |      | 1     | 6     | 6     |
| Switch Phase                                                        |       |        |       |       |       |       |       |       |      |       |       |       |
| Minimum Initial (s)                                                 | 5.0   | 10.0   | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |      | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                   | 18.0  | 41.0   | 41.0  | 18.0  | 41.0  | 41.0  | 24.0  | 37.0  |      | 24.0  | 37.0  | 37.0  |
| Total Split (s)                                                     | 18.0  | 41.0   | 41.0  | 18.0  | 41.0  | 41.0  | 24.0  | 37.0  |      | 24.0  | 37.0  | 37.0  |
| Total Split (%)                                                     | 15.0% | 34.2%  | 34.2% | 15.0% | 34.2% | 34.2% | 20.0% | 30.8% |      | 20.0% | 30.8% | 30.8% |
| Yellow Time (s)                                                     | 3.7   | 3.7    | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |      | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                    | 2.9   | 2.8    | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   |      | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                 | 6.6   | 6.5    | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   |      | 6.3   | 6.5   | 6.5   |
| Lead/Lag                                                            | Lead  | Lag    | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   |      | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?                                                  | Yes   | Yes    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |      | Yes   | Yes   | Yes   |
| Recall Mode                                                         | None  | Max    | Max   | None  | Max   | Max   | None  | C-Max |      | None  | C-Max | C-Max |
| Act Effct Green (s)                                                 | 45.3  | 34.7   | 34.7  | 46.3  | 35.2  | 35.2  | 13.6  | 33.0  |      | 15.2  | 34.6  | 34.6  |
| Actuated g/C Ratio                                                  | 0.38  | 0.29   | 0.29  | 0.39  | 0.29  | 0.29  | 0.11  | 0.28  |      | 0.13  | 0.29  | 0.29  |
| v/c Ratio                                                           | 0.64  | 0.94   | 0.94  | 0.84  | 0.75  | 0.35  | 0.61  | 0.39  |      | 0.69  | 0.38  | 0.26  |
| Control Delay                                                       | 34.3  | 60.4   | 6.3   | 59.4  | 44.3  | 6.2   | 69.4  | 25.8  |      | 58.9  | 36.3  | 5.9   |
| Queue Delay                                                         | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Delay                                                         | 34.3  | 60.4   | 6.3   | 59.4  | 44.3  | 6.2   | 69.4  | 25.8  |      | 58.9  | 36.3  | 5.9   |
| LOS                                                                 | C     | E      | A     | E     | D     | A     | E     | C     |      | E     | D     | A     |
| Approach Delay                                                      |       | 49.0   |       |       | 39.7  |       | 42.7  |       |      |       | 39.0  |       |
| Approach LOS                                                        |       | D      |       |       | D     |       | D     |       |      |       | D     |       |
| Queue Length 50th (m)                                               | 24.4  | 115.6  | 0.0   | 28.4  | 86.5  | 0.0   | 30.5  | 21.5  |      | 34.4  | 38.4  | 0.0   |
| Queue Length 95th (m)                                               | 40.0  | #157.7 | 17.3  | #68.2 | 110.2 | 18.2  | m42.5 | m28.2 |      | 48.4  | 55.5  | 13.8  |
| Internal Link Dist (m)                                              |       | 186.3  |       |       | 415.8 |       | 171.8 |       |      |       | 236.6 |       |
| Turn Bay Length (m)                                                 | 70.0  |        | 100.0 | 130.0 |       | 60.0  |       |       |      | 85.0  |       | 160.0 |
| Base Capacity (vph)                                                 | 259   | 958    | 556   | 215   | 971   | 578   | 474   | 900   |      | 474   | 956   | 528   |
| Starvation Cap Reductn                                              | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Spillback Cap Reductn                                               | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Storage Cap Reductn                                                 | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Reduced v/c Ratio                                                   | 0.62  | 0.94   | 0.34  | 0.83  | 0.75  | 0.35  | 0.47  | 0.39  |      | 0.59  | 0.38  | 0.26  |
| Intersection Summary                                                |       |        |       |       |       |       |       |       |      |       |       |       |
| Cycle Length: 120                                                   |       |        |       |       |       |       |       |       |      |       |       |       |
| Actuated Cycle Length: 120                                          |       |        |       |       |       |       |       |       |      |       |       |       |
| Offset: 7 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |        |       |       |       |       |       |       |      |       |       |       |
| Natural Cycle: 120                                                  |       |        |       |       |       |       |       |       |      |       |       |       |
| Control Type: Actuated-Coordinated                                  |       |        |       |       |       |       |       |       |      |       |       |       |

3288 Greenbank Road PM Peak Hour 2018 Existing

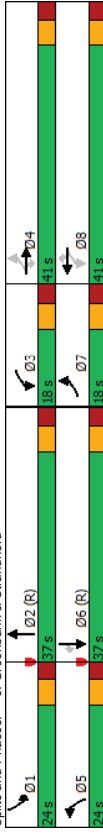
Synchro 10 Light Report  
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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-09-2019

|                                                                   |                        |
|-------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.94                                           | Intersection LOS: D    |
| Intersection Signal Delay: 43.1                                   | ICU Level of Service E |
| Intersection Capacity Utilization 86.4%                           |                        |
| Analysis Period (min) 15                                          |                        |
| Description: As per timing plans provided 26-Nov-2018             |                        |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |
| Queue shown is maximum after two cycles.                          |                        |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |
| Splits and Phases: 3: Greenbank & Strandherd                      |                        |



3288 Greenbank Road PM Peak Hour 2018 Existing

Synchro 10 Light Report  
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# Appendix D

Collision Data

| Accident Date | Accident Year | Accident Time | Location                       | Environment Condition | Light         | Traffic Control     | Traffic Control Condition | Classification Of Accident | Initial Impact Type   | Road Surface Condition |
|---------------|---------------|---------------|--------------------------------|-----------------------|---------------|---------------------|---------------------------|----------------------------|-----------------------|------------------------|
| 2017-06-16    | 2017          | 20:54         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 05 - Dusk     | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-06-06    | 2017          | 19:50         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 01 - Dry               |
| 2017-05-04    | 2017          | 10:10         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 01 - Dry               |
| 2017-09-19    | 2017          | 17:05         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-11-03    | 2017          | 16:35         | GREENBANK RD @ JOCKVALE RD     | 02 - Rain             | 05 - Dusk     | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 02 - Wet               |
| 2017-12-07    | 2017          | 17:04         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 01 - Dry               |
| 2017-02-15    | 2017          | 18:31         | GREENBANK RD @ JOCKVALE RD     | 03 - Snow             | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 05 - Packed snow       |
| 2017-01-21    | 2017          | 11:44         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 06 - Ice               |
| 2016-05-28    | 2016          | 13:29         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 01 - Dry               |
| 2016-03-05    | 2016          | 9:00          | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2016-08-11    | 2016          | 12:54         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 05 - Turning movement | 01 - Dry               |
| 2016-11-18    | 2016          | 17:42         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2015-01-16    | 2015          | 10:00         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 05 - Packed snow       |
| 2015-07-10    | 2015          | 13:20         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2015-03-17    | 2015          | 23:57         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 02 - Angle            | 01 - Dry               |
| 2015-04-16    | 2015          | 20:44         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 01 - Dry               |
| 2015-07-26    | 2015          | 13:00         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2015-02-21    | 2015          | 15:00         | GREENBANK RD @ JOCKVALE RD     | 03 - Snow             | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 03 - Loose snow        |
| 2015-08-01    | 2015          | 13:34         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2015-06-11    | 2015          | 18:52         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2015-12-21    | 2015          | 9:31          | GREENBANK RD @ JOCKVALE RD     | 02 - Rain             | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 02 - Wet               |
| 2014-01-11    | 2014          | 18:30         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 07 - SMV other        | 02 - Wet               |
| 2014-02-01    | 2014          | 15:10         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 06 - Ice               |
| 2014-02-11    | 2014          | 8:25          | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 02 - Wet               |
| 2014-04-03    | 2014          | 13:14         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2014-07-12    | 2014          | 14:19         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2014-07-08    | 2014          | 13:54         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2013-01-25    | 2013          | 8:16          | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 03 - Loose snow        |
| 2013-02-25    | 2013          | 10:15         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 02 - Wet               |
| 2013-05-20    | 2013          | 19:50         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 05 - Turning movement | 01 - Dry               |
| 2013-07-04    | 2013          | 14:29         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 02 - Angle            | 01 - Dry               |
| 2013-07-17    | 2013          | 20:55         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 05 - Dusk     | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 01 - Dry               |
| 2013-11-25    | 2013          | 13:00         | GREENBANK RD @ JOCKVALE RD     | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-08-01    | 2017          | 9:00          | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 01 - Dry               |
| 2017-12-12    | 2017          | 15:09         | GREENBANK RD @ MARKETPLACE AVE | 03 - Snow             | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 03 - Loose snow        |
| 2017-01-06    | 2017          | 11:39         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 01 - Dry               |
| 2016-05-05    | 2016          | 18:31         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 07 - SMV other        | 01 - Dry               |
| 2016-03-18    | 2016          | 18:43         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 05 - Turning movement | 01 - Dry               |
| 2016-08-23    | 2016          | 12:36         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 01 - Dry               |
| 2016-06-28    | 2016          | 23:01         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 01 - Dry               |
| 2016-12-23    | 2016          | 14:09         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 02 - Angle            | 02 - Wet               |
| 2015-03-02    | 2015          | 15:28         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 01 - Dry               |
| 2015-01-07    | 2015          | 15:51         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 05 - Turning movement | 01 - Dry               |
| 2015-05-18    | 2015          | 13:39         | GREENBANK RD @ MARKETPLACE AVE | 02 - Rain             | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 02 - Angle            | 02 - Wet               |
| 2015-10-17    | 2015          | 16:15         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 05 - Turning movement | 01 - Dry               |
| 2015-10-10    | 2015          | 9:38          | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 02 - Angle            | 01 - Dry               |
| 2015-12-28    | 2015          | 19:13         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 01 - Dry               |
| 2014-02-21    | 2014          | 6:14          | GREENBANK RD @ MARKETPLACE AVE | 02 - Rain             | 03 - Dawn     | 01 - Traffic signal |                           | 03 - P.D. only             | 05 - Turning movement | 02 - Wet               |
| 2014-03-04    | 2014          | 14:07         | GREENBANK RD @ MARKETPLACE AVE | 03 - Snow             | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 02 - Angle            | 02 - Wet               |
| 2014-03-28    | 2014          | 9:00          | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 02 - Wet               |
| 2013-03-29    | 2013          | 12:20         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 02 - Angle            | 01 - Dry               |
| 2013-06-02    | 2013          | 16:45         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2013-07-07    | 2013          | 14:21         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 03 - Rear end         | 01 - Dry               |
| 2013-10-26    | 2013          | 16:17         | GREENBANK RD @ MARKETPLACE AVE | 02 - Rain             | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 02 - Wet               |
| 2013-11-01    | 2013          | 9:30          | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 02 - Angle            | 01 - Dry               |
| 2013-12-08    | 2013          | 10:21         | GREENBANK RD @ MARKETPLACE AVE | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 02 - Angle            | 01 - Dry               |
| 2017-06-23    | 2017          | 8:09          | GREENBANK RD @ STRANDHERD DR   | 02 - Rain             | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 02 - Wet               |
| 2017-06-09    | 2017          | 17:50         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-05-17    | 2017          | 21:42         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 07 - Dark     | 01 - Traffic signal |                           | 02 - Non-fatal injury      | 05 - Turning movement | 01 - Dry               |
| 2017-05-13    | 2017          | 16:26         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-07-20    | 2017          | 12:02         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 04 - Sideswipe        | 01 - Dry               |
| 2017-08-05    | 2017          | 15:10         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 05 - Turning movement | 01 - Dry               |
| 2017-07-12    | 2017          | 9:25          | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-08-10    | 2017          | 11:39         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-08-25    | 2017          | 16:47         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-07-11    | 2017          | 5:07          | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 03 - Dawn     | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-07-24    | 2017          | 22:10         | GREENBANK RD @ STRANDHERD DR   | 02 - Rain             | 07 - Dark     | 01 - Traffic signal |                           | 03 - P.D. only             | 05 - Turning movement | 02 - Wet               |
| 2017-09-12    | 2017          | 16:29         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-09-12    | 2017          | 8:17          | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-10-28    | 2017          | 11:20         | GREENBANK RD @ STRANDHERD DR   | 01 - Clear            | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 01 - Dry               |
| 2017-10-08    | 2017          | 10:30         | GREENBANK RD @ STRANDHERD DR   | 02 - Rain             | 01 - Daylight | 01 - Traffic signal |                           | 03 - P.D. only             | 03 - Rear end         | 02 - Wet               |

|            |      |       |                              |                    |               |                     |                       |                       |                  |
|------------|------|-------|------------------------------|--------------------|---------------|---------------------|-----------------------|-----------------------|------------------|
| 2017-11-09 | 2017 | 21:44 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 02 - Wet         |
| 2017-11-18 | 2017 | 15:56 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2017-11-03 | 2017 | 15:29 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2017-11-18 | 2017 | 18:44 | GREENBANK RD @ STRANDHERD DR | 02 - Rain          | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 02 - Wet         |
| 2017-12-08 | 2017 | 17:58 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2017-11-30 | 2017 | 7:20  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2017-12-09 | 2017 | 16:15 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 05 - Dusk     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2017-02-14 | 2017 | 23:00 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 03 - Loose snow  |
| 2017-01-04 | 2017 | 19:05 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 03 - Loose snow  |
| 2017-02-15 | 2017 | 18:57 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 04 - Slush       |
| 2017-03-02 | 2017 | 12:08 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2017-03-24 | 2017 | 9:00  | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 03 - Loose snow  |
| 2017-04-08 | 2017 | 11:26 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 01 - Dry         |
| 2017-02-21 | 2017 | 12:50 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2017-03-24 | 2017 | 12:07 | GREENBANK RD @ STRANDHERD DR | 02 - Rain          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 02 - Wet         |
| 2017-02-22 | 2017 | 18:44 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 01 - Dry         |
| 2017-03-12 | 2017 | 15:12 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 01 - Dry         |
| 2017-12-22 | 2017 | 12:35 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 03 - Loose snow  |
| 2016-04-12 | 2016 | 9:58  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 01 - Dry         |
| 2016-02-17 | 2016 | 20:45 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 99 - Other            | 05 - Packed snow |
| 2016-08-22 | 2016 | 10:28 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2016-01-26 | 2016 | 0:38  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 02 - Wet         |
| 2016-10-25 | 2016 | 18:42 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 02 - Wet         |
| 2016-09-11 | 2016 | 10:15 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 01 - Dry         |
| 2016-08-10 | 2016 | 18:09 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 01 - Dry         |
| 2016-07-25 | 2016 | 17:39 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2016-06-04 | 2016 | 13:10 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2016-06-20 | 2016 | 19:40 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2016-05-31 | 2016 | 13:15 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 01 - Dry         |
| 2016-09-22 | 2016 | 21:17 | GREENBANK RD @ STRANDHERD DR | 02 - Rain          | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 02 - Wet         |
| 2016-07-21 | 2016 | 13:18 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2016-08-25 | 2016 | 19:20 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2016-12-30 | 2016 | 16:05 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 05 - Dusk     | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 02 - Wet         |
| 2016-12-21 | 2016 | 18:36 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 01 - Dry         |
| 2016-12-03 | 2016 | 18:12 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 99 - Other            | 01 - Dry         |
| 2015-05-07 | 2015 | 9:20  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 01 - Dry         |
| 2015-09-01 | 2015 | 20:05 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 01 - Dry         |
| 2015-12-06 | 2015 | 10:30 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 01 - Dry         |
| 2015-10-20 | 2015 | 19:58 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 01 - Dry         |
| 2015-02-08 | 2015 | 10:20 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 03 - Loose snow  |
| 2015-05-12 | 2015 | 14:00 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 01 - Dry         |
| 2015-05-14 | 2015 | 10:46 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 01 - Dry         |
| 2015-09-19 | 2015 | 9:45  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 01 - Dry         |
| 2015-05-05 | 2015 | 14:53 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 01 - Dry         |
| 2015-04-29 | 2015 | 13:06 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 02 - Angle            | 01 - Dry         |
| 2015-07-16 | 2015 | 21:00 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 05 - Dusk     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2015-02-14 | 2015 | 11:00 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 03 - Loose snow  |
| 2015-03-01 | 2015 | 17:17 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 07 - SMV other        | 01 - Dry         |
| 2015-03-18 | 2015 | 22:11 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2015-03-21 | 2015 | 15:19 | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 02 - Wet         |
| 2015-06-05 | 2015 | 18:39 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2015-06-06 | 2015 | 16:29 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 01 - Dry         |
| 2015-11-16 | 2015 | 16:29 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 05 - Dusk     | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 01 - Dry         |
| 2015-12-30 | 2015 | 14:00 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 02 - Wet         |
| 2014-01-11 | 2014 | 8:22  | GREENBANK RD @ STRANDHERD DR | 04 - Freezing Rain | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 06 - Ice         |
| 2014-01-23 | 2014 | 17:49 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 06 - Ice         |
| 2014-03-12 | 2014 | 19:20 | GREENBANK RD @ STRANDHERD DR | 05 - Drifting Snow | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 03 - Loose snow  |
| 2014-05-09 | 2014 | 21:00 | GREENBANK RD @ STRANDHERD DR | 02 - Rain          | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 02 - Wet         |
| 2014-06-23 | 2014 | 13:50 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end         | 01 - Dry         |
| 2014-11-03 | 2014 | 8:22  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement | 01 - Dry         |
| 2014-09-05 | 2014 | 11:43 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 07 - SMV other        | 01 - Dry         |
| 2014-12-21 | 2014 | 0:13  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 02 - Non-fatal injury | 02 - Angle            | 01 - Dry         |
| 2014-01-24 | 2014 | 18:15 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2014-01-31 | 2014 | 18:41 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2014-02-11 | 2014 | 12:35 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 02 - Wet         |
| 2014-02-09 | 2014 | 10:01 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2014-02-18 | 2014 | 7:29  | GREENBANK RD @ STRANDHERD DR | 03 - Snow          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 03 - Loose snow  |
| 2014-05-03 | 2014 | 9:53  | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe        | 01 - Dry         |
| 2014-04-27 | 2014 | 15:15 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |
| 2014-06-11 | 2014 | 17:27 | GREENBANK RD @ STRANDHERD DR | 02 - Rain          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement | 02 - Wet         |
| 2014-07-23 | 2014 | 10:47 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 02 - Angle            | 01 - Dry         |
| 2014-07-28 | 2014 | 14:30 | GREENBANK RD @ STRANDHERD DR | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end         | 01 - Dry         |

|            |      |       |                                                 |                    |               |                     |                       |                           |                  |
|------------|------|-------|-------------------------------------------------|--------------------|---------------|---------------------|-----------------------|---------------------------|------------------|
| 2014-07-14 | 2014 | 7:45  | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2014-07-18 | 2014 | 13:58 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2014-11-25 | 2014 | 18:29 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2014-11-08 | 2014 | 21:51 | GREENBANK RD @ STRANDHERD DR                    | 02 - Rain          | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 02 - Wet         |
| 2014-09-30 | 2014 | 10:20 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe            | 01 - Dry         |
| 2014-11-06 | 2014 | 9:12  | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe            | 01 - Dry         |
| 2014-10-29 | 2014 | 16:10 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2014-10-04 | 2014 | 1:30  | GREENBANK RD @ STRANDHERD DR                    | 02 - Rain          | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 02 - Wet         |
| 2014-09-20 | 2014 | 16:40 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2014-10-30 | 2014 | 16:16 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe            | 01 - Dry         |
| 2014-12-09 | 2014 | 7:48  | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 03 - Dawn     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 01 - Dry         |
| 2014-09-13 | 2014 | 13:55 | GREENBANK RD @ STRANDHERD DR                    | 02 - Rain          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 02 - Wet         |
| 2014-09-26 | 2014 | 19:50 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2014-11-01 | 2014 | 16:13 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 01 - Dry         |
| 2013-01-17 | 2013 | 16:50 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 05 - Dusk     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 02 - Wet         |
| 2013-01-24 | 2013 | 13:52 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe            | 03 - Loose snow  |
| 2013-01-28 | 2013 | 11:02 | GREENBANK RD @ STRANDHERD DR                    | 03 - Snow          | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 02 - Angle                | 04 - Slush       |
| 2013-02-03 | 2013 | 20:28 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 02 - Wet         |
| 2013-02-28 | 2013 | 19:19 | GREENBANK RD @ STRANDHERD DR                    | 03 - Snow          | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 02 - Wet         |
| 2013-03-21 | 2013 | 10:20 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-04-24 | 2013 | 16:30 | GREENBANK RD @ STRANDHERD DR                    | 02 - Rain          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 02 - Wet         |
| 2013-04-28 | 2013 | 15:00 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 01 - Dry         |
| 2013-04-30 | 2013 | 15:36 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end             | 01 - Dry         |
| 2013-05-21 | 2013 | 5:49  | GREENBANK RD @ STRANDHERD DR                    | 02 - Rain          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 02 - Wet         |
| 2013-05-29 | 2013 | 16:50 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-06-01 | 2013 | 14:04 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-06-04 | 2013 | 11:02 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 01 - Dry         |
| 2013-06-21 | 2013 | 17:00 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-06-24 | 2013 | 14:37 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-08-12 | 2013 | 11:47 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement     | 01 - Dry         |
| 2013-09-11 | 2013 | 9:26  | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 02 - Angle                | 01 - Dry         |
| 2013-09-12 | 2013 | 9:17  | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end             | 01 - Dry         |
| 2013-09-11 | 2013 | 8:20  | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-09-20 | 2013 | 10:56 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 05 - Turning movement     | 01 - Dry         |
| 2013-11-10 | 2013 | 16:08 | GREENBANK RD @ STRANDHERD DR                    | 02 - Rain          | 01 - Daylight | 01 - Traffic signal | 02 - Non-fatal injury | 03 - Rear end             | 02 - Wet         |
| 2013-11-17 | 2013 | 11:30 | GREENBANK RD @ STRANDHERD DR                    | 02 - Rain          | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 02 - Wet         |
| 2013-12-03 | 2013 | 12:15 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-12-03 | 2013 | 20:15 | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 07 - Dark     | 01 - Traffic signal | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2013-12-06 | 2013 | 8:35  | GREENBANK RD @ STRANDHERD DR                    | 01 - Clear         | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 04 - Sideswipe            | 01 - Dry         |
| 2013-12-26 | 2013 | 13:38 | GREENBANK RD @ STRANDHERD DR                    | 00 - Unknown       | 01 - Daylight | 01 - Traffic signal | 03 - P.D. only        | 05 - Turning movement     | 00 - Unknown     |
| 2017-06-17 | 2017 | 2:58  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 02 - Wet         |
| 2017-11-11 | 2017 | 12:15 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 02 - Angle                | 01 - Dry         |
| 2017-11-27 | 2017 | 8:02  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 05 - Drifting Snow | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 06 - Ice         |
| 2017-11-27 | 2017 | 8:01  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 02 - Wet         |
| 2017-01-15 | 2017 | 1:14  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 02 - Wet         |
| 2017-04-23 | 2017 | 0:43  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 01 - Dry         |
| 2017-03-22 | 2017 | 11:12 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2016-01-29 | 2016 | 10:18 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 02 - Non-fatal injury | 01 - Approaching          | 03 - Loose snow  |
| 2016-04-30 | 2016 | 11:26 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 02 - Non-fatal injury | 6 - SMV unattended vehicl | 01 - Dry         |
| 2016-06-22 | 2016 | 22:43 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 02 - Rain          | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 01 - Approaching          | 02 - Wet         |
| 2016-04-06 | 2016 | 20:26 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 03 - Snow          | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 05 - Packed snow |
| 2016-04-28 | 2016 | 21:36 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2016-02-19 | 2016 | 18:23 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 02 - Rain          | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 01 - Approaching          | 03 - Loose snow  |
| 2015-01-20 | 2015 | 15:12 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 02 - Non-fatal injury | 03 - Rear end             | 01 - Dry         |
| 2015-05-07 | 2015 | 7:51  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 02 - Non-fatal injury | 03 - Rear end             | 01 - Dry         |
| 2015-01-30 | 2015 | 7:25  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 03 - Snow          | 03 - Dawn     | 10 - No control     | 02 - Non-fatal injury | 07 - SMV other            | 05 - Packed snow |
| 2015-04-09 | 2015 | 0:50  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 02 - Rain          | 07 - Dark     | 10 - No control     | 02 - Non-fatal injury | 07 - SMV other            | 02 - Wet         |
| 2015-09-15 | 2015 | 18:27 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2015-05-07 | 2015 | 21:33 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 01 - Dry         |
| 2015-01-17 | 2015 | 8:55  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 01 - Approaching          | 02 - Wet         |
| 2015-12-10 | 2015 | 1:00  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 02 - Rain          | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 02 - Wet         |
| 2014-02-12 | 2014 | 10:37 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2014-09-26 | 2014 | 14:20 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 01 - Dry         |
| 2014-12-12 | 2014 | 8:10  | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 03 - Snow          | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 03 - Loose snow  |
| 2014-08-26 | 2014 | 16:15 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 01 - Dry         |
| 2013-01-28 | 2013 | 12:18 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 03 - Snow          | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 05 - Packed snow |
| 2013-01-31 | 2013 | 21:45 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 07 - Dark     | 10 - No control     | 03 - P.D. only        | 07 - SMV other            | 01 - Dry         |
| 2013-02-27 | 2013 | 12:34 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 03 - Snow          | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 01 - Approaching          | 03 - Loose snow  |
| 2013-05-31 | 2013 | 17:55 | GREENBANK RD btwn JOCKVALE RD & CAMBRIAN RD     | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 03 - Rear end             | 01 - Dry         |
| 2016-06-14 | 2016 | 20:53 | GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD | 01 - Clear         | 05 - Dusk     | 10 - No control     | 03 - P.D. only        | 04 - Sideswipe            | 01 - Dry         |
| 2015-08-15 | 2015 | 12:00 | GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 04 - Sideswipe            | 01 - Dry         |
| 2015-07-29 | 2015 | 11:01 | GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD | 01 - Clear         | 01 - Daylight | 10 - No control     | 03 - P.D. only        | 05 - Turning movement     | 01 - Dry         |

|            |      |       |                                                   |                    |               |                 |                       |                  |            |
|------------|------|-------|---------------------------------------------------|--------------------|---------------|-----------------|-----------------------|------------------|------------|
| 2015-08-15 | 2015 | 11:40 | GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD   | 01 - Clear         | 01 - Daylight | 10 - No control | 03 - P.D. only        | 02 - Angle       | 01 - Dry   |
| 2015-10-25 | 2015 | 17:44 | GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD   | 01 - Clear         | 01 - Daylight | 10 - No control | 03 - P.D. only        | 04 - Sideswipe   | 01 - Dry   |
| 2014-01-07 | 2014 | 15:45 | GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD   | 06 - Strong wind   | 01 - Daylight | 10 - No control | 03 - P.D. only        | 03 - Rear end    | 06 - Ice   |
| 2014-01-03 | 2014 | 8:58  | GREENBANK RD btwn MARKETPLACE AVE & JOCKVALE RD   | 01 - Clear         | 01 - Daylight | 10 - No control | 03 - P.D. only        | 01 - Approaching | 06 - Ice   |
| 2017-05-13 | 2017 | 19:15 | GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE | 01 - Clear         | 01 - Daylight | 10 - No control | 03 - P.D. only        | 04 - Sideswipe   | 01 - Dry   |
| 2017-01-19 | 2017 | 17:50 | GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE | 01 - Clear         | 07 - Dark     | 10 - No control | 02 - Non-fatal injury | 04 - Sideswipe   | 02 - Wet   |
| 2016-03-24 | 2016 | 15:44 | GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE | 04 - Freezing Rain | 01 - Daylight | 10 - No control | 03 - P.D. only        | 03 - Rear end    | 06 - Ice   |
| 2013-01-07 | 2013 | 7:53  | GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE | 01 - Clear         | 03 - Dawn     | 10 - No control | 03 - P.D. only        | 07 - SMV other   | 04 - Slush |
| 2013-10-30 | 2013 | 11:30 | GREENBANK RD btwn STRANDHERD DR & MARKETPLACE AVE | 01 - Clear         | 01 - Daylight | 10 - No control | 02 - Non-fatal injury | 03 - Rear end    | 01 - Dry   |

# Appendix E

Synchro Intersection Worksheets – 2025 Background Conditions

| Lane Group                                                            | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBP |
|-----------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                   |       |       |     |       |       |     |       |       |     |       |       |     |
| Traffic Volume (vph)                                                  | 43    | 0     | 7   | 1     | 0     | 5   | 20    | 632   | 1   | 5     | 364   | 38  |
| Future Volume (vph)                                                   | 43    | 0     | 7   | 1     | 0     | 5   | 20    | 632   | 1   | 5     | 364   | 38  |
| Satd. Flow (prot)                                                     | 1658  | 1457  | 0   | 0     | 1513  | 0   | 1658  | 3316  | 0   | 1658  | 3260  | 0   |
| Fit Permitted                                                         | 0.750 |       |     |       | 0.959 |     | 0.515 |       |     | 0.412 |       |     |
| Satd. Flow (perm)                                                     | 1314  | 1457  | 0   | 0     | 1461  | 0   | 894   | 3316  | 0   | 717   | 3260  | 0   |
| Flow (RTOR)                                                           | 430   |       |     |       | 29    |     |       |       |     |       | 18    |     |
| Lane Group Flow (vph)                                                 | 43    | 7     | 0   | 0     | 6     | 0   | 20    | 633   | 0   | 5     | 402   | 0   |
| Turn Type                                                             | Perm  | NA    |     | Perm  | NA    |     | Perm  | NA    |     | Perm  | NA    |     |
| Protected Phases                                                      |       | 4     |     |       | 8     |     | 2     |       |     | 6     |       |     |
| Permitted Phases                                                      | 4     |       |     | 8     |       |     | 2     |       |     | 6     |       |     |
| Detector Phase                                                        | 4     | 4     |     | 8     | 8     |     | 2     | 2     |     | 6     | 6     |     |
| Switch Phase                                                          |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                   | 10.0  | 10.0  |     | 10.0  | 10.0  |     | 10.0  | 10.0  |     | 10.0  | 10.0  |     |
| Minimum Split (s)                                                     | 33.8  | 33.8  |     | 34.0  | 34.0  |     | 30.4  | 30.4  |     | 30.4  | 30.4  |     |
| Total Split (s)                                                       | 38.0  | 38.0  |     | 34.0  | 34.0  |     | 52.0  | 52.0  |     | 52.0  | 52.0  |     |
| Total Split (%)                                                       | 42.2% | 42.2% |     | 37.8% | 37.8% |     | 57.8% | 57.8% |     | 57.8% | 57.8% |     |
| Yellow Time (s)                                                       | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                      | 2.5   | 2.5   |     | 2.5   | 2.5   |     | 1.7   | 1.7   |     | 1.7   | 1.7   |     |
| Lost Time Adjust(s)                                                   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                   | 5.8   | 5.8   |     | 5.8   | 5.8   |     | 5.4   | 5.4   |     | 5.4   | 5.4   |     |
| Lead/Lag                                                              |       |       |     |       |       |     |       |       |     |       |       |     |
| Lead-Lag Optimize?                                                    |       |       |     |       |       |     |       |       |     |       |       |     |
| Recall Mode                                                           | None  | None  |     | None  | None  |     | C-Max | C-Max |     | C-Max | C-Max |     |
| Act Effct Green (s)                                                   | 13.6  | 13.6  |     | 13.6  | 13.6  |     | 73.7  | 73.7  |     | 73.7  | 73.7  |     |
| Activated g/C Ratio                                                   | 0.15  | 0.15  |     | 0.15  | 0.15  |     | 0.82  | 0.82  |     | 0.82  | 0.82  |     |
| v/c Ratio                                                             | 0.22  | 0.01  |     | 0.02  | 0.02  |     | 0.03  | 0.23  |     | 0.01  | 0.15  |     |
| Control Delay                                                         | 33.6  | 0.0   |     | 0.2   | 0.2   |     | 2.3   | 1.6   |     | 6.2   | 4.1   |     |
| Queue Delay                                                           | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                           | 33.6  | 0.0   |     | 0.2   | 0.2   |     | 2.3   | 1.6   |     | 6.2   | 4.1   |     |
| LOS                                                                   | C     | A     |     | A     | A     |     | A     | A     |     | A     | A     |     |
| Approach Delay                                                        |       | 28.9  |     | 0.2   | 0.2   |     | 1.6   |       |     | 4.1   |       |     |
| Approach LOS                                                          |       | C     |     | A     | A     |     | A     |       |     | A     |       |     |
| Queue Length 50th (m)                                                 | 7.3   | 0.0   |     | 0.0   | 0.0   |     | 0.2   | 2.5   |     | 0.2   | 7.7   |     |
| Queue Length 95th (m)                                                 | 13.5  | 0.0   |     | 0.0   | 0.0   |     | 1.6   | 11.4  |     | 1.9   | 24.6  |     |
| Internal Link Dist (m)                                                |       | 520.6 |     | 70.5  | 70.5  |     | 161.2 |       |     | 210.2 |       |     |
| Turn Bay Length (m)                                                   | 38.0  |       |     |       |       |     | 38.0  |       |     | 38.0  |       |     |
| Base Capacity (vph)                                                   | 468   | 797   |     | 541   | 541   |     | 732   | 2714  |     | 587   | 2672  |     |
| Starvation Cap Reductn                                                | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                 | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                   | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                     | 0.09  | 0.01  |     | 0.01  | 0.01  |     | 0.03  | 0.23  |     | 0.01  | 0.15  |     |
| Intersection Summary                                                  |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 90                                                      |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 90                                             |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 0 (0°), Referenced to phase 2:NBTL and 6:SBTL, Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 65                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                    |       |       |     |       |       |     |       |       |     |       |       |     |

| Maximum v/c Ratio: 0.23                                    |  |
|------------------------------------------------------------|--|
| Intersection Signal Delay: 3.7                             |  |
| Intersection Capacity Utilization 41.5%                    |  |
| Analysis Period (min) 15                                   |  |
| Intersection LOS: A                                        |  |
| ICU Level of Service A                                     |  |
| <p>Splits and Phases: 1: Greenbank &amp; New Collector</p> |  |

## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

08-30-2019

|                        | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Group             | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations    | 12    | 17    | 16    | 36    | 23    | 106   | 98    | 496   | 74    | 65    | 360   | 6     |
| Traffic Volume (vph)   | 12    | 17    | 16    | 36    | 23    | 106   | 98    | 496   | 74    | 65    | 360   | 6     |
| Future Volume (vph)    | 1658  | 1618  | 0     | 1658  | 1506  | 0     | 1658  | 3253  | 0     | 3216  | 3307  | 0     |
| Satd. Flow (prot)      | 0.659 |       |       | 0.680 |       |       | 0.950 |       |       | 0.950 |       |       |
| Flt Permitted          | 1143  | 1618  | 0     | 1187  | 1506  | 0     | 1641  | 3253  | 0     | 3216  | 3307  | 0     |
| Satd. Flow (perm)      | 16    |       |       | 106   |       |       | 17    |       |       | 2     |       |       |
| Lane Group Flow (vph)  | 12    | 33    | 0     | 36    | 129   | 0     | 98    | 570   | 0     | 65    | 366   | 0     |
| Turn Type              | pm-pt | NA    | pm-pt | NA    | NA    | Prot  | NA    | NA    | Prot  | NA    | NA    |       |
| Protected Phases       | 7     | 4     | 3     | 8     | 5     | 2     | 1     | 6     |       |       |       |       |
| Permitted Phases       | 4     |       | 8     |       |       |       |       |       |       |       |       |       |
| Detector Phase         | 7     | 4     | 3     | 8     | 5     | 2     | 1     | 6     |       |       |       |       |
| Switch Phase           |       |       |       |       |       |       |       |       |       |       |       |       |
| Minimum Initial (s)    | 5.0   | 10.0  | 5.0   | 10.0  | 5.0   | 10.0  | 5.0   | 10.0  | 5.0   | 10.0  | 5.0   | 10.0  |
| Minimum Split (s)      | 12.0  | 35.0  | 12.0  | 35.0  | 12.0  | 35.0  | 15.0  | 58.0  | 15.0  | 58.0  | 15.0  | 58.0  |
| Total Split (s)        | 12.0  | 35.0  | 12.0  | 35.0  | 12.0  | 35.0  | 15.0  | 58.0  | 15.0  | 58.0  | 15.0  | 58.0  |
| Total Split (%)        | 10.0% | 29.2% | 10.0% | 29.2% | 10.0% | 29.2% | 12.5% | 48.3% | 12.5% | 48.3% | 12.5% | 48.3% |
| Yellow Time (s)        | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)       | 3.1   | 3.2   | 3.1   | 3.2   | 3.1   | 3.2   | 2.6   | 2.5   | 2.6   | 2.5   | 2.6   | 2.5   |
| Lost Time Adjust (s)   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)    | 6.4   | 6.5   | 6.4   | 6.5   | 6.4   | 6.5   | 6.3   | 6.2   | 6.3   | 6.2   | 6.3   | 6.2   |
| Lead/Lag               | Lead  | Lag   | Lead  | Lag   | Lead  | Lag   | Lead  | Lag   | Lead  | Lag   | Lead  | Lag   |
| Lead-Lag Optimize?     | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode            | None  | None  | None  | None  | None  | None  | None  | C-Max | None  | C-Max | None  | C-Max |
| Act Effct Green (s)    | 17.1  | 13.6  | 18.4  | 16.0  | 11.7  | 74.9  | 7.7   | 68.5  | 0.06  | 0.57  | 0.06  | 0.57  |
| Act Effct Green Ratio  | 0.14  | 0.11  | 0.15  | 0.13  | 0.10  | 0.62  | 0.01  | 0.28  | 0.32  | 0.19  | 0.32  | 0.19  |
| v/c Ratio              | 0.06  | 0.17  | 0.18  | 0.44  | 0.61  | 0.28  | 0.32  | 0.19  | 0.32  | 0.19  | 0.32  | 0.19  |
| Control Delay          | 34.8  | 29.1  | 38.6  | 16.9  | 68.2  | 13.2  | 63.1  | 13.7  | 63.1  | 13.7  | 63.1  | 13.7  |
| Queue Delay            | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay            | 34.8  | 29.1  | 38.6  | 16.9  | 68.2  | 13.2  | 63.1  | 13.7  | 63.1  | 13.7  | 63.1  | 13.7  |
| LOS                    | C     | C     | D     | B     | E     | B     | E     | B     | E     | B     | E     | B     |
| Approach Delay         | 30.6  | 21.6  | 21.2  | 21.2  | 21.2  | 21.2  | 21.2  | 21.2  | 21.2  | 21.2  | 21.2  | 21.2  |
| Approach LOS           | C     | C     | C     | C     | C     | C     | C     | C     | C     | C     | C     | C     |
| Queue Length 50th (m)  | 2.5   | 4.0   | 7.5   | 4.8   | 23.2  | 33.4  | 8.4   | 17.0  | 8.4   | 17.0  | 8.4   | 17.0  |
| Queue Length 95th (m)  | 6.6   | 12.1  | 14.0  | 21.0  | #53.9 | 63.9  | 16.5  | 28.9  | 16.5  | 28.9  | 16.5  | 28.9  |
| Internal Link Dist (m) | 102.8 | 148.8 | 148.8 | 148.8 | 210.2 | 210.2 | 171.8 | 171.8 | 171.8 | 171.8 | 171.8 | 171.8 |
| Turn Bay Length (m)    | 25.0  | 55.0  | 55.0  | 60.0  | 60.0  | 60.0  | 56.0  | 56.0  | 56.0  | 56.0  | 56.0  | 56.0  |
| Base Capacity (vph)    | 186   | 396   | 203   | 438   | 161   | 2036  | 236   | 1888  | 236   | 1888  | 236   | 1888  |
| Starvation Cap Reductn | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Spillback Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Storage Cap Reductn    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Reduced v/c Ratio      | 0.06  | 0.08  | 0.18  | 0.29  | 0.61  | 0.28  | 0.28  | 0.19  | 0.28  | 0.19  | 0.28  | 0.19  |

#### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

3288 Jockvale Road AM Peak Hour 2025 Background

Synchro 10 Light Report

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## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

08-30-2019

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.61                                         | Intersection LOS: C    |
| Intersection Signal Delay: 21.6                                 | ICU Level of Service A |
| Intersection Capacity Utilization 53.8%                         |                        |
| Analysis Period (min) 15                                        |                        |
| Description: As per timing plans provided 26-Nov-2018           |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 2: Greenbank & Marketplace



3288 Jockvale Road AM Peak Hour 2025 Background

Synchro 10 Light Report

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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

08-30-2019

|                                                                       | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | EBR   |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | EBR   |
| Lane Configurations                                                   | 171   | 632   | 141   | 78    | 705   | 163   | 172   | 323   | 83   | 175   | 204   | 129   |
| Traffic Volume (vph)                                                  | 171   | 632   | 141   | 78    | 705   | 163   | 172   | 323   | 83   | 175   | 204   | 129   |
| Future Volume (vph)                                                   | 171   | 632   | 141   | 78    | 705   | 163   | 172   | 323   | 83   | 175   | 204   | 129   |
| Satd. Flow (prot)                                                     | 1658  | 3316  | 1483  | 1658  | 3316  | 1483  | 3216  | 3193  | 0    | 3216  | 3316  | 1483  |
| Flt Permitted                                                         | 0.204 |       |       | 0.327 |       |       | 0.950 |       |      |       |       |       |
| Satd. Flow (perm)                                                     | 354   | 3316  | 1446  | 568   | 3316  | 1432  | 3206  | 3193  | 0    | 3159  | 3316  | 1462  |
| Satd. Flow (RTOR)                                                     | 149   |       |       | 149   |       |       | 163   | 25    |      |       |       | 149   |
| Lane Group Flow (vph)                                                 | 171   | 632   | 141   | 78    | 705   | 163   | 172   | 406   | 0    | 175   | 204   | 129   |
| Turn Type                                                             | pm-pt | NA    | Perm  | pm-pt | NA    | Perm  | Prot  | NA    | Prot | NA    | Perm  |       |
| Protected Phases                                                      | 7     | 4     |       | 3     | 8     |       | 5     | 2     |      | 1     | 6     |       |
| Permitted Phases                                                      | 4     |       | 4     | 8     |       | 8     |       |       |      |       |       | 6     |
| Detector Phase                                                        | 7     | 4     | 4     | 3     | 8     | 8     | 5     | 2     |      | 1     | 6     | 6     |
| Switch Phase                                                          |       |       |       |       |       |       |       |       |      |       |       |       |
| Minimum Initial (s)                                                   | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |      | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                     | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (s)                                                       | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (%)                                                       | 15.8% | 34.2% | 34.2% | 15.8% | 34.2% | 34.2% | 20.0% | 30.0% |      | 20.0% | 30.0% | 30.0% |
| Yellow Time (s)                                                       | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |      | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                      | 2.9   | 2.8   | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   |      | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                   | 6.6   | 6.5   | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   |      | 6.3   | 6.5   | 6.5   |
| Lead/Lag                                                              | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   |      | Lead  | Lag   | Lag   |
| Lead/Lag Optimize?                                                    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |      | Yes   | Yes   | Yes   |
| Recall Mode                                                           | None  | Max   | Max   | None  | Max   | Max   | None  | C-Max |      | None  | C-Max | C-Max |
| Act Effct Green (s)                                                   | 50.3  | 40.7  | 40.7  | 44.1  | 35.4  | 35.4  | 11.7  | 35.4  |      | 11.8  | 35.5  | 35.5  |
| Actuated g/c Ratio                                                    | 0.42  | 0.34  | 0.34  | 0.37  | 0.30  | 0.30  | 0.10  | 0.30  |      | 0.10  | 0.30  | 0.30  |
| v/c Ratio                                                             | 0.63  | 0.56  | 0.24  | 0.27  | 0.72  | 0.72  | 0.30  | 0.55  |      | 0.55  | 0.21  | 0.24  |
| Control Delay                                                         | 31.7  | 36.0  | 5.4   | 22.4  | 43.1  | 6.5   | 73.8  | 25.1  |      | 57.9  | 33.1  | 4.8   |
| Queue Delay                                                           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Delay                                                           | 31.7  | 36.0  | 5.4   | 22.4  | 43.1  | 6.5   | 73.8  | 25.1  |      | 57.9  | 33.1  | 4.8   |
| LOS                                                                   | C     | D     | A     | C     | D     | A     | E     | C     |      | E     | C     | A     |
| Approach Delay                                                        | 30.7  |       |       | 35.1  |       |       |       | 39.6  |      |       | 34.5  |       |
| Approach LOS                                                          | C     |       |       | D     |       |       |       | D     |      |       | C     |       |
| Queue Length 50th (m)                                                 | 25.7  | 69.2  | 0.0   | 11.0  | 83.2  | 0.0   | 22.9  | 40.8  |      | 21.7  | 19.9  | 0.0   |
| Queue Length 95th (m)                                                 | 41.5  | 92.7  | 13.7  | 20.9  | 106.3 | 16.4  | 35.4  | 25.2  |      | 32.7  | 31.5  | 11.2  |
| Internal Link Dist (m)                                                | 186.3 |       |       | 415.8 |       |       | 171.8 |       |      |       | 236.6 |       |
| Turn Bay Length (m)                                                   | 70.0  |       | 100.0 | 130.0 |       | 60.0  |       |       |      | 85.0  |       | 160.0 |
| Base Capacity (vph)                                                   | 283   | 1123  | 588   | 338   | 979   | 537   | 474   | 958   |      | 474   | 980   | 537   |
| Starvation Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Spillback Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Storage Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Reduced v/c Ratio                                                     | 0.60  | 0.56  | 0.24  | 0.23  | 0.72  | 0.30  | 0.36  | 0.42  |      | 0.37  | 0.21  | 0.24  |
| Intersection Summary                                                  |       |       |       |       |       |       |       |       |      |       |       |       |
| Cycle Length: 120                                                     |       |       |       |       |       |       |       |       |      |       |       |       |
| Actuated Cycle Length: 120                                            |       |       |       |       |       |       |       |       |      |       |       |       |
| Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |       |       |       |      |       |       |       |
| Natural Cycle: 120                                                    |       |       |       |       |       |       |       |       |      |       |       |       |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |       |       |       |      |       |       |       |

3288 Jockvale Road AM Peak Hour 2025 Background

Synchro 10 Light Report

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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

08-30-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.72                               | Intersection LOS: C    |
| Intersection Signal Delay: 34.4                       | ICU Level of Service E |
| Intersection Capacity Utilization 83.5%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |
| Splits and Phases: 3: Greenbank & Strandherd          |                        |
|                                                       |                        |

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Synchro 10 Light Report

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6: Greenbank & Street "B"

| Intersection             | EBL    | EBR    | NBL    | NBT  | SBT  | SBR  |
|--------------------------|--------|--------|--------|------|------|------|
| Int Delay, s/veh         | 1.1    |        |        |      |      |      |
| Movement                 | EBL    | EBR    | NBL    | NBT  | SBT  | SBR  |
| Lane Configurations      | W      | W      | W      | W    | W    | W    |
| Traffic Vol. veh/h       | 51     | 5      | 1      | 482  | 352  | 10   |
| Future Vol. veh/h        | 51     | 5      | 1      | 482  | 352  | 10   |
| Conflicting Peds. #/hr   | 0      | 0      | 0      | 0    | 0    | 0    |
| Sign Control             | Stop   | Stop   | Free   | Free | Free | Free |
| RT Channelized           | -      | None   | -      | None | -    | None |
| Storage Length           | 0      | -      | 380    | -    | -    | -    |
| Veh in Median Storage, # | 0      | -      | -      | 0    | 0    | -    |
| Grade, %                 | 0      | -      | -      | 0    | 0    | -    |
| Peak Hour Factor         | 100    | 100    | 100    | 100  | 100  | 100  |
| Heavy Vehicles, %        | 2      | 2      | 2      | 2    | 2    | 2    |
| Mvmt Flow                | 51     | 5      | 1      | 482  | 352  | 10   |
| Major/Minor              | Minor2 | Major1 | Major2 |      |      |      |
| Conflicting Flow All     | 841    | 357    | 362    | 0    | -    | 0    |
| Stage 1                  | 357    | -      | -      | -    | -    | -    |
| Stage 2                  | 484    | -      | -      | -    | -    | -    |
| Critical Hwy             | 642    | 622    | 412    | -    | -    | -    |
| Critical Hwy Stg 1       | 542    | -      | -      | -    | -    | -    |
| Critical Hwy Stg 2       | 542    | -      | -      | -    | -    | -    |
| Follow-up Hwy            | 3,518  | 3,318  | 2,218  | -    | -    | -    |
| Pot Cap-1 Maneuver       | 335    | 687    | 1197   | -    | -    | -    |
| Stage 1                  | 708    | -      | -      | -    | -    | -    |
| Stage 2                  | 620    | -      | -      | -    | -    | -    |
| Platoon blocked, %       | -      | -      | -      | -    | -    | -    |
| Mov Cap-1 Maneuver       | 335    | 687    | 1197   | -    | -    | -    |
| Mov Cap-2 Maneuver       | 335    | -      | -      | -    | -    | -    |
| Stage 1                  | 707    | -      | -      | -    | -    | -    |
| Stage 2                  | 620    | -      | -      | -    | -    | -    |
| Approach                 | EB     | NB     | SB     |      |      |      |
| HCM Control Delay, s     | 17.2   | 0      | 0      |      |      |      |
| HCM LOS                  | C      |        |        |      |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT    | EBLn1  | SBT  | SBR  |      |
| Capacity (veh/h)         | 1197   | -      | 351    | -    | -    |      |
| HCM Lane V/C Ratio       | 0.001  | -      | 0.16   | -    | -    |      |
| HCM Control Delay (s)    | 8      | -      | 17.2   | -    | -    |      |
| HCM Lane LOS             | A      | -      | C      | -    | -    |      |
| HCM 95th %ile Q(veh)     | 0      | -      | 0.6    | -    | -    |      |

1: Greenbank & New Collector/Loblaws

| Lane Group                                                            | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|-----------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                   | W     | W     | W   | W     | W     | W   | W     | W     | W   | W     | W     | W   |
| Traffic Volume (vph)                                                  | 107   | 0     | 26  | 1     | 0     | 5   | 66    | 571   | 1   | 5     | 687   | 103 |
| Future Volume (vph)                                                   | 107   | 0     | 26  | 1     | 0     | 5   | 66    | 571   | 1   | 5     | 687   | 103 |
| Satd. Flow (prot)                                                     | 1658  | 1457  | 0   | 0     | 1512  | 0   | 1658  | 3316  | 0   | 1658  | 3236  | 0   |
| Flt Permitted                                                         | 0.754 |       |     |       | 0.966 |     | 0.950 |       |     | 0.437 |       |     |
| Satd. Flow (perm)                                                     | 1310  | 1457  | 0   | 0     | 1472  | 0   | 1653  | 3316  | 0   | 1653  | 3236  | 0   |
| Satd. Flow (RTOR)                                                     | 317   |       |     |       | 95    |     |       |       |     | 21    |       |     |
| Lane Group Flow (vph)                                                 | 107   | 26    | 0   | 0     | 6     | 0   | 66    | 572   | 0   | 5     | 790   | 0   |
| Turn Type                                                             | Perm  | NA    |     | Perm  | NA    |     | Prot  | NA    |     | Perm  | NA    |     |
| Protected Phases                                                      | 4     | 4     |     | 8     | 8     |     | 5     | 2     |     | 6     | 6     |     |
| Permitted Phases                                                      | 4     | 4     |     | 8     | 8     |     | 5     | 2     |     | 6     | 6     |     |
| Detector Phase                                                        | 4     | 4     |     | 8     | 8     |     | 5     | 2     |     | 6     | 6     |     |
| Switch Phase                                                          |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                   | 10.0  | 10.0  |     | 10.0  | 10.0  |     | 5.0   | 10.0  |     | 10.0  | 10.0  |     |
| Minimum Split (s)                                                     | 33.8  | 33.8  |     | 33.8  | 33.8  |     | 10.8  | 31.2  |     | 30.8  | 30.8  |     |
| Total Split (s)                                                       | 35.0  | 35.0  |     | 35.0  | 35.0  |     | 15.2  | 55.0  |     | 39.8  | 39.8  |     |
| Total Split (%)                                                       | 38.9% | 38.9% |     | 38.9% | 38.9% |     | 16.9% | 61.1% |     | 44.2% | 44.2% |     |
| Yellow Time (s)                                                       | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                      | 2.5   | 2.5   |     | 2.5   | 2.5   |     | 1.7   | 1.7   |     | 1.7   | 1.7   |     |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                   | 5.8   | 5.8   |     | 5.8   | 5.8   |     | 5.4   | 5.4   |     | 5.4   | 5.4   |     |
| Lead/Lag                                                              |       |       |     |       |       |     | Lead  | Lag   |     | Lag   | Lag   |     |
| Lead-Lag Optimize?                                                    |       |       |     |       |       |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                           | None  | None  |     | None  | None  |     | None  | C-Max |     | C-Max | C-Max |     |
| Act Effct Green (s)                                                   | 15.2  | 15.2  |     | 15.2  | 15.2  |     | 8.6   | 67.8  |     | 56.0  | 56.0  |     |
| Actuated g/C Ratio                                                    | 0.17  | 0.17  |     | 0.17  | 0.17  |     | 0.10  | 0.75  |     | 0.62  | 0.62  |     |
| v/c Ratio                                                             | 0.48  | 0.05  |     | 0.02  | 0.02  |     | 0.42  | 0.23  |     | 0.01  | 0.39  |     |
| Control Delay                                                         | 39.5  | 0.2   |     | 0.2   | 0.2   |     | 68.9  | 1.8   |     | 14.2  | 13.2  |     |
| Queue Delay                                                           | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                           | 39.5  | 0.2   |     | 0.2   | 0.2   |     | 68.9  | 1.8   |     | 14.2  | 13.2  |     |
| LOS                                                                   | D     | A     |     | A     | A     |     | E     | A     |     | B     | B     |     |
| Approach Delay                                                        |       | 31.8  |     | 0.2   | 0.2   |     | 8.8   |       |     | 13.3  |       |     |
| Approach LOS                                                          |       | C     |     | A     | A     |     | A     |       |     | B     |       |     |
| Queue Length 50th (m)                                                 | 18.5  | 0.0   |     | 0.0   | 0.0   |     | 12.8  | 2.6   |     | 0.4   | 38.2  |     |
| Queue Length 95th (m)                                                 | 28.4  | 0.0   |     | 0.0   | 0.0   |     | 26.9  | 10.0  |     | 2.9   | 79.0  |     |
| Internal Link Dist (m)                                                |       | 520.6 |     | 78.7  |       |     | 161.2 |       |     | 210.2 |       |     |
| Turn Bay Length (m)                                                   |       | 38.0  |     |       |       |     | 38.0  |       |     | 38.0  |       |     |
| Base Capacity (vph)                                                   | 425   | 686   |     | 541   |       |     | 186   | 2499  |     | 472   | 2020  |     |
| Sanctuary Cap Reductn                                                 | 0     | 0     |     | 0     |       |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                 | 0     | 0     |     | 0     |       |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                   | 0     | 0     |     | 0     |       |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                     | 0.25  | 0.04  |     | 0.01  |       |     | 0.35  | 0.23  |     | 0.01  | 0.39  |     |
| Intersection Summary                                                  |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 90                                                      |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 90                                             |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 15 (17%), Referenced to phase 2:NBT and 6:SBTL Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 80                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                    |       |       |     |       |       |     |       |       |     |       |       |     |

# Lanes, Volumes, Timings

## 1: Greenbank & New Collector/Loblaws

08-30-2019

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 13.0

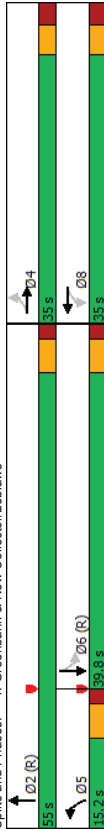
Intersection LOS: B

Intersection Capacity Utilization 57.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Greenbank & New Collector/Loblaws



# Lanes, Volumes, Timings

## 2: Greenbank & Marketplace

08-30-2019

| Lane Group                                                             | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|------------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                    | ↰     | ↰     | ↰   | ↰     | ↰     | ↰   | ↰     | ↰     | ↰   | ↰     | ↰     | ↰   |
| Traffic Volume (vph)                                                   | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 483   | 70  | 195   | 612   | 36  |
| Future Volume (vph)                                                    | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 483   | 70  | 195   | 612   | 36  |
| Satd. Flow (prot)                                                      | 1658  | 1633  | 0   | 1658  | 1569  | 0   | 1658  | 3253  | 0   | 3216  | 3282  | 0   |
| Flt Permitted                                                          | 0.294 |       |     | 0.458 |       |     | 0.950 |       |     | 0.950 |       |     |
| Satd. Flow (perm)                                                      | 511   | 1633  | 0   | 799   | 1569  | 0   | 1647  | 3253  | 0   | 3216  | 3282  | 0   |
| Satd. Flow (RTOR)                                                      | 29    |       |     | 59    |       |     | 15    |       |     | 6     |       |     |
| Lane Group Flow (vph)                                                  | 44    | 203   | 0   | 141   | 309   | 0   | 149   | 563   | 0   | 195   | 648   | 0   |
| Turn Type                                                              | pm-pt | NA    |     | pm-pt | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases                                                       | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases                                                       | 4     |       |     | 8     |       |     |       |       |     |       |       |     |
| Detector Phase                                                         | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase                                                           |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                    | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)                                                      | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (s)                                                        | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (%)                                                        | 10.8% | 29.2% |     | 10.8% | 29.2% |     | 16.7% | 43.3% |     | 16.7% | 43.3% |     |
| Yellow Time (s)                                                        | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                       | 3.1   | 3.2   |     | 3.1   | 3.2   |     | 2.6   | 2.5   |     | 2.6   | 2.5   |     |
| Lost Time Adjust (s)                                                   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                    | 6.4   | 6.5   |     | 6.4   | 6.5   |     | 6.3   | 6.2   |     | 6.3   | 6.2   |     |
| Lead/Lag                                                               | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                            | None  | None  |     | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)                                                    | 29.4  | 22.9  |     | 30.9  | 25.5  |     | 13.9  | 53.1  |     | 12.0  | 51.2  |     |
| Actuated g/C Ratio                                                     | 0.24  | 0.19  |     | 0.26  | 0.21  |     | 0.12  | 0.44  |     | 0.10  | 0.43  |     |
| v/c Ratio                                                              | 0.24  | 0.61  |     | 0.56  | 0.82  |     | 0.78  | 0.38  |     | 0.61  | 0.46  |     |
| Control Delay                                                          | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 24.3  |     | 63.4  | 20.7  |     |
| Queue Delay                                                            | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                            | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 24.3  |     | 63.4  | 20.7  |     |
| LOS                                                                    | C     | D     |     | D     | D     |     | E     | C     |     | E     | C     |     |
| Approach Delay                                                         |       | 42.2  |     |       | 49.8  |     |       | 35.6  |     |       | 30.6  |     |
| Approach LOS                                                           |       | D     |     |       | D     |     |       | D     |     |       | C     |     |
| Queue Length 50th (m)                                                  | 7.6   | 38.8  |     | 25.9  | 60.3  |     | 35.3  | 48.3  |     | 25.5  | 38.4  |     |
| Queue Length 95th (m)                                                  | 16.0  | 62.1  |     | 41.5  | #93.5 |     | #71.4 | 68.1  |     | m36.1 | m49.7 |     |
| Internal Link Dist (m)                                                 |       | 102.8 |     |       | 148.8 |     |       | 210.2 |     |       | 171.8 |     |
| Turn Bay Length (m)                                                    |       | 25.0  |     |       | 55.0  |     |       | 60.0  |     |       | 56.0  |     |
| Base Capacity (vph)                                                    | 189   | 409   |     | 252   | 417   |     | 200   | 1447  |     | 367   | 1402  |     |
| Sanctuary Cap Reductn                                                  | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                  | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                    | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                      | 0.23  | 0.50  |     | 0.56  | 0.74  |     | 0.74  | 0.38  |     | 0.53  | 0.46  |     |
| Intersection Summary                                                   |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 120                                                      |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 120                                             |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT. Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 120                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                     |       |       |     |       |       |     |       |       |     |       |       |     |

### Lanes, Volumes, Timings

#### 2: Greenbank & Marketplace

08-30-2019

|                                                                   |                        |
|-------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.82                                           | Intersection LOS: D    |
| Intersection Signal Delay: 37.3                                   | ICU Level of Service D |
| Intersection Capacity Utilization 74.9%                           |                        |
| Analysis Period (min) 15                                          |                        |
| Description: As per timing plans provided 26-Nov-2018             |                        |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |
| Queue shown is maximum after two cycles                           |                        |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |



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Synchro 10 Light Report

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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

08-30-2019

| Lane Group                                                          | EBL   | EBT    | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR | SBL   | SBT   | SEB   |
|---------------------------------------------------------------------|-------|--------|-------|-------|-------|-------|-------|-------|-----|-------|-------|-------|
| Lane Configurations                                                 | ↔     | ↔      | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔   | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                | 190   | 902    | 220   | 194   | 779   | 184   | 232   | 339   | 96  | 251   | 428   | 174   |
| Future Volume (vph)                                                 | 190   | 902    | 220   | 194   | 779   | 184   | 232   | 339   | 96  | 251   | 428   | 174   |
| Satd. Flow (prot)                                                   | 1658  | 3316   | 1483  | 1658  | 3316  | 1483  | 3216  | 3196  | 0   | 3216  | 3316  | 1483  |
| Flt Permitted                                                       | 0.166 |        |       | 0.115 |       |       | 0.950 |       |     |       |       |       |
| Satd. Flow (perm)                                                   | 290   | 3316   | 1464  | 201   | 3316  | 1483  | 3213  | 3196  | 0   | 3209  | 3316  | 1464  |
| Satd. Flow (RTOR)                                                   | 290   |        | 220   |       |       | 184   | 29    |       |     |       |       | 174   |
| Lane Group Flow (vph)                                               | 190   | 902    | 220   | 194   | 779   | 184   | 232   | 435   | 0   | 251   | 428   | 174   |
| Turn Type                                                           | pm-pt | NA     | Perm  | pm-pt | NA    | Perm  | Prot  | NA    |     | Prot  | NA    | Perm  |
| Protected Phases                                                    | 7     | 4      |       | 3     | 8     |       | 5     | 2     |     | 1     |       | 6     |
| Permitted Phases                                                    | 4     |        | 4     | 8     |       | 8     |       |       |     |       |       | 6     |
| Detector Phase                                                      | 7     | 4      | 4     | 3     | 8     | 8     | 5     | 2     |     | 1     | 6     | 6     |
| Switch Phase                                                        |       |        |       |       |       |       |       |       |     |       |       |       |
| Minimum Initial (s)                                                 | 5.0   | 10.0   | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |     | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                   | 18.0  | 41.0   | 41.0  | 18.0  | 41.0  | 41.0  | 24.0  | 37.0  |     | 24.0  | 37.0  | 37.0  |
| Total Split (s)                                                     | 18.0  | 41.0   | 41.0  | 18.0  | 41.0  | 41.0  | 24.0  | 37.0  |     | 24.0  | 37.0  | 37.0  |
| Total Split (%)                                                     | 15.0% | 34.2%  | 34.2% | 15.0% | 34.2% | 34.2% | 20.0% | 30.8% |     | 20.0% | 30.8% | 30.8% |
| Yellow Time (s)                                                     | 3.7   | 3.7    | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |     | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                    | 2.9   | 2.8    | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   |     | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                 | 6.6   | 6.5    | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   |     | 6.3   | 6.5   | 6.5   |
| Lead/Lag                                                            | Lead  | Lag    | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   |     | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?                                                  | Yes   | Yes    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |     | Yes   | Yes   | Yes   |
| Recall Mode                                                         | None  | Max    | None  | Max   | Max   | Max   | None  | C-Max |     | None  | C-Max | C-Max |
| Act Effct Green (s)                                                 | 45.6  | 34.5   | 34.5  | 46.0  | 34.7  | 34.7  | 13.9  | 33.8  |     | 14.4  | 34.3  | 34.3  |
| Actuated g/C Ratio                                                  | 0.38  | 0.29   | 0.29  | 0.38  | 0.29  | 0.29  | 0.12  | 0.28  |     | 0.12  | 0.29  | 0.29  |
| v/c Ratio                                                           | 0.80  | 0.95   | 0.38  | 0.90  | 0.81  | 0.33  | 0.62  | 0.47  |     | 0.65  | 0.45  | 0.32  |
| Control Delay                                                       | 48.1  | 61.0   | 6.3   | 70.3  | 47.7  | 6.3   | 72.6  | 23.9  |     | 58.3  | 37.6  | 6.8   |
| Queue Delay                                                         | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Delay                                                         | 48.1  | 61.0   | 6.3   | 70.3  | 47.7  | 6.3   | 72.6  | 23.9  |     | 58.3  | 37.6  | 6.8   |
| LOS                                                                 | D     | E      | A     | E     | D     | A     | E     | C     |     | E     | D     | A     |
| Approach Delay                                                      |       | 50.0   |       | 44.9  |       |       |       | 40.9  |     |       | 37.4  |       |
| Approach LOS                                                        |       | D      |       | D     |       |       |       | D     |     |       | D     |       |
| Queue Length 50th (m)                                               | 29.4  | 115.2  | 0.0   | 32.5  | 94.7  | 0.0   | 31.8  | 22.5  |     | 31.0  | 45.8  | 0.0   |
| Queue Length 95th (m)                                               | #61.4 | #157.2 | 18.8  | #77.8 | 119.6 | 17.2  | m44.8 | 31.5  |     | 44.0  | 64.8  | 17.8  |
| Internal Link Dist (m)                                              |       | 186.3  |       | 415.8 |       |       | 171.8 |       |     |       | 236.6 |       |
| Turn Bay Length (m)                                                 | 70.0  |        | 100.0 | 130.0 |       | 60.0  |       |       |     | 85.0  |       | 160.0 |
| Base Capacity (vph)                                                 | 240   | 953    | 577   | 215   | 958   | 559   | 474   | 920   |     | 474   | 948   | 542   |
| Sanctuary Cap Reductn                                               | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     | 0     |
| Spillback Cap Reductn                                               | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     | 0     |
| Storage Cap Reductn                                                 | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     | 0     |
| Reduced v/c Ratio                                                   | 0.79  | 0.95   | 0.38  | 0.90  | 0.81  | 0.33  | 0.49  | 0.47  |     | 0.63  | 0.45  | 0.32  |
| Intersection Summary                                                |       |        |       |       |       |       |       |       |     |       |       |       |
| Cycle Length: 120                                                   |       |        |       |       |       |       |       |       |     |       |       |       |
| Actuated Cycle Length: 120                                          |       |        |       |       |       |       |       |       |     |       |       |       |
| Offset: 7 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |        |       |       |       |       |       |       |     |       |       |       |
| Natural Cycle: 120                                                  |       |        |       |       |       |       |       |       |     |       |       |       |
| Control Type: Actuated-Coordinated                                  |       |        |       |       |       |       |       |       |     |       |       |       |

3288 Jockvale Road PM Peak Hour 2025 Background

Synchro 10 Light Report

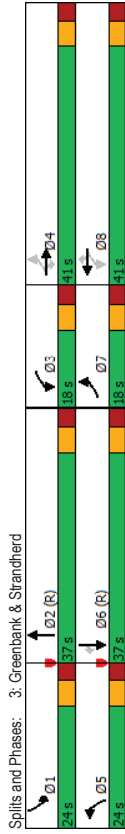
Page 5

### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

08-30-2019

Maximum v/c Ratio: 0.95  
Intersection Signal Delay: 44.3  
Intersection Capacity Utilization 91.0%  
Analysis Period (min) 15  
Description: As per timing plans provided 26-Nov-2018  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.  
m Volume for 95th percentile queue is metered by upstream signal.



### Lanes, Volumes, Timings

#### 5: Greenbank & Chapman Mills

08-30-2019

| Lane Group                                                          | WBL   | WBR   | NBT   | NBR  | SBL   | SBT   |
|---------------------------------------------------------------------|-------|-------|-------|------|-------|-------|
| Lane Configurations                                                 | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     |
| Traffic Volume (vph)                                                | 80    | 120   | 517   | 50   | 60    | 702   |
| Future Volume (vph)                                                 | 80    | 120   | 517   | 50   | 60    | 702   |
| Satd. Flow (prot)                                                   | 1658  | 1483  | 3264  | 0    | 1658  | 1745  |
| Flt Permitted                                                       | 0.950 |       |       |      | 0.950 |       |
| Satd. Flow (perm)                                                   | 1645  | 1456  | 3264  | 0    | 1652  | 1745  |
| Satd. Flow (RTOR)                                                   | 120   | 13    |       |      |       |       |
| Lane Group Flow (vph)                                               | 80    | 120   | 567   | 0    | 60    | 702   |
| Turn Type                                                           | Perm  | Perm  | NA    | Prot | NA    | NA    |
| Protected Phases                                                    |       |       | 2     | 1    | 6     |       |
| Permitted Phases                                                    | 8     | 8     |       |      |       |       |
| Detector Phase                                                      | 8     | 8     | 2     | 1    | 6     |       |
| Switch Phase                                                        |       |       |       |      |       |       |
| Minimum Initial (s)                                                 | 10.0  | 10.0  | 10.0  |      | 5.0   | 10.0  |
| Minimum Split (s)                                                   | 34.7  | 34.7  | 34.6  |      | 11.6  | 34.6  |
| Total Split (s)                                                     | 34.7  | 34.7  | 39.6  |      | 15.7  | 55.3  |
| Total Split (%)                                                     | 38.6% | 38.6% | 44.0% |      | 17.4% | 61.4% |
| Yellow Time (s)                                                     | 3.3   | 3.3   | 3.7   |      | 3.7   | 3.7   |
| All-Red Time (s)                                                    | 3.4   | 3.4   | 2.9   |      | 2.9   | 2.9   |
| Lost Time Adjust (s)                                                | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |
| Total Lost Time (s)                                                 | 6.7   | 6.7   | 6.6   |      | 6.6   | 6.6   |
| Lead/Lag                                                            |       |       |       | Lead |       |       |
| Lead-Lag Optimize?                                                  |       |       | Yes   | Yes  |       |       |
| Recall Mode                                                         | None  | None  | C-Max | None | C-Max |       |
| Act Effct Green (s)                                                 | 13.9  | 13.9  | 50.6  |      | 8.1   | 62.8  |
| Actuated g/C Ratio                                                  | 0.15  | 0.15  | 0.56  |      | 0.09  | 0.70  |
| v/c Ratio                                                           | 0.32  | 0.37  | 0.31  |      | 0.41  | 0.58  |
| Control Delay                                                       | 35.0  | 8.7   | 13.1  |      | 42.5  | 18.5  |
| Queue Delay                                                         | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |
| Total Delay                                                         | 35.0  | 8.7   | 13.1  |      | 42.5  | 18.5  |
| LOS                                                                 | D     | A     | B     |      | D     | B     |
| Approach Delay                                                      | 19.2  |       | 13.1  |      | 20.4  |       |
| Approach LOS                                                        | B     |       | B     |      | C     |       |
| Queue Length 50th (m)                                               | 13.8  | 0.0   | 25.3  |      | 11.0  | 43.2  |
| Queue Length 95th (m)                                               | 21.4  | 12.1  | 55.4  |      | 25.0  | 147.2 |
| Internal Link Dist (m)                                              | 403.7 |       | 204.2 |      |       | 161.2 |
| Turn Bay Length (m)                                                 | 38.0  |       |       |      | 38.0  |       |
| Base Capacity (vph)                                                 | 511   | 535   | 1839  |      | 170   | 1218  |
| Sanitation Cap Reductn                                              | 0     | 0     | 0     |      | 0     | 16    |
| Spillback Cap Reductn                                               | 0     | 0     | 0     |      | 0     | 0     |
| Storage Cap Reductn                                                 | 0     | 0     | 0     |      | 0     | 0     |
| Reduced v/c Ratio                                                   | 0.16  | 0.22  | 0.31  |      | 0.35  | 0.58  |
| Intersection Summary                                                |       |       |       |      |       |       |
| Cycle Length: 90                                                    |       |       |       |      |       |       |
| Actuated Cycle Length: 90                                           |       |       |       |      |       |       |
| Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |      |       |       |
| Natural Cycle: 85                                                   |       |       |       |      |       |       |
| Control Type: Actuated-Coordinated                                  |       |       |       |      |       |       |

# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

08-30-2019

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 17.5

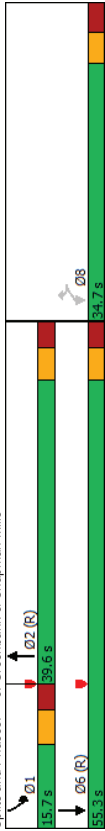
Intersection LOS: B

Intersection Capacity Utilization 60.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: Greenbank & Chapman Mills



# HCM 2010 TWSC

## 6: Greenbank & Street "B"

08-30-2019

| Intersection             | 0.6  |      |      |      |      |      |  |  |  |  |
|--------------------------|------|------|------|------|------|------|--|--|--|--|
| Int Delay, s/veh         |      |      |      |      |      |      |  |  |  |  |
| Movement                 | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |  |  |  |  |
| Lane Configurations      | W    | W    | W    | W    | W    | W    |  |  |  |  |
| Traffic Vol. veh/h       | 25   | 3    | 5    | 542  | 733  | 49   |  |  |  |  |
| Future Vol. veh/h        | 25   | 3    | 5    | 542  | 733  | 49   |  |  |  |  |
| Conflicting Peds. #/hr   | 0    | 0    | 0    | 0    | 0    | 0    |  |  |  |  |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |  |  |  |  |
| RT Channelized           | -    | None | -    | None | -    | None |  |  |  |  |
| Storage Length           | 0    | -    | 380  | -    | -    | -    |  |  |  |  |
| Veh in Median Storage, # | 0    | -    | -    | 0    | 0    | -    |  |  |  |  |
| Grade, %                 | 0    | -    | -    | 0    | 0    | -    |  |  |  |  |
| Peak Hour Factor         | 100  | 100  | 100  | 100  | 100  | 100  |  |  |  |  |
| Heavy Vehicles, %        | 2    | 2    | 2    | 2    | 2    | 2    |  |  |  |  |
| Mvmt Flow                | 25   | 3    | 5    | 542  | 733  | 49   |  |  |  |  |

| Major/Minor          | Minor2 | Major1 | Major2 |   |   |   |  |  |  |  |
|----------------------|--------|--------|--------|---|---|---|--|--|--|--|
| Conflicting Flow All | 1310   | 758    | 782    | 0 | - | 0 |  |  |  |  |
| Stage 1              | 758    | -      | -      | - | - | - |  |  |  |  |
| Stage 2              | 552    | -      | -      | - | - | - |  |  |  |  |
| Critical Hwy         | 6.42   | 6.22   | 4.12   | - | - | - |  |  |  |  |
| Critical Hwy Stg 1   | 5.42   | -      | -      | - | - | - |  |  |  |  |
| Critical Hwy Stg 2   | 5.42   | -      | -      | - | - | - |  |  |  |  |
| Follow-up Hwy        | 3.518  | 3.318  | 2.218  | - | - | - |  |  |  |  |
| Pot Cap-1 Maneuver   | 175    | 407    | 836    | - | - | - |  |  |  |  |
| Stage 1              | 463    | -      | -      | - | - | - |  |  |  |  |
| Stage 2              | 577    | -      | -      | - | - | - |  |  |  |  |
| Platoon blocked, %   | -      | -      | -      | - | - | - |  |  |  |  |
| Mov Cap-1 Maneuver   | 174    | 407    | 836    | - | - | - |  |  |  |  |
| Mov Cap-2 Maneuver   | 174    | -      | -      | - | - | - |  |  |  |  |
| Stage 1              | 460    | -      | -      | - | - | - |  |  |  |  |
| Stage 2              | 577    | -      | -      | - | - | - |  |  |  |  |

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

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

# Appendix F

Synchro Intersection Worksheets – 2030 Background Conditions

| Lane Group                                                           | EBL                                                                                 | EBT                                                                                 | EBR | WBL   | WBT                                                                                 | WBR | NBL                                                                                 | NBT                                                                                 | NBR | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----|-------|-------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations                                                  |  |  |     |       |  |     |  |  |     |  |  |  |
| Traffic Volume (vph)                                                 | 43                                                                                  | 0                                                                                   | 7   | 1     | 0                                                                                   | 5   | 20                                                                                  | 673                                                                                 | 1   | 5                                                                                   | 387                                                                                 | 38                                                                                  |
| Future Volume (vph)                                                  | 43                                                                                  | 0                                                                                   | 7   | 1     | 0                                                                                   | 5   | 20                                                                                  | 673                                                                                 | 1   | 5                                                                                   | 387                                                                                 | 38                                                                                  |
| Satd. Flow (prot)                                                    | 1658                                                                                | 1457                                                                                | 0   | 0     | 1512                                                                                | 0   | 1658                                                                                | 3316                                                                                | 0   | 1658                                                                                | 3264                                                                                | 0                                                                                   |
| Flt Permitted                                                        | 0.754                                                                               |                                                                                     |     |       | 0.940                                                                               |     | 0.504                                                                               |                                                                                     |     | 0.395                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)                                                    | 1310                                                                                | 1457                                                                                | 0   | 0     | 1432                                                                                | 0   | 875                                                                                 | 3316                                                                                | 0   | 687                                                                                 | 3264                                                                                | 0                                                                                   |
| Lane Group (RTOR)                                                    |                                                                                     | 407                                                                                 |     |       | 39                                                                                  |     |                                                                                     |                                                                                     |     |                                                                                     | 17                                                                                  |                                                                                     |
| Lane Group Flow (vph)                                                | 43                                                                                  | 7                                                                                   | 0   | 0     | 6                                                                                   | 0   | 20                                                                                  | 674                                                                                 | 0   | 5                                                                                   | 425                                                                                 | 0                                                                                   |
| Turn Type                                                            | Perm                                                                                | NA                                                                                  |     | Perm  | NA                                                                                  |     | Perm                                                                                | NA                                                                                  |     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                                                     |                                                                                     | 4                                                                                   |     |       | 8                                                                                   |     | 2                                                                                   |                                                                                     |     | 6                                                                                   |                                                                                     |                                                                                     |
| Permitted Phases                                                     | 4                                                                                   |                                                                                     |     | 8     |                                                                                     |     | 2                                                                                   |                                                                                     |     | 6                                                                                   |                                                                                     |                                                                                     |
| Detector Phase                                                       | 4                                                                                   | 4                                                                                   |     | 8     | 8                                                                                   |     | 2                                                                                   | 2                                                                                   |     | 6                                                                                   | 6                                                                                   |                                                                                     |
| Switch Phase                                                         |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)                                                  | 10.0                                                                                | 10.0                                                                                |     | 5.0   | 5.0                                                                                 |     | 10.0                                                                                | 10.0                                                                                |     | 10.0                                                                                | 10.0                                                                                |                                                                                     |
| Minimum Split (s)                                                    | 33.8                                                                                | 33.8                                                                                |     | 33.8  | 33.8                                                                                |     | 31.2                                                                                | 31.2                                                                                |     | 31.2                                                                                | 31.2                                                                                |                                                                                     |
| Total Split (s)                                                      | 37.0                                                                                | 37.0                                                                                |     | 37.0  | 37.0                                                                                |     | 53.0                                                                                | 53.0                                                                                |     | 53.0                                                                                | 53.0                                                                                |                                                                                     |
| Total Split (%)                                                      | 41.1%                                                                               | 41.1%                                                                               |     | 41.1% | 41.1%                                                                               |     | 58.9%                                                                               | 58.9%                                                                               |     | 58.9%                                                                               | 58.9%                                                                               |                                                                                     |
| Yellow Time (s)                                                      | 3.3                                                                                 | 3.3                                                                                 |     | 3.3   | 3.3                                                                                 |     | 3.7                                                                                 | 3.7                                                                                 |     | 3.7                                                                                 | 3.7                                                                                 |                                                                                     |
| All-Red Time (s)                                                     | 2.5                                                                                 | 2.5                                                                                 |     | 2.5   | 2.5                                                                                 |     | 2.5                                                                                 | 2.5                                                                                 |     | 2.5                                                                                 | 2.5                                                                                 |                                                                                     |
| Lost Time Adjst(s)                                                   | 0.0                                                                                 | 0.0                                                                                 |     | 0.0   | 0.0                                                                                 |     | 0.0                                                                                 | 0.0                                                                                 |     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)                                                  | 5.8                                                                                 | 5.8                                                                                 |     | 5.8   | 5.8                                                                                 |     | 6.2                                                                                 | 6.2                                                                                 |     | 6.2                                                                                 | 6.2                                                                                 |                                                                                     |
| Lead-Lag                                                             |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?                                                   |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode                                                          | None                                                                                | None                                                                                |     | None  | None                                                                                |     | C-Max                                                                               | C-Max                                                                               |     | C-Max                                                                               | C-Max                                                                               |                                                                                     |
| Act Effct Green (s)                                                  | 10.4                                                                                | 10.4                                                                                |     | 8.6   | 8.6                                                                                 |     | 76.4                                                                                | 76.4                                                                                |     | 76.4                                                                                | 76.4                                                                                |                                                                                     |
| Actuated g/C Ratio                                                   | 0.12                                                                                | 0.12                                                                                |     | 0.10  | 0.10                                                                                |     | 0.85                                                                                | 0.85                                                                                |     | 0.85                                                                                | 0.85                                                                                |                                                                                     |
| v/c Ratio                                                            | 0.28                                                                                | 0.01                                                                                |     | 0.03  | 0.03                                                                                |     | 0.03                                                                                | 0.24                                                                                |     | 0.01                                                                                | 0.15                                                                                |                                                                                     |
| Control Delay                                                        | 41.4                                                                                | 0.0                                                                                 |     | 0.3   | 0.3                                                                                 |     | 3.0                                                                                 | 2.8                                                                                 |     | 3.2                                                                                 | 2.5                                                                                 |                                                                                     |
| Queue Delay                                                          | 0.0                                                                                 | 0.0                                                                                 |     | 0.0   | 0.0                                                                                 |     | 0.0                                                                                 | 0.0                                                                                 |     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay                                                          | 41.4                                                                                | 0.0                                                                                 |     | 0.3   | 0.3                                                                                 |     | 3.0                                                                                 | 2.8                                                                                 |     | 3.2                                                                                 | 2.5                                                                                 |                                                                                     |
| LOS                                                                  | D                                                                                   | A                                                                                   |     | A     | A                                                                                   |     | A                                                                                   | A                                                                                   |     | A                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay                                                       |                                                                                     | 35.6                                                                                |     | 0.3   | 0.3                                                                                 |     | 2.8                                                                                 | 2.8                                                                                 |     | 2.5                                                                                 | 2.5                                                                                 |                                                                                     |
| Approach LOS                                                         |                                                                                     | D                                                                                   |     | A     | A                                                                                   |     | A                                                                                   | A                                                                                   |     | A                                                                                   | A                                                                                   |                                                                                     |
| Queue Length 50th (m)                                                | 7.3                                                                                 | 0.0                                                                                 |     | 0.0   | 0.0                                                                                 |     | 0.7                                                                                 | 15.8                                                                                |     | 0.2                                                                                 | 8.7                                                                                 |                                                                                     |
| Queue Length 95th (m)                                                | 17.3                                                                                | 0.0                                                                                 |     | 0.0   | 0.0                                                                                 |     | 2.6                                                                                 | 24.1                                                                                |     | 1.0                                                                                 | 14.2                                                                                |                                                                                     |
| Internal Link Dist (m)                                               |                                                                                     | 520.6                                                                               |     | 62.5  | 62.5                                                                                |     |                                                                                     | 161.2                                                                               |     |                                                                                     | 210.2                                                                               |                                                                                     |
| Turn Bay Length (m)                                                  | 38.0                                                                                |                                                                                     |     |       |                                                                                     |     | 38.0                                                                                |                                                                                     |     | 38.0                                                                                |                                                                                     |                                                                                     |
| Base Capacity (vph)                                                  | 454                                                                                 | 771                                                                                 |     | 521   | 521                                                                                 |     | 743                                                                                 | 2815                                                                                |     | 583                                                                                 | 2773                                                                                |                                                                                     |
| Starvation Cap Reductn                                               | 0                                                                                   | 0                                                                                   |     | 0     | 0                                                                                   |     | 0                                                                                   | 0                                                                                   |     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Spillback Cap Reductn                                                | 0                                                                                   | 0                                                                                   |     | 0     | 0                                                                                   |     | 0                                                                                   | 0                                                                                   |     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Storage Cap Reductn                                                  | 0                                                                                   | 0                                                                                   |     | 0     | 0                                                                                   |     | 0                                                                                   | 0                                                                                   |     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Reduced v/c Ratio                                                    | 0.09                                                                                | 0.01                                                                                |     | 0.01  | 0.01                                                                                |     | 0.03                                                                                | 0.24                                                                                |     | 0.01                                                                                | 0.15                                                                                |                                                                                     |
| Intersection Summary                                                 |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Cycle Length: 90                                                     |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length: 90                                            |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Onset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Natural Cycle: 65                                                    |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |
| Control Type: Actuated-Coordinated                                   |                                                                                     |                                                                                     |     |       |                                                                                     |     |                                                                                     |                                                                                     |     |                                                                                     |                                                                                     |                                                                                     |

| Maximum v/c Ratio: 0.28                 | Intersection Signal Delay: 4.1 | Intersection LOS: A    |
|-----------------------------------------|--------------------------------|------------------------|
| Intersection Capacity Utilization 42.2% |                                | ICU Level of Service A |
| Analysis Period (min) 15                |                                |                        |

| Splits and Phases: 1: Greenbank & New Collector |                                                 |
|-------------------------------------------------|-------------------------------------------------|
|                                                 | <p>53 s</p> <p>37 s</p> <p>53 s</p> <p>37 s</p> |

## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-03-2019

| Lane Group                                                            | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|-----------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   |
| Traffic Volume (vph)                                                  | 12    | 17    | 16  | 36    | 23    | 106 | 98    | 559   | 74  | 65    | 380   | 6   |
| Future Volume (vph)                                                   | 12    | 17    | 16  | 36    | 23    | 106 | 98    | 559   | 74  | 65    | 380   | 6   |
| Satd. Flow (prot)                                                     | 1658  | 1607  | 0   | 1658  | 1514  | 0   | 1658  | 3250  | 0   | 3216  | 3308  | 0   |
| Flt Permitted                                                         | 0.659 |       |     | 0.680 |       |     | 0.950 |       |     | 0.950 |       |     |
| Satd. Flow (perm)                                                     | 1149  | 1607  | 0   | 1185  | 1514  | 0   | 1656  | 3250  | 0   | 3210  | 3308  | 0   |
| Satd. Flow (RTOR)                                                     | 16    |       |     | 106   |       |     | 15    |       |     | 2     |       |     |
| Lane Group Flow (vph)                                                 | 12    | 33    | 0   | 36    | 129   | 0   | 98    | 633   | 0   | 65    | 386   | 0   |
| Turn Type                                                             | pm-pt | NA    |     | pm-pt | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases                                                      | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases                                                      | 4     |       |     | 8     |       |     |       |       |     |       |       |     |
| Detector Phase                                                        | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase                                                          |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                   | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)                                                     | 12.0  | 35.0  |     | 12.0  | 35.0  |     | 15.0  | 58.0  |     | 15.0  | 58.0  |     |
| Total Split (s)                                                       | 12.0  | 35.0  |     | 12.0  | 35.0  |     | 15.0  | 58.0  |     | 15.0  | 58.0  |     |
| Total Split (%)                                                       | 10.0% | 29.2% |     | 10.0% | 29.2% |     | 12.5% | 48.3% |     | 12.5% | 48.3% |     |
| Yellow Time (s)                                                       | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                      | 3.1   | 3.2   |     | 3.1   | 3.2   |     | 2.6   | 2.5   |     | 2.6   | 2.5   |     |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                   | 6.4   | 6.5   |     | 6.4   | 6.5   |     | 6.3   | 6.2   |     | 6.3   | 6.2   |     |
| Lead/Lag                                                              | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                    | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                           | None  | None  |     | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)                                                   | 17.1  | 13.6  |     | 18.4  | 16.0  |     | 11.7  | 74.9  |     | 7.7   | 68.5  |     |
| Act Effct Green Ratio                                                 | 0.14  | 0.11  |     | 0.15  | 0.13  |     | 0.10  | 0.62  |     | 0.06  | 0.57  |     |
| v/c Ratio                                                             | 0.06  | 0.17  |     | 0.18  | 0.44  |     | 0.61  | 0.31  |     | 0.32  | 0.20  |     |
| Control Delay                                                         | 34.8  | 29.2  |     | 38.6  | 16.8  |     | 68.2  | 13.6  |     | 62.4  | 13.8  |     |
| Queue Delay                                                           | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                           | 34.8  | 29.2  |     | 38.6  | 16.8  |     | 68.2  | 13.6  |     | 62.4  | 13.8  |     |
| LOS                                                                   | C     | C     |     | D     | B     |     | E     | B     |     | E     | B     |     |
| Approach Delay                                                        |       | 30.7  |     | 21.5  |       |     | 20.9  |       |     | 20.8  |       |     |
| Approach LOS                                                          |       | C     |     | C     |       |     | C     |       |     | C     |       |     |
| Queue Length 50th (m)                                                 | 2.5   | 4.0   |     | 7.5   | 4.8   |     | 23.2  | 38.3  |     | 8.5   | 17.9  |     |
| Queue Length 95th (m)                                                 | 6.6   | 12.1  |     | 14.0  | 21.0  |     | #53.9 | 72.4  |     | 16.8  | 30.5  |     |
| Internal Link Dist (m)                                                |       | 102.8 |     |       | 148.8 |     |       | 210.2 |     |       | 171.8 |     |
| Turn Bay Length (m)                                                   |       | 25.0  |     |       | 55.0  |     |       | 60.0  |     |       | 56.0  |     |
| Base Capacity (vph)                                                   | 187   | 393   |     | 203   | 440   |     | 161   | 2034  |     | 236   | 1888  |     |
| Starvation Cap Reductn                                                | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                 | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                   | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                     | 0.06  | 0.08  |     | 0.18  | 0.29  |     | 0.61  | 0.31  |     | 0.28  | 0.20  |     |
| Intersection Summary                                                  |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 120                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 120                                            |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 120                                                    |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                    |       |       |     |       |       |     |       |       |     |       |       |     |

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## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-03-2019

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.61                                         | Intersection LOS: C    |
| Intersection Signal Delay: 21.3                                 | ICU Level of Service A |
| Intersection Capacity Utilization 53.3%                         |                        |
| Analysis Period (min) 15                                        |                        |
| Description: As per timing plans provided 26-Nov-2018           |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |
| Splits and Phases: 2: Greenbank & Marketplace                   |                        |
|                                                                 |                        |

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### Lanes, Volumes, Timings 3: Greenbank & Strandherd

09-03-2019

| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations                                                   | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                  | 171   | 652   | 144   | 81    | 729   | 163   | 188   | 349   | 99    | 175   | 213   | 129   |
| Future Volume (vph)                                                   | 171   | 652   | 144   | 81    | 729   | 163   | 188   | 349   | 99    | 175   | 213   | 129   |
| Satd. Flow (prot)                                                     | 1658  | 3316  | 1483  | 1658  | 3316  | 1483  | 3216  | 3185  | 0     | 3216  | 3316  | 1483  |
| Flt Permitted                                                         | 0.191 |       |       | 0.311 |       |       | 0.950 |       |       | 0.950 |       |       |
| Satd. Flow (perm)                                                     | 332   | 3316  | 1446  | 541   | 3316  | 1432  | 3206  | 3185  | 0     | 3163  | 3316  | 1462  |
| Satd. Flow (RTOR)                                                     |       |       | 149   |       |       | 163   |       | 29    |       |       |       | 149   |
| Lane Group Flow (vph)                                                 | 171   | 652   | 144   | 81    | 729   | 163   | 188   | 448   | 0     | 175   | 213   | 129   |
| Turn Type                                                             | pm-pt | NA    | Perm  | pm-pt | NA    | Perm  | Prot  | NA    | Prot  | NA    | Perm  | NA    |
| Protected Phases                                                      |       |       |       |       |       |       |       |       |       |       |       |       |
| Permitted Phases                                                      | 4     | 4     | 4     | 3     | 8     | 8     | 5     | 2     | 1     | 1     | 6     | 6     |
| Detector Phase                                                        | 7     | 4     | 4     | 3     | 8     | 8     | 5     | 2     | 1     | 6     | 6     | 6     |
| Switch Phase                                                          |       |       |       |       |       |       |       |       |       |       |       |       |
| Minimum Initial (s)                                                   | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  | 5.0   | 10.0  | 10.0  | 10.0  |
| Minimum Split (s)                                                     | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  | 24.0  | 36.0  | 36.0  | 36.0  |
| Total Split (s)                                                       | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  | 24.0  | 36.0  | 36.0  | 36.0  |
| Total Split (%)                                                       | 15.8% | 34.2% | 34.2% | 15.8% | 34.2% | 34.2% | 20.0% | 30.0% | 20.0% | 30.0% | 30.0% | 30.0% |
| Yellow Time (s)                                                       | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                      | 2.9   | 2.8   | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   | 2.6   | 2.8   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                   | 6.6   | 6.5   | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   | 6.3   | 6.5   | 6.5   | 6.5   |
| Lead/Lag                                                              | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   | Lead  | Lag   | Lag   | Lag   |
| Lead-Lag Optimize?                                                    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode                                                           | None  | Max   | Max   | None  | Max   | Max   | None  | C-Max | None  | C-Max | C-Max | C-Max |
| Act Effct Green (s)                                                   | 50.1  | 40.5  | 40.5  | 44.3  | 35.4  | 35.4  | 12.3  | 35.4  | 11.8  | 34.9  | 34.9  | 34.9  |
| Actuated g/C Ratio                                                    | 0.42  | 0.34  | 0.34  | 0.37  | 0.30  | 0.30  | 0.10  | 0.30  | 0.10  | 0.29  | 0.29  | 0.29  |
| v/c Ratio                                                             | 0.65  | 0.58  | 0.25  | 0.29  | 0.74  | 0.30  | 0.57  | 0.47  | 0.55  | 0.22  | 0.24  | 0.24  |
| Control Delay                                                         | 32.8  | 36.5  | 5.7   | 22.7  | 44.0  | 6.5   | 73.4  | 25.1  | 57.9  | 33.7  | 4.9   | 4.9   |
| Queue Delay                                                           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay                                                           | 32.8  | 36.5  | 5.7   | 22.7  | 44.0  | 6.5   | 73.4  | 25.1  | 57.9  | 33.7  | 4.9   | 4.9   |
| LOS                                                                   | C     | D     | A     | C     | D     | A     | E     | C     | E     | C     | C     | A     |
| Approach Delay                                                        |       | 31.3  |       | 35.9  |       |       | 39.4  |       |       | 34.7  |       |       |
| Approach LOS                                                          |       | C     |       | D     |       |       | D     |       |       | C     |       |       |
| Queue Length 50th (m)                                                 | 25.7  | 72.1  | 0.0   | 11.5  | 86.8  | 0.0   | 24.5  | 45.4  | 21.7  | 21.0  | 0.0   | 0.0   |
| Queue Length 95th (m)                                                 | 41.5  | 96.3  | 14.5  | 21.6  | 110.5 | 16.4  | 36.0  | 26.2  | 32.7  | 33.0  | 11.3  | 11.3  |
| Internal Link Dist (m)                                                |       | 186.3 |       |       | 415.8 |       | 171.8 |       |       | 236.6 |       |       |
| Turn Bay Length (m)                                                   | 70.0  | 100.0 | 130.0 |       |       | 60.0  |       |       | 85.0  |       | 160.0 |       |
| Base Capacity (vph)                                                   | 276   | 1120  | 587   | 330   | 979   | 537   | 474   | 959   | 474   | 964   | 530   | 530   |
| Starvation Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Spillback Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Storage Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Reduced v/c Ratio                                                     | 0.62  | 0.58  | 0.25  | 0.25  | 0.74  | 0.30  | 0.40  | 0.47  | 0.37  | 0.22  | 0.24  | 0.24  |
| Intersection Summary                                                  |       |       |       |       |       |       |       |       |       |       |       |       |
| Cycle Length: 120                                                     |       |       |       |       |       |       |       |       |       |       |       |       |
| Actuated Cycle Length: 120                                            |       |       |       |       |       |       |       |       |       |       |       |       |
| Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |       |       |       |       |       |       |       |
| Natural Cycle: 120                                                    |       |       |       |       |       |       |       |       |       |       |       |       |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |       |       |       |       |       |       |       |

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### Lanes, Volumes, Timings 3: Greenbank & Strandherd

09-03-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.74                               | Intersection LOS: C    |
| Intersection Signal Delay: 35.0                       | ICU Level of Service E |
| Intersection Capacity Utilization 83.9%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |
| Splits and Phases: 3: Greenbank & Strandherd          |                        |
|                                                       |                        |

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# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

09-03-2019

| Lane Group                                                          | WBL   | WBR   | NBT   | NBR   | SBL   | SBT  |
|---------------------------------------------------------------------|-------|-------|-------|-------|-------|------|
| Lane Configurations                                                 | ↩     | ↩     | ↩↪    | ↩↪    | ↩     | ↩    |
| Traffic Volume (vph)                                                | 30    | 130   | 591   | 40    | 30    | 374  |
| Future Volume (vph)                                                 | 30    | 130   | 591   | 40    | 30    | 374  |
| Satd. Flow (prot)                                                   | 1658  | 1483  | 3276  | 0     | 1658  | 1745 |
| Flt Permitted                                                       | 0.950 |       |       |       | 0.950 |      |
| Satd. Flow (perm)                                                   | 1644  | 1456  | 3276  | 0     | 1652  | 1745 |
| Satd. Flow (RTOR)                                                   | 130   |       | 9     |       |       |      |
| Lane Group Flow (vph)                                               | 30    | 130   | 631   | 0     | 30    | 374  |
| Turn Type                                                           | Prot  | Perm  | NA    | Prot  | NA    |      |
| Protected Phases                                                    | 3     |       | 2     | 1     | 6     |      |
| Permitted Phases                                                    | 3     |       |       |       |       |      |
| Detector Phase                                                      | 3     | 3     | 2     | 1     | 6     |      |
| Switch Phase                                                        |       |       |       |       |       |      |
| Minimum Initial (s)                                                 | 5.0   | 5.0   | 10.0  |       | 5.0   | 10.0 |
| Minimum Split (s)                                                   | 34.7  | 34.7  | 34.6  | 11.6  | 34.6  |      |
| Total Split (s)                                                     | 34.7  | 34.7  | 47.0  | 15.0  | 62.0  |      |
| Total Split (%)                                                     | 35.9% | 35.9% | 48.6% | 15.5% | 64.1% |      |
| Yellow Time (s)                                                     | 3.3   | 3.3   | 3.7   | 3.7   | 3.7   |      |
| All-Red Time (s)                                                    | 3.4   | 3.4   | 2.9   | 1.0   | 2.9   |      |
| Lost Time Adjust (s)                                                | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |
| Total Lost Time (s)                                                 | 6.7   | 6.7   | 6.6   | 4.7   | 6.6   |      |
| Lead/Lag                                                            |       |       | Lag   | Lead  |       |      |
| Lead-Lag Optimize?                                                  |       |       | Yes   | Yes   |       |      |
| Recall Mode                                                         | None  | None  | C-Max | None  | C-Max |      |
| Act Effct Green (s)                                                 | 11.0  | 11.0  | 64.6  | 7.3   | 72.4  |      |
| Actuated g/C Ratio                                                  | 0.11  | 0.11  | 0.67  | 0.08  | 0.75  |      |
| v/c Ratio                                                           | 0.16  | 0.46  | 0.29  | 0.24  | 0.29  |      |
| Control Delay                                                       | 36.4  | 11.4  | 9.6   | 46.1  | 6.0   |      |
| Queue Delay                                                         | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |
| Total Delay                                                         | 36.4  | 11.4  | 9.6   | 46.1  | 6.0   |      |
| LOS                                                                 | D     | B     | A     | D     | A     |      |
| Approach Delay                                                      | 16.1  |       | 9.6   |       | 9.0   |      |
| Approach LOS                                                        | B     |       | A     |       | A     |      |
| Queue Length 50th (m)                                               | 5.7   | 0.0   | 23.6  | 5.7   | 15.3  |      |
| Queue Length 95th (m)                                               | 11.3  | 13.4  | 60.1  | 14.6  | 56.7  |      |
| Internal Link Dist (m)                                              | 403.7 |       | 204.2 |       | 161.2 |      |
| Turn Bay Length (m)                                                 | 38.0  |       |       |       | 38.0  |      |
| Base Capacity (vph)                                                 | 480   | 513   | 2191  | 176   | 1306  |      |
| Starvation Cap Reductn                                              | 0     | 0     | 0     | 0     | 0     |      |
| Spillback Cap Reductn                                               | 0     | 0     | 0     | 0     | 0     |      |
| Storage Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     |      |
| Reduced v/c Ratio                                                   | 0.06  | 0.25  | 0.29  | 0.17  | 0.29  |      |
| Intersection Summary                                                |       |       |       |       |       |      |
| Cycle Length: 96.7                                                  |       |       |       |       |       |      |
| Actuated Cycle Length: 96.7                                         |       |       |       |       |       |      |
| Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |      |
| Natural Cycle: 85                                                   |       |       |       |       |       |      |
| Control Type: Actuated-Coordinated                                  |       |       |       |       |       |      |

3288 Jockvale Road AM Peak Hour 2030 Background

# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

09-03-2019

|                                                                                                                                                                                                      |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.46                                                                                                                                                                              | Intersection LOS: B    |
| Intersection Signal Delay: 10.3                                                                                                                                                                      | ICU Level of Service A |
| Intersection Capacity Utilization 45.6%                                                                                                                                                              |                        |
| Analysis Period (min) 15                                                                                                                                                                             |                        |
| Splits and Phases: 5: Greenbank & Chapman Mills                                                                                                                                                      |                        |
| <div> <div> <div>Ø1</div> <div>15 s</div> </div> <div> <div>Ø2 (R)</div> <div>4.7 s</div> </div> <div> <div>Ø3</div> <div>34.7 s</div> </div> <div> <div>Ø4 (R)</div> <div>3.7 s</div> </div> </div> |                        |

3288 Jockvale Road AM Peak Hour 2030 Background

6: Greenbank & Street "B"

| Intersection             | EBL    | EBR    | NBL    | NBT  | SBT  | SBR  |
|--------------------------|--------|--------|--------|------|------|------|
| Int Delay, s/veh         | 0.7    |        |        |      |      |      |
| Movement                 | EBL    | EBR    | NBL    | NBT  | SBT  | SBR  |
| Lane Configurations      | W      | W      | W      | W    | W    | W    |
| Traffic Vol. veh/h       | 34     | 4      | 1      | 547  | 370  | 7    |
| Future Vol. veh/h        | 34     | 4      | 1      | 547  | 370  | 7    |
| Conflicting Peds. #/hr   | 0      | 0      | 0      | 0    | 0    | 0    |
| Sign Control             | Stop   | Stop   | Free   | Free | Free | Free |
| RT Channelized           | -      | None   | -      | -    | -    | None |
| Storage Length           | 0      | -      | 380    | -    | -    | -    |
| Veh in Median Storage, # | 0      | -      | 0      | 0    | 0    | -    |
| Grade, %                 | 0      | -      | -      | -    | -    | -    |
| Peak Hour Factor         | 100    | 100    | 100    | 100  | 100  | 100  |
| Heavy Vehicles, %        | 2      | 2      | 2      | 2    | 2    | 2    |
| Mvmt Flow                | 34     | 4      | 1      | 547  | 370  | 7    |
| Major/Minor              | Minor2 | Major1 | Major2 |      |      |      |
| Conflicting Flow All     | 923    | 374    | 377    | 0    | -    | 0    |
| Stage 1                  | 374    | -      | -      | -    | -    | -    |
| Stage 2                  | 549    | -      | -      | -    | -    | -    |
| Critical Hwy             | 642    | 622    | 412    | -    | -    | -    |
| Critical Hwy Stg 1       | 542    | -      | -      | -    | -    | -    |
| Critical Hwy Stg 2       | 542    | -      | -      | -    | -    | -    |
| Follow-up Hwy            | 3,518  | 3,318  | 2,218  | -    | -    | -    |
| Pot Cap-1 Maneuver       | 299    | 672    | 1181   | -    | -    | -    |
| Stage 1                  | 696    | -      | -      | -    | -    | -    |
| Stage 2                  | 579    | -      | -      | -    | -    | -    |
| Platoon blocked, %       | -      | -      | -      | -    | -    | -    |
| Mov Cap-1 Maneuver       | 299    | 672    | 1181   | -    | -    | -    |
| Mov Cap-2 Maneuver       | 299    | -      | -      | -    | -    | -    |
| Stage 1                  | 695    | -      | -      | -    | -    | -    |
| Stage 2                  | 579    | -      | -      | -    | -    | -    |
| Approach                 | EB     | NB     | SB     |      |      |      |
| HCM Control Delay, s     | 17.9   | 0      | 0      |      |      |      |
| HCM LOS                  | C      |        |        |      |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT    | EBLn1  | SBT  | SBR  |      |
| Capacity (veh/h)         | 1181   | -      | 318    | -    | -    |      |
| HCM Lane V/C Ratio       | 0.001  | -      | 0.119  | -    | -    |      |
| HCM Control Delay (s)    | 8.1    | -      | 17.9   | -    | -    |      |
| HCM Lane LOS             | A      | -      | C      | -    | -    |      |
| HCM 95th %ile Q(veh)     | 0      | -      | 0.4    | -    | -    |      |

1: Greenbank & New Collector/Loblaws

| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations                                                   | W     | W     | W     | W     | W     | W     | W     | W     | W     | W     | W     | W     |
| Traffic Volume (vph)                                                  | 107   | 0     | 26    | 1     | 0     | 5     | 66    | 640   | 1     | 5     | 776   | 103   |
| Future Volume (vph)                                                   | 107   | 0     | 26    | 1     | 0     | 5     | 66    | 640   | 1     | 5     | 776   | 103   |
| Satd. Flow (prot)                                                     | 1658  | 1456  | 0     | 0     | 1512  | 0     | 1658  | 3316  | 0     | 1658  | 3244  | 0     |
| Flt Permitted                                                         | 0.754 |       |       |       | 0.972 |       | 0.950 |       |       | 0.408 |       |       |
| Satd. Flow (perm)                                                     | 1310  | 1456  | 0     | 0     | 1481  | 0     | 1653  | 3316  | 0     | 709   | 3244  | 0     |
| Satd. Flow (RTOR)                                                     | 304   |       |       |       | 104   |       |       |       |       | 18    |       |       |
| Lane Group Flow (vph)                                                 | 107   | 26    | 0     | 0     | 6     | 0     | 66    | 641   | 0     | 5     | 879   | 0     |
| Turn Type                                                             | Perm  | NA    | Perm  | NA    | Perm  | NA    | Prot  | NA    | Perm  | NA    | Perm  | NA    |
| Protected Phases                                                      | 4     | 4     | 8     | 8     | 8     | 8     | 5     | 2     | 2     | 6     | 6     | 6     |
| Permitted Phases                                                      | 4     | 4     | 8     | 8     | 8     | 8     | 5     | 2     | 2     | 6     | 6     | 6     |
| Detector Phase                                                        | 4     | 4     | 8     | 8     | 8     | 8     | 5     | 2     | 2     | 6     | 6     | 6     |
| Switch Phase                                                          | 10.0  | 10.0  | 5.0   | 5.0   | 5.0   | 5.0   | 10.0  | 10.0  | 10.0  | 10.0  | 10.0  | 10.0  |
| Minimum Initial (s)                                                   | 33.8  | 33.8  | 32.5  | 32.5  | 32.5  | 32.5  | 10.8  | 30.8  | 30.8  | 30.8  | 30.8  | 30.8  |
| Minimum Split (s)                                                     | 34.0  | 34.0  | 32.5  | 32.5  | 32.5  | 32.5  | 16.0  | 56.0  | 40.0  | 40.0  | 40.0  | 40.0  |
| Total Split (%)                                                       | 37.8% | 37.8% | 36.1% | 36.1% | 36.1% | 36.1% | 17.8% | 62.2% | 44.4% | 44.4% | 44.4% | 44.4% |
| Yellow Time (s)                                                       | 3.3   | 3.3   | 3.5   | 3.5   | 3.5   | 3.5   | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |
| All-Red Time (s)                                                      | 2.5   | 2.5   | 1.0   | 1.0   | 1.0   | 1.0   | 2.5   | 2.5   | 2.5   | 2.5   | 2.5   | 2.5   |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                   | 5.8   | 5.8   | 4.5   | 4.5   | 4.5   | 4.5   | 5.8   | 5.8   | 5.8   | 5.8   | 5.8   | 5.8   |
| Lead/Lag                                                              |       |       |       |       |       |       | Lead  | Lag   | Lag   | Lag   | Lag   | Lag   |
| Lead-Lag Optimize?                                                    |       |       |       |       |       |       | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode                                                           | None  | None  | None  | None  | None  | None  | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max |
| Act Effct Green (s)                                                   | 13.3  | 13.3  | 13.4  | 13.4  | 13.4  | 13.4  | 8.9   | 69.4  | 57.0  | 57.0  | 57.0  | 57.0  |
| Actuated g/C Ratio                                                    | 0.15  | 0.15  | 0.15  | 0.15  | 0.15  | 0.15  | 0.10  | 0.77  | 0.63  | 0.63  | 0.63  | 0.63  |
| v/c Ratio                                                             | 0.55  | 0.05  | 0.02  | 0.02  | 0.02  | 0.02  | 0.40  | 0.25  | 0.01  | 0.43  | 0.43  | 0.43  |
| Control Delay                                                         | 46.1  | 0.2   | 0.2   | 0.2   | 0.2   | 0.2   | 61.6  | 1.4   | 11.8  | 12.5  | 12.5  | 12.5  |
| Queue Delay                                                           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay                                                           | 46.1  | 0.2   | 0.2   | 0.2   | 0.2   | 0.2   | 61.6  | 1.4   | 11.8  | 12.5  | 12.5  | 12.5  |
| LOS                                                                   | D     | A     | A     | A     | A     | A     | E     | A     | B     | B     | B     | B     |
| Approach Delay                                                        | 37.1  | 0.2   | 0.2   | 0.2   | 0.2   | 0.2   | 7.0   | 7.0   | 12.5  | 12.5  | 12.5  | 12.5  |
| Approach LOS                                                          | D     | A     | A     | A     | A     | A     | A     | A     | B     | B     | B     | B     |
| Queue Length 50th (m)                                                 | 18.5  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 12.9  | 2.5   | 0.4   | 45.3  | 45.3  | 45.3  |
| Queue Length 95th (m)                                                 | 33.2  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 26.9  | 8.3   | 2.4   | 77.1  | 77.1  | 77.1  |
| Internal Link Dist (m)                                                | 520.6 |       |       |       |       |       | 161.2 |       |       | 210.2 |       |       |
| Turn Bay Length (m)                                                   | 38.0  |       |       |       |       |       | 38.0  |       |       | 38.0  |       |       |
| Base Capacity (vph)                                                   | 410   | 664   | 555   | 555   | 555   | 555   | 196   | 2558  | 448   | 2060  | 2060  | 2060  |
| Sanctuary Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Spillback Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Storage Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Reduced v/c Ratio                                                     | 0.26  | 0.04  | 0.01  | 0.01  | 0.01  | 0.01  | 0.34  | 0.25  | 0.01  | 0.43  | 0.43  | 0.43  |
| Intersection Summary                                                  |       |       |       |       |       |       |       |       |       |       |       |       |
| Cycle Length: 90                                                      |       |       |       |       |       |       |       |       |       |       |       |       |
| Actuated Cycle Length: 90                                             |       |       |       |       |       |       |       |       |       |       |       |       |
| Offset: 16 (18%), Referenced to phase 2:NBT and 6:SBTL Start of Green |       |       |       |       |       |       |       |       |       |       |       |       |
| Natural Cycle: 80                                                     |       |       |       |       |       |       |       |       |       |       |       |       |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |       |       |       |       |       |       |       |

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 12.1

Intersection LOS: B

Intersection Capacity Utilization 59.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Greenbank &amp; New Collector/Loblaws



Maximum v/c Ratio: 0.55

Intersection Signal Delay: 12.1

Intersection LOS: B

Intersection Capacity Utilization 59.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Greenbank &amp; New Collector/Loblaws



| Lane Group                                                             | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|------------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                    | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   |
| Traffic Volume (vph)                                                   | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 547   | 70  | 195   | 678   | 36  |
| Future Volume (vph)                                                    | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 547   | 70  | 195   | 678   | 36  |
| Satd. Flow (prot)                                                      | 1658  | 1633  | 0   | 1658  | 1569  | 0   | 1658  | 3259  | 0   | 3216  | 3283  | 0   |
| Flt Permitted                                                          | 0.294 |       |     | 0.458 |       |     | 0.950 |       |     | 0.950 |       |     |
| Satd. Flow (perm)                                                      | 511   | 1633  | 0   | 799   | 1569  | 0   | 1648  | 3259  | 0   | 3216  | 3283  | 0   |
| Satd. Flow (RTOR)                                                      | 29    |       |     | 59    |       |     | 13    |       |     | 5     |       |     |
| Lane Group Flow (vph)                                                  | 44    | 203   | 0   | 141   | 309   | 0   | 149   | 617   | 0   | 195   | 714   | 0   |
| Turn Type                                                              | pm-pt | NA    |     | pm-pt | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases                                                       | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases                                                       | 4     |       |     | 8     |       |     |       |       |     |       |       |     |
| Detector Phase                                                         | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase                                                           |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                    | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)                                                      | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (s)                                                        | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (%)                                                        | 10.8% | 29.2% |     | 10.8% | 29.2% |     | 16.7% | 43.3% |     | 16.7% | 43.3% |     |
| Yellow Time (s)                                                        | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                       | 3.1   | 3.2   |     | 3.1   | 3.2   |     | 2.6   | 2.5   |     | 2.6   | 2.5   |     |
| Lost Time Adjust (s)                                                   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                    | 6.4   | 6.5   |     | 6.4   | 6.5   |     | 6.3   | 6.2   |     | 6.3   | 6.2   |     |
| Lead/Lag                                                               | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                            | None  | None  |     | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)                                                    | 29.4  | 22.9  |     | 30.9  | 25.5  |     | 13.9  | 53.1  |     | 12.0  | 51.2  |     |
| Actuated g/C Ratio                                                     | 0.24  | 0.19  |     | 0.26  | 0.21  |     | 0.12  | 0.44  |     | 0.10  | 0.43  |     |
| v/c Ratio                                                              | 0.24  | 0.61  |     | 0.56  | 0.82  |     | 0.78  | 0.43  |     | 0.61  | 0.51  |     |
| Control Delay                                                          | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 25.1  |     | 63.2  | 20.7  |     |
| Queue Delay                                                            | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                            | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 25.1  |     | 63.2  | 20.7  |     |
| LOS                                                                    | C     | D     |     | D     | D     |     | E     | C     |     | E     | C     |     |
| Approach Delay                                                         | 42.2  |       |     | 49.8  |       |     | 35.3  |       |     | 29.9  |       |     |
| Approach LOS                                                           | D     |       |     | D     |       |     | D     |       |     | C     |       |     |
| Queue Length 50th (m)                                                  | 7.6   | 38.8  |     | 25.9  | 60.3  |     | 35.3  | 55.5  |     | 25.6  | 42.0  |     |
| Queue Length 95th (m)                                                  | 16.0  | 62.1  |     | 41.5  | 93.5  |     | 71.4  | 117.2 |     | 43.9  | 71.8  |     |
| Internal Link Dist (m)                                                 | 102.8 |       |     | 148.8 |       |     | 210.2 |       |     | 171.8 |       |     |
| Turn Bay Length (m)                                                    | 25.0  |       |     | 55.0  |       |     | 60.0  |       |     | 56.0  |       |     |
| Base Capacity (vph)                                                    | 189   | 409   |     | 252   | 417   |     | 200   | 1448  |     | 367   | 1402  |     |
| Sanitation Cap Reductn                                                 | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                  | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                    | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                      | 0.23  | 0.50  |     | 0.56  | 0.74  |     | 0.74  | 0.43  |     | 0.53  | 0.51  |     |
| Intersection Summary                                                   |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 120                                                      |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 120                                             |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT. Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 120                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                     |       |       |     |       |       |     |       |       |     |       |       |     |

## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-03-2019

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.82                                         |                        |
| Intersection Signal Delay: 36.7                                 | Intersection LOS: D    |
| Intersection Capacity Utilization 75.1%                         | ICU Level of Service D |
| Analysis Period (min) 15                                        |                        |
| Description: As per timing plans provided 26-Nov-2018           |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |
| Volume for 95th percentile queue is metered by upstream signal. |                        |



## Lanes, Volumes, Timings

### 3: Greenbank & Strandherd

09-03-2019

| Lane Group             | EBL   | EBT    | EBR   | WBL   | WBT    | WBR   | NBL   | NBT   | NBR | SBL   | SBT   | SEB   |
|------------------------|-------|--------|-------|-------|--------|-------|-------|-------|-----|-------|-------|-------|
| Lane Configurations    | ↔     | ↔      | ↔     | ↔     | ↔      | ↔     | ↔     | ↔     | ↔   | ↔     | ↔     | ↔     |
| Traffic Volume (vph)   | 190   | 979    | 228   | 202   | 841    | 184   | 243   | 375   | 107 | 251   | 467   | 174   |
| Future Volume (vph)    | 190   | 979    | 228   | 202   | 841    | 184   | 243   | 375   | 107 | 251   | 467   | 174   |
| Satd. Flow (prot)      | 1658  | 3316   | 1483  | 1658  | 3316   | 1483  | 3216  | 3196  | 0   | 3216  | 3316  | 1483  |
| Fit Permitted          | 0.128 |        |       | 0.116 |        |       | 0.950 |       |     |       |       |       |
| Satd. Flow (perm)      | 223   | 3316   | 1464  | 202   | 3316   | 1483  | 3213  | 3196  | 0   | 3209  | 3316  | 1464  |
| Satd. Flow (RTOR)      | 228   |        |       | 228   |        |       | 184   | 29    |     |       |       | 174   |
| Lane Group Flow (vph)  | 190   | 979    | 228   | 202   | 841    | 184   | 243   | 482   | 0   | 251   | 467   | 174   |
| Turn Type              | pm-pt | NA     | Perm  | pm-pt | NA     | Perm  | Prot  | NA    |     | Prot  | NA    | Perm  |
| Protected Phases       | 7     | 4      |       | 3     | 8      |       | 5     | 2     |     | 1     |       | 6     |
| Permitted Phases       | 4     |        | 4     | 8     |        | 8     |       |       |     |       |       | 6     |
| Detector Phase         | 7     | 4      | 4     | 3     | 8      | 8     | 5     | 2     |     | 1     | 6     | 6     |
| Switch Phase           |       |        |       |       |        |       |       |       |     |       |       |       |
| Minimum Initial (s)    | 5.0   | 10.0   | 10.0  | 5.0   | 10.0   | 10.0  | 5.0   | 10.0  |     | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)      | 18.0  | 41.0   | 41.0  | 18.0  | 41.0   | 41.0  | 24.0  | 37.0  |     | 24.0  | 37.0  | 37.0  |
| Total Split (s)        | 18.0  | 41.0   | 41.0  | 18.0  | 41.0   | 41.0  | 24.0  | 37.0  |     | 24.0  | 37.0  | 37.0  |
| Total Split (%)        | 15.0% | 34.2%  | 34.2% | 15.0% | 34.2%  | 34.2% | 20.0% | 30.8% |     | 20.0% | 30.8% | 30.8% |
| Yellow Time (s)        | 3.7   | 3.7    | 3.7   | 3.7   | 3.7    | 3.7   | 3.7   | 3.7   |     | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)       | 2.9   | 2.8    | 2.8   | 2.9   | 2.8    | 2.8   | 2.6   | 2.8   |     | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)   | 0.0   | 0.0    | 0.0   | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)    | 6.6   | 6.5    | 6.5   | 6.6   | 6.5    | 6.5   | 6.3   | 6.5   |     | 6.3   | 6.5   | 6.5   |
| Lead/Lag               | Lead  | Lag    | Lag   | Lead  | Lag    | Lag   | Lead  | Lag   |     | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?     | Yes   | Yes    | Yes   | Yes   | Yes    | Yes   | Yes   | Yes   |     | Yes   | Yes   | Yes   |
| Recall Mode            | None  | Max    | None  | Max   | Max    | Max   | None  | C-Max |     | None  | C-Max | C-Max |
| Act Effct Green (s)    | 45.8  | 34.5   | 34.5  | 45.8  | 34.5   | 34.5  | 14.2  | 33.8  |     | 14.4  | 34.0  | 34.0  |
| Actuated g/C Ratio     | 0.38  | 0.29   | 0.29  | 0.38  | 0.29   | 0.29  | 0.12  | 0.28  |     | 0.12  | 0.28  | 0.28  |
| v/c Ratio              | 0.86  | 1.03   | 0.39  | 0.94  | 0.88   | 0.33  | 0.64  | 0.52  |     | 0.65  | 0.50  | 0.32  |
| Control Delay          | 60.7  | 78.5   | 6.3   | 78.2  | 52.9   | 6.3   | 74.2  | 23.7  |     | 58.3  | 38.6  | 6.9   |
| Queue Delay            | 0.0   | 0.0    | 0.0   | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Delay            | 60.7  | 78.5   | 6.3   | 78.2  | 52.9   | 6.3   | 74.2  | 23.7  |     | 58.3  | 38.6  | 6.9   |
| LOS                    | E     | E      | A     | E     | D      | A     | E     | C     |     | E     | D     | A     |
| Approach Delay         |       | 64.3   |       |       | 50.1   |       |       | 40.6  |     |       | 38.0  |       |
| Approach LOS           |       | E      |       |       | D      |       |       | D     |     |       | D     |       |
| Queue Length 50th (m)  | 29.7  | ~136.3 | 0.0   | 34.9  | 104.7  | 0.0   | 33.2  | 23.5  |     | 31.0  | 50.9  | 0.0   |
| Queue Length 95th (m)  | #72.4 | #178.6 | 19.0  | #82.9 | #139.8 | 17.2  | #46.7 | 30.9  |     | 44.0  | 71.0  | 17.8  |
| Internal Link Dist (m) |       | 186.3  |       |       | 415.8  |       |       | 171.8 |     |       | 236.6 |       |
| Turn Bay Length (m)    | 70.0  |        | 100.0 | 130.0 |        | 60.0  |       |       |     | 85.0  |       | 160.0 |
| Base Capacity (vph)    | 221   | 953    | 583   | 215   | 953    | 557   | 474   | 920   |     | 474   | 939   | 539   |
| Sanction Cap Reductn   | 0     | 0      | 0     | 0     | 0      | 0     | 0     | 0     |     | 0     | 0     | 0     |
| Spillback Cap Reductn  | 0     | 0      | 0     | 0     | 0      | 0     | 0     | 0     |     | 0     | 0     | 0     |
| Storage Cap Reductn    | 0     | 0      | 0     | 0     | 0      | 0     | 0     | 0     |     | 0     | 0     | 0     |
| Reduced v/c Ratio      | 0.86  | 1.03   | 0.39  | 0.94  | 0.88   | 0.33  | 0.51  | 0.52  |     | 0.63  | 0.50  | 0.32  |

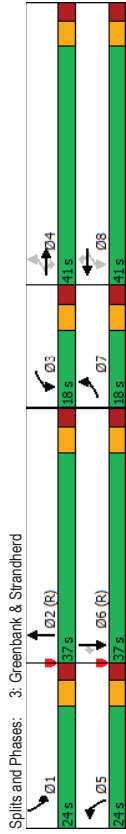
|                                                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Intersection Summary                                              |  |  |  |  |  |  | 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

### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-03-2019

|                                                                   |                        |
|-------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 1.03                                           | Intersection LOS: D    |
| Intersection Signal Delay: 50.6                                   | ICU Level of Service F |
| Intersection Capacity Utilization 93.7%                           |                        |
| Analysis Period (min) 15                                          |                        |
| Description: As per timing plans provided 26-Nov-2018             |                        |
| ~ Volume exceeds capacity, queue is theoretically infinite.       |                        |
| Queue shown is maximum after two cycles                           |                        |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |
| Queue shown is maximum after two cycles.                          |                        |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |



### Lanes, Volumes, Timings

#### 5: Greenbank & Chapman Mills

09-03-2019

| Lane Group                                                          | WBL   | WBR   | NBT   | NBR   | SBL   | SBT  |
|---------------------------------------------------------------------|-------|-------|-------|-------|-------|------|
| Lane Configurations                                                 | ↩     | ↩     | ↩↪    | ↩↪    | ↩     | ↩    |
| Traffic Volume (vph)                                                | 80    | 120   | 602   | 50    | 50    | 787  |
| Future Volume (vph)                                                 | 80    | 120   | 602   | 50    | 50    | 787  |
| Satd. Flow (prot)                                                   | 1658  | 1483  | 3268  | 0     | 1658  | 1745 |
| Flt Permitted                                                       | 0.950 |       |       |       | 0.950 |      |
| Satd. Flow (perm)                                                   | 1645  | 1456  | 3268  | 0     | 1652  | 1745 |
| Satd. Flow (RTOR)                                                   | 120   | 12    |       |       |       |      |
| Lane Group Flow (vph)                                               | 80    | 120   | 652   | 0     | 50    | 787  |
| Turn Type                                                           | Prot  | Perm  | NA    | Prot  | NA    | NA   |
| Protected Phases                                                    | 3     | 2     | 2     | 1     | 6     |      |
| Permitted Phases                                                    |       |       |       |       |       |      |
| Detector Phase                                                      | 3     | 3     | 2     | 1     | 6     |      |
| Switch Phase                                                        |       |       |       |       |       |      |
| Minimum Initial (s)                                                 | 10.0  | 10.0  | 10.0  | 5.0   | 10.0  |      |
| Minimum Split (s)                                                   | 33.8  | 33.8  | 33.8  | 10.8  | 33.8  |      |
| Total Split (s)                                                     | 33.8  | 33.8  | 43.2  | 13.0  | 56.2  |      |
| Total Split (%)                                                     | 37.6% | 37.6% | 48.0% | 14.4% | 62.4% |      |
| Yellow Time (s)                                                     | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |      |
| All-Red Time (s)                                                    | 2.5   | 2.5   | 2.5   | 2.5   | 2.5   |      |
| Lost Time Adjust (s)                                                | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |
| Total Lost Time (s)                                                 | 5.8   | 5.8   | 5.8   | 5.8   | 5.8   |      |
| Lead/Lag                                                            | Lead  | Lag   | Lead  | Lead  | Lead  |      |
| Lead-Lag Optimize?                                                  | Yes   | Yes   | Yes   | Yes   | Yes   |      |
| Recall Mode                                                         | None  | None  | C-Max | None  | C-Max |      |
| Act Effct Green (s)                                                 | 13.9  | 13.9  | 56.1  | 7.4   | 64.5  |      |
| Actuated g/C Ratio                                                  | 0.15  | 0.15  | 0.62  | 0.08  | 0.72  |      |
| v/c Ratio                                                           | 0.31  | 0.37  | 0.32  | 0.37  | 0.63  |      |
| Control Delay                                                       | 35.0  | 8.7   | 10.7  | 44.7  | 17.1  |      |
| Queue Delay                                                         | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |
| Total Delay                                                         | 35.0  | 8.7   | 10.7  | 44.7  | 17.1  |      |
| LOS                                                                 | C     | A     | B     | D     | B     |      |
| Approach Delay                                                      | 19.2  | 10.7  |       | 18.8  |       |      |
| Approach LOS                                                        | B     | B     |       | B     |       |      |
| Queue Length 50th (m)                                               | 13.8  | 0.0   | 27.4  | 9.4   | 46.7  |      |
| Queue Length 95th (m)                                               | 21.4  | 12.1  | 59.3  | 22.3  | 123.7 |      |
| Internal Link Dist (m)                                              | 403.7 | 204.2 |       | 161.2 |       |      |
| Turn Bay Length (m)                                                 | 38.0  |       |       | 38.0  |       |      |
| Base Capacity (vph)                                                 | 515   | 535   | 2043  | 143   | 1251  |      |
| Sanctuary Cap Reductn                                               | 0     | 0     | 0     | 0     | 0     |      |
| Spillback Cap Reductn                                               | 0     | 0     | 0     | 0     | 0     |      |
| Storage Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     |      |
| Reduced v/c Ratio                                                   | 0.16  | 0.22  | 0.32  | 0.35  | 0.63  |      |
| Intersection Summary                                                |       |       |       |       |       |      |
| Cycle Length: 90                                                    |       |       |       |       |       |      |
| Actuated Cycle Length: 90                                           |       |       |       |       |       |      |
| Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |      |
| Natural Cycle: 80                                                   |       |       |       |       |       |      |
| Control Type: Actuated-Coordinated                                  |       |       |       |       |       |      |

# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

09-03-2019

Maximum v/c Ratio: 0.63

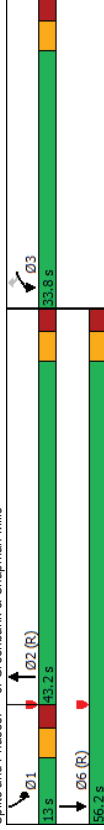
Intersection Signal Delay: 15.7

Intersection LOS: B

Intersection Capacity Utilization 64.0%

Analysis Period (min) 15

Splits and Phases: 5: Greenbank & Chapman Mills



# HCM 2010 TWSC

## 6: Greenbank & Street "B"

09-03-2019

| Intersection             | EBL    | EBR    | NBL    | NBT    | SBT  | SBR  |
|--------------------------|--------|--------|--------|--------|------|------|
| Int Delay, s/veh         | 0.4    |        |        |        |      |      |
| Movement                 | EBL    | EBR    | NBL    | NBT    | SBT  | SBR  |
| Lane Configurations      | W      | W      | W      | W      | W    | W    |
| Traffic Vol. veh/h       | 17     | 2      | 3      | 581    | 804  | 6    |
| Future Vol. veh/h        | 17     | 2      | 3      | 581    | 804  | 6    |
| Conflicting Peds. #/hr   | 0      | 0      | 0      | 0      | 0    | 0    |
| Sign Control             | Stop   | Stop   | Free   | Free   | Free | Free |
| RT Channelized           | -      | None   | -      | None   | -    | None |
| Storage Length           | 0      | -      | 380    | -      | -    | -    |
| Veh in Median Storage, # | 0      | -      | -      | 0      | 0    | -    |
| Grade, %                 | 0      | -      | -      | 0      | 0    | -    |
| Peak Hour Factor         | 100    | 100    | 100    | 100    | 100  | 100  |
| Heavy Vehicles, %        | 2      | 2      | 2      | 2      | 2    | 2    |
| Mvmt Flow                | 17     | 2      | 3      | 581    | 804  | 6    |
| Major/Minor              | Minor2 | Major1 | Major1 | Major2 |      |      |
| Conflicting Flow All     | 1394   | 807    | 810    | 0      | -    | 0    |
| Stage 1                  | 807    | -      | -      | -      | -    | -    |
| Stage 2                  | 587    | -      | -      | -      | -    | -    |
| Critical Hwy             | 6.42   | 6.22   | 4.12   | -      | -    | -    |
| Critical Hwy Stg 1       | 5.42   | -      | -      | -      | -    | -    |
| Critical Hwy Stg 2       | 5.42   | -      | -      | -      | -    | -    |
| Follow-up Hwy            | 3.518  | 3.318  | 2.218  | -      | -    | -    |
| Pot Cap-1 Maneuver       | 156    | 381    | 816    | -      | -    | -    |
| Stage 1                  | 439    | -      | -      | -      | -    | -    |
| Stage 2                  | 556    | -      | -      | -      | -    | -    |
| Platoon blocked, %       | -      | -      | -      | -      | -    | -    |
| Mov Cap-1 Maneuver       | 155    | 381    | 816    | -      | -    | -    |
| Mov Cap-2 Maneuver       | 155    | -      | -      | -      | -    | -    |
| Stage 1                  | 437    | -      | -      | -      | -    | -    |
| Stage 2                  | 556    | -      | -      | -      | -    | -    |
| Approach                 | EB     | NB     | SB     |        |      |      |
| HCM Control Delay, s     | 29.6   | 0      | 0      |        |      |      |
| HCM LOS                  | D      |        |        |        |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT    | EBLn1  | SBT    | SBR  |      |
| Capacity (veh/h)         | 816    | -      | 165    | -      | -    | -    |
| HCM Lane V/C Ratio       | 0.004  | -      | 0.115  | -      | -    | -    |
| HCM Control Delay (s)    | 9.4    | -      | 29.6   | -      | -    | -    |
| HCM Lane LOS             | A      | -      | D      | -      | -    | -    |
| HCM 95th %tile Q(veh)    | 0      | -      | 0.4    | -      | -    | -    |

# Appendix G

Background Development Volumes

Figure 9: Site Generated Traffic Volumes

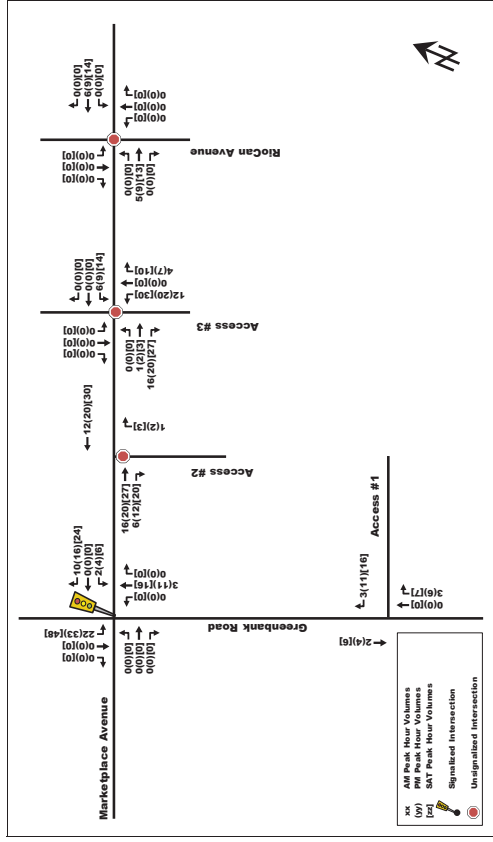
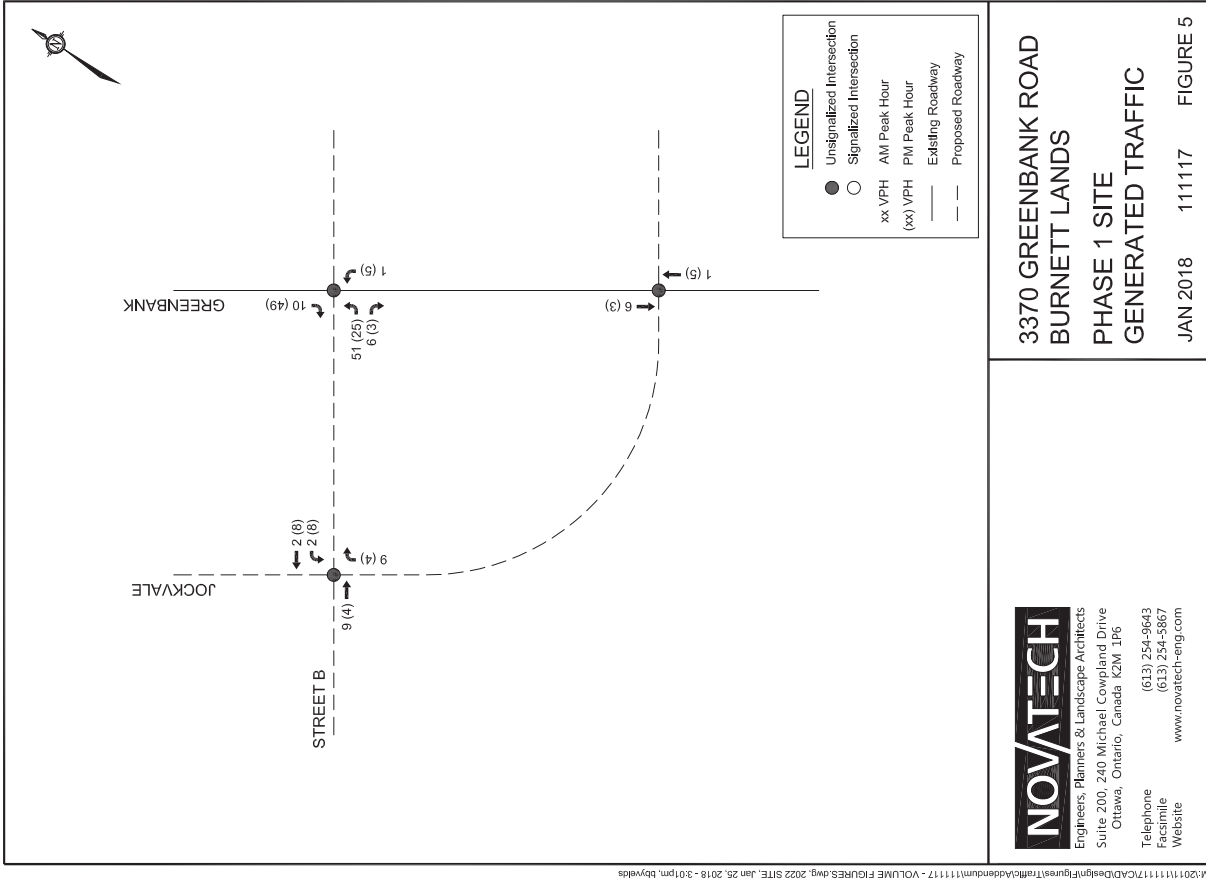
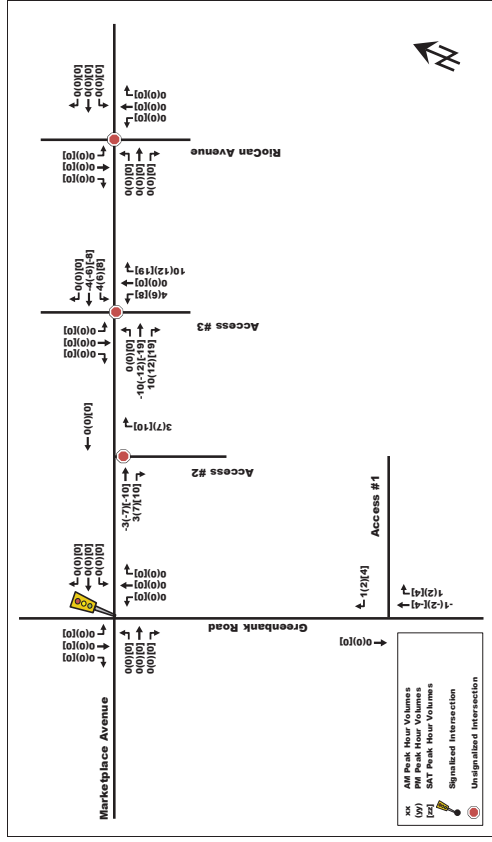


Figure 10: Pass-by Traffic Volumes



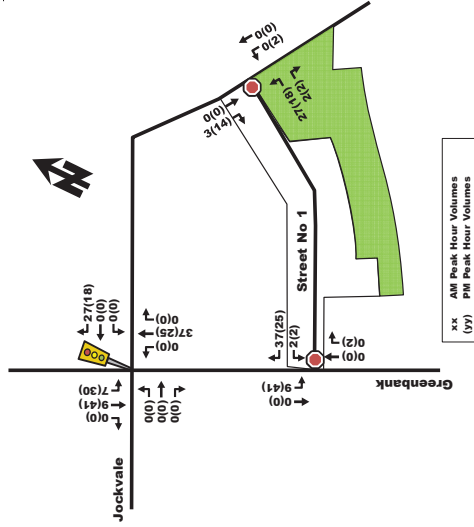
**NOVATECH**  
Engineers, Planners & Landscape Architects  
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Ottawa, Ontario, Canada K2M 1P6  
Telephone (613) 254-9643  
Facsimile (613) 254-5867  
Website www.novatech-eng.com

3370 GREENBANK ROAD  
BURNETT LANDS  
PHASE 1 SITE  
GENERATED TRAFFIC

JAN 2018 111117 FIGURE 5

SYNTHETIC - 216mm x 278mm

Figure 8: 'New' Site Generated Auto Volumes

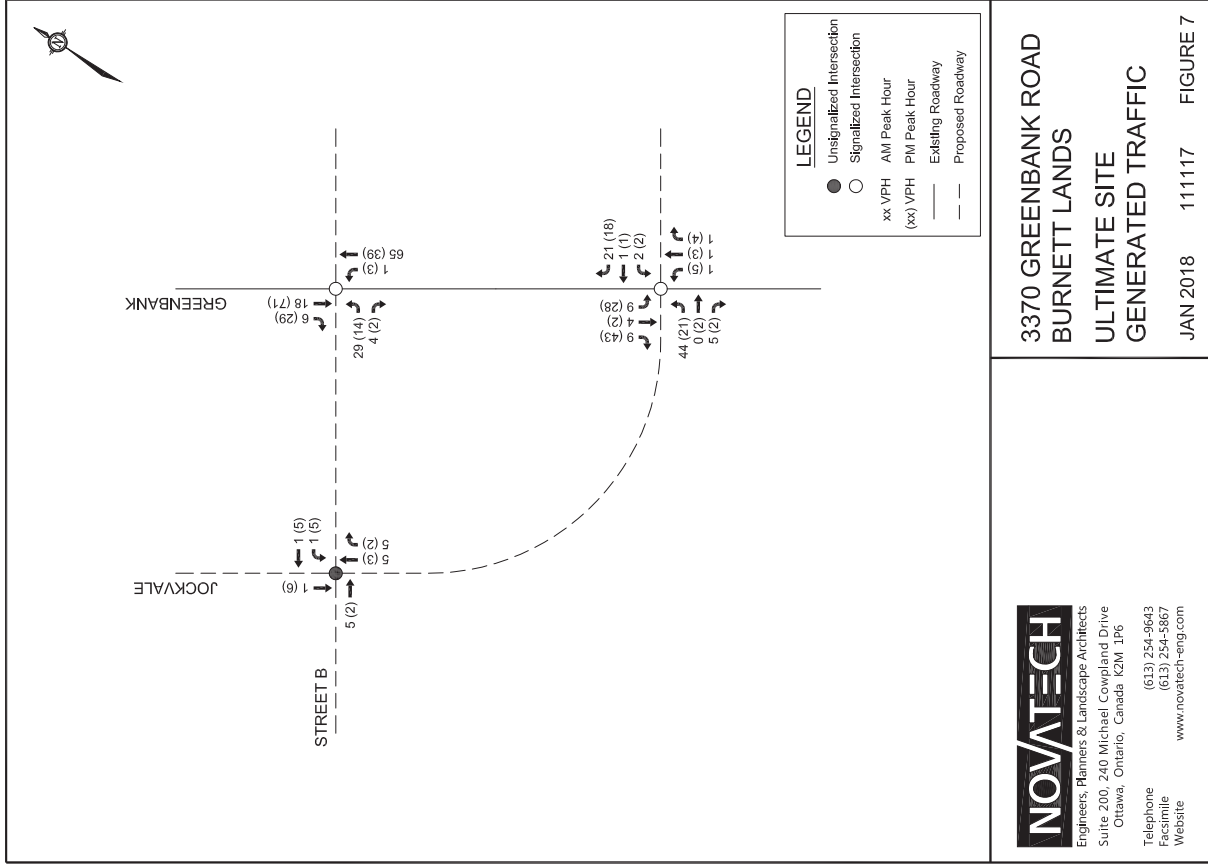


#### 4. FUTURE TRAFFIC OPERATIONS

##### 4.1. PROJECTED 2020 CONDITIONS AT FULL SITE DEVELOPMENT

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

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



3370 GREENBANK ROAD  
BURNETT LANDS  
ULTIMATE SITE  
GENERATED TRAFFIC

JAN 2018 11117 FIGURE 7

SYNCHRO.DWG - 218mm x 278mm

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Website www.novatech-eng.com

Figure 10: New Site Generation Auto Volumes

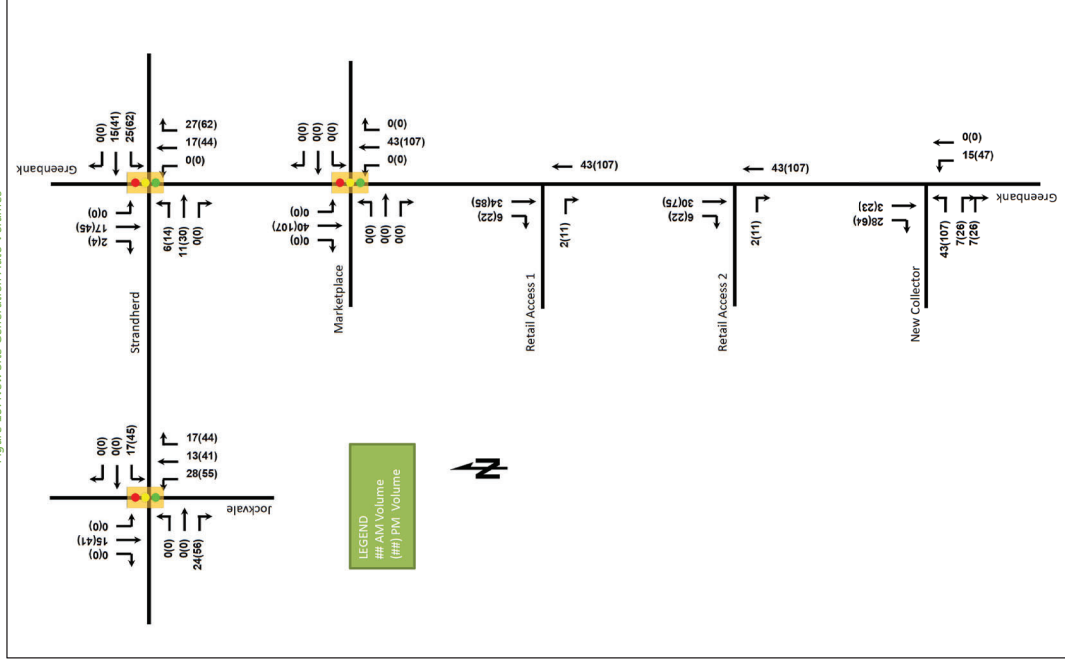
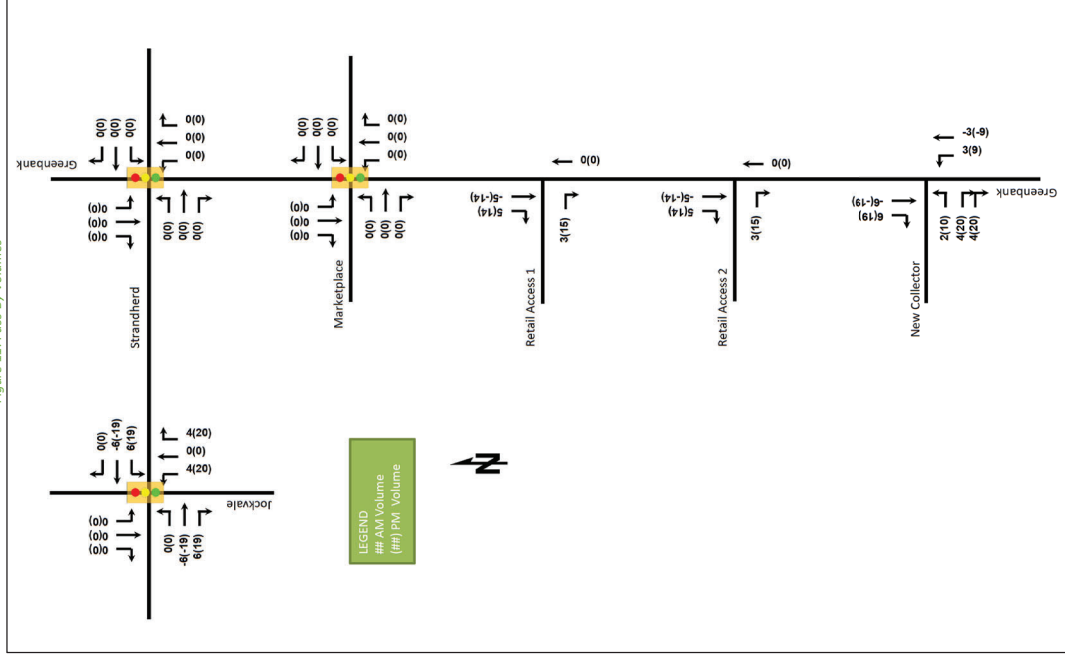
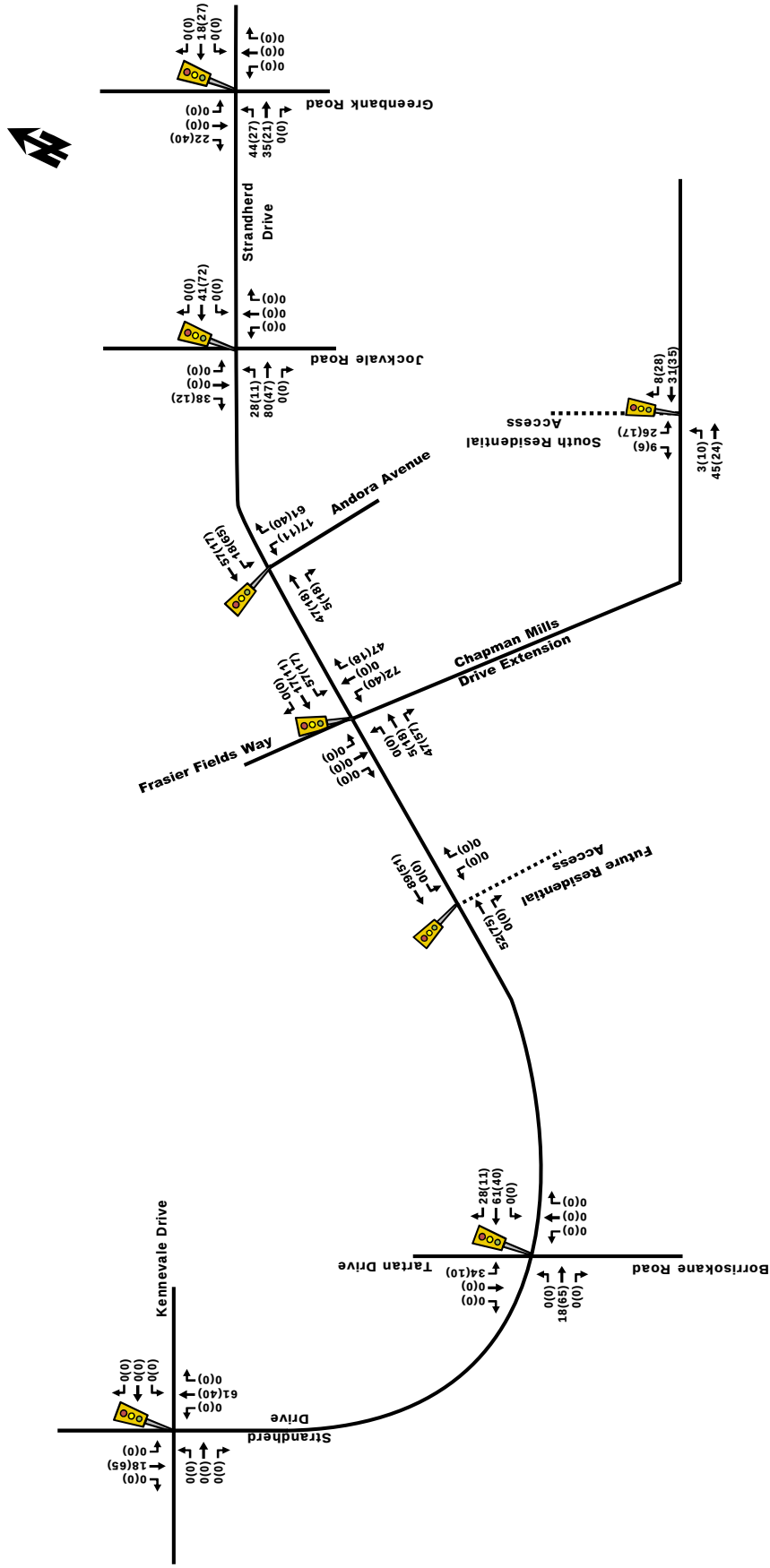


Figure 11: Pass-By Volumes





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

Figure 13: Site Generated Traffic Volumes

# Appendix H

MMLOS Analysis

# Multi-Modal Level of Service - Intersections Form

Consultant  
Scenario  
Comments

|                    |
|--------------------|
| CGH Transportation |
|                    |
|                    |

Project  
Date

|                    |
|--------------------|
| 3194 Jockvale Road |
| Sept. 2019         |
|                    |

| INTERSECTIONS |                                                          |                                     |                                   |                             |                             |                                   |                                   |                                            |                                   |                                   |                                   |                                   |                                   |
|---------------|----------------------------------------------------------|-------------------------------------|-----------------------------------|-----------------------------|-----------------------------|-----------------------------------|-----------------------------------|--------------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Crossing Side |                                                          | Greenbank Road & Marketplace Avenue |                                   |                             |                             | Greenbank Road & Strandherd Drive |                                   |                                            |                                   | Greenbank Road & Chapman Mills    |                                   |                                   |                                   |
|               |                                                          | NORTH                               | SOUTH                             | EAST                        | WEST                        | NORTH                             | SOUTH                             | EAST                                       | WEST                              | NORTH                             | SOUTH                             | EAST                              | WEST                              |
| Pedestrian    | Lanes                                                    | 6                                   | 5                                 | 4                           | 4                           | 7                                 | 6                                 | 6                                          | 4                                 | 5                                 | 5                                 | 3                                 | 4                                 |
|               | Median                                                   | Median > 2.4 m                      | Median > 2.4 m                    | No Median - 2.4 m           | No Median - 2.4 m           | Median > 2.4 m                    | Median > 2.4 m                    | Median > 2.4 m                             | Median > 2.4 m                    | No Median - 2.4 m                 | No Median - 2.4 m                 | No Median - 2.4 m                 | No Median - 2.4 m                 |
|               | Conflicting Left Turns                                   | Permissive                          | Permissive                        | Protected                   | Protected                   | Permissive                        | Permissive                        | Protected                                  | Protected                         | Protected                         | Protected                         | Protected                         | Protected                         |
|               | Conflicting Right Turns                                  | Permissive or yield control         | Permissive or yield control       | Permissive or yield control | Permissive or yield control | Permissive or yield control       | Permissive or yield control       | Permissive or yield control                | Permissive or yield control       | Permissive or yield control       | Permissive or yield control       | Permissive or yield control       | Permissive or yield control       |
|               | Right Turns on Red (RTOR) ?                              | RTOR allowed                        | RTOR allowed                      | RTOR allowed                | RTOR allowed                | RTOR allowed                      | RTOR allowed                      | RTOR allowed                               | RTOR allowed                      | RTOR allowed                      | RTOR allowed                      | RTOR prohibited                   | RTOR allowed                      |
|               | Ped Signal Leading Interval?                             | No                                  | No                                | No                          | No                          | No                                | No                                | No                                         | No                                | No                                | No                                | No                                | No                                |
|               | Right Turn Channel                                       | No Channel                          | No Channel                        | No Channel                  | No Channel                  | Smart Channel                     | No Channel                        | Smart Channel                              | Smart Channel                     | No Channel                        | No Channel                        | No Channel                        | No Channel                        |
|               | Corner Radius                                            | 10-15m                              | 10-15m                            | 10-15m                      | 10-15m                      | 10-15m                            | 15-25m                            | 15-25m                                     | >25m                              | 5-10m                             | 5-10m                             | 5-10m                             | 5-10m                             |
|               | Crosswalk Type                                           | Std transverse markings             | Std transverse markings           | Std transverse markings     | Std transverse markings     | Std transverse markings           | Std transverse markings           | Std transverse markings                    | Std transverse markings           | Std transverse markings           | Std transverse markings           | Std transverse markings           | Std transverse markings           |
|               | PETSI Score                                              | 25                                  | 40                                | 61                          | 61                          | 16                                | 23                                | 37                                         | 66                                | 46                                | 46                                | 82                                | 62                                |
|               | Ped. Exposure to Traffic LoS                             | F                                   | E                                 | C                           | C                           | F                                 | F                                 | E                                          | C                                 | D                                 | D                                 | B                                 | C                                 |
|               | Cycle Length                                             | 120                                 | 120                               | 120                         | 120                         | 120                               | 120                               | 120                                        | 120                               | 90                                | 90                                | 90                                | 90                                |
|               | Effective Walk Time                                      | 28                                  | 28                                | 25                          | 25                          | 27                                | 27                                | 29                                         | 29                                | 34                                | 29                                | 40                                | 42                                |
|               | Average Pedestrian Delay                                 | 35                                  | 35                                | 38                          | 38                          | 36                                | 36                                | 35                                         | 35                                | 17                                | 21                                | 14                                | 13                                |
|               | Pedestrian Delay LoS                                     | D                                   | D                                 | D                           | D                           | D                                 | D                                 | D                                          | D                                 | B                                 | C                                 | B                                 | B                                 |
|               | Level of Service                                         | F                                   | E                                 | D                           | D                           | F                                 | F                                 | E                                          | D                                 | D                                 | D                                 | B                                 | C                                 |
| Approach From |                                                          | F                                   |                                   |                             |                             | F                                 |                                   |                                            |                                   | D                                 |                                   |                                   |                                   |
|               |                                                          | NORTH                               | SOUTH                             | EAST                        | WEST                        | NORTH                             | SOUTH                             | EAST                                       | WEST                              | NORTH                             | SOUTH                             | EAST                              | WEST                              |
| Bicycle       | Bicycle Lane Arrangement on Approach                     | Curb Bike Lane, Cycletrack or MUP   | Curb Bike Lane, Cycletrack or MUP | Mixed Traffic               | Mixed Traffic               | Pocket Bike Lane                  | Curb Bike Lane, Cycletrack or MUP | Pocket Bike Lane                           | Pocket Bike Lane                  | Curb Bike Lane, Cycletrack or MUP | Curb Bike Lane, Cycletrack or MUP | Curb Bike Lane, Cycletrack or MUP | Curb Bike Lane, Cycletrack or MUP |
|               | Right Turn Lane Configuration                            | Not Applicable                      | Not Applicable                    | ≤ 50 m                      | ≤ 50 m                      | > 50 m Introduced right turn lane | Not Applicable                    | Bike lane shifts to the left of right turn | ≤ 50 m Introduced right turn lane | Not Applicable                    | Not Applicable                    | Not Applicable                    | Not Applicable                    |
|               | Right Turning Speed                                      | Not Applicable                      | Not Applicable                    | ≤ 25 km/h                   | ≤ 25 km/h                   | ≤ 25 km/h                         | Not Applicable                    | >25 to 30 km/h                             | >25 to 30 km/h                    | Not Applicable                    | Not Applicable                    | Not Applicable                    | Not Applicable                    |
|               | Cyclist relative to RT motorists                         | Not Applicable                      | Not Applicable                    | D                           | D                           | D                                 | Not Applicable                    | F                                          | C                                 | Not Applicable                    | Not Applicable                    | Not Applicable                    | Not Applicable                    |
|               | Separated or Mixed Traffic                               | Separated                           | Separated                         | Mixed Traffic               | Mixed Traffic               | Separated                         | Separated                         | Separated                                  | Separated                         | Separated                         | Separated                         | Separated                         | Separated                         |
|               | Left Turn Approach                                       | ≥ 2 lanes crossed                   | ≥ 2 lanes crossed                 | No lane crossed             | No lane crossed             | ≥ 2 lanes crossed                 | ≥ 2 lanes crossed                 | ≥ 2 lanes crossed                          | ≥ 2 lanes crossed                 | 1 lane crossed                    | 1 lane crossed                    | 1 lane crossed                    | 1 lane crossed                    |
|               | Operating Speed                                          | ≥ 60 km/h                           | ≥ 60 km/h                         | > 40 to ≤ 50 km/h           | ≤ 40 km/h                   | ≥ 60 km/h                         | ≥ 60 km/h                         | ≥ 60 km/h                                  | ≥ 60 km/h                         | ≥ 60 km/h                         | > 40 to ≤ 50 km/h                 | > 40 to ≤ 50 km/h                 | > 40 to ≤ 50 km/h                 |
|               | Left Turning Cyclist                                     | F                                   | F                                 | B                           | B                           | F                                 | F                                 | F                                          | F                                 | E                                 | C                                 | C                                 | C                                 |
|               | Level of Service                                         | F                                   | F                                 | D                           | D                           | F                                 | F                                 | F                                          | F                                 | E                                 | C                                 | C                                 | C                                 |
|               |                                                          | F                                   |                                   |                             |                             | F                                 |                                   |                                            |                                   | E                                 |                                   |                                   |                                   |
| Transit       | Average Signal Delay                                     | ≤ 30 sec                            | ≤ 30 sec                          | > 40 sec                    | > 40 sec                    | > 40 sec                          | > 40 sec                          | ≤ 40 sec                                   | ≤ 40 sec                          | > 40 sec                          | > 40 sec                          | ≤ 30 sec                          | > 40 sec                          |
|               | Level of Service                                         | D                                   | D                                 | F                           | F                           | F                                 | F                                 | E                                          | E                                 | F                                 | F                                 | D                                 | F                                 |
|               |                                                          | F                                   |                                   |                             |                             | F                                 |                                   |                                            |                                   | F                                 |                                   |                                   |                                   |
| Truck         | Effective Corner Radius                                  | 10 - 15 m                           | 10 - 15 m                         | 10 - 15 m                   | 10 - 15 m                   | > 15 m                            | 10 - 15 m                         | > 15 m                                     | > 15 m                            | < 10 m                            | < 10 m                            | < 10 m                            | < 10 m                            |
|               | Number of Receiving Lanes on Departure from Intersection | ≥ 2                                 | ≥ 2                               | ≥ 2                         | ≥ 2                         | ≥ 2                               | ≥ 2                               | ≥ 2                                        | ≥ 2                               | 1                                 | 1                                 | ≥ 2                               | ≥ 2                               |
|               | Level of Service                                         | B                                   | B                                 | B                           | B                           | A                                 | B                                 | A                                          | A                                 | F                                 | F                                 | D                                 | D                                 |
| Auto          | Volume to Capacity Ratio                                 | 0.61 - 0.70                         |                                   |                             |                             | 0.71 - 0.80                       |                                   |                                            |                                   | 0.71 - 0.80                       |                                   |                                   |                                   |
|               | Level of Service                                         | B                                   |                                   |                             |                             | C                                 |                                   |                                            |                                   | C                                 |                                   |                                   |                                   |

Unlocked Rows for Replicating

| Greenbank Road & New Collector    |                                   |                   |                             | Chapman Mills Drive & Jockvale Road |                                   |                                   |                                   | Greenbank Road & Street B |                             |                   |                             |
|-----------------------------------|-----------------------------------|-------------------|-----------------------------|-------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|---------------------------|-----------------------------|-------------------|-----------------------------|
| NORTH                             | SOUTH                             | EAST              | WEST                        | NORTH                               | SOUTH                             | EAST                              | WEST                              | NORTH                     | SOUTH                       | EAST              | WEST                        |
| 6                                 | 5                                 |                   | 5                           |                                     | 0 - 2                             | 5                                 | 5                                 | 0 - 2                     | 3                           |                   | 0 - 2                       |
| Median > 2.4 m                    | Median > 2.4 m                    |                   | No Median - 2.4 m           |                                     | No Median - 2.4 m                 | Median > 2.4 m                    | Median > 2.4 m                    | No Median - 2.4 m         | No Median - 2.4 m           |                   | No Median - 2.4 m           |
| Permissive                        | Permissive                        |                   | Protected                   |                                     | Permissive                        | Protected                         | Protected                         | Permissive                | Permissive                  |                   | Permissive                  |
| Permissive or yield control       | Permissive or yield control       |                   | Permissive or yield control |                                     | Permissive or yield control       | Permissive or yield control       | Permissive or yield control       | No right turn             | Permissive or yield control |                   | Permissive or yield control |
| RTOR allowed                      | RTOR allowed                      |                   | RTOR allowed                |                                     | RTOR allowed                      | RTOR allowed                      | RTOR allowed                      | RTOR prohibited           | RTOR allowed                |                   | RTOR allowed                |
| No                                | No                                |                   | No                          |                                     | No                                | No                                | No                                | No                        | No                          |                   | No                          |
| No Channel                        | No Channel                        |                   | No Channel                  |                                     | No Channel                        | No Channel                        | No Channel                        | No Channel                | No Channel                  |                   | No Channel                  |
| 10-15m                            | 10-15m                            |                   | 10-15m                      |                                     | 10-15m                            | 10-15m                            | 10-15m                            | 10-15m                    | 10-15m                      |                   | 10-15m                      |
| Std transverse markings           | Std transverse markings           |                   | Std transverse markings     |                                     | Std transverse markings           | Std transverse markings           | Std transverse markings           | Std transverse markings   | Std transverse markings     |                   | Std transverse markings     |
| 25                                | 40                                |                   | 45                          |                                     | 85                                | 48                                | 48                                | 93                        | 70                          |                   | 85                          |
| F                                 | E                                 | -                 | D                           | -                                   | B                                 | D                                 | D                                 | A                         | C                           | -                 | B                           |
| 90                                | 90                                |                   | 90                          |                                     | 90                                | 90                                | 90                                | 90                        | 90                          |                   | 90                          |
| 34                                | 34                                |                   | 40                          |                                     | 40                                | 35                                | 35                                | 20                        | 20                          |                   | 56                          |
| 17                                | 17                                |                   | 14                          |                                     | 14                                | 17                                | 17                                | 27                        | 27                          |                   | 6                           |
| B                                 | B                                 | -                 | B                           | -                                   | B                                 | B                                 | B                                 | C                         | C                           | -                 | A                           |
| F                                 | E                                 | -                 | D                           | -                                   | B                                 | D                                 | D                                 | C                         | C                           | -                 | B                           |
| F                                 |                                   |                   |                             | D                                   |                                   |                                   |                                   | C                         |                             |                   |                             |
| NORTH                             | SOUTH                             | EAST              | WEST                        | NORTH                               | SOUTH                             | EAST                              | WEST                              | NORTH                     | SOUTH                       | EAST              | WEST                        |
| Curb Bike Lane, Cycletrack or MUP | Curb Bike Lane, Cycletrack or MUP | Mixed Traffic     |                             |                                     | Curb Bike Lane, Cycletrack or MUP | Curb Bike Lane, Cycletrack or MUP | Curb Bike Lane, Cycletrack or MUP | Mixed Traffic             |                             | Mixed Traffic     |                             |
| Not Applicable                    | Not Applicable                    | ≤ 50 m            |                             |                                     | Not Applicable                    | Not Applicable                    | Not Applicable                    | ≤ 50 m                    |                             | ≤ 50 m            |                             |
| Not Applicable                    | Not Applicable                    | ≤ 25 km/h         |                             |                                     | Not Applicable                    | Not Applicable                    | Not Applicable                    | ≤ 25 km/h                 |                             | ≤ 25 km/h         |                             |
| Not Applicable                    | Not Applicable                    | D                 | -                           | -                                   | Not Applicable                    | Not Applicable                    | Not Applicable                    | D                         | -                           | D                 | -                           |
| Separated                         | Separated                         | Mixed Traffic     | -                           | -                                   | Separated                         | Separated                         | Separated                         | Mixed Traffic             | -                           | Mixed Traffic     | -                           |
| ≥ 2 lanes crossed                 |                                   | No lane crossed   |                             |                                     | No lane crossed                   | 2-stage, LT box                   | 2-stage, LT box                   | No lane crossed           |                             | No lane crossed   |                             |
| ≥ 60 km/h                         |                                   | > 40 to ≤ 50 km/h |                             |                                     | > 40 to ≤ 50 km/h                 | > 50 to < 60 km/h                 | > 50 to < 60 km/h                 | > 50 to < 60 km/h         |                             | > 40 to ≤ 50 km/h |                             |
| F                                 | -                                 | B                 | -                           | -                                   | B                                 | A                                 | A                                 | C                         | -                           | B                 | -                           |
| F                                 | -                                 | D                 | -                           | -                                   | B                                 | A                                 | A                                 | D                         | -                           | D                 | -                           |
| F                                 |                                   |                   |                             | B                                   |                                   |                                   |                                   | D                         |                             |                   |                             |
| ≤ 10 sec                          | ≤ 20 sec                          | ≤ 40 sec          |                             |                                     |                                   |                                   |                                   | ≤ 10 sec                  | ≤ 10 sec                    | > 40 sec          |                             |
| B                                 | C                                 | E                 | -                           | -                                   | -                                 | -                                 | -                                 | B                         | B                           | F                 | -                           |
| E                                 |                                   |                   |                             | -                                   |                                   |                                   |                                   | F                         |                             |                   |                             |
| < 10 m                            |                                   | < 10 m            |                             |                                     | 10 - 15 m                         | 10 - 15 m                         | 10 - 15 m                         | 10 - 15 m                 | 10 - 15 m                   | 10 - 15 m         |                             |
| 1                                 |                                   | ≥ 2               |                             |                                     | 1                                 | 1                                 | 1                                 | 1                         | 1                           | 1                 |                             |
| F                                 | -                                 | D                 | -                           | -                                   | E                                 | E                                 | E                                 | E                         | E                           | E                 | -                           |
| F                                 |                                   |                   |                             | E                                   |                                   |                                   |                                   | E                         |                             |                   |                             |
| 0.0 - 0.60                        |                                   |                   |                             | 0.0 - 0.60                          |                                   |                                   |                                   | 0.0 - 0.60                |                             |                   |                             |
| A                                 |                                   |                   |                             | A                                   |                                   |                                   |                                   | A                         |                             |                   |                             |

## Multi-Modal Level of Service - Segments Form

|            |                    |         |                     |
|------------|--------------------|---------|---------------------|
| Consultant | CGH Transportation | Project | 3288 Greenbank Road |
| Scenario   |                    | Date    | Sept. 2019          |
| Comments   |                    |         |                     |
|            |                    |         |                     |

| SEGMENTS   |                                           | Segment          | GB Existing     | GB Future             | CM Future            | St B Future         | JV Future            |
|------------|-------------------------------------------|------------------|-----------------|-----------------------|----------------------|---------------------|----------------------|
|            |                                           |                  | 1               | 2                     | 3                    | 4                   | 5                    |
| Pedestrian | Sidewalk Width                            | E                | 1.8 m           | ≥ 2 m                 | ≥ 2 m                | ≥ 2 m               | ≥ 2 m                |
|            | Boulevard Width                           |                  | 0.5 - 2 m       | 0.5 - 2 m             | > 2 m                | 0.5 - 2 m           | > 2 m                |
|            | Avg Daily Curb Lane Traffic Volume        |                  | > 3000          | > 3000                | > 3000               | ≤ 3000              | ≤ 3000               |
|            | Operating Speed                           |                  | > 60 km/h       | > 60 km/h             | > 30 to 50 km/h      | > 30 to 50 km/h     | > 30 to 50 km/h      |
|            | On-Street Parking                         |                  | no              | no                    | yes                  | yes                 | yes                  |
|            | Exposure to Traffic PLoS                  |                  | E               | E                     | B                    | A                   | A                    |
|            | Effective Sidewalk Width                  |                  | 1.5 m           | 2.0 m                 | 2.5 m                | 2.0 m               | 2.0 m                |
|            | Pedestrian Volume                         |                  | 250 ped/hr      | 250 ped/hr            | 250 ped/hr           | 250 ped/hr          | 250 ped/hr           |
|            |                                           | Crowding PLoS    | B               | B                     | B                    | B                   | B                    |
|            |                                           | Level of Service | E               | E                     | B                    | B                   | B                    |
| Bicycle    | Type of Cycling Facility                  | F                | Mixed Traffic   | Curbside Bike Lane    | Physically Separated | Mixed Traffic       | Physically Separated |
|            | Number of Travel Lanes                    |                  | 2-3 lanes total | 2 ea. dir. (w median) |                      | ≤ 2 (no centreline) |                      |
|            | Operating Speed                           |                  | ≥ 60 km/h       | >50 to 70 km/h        |                      | >40 to <50 km/h     |                      |
|            | # of Lanes & Operating Speed LoS          |                  | F               | C                     | -                    | B                   | -                    |
|            | Bike Lane (+ Parking Lane) Width          |                  |                 | ≥ 1.8 m               |                      |                     |                      |
|            | Bike Lane Width LoS                       |                  | -               | A                     | -                    | -                   | -                    |
|            | Bike Lane Blockages                       |                  |                 | Rare                  |                      |                     |                      |
|            | Blockage LoS                              |                  | -               | A                     | -                    | -                   | -                    |
|            | Median Refuge Width (no median = < 1.8 m) |                  | < 1.8 m refuge  | ≥ 1.8 m refuge        |                      | < 1.8 m refuge      |                      |
|            | No. of Lanes at Unsignalized Crossing     |                  | ≤ 3 lanes       | ≤ 3 lanes             |                      | ≤ 3 lanes           |                      |
|            | Sidestreet Operating Speed                |                  | >40 to 50 km/h  | >40 to 50 km/h        |                      | >40 to 50 km/h      |                      |
|            | Unsignalized Crossing - Lowest LoS        |                  | B               | B                     | A                    | A                   | A                    |
|            |                                           | Level of Service | F               | C                     | A                    | B                   | A                    |
| Transit    | Facility Type                             | D                | Mixed Traffic   | Segregated ROW        | Segregated ROW       | Mixed Traffic       | Mixed Traffic        |
|            | Friction or Ratio Transit:Posted Speed    |                  | Vt/Vp ≥ 0.8     |                       |                      | Vt/Vp ≥ 0.8         | Vt/Vp ≥ 0.8          |
|            | Level of Service                          |                  | D               | A                     | A                    | D                   | D                    |
| Truck      | Truck Lane Width                          | C                | ≤ 3.5 m         | ≤ 3.5 m               | ≤ 3.5 m              | ≤ 3.5 m             | ≤ 3.5 m              |
|            | Travel Lanes per Direction                |                  | > 1             | > 1                   | 1                    | 1                   | 1                    |
|            | Level of Service                          |                  | A               | A                     | C                    | C                   | C                    |
| Auto       | Level of Service                          | Not Applicable   |                 |                       |                      |                     |                      |

# Appendix I

Synchro Intersection Worksheets – 2025 Future Total Conditions

| Lane Group                                                            | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations                                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)                                                  | 43                                                                                  | 0                                                                                   | 7                                                                                   | 1                                                                                   | 0                                                                                   | 5                                                                                   | 20                                                                                  | 752                                                                                 | 1                                                                                   | 5                                                                                   | 422                                                                                 | 38                                                                                  |
| Future Volume (vph)                                                   | 43                                                                                  | 0                                                                                   | 7                                                                                   | 1                                                                                   | 0                                                                                   | 5                                                                                   | 20                                                                                  | 752                                                                                 | 1                                                                                   | 5                                                                                   | 422                                                                                 | 38                                                                                  |
| Satd. Flow (prot)                                                     | 1658                                                                                | 1457                                                                                | 0                                                                                   | 0                                                                                   | 1509                                                                                | 0                                                                                   | 1688                                                                                | 3316                                                                                | 0                                                                                   | 1688                                                                                | 3268                                                                                | 0                                                                                   |
| Fit Permitted                                                         | 0.754                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.959                                                                               |                                                                                     | 0.487                                                                               |                                                                                     |                                                                                     | 0.363                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)                                                     | 1306                                                                                | 1457                                                                                | 0                                                                                   | 0                                                                                   | 1458                                                                                | 0                                                                                   | 846                                                                                 | 3316                                                                                | 0                                                                                   | 632                                                                                 | 3268                                                                                | 0                                                                                   |
| Lane Flow (RTOR)                                                      | 396                                                                                 |                                                                                     |                                                                                     |                                                                                     | 29                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 17                                                                                  |                                                                                     |                                                                                     |
| Lane Group Flow (vph)                                                 | 43                                                                                  | 7                                                                                   | 0                                                                                   | 0                                                                                   | 6                                                                                   | 0                                                                                   | 20                                                                                  | 753                                                                                 | 0                                                                                   | 5                                                                                   | 460                                                                                 | 0                                                                                   |
| Turn Type                                                             | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                                                      |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Permitted Phases                                                      | 4                                                                                   |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Detector Phase                                                        | 4                                                                                   | 4                                                                                   |                                                                                     | 8                                                                                   | 8                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     |
| Switch Phase                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)                                                   | 10.0                                                                                | 10.0                                                                                |                                                                                     | 10.0                                                                                | 10.0                                                                                |                                                                                     | 10.0                                                                                | 10.0                                                                                |                                                                                     | 10.0                                                                                | 10.0                                                                                |                                                                                     |
| Minimum Split (s)                                                     | 33.8                                                                                | 33.8                                                                                |                                                                                     | 24.0                                                                                | 24.0                                                                                |                                                                                     | 31.2                                                                                | 31.2                                                                                |                                                                                     | 31.2                                                                                | 31.2                                                                                |                                                                                     |
| Total Split (s)                                                       | 35.0                                                                                | 35.0                                                                                |                                                                                     | 24.0                                                                                | 24.0                                                                                |                                                                                     | 55.0                                                                                | 55.0                                                                                |                                                                                     | 55.0                                                                                | 55.0                                                                                |                                                                                     |
| Total Split (%)                                                       | 38.9%                                                                               | 38.9%                                                                               |                                                                                     | 26.7%                                                                               | 26.7%                                                                               |                                                                                     | 61.1%                                                                               | 61.1%                                                                               |                                                                                     | 61.1%                                                                               | 61.1%                                                                               |                                                                                     |
| Yellow Time (s)                                                       | 3.3                                                                                 | 3.3                                                                                 |                                                                                     | 3.3                                                                                 | 3.3                                                                                 |                                                                                     | 3.7                                                                                 | 3.7                                                                                 |                                                                                     | 3.7                                                                                 | 3.7                                                                                 |                                                                                     |
| All-Red Time (s)                                                      | 2.5                                                                                 | 2.5                                                                                 |                                                                                     | 2.5                                                                                 | 2.5                                                                                 |                                                                                     | 1.7                                                                                 | 1.7                                                                                 |                                                                                     | 1.7                                                                                 | 1.7                                                                                 |                                                                                     |
| Lost Time Adjust(s)                                                   | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)                                                   | 5.8                                                                                 | 5.8                                                                                 |                                                                                     |                                                                                     | 5.8                                                                                 |                                                                                     | 5.4                                                                                 | 5.4                                                                                 |                                                                                     | 5.4                                                                                 | 5.4                                                                                 |                                                                                     |
| Lead-Lag                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode                                                           | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | C-Max                                                                               | C-Max                                                                               |                                                                                     | C-Max                                                                               | C-Max                                                                               |                                                                                     |
| Act Effct Green (s)                                                   | 13.6                                                                                | 13.6                                                                                |                                                                                     | 13.6                                                                                | 13.6                                                                                |                                                                                     | 73.7                                                                                | 73.7                                                                                |                                                                                     | 73.7                                                                                | 73.7                                                                                |                                                                                     |
| Actuated g/C Ratio                                                    | 0.15                                                                                | 0.15                                                                                |                                                                                     | 0.15                                                                                | 0.15                                                                                |                                                                                     | 0.82                                                                                | 0.82                                                                                |                                                                                     | 0.82                                                                                | 0.82                                                                                |                                                                                     |
| v/c Ratio                                                             | 0.22                                                                                | 0.01                                                                                |                                                                                     | 0.02                                                                                | 0.02                                                                                |                                                                                     | 0.03                                                                                | 0.28                                                                                |                                                                                     | 0.01                                                                                | 0.17                                                                                |                                                                                     |
| Control Delay                                                         | 33.6                                                                                | 0.0                                                                                 |                                                                                     | 0.2                                                                                 | 4.3                                                                                 |                                                                                     | 6.2                                                                                 | 3.1                                                                                 |                                                                                     | 6.2                                                                                 | 4.2                                                                                 |                                                                                     |
| Queue Delay                                                           | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay                                                           | 33.6                                                                                | 0.0                                                                                 |                                                                                     | 0.2                                                                                 | 4.3                                                                                 |                                                                                     | 6.2                                                                                 | 3.1                                                                                 |                                                                                     | 6.2                                                                                 | 4.2                                                                                 |                                                                                     |
| LOS                                                                   | C                                                                                   | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay                                                        |                                                                                     | 28.9                                                                                |                                                                                     | 0.2                                                                                 | 0.2                                                                                 |                                                                                     |                                                                                     | 3.2                                                                                 |                                                                                     |                                                                                     | 4.2                                                                                 |                                                                                     |
| Approach LOS                                                          |                                                                                     | C                                                                                   |                                                                                     | A                                                                                   | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Queue Length 50th (m)                                                 | 7.3                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.5                                                                                 | 11.2                                                                                |                                                                                     | 0.2                                                                                 | 9.1                                                                                 |                                                                                     |
| Queue Length 95th (m)                                                 | 13.5                                                                                | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 2.5                                                                                 | 20.7                                                                                |                                                                                     | 1.9                                                                                 | 28.4                                                                                |                                                                                     |
| Internal Link Dist (m)                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (m)                                                   | 38.0                                                                                |                                                                                     |                                                                                     |                                                                                     | 60.8                                                                                |                                                                                     |                                                                                     | 161.2                                                                               |                                                                                     |                                                                                     | 210.2                                                                               |                                                                                     |
| Base Capacity (vph)                                                   | 423                                                                                 | 740                                                                                 |                                                                                     | 492                                                                                 | 492                                                                                 |                                                                                     | 692                                                                                 | 2714                                                                                |                                                                                     | 517                                                                                 | 2678                                                                                |                                                                                     |
| 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                                                     | 0.10                                                                                | 0.01                                                                                |                                                                                     | 0.01                                                                                | 0.01                                                                                |                                                                                     | 0.03                                                                                | 0.28                                                                                |                                                                                     | 0.01                                                                                | 0.17                                                                                |                                                                                     |
| Intersection Summary                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Cycle Length: 90                                                      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length: 90                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Offset: 0 (0%), Referenced to phase 2:NBLT and 6:SBTL, Start of Green |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Natural Cycle: 65                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Type: Actuated-Coordinated                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

| <p>Maximum v/c Ratio: 0.28</p> <p>Intersection Signal Delay: 4.5</p> <p>Intersection Capacity Utilization 42.7%</p> <p>Analysis Period (min) 15</p> |  | Intersection LOS: A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------|
| <p>Splits and Phases: 1: Greenbank &amp; New Collector</p>                                                                                          |  |                     |

## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-17-2019

| Lane Group                                                            | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|-----------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   |
| Traffic Volume (vph)                                                  | 12    | 17    | 16  | 36    | 23    | 106 | 98    | 616   | 74  | 65    | 418   | 6   |
| Future Volume (vph)                                                   | 12    | 17    | 16  | 36    | 23    | 106 | 98    | 616   | 74  | 65    | 418   | 6   |
| Satd. Flow (prot)                                                     | 1658  | 1607  | 0   | 1658  | 1514  | 0   | 1658  | 3257  | 0   | 3216  | 3308  | 0   |
| Flt Permitted                                                         | 0.659 |       |     | 0.680 |       |     | 0.950 |       |     | 0.950 |       |     |
| Satd. Flow (perm)                                                     | 1149  | 1607  | 0   | 1185  | 1514  | 0   | 1656  | 3257  | 0   | 3210  | 3308  | 0   |
| Satd. Flow (RTOR)                                                     | 16    |       |     | 106   |       |     | 14    |       |     |       |       | 1   |
| Lane Group Flow (vph)                                                 | 12    | 33    | 0   | 36    | 129   | 0   | 98    | 690   | 0   | 65    | 424   | 0   |
| Turn Type                                                             | pm-pt | NA    |     | pm-pt | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases                                                      | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases                                                      | 4     |       |     | 8     |       |     |       |       |     |       |       |     |
| Detector Phase                                                        | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase                                                          |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                   | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)                                                     | 12.0  | 35.0  |     | 12.0  | 35.0  |     | 15.0  | 58.0  |     | 15.0  | 58.0  |     |
| Total Split (s)                                                       | 12.0  | 35.0  |     | 12.0  | 35.0  |     | 15.0  | 58.0  |     | 15.0  | 58.0  |     |
| Total Split (%)                                                       | 10.0% | 29.2% |     | 10.0% | 29.2% |     | 12.5% | 48.3% |     | 12.5% | 48.3% |     |
| Yellow Time (s)                                                       | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                      | 3.1   | 3.2   |     | 3.1   | 3.2   |     | 2.6   | 2.5   |     | 2.6   | 2.5   |     |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                   | 6.4   | 6.5   |     | 6.4   | 6.5   |     | 6.3   | 6.2   |     | 6.3   | 6.2   |     |
| Lead/Lag                                                              | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                    | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                           | None  | None  |     | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)                                                   | 17.1  | 13.6  |     | 18.4  | 16.0  |     | 11.7  | 74.9  |     | 7.7   | 68.5  |     |
| Act Effct Green Ratio                                                 | 0.14  | 0.11  |     | 0.15  | 0.13  |     | 0.10  | 0.62  |     | 0.06  | 0.57  |     |
| v/c Ratio                                                             | 0.06  | 0.17  |     | 0.18  | 0.44  |     | 0.61  | 0.34  |     | 0.32  | 0.22  |     |
| Control Delay                                                         | 34.8  | 29.2  |     | 38.6  | 16.8  |     | 68.2  | 13.9  |     | 60.8  | 14.7  |     |
| Queue Delay                                                           | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                           | 34.8  | 29.2  |     | 38.6  | 16.8  |     | 68.2  | 13.9  |     | 60.8  | 14.7  |     |
| LOS                                                                   | C     | C     |     | D     | B     |     | E     | B     |     | E     | B     |     |
| Approach Delay                                                        |       | 30.7  |     | 21.5  |       |     | 20.7  |       |     | 20.8  |       |     |
| Approach LOS                                                          |       | C     |     | C     |       |     | C     |       |     | C     |       |     |
| Queue Length 50th (m)                                                 | 2.5   | 4.0   |     | 7.5   | 4.8   |     | 23.2  | 42.8  |     | 8.5   | 21.0  |     |
| Queue Length 95th (m)                                                 | 6.6   | 12.1  |     | 14.0  | 21.0  |     | #53.9 | 80.1  |     | 16.5  | 34.8  |     |
| Internal Link Dist (m)                                                |       | 102.8 |     |       | 148.8 |     |       | 210.2 |     |       | 171.8 |     |
| Turn Bay Length (m)                                                   | 25.0  |       |     | 55.0  |       |     | 60.0  |       |     | 56.0  |       |     |
| Base Capacity (vph)                                                   | 187   | 393   |     | 203   | 440   |     | 161   | 2038  |     | 236   | 1888  |     |
| Starvation Cap Reductn                                                | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                 | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                   | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                     | 0.06  | 0.08  |     | 0.18  | 0.29  |     | 0.61  | 0.34  |     | 0.28  | 0.22  |     |
| Intersection Summary                                                  |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 120                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 120                                            |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 120                                                    |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                    |       |       |     |       |       |     |       |       |     |       |       |     |

3288 Jockvale Road AM Peak Hour 2025 Total

Synchro 10 Light Report

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## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-17-2019

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.61                                         | Intersection LOS: C    |
| Intersection Signal Delay: 21.1                                 | ICU Level of Service A |
| Intersection Capacity Utilization 53.3%                         |                        |
| Analysis Period (min) 15                                        |                        |
| Description: As per timing plans provided 26-Nov-2018           |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 2: Greenbank & Marketplace



3288 Jockvale Road AM Peak Hour 2025 Total

Synchro 10 Light Report

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### Lanes, Volumes, Timings 3: Greenbank & Strandherd

09-17-2019

| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR   |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| Lane Configurations                                                   | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                  | 171   | 632   | 166   | 95    | 705   | 163   | 224   | 357   | 117  | 175   | 221   | 129   |
| Future Volume (vph)                                                   | 171   | 632   | 166   | 95    | 705   | 163   | 224   | 357   | 117  | 175   | 221   | 129   |
| Satd. Flow (prot)                                                     | 1658  | 3316  | 1483  | 1658  | 3316  | 1483  | 3216  | 3169  | 0    | 3216  | 3316  | 1483  |
| Flt Permitted                                                         | 0.204 |       |       | 0.293 |       |       | 0.950 |       |      | 0.950 |       |       |
| Satd. Flow (perm)                                                     | 354   | 3316  | 1446  | 509   | 3316  | 1432  | 3206  | 3169  | 0    | 3165  | 3316  | 1462  |
| Satd. Flow (RTOR)                                                     |       |       | 166   |       |       | 163   |       | 35    |      |       |       | 149   |
| Lane Group Flow (vph)                                                 | 171   | 632   | 166   | 95    | 705   | 163   | 224   | 474   | 0    | 175   | 221   | 129   |
| Turn Type                                                             | pm-pt | NA    | Perm  | pm-pt | NA    | Perm  | Prot  | NA    | Prot | NA    | Perm  |       |
| Protected Phases                                                      | 7     | 4     |       | 3     | 8     |       | 5     | 2     |      | 1     | 6     |       |
| Permitted Phases                                                      | 4     |       | 4     | 8     |       | 8     |       |       |      |       |       | 6     |
| Detector Phase                                                        | 7     | 4     | 4     | 3     | 8     | 8     | 5     | 2     |      | 1     | 6     | 6     |
| Switch Phase                                                          |       |       |       |       |       |       |       |       |      |       |       |       |
| Minimum Initial (s)                                                   | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |      | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                     | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (s)                                                       | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (%)                                                       | 15.8% | 34.2% | 34.2% | 15.8% | 34.2% | 34.2% | 20.0% | 30.0% |      | 20.0% | 30.0% | 30.0% |
| Yellow Time (s)                                                       | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |      | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                      | 2.9   | 2.8   | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   |      | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                   | 6.6   | 6.5   | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   |      | 6.3   | 6.5   | 6.5   |
| Lead/Lag                                                              | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   |      | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?                                                    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |      | Yes   | Yes   | Yes   |
| Recall Mode                                                           | None  | Max   | Max   | None  | Max   | Max   | None  | C-Max |      | None  | C-Max | C-Max |
| Act Effct Green (s)                                                   | 48.7  | 37.4  | 37.4  | 44.9  | 35.4  | 35.4  | 13.6  | 35.4  |      | 11.8  | 33.6  | 33.6  |
| Actuated g/C Ratio                                                    | 0.41  | 0.31  | 0.31  | 0.37  | 0.30  | 0.30  | 0.11  | 0.30  |      | 0.10  | 0.28  | 0.28  |
| v/c Ratio                                                             | 0.64  | 0.61  | 0.29  | 0.34  | 0.72  | 0.30  | 0.61  | 0.49  |      | 0.55  | 0.24  | 0.25  |
| Control Delay                                                         | 32.5  | 38.6  | 6.2   | 23.5  | 43.1  | 6.5   | 72.0  | 25.7  |      | 57.9  | 34.9  | 5.1   |
| Queue Delay                                                           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Delay                                                           | 32.5  | 38.6  | 6.2   | 23.5  | 43.1  | 6.5   | 72.0  | 25.7  |      | 57.9  | 34.9  | 5.1   |
| LOS                                                                   | C     | D     | A     | C     | D     | A     | E     | C     |      | E     | C     | A     |
| Approach Delay                                                        |       | 32.0  |       | 34.9  |       |       | 40.5  |       |      | 35.3  |       |       |
| Approach LOS                                                          |       | C     |       | C     |       |       | D     |       |      | D     |       |       |
| Queue Length 50th (m)                                                 | 25.7  | 69.9  | 0.0   | 13.6  | 83.2  | 0.0   | 28.1  | 48.0  |      | 21.7  | 22.2  | 0.0   |
| Queue Length 95th (m)                                                 | 41.5  | 93.6  | 16.6  | 24.7  | 106.3 | 16.4  | 44.0  | 29.1  |      | 32.7  | 34.8  | 11.5  |
| Internal Link Dist (m)                                                |       | 186.3 |       |       | 415.8 |       | 171.8 |       |      | 236.6 |       |       |
| Turn Bay Length (m)                                                   | 70.0  |       | 100.0 | 130.0 |       | 60.0  |       |       |      | 85.0  |       | 160.0 |
| Base Capacity (vph)                                                   | 281   | 1032  | 564   | 321   | 979   | 537   | 474   | 958   |      | 474   | 927   | 516   |
| Starvation Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Spillback Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Storage Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Reduced v/c Ratio                                                     | 0.61  | 0.61  | 0.29  | 0.30  | 0.72  | 0.30  | 0.47  | 0.49  |      | 0.37  | 0.24  | 0.25  |
| Intersection Summary                                                  |       |       |       |       |       |       |       |       |      |       |       |       |
| Cycle Length: 120                                                     |       |       |       |       |       |       |       |       |      |       |       |       |
| Actuated Cycle Length: 120                                            |       |       |       |       |       |       |       |       |      |       |       |       |
| Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |       |       |       |      |       |       |       |
| Natural Cycle: 120                                                    |       |       |       |       |       |       |       |       |      |       |       |       |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |       |       |       |      |       |       |       |

3288 Jockvale Road AM Peak Hour 2025 Total

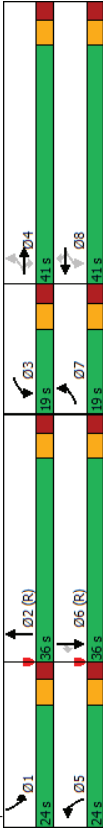
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### Lanes, Volumes, Timings 3: Greenbank & Strandherd

09-17-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.72                               | Intersection LOS: D    |
| Intersection Signal Delay: 35.3                       | ICU Level of Service E |
| Intersection Capacity Utilization 65.0%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |

Splits and Phases: 3: Greenbank & Strandherd



3288 Jockvale Road AM Peak Hour 2025 Total

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# HCM 6th AWSC

## 4: Jockvale & Chapman Mills

09-17-2019

| Intersection               | EBT   | EBR   | WBL   | WBT   | NBL  | NBR  |
|----------------------------|-------|-------|-------|-------|------|------|
| Intersection Delay, s/veh  | 7.2   |       |       |       |      |      |
| Intersection LOS           | A     |       |       |       |      |      |
| <b>Movement</b>            |       |       |       |       |      |      |
| Lane Configurations        | EBT   | EBR   | WBL   | WBT   | NBL  | NBR  |
| Traffic Vol, veh/h         | 26    | 0     | 52    | 0     | 0    | 34   |
| Future Vol, veh/h          | 26    | 0     | 52    | 0     | 0    | 34   |
| Peak Hour Factor           | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 | 1.00 |
| Heavy Vehicles, %          | 2     | 2     | 2     | 2     | 2    | 2    |
| Mvmt Flow                  | 26    | 0     | 52    | 0     | 0    | 34   |
| Number of Lanes            | 1     | 0     | 1     | 0     | 0    | 1    |
| <b>Approach</b>            |       |       |       |       |      |      |
| Opposing Approach          | EB    | WB    | WB    | EB    |      | NB   |
| Opposing Lanes             | 1     | 1     | 1     | 1     |      | 0    |
| Conflicting Approach Left  |       | NB    |       |       | EB   |      |
| Conflicting Lanes Left     | 0     | 1     |       |       | 1    |      |
| Conflicting Approach Right | NB    |       |       |       |      | WB   |
| Conflicting Lanes Right    | 1     | 0     |       |       |      | 1    |
| HCM Control Delay          | 7.2   | 7.5   |       |       |      | 6.6  |
| HCM LOS                    | A     | A     |       |       |      | A    |
| <b>Lane</b>                |       |       |       |       |      |      |
| Vol Left, %                |       | NBLn1 | EBLn1 | WBLn1 |      |      |
| Vol Thru, %                | 0%    | 0%    | 0%    | 100%  |      |      |
| Vol Right, %               | 100%  | 100%  | 0%    | 0%    |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |
| Traffic Vol by Lane        | 34    | 26    | 52    |       |      |      |
| LT Vol                     | 0     | 0     | 52    |       |      |      |
| Through Vol                | 0     | 26    | 0     |       |      |      |
| RT Vol                     | 34    | 0     | 0     |       |      |      |
| Lane Flow Rate             | 34    | 26    | 52    |       |      |      |
| Geometry Grp               | 1     | 1     | 1     |       |      |      |
| Degree of Util (X)         | 0.033 | 0.029 | 0.061 |       |      |      |
| Departure Headway (Hd)     | 3.467 | 4.032 | 4.213 |       |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   |       |      |      |
| Cap                        | 1027  | 889   | 853   |       |      |      |
| Service Time               | 1.508 | 2.051 | 2.224 |       |      |      |
| HCM Lane V/C Ratio         | 0.033 | 0.029 | 0.061 |       |      |      |
| HCM Control Delay          | 6.6   | 7.2   | 7.5   |       |      |      |
| HCM Lane LOS               | A     | A     | A     |       |      |      |
| HCM 95th-tile Q            | 0.1   | 0.1   | 0.2   |       |      |      |

3288 Jockvale Road AM Peak Hour 2025 Total

Synchro 10 Light Report

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# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

09-17-2019

| Lane Group                                                           | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR   |
|----------------------------------------------------------------------|-------|-------|-------|-------|-------|-----|-------|-------|-----|-------|-------|-------|
| Lane Configurations                                                  | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR   |
| Traffic Volume (vph)                                                 | 69    | 34    | 4     | 34    | 17    | 130 | 2     | 574   | 49  | 30    | 376   | 33    |
| Future Volume (vph)                                                  | 69    | 34    | 4     | 34    | 17    | 130 | 2     | 574   | 49  | 30    | 376   | 33    |
| Satd. Flow (prot)                                                    | 1658  | 1745  | 1483  | 1658  | 1483  | 0   | 1658  | 3268  | 0   | 1658  | 1745  | 1483  |
| Flt Permitted                                                        | 0.662 |       |       | 0.735 |       |     | 0.538 |       |     | 0.950 |       |       |
| Satd. Flow (perm)                                                    | 1146  | 1745  | 1427  | 1263  | 1483  | 0   | 934   | 3268  | 0   | 1652  | 1745  | 1440  |
| Satd. Flow (RTOR)                                                    |       |       | 124   |       |       |     | 130   |       | 11  |       |       | 45    |
| Lane Group Flow (vph)                                                | 69    | 34    | 4     | 34    | 147   | 0   | 2     | 623   | 0   | 30    | 376   | 33    |
| Turn Type                                                            | Perm  | NA    | Perm  | Perm  | NA    |     | Perm  | NA    |     | Prot  | NA    | Perm  |
| Protected Phases                                                     |       | 4     |       | 8     |       | 8   |       | 2     |     | 1     |       | 6     |
| Permitted Phases                                                     | 4     | 4     | 4     | 8     | 8     |     | 2     | 2     |     | 1     | 6     | 6     |
| Detector Phase                                                       | 4     | 4     | 4     | 8     | 8     |     | 2     | 2     |     | 1     | 6     | 6     |
| <b>Switch Phase</b>                                                  |       |       |       |       |       |     |       |       |     |       |       |       |
| Minimum Initial (s)                                                  | 10.0  | 10.0  | 10.0  | 10.0  | 10.0  |     | 10.0  | 10.0  |     | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                    | 34.7  | 34.7  | 34.7  | 34.7  | 34.7  |     | 34.6  | 34.6  |     | 11.6  | 34.6  | 34.6  |
| Total Split (s)                                                      | 36.0  | 36.0  | 36.0  | 36.0  | 36.0  |     | 40.0  | 40.0  |     | 14.0  | 54.0  | 54.0  |
| Total Split (%)                                                      | 40.0% | 40.0% | 40.0% | 40.0% | 40.0% |     | 44.4% | 44.4% |     | 15.6% | 60.0% | 60.0% |
| Yellow Time (s)                                                      | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                     | 3.4   | 3.4   | 3.4   | 3.4   | 3.4   |     | 2.9   | 2.9   |     | 2.9   | 2.9   | 2.9   |
| Lost Time Adjust (s)                                                 | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                  | 6.7   | 6.7   | 6.7   | 6.7   | 6.7   |     | 6.6   | 6.6   |     | 6.6   | 6.6   | 6.6   |
| Lead/Lag                                                             |       |       |       |       |       |     | Lag   | Lag   |     | Lead  | Lead  |       |
| Lead-Lag Optimize?                                                   |       |       |       |       |       |     | Yes   | Yes   |     | Yes   | Yes   |       |
| Recall Mode                                                          | None  | None  | None  | None  | None  |     | C-Max | C-Max |     | C-Max | C-Max |       |
| Act Effct Green (s)                                                  | 14.3  | 14.3  | 14.3  | 14.3  | 14.3  |     | 53.7  | 53.7  |     | 7.1   | 62.4  | 62.4  |
| Actuated g/C Ratio                                                   | 0.16  | 0.16  | 0.16  | 0.16  | 0.16  |     | 0.60  | 0.60  |     | 0.08  | 0.69  | 0.69  |
| v/c Ratio                                                            | 0.38  | 0.12  | 0.01  | 0.17  | 0.43  |     | 0.00  | 0.32  |     | 0.23  | 0.31  | 0.03  |
| Control Delay                                                        | 37.6  | 30.2  | 0.0   | 31.5  | 11.0  |     | 14.5  | 12.2  |     | 49.6  | 6.9   | 1.6   |
| Queue Delay                                                          | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Delay                                                          | 37.6  | 30.2  | 0.0   | 31.5  | 11.0  |     | 14.5  | 12.2  |     | 49.6  | 6.9   | 1.6   |
| LOS                                                                  | D     | C     | A     | C     | B     |     | B     | B     |     | D     | A     | A     |
| Approach Delay                                                       |       | 33.9  |       | 14.8  |       |     |       |       |     |       | 9.5   |       |
| Approach LOS                                                         |       | C     |       | B     |       |     |       |       |     |       | A     |       |
| Queue Length 50th (m)                                                | 12.0  | 5.7   | 0.0   | 5.7   | 2.8   |     | 0.2   | 27.8  |     | 5.4   | 19.3  | 0.0   |
| Queue Length 95th (m)                                                | 19.9  | 11.3  | 0.0   | 11.5  | 15.7  |     | 1.7   | 61.2  |     | 15.5  | 32.9  | 1.9   |
| Internal Link Dist (m)                                               |       | 243.9 |       | 403.7 |       |     |       | 204.2 |     |       | 161.2 |       |
| Turn Bay Length (m)                                                  |       | 38.0  |       | 60.0  | 38.0  |     |       | 38.0  |     |       | 38.0  |       |
| Base Capacity (vph)                                                  | 373   | 568   | 548   | 411   | 570   |     | 557   | 1953  |     | 143   | 1209  | 1011  |
| Sanctuary Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |     | 0     | 0     | 0     |
| Spillback Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |     | 0     | 0     | 0     |
| Storage Cap Reductn                                                  | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |     | 0     | 0     | 0     |
| Reduced v/c Ratio                                                    | 0.18  | 0.06  | 0.01  | 0.08  | 0.26  |     | 0.00  | 0.32  |     | 0.21  | 0.31  | 0.03  |
| <b>Intersection Summary</b>                                          |       |       |       |       |       |     |       |       |     |       |       |       |
| Cycle Length: 90                                                     |       |       |       |       |       |     |       |       |     |       |       |       |
| Actuated Cycle Length: 90                                            |       |       |       |       |       |     |       |       |     |       |       |       |
| Offset: 0 (0%), Referenced to phase 2:NBLT and 6:SBT. Start of Green |       |       |       |       |       |     |       |       |     |       |       |       |
| Natural Cycle: 85                                                    |       |       |       |       |       |     |       |       |     |       |       |       |
| Control Type: Actuated-Coordinated                                   |       |       |       |       |       |     |       |       |     |       |       |       |

3288 Jockvale Road AM Peak Hour 2025 Total

Synchro 10 Light Report

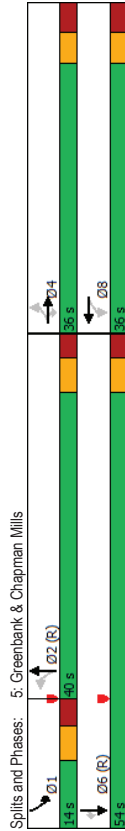
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# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

09-17-2019

|                                         |                        |
|-----------------------------------------|------------------------|
| Maximum v/c Ratio: 0.43                 | Intersection LOS: B    |
| Intersection Signal Delay: 13.4         | ICU Level of Service C |
| Intersection Capacity Utilization 65.3% |                        |
| Analysis Period (min) 15                |                        |



# Lanes, Volumes, Timings

## 6: Greenbank & Street "B"

09-17-2019

| Lane Group                     | EBL   | EBR   | NBL   | NBT   | SBT   | SBR |
|--------------------------------|-------|-------|-------|-------|-------|-----|
| Lane Configurations            | W     | W     | W     | W     | W     | W   |
| Traffic Volume (vph)           | 111   | 9     | 3     | 484   | 356   | 39  |
| Future Volume (vph)            | 111   | 9     | 3     | 484   | 356   | 39  |
| Satd. Flow (prot)              | 1652  | 0     | 1658  | 1745  | 1722  | 0   |
| Flt Permitted                  | 0.956 | 0.525 |       |       |       |     |
| Satd. Flow (perm)              | 1652  | 0     | 916   | 1745  | 1722  | 0   |
| Satd. Flow (RTOR)              | 5     |       |       |       | 11    |     |
| Lane Group Flow (vph)          | 120   | 0     | 3     | 484   | 395   | 0   |
| Turn Type                      | Prot  |       | Perm  | NA    | NA    |     |
| Protected Phases               | 4     |       | 2     | 2     | 6     |     |
| Permitted Phases               |       |       | 2     |       |       |     |
| Detector Phase                 | 4     |       | 2     | 2     | 6     |     |
| Switch Phase                   |       |       |       |       |       |     |
| Minimum Initial (s)            | 10.0  |       | 10.0  | 10.0  | 10.0  |     |
| Minimum Split (s)              | 26.8  |       | 33.1  | 33.1  | 24.2  |     |
| Total Split (s)                | 31.0  |       | 59.0  | 59.0  | 59.0  |     |
| Total Split (%)                | 34.4% |       | 65.6% | 65.6% | 65.6% |     |
| Yellow Time (s)                | 3.3   |       | 3.7   | 3.7   | 3.7   |     |
| All-Red Time (s)               | 1.9   |       | 1.4   | 1.4   | 1.4   |     |
| Lost Time Adjust (s)           | 0.0   |       | 0.0   | 0.0   | 0.0   |     |
| Total Lost Time (s)            | 5.2   |       | 5.1   | 5.1   | 5.1   |     |
| Lead/Lag                       |       |       |       |       |       |     |
| Lead-Lag Optimize?             |       |       |       |       |       |     |
| Recall Mode                    | None  |       | Max   | Max   | Max   |     |
| Act Effct Green (s)            | 11.8  |       | 63.6  | 63.6  | 63.6  |     |
| Actuated g/C Ratio             | 0.15  |       | 0.78  | 0.78  | 0.78  |     |
| v/c Ratio                      | 0.49  |       | 0.00  | 0.35  | 0.29  |     |
| Control Delay                  | 37.7  |       | 3.7   | 4.9   | 4.4   |     |
| Queue Delay                    | 0.0   |       | 0.0   | 0.0   | 0.0   |     |
| Total Delay                    | 37.7  |       | 3.7   | 4.9   | 4.4   |     |
| LOS                            | D     |       | A     | A     | A     |     |
| Approach Delay                 | 37.7  |       | 4.9   | 4.4   |       |     |
| Approach LOS                   | D     |       | A     | A     |       |     |
| Queue Length 50th (m)          | 18.3  |       | 0.1   | 23.0  | 16.9  |     |
| Queue Length 95th (m)          | 31.7  |       | 0.9   | 44.9  | 34.1  |     |
| Internal Link Dist (m)         | 444.3 |       | 187.4 | 204.2 |       |     |
| Turn Bay Length (m)            |       |       | 38.0  |       |       |     |
| Base Capacity (vph)            | 530   |       | 717   | 1366  | 1350  |     |
| Sanction Cap Reductn           | 0     |       | 0     | 0     | 0     |     |
| Spillback Cap Reductn          | 0     |       | 0     | 0     | 0     |     |
| Storage Cap Reductn            | 0     |       | 0     | 0     | 0     |     |
| Reduced v/c Ratio              | 0.23  |       | 0.00  | 0.35  | 0.29  |     |
| Intersection Summary           |       |       |       |       |       |     |
| Cycle Length: 90               |       |       |       |       |       |     |
| Actuated Cycle Length: 81.3    |       |       |       |       |       |     |
| Natural Cycle: 60              |       |       |       |       |       |     |
| Control Type: Semi Act-Uncoord |       |       |       |       |       |     |
| Maximum v/c Ratio: 0.49        |       |       |       |       |       |     |

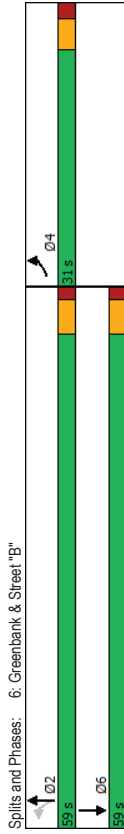
3288 Jockvale Road AM Peak Hour 2025 Total

3288 Jockvale Road AM Peak Hour 2025 Total

Lanes, Volumes, Timings  
6: Greenbank & Street "B"

09-17-2019

Intersection Signal Delay: 8.6  
Intersection Capacity Utilization 43.8%  
Analysis Period (min) 15



Lanes, Volumes, Timings  
1: Greenbank & New Collector/Loblaws

09-17-2019

| Lane Group                                                          | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|---------------------------------------------------------------------|-------|-------|-------|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                 | ↩     | ↩     | ↩     | ↩     | ↩     | ↩   | ↩     | ↩     | ↩   | ↩     | ↩     | ↩   |
| Traffic Volume (vph)                                                | 107   | 0     | 26    | 1     | 0     | 5   | 66    | 666   | 1   | 5     | 809   | 103 |
| Future Volume (vph)                                                 | 107   | 0     | 26    | 1     | 0     | 5   | 66    | 666   | 1   | 5     | 809   | 103 |
| Satd. Flow (prot)                                                   | 1658  | 0     | 1483  | 0     | 1509  | 0   | 1658  | 3316  | 0   | 1658  | 3248  | 0   |
| Flt Permitted                                                       | 0.754 |       |       |       | 0.992 |     | 0.950 |       |     | 0.398 |       |     |
| Satd. Flow (perm)                                                   | 1306  | 0     | 1456  | 0     | 1507  | 0   | 1654  | 3316  | 0   | 692   | 3248  | 0   |
| Satd. Flow (RTOR)                                                   |       |       | 86    |       | 86    |     |       |       |     |       | 17    |     |
| Lane Group Flow (vph)                                               | 107   | 0     | 26    | 0     | 6     | 0   | 66    | 667   | 0   | 5     | 912   | 0   |
| Turn Type                                                           | Perm  |       | Perm  | Perm  | NA    |     | Prot  | NA    |     | Perm  | NA    |     |
| Protected Phases                                                    |       |       |       |       | 8     |     | 5     | 2     |     |       | 6     |     |
| Permitted Phases                                                    | 4     |       | 4     | 8     |       |     |       |       |     | 6     |       |     |
| Detector Phase                                                      | 4     |       | 4     | 8     | 8     |     | 5     | 2     |     | 6     |       |     |
| Switch Phase                                                        |       |       |       |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                 | 5.0   |       | 5.0   | 10.0  | 10.0  |     | 10.0  | 10.0  |     | 10.0  | 10.0  |     |
| Minimum Split (s)                                                   | 34.5  |       | 34.5  | 22.7  | 22.7  |     | 16.3  | 31.2  |     | 31.2  | 31.2  |     |
| Total Split (s)                                                     | 34.6  |       | 34.6  | 34.6  | 34.6  |     | 16.4  | 55.4  |     | 35.0  | 39.0  |     |
| Total Split (%)                                                     | 38.4% |       | 38.4% | 38.4% | 38.4% |     | 18.2% | 61.6% |     | 43.3% | 43.3% |     |
| Yellow Time (s)                                                     | 3.3   |       | 3.3   | 2.2   | 2.2   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                    | 2.5   |       | 2.5   | 2.5   | 2.5   |     | 1.0   | 1.7   |     | 1.7   | 1.7   |     |
| Lost Time Adjust (s)                                                | 0.0   |       | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                 | 5.8   |       | 5.8   | 4.7   | 4.7   |     | 4.7   | 5.4   |     | 5.4   | 5.4   |     |
| Lead/Lag                                                            |       |       |       |       |       |     | Lead  | Lag   |     | Lag   | Yes   |     |
| Lead-Lag Optimize?                                                  |       |       |       |       |       |     | Yes   |       |     | Yes   |       |     |
| Recall Mode                                                         | None  |       | None  | None  | None  |     | None  | C-Max |     | C-Max | Yes   |     |
| Act Effct Green (s)                                                 | 12.7  |       | 12.7  | 14.2  | 14.2  |     | 10.5  | 69.7  |     | 57.4  | 57.4  |     |
| Actuated g/C Ratio                                                  | 0.14  |       | 0.14  | 0.16  | 0.16  |     | 0.12  | 0.77  |     | 0.64  | 0.64  |     |
| v/c Ratio                                                           | 0.58  |       | 0.09  | 0.02  | 0.34  |     | 0.34  | 0.26  |     | 0.01  | 0.44  |     |
| Control Delay                                                       | 47.8  |       | 0.7   | 0.2   | 0.2   |     | 44.9  | 3.4   |     | 11.2  | 12.3  |     |
| Queue Delay                                                         | 0.0   |       | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                         | 47.8  |       | 0.7   | 0.2   | 0.2   |     | 44.9  | 3.4   |     | 11.2  | 12.3  |     |
| LOS                                                                 | D     |       | A     | A     | A     |     | D     | A     |     | B     | B     |     |
| Approach Delay                                                      |       | 38.6  |       | 0.2   | 0.2   |     |       | 7.2   |     |       | 12.3  |     |
| Approach LOS                                                        |       | D     |       | A     | A     |     |       | A     |     |       | B     |     |
| Queue Length 50th (m)                                               | 18.5  |       | 0.0   | 0.0   | 0.0   |     | 12.0  | 14.3  |     | 0.4   | 47.3  |     |
| Queue Length 95th (m)                                               | 33.2  |       | 0.0   | 0.0   | 0.0   |     | 26.4  | 23.8  |     | 2.4   | 78.3  |     |
| Internal Link Dist (m)                                              |       | 520.6 |       |       | 76.1  |     |       | 161.2 |     |       | 210.2 |     |
| Turn Bay Length (m)                                                 | 38.0  |       |       |       |       |     | 38.0  |       |     |       | 38.0  |     |
| Base Capacity (vph)                                                 | 417   |       | 524   |       | 558   |     | 218   | 2568  |     | 441   | 2078  |     |
| Sanctuary Cap Reductn                                               | 0     |       | 0     |       | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                               | 0     |       | 0     |       | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                 | 0     |       | 0     |       | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                   | 0.26  |       | 0.05  |       | 0.01  |     | 0.30  | 0.26  |     | 0.01  | 0.44  |     |
| Intersection Summary                                                |       |       |       |       |       |     |       |       |     |       |       |     |
| Cycle Length: 90                                                    |       |       |       |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 90                                           |       |       |       |       |       |     |       |       |     |       |       |     |
| Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL Start of Green |       |       |       |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 85                                                   |       |       |       |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                  |       |       |       |       |       |     |       |       |     |       |       |     |

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 12.1

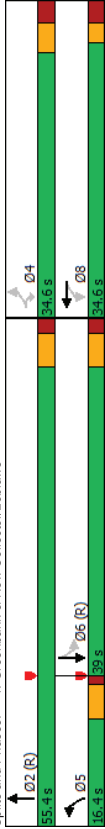
Intersection LOS: B

Intersection Capacity Utilization 60.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Greenbank &amp; New Collector/Loblaws



| Lane Group                                                             | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|------------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations                                                    | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   |
| Traffic Volume (vph)                                                   | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 578   | 70  | 195   | 734   | 36  |
| Future Volume (vph)                                                    | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 578   | 70  | 195   | 734   | 36  |
| Satd. Flow (prot)                                                      | 1658  | 1633  | 0   | 1658  | 1569  | 0   | 1658  | 3263  | 0   | 3216  | 3287  | 0   |
| Flt Permitted                                                          | 0.294 |       |     | 0.458 |       |     | 0.950 |       |     | 0.950 |       |     |
| Satd. Flow (perm)                                                      | 511   | 1633  | 0   | 799   | 1569  | 0   | 1648  | 3263  | 0   | 3216  | 3287  | 0   |
| Satd. Flow (RTOR)                                                      | 29    |       |     | 59    |       |     | 13    |       |     | 5     |       |     |
| Lane Group Flow (vph)                                                  | 44    | 203   | 0   | 141   | 309   | 0   | 149   | 648   | 0   | 195   | 770   | 0   |
| Turn Type                                                              | pm-pt | NA    |     | pm-pt | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases                                                       | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases                                                       | 4     |       |     | 8     |       |     |       |       |     |       |       |     |
| Detector Phase                                                         | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase                                                           |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                    | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)                                                      | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (s)                                                        | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (%)                                                        | 10.8% | 29.2% |     | 10.8% | 29.2% |     | 16.7% | 43.3% |     | 16.7% | 43.3% |     |
| Yellow Time (s)                                                        | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                       | 3.1   | 3.2   |     | 3.1   | 3.2   |     | 2.6   | 2.5   |     | 2.6   | 2.5   |     |
| Lost Time Adjust (s)                                                   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                    | 6.4   | 6.5   |     | 6.4   | 6.5   |     | 6.3   | 6.2   |     | 6.3   | 6.2   |     |
| Lead/Lag                                                               | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                            | None  | None  |     | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)                                                    | 29.4  | 22.9  |     | 30.9  | 25.5  |     | 13.9  | 53.1  |     | 12.0  | 51.2  |     |
| Actuated g/C Ratio                                                     | 0.24  | 0.19  |     | 0.26  | 0.21  |     | 0.12  | 0.44  |     | 0.10  | 0.43  |     |
| v/c Ratio                                                              | 0.24  | 0.61  |     | 0.56  | 0.82  |     | 0.78  | 0.45  |     | 0.61  | 0.55  |     |
| Control Delay                                                          | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 25.5  |     | 61.5  | 22.4  |     |
| Queue Delay                                                            | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                            | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 25.5  |     | 61.5  | 22.4  |     |
| LOS                                                                    | C     | D     |     | D     | D     |     | E     | C     |     | E     | C     |     |
| Approach Delay                                                         |       | 42.2  |     |       | 49.8  |     |       | 35.3  |     |       | 30.3  |     |
| Approach LOS                                                           |       | D     |     |       | D     |     |       | D     |     |       | C     |     |
| Queue Length 50th (m)                                                  | 7.6   | 38.8  |     | 25.9  | 60.3  |     | 35.3  | 59.1  |     | 25.5  | 48.6  |     |
| Queue Length 95th (m)                                                  | 16.0  | 62.1  |     | 41.5  | #93.5 |     | #71.4 | 81.5  |     | m34.8 | m59.1 |     |
| Internal Link Dist (m)                                                 |       | 102.8 |     |       | 148.8 |     |       | 210.2 |     |       | 171.8 |     |
| Turn Bay Length (m)                                                    |       | 25.0  |     |       | 55.0  |     |       | 60.0  |     |       | 56.0  |     |
| Base Capacity (vph)                                                    | 189   | 409   |     | 252   | 417   |     | 200   | 1450  |     | 367   | 1404  |     |
| Sanitation Cap Reductn                                                 | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                  | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                    | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                      | 0.23  | 0.50  |     | 0.56  | 0.74  |     | 0.74  | 0.45  |     | 0.53  | 0.55  |     |
| Intersection Summary                                                   |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 120                                                      |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 120                                             |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT. Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 120                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                     |       |       |     |       |       |     |       |       |     |       |       |     |

Maximum v/c Ratio: 0.82

### Intersection Signal Delay 36.7

Intersection Signal Delay: 36.7  
Intersection LOS: D

Intersection Capacity Utilization 76.7%

Intersection Signal Data: 50%  
ICU Level of Service D  
Intersection Capacity Utilization 76.7%

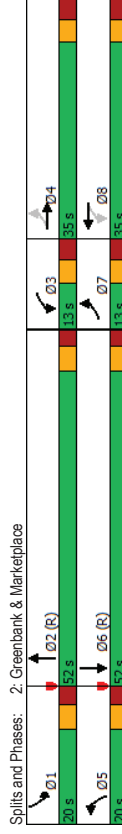
Analysis Period (min) 15

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

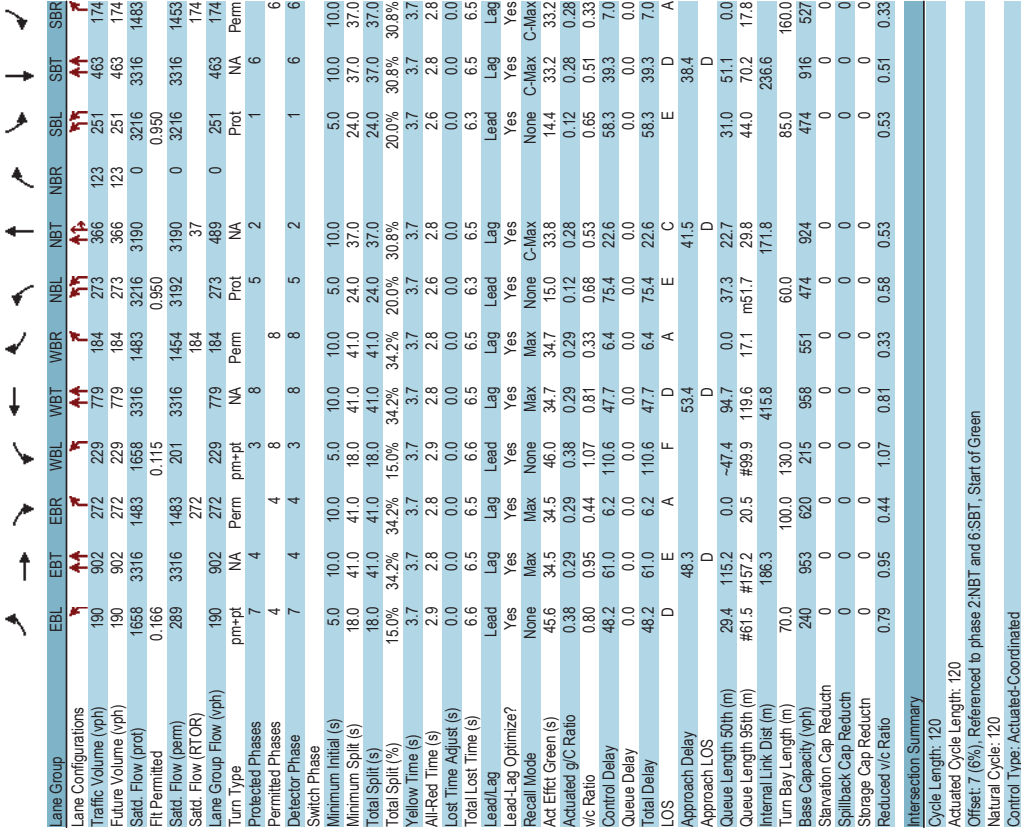
# 95th percentile volume exceeds capacity, queue may be longer;

Queue shown is maximum after two cycles.

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



### Lanes, Volumes, Timings



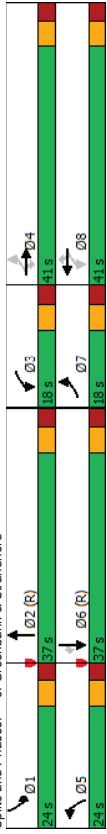
### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-17-2019

|                                                                   |                        |
|-------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 1.07                                           | Intersection LOS: D    |
| Intersection Signal Delay: 46.4                                   | ICU Level of Service F |
| Intersection Capacity Utilization 93.7%                           |                        |
| Analysis Period (min) 15                                          |                        |
| Description: As per timing plans provided 26-Nov-2018             |                        |
| ~ Volume exceeds capacity, queue is theoretically infinite.       |                        |
| Queue shown is maximum after two cycles.                          |                        |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |
| Queue shown is maximum after two cycles.                          |                        |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |

Splits and Phases: 3: Greenbank & Strandherd



### Lanes, Volumes, Timings

#### 5: Greenbank & Chapman Mills

09-17-2019

| Lane Group             | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR | SBL   | SBT   | SBR   |
|------------------------|-------|-------|-------|-------|-------|------|-------|-------|-----|-------|-------|-------|
| Lane Configurations    | ↔     | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     | ↔   | ↔     | ↔     | ↔     |
| Traffic Volume (vph)   | 54    | 27    | 3     | 89    | 35    | 120  | 4     | 558   | 57  | 50    | 754   | 70    |
| Future Volume (vph)    | 54    | 27    | 3     | 89    | 35    | 120  | 4     | 558   | 57  | 50    | 754   | 70    |
| Satd. Flow (prot)      | 1658  | 1745  | 1483  | 1658  | 1515  | 0    | 1658  | 3260  | 0   | 1658  | 1745  | 1483  |
| Flt Permitted          | 0.595 |       |       | 0.740 |       |      | 0.368 |       |     |       | 0.950 |       |
| Satd. Flow (perm)      | 1030  | 1745  | 1414  | 1260  | 1515  | 0    | 641   | 3260  | 0   | 1652  | 1745  | 1440  |
| Satd. Flow (RTOR)      |       |       | 124   |       | 120   |      | 14    |       |     |       |       | 70    |
| Lane Group Flow (vph)  | 54    | 27    | 3     | 89    | 155   | 0    | 4     | 615   | 0   | 50    | 754   | 70    |
| Turn Type              | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA  | Prot  | NA    | Perm  |
| Protected Phases       | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |     | 1     | 6     | 6     |
| Permitted Phases       | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |     | 1     | 6     | 6     |
| Detector Phase         | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |     | 1     | 6     | 6     |
| Switch Phase           |       |       |       |       |       |      |       |       |     |       |       |       |
| Minimum Initial (s)    | 10.0  | 10.0  | 10.0  | 10.0  | 10.0  |      | 10.0  | 10.0  |     | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)      | 24.7  | 24.7  | 24.7  | 34.0  | 34.0  |      | 34.6  | 34.6  |     | 11.6  | 34.6  | 34.6  |
| Total Split (s)        | 34.0  | 34.0  | 34.0  | 34.0  | 34.0  |      | 42.2  | 42.2  |     | 13.8  | 56.0  | 56.0  |
| Total Split (%)        | 37.8% | 37.8% | 37.8% | 37.8% | 37.8% |      | 46.9% | 46.9% |     | 15.3% | 62.2% | 62.2% |
| Yellow Time (s)        | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |      | 3.7   | 3.7   |     | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)       | 3.4   | 3.4   | 3.4   | 2.4   | 2.4   |      | 2.9   | 2.9   |     | 2.9   | 2.9   | 2.9   |
| Lost Time Adjust (s)   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)    | 6.7   | 6.7   | 6.7   | 5.7   | 5.7   |      | 6.6   | 6.6   |     | 6.6   | 6.6   | 6.6   |
| Lead/Lag               |       |       |       |       |       |      |       |       |     |       |       |       |
| Lead-Lag Optimize?     |       |       |       |       |       |      |       |       |     |       |       |       |
| Recall Mode            | None  | None  | None  | None  | None  |      | C-Max | C-Max |     | Yes   | Yes   |       |
| Act Effct Green (s)    | 14.1  | 14.1  | 14.1  | 15.1  | 15.1  |      | 53.7  | 53.7  |     | 7.5   | 62.6  | 62.6  |
| Actuated g/C Ratio     | 0.16  | 0.16  | 0.16  | 0.17  | 0.17  |      | 0.60  | 0.60  |     | 0.08  | 0.70  | 0.70  |
| v/c Ratio              | 0.34  | 0.10  | 0.01  | 0.42  | 0.44  |      | 0.01  | 0.32  |     | 0.36  | 0.62  | 0.07  |
| Control Delay          | 37.1  | 30.0  | 0.0   | 37.9  | 13.0  |      | 13.8  | 11.9  |     | 60.2  | 10.7  | 0.4   |
| Queue Delay            | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |     | 0.0   | 0.0   | 0.0   |
| Total Delay            | 37.1  | 30.0  | 0.0   | 37.9  | 13.0  |      | 13.8  | 11.9  |     | 60.2  | 10.7  | 0.4   |
| LOS                    | D     | C     | A     | D     | B     |      | B     | B     |     | E     | B     | A     |
| Approach Delay         |       | 33.5  |       | 22.1  |       |      | 11.9  |       |     | 12.7  |       |       |
| Approach LOS           |       | C     |       | C     |       |      | B     |       |     | B     |       |       |
| Queue Length 50th (m)  | 9.3   | 4.5   | 0.0   | 15.4  | 5.8   |      | 0.3   | 28.1  |     | 9.7   | 28.8  | 0.0   |
| Queue Length 95th (m)  | 16.7  | 9.7   | 0.0   | 24.1  | 18.7  |      | 2.6   | 57.4  |     | 22.2  | 66.0  | 0.5   |
| Internal Link Dist (m) |       | 239.9 |       | 403.7 |       |      | 204.2 |       |     | 161.2 |       |       |
| Turn Bay Length (m)    | 38.0  |       | 60.0  | 38.0  |       |      | 38.0  |       |     | 38.0  |       |       |
| Base Capacity (vph)    | 312   | 529   | 515   | 396   | 558   |      | 382   | 1949  |     | 144   | 1213  | 1023  |
| Sanctuary Cap Reductn  | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |     | 0     | 0     | 0     |
| Spillback Cap Reductn  | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |     | 0     | 0     | 0     |
| Storage Cap Reductn    | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |     | 0     | 0     | 0     |
| Reduced v/c Ratio      | 0.17  | 0.05  | 0.01  | 0.22  | 0.28  |      | 0.01  | 0.32  |     | 0.35  | 0.62  | 0.07  |

| Intersection Summary                                                |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Cycle Length: 90                                                    |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 90                                           |  |  |  |  |  |  |  |  |  |  |  |  |
| Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT. Start of Green |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 85                                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Coordinated                                  |  |  |  |  |  |  |  |  |  |  |  |  |

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Synchro 10 Light Report

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3288 Jockvale Road PM Peak Hour 2025 Total

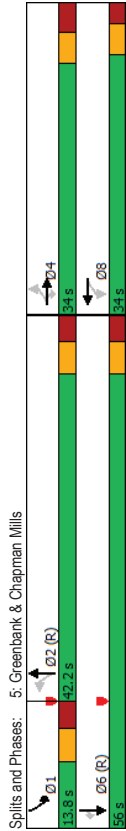
Synchro 10 Light Report

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Lanes, Volumes, Timings  
5: Greenbank & Chapman Mills

09-17-2019

|                                         |                        |
|-----------------------------------------|------------------------|
| Maximum v/c Ratio: 0.62                 | Intersection LOS: B    |
| Intersection Signal Delay: 14.6         | ICU Level of Service E |
| Intersection Capacity Utilization 82.2% |                        |
| Analysis Period (min) 15                |                        |



Lanes, Volumes, Timings  
6: Greenbank & Street "B"

09-17-2019

| Lane Group                     | EBL   | EBR   | NBL   | NBT   | SBT   | SBR |
|--------------------------------|-------|-------|-------|-------|-------|-----|
| Lane Configurations            | W     | W     | W     | W     | W     | W   |
| Traffic Volume (vph)           | 73    | 6     | 9     | 546   | 736   | 110 |
| Future Volume (vph)            | 73    | 6     | 9     | 546   | 736   | 110 |
| Satd. Flow (prot)              | 1652  | 0     | 1658  | 1745  | 1714  | 0   |
| Flt Permitted                  | 0.956 | 0.291 |       |       |       |     |
| Satd. Flow (perm)              | 1652  | 0     | 508   | 1745  | 1714  | 0   |
| Satd. Flow (RTOR)              | 4     |       |       |       | 17    |     |
| Lane Group Flow (vph)          | 79    | 0     | 9     | 546   | 846   | 0   |
| Turn Type                      | Prot  |       | Perm  | NA    | NA    |     |
| Protected Phases               | 4     |       | 2     | 2     | 6     |     |
| Permitted Phases               |       |       | 2     |       |       |     |
| Detector Phase                 | 4     |       | 2     | 2     | 6     |     |
| Switch Phase                   |       |       |       |       |       |     |
| Minimum Initial (s)            | 10.0  |       | 10.0  | 10.0  | 10.0  |     |
| Minimum Split (s)              | 26.2  |       | 23.1  | 23.1  | 23.1  |     |
| Total Split (s)                | 26.3  |       | 63.7  | 63.7  | 63.7  |     |
| Total Split (%)                | 29.2% |       | 70.8% | 70.8% | 70.8% |     |
| Yellow Time (s)                | 3.3   |       | 3.7   | 3.7   | 3.7   |     |
| All-Red Time (s)               | 1.9   |       | 1.4   | 1.4   | 1.4   |     |
| Lost Time Adjust (s)           | 0.0   |       | 0.0   | 0.0   | 0.0   |     |
| Total Lost Time (s)            | 5.2   |       | 5.1   | 5.1   | 5.1   |     |
| Lead/Lag                       |       |       |       |       |       |     |
| Lead-Lag Optimize?             |       |       |       |       |       |     |
| Recall Mode                    | None  |       | Max   | Max   | Max   |     |
| Act Effct Green (s)            | 10.8  |       | 71.9  | 71.9  | 71.9  |     |
| Actuated g/C Ratio             | 0.12  |       | 0.81  | 0.81  | 0.81  |     |
| v/c Ratio                      | 0.39  |       | 0.02  | 0.39  | 0.61  |     |
| Control Delay                  | 40.3  |       | 3.0   | 4.3   | 6.8   |     |
| Queue Delay                    | 0.0   |       | 0.0   | 0.0   | 0.3   |     |
| Total Delay                    | 40.3  |       | 3.0   | 4.3   | 7.2   |     |
| LOS                            | D     |       | A     | A     | A     |     |
| Approach Delay                 | 40.3  |       | 4.3   | 7.2   |       |     |
| Approach LOS                   | D     |       | A     | A     |       |     |
| Queue Length 50th (m)          | 13.6  |       | 0.3   | 25.3  | 51.6  |     |
| Queue Length 95th (m)          | 25.1  |       | 1.5   | 46.2  | 96.4  |     |
| Internal Link Dist (m)         | 444.3 |       | 187.4 | 204.2 |       |     |
| Turn Bay Length (m)            |       |       | 38.0  |       |       |     |
| Base Capacity (vph)            | 398   |       | 413   | 1417  | 1396  |     |
| Sanction Cap Reductn           | 0     |       | 0     | 0     | 155   |     |
| Spillback Cap Reductn          | 0     |       | 0     | 0     | 0     |     |
| Storage Cap Reductn            | 0     |       | 0     | 0     | 0     |     |
| Reduced v/c Ratio              | 0.20  |       | 0.02  | 0.39  | 0.68  |     |
| Intersection Summary           |       |       |       |       |       |     |
| Cycle Length: 90               |       |       |       |       |       |     |
| Actuated Cycle Length: 88.5    |       |       |       |       |       |     |
| Natural Cycle: 70              |       |       |       |       |       |     |
| Control Type: Semi Act-Uncoord |       |       |       |       |       |     |
| Maximum v/c Ratio: 0.61        |       |       |       |       |       |     |

# Lanes, Volumes, Timings 6: Greenbank & Street "B"

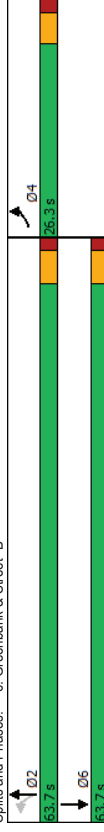
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Intersection Signal Delay: 7.8  
Intersection Capacity Utilization 64.9%  
Analysis Period (min) 15

Intersection LOS: A

ICU Level of Service C

Splits and Phases: 6: Greenbank & Street "B"



## HCM 6th AWSC

09-17-2019

### 8: Jockvale & Chapman Mills

| Intersection               | EBT   | EBR   | WBL   | WBT   | NBL  | NBR  |
|----------------------------|-------|-------|-------|-------|------|------|
| Intersection Delay, s/veh  | 7.5   |       |       |       |      |      |
| Intersection LOS           | A     |       |       |       |      |      |
| Movement                   | EBT   | EBR   | WBL   | WBT   | NBL  | NBR  |
| Lane Configurations        | ↖     | ↗     | ↖     | ↗     | ↖    | ↗    |
| Traffic Vol, veh/h         | 20    | 0     | 109   | 0     | 0    | 27   |
| Future Vol, veh/h          | 20    | 0     | 109   | 0     | 0    | 27   |
| Peak Hour Factor           | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 | 1.00 |
| Heavy Vehicles, %          | 2     | 2     | 2     | 2     | 2    | 2    |
| Mynt Flow                  | 20    | 0     | 109   | 0     | 0    | 27   |
| Number of Lanes            | 1     | 0     | 1     | 0     | 0    | 1    |
| Approach                   | EB    | WB    | WB    | EB    | NB   | NB   |
| Opposing Approach          | WB    | EB    |       |       |      |      |
| Opposing Lanes             | 1     | 1     |       |       |      | 0    |
| Conflicting Approach Left  |       | NB    |       | EB    |      | EB   |
| Conflicting Lanes Left     | 0     | 1     |       | 1     |      | 1    |
| Conflicting Approach Right | NB    |       |       |       |      | WB   |
| Conflicting Lanes Right    | 1     | 0     |       |       |      | 1    |
| HCM Control Delay          | 7.2   | 7.8   |       |       |      | 6.7  |
| HCM LOS                    | A     | A     |       |       |      | A    |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | WBLn1 |      |      |
| Vol Left, %                | 0%    | 0%    | 0%    | 100%  |      |      |
| Vol Thru, %                | 0%    | 100%  | 0%    | 0%    |      |      |
| Vol Right, %               | 100%  | 0%    | 0%    | 0%    |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |
| Traffic Vol by Lane        | 27    | 20    | 109   |       |      |      |
| LT Vol                     | 0     | 0     | 0     | 109   |      |      |
| Through Vol                | 0     | 20    | 0     | 0     |      |      |
| RT Vol                     | 27    | 0     | 0     | 0     |      |      |
| Lane Flow Rate             | 27    | 20    | 109   |       |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |
| Degree of Utl (X)          | 0.027 | 0.023 | 0.127 |       |      |      |
| Departure Headway (Hd)     | 3.556 | 4.063 | 4.197 |       |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   |       |      |      |
| Cap                        | 994   | 880   | 858   |       |      |      |
| Service Time               | 1.624 | 2.094 | 2.207 |       |      |      |
| HCM Lane V/C Ratio         | 0.027 | 0.023 | 0.127 |       |      |      |
| HCM Control Delay          | 6.7   | 7.2   | 7.8   |       |      |      |
| HCM Lane LOS               | A     | A     | A     |       |      |      |
| HCM 95th-tile Q            | 0.1   | 0.1   | 0.4   |       |      |      |

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3288 Jockvale Road PM Peak Hour 2025 Total

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# Appendix J

Synchro Intersection Worksheets – 2030 Future Total Conditions

[illegible]

| Maximum v/c Ratio: 0.23                 |                        |
|-----------------------------------------|------------------------|
| Intersection Signal Delay: 5.5          | Intersection LOS: A    |
| Intersection Capacity Utilization 41.5% | ICU Level of Service A |
| Analysis Period (min) 15                |                        |

| Splits and Phases: 1: Greenbank & New Collector/Loblaws |                                                                                                 |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------|
|                                                         | <p>Ø2 (R)</p> <p>55 s</p> <p>5 s</p> <p>5 s</p> <p>Ø6 (R)</p> <p>55 s</p> <p>5 s</p> <p>5 s</p> |

## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-17-2019

| Lane Group             | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Configurations    | ↩     | ↩     | ↩   | ↩     | ↩     | ↩   | ↩     | ↩     | ↩   | ↩     | ↩     | ↩   |
| Traffic Volume (vph)   | 12    | 17    | 16  | 36    | 23    | 106 | 98    | 477   | 74  | 65    | 321   | 6   |
| Future Volume (vph)    | 12    | 17    | 16  | 36    | 23    | 106 | 98    | 477   | 74  | 65    | 321   | 6   |
| Satd. Flow (prot)      | 1658  | 1607  | 0   | 1658  | 1514  | 0   | 1658  | 3243  | 0   | 3216  | 3304  | 0   |
| Flt Permitted          | 0.644 |       |     | 0.669 |       |     | 0.950 |       |     | 0.950 |       |     |
| Satd. Flow (perm)      | 1123  | 1607  | 0   | 1166  | 1514  | 0   | 1655  | 3243  | 0   | 3209  | 3304  | 0   |
| Satd. Flow (RTOR)      | 16    |       |     | 106   |       |     | 18    |       |     | 2     |       |     |
| Lane Group Flow (vph)  | 12    | 33    | 0   | 36    | 129   | 0   | 98    | 551   | 0   | 65    | 327   | 0   |
| Turn Type              | pm-pt | NA    |     | pm+pt | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases       | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases       | 4     |       |     | 8     |       |     |       |       |     |       |       |     |
| Detector Phase         | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase           |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)    | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)      | 12.0  | 35.0  |     | 12.0  | 35.0  |     | 15.0  | 58.0  |     | 15.0  | 58.0  |     |
| Total Split (s)        | 12.0  | 35.0  |     | 12.0  | 35.0  |     | 15.0  | 58.0  |     | 15.0  | 58.0  |     |
| Total Split (%)        | 10.0% | 29.2% |     | 10.0% | 29.2% |     | 12.5% | 48.3% |     | 12.5% | 48.3% |     |
| Yellow Time (s)        | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)       | 3.1   | 3.2   |     | 3.1   | 3.2   |     | 2.6   | 2.5   |     | 2.6   | 2.5   |     |
| Lost Time Adjust (s)   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)    | 6.4   | 6.5   |     | 6.4   | 6.5   |     | 6.3   | 6.2   |     | 6.3   | 6.2   |     |
| Lead/Lag               | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode            | None  | None  |     | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)    | 14.3  | 10.8  |     | 15.6  | 13.2  |     | 13.3  | 77.5  |     | 7.8   | 69.7  |     |
| Actuated g/C Ratio     | 0.12  | 0.09  |     | 0.13  | 0.11  |     | 0.11  | 0.65  |     | 0.06  | 0.58  |     |
| v/c Ratio              | 0.08  | 0.21  |     | 0.21  | 0.49  |     | 0.54  | 0.26  |     | 0.31  | 0.17  |     |
| Control Delay          | 40.2  | 34.2  |     | 43.8  | 20.6  |     | 60.5  | 10.8  |     | 63.7  | 10.6  |     |
| Queue Delay            | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay            | 40.2  | 34.2  |     | 43.8  | 20.6  |     | 60.5  | 10.8  |     | 63.7  | 10.6  |     |
| LOS                    | D     | C     |     | D     | C     |     | E     | B     |     | E     | B     |     |
| Approach Delay         |       | 35.8  |     | 25.6  |       |     | 18.3  |       |     | 19.4  |       |     |
| Approach LOS           |       | D     |     | C     |       |     | B     |       |     | B     |       |     |
| Queue Length 50th (m)  | 2.5   | 4.0   |     | 7.5   | 4.8   |     | 23.2  | 32.0  |     | 8.6   | 12.8  |     |
| Queue Length 95th (m)  | 7.8   | 14.1  |     | 16.6  | 24.6  |     | 40.2  | 48.4  |     | 16.4  | 18.6  |     |
| Internal Link Dist (m) |       | 102.8 |     |       | 148.8 |     |       | 210.2 |     |       | 171.8 |     |
| Turn Bay Length (m)    | 25.0  |       |     | 55.0  |       |     | 60.0  |       |     | 56.0  |       |     |
| Base Capacity (vph)    | 168   | 393   |     | 174   | 440   |     | 183   | 2101  |     | 239   | 1918  |     |
| Starvation Cap Reductn | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn  | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn    | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio      | 0.08  | 0.08  |     | 0.21  | 0.29  |     | 0.54  | 0.26  |     | 0.27  | 0.17  |     |

#### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 89 (74%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

## Lanes, Volumes, Timings

### 2: Greenbank & Marketplace

09-17-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.54                               | Intersection LOS: C    |
| Intersection Signal Delay: 20.3                       | ICU Level of Service A |
| Intersection Capacity Utilization 53.3%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |

Splits and Phases: 2: Greenbank & Marketplace



3288 Jockvale Road AM Peak Hour 2030 Total

3288 Jockvale Road AM Peak Hour 2030 Total

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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-17-2019

|                                                                       | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR   |
|-----------------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| Lane Group                                                            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR   |
| Lane Configurations                                                   | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                  | 164   | 588   | 82    | 71    | 694   | 163   | 106   | 361   | 87   | 175   | 227   | 125   |
| Future Volume (vph)                                                   | 164   | 588   | 82    | 71    | 694   | 163   | 106   | 361   | 87   | 175   | 227   | 125   |
| Satd. Flow (prot)                                                     | 1658  | 3316  | 1483  | 1658  | 3316  | 1483  | 3216  | 3201  | 0    | 3216  | 3316  | 1483  |
| Flt Permitted                                                         | 0.210 |       |       | 0.362 |       |       | 0.950 |       |      | 0.950 |       |       |
| Satd. Flow (perm)                                                     | 364   | 3316  | 1446  | 629   | 3316  | 1432  | 3206  | 3201  | 0    | 3163  | 3316  | 1462  |
| Satd. Flow (RTOR)                                                     |       |       | 149   |       |       | 163   |       | 23    |      |       |       | 149   |
| Lane Group Flow (vph)                                                 | 164   | 588   | 82    | 71    | 694   | 163   | 106   | 448   | 0    | 175   | 227   | 125   |
| Turn Type                                                             | pm-pt | NA    | Perm  | pm-pt | NA    | Perm  | Prot  | NA    | Prot | NA    | Perm  | NA    |
| Protected Phases                                                      | 7     | 4     | 3     | 8     | 5     | 2     |       |       |      |       |       | 6     |
| Permitted Phases                                                      | 4     | 4     | 4     | 8     | 8     | 8     |       |       |      |       |       | 6     |
| Detector Phase                                                        | 7     | 4     | 4     | 3     | 8     | 8     | 5     | 2     |      | 1     | 6     | 6     |
| Switch Phase                                                          |       |       |       |       |       |       |       |       |      |       |       |       |
| Minimum Initial (s)                                                   | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |      | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                     | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (s)                                                       | 19.0  | 41.0  | 41.0  | 19.0  | 41.0  | 41.0  | 24.0  | 36.0  |      | 24.0  | 36.0  | 36.0  |
| Total Split (%)                                                       | 15.8% | 34.2% | 34.2% | 15.8% | 34.2% | 34.2% | 20.0% | 30.0% |      | 20.0% | 30.0% | 30.0% |
| Yellow Time (s)                                                       | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |      | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                      | 2.9   | 2.8   | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   |      | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                   | 6.6   | 6.5   | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   |      | 6.3   | 6.5   | 6.5   |
| Lead/Lag                                                              | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   |      | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?                                                    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |      | Yes   | Yes   | Yes   |
| Recall Mode                                                           | None  | Max   | Max   | None  | Max   | Max   | None  | C-Max |      | None  | C-Max | C-Max |
| Act Effct Green (s)                                                   | 50.5  | 40.9  | 40.9  | 43.9  | 35.5  | 35.5  | 9.3   | 35.4  |      | 11.8  | 37.9  | 37.9  |
| Actuated g/C Ratio                                                    | 0.42  | 0.34  | 0.34  | 0.37  | 0.30  | 0.30  | 0.08  | 0.30  |      | 0.10  | 0.32  | 0.32  |
| v/c Ratio                                                             | 0.60  | 0.52  | 0.14  | 0.24  | 0.71  | 0.30  | 0.43  | 0.47  |      | 0.55  | 0.22  | 0.22  |
| Control Delay                                                         | 30.2  | 34.9  | 0.5   | 21.8  | 42.5  | 6.5   | 76.1  | 27.5  |      | 57.9  | 31.3  | 4.0   |
| Queue Delay                                                           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Delay                                                           | 30.2  | 34.9  | 0.5   | 21.8  | 42.5  | 6.5   | 76.1  | 27.5  |      | 57.9  | 31.3  | 4.0   |
| LOS                                                                   | C     | C     | A     | C     | D     | A     | E     | C     |      | E     | C     | A     |
| Approach Delay                                                        |       | 30.6  |       |       | 34.6  |       |       | 36.8  |      |       | 33.7  |       |
| Approach LOS                                                          |       | C     |       |       | C     |       |       | D     |      |       | C     |       |
| Queue Length 50th (m)                                                 | 24.5  | 63.1  | 0.0   | 10.0  | 81.6  | 0.0   | 14.3  | 46.2  |      | 21.7  | 21.6  | 0.0   |
| Queue Length 95th (m)                                                 | 39.9  | 84.8  | 0.0   | 19.3  | 104.3 | 16.4  | 24.4  | 66.2  |      | 32.7  | 33.4  | 9.8   |
| Internal Link Dist (m)                                                |       | 186.3 |       |       | 415.8 |       |       | 171.8 |      |       | 236.6 |       |
| Turn Bay Length (m)                                                   | 70.0  |       | 100.0 | 130.0 |       | 60.0  |       |       |      | 85.0  |       | 160.0 |
| Base Capacity (vph)                                                   | 287   | 1131  | 591   | 356   | 982   | 538   | 474   | 959   |      | 474   | 1047  | 563   |
| Starvation Cap Reductn                                                | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Spillback Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Storage Cap Reductn                                                   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Reduced v/c Ratio                                                     | 0.57  | 0.52  | 0.14  | 0.20  | 0.71  | 0.30  | 0.22  | 0.47  |      | 0.37  | 0.22  | 0.22  |
| Intersection Summary                                                  |       |       |       |       |       |       |       |       |      |       |       |       |
| Cycle Length: 120                                                     |       |       |       |       |       |       |       |       |      |       |       |       |
| Actuated Cycle Length: 120                                            |       |       |       |       |       |       |       |       |      |       |       |       |
| Offset: 94 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |       |       |       |      |       |       |       |
| Natural Cycle: 120                                                    |       |       |       |       |       |       |       |       |      |       |       |       |
| Control Type: Actuated-Coordinated                                    |       |       |       |       |       |       |       |       |      |       |       |       |

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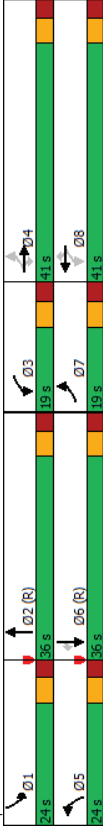
### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-17-2019

|                                                       |                        |
|-------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.71                               | Intersection LOS: C    |
| Intersection Signal Delay: 33.7                       | ICU Level of Service E |
| Intersection Capacity Utilization 83.1%               |                        |
| Analysis Period (min) 15                              |                        |
| Description: As per timing plans provided 26-Nov-2018 |                        |

Splits and Phases: 3: Greenbank & Strandherd



3288 Jockvale Road AM Peak Hour 2030 Total

Synchro 10 Light Report  
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| Lane Group                     | EBT   | EBR   | WBL   | WBT   | NBL   | NBR   |
|--------------------------------|-------|-------|-------|-------|-------|-------|
| Lane Configurations            | 79    | 9     | 44    | 55    | 53    | 26    |
| Traffic Volume (vph)           | 79    | 9     | 44    | 55    | 53    | 26    |
| Future Volume (vph)            | 79    | 9     | 44    | 55    | 53    | 26    |
| Satd. Flow (prot)              | 1711  | 0     | 1658  | 1745  | 1658  | 1483  |
| Flt Permitted                  |       |       | 0.700 |       | 0.950 |       |
| Satd. Flow (perm)              | 1711  | 0     | 1185  | 1745  | 1640  | 1435  |
| Satd. Flow (RTOR)              | 6     |       |       |       |       | 26    |
| Lane Group Flow (vph)          | 88    | 0     | 44    | 55    | 53    | 26    |
| Turn Type                      | NA    | Perm  | NA    | Prot  | Perm  | Perm  |
| Protected Phases               | 4     |       |       | 8     | 2     |       |
| Permitted Phases               |       |       | 8     |       |       | 2     |
| Detector Phase                 | 4     | 8     | 8     | 2     | 2     | 2     |
| Switch Phase                   |       |       |       |       |       |       |
| Minimum Initial (s)            | 10.0  |       | 10.0  | 10.0  | 10.0  | 10.0  |
| Minimum Split (s)              | 24.8  | 24.8  | 24.8  | 34.8  | 34.8  | 34.8  |
| Total Split (s)                | 60.0  | 60.0  | 60.0  | 60.0  | 60.0  | 60.0  |
| Total Split (%)                | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% | 50.0% |
| Yellow Time (s)                | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |
| All-Red Time (s)               | 1.9   | 1.9   | 1.9   | 3.5   | 3.5   | 3.5   |
| Lost Time Adjust (s)           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)            | 5.2   | 5.2   | 5.2   | 6.8   | 6.8   | 6.8   |
| Lead/Lag                       |       |       |       |       |       |       |
| Lead-Lag Optimize?             |       |       |       |       |       |       |
| Recall Mode                    | Max   | Max   | Max   | None  | None  | None  |
| Act Effct Green (s)            | 59.5  | 59.5  | 59.5  | 13.1  | 13.1  | 13.1  |
| Actuated g/C Ratio             | 0.74  | 0.74  | 0.74  | 0.16  | 0.16  | 0.16  |
| v/c Ratio                      | 0.07  | 0.05  | 0.05  | 0.20  | 0.10  | 0.10  |
| Control Delay                  | 5.4   | 5.9   | 5.7   | 29.7  | 11.2  | 11.2  |
| Queue Delay                    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay                    | 5.4   | 5.9   | 5.7   | 29.7  | 11.2  | 11.2  |
| LOS                            | A     | A     | A     | C     | B     | B     |
| Approach Delay                 | 5.4   |       | 5.8   | 23.6  |       |       |
| Approach LOS                   | A     |       | A     | C     |       |       |
| Queue Length 50th (m)          | 3.1   | 1.6   | 2.0   | 7.4   | 0.0   | 0.0   |
| Queue Length 95th (m)          | 13.3  | 8.3   | 9.5   | 16.6  | 6.1   | 6.1   |
| Internal Link Dist (m)         | 223.3 |       | 240.5 | 108.6 |       |       |
| Turn Bay Length (m)            |       | 38.0  |       | 38.0  |       |       |
| Base Capacity (vph)            | 1274  | 882   | 1298  | 1110  | 970   |       |
| 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              | 0.07  | 0.05  | 0.04  | 0.05  | 0.03  |       |
| Intersection Summary           |       |       |       |       |       |       |
| Cycle Length: 120              |       |       |       |       |       |       |
| Actuated Cycle Length: 80      |       |       |       |       |       |       |
| Natural Cycle: 60              |       |       |       |       |       |       |
| Control Type: Semi Act-Uncoord |       |       |       |       |       |       |
| Maximum v/c Ratio: 0.20        |       |       |       |       |       |       |

|                                                |                                              |
|------------------------------------------------|----------------------------------------------|
| Intersection Signal Delay: 10.9                | Intersection LOS: B                          |
| Intersection Capacity Utilization 35.6%        | ICU Level of Service A                       |
| Analysis Period (min) 15                       |                                              |
| Splits and Phases: 4: Jockvale & Chapman Mills |                                              |
| <div> <div>60 s</div> <div>→ D2</div> </div>   | <div> <div>60 s</div> <div>← D4</div> </div> |
| <div> <div>60 s</div> <div>← D8</div> </div>   | <div> <div>60 s</div> <div>→ D8</div> </div> |

# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

09-17-2019

|                                                                     | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|---------------------------------------------------------------------|-------|-------|-------|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Group                                                          | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
| Lane Configurations                                                 | 82    | 134   | 50    | 34    | 156   | 40  | 74    | 491   | 49  | 30    | 257   | 54  |
| Traffic Volume (vph)                                                | 82    | 134   | 50    | 34    | 156   | 40  | 74    | 491   | 49  | 30    | 257   | 54  |
| Future Volume (vph)                                                 | 82    | 134   | 50    | 34    | 156   | 40  | 74    | 491   | 49  | 30    | 257   | 54  |
| Satd. Flow (prot)                                                   | 1658  | 1745  | 1483  | 1658  | 1682  | 0   | 1658  | 3260  | 0   | 1658  | 1690  | 0   |
| Flt Permitted                                                       | 0.950 |       |       | 0.950 |       |     | 0.950 |       |     | 0.950 |       |     |
| Satd. Flow (perm)                                                   | 1642  | 1745  | 1419  | 1628  | 1682  | 0   | 1646  | 3260  | 0   | 1649  | 1690  | 0   |
| Satd. Flow (RTOR)                                                   |       |       |       | 157   | 10    |     | 10    |       |     |       | 10    |     |
| Lane Group Flow (vph)                                               | 82    | 134   | 50    | 34    | 196   | 0   | 74    | 540   | 0   | 30    | 311   | 0   |
| Turn Type                                                           | Prot  | NA    | Perm  | Prot  | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases                                                    | 7     | 4     |       | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases                                                    | 4     |       |       |       |       |     |       |       |     |       |       |     |
| Detector Phase                                                      | 7     | 4     | 4     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase                                                        |       |       |       |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                 | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)                                                   | 9.5   | 34.7  | 34.7  | 9.5   | 34.7  |     | 9.7   | 34.6  |     | 10.9  | 34.6  |     |
| Total Split (s)                                                     | 19.0  | 43.0  | 43.0  | 12.0  | 36.0  |     | 18.0  | 53.0  |     | 12.0  | 47.0  |     |
| Total Split (%)                                                     | 15.8% | 35.8% | 35.8% | 10.0% | 30.0% |     | 15.0% | 44.2% |     | 10.0% | 39.2% |     |
| Yellow Time (s)                                                     | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                    | 1.0   | 3.4   | 3.4   | 1.0   | 3.4   |     | 1.0   | 2.9   |     | 1.0   | 2.9   |     |
| Lost Time Adjust (s)                                                | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                 | 4.3   | 6.7   | 6.7   | 4.3   | 6.7   |     | 4.7   | 6.6   |     | 4.7   | 6.6   |     |
| Lead/Lag                                                            | Lead  | Lag   | Lag   | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                  | Yes   | Yes   | Yes   | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                         | None  | None  | None  | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)                                                 | 11.0  | 25.0  | 25.0  | 7.1   | 19.1  |     | 10.6  | 66.7  |     | 7.4   | 61.4  |     |
| Actuated g/C Ratio                                                  | 0.09  | 0.21  | 0.21  | 0.06  | 0.16  |     | 0.09  | 0.56  |     | 0.06  | 0.51  |     |
| v/c Ratio                                                           | 0.54  | 0.37  | 0.12  | 0.35  | 0.71  |     | 0.51  | 0.30  |     | 0.30  | 0.36  |     |
| Control Delay                                                       | 64.5  | 41.9  | 0.6   | 64.1  | 58.6  |     | 63.5  | 18.0  |     | 60.9  | 23.2  |     |
| Queue Delay                                                         | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                         | 64.5  | 41.9  | 0.6   | 64.1  | 58.6  |     | 63.5  | 18.0  |     | 60.9  | 23.2  |     |
| LOS                                                                 | E     | D     | A     | E     | E     |     | E     | B     |     | E     | C     |     |
| Approach Delay                                                      |       |       |       |       |       |     |       |       |     |       |       |     |
| Approach LOS                                                        |       |       |       |       |       |     |       |       |     |       |       |     |
| Queue Length 50th (m)                                               | 19.7  | 29.7  | 0.0   | 8.2   | 44.5  |     | 17.8  | 39.8  |     | 7.2   | 46.5  |     |
| Queue Length 95th (m)                                               | 35.9  | 42.8  | 0.0   | 19.4  | 64.6  |     | 33.0  | 66.1  |     | 17.4  | 89.9  |     |
| Internal Link Dist (m)                                              |       |       |       |       |       |     |       |       |     |       |       |     |
| Turn Bay Length (m)                                                 | 38.0  |       | 60.0  | 38.0  |       |     | 38.0  |       |     | 38.0  |       |     |
| Base Capacity (vph)                                                 | 203   | 527   | 538   | 106   | 418   |     | 187   | 1815  |     | 109   | 869   |     |
| Starvation Cap Reductn                                              | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                               | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                 | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                   | 0.40  | 0.25  | 0.09  | 0.32  | 0.47  |     | 0.40  | 0.30  |     | 0.28  | 0.36  |     |
| Intersection Summary                                                |       |       |       |       |       |     |       |       |     |       |       |     |
| Cycle Length: 120                                                   |       |       |       |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 120                                          |       |       |       |       |       |     |       |       |     |       |       |     |
| Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |       |       |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 90                                                   |       |       |       |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                  |       |       |       |       |       |     |       |       |     |       |       |     |

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# Lanes, Volumes, Timings

## 5: Greenbank & Chapman Mills

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|                                                 |                        |
|-------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.71                         | Intersection LOS: C    |
| Intersection Signal Delay: 33.1                 | ICU Level of Service C |
| Intersection Capacity Utilization 65.9%         |                        |
| Analysis Period (min) 15                        |                        |
| Splits and Phases: 5: Greenbank & Chapman Mills |                        |
| Ø1<br>13.5 s                                    | Ø2 (R)<br>55.3 s       |
| Ø3<br>12.5 s                                    | Ø4<br>47.3 s           |
| Ø5<br>13.5 s                                    | Ø6 (R)<br>47.3 s       |
| Ø7<br>13.5 s                                    | Ø8<br>47.3 s           |

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Lanes, Volumes, Timings  
6: Greenbank & Street "B"

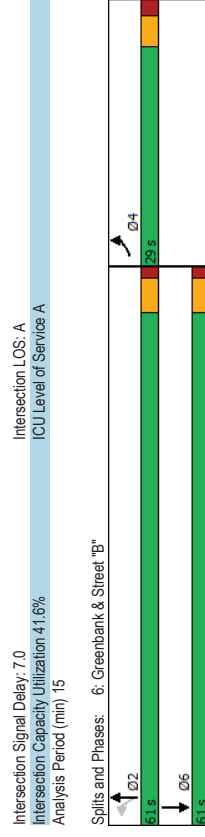
09-17-2019

| Lane Group                     | EBL   | EBR | NBL   | NBT   | SBT   | SBR |
|--------------------------------|-------|-----|-------|-------|-------|-----|
| Lane Configurations            | W     |     |       |       |       |     |
| Traffic Volume (vph)           | 72    | 8   | 3     | 510   | 285   | 27  |
| Future Volume (vph)            | 72    | 8   | 3     | 510   | 285   | 27  |
| Satd. Flow (prot)              | 1647  | 0   | 1658  | 1745  | 1724  | 0   |
| Flt Permitted                  | 0.957 |     | 0.571 |       |       |     |
| Satd. Flow (perm)              | 1647  | 0   | 996   | 1745  | 1724  | 0   |
| Satd. Flow (RTOR)              | 6     |     |       |       | 10    |     |
| Lane Group Flow (vph)          | 80    | 0   | 3     | 510   | 312   | 0   |
| Turn Type                      | Prot  |     | Perm  | NA    | NA    |     |
| Protected Phases               | 4     |     |       | 2     | 6     |     |
| Permitted Phases               |       |     | 2     |       |       |     |
| Detector Phase                 | 4     | 2   | 2     | 2     | 6     |     |
| Switch Phase                   |       |     |       |       |       |     |
| Minimum Initial (s)            | 5.0   |     | 5.0   | 5.0   | 5.0   |     |
| Minimum Split (s)              | 26.2  |     | 23.1  | 23.1  | 23.1  |     |
| Total Split (s)                | 29.0  |     | 61.0  | 61.0  | 61.0  |     |
| Total Split (%)                | 32.2% |     | 67.8% | 67.8% | 67.8% |     |
| Yellow Time (s)                | 3.3   |     | 3.7   | 3.7   | 3.7   |     |
| All-Red Time (s)               | 1.9   |     | 1.4   | 1.4   | 1.4   |     |
| Lost Time Adjust (s)           | 0.0   |     | 0.0   | 0.0   | 0.0   |     |
| Total Lost Time (s)            | 5.2   |     | 5.1   | 5.1   | 5.1   |     |
| Lead/Lag                       |       |     |       |       |       |     |
| Lead-Lag Optimize?             |       |     |       |       |       |     |
| Recall Mode                    | None  |     | Max   | Max   | Max   |     |
| Act Effct Green (s)            | 9.2   |     | 69.1  | 69.1  | 69.1  |     |
| Actuated g/C Ratio             | 0.11  |     | 0.81  | 0.81  | 0.81  |     |
| v/c Ratio                      | 0.44  |     | 0.00  | 0.36  | 0.22  |     |
| Control Delay                  | 40.5  |     | 3.0   | 4.1   | 3.2   |     |
| Queue Delay                    | 0.0   |     | 0.0   | 0.0   | 0.0   |     |
| Total Delay                    | 40.5  |     | 3.0   | 4.1   | 3.2   |     |
| LOS                            | D     |     | A     | A     | A     |     |
| Approach Delay                 | 40.5  |     | 4.1   | 3.2   |       |     |
| Approach LOS                   | D     |     | A     | A     |       |     |
| Queue Length 50th (m)          | 13.0  |     | 0.1   | 22.0  | 11.2  |     |
| Queue Length 95th (m)          | 24.1  |     | 0.8   | 41.9  | 22.6  |     |
| Internal Link Dist (m)         | 444.3 |     | 187.4 | 204.2 |       |     |
| Turn Bay Length (m)            |       |     | 38.0  |       |       |     |
| Base Capacity (vph)            | 466   |     | 808   | 1417  | 1402  |     |
| 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              | 0.17  |     | 0.00  | 0.36  | 0.22  |     |
| Intersection Summary           |       |     |       |       |       |     |
| Cycle Length: 90               |       |     |       |       |       |     |
| Actuated Cycle Length: 85.1    |       |     |       |       |       |     |
| Natural Cycle: 55              |       |     |       |       |       |     |
| Control Type: Semi Act-Uncoord |       |     |       |       |       |     |
| Maximum v/c Ratio: 0.44        |       |     |       |       |       |     |

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Lanes, Volumes, Timings  
6: Greenbank & Street "B"

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3288 Jockvale Road AM Peak Hour 2030 Total

# Lanes, Volumes, Timings

## 1: Greenbank & New Collector/Loblaws

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|                                                                       | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT  | SBR   |
|-----------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|------|-------|
| Lane Configurations                                                   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔     | ↔   | ↔     | ↔    | ↔     |
| Traffic Volume (vph)                                                  | 107   | 0     | 26  | 1     | 0     | 5   | 66    | 578   | 1   | 5     | 693  | 103   |
| Future Volume (vph)                                                   | 107   | 0     | 26  | 1     | 0     | 5   | 66    | 578   | 1   | 5     | 693  | 103   |
| Satd. Flow (prot)                                                     | 1658  | 1456  | 0   | 0     | 1512  | 0   | 1658  | 3316  | 0   | 1658  | 3240 | 0     |
| Flt Permitted                                                         | 0.754 |       |     |       | 0.966 |     | 0.950 |       |     | 0.434 |      |       |
| Satd. Flow (perm)                                                     | 1310  | 1456  | 0   | 0     | 1472  | 0   | 1653  | 3316  | 0   | 754   | 3240 | 0     |
| Satd. Flow (RTOR)                                                     | 341   |       |     |       | 86    |     |       |       |     | 21    |      |       |
| Lane Group Flow (vph)                                                 | 107   | 26    | 0   | 0     | 6     | 0   | 66    | 579   | 0   | 5     | 796  | 0     |
| Turn Type                                                             | Perm  | NA    |     | Perm  | NA    |     | Prot  | NA    |     | Perm  | NA   |       |
| Protected Phases                                                      | 4     | 4     |     | 8     |       |     | 5     | 2     |     | 6     |      |       |
| Permitted Phases                                                      | 4     | 4     |     | 8     |       |     | 5     | 2     |     | 6     |      |       |
| Detector Phase                                                        | 4     | 4     |     | 8     |       |     | 5     | 2     |     | 6     |      |       |
| Switch Phase                                                          |       |       |     |       |       |     |       |       |     |       |      |       |
| Minimum Initial (s)                                                   | 5.0   | 5.0   |     | 5.0   |       |     | 5.0   | 5.0   |     | 5.0   |      | 5.0   |
| Minimum Split (s)                                                     | 33.8  | 33.8  |     | 33.8  |       |     | 10.8  | 30.8  |     | 33.4  |      | 33.4  |
| Total Split (s)                                                       | 34.0  | 34.0  |     | 33.8  |       |     | 16.0  | 56.0  |     | 40.0  |      | 40.0  |
| Total Split (%)                                                       | 37.8% | 37.8% |     | 37.6% |       |     | 17.8% | 62.2% |     | 44.4% |      | 44.4% |
| Yellow Time (s)                                                       | 3.3   | 3.3   |     | 3.3   |       |     | 3.7   | 3.7   |     | 3.7   |      | 3.7   |
| All-Red Time (s)                                                      | 2.5   | 2.5   |     | 2.5   |       |     | 1.0   | 1.7   |     | 1.7   |      | 1.7   |
| Lost Time Adjust (s)                                                  | 0.0   | 0.0   |     | 0.0   |       |     | 0.0   | 0.0   |     | 0.0   |      | 0.0   |
| Total Lost Time (s)                                                   | 5.8   | 5.8   |     | 5.8   |       |     | 4.7   | 5.4   |     | 5.4   |      | 5.4   |
| Lead/Lag                                                              |       |       |     |       |       |     | Lead  | Lag   |     | Lag   |      | Lead  |
| Lead-Lag Optimize?                                                    |       |       |     |       |       |     | Yes   | Yes   |     | Yes   |      | Yes   |
| Recall Mode                                                           | None  | None  |     | None  |       |     | None  | C-Max |     | C-Max |      | C-Max |
| Act Effct Green (s)                                                   | 14.6  | 14.6  |     | 14.3  |       |     | 8.7   | 67.8  |     | 56.4  |      | 56.4  |
| Actuated g/C Ratio                                                    | 0.16  | 0.16  |     | 0.16  |       |     | 0.10  | 0.75  |     | 0.63  |      | 0.63  |
| v/c Ratio                                                             | 0.50  | 0.05  |     | 0.02  |       |     | 0.41  | 0.23  |     | 0.01  |      | 0.39  |
| Control Delay                                                         | 40.4  | 0.2   |     | 0.2   |       |     | 45.2  | 5.6   |     | 14.0  |      | 13.0  |
| Queue Delay                                                           | 0.0   | 0.0   |     | 0.0   |       |     | 0.0   | 0.0   |     | 0.0   |      | 0.0   |
| Total Delay                                                           | 40.4  | 0.2   |     | 0.2   |       |     | 45.2  | 5.6   |     | 14.0  |      | 13.0  |
| LOS                                                                   | D     | A     |     | A     |       |     | D     | A     |     | B     |      | B     |
| Approach Delay                                                        |       | 32.6  |     | 0.2   |       |     |       | 9.6   |     |       |      | 13.0  |
| Approach LOS                                                          |       | C     |     | A     |       |     |       | A     |     |       |      | B     |
| Queue Length 50th (m)                                                 | 18.5  | 0.0   |     | 0.0   |       |     | 11.5  | 14.7  |     | 0.4   |      | 37.6  |
| Queue Length 95th (m)                                                 | 28.4  | 0.0   |     | 0.0   |       |     | 23.9  | 37.3  |     | 2.8   |      | 79.3  |
| Internal Link Dist (m)                                                |       | 520.6 |     | 48.8  |       |     |       | 161.2 |     |       |      | 210.2 |
| Turn Bay Length (m)                                                   |       | 38.0  |     |       |       |     | 38.0  |       |     |       |      | 38.0  |
| Base Capacity (vph)                                                   | 410   | 690   |     | 520   |       |     | 209   | 2498  |     | 472   |      | 2039  |
| Starvation Cap Reductn                                                | 0     | 0     |     | 0     |       |     | 0     | 0     |     | 0     |      | 0     |
| Spillback Cap Reductn                                                 | 0     | 0     |     | 0     |       |     | 0     | 0     |     | 0     |      | 0     |
| Storage Cap Reductn                                                   | 0     | 0     |     | 0     |       |     | 0     | 0     |     | 0     |      | 0     |
| Reduced v/c Ratio                                                     | 0.26  | 0.04  |     | 0.01  |       |     | 0.32  | 0.23  |     | 0.01  |      | 0.39  |
| Intersection Summary                                                  |       |       |     |       |       |     |       |       |     |       |      |       |
| Cycle Length: 90                                                      |       |       |     |       |       |     |       |       |     |       |      |       |
| Actuated Cycle Length: 90                                             |       |       |     |       |       |     |       |       |     |       |      |       |
| Offset: 16 (18%), Referenced to phase 2:NBT and 6:SBTL Start of Green |       |       |     |       |       |     |       |       |     |       |      |       |
| Natural Cycle: 80                                                     |       |       |     |       |       |     |       |       |     |       |      |       |
| Control Type: Actuated-Coordinated                                    |       |       |     |       |       |     |       |       |     |       |      |       |

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# Lanes, Volumes, Timings

## 1: Greenbank & New Collector/Loblaws

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|                                                         |                        |
|---------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.50                                 | Intersection LOS: B    |
| Intersection Signal Delay: 13.2                         | ICU Level of Service B |
| Intersection Capacity Utilization 55.7%                 |                        |
| Analysis Period (min) 15                                |                        |
| Splits and Phases: 1: Greenbank & New Collector/Loblaws |                        |
|                                                         |                        |

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# Lanes, Volumes, Timings

## 2: Greenbank & Marketplace

09-17-2019

|                                                                        | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
|------------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|-------|-------|-----|
| Lane Group                                                             | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
| Lane Configurations                                                    | EBL   | EBT   | EBR | WBL   | WBT   | WBR | NBL   | NBT   | NBR | SBL   | SBT   | SBR |
| Traffic Volume (vph)                                                   | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 469   | 70  | 195   | 599   | 36  |
| Future Volume (vph)                                                    | 44    | 117   | 86  | 141   | 124   | 185 | 149   | 469   | 70  | 195   | 599   | 36  |
| Satd. Flow (prot)                                                      | 1658  | 1633  | 0   | 1658  | 1569  | 0   | 1658  | 3253  | 0   | 3216  | 3279  | 0   |
| Flt Permitted                                                          | 0.294 |       |     | 0.458 |       |     | 0.950 |       |     |       |       |     |
| Satd. Flow (perm)                                                      | 511   | 1633  | 0   | 799   | 1569  | 0   | 1646  | 3253  | 0   | 3216  | 3279  | 0   |
| Satd. Flow (RTOR)                                                      | 29    |       |     | 59    |       |     | 16    |       |     |       |       | 6   |
| Lane Group Flow (vph)                                                  | 44    | 203   | 0   | 141   | 309   | 0   | 149   | 539   | 0   | 195   | 635   | 0   |
| Turn Type                                                              | pm-pt | NA    |     | pm-pt | NA    |     | Prot  | NA    |     | Prot  | NA    |     |
| Protected Phases                                                       | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Permitted Phases                                                       | 4     |       |     | 8     |       |     |       |       |     |       |       |     |
| Detector Phase                                                         | 7     | 4     |     | 3     | 8     |     | 5     | 2     |     | 1     | 6     |     |
| Switch Phase                                                           |       |       |     |       |       |     |       |       |     |       |       |     |
| Minimum Initial (s)                                                    | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     | 5.0   | 10.0  |     |
| Minimum Split (s)                                                      | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (s)                                                        | 13.0  | 35.0  |     | 13.0  | 35.0  |     | 20.0  | 52.0  |     | 20.0  | 52.0  |     |
| Total Split (%)                                                        | 10.8% | 29.2% |     | 10.8% | 29.2% |     | 16.7% | 43.3% |     | 16.7% | 43.3% |     |
| Yellow Time (s)                                                        | 3.3   | 3.3   |     | 3.3   | 3.3   |     | 3.7   | 3.7   |     | 3.7   | 3.7   |     |
| All-Red Time (s)                                                       | 3.1   | 3.2   |     | 3.1   | 3.2   |     | 2.6   | 2.5   |     | 2.6   | 2.5   |     |
| Lost Time Adjust (s)                                                   | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Lost Time (s)                                                    | 6.4   | 6.5   |     | 6.4   | 6.5   |     | 6.3   | 6.2   |     | 6.3   | 6.2   |     |
| Lead/Lag                                                               | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     | Lead  | Lag   |     |
| Lead-Lag Optimize?                                                     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     | Yes   | Yes   |     |
| Recall Mode                                                            | None  | None  |     | None  | None  |     | None  | C-Max |     | None  | C-Max |     |
| Act Effct Green (s)                                                    | 23.4  | 22.9  |     | 30.9  | 25.5  |     | 13.9  | 53.1  |     | 12.0  | 51.2  |     |
| Actuated g/C Ratio                                                     | 0.24  | 0.19  |     | 0.26  | 0.21  |     | 0.12  | 0.44  |     | 0.10  | 0.43  |     |
| v/c Ratio                                                              | 0.24  | 0.61  |     | 0.56  | 0.82  |     | 0.78  | 0.37  |     | 0.61  | 0.45  |     |
| Control Delay                                                          | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 24.1  |     | 67.1  | 18.1  |     |
| Queue Delay                                                            | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     | 0.0   | 0.0   |     |
| Total Delay                                                            | 30.8  | 44.6  |     | 41.5  | 53.6  |     | 77.7  | 24.1  |     | 67.1  | 18.1  |     |
| LOS                                                                    | C     | D     |     | D     | D     |     | E     | C     |     | E     | B     |     |
| Approach Delay                                                         |       | 42.2  |     |       | 49.8  |     |       | 35.7  |     |       | 29.6  |     |
| Approach LOS                                                           |       | D     |     |       | D     |     |       | D     |     |       | C     |     |
| Queue Length 50th (m)                                                  | 7.6   | 38.8  |     | 25.9  | 60.3  |     | 35.3  | 46.6  |     | 25.7  | 32.3  |     |
| Queue Length 95th (m)                                                  | 16.0  | 62.1  |     | 41.5  | #93.5 |     | #71.4 | 65.9  |     | m36.9 | m41.6 |     |
| Internal Link Dist (m)                                                 |       | 102.8 |     |       | 148.8 |     |       | 210.2 |     |       | 171.8 |     |
| Turn Bay Length (m)                                                    | 25.0  |       |     | 55.0  |       |     | 60.0  |       |     | 56.0  |       |     |
| Base Capacity (vph)                                                    | 189   | 409   |     | 252   | 417   |     | 200   | 1447  |     | 367   | 1401  |     |
| Starvation Cap Reductn                                                 | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Spillback Cap Reductn                                                  | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Storage Cap Reductn                                                    | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     | 0     | 0     |     |
| Reduced v/c Ratio                                                      | 0.23  | 0.50  |     | 0.56  | 0.74  |     | 0.74  | 0.37  |     | 0.53  | 0.45  |     |
| Intersection Summary                                                   |       |       |     |       |       |     |       |       |     |       |       |     |
| Cycle Length: 120                                                      |       |       |     |       |       |     |       |       |     |       |       |     |
| Actuated Cycle Length: 120                                             |       |       |     |       |       |     |       |       |     |       |       |     |
| Offset: 117 (98%), Referenced to phase 2:NBT and 6:SBT. Start of Green |       |       |     |       |       |     |       |       |     |       |       |     |
| Natural Cycle: 120                                                     |       |       |     |       |       |     |       |       |     |       |       |     |
| Control Type: Actuated-Coordinated                                     |       |       |     |       |       |     |       |       |     |       |       |     |

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# Lanes, Volumes, Timings

## 2: Greenbank & Marketplace

09-17-2019

|                                                                   |                        |
|-------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.82                                           | Intersection LOS: D    |
| Intersection Signal Delay: 37.0                                   | ICU Level of Service D |
| Intersection Capacity Utilization 74.9%                           |                        |
| Analysis Period (min) 15                                          |                        |
| Description: As per timing plans provided 26-Nov-2018             |                        |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |
| Queue shown is maximum after two cycles.                          |                        |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |
| Splits and Phases: 2: Greenbank & Marketplace                     |                        |
|                                                                   |                        |

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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-17-2019

| Lane Group                                                          | EBL   | EBT    | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR   |
|---------------------------------------------------------------------|-------|--------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|
| Lane Configurations                                                 | ↔     | ↔      | ↔     | ↔     | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     | ↔     |
| Traffic Volume (vph)                                                | 186   | 942    | 136   | 183   | 784   | 184   | 151   | 401   | 93   | 251   | 498   | 168   |
| Future Volume (vph)                                                 | 186   | 942    | 136   | 183   | 784   | 184   | 151   | 401   | 93   | 251   | 498   | 168   |
| Satd. Flow (prot)                                                   | 1658  | 3316   | 1483  | 1658  | 3316  | 1483  | 3216  | 3214  | 0    | 3216  | 3316  | 1483  |
| Flt Permitted                                                       | 0.162 |        |       | 0.115 |       |       | 0.950 |       |      | 0.950 |       |       |
| Satd. Flow (perm)                                                   | 283   | 3316   | 1464  | 201   | 3316  | 1483  | 3213  | 3214  | 0    | 3210  | 3316  | 1464  |
| Satd. Flow (RTOR)                                                   | 149   |        |       | 184   |       |       | 22    |       |      |       |       | 168   |
| Lane Group Flow (vph)                                               | 186   | 942    | 136   | 183   | 784   | 184   | 151   | 494   | 0    | 251   | 498   | 168   |
| Turn Type                                                           | pm-pt | NA     | Perm  | pm-pt | NA    | Perm  | Prot  | NA    | Prot | NA    | Perm  | NA    |
| Protected Phases                                                    | 7     | 4      | 3     | 8     | 5     | 2     |       |       |      |       |       | 6     |
| Permitted Phases                                                    | 4     |        | 4     | 8     | 8     |       |       |       |      |       |       | 6     |
| Detector Phase                                                      | 7     | 4      | 4     | 3     | 8     | 8     | 5     | 2     |      | 1     | 6     | 6     |
| Switch Phase                                                        |       |        |       |       |       |       |       |       |      |       |       |       |
| Minimum Initial (s)                                                 | 5.0   | 10.0   | 10.0  | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |      | 5.0   | 10.0  | 10.0  |
| Minimum Split (s)                                                   | 18.0  | 41.0   | 41.0  | 18.0  | 41.0  | 41.0  | 24.0  | 37.0  |      | 24.0  | 37.0  | 37.0  |
| Total Split (s)                                                     | 18.0  | 41.0   | 41.0  | 18.0  | 41.0  | 41.0  | 24.0  | 37.0  |      | 24.0  | 37.0  | 37.0  |
| Total Split (%)                                                     | 15.0% | 34.2%  | 34.2% | 15.0% | 34.2% | 34.2% | 20.0% | 30.8% |      | 20.0% | 30.8% | 30.8% |
| Yellow Time (s)                                                     | 3.7   | 3.7    | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   | 3.7   |      | 3.7   | 3.7   | 3.7   |
| All-Red Time (s)                                                    | 2.9   | 2.8    | 2.8   | 2.9   | 2.8   | 2.8   | 2.6   | 2.8   |      | 2.6   | 2.8   | 2.8   |
| Lost Time Adjust (s)                                                | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)                                                 | 6.6   | 6.5    | 6.5   | 6.6   | 6.5   | 6.5   | 6.3   | 6.5   |      | 6.3   | 6.5   | 6.5   |
| Lead/Lag                                                            | Lead  | Lag    | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   |      | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?                                                  | Yes   | Yes    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |      | Yes   | Yes   | Yes   |
| Recall Mode                                                         | None  | Max    | Max   | None  | Max   | Max   | None  | C-Max |      | None  | C-Max | C-Max |
| Act Effct Green (s)                                                 | 45.6  | 34.6   | 34.6  | 46.0  | 34.7  | 34.7  | 11.0  | 33.8  |      | 14.4  | 37.2  | 37.2  |
| Actuated g/C Ratio                                                  | 0.38  | 0.29   | 0.29  | 0.38  | 0.29  | 0.29  | 0.09  | 0.28  |      | 0.12  | 0.31  | 0.31  |
| v/c Ratio                                                           | 0.79  | 0.99   | 0.26  | 0.86  | 0.82  | 0.33  | 0.52  | 0.54  |      | 0.65  | 0.48  | 0.29  |
| Control Delay                                                       | 47.4  | 68.7   | 5.4   | 61.9  | 47.9  | 6.3   | 71.2  | 26.4  |      | 58.3  | 36.0  | 6.2   |
| Queue Delay                                                         | 0.0   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |
| Total Delay                                                         | 47.4  | 68.7   | 5.4   | 61.9  | 47.9  | 6.3   | 71.2  | 26.4  |      | 58.3  | 36.0  | 6.2   |
| LOS                                                                 | D     | E      | A     | E     | D     | A     | E     | C     |      | E     | D     | A     |
| Approach Delay                                                      |       | 58.8   |       | 43.4  |       |       |       | 36.9  |      |       | 36.6  |       |
| Approach LOS                                                        |       | E      |       | D     |       |       |       | D     |      |       | D     |       |
| Queue Length 50th (m)                                               | 28.7  | 122.3  | 0.0   | 29.5  | 95.5  | 0.0   | 20.7  | 31.6  |      | 31.0  | 52.6  | 0.0   |
| Queue Length 95th (m)                                               | #59.9 | #168.3 | 12.6  | #71.5 | 120.6 | 17.2  | m31.3 | 44.7  |      | 44.0  | 72.5  | 16.9  |
| Internal Link Dist (m)                                              |       | 186.3  |       |       | 415.8 |       |       | 171.8 |      |       | 236.6 |       |
| Turn Bay Length (m)                                                 | 70.0  |        | 100.0 | 130.0 |       | 60.0  |       |       |      | 85.0  |       | 160.0 |
| Base Capacity (vph)                                                 | 238   | 955    | 528   | 215   | 960   | 560   | 474   | 920   |      | 474   | 1028  | 570   |
| Starvation Cap Reductn                                              | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Spillback Cap Reductn                                               | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Storage Cap Reductn                                                 | 0     | 0      | 0     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     | 0     |
| Reduced v/c Ratio                                                   | 0.78  | 0.99   | 0.26  | 0.85  | 0.82  | 0.33  | 0.32  | 0.54  |      | 0.63  | 0.48  | 0.29  |
| Intersection Summary                                                |       |        |       |       |       |       |       |       |      |       |       |       |
| Cycle Length: 120                                                   |       |        |       |       |       |       |       |       |      |       |       |       |
| Actuated Cycle Length: 120                                          |       |        |       |       |       |       |       |       |      |       |       |       |
| Offset: 7 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green |       |        |       |       |       |       |       |       |      |       |       |       |
| Natural Cycle: 120                                                  |       |        |       |       |       |       |       |       |      |       |       |       |
| Control Type: Actuated-Coordinated                                  |       |        |       |       |       |       |       |       |      |       |       |       |

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### Lanes, Volumes, Timings

#### 3: Greenbank & Strandherd

09-17-2019

|                                                                   |                        |
|-------------------------------------------------------------------|------------------------|
| Maximum v/c Ratio: 0.99                                           | Intersection LOS: D    |
| Intersection Capacity Utilization 91.5%                           | ICU Level of Service F |
| Analysis Period (min) 15                                          |                        |
| Description: As per timing plans provided 26-Nov-2018             |                        |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |
| Queue shown is maximum after two cycles.                          |                        |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |
| Splits and Phases: 3: Greenbank & Strandherd                      |                        |
|                                                                   |                        |

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Lanes, Volumes, Timings

5: Greenbank & Chapman Mills

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|                                | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR   | SBL   | SBT    | SBR |
|--------------------------------|-------|-------|-------|-------|-------|-----|-------|-------|-------|-------|--------|-----|
| Lane Group                     | EBL   | EBT   | EBR   | WBL   | WBT   | WBR | NBL   | NBT   | NBR   | SBL   | SBT    | SBR |
| Lane Configurations            | 1     | 2     | 3     | 4     | 5     | 6   | 7     | 8     | 9     | 10    | 11     | 12  |
| Traffic Volume (vph)           | 91    | 206   | 88    | 99    | 165   | 40  | 81    | 502   | 57    | 50    | 578    | 102 |
| Future Volume (vph)            | 91    | 206   | 88    | 99    | 165   | 40  | 81    | 502   | 57    | 50    | 578    | 102 |
| Satd. Flow (prot)              | 1658  | 1745  | 1483  | 1658  | 1686  | 0   | 1658  | 3255  | 0     | 1658  | 1697   | 0   |
| Flt Permitted                  | 0.950 |       |       | 0.950 |       |     | 0.950 |       |       | 0.950 |        |     |
| Satd. Flow (perm)              | 1642  | 1745  | 1400  | 1616  | 1686  | 0   | 1651  | 3255  | 0     | 1650  | 1697   | 0   |
| Satd. Flow (RTOR)              |       |       | 114   | 9     |       |     | 12    |       |       |       | 9      |     |
| Lane Group Flow (vph)          | 91    | 206   | 88    | 99    | 205   | 0   | 81    | 559   | 0     | 50    | 680    | 0   |
| Turn Type                      | Prot  | NA    | Perm  | Prot  | NA    |     | Prot  | NA    |       | Prot  | NA     |     |
| Protected Phases               | 7     | 4     |       | 3     | 8     |     | 5     | 2     |       | 1     | 6      |     |
| Permitted Phases               | 4     |       |       |       |       |     |       |       |       |       |        |     |
| Detector Phase                 | 7     | 4     | 4     | 3     | 8     |     | 5     | 2     |       | 1     | 6      |     |
| Switch Phase                   |       |       |       |       |       |     |       |       |       |       |        |     |
| Minimum Initial (s)            | 5.0   | 10.0  | 10.0  | 5.0   | 10.0  |     | 5.0   | 10.0  |       | 5.0   | 10.0   |     |
| Minimum Split (s)              | 13.0  | 24.7  | 24.7  | 11.7  | 34.7  |     | 11.2  | 34.6  |       | 11.6  | 34.6   |     |
| Total Split (s)                | 14.0  | 32.6  | 32.6  | 15.2  | 34.7  |     | 14.0  | 58.0  |       | 14.2  | 58.2   |     |
| Total Split (%)                | 11.6% | 27.0% | 27.0% | 12.6% | 28.7% |     | 11.6% | 48.0% |       | 11.7% | 48.1%  |     |
| Yellow Time (s)                | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |     | 3.7   | 3.7   |       | 3.7   | 3.7    |     |
| All-Red Time (s)               | 1.0   | 3.4   | 3.4   | 1.0   | 3.4   |     | 1.0   | 2.9   |       | 1.0   | 2.9    |     |
| Lost Time Adjust (s)           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |       | 0.0   | 0.0    |     |
| Total Lost Time (s)            | 4.3   | 6.7   | 6.7   | 4.3   | 6.7   |     | 4.7   | 6.6   |       | 4.7   | 6.6    |     |
| Lead/Lag                       | Lead  | Lag   | Lag   | Lead  | Lag   |     | Lead  | Lag   |       | Lead  | Lag    |     |
| Lead-Lag Optimize?             | Yes   | Yes   | Yes   | Yes   | Yes   |     | Yes   | Yes   |       | Yes   | Yes    |     |
| Recall Mode                    | None  | None  | None  | None  | None  |     | None  | Max   |       | None  | Max    |     |
| Act Effct Green (s)            | 9.2   | 18.4  | 18.4  | 10.1  | 19.2  |     | 8.8   | 52.7  |       | 8.0   | 52.2   |     |
| Actuated g/C Ratio             | 0.08  | 0.17  | 0.17  | 0.09  | 0.18  |     | 0.08  | 0.48  |       | 0.07  | 0.48   |     |
| v/c Ratio                      | 0.65  | 0.70  | 0.27  | 0.65  | 0.67  |     | 0.61  | 0.35  |       | 0.41  | 0.83   |     |
| Control Delay                  | 73.2  | 56.9  | 5.6   | 70.6  | 52.2  |     | 71.2  | 19.9  |       | 61.6  | 37.5   |     |
| Queue Delay                    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |     | 0.0   | 0.0   |       | 0.0   | 3.8    |     |
| Total Delay                    | 73.2  | 56.9  | 5.6   | 70.6  | 52.2  |     | 71.2  | 19.9  |       | 61.6  | 41.3   |     |
| LOS                            | E     | E     | A     | E     | D     |     | E     | B     |       | E     | D      |     |
| Approach Delay                 | 49.0  |       |       |       | 58.2  |     |       |       | 26.4  |       |        |     |
| Approach LOS                   | D     |       |       |       | E     |     |       |       | C     |       |        |     |
| Queue Length 50th (m)          | 20.7  | 45.7  | 0.0   | 22.4  | 43.0  |     | 18.4  | 41.8  |       | 11.2  | 136.5  |     |
| Queue Length 95th (m)          | #48.1 | 71.5  | 8.3   | #49.0 | 66.5  |     | #42.8 | 64.3  |       | 25.5  | #237.6 |     |
| Internal Link Dist (m)         | 241.3 |       |       |       | 403.7 |     |       |       | 204.2 |       |        |     |
| Turn Bay Length (m)            | 38.0  |       | 60.0  | 38.0  |       |     | 38.0  |       |       | 38.0  |        |     |
| Base Capacity (vph)            | 149   | 433   | 433   | 167   | 444   |     | 143   | 1575  |       | 146   | 816    |     |
| Starvation Cap Reductn         | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |       | 0     | 76     |     |
| Spillback Cap Reductn          | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |       | 0     | 0      |     |
| Storage Cap Reductn            | 0     | 0     | 0     | 0     | 0     |     | 0     | 0     |       | 0     | 0      |     |
| Reduced v/c Ratio              | 0.61  | 0.48  | 0.20  | 0.59  | 0.46  |     | 0.57  | 0.35  |       | 0.34  | 0.92   |     |
| Intersection Summary           |       |       |       |       |       |     |       |       |       |       |        |     |
| Cycle Length: 120.9            |       |       |       |       |       |     |       |       |       |       |        |     |
| Actuated Cycle Length: 109.2   |       |       |       |       |       |     |       |       |       |       |        |     |
| Natural Cycle: 105             |       |       |       |       |       |     |       |       |       |       |        |     |
| Control Type: Semi Act-Uncoord |       |       |       |       |       |     |       |       |       |       |        |     |
| Maximum v/c Ratio: 0.83        |       |       |       |       |       |     |       |       |       |       |        |     |

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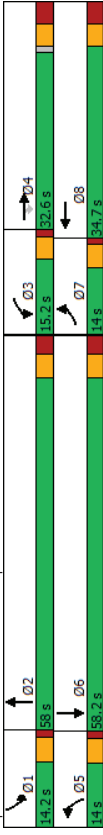
Lanes, Volumes, Timings

5: Greenbank & Chapman Mills

09-17-2019

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Intersection Signal Delay: 41.1                                 | Intersection LOS: D    |
| Analysis Period (min) 15                                        | ICU Level of Service E |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 5: Greenbank & Chapman Mills



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Lanes, Volumes, Timings  
6: Greenbank & Street "B"

09-17-2019

| Lane Group                     | EBL   | EBR | NBL   | NBT   | SBT   | SBR |
|--------------------------------|-------|-----|-------|-------|-------|-----|
| Lane Configurations            | W     |     |       |       |       |     |
| Traffic Volume (vph)           | 48    | 5   | 7     | 548   | 649   | 73  |
| Future Volume (vph)            | 48    | 5   | 7     | 548   | 649   | 73  |
| Satd. Flow (prot)              | 1648  | 0   | 1658  | 1745  | 1721  | 0   |
| Flt Permitted                  | 0.957 |     | 0.362 |       |       |     |
| Satd. Flow (perm)              | 1648  | 0   | 632   | 1745  | 1721  | 0   |
| Satd. Flow (RTOR)              | 5     |     |       |       | 13    |     |
| Lane Group Flow (vph)          | 53    | 0   | 7     | 548   | 722   | 0   |
| Turn Type                      | Prot  |     | Perm  | NA    | NA    |     |
| Protected Phases               | 4     |     |       | 2     | 6     |     |
| Permitted Phases               |       |     | 2     |       |       |     |
| Detector Phase                 | 4     | 2   | 2     | 2     | 6     |     |
| Switch Phase                   |       |     |       |       |       |     |
| Minimum Initial (s)            | 5.0   |     | 5.0   | 5.0   | 5.0   |     |
| Minimum Split (s)              | 26.2  |     | 23.1  | 23.1  | 23.1  |     |
| Total Split (s)                | 27.0  |     | 63.0  | 63.0  | 63.0  |     |
| Total Split (%)                | 30.0% |     | 70.0% | 70.0% | 70.0% |     |
| Yellow Time (s)                | 3.3   |     | 3.7   | 3.7   | 3.7   |     |
| All-Red Time (s)               | 1.9   |     | 1.4   | 1.4   | 1.4   |     |
| Lost Time Adjust (s)           | 0.0   |     | 0.0   | 0.0   | 0.0   |     |
| Total Lost Time (s)            | 5.2   |     | 5.1   | 5.1   | 5.1   |     |
| Lead/Lag                       |       |     |       |       |       |     |
| Lead-Lag Optimize?             |       |     |       |       |       |     |
| Recall Mode                    | None  |     | Max   | Max   | Max   |     |
| Act Effct Green (s)            | 8.0   |     | 74.6  | 74.6  | 74.6  |     |
| Actuated g/C Ratio             | 0.09  |     | 0.87  | 0.87  | 0.87  |     |
| v/c Ratio                      | 0.34  |     | 0.01  | 0.36  | 0.48  |     |
| Control Delay                  | 40.3  |     | 2.4   | 3.2   | 4.1   |     |
| Queue Delay                    | 0.0   |     | 0.0   | 0.0   | 0.0   |     |
| Total Delay                    | 40.3  |     | 2.4   | 3.2   | 4.1   |     |
| LOS                            | D     |     | A     | A     | A     |     |
| Approach Delay                 | 40.3  |     | 3.2   | 4.1   |       |     |
| Approach LOS                   | D     |     | A     | A     |       |     |
| Queue Length 50th (m)          | 8.5   |     | 0.2   | 21.9  | 33.1  |     |
| Queue Length 95th (m)          | 19.1  |     | 1.2   | 41.5  | 63.9  |     |
| Internal Link Dist (m)         | 444.3 |     |       | 187.4 | 204.2 |     |
| Turn Bay Length (m)            |       |     | 38.0  |       |       |     |
| Base Capacity (vph)            | 424   |     | 549   | 1516  | 1497  |     |
| 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              | 0.13  |     | 0.01  | 0.36  | 0.48  |     |
| Intersection Summary           |       |     |       |       |       |     |
| Cycle Length: 90               |       |     |       |       |       |     |
| Actuated Cycle Length: 85.8    |       |     |       |       |       |     |
| Natural Cycle: 60              |       |     |       |       |       |     |
| Control Type: Semi Act-Uncoord |       |     |       |       |       |     |
| Maximum v/c Ratio: 0.48        |       |     |       |       |       |     |

3288 Jockvale Road PM Peak Hour 2030 Total

Synchro 10 Light Report  
Page 9

Lanes, Volumes, Timings  
6: Greenbank & Street "B"

09-17-2019

|                                              |                        |
|----------------------------------------------|------------------------|
| Intersection Signal Delay: 5.1               | Intersection LOS: A    |
| Intersection Capacity Utilization 53.5%      | ICU Level of Service A |
| Analysis Period (min) 15                     |                        |
| Splits and Phases: 6: Greenbank & Street "B" |                        |
| ← Ø2                                         | → Ø4                   |
| 83 s                                         | 27 s                   |
| ↓ Ø6                                         |                        |
| 53 s                                         |                        |

3288 Jockvale Road PM Peak Hour 2030 Total

Synchro 10 Light Report  
Page 10

Lanes, Volumes, Timings  
8: Chapman Mills

09-17-2019

| Lane Group                     | EBT   | EBR   | WBL   | WBT   | NBL   | NBR  |
|--------------------------------|-------|-------|-------|-------|-------|------|
| Lane Configurations            | 126   | 29    | 91    | 74    | 38    | 20   |
| Traffic Volume (vph)           | 126   | 29    | 91    | 74    | 38    | 20   |
| Future Volume (vph)            | 1691  | 0     | 1658  | 1745  | 1658  | 1483 |
| Satd. Flow (prot)              |       |       | 0.659 |       | 0.950 |      |
| Flt Permitted                  |       |       |       |       |       |      |
| Satd. Flow (perm)              | 1691  | 0     | 1138  | 1745  | 1645  | 1439 |
| Satd. Flow (RTOR)              | 17    |       |       |       |       | 20   |
| Lane Group Flow (vph)          | 155   | 0     | 91    | 74    | 38    | 20   |
| Turn Type                      | NA    | Perm  | NA    | Prot  | Perm  | Perm |
| Protected Phases               | 4     |       |       | 8     | 2     |      |
| Permitted Phases               |       |       | 8     |       |       | 2    |
| Detector Phase                 | 4     | 8     | 8     | 2     | 2     | 2    |
| Switch Phase                   |       |       |       |       |       |      |
| Minimum Initial (s)            | 10.0  |       | 10.0  | 10.0  | 10.0  | 10.0 |
| Minimum Split (s)              | 23.2  | 23.2  | 34.8  | 34.8  | 34.8  |      |
| Total Split (s)                | 47.0  | 47.0  | 47.0  | 43.0  | 43.0  |      |
| Total Split (%)                | 52.2% | 52.2% | 52.2% | 47.8% | 47.8% |      |
| Yellow Time (s)                | 3.3   | 3.3   | 3.3   | 3.3   | 3.3   |      |
| All-Red Time (s)               | 1.9   | 1.9   | 1.9   | 3.5   | 3.5   |      |
| Lost Time Adjust (s)           | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |
| Total Lost Time (s)            | 5.2   | 5.2   | 5.2   | 6.8   | 6.8   |      |
| Lead/Lag                       |       |       |       |       |       |      |
| Lead-Lag Optimize?             |       |       |       |       |       |      |
| Recall Mode                    | Max   | Max   | Max   | None  | None  |      |
| Act Effct Green (s)            | 57.8  | 57.8  | 57.8  | 13.3  | 13.3  |      |
| Actuated g/C Ratio             | 0.79  | 0.79  | 0.79  | 0.18  | 0.18  |      |
| v/c Ratio                      | 0.12  | 0.10  | 0.05  | 0.13  | 0.07  |      |
| Control Delay                  | 5.2   | 6.2   | 5.8   | 26.1  | 10.9  |      |
| Queue Delay                    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |
| Total Delay                    | 5.2   | 6.2   | 5.8   | 26.1  | 10.9  |      |
| LOS                            | A     | A     | A     | C     | B     |      |
| Approach Delay                 | 5.2   | 6.0   | 20.9  |       |       |      |
| Approach LOS                   | A     | A     | C     |       |       |      |
| Queue Length 50th (m)          | 5.4   | 3.5   | 2.8   | 5.5   | 0.0   |      |
| Queue Length 95th (m)          | 21.3  | 15.5  | 12.3  | 11.3  | 4.8   |      |
| Internal Link Dist (m)         | 234.6 |       | 241.3 | 107.8 |       |      |
| Turn Bay Length (m)            |       | 38.0  |       | 38.0  |       |      |
| Base Capacity (vph)            | 1344  | 902   | 1383  | 837   | 736   |      |
| Starvation Cap Reductn         | 0     | 0     | 0     | 0     | 0     |      |
| Spillback Cap Reductn          | 0     | 0     | 0     | 0     | 0     |      |
| Storage Cap Reductn            | 0     | 0     | 0     | 0     | 0     |      |
| Reduced v/c Ratio              | 0.12  | 0.10  | 0.05  | 0.05  | 0.03  |      |
| Intersection Summary           |       |       |       |       |       |      |
| Cycle Length: 90               |       |       |       |       |       |      |
| Actuated Cycle Length: 72.9    |       |       |       |       |       |      |
| Natural Cycle: 60              |       |       |       |       |       |      |
| Control Type: Semi Act-Uncoord |       |       |       |       |       |      |
| Maximum v/c Ratio: 0.13        |       |       |       |       |       |      |

3288 Jockvale Road PM Peak Hour 2030 Total

Lanes, Volumes, Timings  
8: Chapman Mills

09-17-2019

|                                              |                                              |
|----------------------------------------------|----------------------------------------------|
| Intersection Signal Delay: 8.0               | Intersection LOS: A                          |
| Intersection Capacity Utilization 48.3%      | ICU Level of Service A                       |
| Analysis Period (min) 15                     |                                              |
| Splits and Phases: 8: Chapman Mills          |                                              |
| <div> <div>← D2</div> <div>→ D4</div> </div> | <div> <div>← D2</div> <div>→ D4</div> </div> |
| 43 s                                         | 47 s                                         |
| 47 s                                         | 47 s                                         |

3288 Jockvale Road PM Peak Hour 2030 Total

# Appendix K

TDM Checklists

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

**Legend**

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

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

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

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

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

| TDM measures: Residential developments       |                                                                               | Check if proposed & add descriptions |
|----------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------|
| <b>6. TDM MARKETING &amp; COMMUNICATIONS</b> |                                                                               |                                      |
| <b>6.1 Multimodal travel information</b>     |                                                                               |                                      |
| BASIC ★                                      | 6.1.1 Provide a multimodal travel option information package to new residents | <input checked="" type="checkbox"/>  |
| <b>6.2 Personalized trip planning</b>        |                                                                               |                                      |
| BETTER ★                                     | 6.2.1 Offer personalized trip planning to new residents                       | <input type="checkbox"/>             |

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

**Legend**

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

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

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

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

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