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National Capital Business Park

Traffic Impact Assessment

Engineering excellence. Planning precision. Inspired landscapes.

National Capital Business Park
4055 and 4120 Russell Road
Transportation Impact Assessment

Prepared By:

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Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
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May 2020

Novatech File: 119124
Ref: R-2020-015

May 19, 2020

Ministry of Transportation - Eastern Region
Corridor Management Planner
1355 John Counter Blvd.
Kingston, Ontario K7L 5A3

Attention: Mr. Stephen Kapusta

City of Ottawa
Planning and Growth Management Department
110 Laurier Ave. W., 4th Floor,
Ottawa, Ontario K1P 1J1

Attention: Mr. Wally Dubyk

Dear Sirs:

**Reference: National Capital Business Park
Transportation Impact Assessment
Novatech File No. 119124**

We are pleased to submit the following Transportation Impact Assessment in support of a Master Site Plan Application for the development of the National Capital Business Park (4055 and 4120 Russell Road). The structure and format of this report is in accordance with the City of Ottawa Transportation Impact Assessment Guidelines (June 2017) and the MTO General Guidelines for the Preparation of Traffic Impact Studies (December 2009).

If you have any questions or comments regarding this report, please feel free to contact me.

Yours truly,

NOVATECH



Patrick Hatton, P.Eng.
Project Manager | Transportation/Traffic



TIA Plan Reports

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

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

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

CERTIFICATION

1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
4. I am either a licensed¹ or registered² professional in good standing, whose field of expertise [check ☒ appropriate field(s)] is either transportation engineering ☒ or transportation planning ☐.

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

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Dated at Ottawa this 19th day of May, 2020.
(City)

Name: Patrick Hatton, P.Eng.
(Please Print)

Professional Title: Project Manager, Transportation / Traffic



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

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EXECUTIVE SUMMARY

This Transportation Impact Assessment (TIA) report has been prepared in support of a Master Site Plan application for the National Capital Business Park at 4055 and 4120 Russell Road.

The general area is characterized by a combination of various commercial and industrial land uses, including an existing hydro substation immediately north of 4055 Russell Road and a newly constructed Hydro Ottawa office just to the west of 4120 Russell Road.

The subject sites are designated as 'Urban Employment Area' on Schedule 'B' of the City of Ottawa's Official Plan and zoned IH (Heavy Industrial). The proposed development is planned to be completed by 2023 and includes:

- Site 1- one warehouse with 8,325m² (89,610ft²);
- Site 2- two warehouses with 17,400m² (187,300ft²); and,
- Site 3- three warehouses with 75,685m² (814,700ft²).

The development is planned to include a total of about 976 parking spaces as well as loading bays and trailer drop spaces within each site. The concept includes six accesses to Russell Road and a connection to Hunt Club Road.

The study area intersections are:

- Russell Road / Walkley Road
- Russell Road/ Hawthorne Road
- Hawthorne Road / Stevenage Road
- Hawthorne Road / Hunt Club Road
- Russell Road / Belgreen Drive
- Russell Road/Anderson Road
- Hunt Club Road/Highway 417 EB Off-Ramp
- Ramsayville Road/Russell Road (South)
- Ramsayville Road/Russell Road (North)
- Walkley Road / Highway 417 SB Off-Ramp
- Walkley Road / Highway 417 NB Off-Ramp
- The five site driveway intersections (seven accesses)

The weekday AM and PM peak hours are considered to represent the "worst case" combination of site-generated traffic and peak traffic conditions of the adjacent roadways. Intersection capacity analysis has been completed for the weekday AM and PM peak hours. Analysis of potential transportation impacts has been completed for the 2023 opening year, the 2028 five-year horizon, and the 2033 ten-year horizon year. Weekday AM and PM traffic counts were completed at the existing study area intersections by the City of Ottawa, the MTO, or coordinated by Novatech.

A 1% background growth rate was applied to traffic along Walkley Road, Russell Road, Hunt Club Road, Hawthorne Road, the Hwy 417 ramps, and Ramsayville Road between Russell Road North and Russell Road South with a 0% growth rate on other study streets. Other study area developments have been accounted for separately. Background traffic volumes for the 2023 opening year and the 2028 and 2033 horizon years were determined by applying the annual traffic growth rate to the peak hour traffic volumes and by adding the traffic from the new developments in the area. Site generated traffic was estimated using *Trip Generation Manual, 10th Edition* (Institute of Transportation Engineers, Washington 2017). Site traffic was distributed and added to the projected background traffic to determine future total traffic volumes.

The main conclusions and recommendations of this TIA are:

Development Design and Parking

- Pedestrian facilities will be provided between the main buildings and the parking lots. New pedestrian walkways will be constructed, providing connectivity to Russell Road.
- The Transportation Demand Management (TDM) infrastructure and measures checklists will be prepared for each site plan submission.
- The conceptual vehicular parking spaces meet the requirements of the Zoning By-Law (ZBL) for each of the three sites. Vehicular, accessible, and bicycle parking requirements for each building will be confirmed with the site plan submissions.
- Stops #3336 and 3339 are located immediately in front of Buildings A and B. Stops #3335 and 3340 are less than 400m to Buildings C, D, and F. Building E is about 650m from the nearest bus stop. Walking distance between exterior access doors and the transit stops will be reviewed at site plan submission.
- Each building exceeds the minimum requirements of the ZBL for vehicle loading space, and this will be confirmed at site plan submission.

Boundary Street Multi-Modal Level of Service (MMLOS)

The results of the segment MMLOS analysis for Russell Road and Hunt Club Road can be summarized as follows:

- Both Russell Road and Hunt Club Road operate with a Pedestrian Level of Service (PLOS) F, missing the target PLOS C;
- Russell Road (F) and Hunt Club Road (E) miss the target Bicycle Level of Service (BLOS) of E and C, respectively;
- Russell Road (C) misses and Hunt Club Road (A) exceeds the target Truck Level of Service (TkLOS) of B; and,
- If the City urbanizes Russell Road in the future, sidewalk and onstreet bicycle lanes should be considered. The existing gravel shoulders are approximately 2.5m. The City may wish to consider paving an additional 0.5m on either side of the road.

Transit

- The proposed development is anticipated to generate an additional 110 transit trips (60 in, 50 out) during the weekday AM peak hour and 111 transit trips (68 in, 43 out) during the weekday PM peak hour.
- The City should consider providing additional transit service during the peak period. The transit trips will be reviewed with each site plan submission.

Access Design

- The proposed development will be served by a total of seven accesses. The accesses will be 7-9m wide, measured at the property line. The accesses meet the requirements of the City's Private Approach By-law and provide adequate turning sight distance for heavy vehicles. Access design will be further reviewed with each site plan submission.
- Southbound left turn lanes are warranted along Russell Road at both accesses to Building A.
- An eastbound left turn lane is warranted along Hunt Club Road at the Street 1 connection.
- Left turn lanes are not warranted on Russell Road at the access intersections for Sites 1 and 2 or Building F.
- The Street 1 connection to Hunt Club Road should be signalized while the remaining connections operate well with STOP control.

- The signalized Street 1 connection to Hunt Club is proposed approximately 250m east of the Hydro Ottawa (signalized) Access. The location and ultimate functional design of this intersection have been agreed by the City of Ottawa in a tri-party agreement with NCC and Hydro Ottawa in 2016.
- The Street 1 connection is 60m east of Hydro Ottawa's right-in, right-out (RIRO) driveway. Per the 2711 Hunt Club TIS, it is understood that Hydro's RIRO access may be closed with construction of the Street 1 access and a new connection provided between the Hydro Ottawa site and Street 1.

Intersection MMLOS Analysis

- The Walkley at Russell and Hunt Club at Hawthorne intersections do not meet the target Auto LOS.
- Auto Level of Service:
 - The northbound, eastbound, and westbound approaches at the **Walkley Road / Russell Road** intersection do not meet the target Auto LOS D in the PM peak hour. The eastbound left turn movement in the PM peak can be improved to LOS D or better with signal timing adjustments at the expense of the westbound through movement. To achieve the target, a reduction in PM peak hour traffic volumes for the following movements are required:
 - Northbound right turn: reduction of approximately 130 vehicles;
 - Eastbound through: reduction of approximately 165 vehicles;
 - Westbound left turn: reduction of approximately 110 vehicles.
 - At the **Hunt Club Road / Hawthorne Road** intersection, the northbound through and eastbound left movements do not meet the target Auto LOS D in the AM peak hour and the westbound left movement does not meet the target Auto LOS D in the PM peak hour. The installation of dual eastbound and westbound left turn lanes and signal timing adjustments would improve the existing Auto LOS to D.
- In existing and future traffic conditions, capacity issues have been identified for the following movements:
 - Walkley Road/Russell Road
 - Northbound left turn (AM peak)
 - Northbound right turn (PM peak)
 - Eastbound left turn (PM peak)
 - Eastbound through (PM peak)
 - Westbound left turn (PM peak)
 - Russell Road/Hawthorne Road
 - Southbound left turn (AM and PM peak)
 - Westbound right turn (AM peak)
 - Hawthorne Road/Hunt Club Road
 - Northbound through (AM peak)
 - Eastbound left turn (AM and PM peak)
 - Eastbound through (PM peak)
 - Westbound left (PM peak)
 - Walkley Road/Highway 417 NB Off-ramp
 - Northbound approach (AM peak)
 - Walkley Road/Highway 417 SB Off-ramp
 - Southbound approach (PM peak)
 - Russell Road/Anderson Road

- Northbound approach (AM peak)
- Westbound approach (AM peak)

Recommended Modifications

Several modifications have been identified for consideration. The need and timing will be confirmed at site plan submission. Functional designs of required road modifications to accommodate the development will be included in the site plan submissions. The modifications that have been identified for consideration are:

Existing/Background Traffic:

These modifications are identified for the City's/MTO's consideration without added site development.

- Install dual eastbound and westbound left turn lanes on Hunt Club Road at Hawthorne Road to improve the level of service and accommodate the existing and projected queues without and with site generated trips.
- Consider installation of a roundabout at the Russell Road/Anderson Road intersection to accommodate existing and projected traffic without and with site generated trips.
- Install traffic signals at the Walkley Road/Highway 417 northbound and southbound off-ramps to accommodate existing and projected traffic without and with site generated trips.
- Modify the right turn ramp for Highway 417 eastbound off-ramp onto Hunt Club Road with an increased radius or a second lane to accommodate projected traffic without and with site generated trips.

Site Traffic:

These modifications are identified to accommodate site generated trips.

- Install a left turn protected/permissive phase southbound on Russell Road at the Hawthorne intersection. This is expected to be required to accommodate site generated trips.
- Install southbound left turn lanes on Russell Road at both connections to the parcel hub (Civic #4055) to accommodate site generated trips.
- Install a northbound left turn lane on Russell Road at Belgreen Drive, warranted with site development. As development progresses in the Russell Road corridor and with the addition of new site accesses, it is expected that the operating speed may decrease and the posted speed of 60 km/h further north on Russell Road should be extended.
- Install an eastbound left turn lane and traffic signals at the Street 1 connection to Hunt Club Road to accommodate site generated trips.

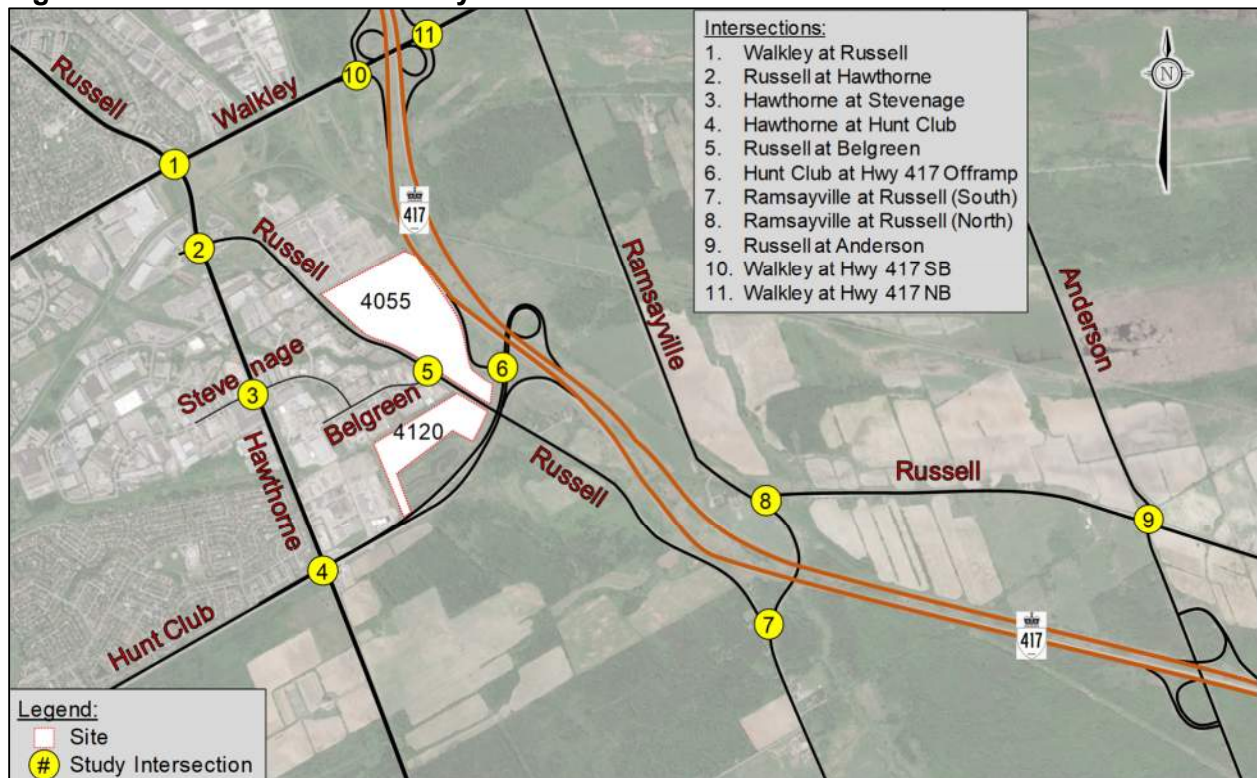
Required Road Modification Approvals (RMA) for these potential modifications will be prepared at site plan when the details of the individual sites are known.

1.0 SITE LOCATION

This Transportation Impact Assessment (TIA) Forecasting report has been prepared in support of a Master Site Plan application for the National Capital Business Park at 4055 and 4120 Russell Road located west of the Hunt Club / Hwy 417 interchange (See **Figure 1**). Civic #4120 is vacant while civic #4055 includes a vacant farm as well as one single family dwelling.

The general area is characterized by a combination of various commercial and industrial land uses, including an existing hydro substation immediately north of 4055 Russell Road and a newly constructed Hydro Ottawa office just to the west of 4120 Russell Road.

Figure 1: Site Location and Study Area



2.0 PROPOSED DEVELOPMENT

The subject sites are designated as 'Urban Employment Area' on Schedule 'B' of the City of Ottawa's Official Plan and zoned IH (Heavy Industrial). The proposed development (See **Appendix A**) is planned to be completed by 2023 and includes:

- Site 1- one warehouse with 8,325m² (89,610ft²);
- Site 2- two warehouses with 17,400m² (187,300ft²); and,
- Site 3- three warehouses with 75,685m² (814,700ft²).

The development is planned to include a total of about 976 parking spaces as well as loading bays and trailer drop spaces within each site. The concept includes six accesses to Russell Road and a connection to Hunt Club Road (Street 1).

3.0 SCREENING

The City of Ottawa's 2017 TIA Guidelines identifies three triggers for completing a TIA report, including trip generation, location, and safety. The criteria for each trigger are outlined in the City's TIA Screening Form.

The proposed development satisfies all three triggers for completing a TIA since:

1. The development is expected to generate more than 60 person trips;
2. A connection to Hunt Club is proposed; and,
3. The posted speed limit on Russell Road is 80 km/h.

The TIA screening form is included in **Appendix B**.

4.0 SCOPING

4.1 Existing Conditions

4.1.1 Roadways

Russell Road is a two-lane undivided rural arterial and is classified as a truck route, allowing full loads. It runs northwest-southeast through the area and has a posted speed limit of 80km/h. The City of Ottawa Official Plan identifies 30m ROW protection and widening may be required as part of development applications.

Hunt Club Road is a four-lane divided arterial roadway and is classified as a truck route, allowing full loads. It runs east-west and has a posted speed limit of 80km/h. The City of Ottawa Official Plan identifies 42.5m - 50m ROW protection from Hawthorne Road to Highway 417.

Walkley Road is a four-lane divided arterial roadway and is classified as a truck route, allowing full loads. It runs east-west and has a posted speed limit of 80km/h east of Russell and 50km/h west of Russell.

Hawthorne Road is a five-lane undivided arterial roadway and is classified as a truck route, allowing full loads between the north-south Russell Road intersections, north and south of the 417. It runs north-south and has a posted speed limit of 70km/h in this area.

Ramsayville Road is a two-lane undivided rural arterial roadway and is classified as a truck route between Russell North and Russell South. It runs north-south and has a posted speed limit of 80km/h in this area.

Anderson Road is a two-lane undivided rural arterial roadway and is classified as a truck route, allowing full loads south of Russell and restricted loads north of Russell. It runs north-south and has a posted speed limit of 80km/h in this area.

Stevenage Drive and **Belgreen Drive** are two-lane local roadways with posted speed limits of 40km/h.

4.1.2 Pedestrian and Cycling Facilities

Walkley Road, Hunt Club Road, Hawthorne Road, Ramsayville Road, and Russell Road east of Ramsayville Road are identified as spine cycling routes in the City's Cycling Network. There are currently on-street bicycle lanes along Hawthorne Road between Russell Road and Hunt Club Road.

Concrete sidewalks are provided along both sides of Walkley Road, along the west side of Hawthorne Road and along the north side of Hunt Club Road east of Hawthorne. There are greenbelt pathway connections at Russell / Ramsayville South.

4.1.3 Transit

Transit service (via route #47) is provided along Russell Road in front of the civic #4055 site and along Belgreen Drive with bus stops #3335 and #3336 (northbound service) and #3339 and #3340 (southbound service).

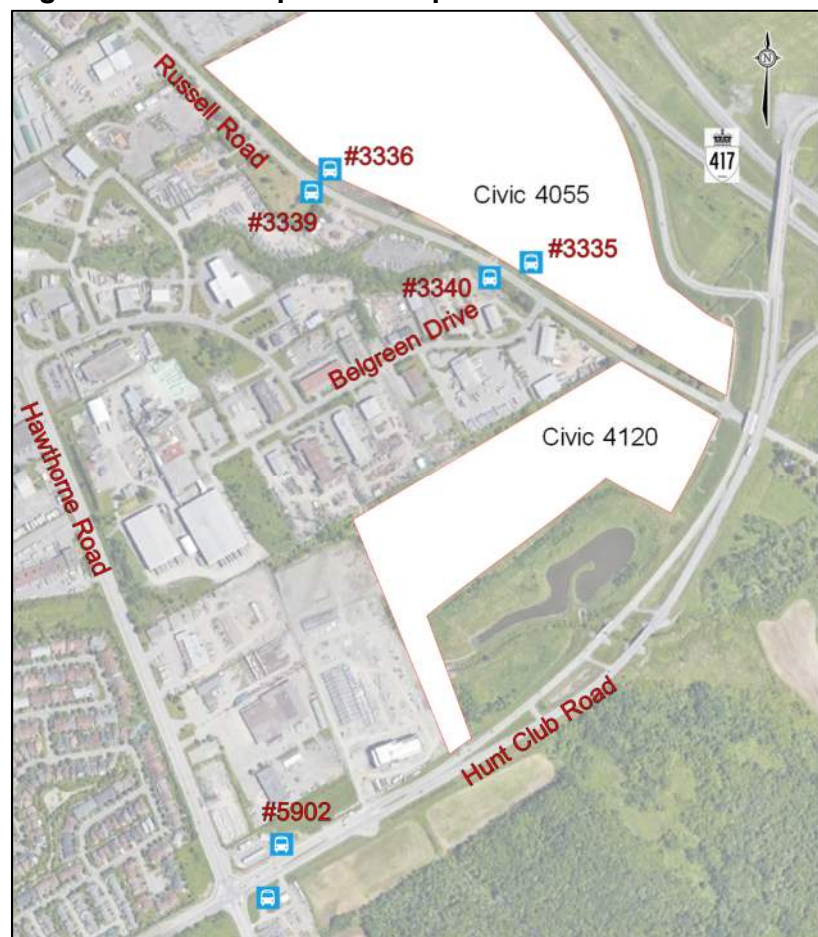
Additional transit service is provided (via route #98) with bus stops at the Hunt Club / Hawthorne intersection. These bus stop locations are shown in **Figure 2**.

OC Transpo Route #47 travels from the Hydro station just north of civic #4055, past the civic #4055 site along Russell Road and to the St Laurent Station. It provides weekday peak period service (from St Laurent toward the site in the morning and from the site toward St Laurent in the afternoon).

OC Transpo Route #98 travels from the Hunt Club / Hawthorne intersection to Hurdman station. It provides all day service 7 days per week.

OC Transpo Route information is included in **Appendix C**.

Figure 2: OC Transpo Bus Stop Locations

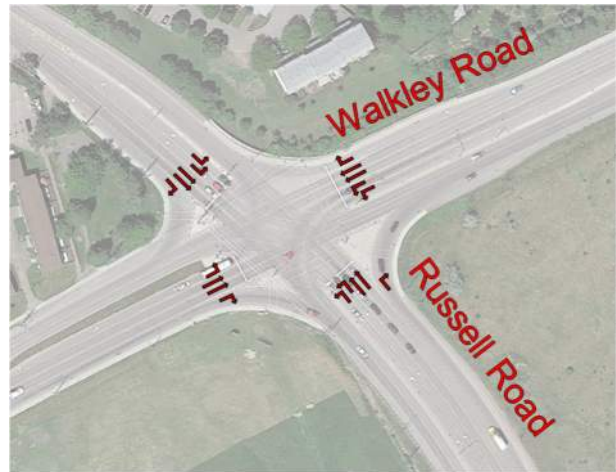


4.1.4 Study Area Intersections

The following are considered the study area intersections with layout and lane configurations of each described below.

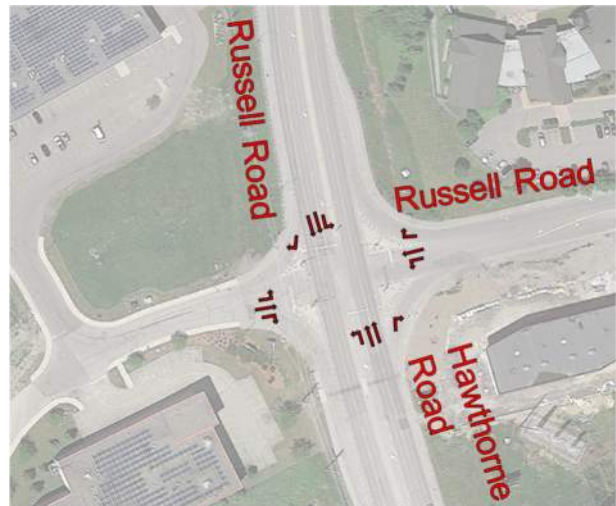
1. Russell Road at Walkley Road

- Signalized intersection
- Northbound (Russell Road): two left turn lanes, two through lanes, one pocket bicycle lane, and one channelized right turn lane.
- Southbound (Russell Road): two left turn lanes, two through lanes, and one channelized right turn lane.
- Eastbound (Walkley Road): one left turn lane, two through lanes, and one channelized right turn lane.
- Westbound (Walkley Road): two left turn lanes, two through lanes, and one right turn lane.
- Standard crosswalks are provided on all legs.



2. Russell Road at Hawthorne Road

- Signalized intersection
- Northbound (Hawthorne Road): one left turn lane, one through lane, one shared through/right turn (channelized) lane, and one bicycle lane.
- Southbound (Russell Road): one left turn lane, one through lane, one shared through/right turn (channelized) lane, and one pocket bicycle lane.
- Eastbound (3020 Hawthorne Road): one left turn lane, and one shared through/right turn (channelized) lane.
- Westbound (Russell Road): one left turn lane, one through lane, and one channelized right turn lane.
- Standard crosswalks are provided on all legs.



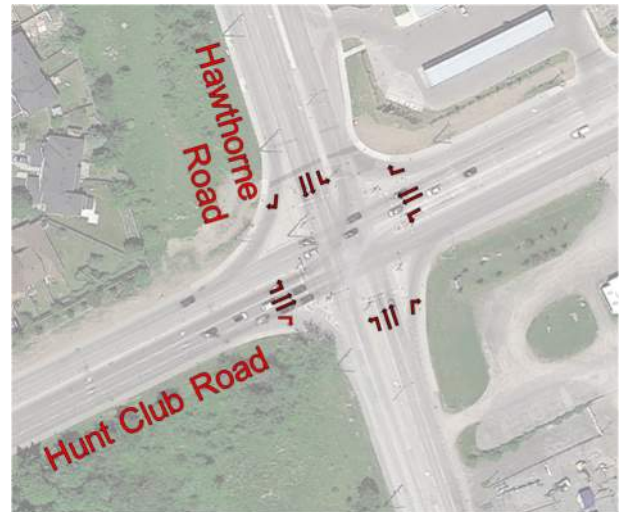
3. Hawthorne Road at Stevenage Drive

- Signalized intersection
- Northbound (Hawthorne Road): one left turn lane, one through lane, one shared through/right turn (channelized) lane, and one bicycle lane.
- Southbound (Hawthorne Road): one left turn lane, two through lanes, one bicycle lane, and one channelized right turn lane.
- Eastbound/Westbound (Stevenage Drive): one left turn lane, and one shared through/right turn (channelized) lane.
- Standard crosswalks are provided on all legs.



4. Hawthorne Road at Hunt Club Road

- Signalized intersection
- Northbound (Hawthorne Road): one left turn lane, one through lane, one shared through/right turn (channelized) lane, and one bicycle lane.
- Southbound (Hawthorne Road): one left turn lane, two through lanes, one bicycle lane, and one channelized right turn lane.
- Eastbound (Hunt Club Road): one left turn lane, one through lane, one shared through/right turn (channelized) lane.
- Westbound (Hunt Club Road): one left turn lane, two through lanes, one pocket bicycle lane, and one channelized right turn lane.
- Standard crosswalks are provided on all legs.



5. Russell Road at Belgreen Drive

- Minor STOP controlled intersection (STOP on Belgreen)
- Single lane approaches.



6. Hunt Club Road at Highway 417 EB Off-ramp

- STOP controlled intersection (STOP on ramp)
- Northbound/Southbound (Hunt Club Road): one through lane.
- Eastbound (Highway 417): one left turn lane and one channelized right turn lane.



7. Ramsayville Road at Russell Road (South)

- Minor STOP controlled intersection (STOP on Russell)
- Single Lane Approaches



8. Ramsayville Road at Russell Road (North)

- STOP controlled intersection (All-way STOP)
- Single Lane Approaches



9. Russell Road at Anderson Road

- STOP controlled intersection (All-way STOP)
- Single Lane Approaches



10, 11. Walkley Road at Highway 417 Ramps

- Partial cloverleaf interchange with channelized right turn lanes for all on-ramps
- Both intersections are unsignalized
- East/West: two through lanes
- Southbound off-ramp: One left turn lane and one channelized right turn lane
- Northbound off-ramp: One shared left turn / right turn lane



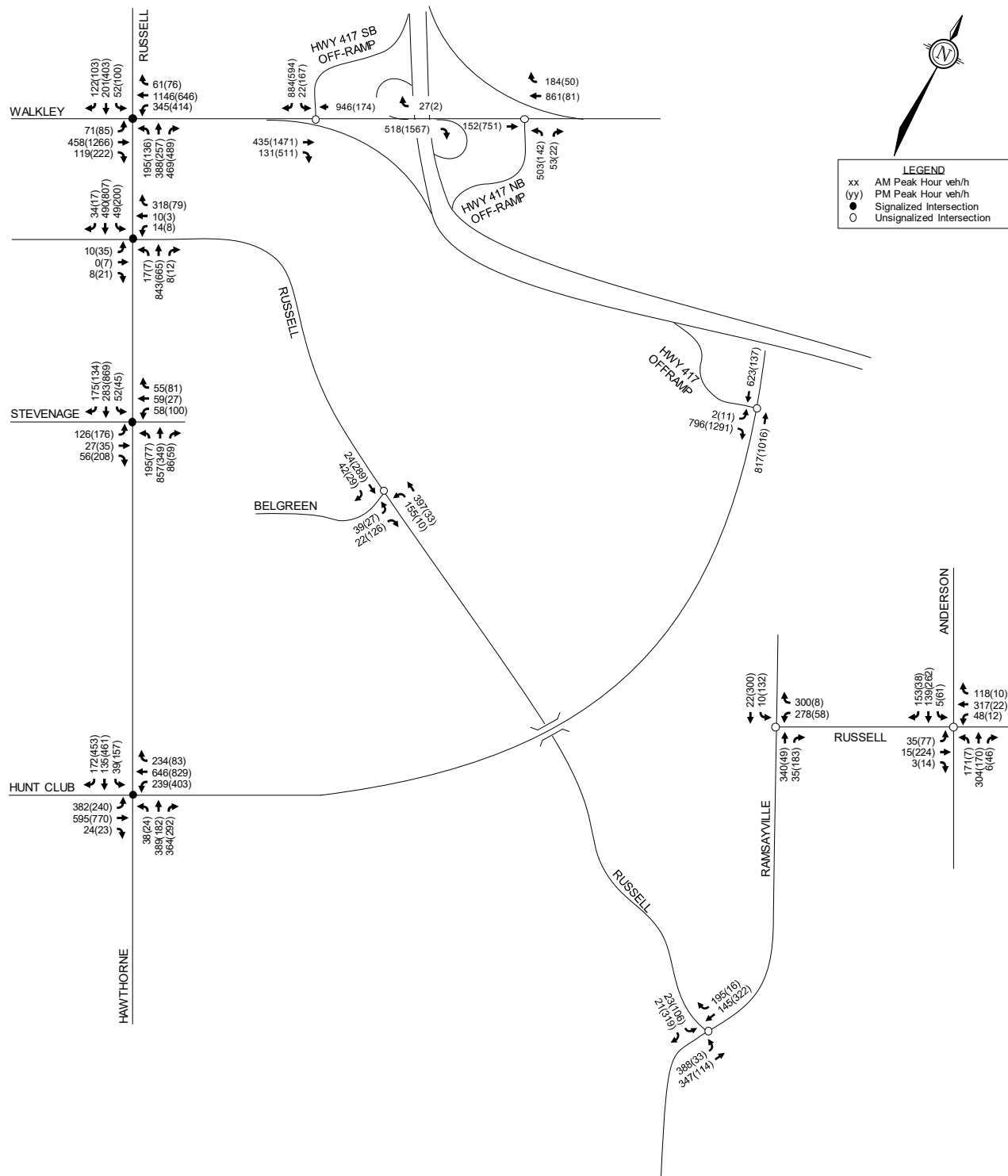
4.1.5 Existing Study Area Traffic Volumes

Weekday traffic counts were collected at the study area intersections to determine the existing pedestrian, cyclist and vehicular traffic volumes. The counts were completed by the City of Ottawa or MTO, or coordinated by Novatech on the following dates:

| | | |
|--|-------------------|------------|
| • Russell Road/Walkley Road | February 22, 2018 | (City) |
| • Russell Road/Hawthorne Road | January 30, 2019 | (City) |
| • Hawthorne Road/Stevenage Road | December 7, 2016 | (City) |
| • Hawthorne Road/Hunt Club Road | July 24, 2018 | (City) |
| • Russell Road/Belgreen Drive | November 14, 2019 | (Novatech) |
| • Hunt Club Road/Highway 417 EB Off-Ramp | December 12, 2019 | (Novatech) |
| • Ramsayville Road/Russell Road (South) | November 14, 2019 | (Novatech) |
| • Ramsayville Road/Russell Road (North) | November 14, 2019 | (Novatech) |
| • Russell Road/Anderson Road | November 14, 2019 | (Novatech) |
| • Walkley Road / Highway 417 SB Off-Ramp | August 6, 2019 | (MTO) |
| • Walkley Road / Highway 417 NB Off-Ramp | June 1, 2015 | (MTO) |

Observed weekday AM and PM peak hour traffic volumes at the study area intersections are shown in **Figure 3**. Peak hour summary sheets of the above traffic counts are included in **Appendix D**.

Figure 3: Existing Traffic Volumes



4.1.6 Collision Data

Historical collision data from the last five years were obtained from the City's Public Works and Service Department for the eleven study area intersections. Copies of the collision summary reports are included in **Appendix E**.

The collision data have been evaluated to determine if there are identifiable collision patterns. **Table 1** summarizes the number of collisions at each study intersection from January 1, 2014 to December 31, 2018. During the period, there were zero fatal collisions reported at the study intersections.

Table 1: Reported Collisions

| Intersection | Number of Collisions | | | | | | |
|--------------------------------|--------------------------|---------------|----------|-------|--------------|------------|------------|
| | SMV ¹ / Other | Approach- ing | Rear-End | Angle | Turning Mvmt | Side-swipe | Total |
| Russell at Walkley | 8 | 1 | 66 | 7 | 6 | 18 | 106 |
| Russell at Hawthorne | 0 | 0 | 1 | 0 | 2 | 1 | 4 |
| Hawthorne at Stevenage | 0 | 0 | 5 | 3 | 14 | 2 | 24 |
| Hawthorne at Hunt Club | 9 | 1 | 87 | 10 | 22 | 15 | 144 |
| Russell at Belgreen | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Hunt Club at Hwy 417 Off-ramp | 1 | 0 | 6 | 1 | 0 | 0 | 8 |
| Ramsayville at Russell (S) | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| Ramsayville at Russell (N) | 7 | 0 | 0 | 0 | 1 | 0 | 8 |
| Russell at Anderson | 0 | 0 | 3 | 2 | 0 | 0 | 5 |
| Walkley at Hwy 417 SB Off-ramp | 0 | 0 | 2 | 5 | 0 | 0 | 7 |
| Walkley at Hwy 417 NB Off-ramp | 1 | 0 | 0 | 1 | 1 | 2 | 5 |

1. SMV: Single Motor Vehicle

Russell at Walkley

A total of 106 collisions were reported at this intersection over the last five years, of which there were 66 rear-end impacts, six turning movement impacts, 18 sideswipe impacts, seven angle impacts, and eight single-vehicle/other impacts. Twenty of the collisions caused injuries, but none caused fatalities.

Of the 66 rear-end impacts, 23 occurred at the northbound approach (five through vehicle incidents, 14 right turn incidents, and four unknown), 15 occurred at the southbound approach (one left turn incident, six through vehicle incidents, and eight right turn incidents), 18 occurred at the eastbound approach (10 through vehicle incidents, four right turn incidents, and four unknown), and 10 occurred at the westbound approach (one left turn incident, eight through vehicle incidents, one right turn incident). Twenty-four of the 66 impacts occurred in poor driving conditions. Each approach features at least six rear-end impacts for at least one movement, meeting the threshold to be considered a collision pattern. High traffic volumes, including a high percentage of heavy vehicle traffic, create the potential for more collisions of this type. Additionally, the speed limit of the northbound approach is 70 km/h, the speed limit of the westbound approach changes from 80km/h to 50 km/h within approximately 75m of the intersection. All of these attributes may play a factor in the high number of rear-end collisions at this intersection. A red-light camera has been implemented at this intersection.

Of the 18 sideswipe impacts, five occurred at the northbound approach, two occurred at the southbound approach, two occurred at the eastbound approach, and nine occurred at the westbound approach. Six of the 18 impacts occurred in poor driving conditions. As discussed previously, high traffic volumes and a high percentage of heavy vehicles create the potential for collisions of this type. For westbound traffic, the upstream signal at Walkley Road/Lancaster Road is approximately 220m east, measured stop bar to stop bar. The westbound left turn lane extends back through the intersection with Lancaster Road as a third “through” lane, which may contribute to westbound sideswipes.

Of the seven angle impacts, two involved a northbound vehicle and an eastbound vehicle, one involved a northbound vehicle and a westbound vehicle, one involved a southbound vehicle and an eastbound vehicle, and three involved a southbound vehicle and a westbound vehicle. Two of the seven impacts occurred in poor driving conditions.

Of the eight single-vehicle/other impacts, two occurred at the northbound approach, two occurred at the southbound approach, three occurred at the eastbound approach, and one occurred at the westbound approach. Four of the eight impacts occurred in poor driving conditions.

Hawthorne at Stevenage

Six of the collisions caused an injury. Twelve collisions occurred in clear conditions, five in rain conditions, six in snow conditions, and one in freezing rain conditions.

Of the 14 turning movement impacts, seven were between northbound left turning vehicles and southbound through vehicles, three were between southbound left turning vehicles and northbound through vehicles, one was between a westbound left turning vehicle and a eastbound right turning vehicle, two were between eastbound left turning vehicles and westbound through vehicles, and one was between northbound right turning heavy vehicle and a northbound through vehicle.

With an 70km/h posted speed limit and high through volumes along Hawthorne, the City could consider providing protected only signal phasing for left turns from Hawthorne Road.

Hawthorne at Hunt Club

A total of 144 collisions were reported at this intersection over the last five years, of which there were 87 rear-end impacts, 22 turning movement impacts, 15 sideswipe impacts, 10 angle impacts, and nine single-vehicle/other impacts. 29 of the collisions caused injuries, but none caused fatalities.

Of the 87 rear-end impacts, 18 occurred at the northbound approach (five through vehicle incidents, 12 right turn incidents, and one unknown), 36 occurred at the southbound approach (one through vehicle incidents, 33 right turn incidents, and two unknowns), 17 occurred at the eastbound approach (five left turn incidents, four through vehicle incidents, two right turn incidents, and six unknown), and 16 occurred at the westbound approach (one left turn incident, three through vehicle incident, eight right turn incidents, and four unknown). Sixteen of the 87 impacts occurred in poor driving conditions. Each approach features at least six rear-end impacts for at least one movement, meeting the threshold to be considered a collision pattern. A recent TIS (2017) was completed for development at 3500 Hawthorne and recommended modifying the southbound right turn channel to create a ‘Smart’ channel. The City has accepted this study and registered an agreement for the development.

Of the 15 sideswipe impacts, two occurred at the northbound approach, two occurred at the southbound approach, five occurred at the eastbound approach, and six occurred at the westbound

approach. Two of the 15 impacts occurred in poor driving conditions. As discussed previously, high traffic volumes and a high percentage of heavy vehicles create the potential for collisions of this type.

Of the 10 angle impacts, three involved a northbound vehicle and an eastbound vehicle, one involved a northbound vehicle and a westbound vehicle, one involved a southbound vehicle and an eastbound vehicle, and five involved a southbound vehicle and a westbound vehicle. One of the 10 impacts occurred in poor driving conditions.

Of the nine single-vehicle/other impacts, one occurred at the northbound approach, four occurred at the southbound approach, one occurred at the eastbound approach, and three occurred at the westbound approach. Three of the nine impacts occurred in poor driving conditions.

4.1.7 Driveways

In accordance with the City's 2017 TIA guidelines, a review of adjacent driveways along the boundary roads are provided as follows:

Russell Road, West Side:

- One looped residential driveway and one commercial driveway for 3830 Russell
- One looped driveway for 3894 Russell
- One commercial driveway and one residential driveway for 3900 Russell
- One commercial driveway and one driveway for a cemetery for 3970 Russell
- One commercial driveway for 4000 Russell

Russell Road, East Side:

- One driveway for a farm and one residential driveway at 4055 Russell

Hunt Club Road, North Side:

- One signalized driveway for Hydro Ottawa 250m west of Street 1
- One right-in, right-out driveway about 60m west of Street 1.

4.1.8 Area Traffic Management

There are no Area Traffic Management (ATM) studies within the study area that have been completed or are currently in progress.

4.2 Planned Conditions

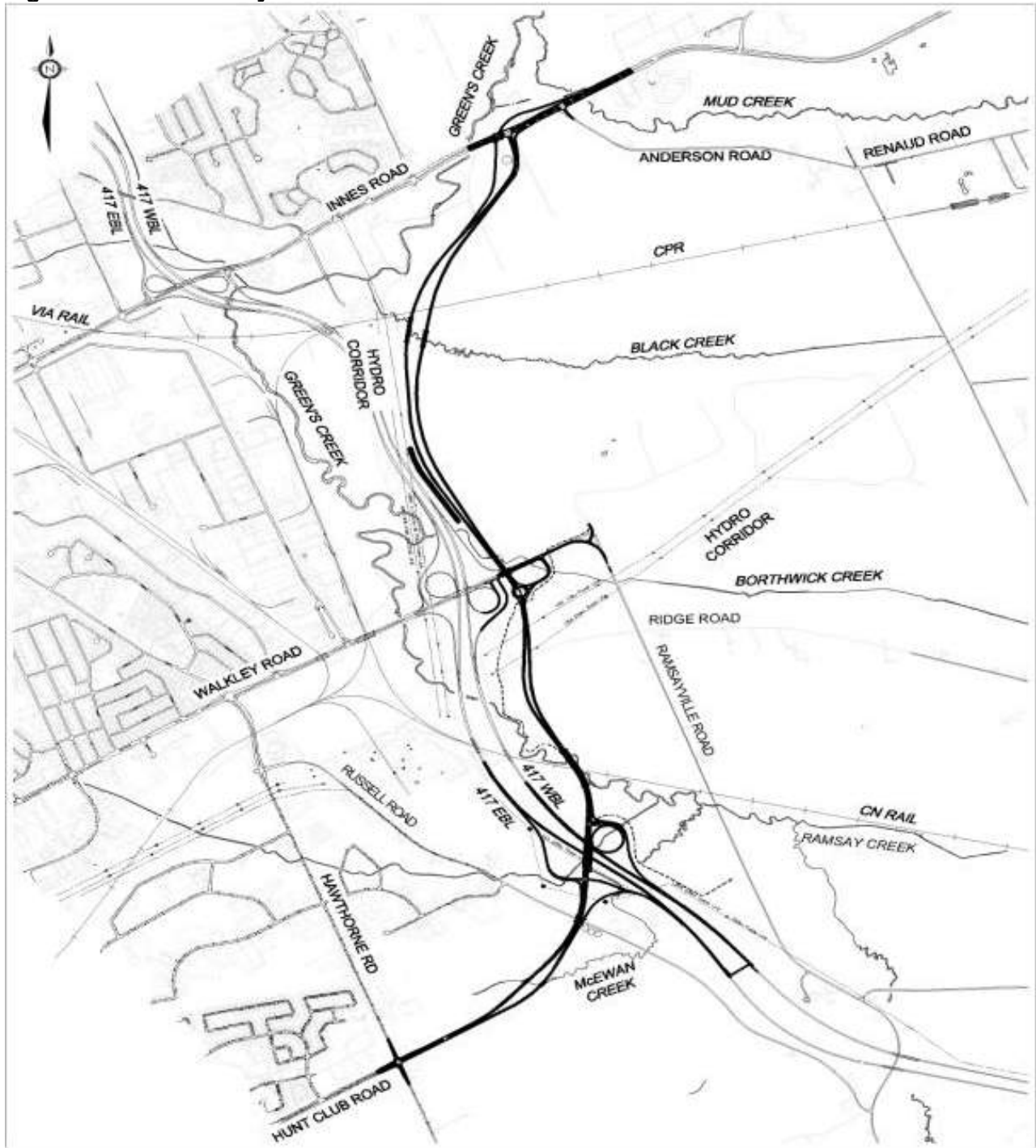
The 2031 Rapid Transit and Transit Priority (RTTP) Network identifies a bus rapid transit (BRT) project within the study area. The Baseline/Heron/Walkley/St. Laurent BRT project will provide high-quality transit access to employment, commercial, and institutional land uses along the corridor. In the 2031 Affordable Network, at-grade BRT will connect from Baseline Station to Heron Station. In the 2031 Network Concept, at-grade BRT will connect from Bayshore Station to St. Laurent Station. The 2031 Network Concept will not be implemented until after 2031.

The Innes-Walkley-Hunt Club Connection (See **Figure 4**) is identified in the City of Ottawa's 2031 network concept. This is a new four lane road (initial phase two-lanes) between Hunt Club and Innes

Road west of Blackburn Hamlet. The road would bypass congestion on a section of Innes Road and provides direct connection between Orléans and Hunt Club.

Information on other area developments is included in **Section 5.2.2**.

Figure 4: Innes-Walkley-Hunt Club Connection



Source: Innes-Walkley-Hunt Club Connection Environmental Assessment – Study Recommendations, City of Ottawa Transportation Committee

4.3 Study Area and Time Periods

A boundary street review will be conducted for Russell Road and Hunt Club Road. The study area intersections are the 11 existing intersections (See **Section 4.1.4**) as well as the site accesses.

The selected time periods for the analysis are the weekday AM and PM peak hours, as they represent the 'highest volume' of site generated traffic and adjacent street traffic. This TIA will perform analysis for the weekday AM and PM peak periods with full buildout in 2023, as well as the 2028 and 2033 horizon years.

4.4 Exemptions Review

This module reviews possible exemptions from the final Transportation Impact Assessment, as outlined in the City's TIA guidelines. The applicable exemptions for this site are shown in **Table 2**.

Table 2: TIA Exemptions

| Module | Element | Exemption Criteria | Exemption Status |
|--|----------------------------------|--|------------------|
| Design Review Component | | | |
| 4.1 Development Design | 4.1.2 Circulation and Access | • Only required for site plans | Exempt |
| | 4.1.3 New Street Networks | • Only required for plans of subdivision | Exempt |
| 4.2 Parking | 4.2.1 Parking Supply | • Only required for site plans | Exempt |
| | 4.2.2 Spillover Parking | • Only required for site plans where parking supply is 15% below unconstrained demand | Exempt |
| Network Impact Component | | | |
| 4.5 Transportation Demand Management | <i>All elements</i> | • Not required for non-residential site plans expected to have fewer than 60 employees and/or students on location at any given time | Exempt |
| 4.6 Neighbourhood Traffic Management | 4.6.1 Adjacent Neighbourhoods | • Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds | Exempt |
| 4.8 Network Concept | <i>All elements</i> | • Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by the established zoning | Exempt |

Note: Review of Modules 4.1.2, 4.2.1, 4.2.2 and 4.5 will be required as individual site plan submissions are made.

5.0 Forecasting

5.1 Development-Generated Traffic

5.1.1 Trip Generation

The proposed development is planned to be completed with three subareas consisting of:

- Site 1- one warehouse with 8,325m² (89,610ft²);
- Site 2- two warehouses with 17,400m² (187,300ft²); and,
- Site 3- three warehouses with 75,685m² (814,700ft²).

Trips generated by the proposed site development were estimated using *Trip Generation, 10th Edition* (Institute of Transportation Engineers, Washington, 2017). Person trips were estimated (See **Table 3**) using an ITE Trip to Person Trip conversion factor of 1.28, consistent with the City of Ottawa TIA Guidelines.

Table 3: Person Trip Generation

| Land Use ¹ | Units ² | Person Trips Generated ³ | | | | | |
|---|--------------------|-------------------------------------|-----|-------|--------------|-----|-------|
| | | AM Peak Hour | | | PM Peak Hour | | |
| | | In | Out | Total | In | Out | Total |
| Site 1 | | | | | | | |
| Warehouse (ITE 150) | 89.6 | 35 | 11 | 46 | 13 | 36 | 49 |
| Site 2 | | | | | | | |
| Warehouse (ITE 150) | 187.3 | 47 | 14 | 61 | 17 | 47 | 64 |
| Site 3 | | | | | | | |
| Warehouse (ITE 150) | 120.2 | 39 | 12 | 51 | 15 | 39 | 54 |
| High-Cube Parcel Hub Warehouse (ITE 156) | 694.5 | 470 | 469 | 939 | 631 | 297 | 928 |
| Total Development Trip Generation Sites 1-3 | | 591 | 506 | 1097 | 676 | 419 | 1095 |
| Notes: 1. Trip Generation for the associated Land Use from <i>Trip Generation 10th Edition</i> (Institute of Transportation Engineers, Washington, 2017). Trips have been increased by 28% to account for 10% non-auto mode share and average vehicle occupancy of 1.15. 2. Units are 1,000 ft ² of GFA. 3. Person trips per hour for peak hours. | | | | | | | |

The modal shares for the proposed development are anticipated to be generally consistent with the existing modal shares (See **Table 4**) outlined in the *2011 TRANS O-D Survey Report*, specific to the Hunt Club region which indicate the modal share values for the trips to/from and within the Hunt Club district. An increase to the auto driver share has been applied based on the location of the subject site, as the site is somewhat removed from significant residential development with minimal active transportation connections and transit service. The projected person trips by modal share for this full development are shown in **Table 4**.

Table 4: Person Trips by Modal Share

| Travel Mode | Existing Modal Share | Target Modal Share | AM Peak | | | PM Peak | | |
|-------------------|----------------------|--------------------|---------|-----|------|---------|-----|------|
| | | | IN | OUT | TOT | IN | OUT | TOT |
| Site 1 | | | | | | | | |
| Person Trips | | | 35 | 11 | 46 | 13 | 36 | 49 |
| Auto Driver | 60% | 70% | 24 | 7 | 31 | 9 | 25 | 34 |
| Auto Passenger | 15% | 15% | 5 | 2 | 7 | 2 | 5 | 7 |
| Transit | 15% | 10% | 4 | 1 | 5 | 1 | 4 | 5 |
| Active Trips | 10% | 5% | 2 | 1 | 3 | 1 | 2 | 3 |
| Site 2 | | | | | | | | |
| Person Trips | | | 47 | 14 | 61 | 17 | 47 | 64 |
| Auto Driver | 60% | 70% | 33 | 10 | 43 | 11 | 33 | 44 |
| Auto Passenger | 15% | 15% | 7 | 2 | 9 | 3 | 7 | 10 |
| Transit | 15% | 10% | 5 | 1 | 6 | 2 | 5 | 7 |
| Active Trips | 10% | 5% | 2 | 1 | 3 | 1 | 2 | 3 |
| Site 3 | | | | | | | | |
| Person Trips | | | 509 | 481 | 990 | 646 | 336 | 982 |
| Auto Driver | 60% | 70% | 357 | 337 | 694 | 452 | 235 | 687 |
| Auto Passenger | 15% | 15% | 76 | 72 | 148 | 97 | 50 | 147 |
| Transit | 15% | 10% | 51 | 48 | 99 | 65 | 34 | 99 |
| Active Trips | 10% | 5% | 25 | 24 | 49 | 32 | 17 | 49 |
| Total Development | | | | | | | | |
| Person Trips | | | 591 | 506 | 1097 | 676 | 419 | 1095 |
| Auto Driver | 60% | 70% | 414 | 354 | 768 | 472 | 293 | 765 |
| Auto Passenger | 15% | 15% | 88 | 76 | 164 | 102 | 62 | 164 |
| Transit | 15% | 10% | 60 | 50 | 110 | 68 | 43 | 111 |
| Active Trips | 10% | 5% | 29 | 26 | 55 | 34 | 21 | 55 |

Full Buildout of the proposed development is estimated to generate 768 two-way vehicle trips during the AM peak hour and 765 two-way vehicle trips during the PM peak hour.

5.1.2 Trip Distribution / Assignment

The overall distribution of trips generated by the development has been estimated (see below) based on the observed volumes along the study area roadways as well as a review of the existing settlement patterns.

- 10% to/from the north via Russell Road (Alta Vista)
- 10% to/from the south / east (Russell Road south, Hwy 417 E)
- 5% to/from the south (East Barrhaven and Airport via Ramsayville Road)
- 40% to/from the north/west (Hwy 417 W)
- 15% to/from the west via Walkley Road (Alta Vista, Baseline Road)
- 20% to/from the west via Hunt Club (Nepean)

Trips have been assigned based on the assumptions presented in **Table 5**.

Table 5: Trip Assignment Assumptions

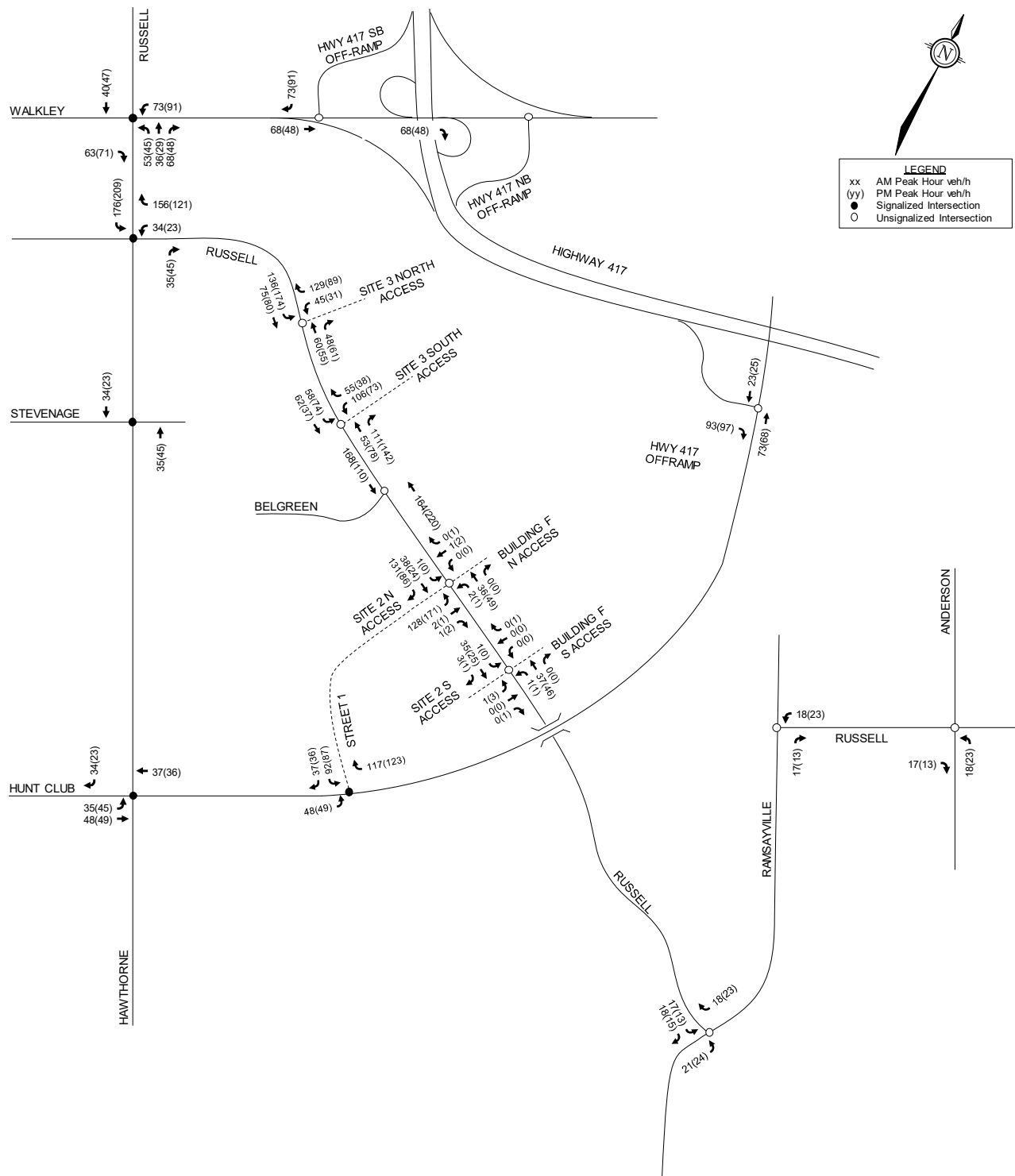
| | Buildings A & B | Buildings D & E | Buildings C & F |
|-----------------------------------|---|---|--|
| Trip Breakdown | The parcel hub (Building A) accounts for ~95% of all the Site 3 trips | These buildings account for all the Site 2 trips | Building F is ~1% of all Site 3 trips Building C is all the Site 1 trips |
| Hwy 417^{1,2} | 50% of trips will use the Hunt Club interchange and the Street 1 connection to Hunt Club | 100% of trips will use the Hunt Club interchange and the Street 1 connection to Hunt Club | 80% of trips will use the Hunt Club interchange and the Street 1 connection to Hunt Club |
| Hunt Club W | 50% of trips will use the Street 1 connection to Hunt Club, remainder will use Hawthorne to Russell | 100% of trips will use the Street 1 connection to Hunt Club | 100% of trips will use the Street 1 connection to Hunt Club |
| To / from north on Russell | 70% of trips will use the north driveway | 100% of trips will use the north driveway | 60% of trips will use the north driveway |
| To / from south on Russell | 30% of trips will use the north driveway | 100% of trips will use the north driveway | 20% of trips will use the north driveway |

Notes: 1. All Highway 417 trips from and to the west not assigned to the Hunt Club Street 1 connection were assigned to the Walkley Road interchange.

Notes: 2. All Highway 417 trips from and to the east not assigned to the Hunt Club Street 1 connection were assigned to the Anderson Road interchange.

Site generated traffic volumes for the three sub area sites have been assigned to the study area intersections and are shown in **Figure 5**.

Figure 5: Site Generated Traffic Volumes



5.2 Background Traffic

5.2.1 General Background Traffic Growth Rate

A rate of background growth has been established through a review of the City of Ottawa's 2013 TMP and Strategic Long Range Model (comparing snapshots of 2011 and 2031 AM peak volumes). The snapshots (See **Appendix D**) suggest a growth rate of -0.5% to 1.5% per year on arterial roadways within the study area. For the 'Inner Suburbs' area of Ottawa, Exhibit 2.10 of the 2013 TMP projects population and employment growth rates of approximately 0.3% and 1.2% per year, respectively. To reflect the study area's development as an employment area, a 1% annual background growth rate has been applied to traffic along Walkley Road, Russell Road, Hunt Club Road, Hawthorne Road, the Hwy 417 ramps, and Ramsayville Road between Russell Road North and Russell Road South. A 0% growth rate has been applied to all other roadways within the study area. This growth rate is consistent with the recent Giant Tiger TIA approximately 1km to the north.

5.2.2 Other Area Development

There are other developments planned within the area including:

- 3500 Hawthorne Road – A gas station with convenience store and a fast food restaurant with drive-through. A TIS was prepared (Stantec 2017) and estimated the site would generate 21 and 24 net new two-way auto trips during the AM and PM peak hours, respectively. The TIS recommended modifying the southbound right turn channel to create a 'Smart' channel. The City has accepted this study and registered an agreement for the development.
- 2510 Walkley Road – A retail showroom (929m²) and warehouse (2,323m²). A TIA was prepared (Parsons 2018) and estimates the site will generate 15 and 30 two-way vehicle trips during the AM and PM peak hours, respectively.
- 2390 Stevenage Drive – An additional approximately 13,000m² of industrial use added to the approximately 10,000m². A TIA was prepared (Parsons 2018) and estimated the site would generate 55 and 58 new two-way auto trips during the AM and PM peak hours, respectively.
- 2480 Walkley Road – Reconfiguration of the existing Giant Tiger site to become the headquarters. A TIA was prepared (Novatech 2019) and estimated the site would generate 69 and 56 new two-way auto trips during the AM and PM peak hours, respectively.

The traffic volumes projected by the buildout of each of these developments from their associated traffic studies are shown in **Figure 6** with relevant excerpts of the traffic studies included in **Appendix F**. Each background development is anticipated to be complete by 2023.

5.2.3 Demand Rationalization

In existing conditions, some movements at the study area intersections operate outside of City Guidelines in the weekday AM and PM peak hours. Existing intersection performance is part of the Intersection MMLOS review included in **Appendix G**. Future intersection performance of the study area is included in **Section 6.6**.

5.2.4 Future Background and Total Traffic Volume Projections

Future Background Traffic Volumes have been projected for the 2023, 2028, and 2033 (See **Figures 7, 8, and 9**, respectively) and include the annual background growth and background development trips. Total Traffic Volumes have been projected for the Study Area intersections for the weekday

AM and PM peak hours in 2023, 2028, and 2033 (Figures 10, 11, and 12, respectively) and include future background traffic and site generated trips.

Figure 6: Other Development Traffic Volumes

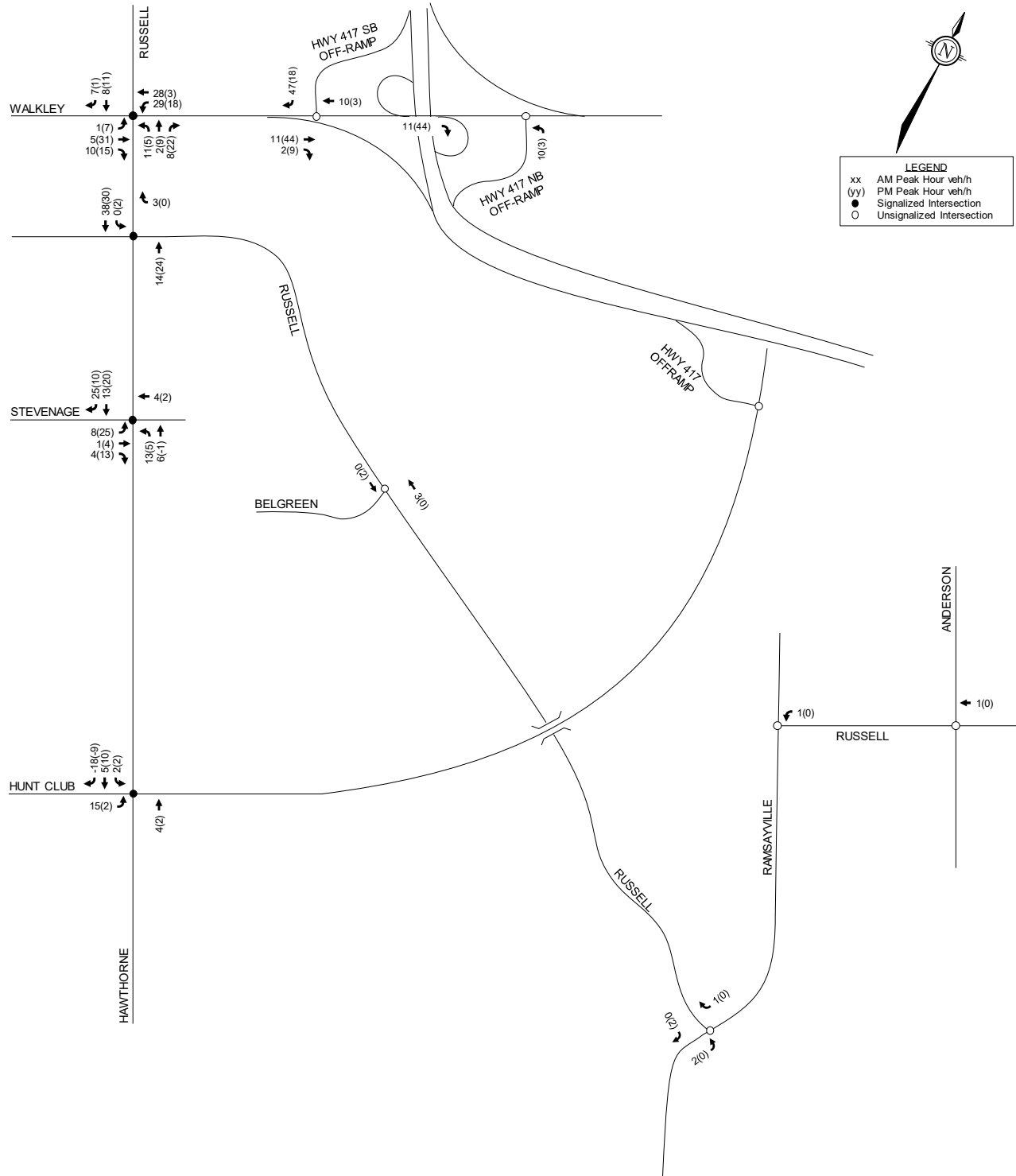


Figure 7: 2023 Future Background Traffic Volumes

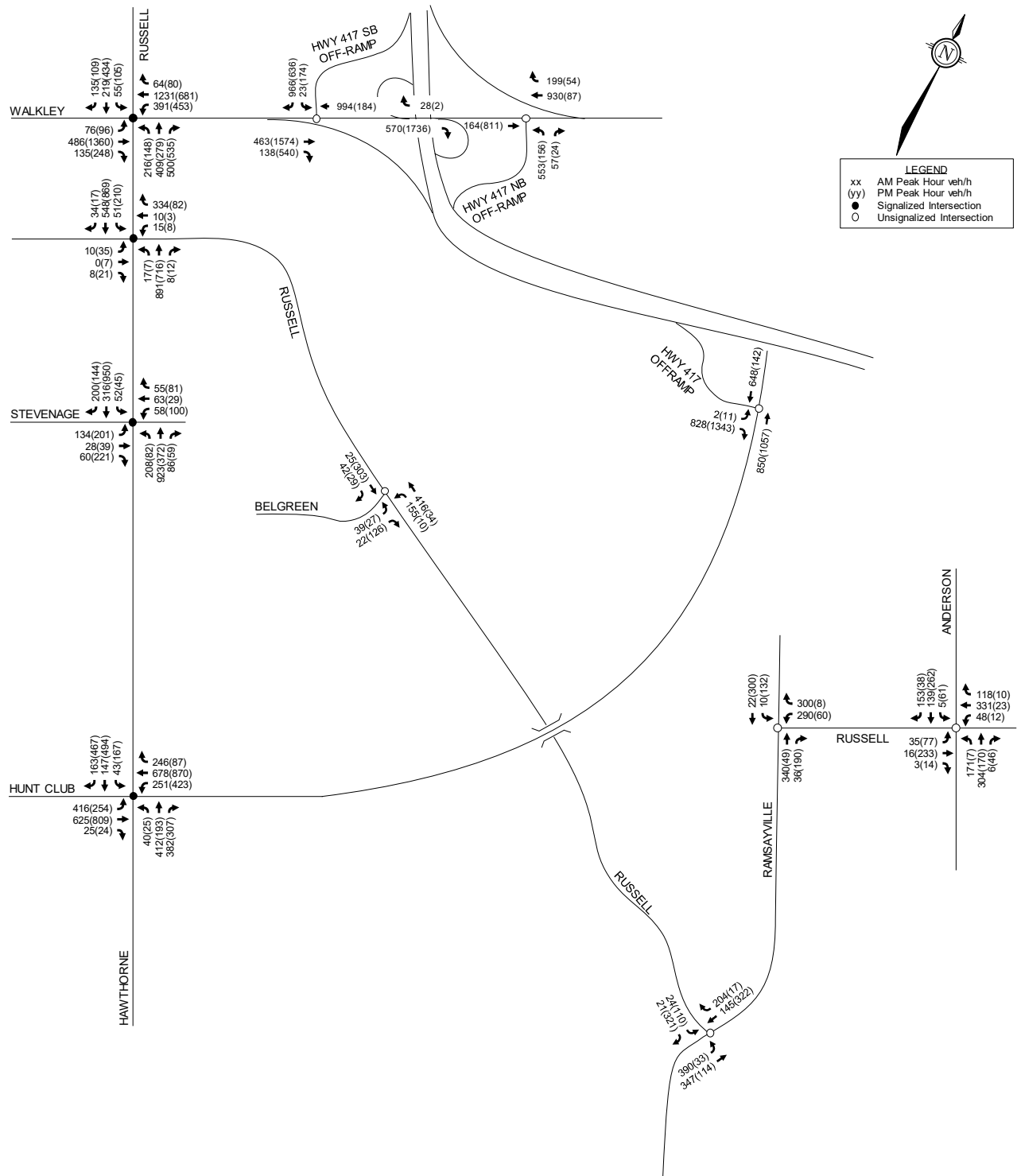


Figure 8: 2028 Future Background Traffic Volumes

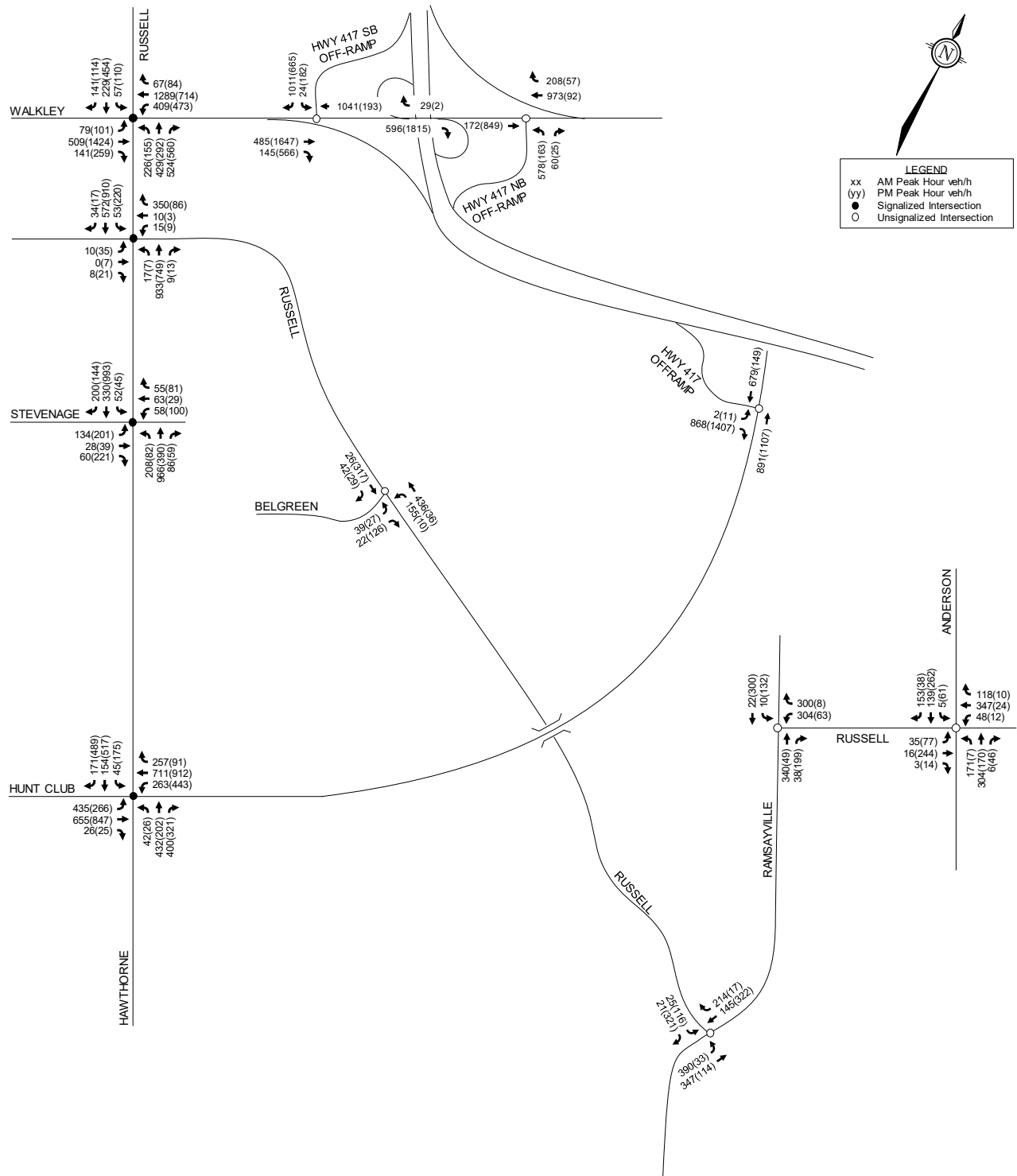
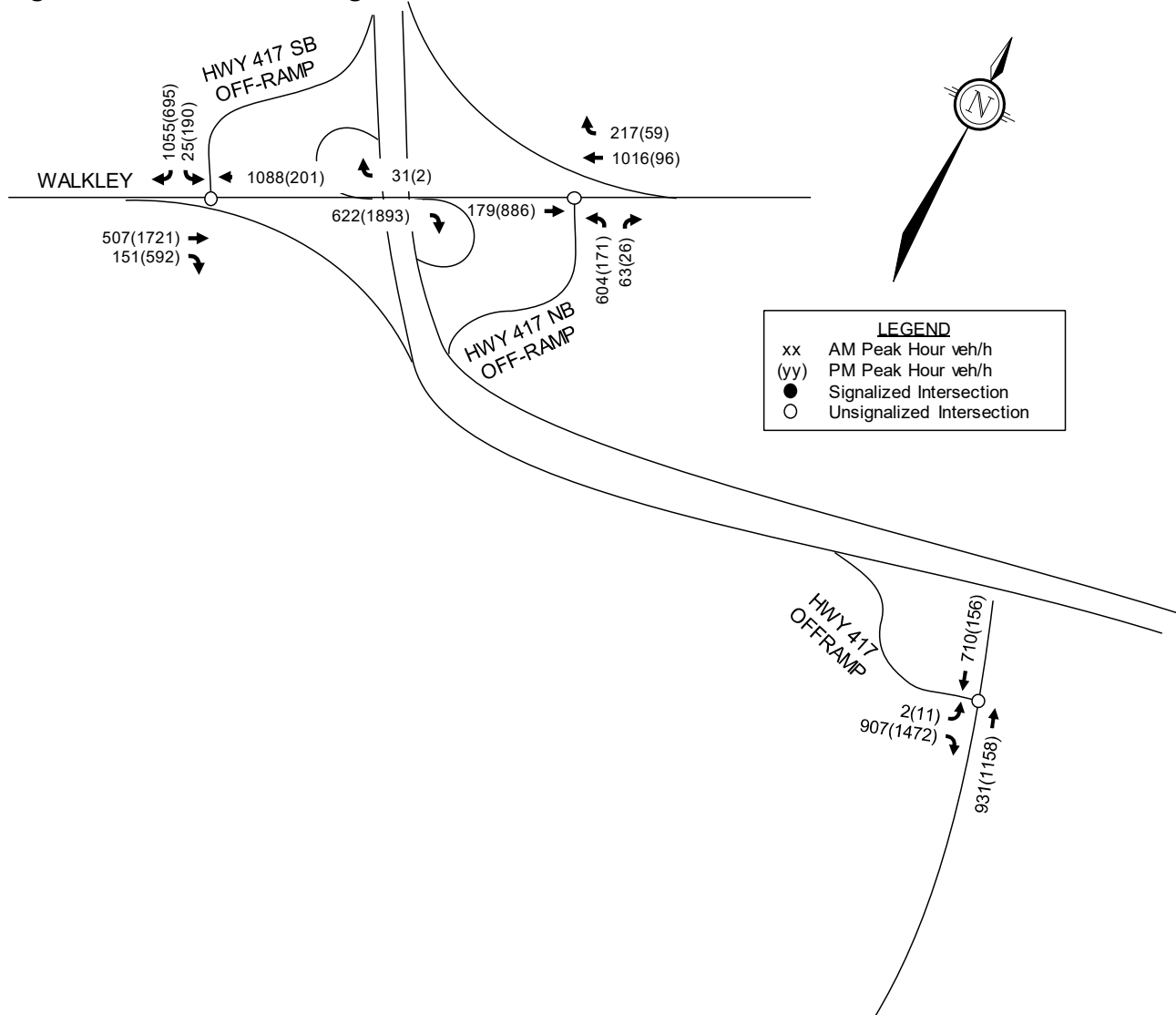


Figure 9: 2033 Future Background Traffic Volumes



The map illustrates the project area, including the intersection of Highway 417 and Russell Road. Key features include:

- Highway 417:** Running vertically through the center of the map.
- Russell Road:** Running horizontally across the top and bottom of the map.
- Intersections:**
 - WALKLEY (Top Left)
 - STEVENAGE (Middle Left)
 - HUNT CLUB (Bottom Left)
 - HAWTHORNE (Bottom Left)
 - RAMSAYVILLE (Bottom Right)
 - ANDERSON (Far Right)
- Access Points:**
 - SITE 3 NORTH ACCESS
 - SITE 3 SOUTH ACCESS
 - SITE 2N ACCESS
 - SITE 2 S ACCESS
 - BUILDING F N ACCESS
 - BUILDING F S ACCESS
 - STREET 1
- Traffic Volume Data:** Provided for various approaches and intersections, including AM and PM Peak Hour volumes.
- Legend:**
 - xx (yy): AM Peak Hour veh/h (PM Peak Hour veh/h)
 - : Signalized Intersection
 - : Unsignalized Intersection
- North Arrow:** Located in the top right corner.

Figure 11: 2028 Total Traffic Volumes with Site Generated Trips

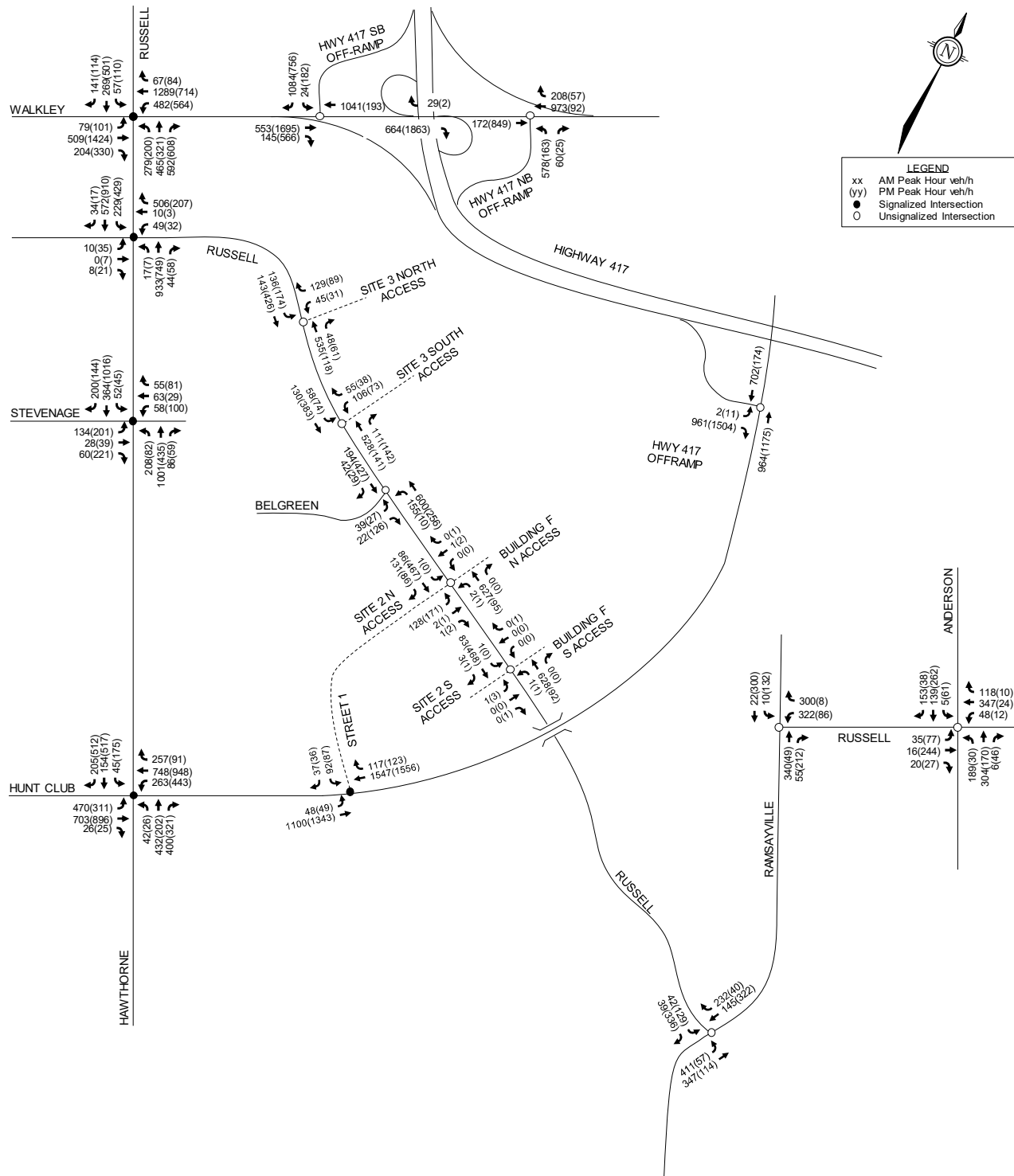
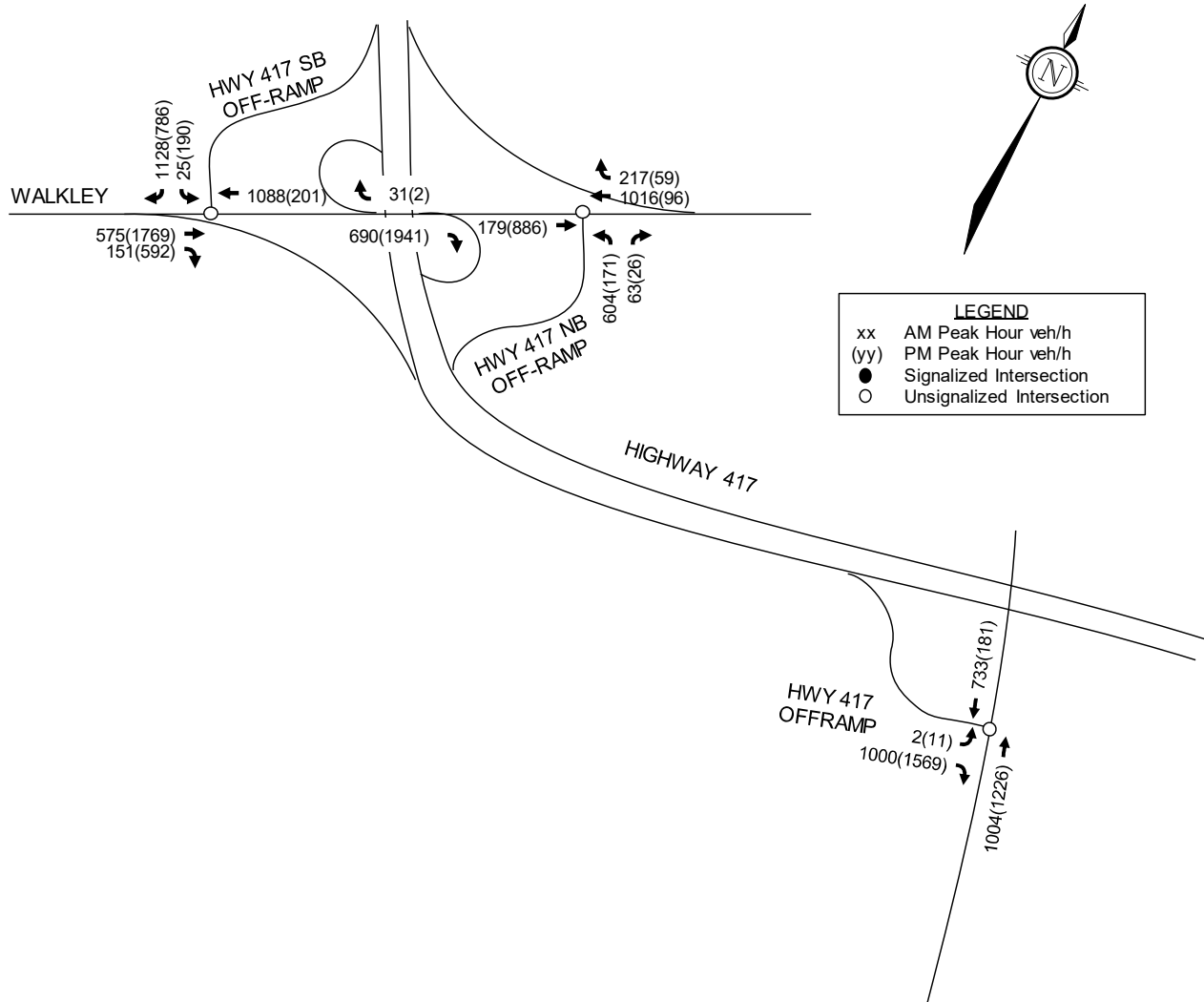


Figure 12: 2033 Total Traffic Volumes with Site Generated Trips



6.0 Analysis

6.1 Development Design

Conceptually, it is expected that pedestrian facilities will be provided between each building and the parking lots, to be reviewed at site plan for each site. New pedestrian walkways will be constructed, providing connectivity to Russell Road.

OC Transpo's service design guideline for peak period service is to provide service within a five minute (400m) walk of the home, school and work location of 95% of urban residents. The existing bus stops near the subject sites are described in **Section 4.1.3**.

Stops #3336 and 3339 are located in front of Buildings A and B. Stops #3335 and 3340 are less than 400m to Buildings C, D, and F. The distance between the stops and Building E is about 650m. Actual walking distance between exterior access doors and the transit stops will be measured and reviewed at site plan submission.

Each development block includes two connections to Russell Road to separate trucks and employees and have been aligned with opposing driveways where possible. Connections will be further reviewed at site plan.

Onsite turning paths of heavy vehicles and review of garbage collection and fire routes will also be reviewed at site plan.

6.2 Parking

The subject site is located in Area C on Schedule 1 and 1A of the City of Ottawa's ZBL. Minimum vehicular parking rates (0.8 / 100 m²) and bicycle parking rates (1 / 100 m²) for light industrial development are identified in the ZBL. The concept plan indicates sufficient vehicular parking within each of sites 1, 2, and 3, and the vehicular, accessible, and bicycle parking requirements for each building will be confirmed with the site plan submissions.

Minimum vehicle loading for light industrial are identified in the ZBL and indicate that for warehouse / light industrial uses, 1 space is required for buildings up to 9,999 m², 2 spaces are required for sites up to 24,999 m², and 3 spaces are required for sites over 25,000m². Each building exceeds these minimum requirements, and this will be confirmed at site plan submission.

6.3 Boundary Streets

Schedule 'B' of the City of Ottawa's Official Plan indicates the site is in an Urban Employment Area. Targets for pedestrian level of service (PLOS), bicycle level of service (BLOS), and truck level of service (TkLOS) for Russell Road and Hunt Club Road reflect those outlined for an arterial road located within an employment area in Exhibit 22 of the MMLOS guidelines. Since neither boundary street is identified as a transit priority corridor, the transit level of service (TLOS) has not been evaluated. The Segment PLOS, BLOS, and TkLOS and associated targets for Russell Road and Hunt Club Road are summarized in

Table 6. Details on the Segment MMLOS are included in **Appendix G**.

Table 6: Segment MMLOS Summary

| Intersection | PLOS | BLOS | TkLOS |
|----------------|----------|----------|----------|
| Russell Road | F | F | C |
| Target | C | E | B |
| Hunt Club Road | F | E | A |
| Target | C | C | B |

The PLOS along both Russell Road and Hunt Club Road fronting the site is currently failing. Both streets have 80km/h posted speed limits fronting the site and more than 3,000 vehicles per day AADT. Even if sidewalk were installed, the highest attainable PLOS score for each roadway is D due to the roadway speed and volume. Hunt Club Road fronting the site currently only leads to the Highway 417 ramps and has no pedestrian destinations. If Russell Road in this area is urbanized in the future and a reduced operating speed of 60km/h (posted 50km/h) is achieved, the City could include 2m sidewalk with 2m boulevard to achieve the PLOS target.

The BLOS along both Russell Road and Hunt Club Road fronting the site is currently failing. Without physically separated bikeways, the highest attainable BLOS score on both roadways is E due to the high operating speed. Hunt Club Road fronting the site currently only leads to the Highway 417 ramps and has no cycling destinations. The addition of on-street bicycle lanes along Russell Road would achieve the City's BLOS target for that street. This is identified for the City's consideration pending funding.

The TkLOS along Russell Road fronting the site misses the target B. To achieve the target TkLOS of B, 3.7m wide lanes are required. The existing gravel shoulders are approximately 2.5m. The City may wish to consider paving an additional 0.5m on either side of the road.

6.4 Access Intersections

The proposed development will be served by seven connections, six to Russell Road and one to Hunt Club Road. Each Russell Road driveway is intended to be STOP controlled with free flow traffic on Russell Road.

Signals are required at the connection to Hunt Club based on high approach intersection delay (See **Table 10**). The Street 1 connection to Hunt Club Road is proposed approximately 250m east of the Hydro Ottawa (signalized) access road. The location and ultimate functional design of this intersection have been agreed by the City of Ottawa in a tri-party agreement with NCC and Hydro Ottawa in 2016.

The driveway configurations with respect to design guidelines and requirements of the City's Private Approach By-law will be reviewed at site plan submission for each site, however the following are noted:

- The Transportation Association of Canada (TAC) outlines minimum clear throat lengths for driveways based on the land use, development size, and type of roadway. For the proposed building sizes, the clear throat requirements are:
 - 60m for driveways to Building A (60m is provided);
 - 30m for driveways to Sites 1 and 2 (30m is provided);

- 15m for driveways to Building F (15m is provided for the south driveway, 10m is provided at the north driveway, this will be reviewed at site plan submission);
- Section 25 (a) of the City's Private Approach By-Law identifies a maximum number of private approaches that can be provided, based on the amount of frontage. With about 1350m of frontage for Site 1 (east side of Russell Road) and about 205m of frontage for Sites 2 and 3 (west side of Russell Road) the number of proposed accesses meets the by-law.
- Section 25 (m) of the *Private Approach By-Law* identifies a minimum driveway spacing along arterial and major collector roads. Each driveway has a spacing in excess of 60m, meeting this by-law requirement.
- The Stopping Sight Distance (SSD) along a 90 km/h design speed is 155.5m. Available SSD is expected to be greater than 200m at each driveway and will be confirmed at site plan.
- The Turning Sight Distance (TSD) requirements for a left turning and right turning heavy vehicle from STOP on a two-lane roadway are 287.5m and 262.5m, respectively. The TSD has been reviewed at each proposed driveway location and sufficient (>300m) TSD is available at each driveway and will be confirmed at site plan.

The Street 1 connection is 60m east of Hydro Ottawa's right-in, right-out (RIRO) driveway. Per the 2711 Hunt Club TIS, it is understood that Hydro's RIRO access may be closed with construction of the Street 1 access and a new connection provided between the Hydro Ottawa site and Street 1.

Each of the seven accesses (six to Russell Road and one to Hunt Club Road) meet the requirements of the City's Zoning By-law and Private Approach By-law and these will be reviewed with each site plan submission.

Traffic analysis of the driveway intersections is included in **Section 6.7**.

6.5 Transportation Demand Management

The TDM infrastructure and measures checklists will be prepared for each site plan submission once more information is known about the placement of bicycle parking and other site features. TDM measures could include:

- Display local area maps with walking/cycling access routes and key destinations at major entrances;
- Display relevant transit schedules and route maps at entrances;
- Provide online links to OC Transpo and STO information;
- Provide a dedicated ridematching portal at OttawaRideMatch.com; and,
- Provide a multimodal travel option information package for employees.

6.6 Transit

Based on the modal share presented in **Table 4**, the proposed development is anticipated to generate an additional 110 transit trips (60 in, 50 out) during the weekday AM peak hour and 111 transit trips (68 in, 43 out) during the weekday PM peak hour.

The City should consider providing additional transit service during the peak periods along Russell Road. The transit trips will be reviewed with each site plan submission.

6.7 Intersection Analysis

Signal warrants have been completed (See **Appendix I**) for the Anderson Road at Russell Road and Walkley Road at Northbound Off-ramp intersections with observed traffic volumes and indicate:

- **Anderson Road at Russell Road:** The intersection nearly warrants traffic signals based on Justification 3 (79/80) and warrants based on Justification 4. This analysis is based on observed traffic volumes without background growth or site traffic and the City of Ottawa should consider installing a roundabout at this intersection. The City of Ottawa's Roundabout Screening Tool was prepared (See **Appendix I**) for this intersection and recommends the City proceed with an Intersection Control Study. This analysis is based on existing conditions and is offered for the City's consideration.
- **Walkley Road at Northbound Off-ramp:** The intersection nearly warrants traffic signals based on Justification 3 (71/80) and warrants based on Justification 4. The available count was completed in 2015 and is quite a bit (about 40%) higher than the recent counts at the southbound off-ramp. Since it is not possible to conduct a representative count at this time due to COVID-19, when possible MTO should conduct a new traffic count to confirm the signal warrant. This analysis is based on observed traffic volumes without background growth or site traffic and MTO should consider signaling this intersection. This analysis is based on existing conditions and is offered for MTO's consideration.

Traffic analysis of both above intersections has been completed with the existing traffic control.

Left turn lane warrants (See **Appendix I**) has also been prepared for the site access as well as the Russell Road at Belgreen Drive intersection and indicate:

- Southbound left turn lanes are warranted on Russell Road at both accesses serving Building A with site generated trips;
- An eastbound left turn lane is warranted on Hunt Club Road at the Street 1 connection with site generated trips;
- Due to the low turning volumes, left turn lanes are not warranted on Russell Road at the access intersections for Sites 1 and 2 or Building F; and,
- A left turn lane is warranted on Russell Road at Belgreen Drive with the addition of site generated trips in the 5-year horizon. With low opposing volumes during the AM peak and low advancing volumes during the PM peak the left turn lane is not warranted without site development. As development progresses in the Russell Road corridor and with the addition of new site accesses, it is expected that the operating speed may decrease and the posted speed of 60 km/h further north on Russell Road should be extended. The warrant for this lane will be reviewed with each site plan submission.

Required RMAs for these potential modifications will be prepared at site plan when the details of the individual sites are known.

MMLOS analysis has been completed for the existing conditions using the methodology presented in the City of Ottawa's MMLOS Guidelines. Auto LOS (*Synchro 10*) analysis for the existing as well as the 2023, 2028, and 2033 peak periods without and with the addition of site generated trips are summarized in the following sections. Intersection parameters in the analysis are consistent with the TIA guidelines (saturation flow rate: 1800 vphpl, existing conditions Peak Hour Factor (PHF): 0.9, future conditions PHF: 1.0).

Since there are receiving lanes to accommodate the right turning traffic from the Highway 417 off-ramps along Walkley Road (Southbound ramp) and Hunt Club Road, the right turn channels for these ramps generally operate in free flow with delay and capacity constraints due to downstream merging with mainline through traffic. For the Hunt Club ramp, this receiving lane is continuous and does not require a merge except at downstream intersections over 1km away. For the below analysis, the volume-to-capacity ratios of the left turn movements is reported at these intersections. Analysis of these offramps and their right turn channels has been prepared using SimTraffic and is included in **Section 6.7.8** with results included in **Appendix J**.

6.7.1 Existing MMLOS

Identified and target PLOS, BLOS, TkLOS and Auto LOS for the study area signalized intersections are summarized in **Table 7**. Existing traffic signal timings are included in **Appendix H** and detailed MMLOS calculations are included in **Appendix F**.

Table 7: Intersection MMLOS Summary

| Intersection | PLOS | BLOS | TkLOS | Auto LOS |
|---|----------|----------|----------|----------|
| Walkley at Russell | F | F | A | F |
| Target | C | C | B | D |
| Russell at Hawthorne | F | F | C | D |
| Target | C | C | B | D |
| Hawthorne at Stevenage | F | F | C | C |
| Target | C | C | D | D |
| Hunt Club at Hawthorne | F | F | A | F |
| Target | C | C | B | D |
| Russell at Belgreen ¹ | - | - | - | C |
| Target | - | - | - | D |
| Hunt Club at Hwy 417 Off-ramp ¹ | - | - | - | E |
| Target | - | - | - | D |
| Ramsayville at Russell (S) ¹ | - | - | - | F |
| Target | - | - | - | D |
| Ramsayville at Russell (N) ¹ | - | - | - | E |
| Target | - | - | - | D |
| Russell at Anderson ¹ | - | - | - | F |
| Target | - | - | - | D |
| Walkley at Hwy 417 SB Off-ramp ¹ | - | - | - | F |
| Target | - | - | - | D |
| Walkley at Hwy 417 NB Off-ramp ¹ | - | - | - | F |
| Target | - | - | - | D |

1. Unsignalized intersection, evaluated for Auto LOS only

6.7.1.1 Walkley Road / Russell Road

Walkley Road/Russell Road does not meet the target PLOS C, BLOS C, or Auto LOS D.

All approaches have a divided cross-section with a width equivalent to ten lanes crossed or more. There is limited opportunity in improving the PLOS at each approach without reducing the number of travel lanes or restricting turning movements. The level of comfort for pedestrians can be increased by implementing zebra-striped crosswalks. The east and west approaches meet the City's vehicle/pedestrian conflict threshold for zebra-striped crosswalks (greater than 400,000 vehicle/pedestrian conflicts over an eight-hour period). There is also limited opportunity in improving the delay score for pedestrians without incurring major delays for vehicles.

None of the approaches meet the target BLOS C based on both left and right turn characteristics. Given the high traffic volumes on both roadways, the existing right turn lanes and dual left turn lanes are required. Cyclists would be best served to perform turns at a different intersection. Therefore, no recommendations have been made in improving the BLOS at this intersection.

The northbound, eastbound, and westbound approaches do not meet the target Auto LOS D in the PM peak hour. The eastbound left turn movement in the PM peak can be improved to LOS D or better with signal timing adjustments at the expense of the westbound through movement. To achieve the target, a reduction in PM peak hour traffic volumes for the following movements are required (See **Appendix J**):

- Northbound right turn: reduction of approximately 130 vehicles;
- Eastbound through: reduction of approximately 165 vehicles;
- Westbound left turn: reduction of approximately 110 vehicles.

6.7.1.2 Russell Road / Hawthorne Road

Russell Road/Hawthorne Road does not meet the target PLOS C, BLOS C, or TkLOS B.

The north and south approaches both have a divided cross-section with widths equivalent to ten lanes crossed or more. The east and west approaches have auxiliary turn lanes and right turn channels with widths equivalent to 9 or more lanes crossed. There is limited opportunity in improving the PLOS at each approach without reducing the number of lanes. With lower left turning volumes at the eastbound and westbound approaches, consideration could be given to removing the left turn lanes on these approaches, however this would not improve the overall PLOS. Improving the delay scores for pedestrians crossing the north and south approaches would require reducing green time for the heavy northbound and southbound movements and is not desirable.

All approaches do not meet the target BLOS C based on right turn or both left and right turn characteristics. Given the high travel speeds along Hawthorne Road and Russell Road and the high traffic volumes along the north and south approaches, there is limited opportunity for improving the BLOS along the north and south approaches. With lower left turning volumes at the eastbound and westbound approaches, consideration could be given to removing the left turn lanes on these approaches.

The north and south approach misses the target TkLOS B, achieving a C. To achieve TkLOS B, a second receiving lane is required on the east and west approach, however, the TkLOS is close to meeting the City's target and large curb radii are provided to accommodate truck movements.

6.7.1.3 Hawthorne Road / Stevenage Drive

Hawthorne Road/Stevenage Drive does not meet the target PLOS C or BLOS C.

The north and south approaches both have a divided cross-section with widths equivalent to ten lanes crossed or more. The east and west approaches have auxiliary turn lanes and right turn channels with widths equivalent to 10 lanes crossed. There is limited opportunity in improving the PLOS at each approach without reducing the number of lanes. Improving the delay scores for pedestrians crossing the north and south approaches would require reducing green time for the heavy northbound and southbound movements and is not recommended.

All approaches do not meet the target BLOS C based on right turn and / or left turn characteristics. Given the high travel speeds along Hawthorne Road and the high traffic volumes along the north and south approaches, there is limited opportunity for improving the BLOS along the north and south approaches.

6.7.1.4 Hunt Club / Hawthorne Road

Hunt Club Road/Hawthorne Road does not meet the target PLOS C, BLOS C, or Auto LOS D.

All approaches have a divided cross-section with a width equivalent to ten lanes crossed or more. There is limited opportunity in improving the PLOS at each approach without reducing the number of travel lanes or restricting turning movements. There is also limited opportunity in improving the delay score for pedestrians without incurring major delays for vehicles.

All approaches do not meet the target BLOS C based on right turn and / or left turn characteristics. Given the high traffic volumes on both roadways, the existing right turn lanes and left turn lanes are required. Cyclists would be best served to perform turns at a different intersection. Therefore, no recommendations have been made in improving the BLOS at this intersection.

The northbound through and eastbound left movements do not meet the target Auto LOS D in the AM peak hour and the westbound left movement does not meet the target Auto LOS D in the PM peak hour. The installation of dual eastbound and westbound left turn lanes and signal timing adjustments to improve the northbound movement would improve the existing Auto LOS to D.

6.7.1.5 Unsignalized Intersections

The Hunt Club at Hwy 417 Off-ramp, Ramsayville at Russell (S), Ramsayville at Russell (N), Russell at Anderson, and both Walkley at Hwy 417 Off-ramp intersections operate with LOS E or F during either the AM or PM peak hour. Signalization warrants and improvement recommendations are identified in the subsequent sections

6.7.2 2023 Intersection Operations – Future Background Traffic

Intersection capacity analysis has been completed for the projected 2023 AM and PM peak hours with background traffic volumes (See **Figure 7**) are summarized in **Table 8**. Approaches where long queuing is expected are shown with the associated 50th and 95th percentile queue lengths in **Table 9**.

Existing signal timing plans obtained from the City of Ottawa are included in **Appendix H**. Detailed *Synchro 10* reports are included in **Appendix J**.

Table 8: 2023 Background Traffic - Intersection Operations

| Intersection | AM Peak | | | PM Peak | | |
|---|-------------------|----------|------------|-------------------|----------|------------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Russell at Walkley | 0.85 | D | NBL | 1.44 | F | WBL |
| Russell at Hawthorne | 0.80 | C | WBR | 0.42 | A | SBL |
| Hawthorne at Stevenage | 0.64 | B | EBL | 0.71 | C | WBL |
| Hawthorne at Hunt Club | 0.98 | E | NBT | 0.93 | E | WBL |
| Russell at Belgreen ¹ | 16 sec | C | NB | 12 sec | B | NB |
| Hunt Club at Hwy 417 Off-ramp ¹ | 32 sec | D | EBL | 24 sec | C | EBL |
| Ramsayville at Russell (S) ¹ | 40 sec | E | EB | 22 sec | C | EB |
| Ramsayville at Russell (N) ¹ | 26 sec | D | WB | 12 sec | B | SB |
| Russell at Anderson ¹ | 41 sec | E | NB | 15 sec | B | SB |
| Walkley at Highway 417 SB Off-ramp ¹ | 30 sec | D | SBL | 49 sec | E | SBL |
| Walkey at Highway 417 NB Off-ramp ¹ | 226 sec | F | NB | 31 sec | D | NB |

1. Unsignalized intersection

Table 9: 2023 Background Traffic - Queuing

| Intersection | Mvmt | AM Peak | | | PM Peak | | |
|------------------------|------|----------------|------------------------------|------------------------------|--------------|------------------------------|------------------------------|
| | | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) |
| Russell at Walkley | NBL | 0.85 | 31 | #51 | 0.66 | 18 | 28 |
| | NBR | 0.74 | 0 | 34 | 1.15 | ~109 | #172 |
| | EBL | 0.63 | 20 | 36 | 1.39 | ~30 | #63 |
| | EBT | 0.38 | 52 | 74 | 1.01 | ~169 | #215 |
| | WBL | 0.79 | 54 | 67 | 1.44 | ~75 | #105 |
| | WBT | 0.77 | 151 | #208 | 0.44 | 57 | 71 |
| Russell at Hawthorne | SBL | 0.16 | 3 | 8 | 0.42 | 10 | 23 |
| | WBR | 0.80 | 24 | 50 | 0.32 | 0 | 11 |
| Hawthorne at Hunt Club | NBT | 0.98 | ~89 | #133 | 0.81 | 35 | 54 |
| | SBL | 0.37 | 7 | 15 | 0.78 | 34 | #59 |
| | EBL | 0.93 | 101 | #167 | 0.85 | 63 | #101 |
| | EBT | 0.59 | 69 | 100 | 0.85 | 105 | 134 |
| | WBL | 0.80 | 59 | 83 | 0.93 | 108 | #176 |
| | WBT | 0.79 | 81 | 105 | 0.67 | 100 | 130 |
| Walkley at 417 NB Ramp | NB | 226 sec | - | 210 | 31 sec | - | 24 |

#: volume for the 95th percentile cycle exceeds capacity

~: approach is above capacity

The heavy left turning volume on the Hwy 417 NB ramp at Walkley Road yields a v/c ratio over MTO thresholds, indicating that geometric improvements should be considered. This ramp operates with very heavy NB and WB volumes during the AM peak hour and signalization should be considered.

This modification is also noted for existing conditions and is provided for MTO's consideration. The intersection improves to LOS C or better with the addition of signals (See signalized intersection analysis, **Appendix J**).

With the right turn channelized on the Hwy 417 SB ramp at Walkley Road, there is insufficient left turn volume to warrant signalization (67%, See **Appendix I**), however, signalization could be considered to improve the operations of the southbound left turning volume. This modification is provided for MTO's consideration. The SBL movement and overall intersection improves to LOS B, See **Appendix J**.

At Walkley Road/Russell Road, capacity issues are identified for the northbound right turn, eastbound left turn, eastbound through, and westbound left turn movements during the PM peak hour. The Synchro analysis also identifies that the 95th-percentile northbound right turn queue length is greater than the approximately 120m auxiliary lane during the PM peak hour. To achieve the target in the PM peak hour, a reduction in PM peak hour traffic volumes for the following movements are required (See **Appendix J**):

- Northbound right turn: reduction of approximately 165 vehicles;
- Eastbound through: reduction of approximately 120 vehicles;
- Westbound left turn: reduction of approximately 140 vehicles.

At Hawthorne Road / Hunt Club Road, capacity issues were identified for the northbound through and eastbound left turn movements during the AM peak hour and for the westbound left turn movement during the PM peak hour. The Synchro analysis also identifies that the 95th-percentile eastbound left turn queue length during the AM peak hour is greater than the approximately 105m auxiliary lane and the 95th-percentile northbound westbound left turn queue length during the PM peak hour is greater than the approximately 65m auxiliary lane during the PM peak hour. The installation of dual eastbound and westbound left turn lanes would reduce this queue spillback and bring the intersection within City Guidelines. These added lanes are based on existing / background conditions and is provided for the City's consideration.

The Russell Road at Anderson Road intersection (LOS E during the AM peak hour) was found to warrant traffic signals (Justification 4) based on existing volumes and the City should consider installing a roundabout at this intersection, improving the LOS to B. This modification is based on existing conditions and is offered for the City's consideration.

The Ramsayville at Russell Road (S) intersection operates with LOS E but has residual capacity (v/c is about 0.35 or less). There are no recommended modifications for this intersection at this time.

6.7.3 2023 Intersection Operations – Total Traffic with Site Generated Trips

Intersection capacity analysis has been completed for the projected 2023 AM and PM peak hours with the addition of site generated trips (See **Figure 10**). The results of the analysis are summarized in **Table 10** for the weekday AM and PM peak hours. Approaches where long queuing is expected are shown with the associated 50th and 95th percentile queue lengths in **Table 11**.

Existing signal timing plans obtained from the City of Ottawa are included in **Appendix H**. Detailed *Synchro 10* reports are included in **Appendix J**.

Table 10: 2023 Total Traffic - Intersection Operations

| Intersection | AM Peak | | | PM Peak | | |
|---|-------------------|----------|------------|-------------------|----------|------------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Russell at Walkley | 1.05 | F | NBL | 1.73 | F | WBL |
| Russell at Hawthorne | 1.03 | F | WBR | 0.98 | E | SBL |
| Hawthorne at Stevenage | 0.64 | B | EBL | 0.71 | C | WBL |
| Hawthorne at Hunt Club | 1.02 | F | EBL | 0.93 | E | WBL |
| Russell at Belgreen ¹ | 25 sec | C | NBLR | 14 sec | B | NB |
| Hunt Club at Hwy 417 Off-ramp ¹ | 36 sec | E | EBL | 26 sec | D | EBL |
| Ramsayville at Russell (S) ¹ | 64 sec | F | EB | 27 sec | D | EB |
| Ramsayville at Russell (N) ¹ | 29 sec | D | WB | 13 sec | B | SB |
| Russell at Anderson ¹ | 53 sec | F | NB | 15 sec | B | EB |
| Walkley at Highway 417 SB Off-ramp ¹ | 32 sec | D | SBL | 53 sec | F | SBL |
| Walkey at Highway 417 NB Off-ramp ¹ | 226 sec | F | NB | 31 sec | D | NB |
| Hunt Club at Street 1 | 0.65 | B | WBT | 0.64 | B | WBT |
| Hunt Club at Street 1 (Unsignalized) ¹ | 1011 sec | F | SB | Error | F | SB |
| Russell at Site 3 North Access ¹ | 23 sec | C | SBL | 20 sec | C | SBL |
| Russell at Site 3 South Access ¹ | 22 sec | C | SB | 16 sec | C | SB |
| Russell at Site 1 North Access ¹ | 24 sec | C | NB | 20 sec | C | NB |
| Russell at Site 1 South Access ¹ | 15 sec | C | NB | 13 sec | B | NB |

1. Unsignalized intersection

Table 11: 2023 Total Traffic – Queuing

| Intersection | Mvmt | AM Peak | | | PM Peak | | |
|------------------------|------|----------------|------------------------------|------------------------------|--------------|------------------------------|------------------------------|
| | | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) |
| Russell at Walkley | NBL | 1.05 | ~41 | #68 | 0.84 | 24 | #42 |
| | NBR | 0.80 | 7 | 53 | 1.25 | ~133 | #197 |
| | EBL | 0.63 | 20 | 36 | 1.39 | ~30 | #63 |
| | EBT | 0.42 | 56 | 77 | 1.01 | ~169 | #215 |
| | WBL | 0.81 | 64 | 77 | 1.73 | ~98 | #128 |
| | WBT | 0.79 | 160 | #208 | 0.44 | 57 | 71 |
| Russell at Hawthorne | SBL | 0.82 | 25 | #70 | 0.98 | 42 | #118 |
| | WBR | 1.03 | ~60 | #114 | 0.51 | 0 | 14 |
| Hawthorne at Hunt Club | NBT | 0.99 | ~89 | #133 | 0.81 | 35 | 54 |
| | SBL | 0.37 | 7 | 15 | 0.79 | 34 | #60 |
| | EBL | 1.02 | ~120 | #187 | 0.91 | 76 | #129 |
| | EBT | 0.63 | 76 | 109 | 0.88 | 114 | #152 |
| | WBL | 0.80 | 59 | 83 | 0.93 | 108 | #176 |
| | WBT | 0.82 | 86 | 112 | 0.73 | 107 | 137 |
| Walkley at 417 NB Ramp | NB | 226 sec | - | 210 | 31 sec | - | 24 |

#: volume for the 95th percentile cycle exceeds capacity

~: approach is above capacity

Based on the previous tables and compared to the 2023 background traffic conditions, increases in v/c ratios and queue lengths at the Russell / Walkley and Hawthorne / Hunt Club intersections are anticipated, as a result of increased traffic generated by the proposed development.

Signal timing adjustments could be made to improve the NBL movement during the AM peak hour at the Russell Road at Walkley Road intersection and bring the intersection within City Guidelines during the AM peak hour (See **Appendix J**). To achieve the target in the PM peak hour, a reduction in PM peak hour traffic volumes for the following movements are required (See **Appendix J**):

- Northbound right turn: reduction of approximately 190 vehicles;
- Eastbound through: reduction of approximately 120 vehicles;
- Westbound left turn: reduction of approximately 235 vehicles.

With the signalized Street 1 connection to Hunt Club it is expected that minimal to no site traffic will be added to the Walkley Road at 417 NB Off-ramp intersection. The operation of that intersection (overall LOS C) with traffic signals is included in **Appendix J**.

It is expected that minimal to no site traffic will be added to the southbound left movement at the 417 SB Off-ramp at Walkley Road. The operation of that intersection with traffic signals (overall LOS B) is included in **Appendix J**.

The Russell Road at Anderson Road intersection (LOS F during the AM peak hour) with All-Way STOP control improves to LOS C with construction of a roundabout (See **Appendix J**).

With installation of dual eastbound and westbound left turn lanes, the Hunt Club Road at Hawthorne Road intersection is expected to operate within City Guidelines with added site generated trips.

The Ramsayville at Russell Road (S) intersection operates with LOS F but has residual capacity (v/c is about 0.60 or less). There are no recommended modifications for this intersection at this time.

A southbound left turn protected / permissive phase should be added to the Russell at Hawthorne intersection to accommodate site generated trips and bring the intersection to within City Guidelines (See **Appendix J**).

The signalized Street 1 connection to Hunt Club Road is expected to operate within City Guidelines with site generated trips. The STOP controlled site accesses (along Russell Road) are expected to operate with LOS 'C' or better under 2023 total traffic conditions.

6.7.4 2028 Intersection Operations – Future Background Traffic

Intersection capacity analysis has been completed for the projected 2028 AM and PM peak hours with background traffic volumes for the weekday AM and PM peak hours (See **Figure 8**) and are summarized in **Table 12**. Approaches where long queuing is expected are shown with the associated 50th and 95th percentile queue lengths in **Table 13**.

Existing signal timing plans obtained from the City of Ottawa are included in **Appendix H**. Detailed *Synchro 10* reports are included in **Appendix J**.

Table 12: 2028 Background Traffic - Intersection Operations

| Intersection | AM Peak | | | PM Peak | | |
|---|-------------------|----------|------------|-------------------|----------|------------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Russell at Walkley | 0.89 | D | NBL | 1.50 | F | WBL |
| Russell at Hawthorne | 0.84 | D | WBR | 0.45 | A | SBL |
| Hawthorne at Stevenage | 0.64 | B | EBL | 0.71 | C | WBL |
| Hawthorne at Hunt Club | 1.03 | F | NBT | 0.98 | E | WBL |
| Russell at Belgreen ¹ | 17 sec | C | NB | 12 sec | B | NB |
| Hunt Club at Hwy 417 Off-ramp ¹ | 35 sec | D | EBL | 25 sec | D | EBL |
| Ramsayville at Russell (S) ¹ | 42 sec | E | EB | 22 sec | C | EB |
| Ramsayville at Russell (N) ¹ | 28 sec | D | WB | 13 sec | B | SB |
| Russell at Anderson ¹ | 46 sec | E | NB | 15 sec | B | SB |
| Walkley at Highway 417 SB Off-ramp ¹ | 33 sec | D | SBL | 63 sec | F | SBL |
| Walkey at Highway 417 NB Off-ramp ¹ | 281 sec | F | NB | 36 sec | E | NB |

1. Unsignalized intersection

Table 13: 2028 Background Traffic - Queuing

| Intersection | Mvmt | AM Peak | | | PM Peak | | |
|------------------------|------|----------------|------------------------------|------------------------------|--------------|------------------------------|------------------------------|
| | | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) |
| Russell at Walkley | NBL | 0.89 | 32 | #54 | 0.69 | 19 | #31 |
| | NBR | 0.75 | 0 | 35 | 1.20 | ~121 | #185 |
| | EBL | 0.64 | 21 | 37 | 1.46 | ~33 | #66 |
| | EBT | 0.41 | 56 | 78 | 1.05 | ~193 | #232 |
| | WBL | 0.79 | 56 | 70 | 1.50 | ~80 | #111 |
| | WBT | 0.82 | 167 | #225 | 0.46 | 60 | 75 |
| Russell at Hawthorne | SBL | 0.18 | 3 | 8 | 0.45 | 11 | 25 |
| | WBR | 0.84 | 28 | #65 | 0.33 | 0 | 11 |
| Hawthorne at Hunt Club | NBT | 1.03 | ~102 | #144 | 0.83 | 39 | 59 |
| | SBL | 0.38 | 8 | 16 | 0.83 | 36 | #68 |
| | EBL | 0.98 | ~112 | #178 | 0.87 | 67 | #108 |
| | EBT | 0.63 | 75 | 106 | 0.88 | 115 | #149 |
| | WBL | 0.82 | 62 | 87 | 0.98 | ~123 | #188 |
| | WBT | 0.82 | 86 | 111 | 0.71 | 112 | 138 |
| Walkley at 417 NB Ramp | NB | 281 sec | - | 245 | 36 sec | - | 28 |

#: volume for the 95th percentile cycle exceeds capacity

~: approach is above capacity

Based on the previous tables and compared to the 2023 background traffic conditions, marginal increases in v/c ratios and queue lengths are anticipated as a result of background growth within the study area.

With signalization of the Walkley Road at 417 NB Off-ramp, that intersection is expected to operate with LOS C (See **Appendix J**).

With signalization of the Walkley Road at 417 SB Off-ramp, that intersection is expected to operate with LOS B (See **Appendix J**).

The Russell Road at Anderson Road intersection (LOS E during the AM peak hour) with All-Way STOP control improves to LOS C with construction of a roundabout (See **Appendix J**).

With installation of dual eastbound and westbound left turn lanes, the Hunt Club Road at Hawthorne Road is expected to operate within City Guidelines.

The Ramsayville at Russell Road (S) intersection operates with LOS F but has residual capacity (v/c is about 0.35 or less). There are no recommended modifications for this intersection at this time.

6.7.5 2028 Intersection Operations – Total Traffic with Site Generated Trips

Intersection capacity analysis has been completed for the 2028 AM and PM peak hours with the addition of site generated trips (See **Figure 11**). The results of the analysis are summarized in **Table 14** for the weekday AM and PM peak hours. Approaches where long queuing is expected are shown with the associated 50th and 95th percentile queue lengths in **Table 15**.

Existing signal timing plans obtained from the City of Ottawa are included in **Appendix H**. Detailed *Synchro 10* reports are included in **Appendix J**.

Table 14: 2028 Total Traffic - Intersection Operations

| Intersection | AM Peak | | | PM Peak | | |
|---|-------------------|-----|------|-------------------|-----|------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Russell at Walkley | 1.09 | F | NBL | 1.79 | F | WBL |
| Russell at Hawthorne | 1.08 | F | WBR | 1.05 | F | SBL |
| Hawthorne at Stevenage | 0.64 | B | EBL | 0.71 | C | WBL |
| Hawthorne at Hunt Club | 1.07 | F | EBL | 0.99 | E | WBL |
| Russell at Belgreen ¹ | 26 sec | D | NBLR | 14 sec | B | NB |
| Hunt Club at Hwy 417 Off-ramp ¹ | 39 sec | E | EBL | 28 sec | D | EBL |
| Ramsayville at Russell (S) ¹ | 67 sec | F | EB | 28 sec | D | EB |
| Ramsayville at Russell (N) ¹ | 32 sec | D | WB | 13 sec | B | SB |
| Russell at Anderson ¹ | 56 sec | F | NB | 15 sec | B | SB |
| Walkley at Highway 417 SB Off-ramp ¹ | 35 sec | D | SBL | 69 sec | F | SBL |
| Walkey at Highway 417 NB Off-ramp ¹ | 281 sec | F | NB | 36 sec | E | NB |
| Hunt Club at Street 1 | 0.68 | B | WBT | 0.67 | B | WBT |
| Russell at Site 3 North Access ¹ | 24 sec | C | SBL | 21 sec | C | SBL |
| Russell at Site 3 South Access ¹ | 23 sec | C | SB | 16 sec | C | SB |
| Russell at Site 1 North Access ¹ | 25 sec | D | NB | 21 sec | C | NB |
| Russell at Site 1 South Access ¹ | 16 sec | C | NB | 13 sec | B | NB |

1. Unsignalized intersection

Table 15: 2028 Total Traffic - Queuing

| Intersection | Mvmt | AM Peak | | | PM Peak | | |
|------------------------|------|----------------|---------------------------------|---------------------------------|--------------|---------------------------------|---------------------------------|
| | | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) |
| Russell at Walkley | NBL | 1.09 | ~44 | #72 | 0.87 | 24 | #44 |
| | NBR | 0.83 | 14 | 70 | 1.30 | ~145 | #210 |
| | EBL | 0.64 | 21 | 37 | 1.46 | ~33 | #66 |
| | EBT | 0.45 | 60 | 82 | 1.05 | ~193 | #232 |
| | WBL | 0.82 | 66 | 79 | 1.79 | ~103 | #135 |
| | WBT | 0.83 | 172 | #225 | 0.46 | 60 | 75 |
| Russell at Hawthorne | SBL | 0.88 | 27 | #73 | 1.05 | ~52 | #75 |
| | WBR | 1.08 | ~70 | #125 | 0.52 | 0 | 14 |
| Hawthorne at Hunt Club | NBT | 1.04 | ~102 | #144 | 0.83 | 39 | 59 |
| | SBL | 0.38 | 8 | 16 | 0.83 | 36 | #68 |
| | EBL | 1.07 | ~130 | #198 | 0.94 | 81 | #137 |
| | EBT | 0.67 | 81 | #117 | 0.92 | 124 | #163 |
| | WBL | 0.82 | 62 | 87 | 0.99 | ~123 | #188 |
| | WBT | 0.85 | 92 | #123 | 0.77 | 118 | 145 |
| Walkley at 417 NB Ramp | NB | 281 sec | - | 245 | 36 sec | - | 28 |

#: volume for the 95th percentile cycle exceeds capacity

~: approach is above capacity

Based on the previous tables and compared to the 2028 background traffic conditions, increases in v/c ratios and queue lengths within the study area are anticipated, as a result of increased traffic generated by the proposed development.

With the signalized Street 1 connection to Hunt Club it is expected that minimal to no site traffic will be added to the Walkley Road at 417 NB Off-ramp intersection. The operation of that intersection (overall LOS C) with traffic signals is included in **Appendix J**.

It is expected that minimal to no site traffic will be added to the southbound left movement at the 417 SB Off-ramp at Walkley Road. The operation of that intersection with traffic signals (overall LOS C) is included in **Appendix J**.

The Russell Road at Anderson Road intersection (LOS F during the AM peak hour) with All-Way STOP control improves to LOS D with construction of a roundabout (See **Appendix J**).

The Ramsayville at Russell Road (S) intersection operates with LOS F but has residual capacity (v/c is about 0.61). There are no recommended modifications for this intersection at this time.

With the signal timing adjustments during the AM peak identified for the 2023 Total Traffic at the Russell Road at Walkley intersection, that intersection would operate within City Guidelines during the AM peak hour with 2028 Total Traffic volumes (See **Appendix J**).

With the southbound left turn protected / permissive phase identified for the 2023 Total Traffic at the Russell at Hawthorne intersection, that intersection would operate within City Guidelines during the AM and PM peak hour with 2028 Total Traffic volumes (See **Appendix J**).

With installation of dual eastbound and westbound left turn lanes, the Hunt Club Road at Hawthorne Road is expected to operate within City Guidelines with 2028 Total Traffic volumes.

The signalized Street 1 connection to Hunt Club Road is expected to operate within City Guidelines. The STOP controlled site accesses (along Russell Road) are expected to operate with LOS 'C' or better under 2028 total traffic conditions.

6.7.6 2033 Intersection Operations – Future Background Traffic

Intersection capacity analysis has been completed for the projected 2033 AM and PM peak hours with background traffic volumes (See **Figure 9**) for the MTO intersections per the MTO General Guidelines for the Preparation of Traffic Impact Studies (December 2009) and is summarized in **Table 16** for the weekday AM and PM peak hours. Approaches where long queuing is expected are shown with the associated 50th and 95th percentile queue lengths in **Table 17**.

Existing signal timing plans obtained from the City of Ottawa are included in **Appendix H**. Detailed *Synchro 10* reports are included in **Appendix J**.

Table 16: 2033 Background Traffic - Intersection Operations

| Intersection | AM Peak | | | PM Peak | | |
|---|-------------------|-----|------|-------------------|-----|------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Hunt Club at Hwy 417 Off-ramp ¹ | 38 sec | E | EBL | 27 sec | D | EBL |
| Walkley at Highway 417 SB Off-ramp ¹ | 36 sec | E | SBL | 83 sec | F | SBL |
| Walkey at Highway 417 NB Off-ramp ¹ | 342 sec | F | NB | 44 sec | E | NB |

1. Unsignalized intersection

Table 17: 2033 Background Traffic - Queuing

| Intersection | Mvmt | AM Peak | | | PM Peak | | |
|------------------------|------|--------------|------------------------------|------------------------------|--------------|------------------------------|------------------------------|
| | | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) |
| Walkley at 417 NB Ramp | NB | 342 sec | - | 280 | 44 sec | - | 34 |

#: volume for the 95th percentile cycle exceeds capacity

~: approach is above capacity

Based on the previous tables and compared to the 2028 background traffic conditions, marginal increases in v/c ratios and queue lengths are anticipated as a result of background growth within the study area.

With signalization of the Walkley Road at 417 NB Off-ramp, that intersection is expected to operate with LOS C (See **Appendix J**).

With signalization of the Walkley Road at 417 SB Off-ramp, that intersection is expected to operate with LOS C (See **Appendix J**).

6.7.7 2033 Intersection Operations – Total Traffic with Site Generated Trips

Intersection capacity analysis has been completed for the 2033 AM and PM peak hours with the addition of site generated trips at the MTO intersections per the MTO guidelines (See **Figure 12**). The results of the analysis are summarized in **Table 18** for the weekday AM and PM peak hours. Approaches where long queuing is expected are shown with the associated 50th and 95th percentile queue lengths in **Table 19**.

Existing signal timing plans obtained from the City of Ottawa are included in **Appendix H**. Detailed *Synchro 10* reports are included in **Appendix J**.

Table 18: 2033 Total Traffic - Intersection Operations

| Intersection | AM Peak | | | PM Peak | | |
|---|-------------------|-----|------|-------------------|-----|------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Hunt Club at Hwy 417 Off-ramp ¹ | 43 sec | E | EBL | 30 sec | D | EBL |
| Walkley at Highway 417 SB Off-ramp ¹ | 38 sec | E | SBL | 92 sec | F | SBL |
| Walkey at Highway 417 NB Off-ramp ¹ | 342 sec | F | NB | 44 sec | E | NB |

1. Unsignalized intersection

Table 19: 2033 Total Traffic - Queuing

| Intersection | Mvmt | AM Peak | | | PM Peak | | |
|------------------------|------|--------------|------------------------------|------------------------------|--------------|------------------------------|------------------------------|
| | | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) | v/c or Delay | 50 th % Queue (m) | 95 th % Queue (m) |
| Walkley at 417 NB Ramp | NB | 342 sec | - | 280 | 44 sec | - | 34 |

#: volume for the 95th percentile cycle exceeds capacity

~: approach is above capacity

Based on the previous tables and compared to the 2033 background traffic conditions, increases in v/c ratios and queue lengths within the study area are anticipated, as a result of increased traffic generated by the proposed development.

With signalization of the Walkley Road at 417 NB Off-ramp, that intersection is expected to operate with LOS C (See **Appendix J**).

With signalization of the Walkley Road at 417 SB Off-ramp, that intersection is expected to operate with LOS C (See **Appendix J**).

6.7.8 Right Turn Channelized Highway Ramps – Traffic Analysis and Results

SimTraffic is a microscopic model used to simulate a wide variety of traffic controls. Each vehicle in the traffic system is individually tracked through the model and comprehensive operational measures of effectiveness are collected on every vehicle during each 0.1-second of the simulation. Unlike Synchro, SimTraffic measures the full impact of queuing and blocking.

Eleven 1-hour SimTraffic simulation runs have been prepared for each of the AM and PM peak hours with 2033 Total Traffic to analyze the operations of the Highway 417 off-ramps to Hunt Club Road and Walkley Road (SB ramp). This analysis considers the free flow channel and impacts of

downstream merging. The delay results of this SimTraffic analysis for the 2033 future background and total traffic scenarios are included in **Table 20** and **Table 21**, respectively. The merging queues along Hunt Club Road and Walkley Road downstream of these channels for the 2033 future background and total traffic scenarios are summarized in **Table 22** and **Table 23**, respectively. Detailed SimTraffic reports are included in **Appendix J**.

Table 20: 2033 Background Traffic – SimTraffic Delay Results

| Intersection | AM Peak | | | PM Peak | | |
|------------------------------------|-------------------|-----|------|-------------------|-----|------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Hunt Club at Highway 417 Off-ramp | 4 secs | A | EBR | 21 sec | C | EBR |
| Walkley at Highway 417 SB Off-ramp | 3 secs | A | SBR | 2 sec | A | SBR |

Table 21: 2033 Total Traffic – SimTraffic Delay Results

| Intersection | AM Peak | | | PM Peak | | |
|------------------------------------|-------------------|-----|------|-------------------|-----|------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Hunt Club at Highway 417 Off-ramp | 5 secs | A | EBR | 71 sec | F | EBR |
| Walkley at Highway 417 SB Off-ramp | 3 secs | A | SBR | 2 sec | A | SBR |

Table 22: 2033 Background Traffic – SimTraffic Merging Queue Results

| Intersection | AM Peak | | | PM Peak | | |
|------------------------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|
| | Average Queue (m) | 95th % Queue (m) | Maximum Queue (m) | Average Queue (m) | 95th % Queue (m) | Maximum Queue (m) |
| Hunt Club at Highway 417 Off-ramp | - | - | - | - | - | - |
| Walkley at Highway 417 SB Off-ramp | 0.0 | 2 | 2 | - | - | - |

Table 23: 2033 Total Traffic – SimTraffic Merging Queue Results

| Intersection | AM Peak | | | PM Peak | | |
|------------------------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|
| | Average Queue (m) | 95th % Queue (m) | Maximum Queue (m) | Average Queue (m) | 95th % Queue (m) | Maximum Queue (m) |
| Hunt Club at Highway 417 Off-ramp | - | - | - | - | - | - |
| Walkley at Highway 417 SB Off-ramp | 0 | 13 | 23 | - | - | - |

The SimTraffic analysis indicates that:

Hunt Club at Highway 417 Offramp:

- During the 2033 AM peak hour without and with added site generated trips, the right turn from the Highway 417 SB off-ramp onto Hunt Club Road will operate well. With a continuous lane along Hunt Club, merging is only required for lane selection at downstream intersections, about 1km away.
- During the 2033 PM peak hour, with projected right turning volume approaching or exceeding 1500 vehicles coming from the highway turning right to Hunt Club, the turn is approaching (or may exceed) its lane capacity without and with site generated trips.

- Consideration should be given to creating a wider radius channel to accommodate higher speeds around this turn or a second right turning lane may be required for this movement. This is identified for MTO's consideration.

Walkley at Highway 417 Offramp:

- During the 2033 AM and PM peak hours without and with added site generated trips, the right turn from the Highway 417 SB off-ramp onto Walkley Road will operate well.

7.0 Conclusions and Recommendations**Development Design and Parking**

- Pedestrian facilities will be provided between the main buildings and the parking lots. New pedestrian walkways will be constructed, providing connectivity to Russell Road.
- The Transportation Demand Management (TDM) infrastructure and measures checklists will be prepared for each site plan submission.
- The conceptual vehicular parking spaces meet the requirements of the Zoning By-Law (ZBL) for each of the three sites. Vehicular, accessible, and bicycle parking requirements for each building will be confirmed with the site plan submissions.
- Stops #3336 and 3339 are located immediately in front of Buildings A and B. Stops #3335 and 3340 are less than 400m to Buildings C, D, and F. Building E is about 650m from the nearest bus stop. Walking distance between exterior access doors and the transit stops will be reviewed at site plan submission.
- Each building exceeds the minimum requirements of the ZBL for vehicle loading space, and this will be confirmed at site plan submission.

Boundary Street Multi-Modal Level of Service (MMLOS)

The results of the segment MMLOS analysis for Russell Road and Hunt Club Road can be summarized as follows:

- Both Russell Road and Hunt Club Road operate with a Pedestrian Level of Service (PLOS) F, missing the target PLOS C;
- Russell Road (F) and Hunt Club Road (E) miss the target Bicycle Level of Service (BLOS) of E and C, respectively;
- Russell Road (C) misses and Hunt Club Road (A) exceeds the target Truck Level of Service (TkLOS) of B; and,
- If the City urbanizes Russell Road in the future, sidewalk and onstreet bicycle lanes should be considered. The existing gravel shoulders are approximately 2.5m. The City may wish to consider paving an additional 0.5m on either side of the road.

Transit

- The proposed development is anticipated to generate an additional 110 transit trips (60 in, 50 out) during the weekday AM peak hour and 111 transit trips (68 in, 43 out) during the weekday PM peak hour.
- The City should consider providing additional transit service during the peak period. The transit trips will be reviewed with each site plan submission.

Access Design

- The proposed development will be served by a total of seven accesses. The accesses will be 7-9m wide, measured at the property line. The accesses meet the requirements of the

City's Private Approach By-law and provide adequate turning sight distance for heavy vehicles. Access design will be further reviewed with each site plan submission.

- Southbound left turn lanes are warranted along Russell Road at both accesses to Building A.
- An eastbound left turn lane is warranted along Hunt Club Road at the Street 1 connection.
- Left turn lanes are not warranted on Russell Road at the access intersections for Sites 1 and 2 or Building F.
- The Street 1 connection to Hunt Club Road should be signalized while the remaining connections operate well with STOP control.
- The signalized Street 1 connection to Hunt Club is proposed approximately 250m east of the Hydro Ottawa (signalized) Access. The location and ultimate functional design of this intersection have been agreed by the City of Ottawa in a tri-party agreement with NCC and Hydro Ottawa in 2016.
- The Street 1 connection is 60m east of Hydro Ottawa's right-in, right-out (RIRO) driveway. Per the 2711 Hunt Club TIS, it is understood that Hydro's RIRO access may be closed with construction of the Street 1 access and a new connection provided between the Hydro Ottawa site and Street 1.

Intersection MMLOS Analysis

- The Walkley at Russell and Hunt Club at Hawthorne intersections do not meet the target Auto LOS.
- Auto Level of Service:
 - The northbound, eastbound, and westbound approaches at the **Walkley Road / Russell Road** intersection do not meet the target Auto LOS D in the PM peak hour. The eastbound left turn movement in the PM peak can be improved to LOS D or better with signal timing adjustments at the expense of the westbound through movement. To achieve the target, a reduction in PM peak hour traffic volumes for the following movements are required:
 - Northbound right turn: reduction of approximately 130 vehicles;
 - Eastbound through: reduction of approximately 165 vehicles;
 - Westbound left turn: reduction of approximately 110 vehicles.
 - At the **Hunt Club Road / Hawthorne Road** intersection, the northbound through and eastbound left movements do not meet the target Auto LOS D in the AM peak hour and the westbound left movement does not meet the target Auto LOS D in the PM peak hour. The installation of dual eastbound and westbound left turn lanes and signal timing adjustments would improve the existing Auto LOS to D.
- In existing and future traffic conditions, capacity issues have been identified for the following movements:
 - Walkley Road/Russell Road
 - Northbound left turn (AM peak)
 - Northbound right turn (PM peak)
 - Eastbound left turn (PM peak)
 - Eastbound through (PM peak)
 - Westbound left turn (PM peak)
 - Russell Road/Hawthorne Road
 - Southbound left turn (AM and PM peak)
 - Westbound right turn (AM peak)
 - Hawthorne Road/Hunt Club Road

- Northbound through (AM peak)
- Eastbound left turn (AM and PM peak)
- Eastbound through (PM peak)
- Westbound left (PM peak)
- Walkley Road/Highway 417 NB Off-ramp
 - Northbound approach (AM peak)
- Walkley Road/Highway 417 SB Off-ramp
 - Southbound approach (PM peak)
- Russell Road/Anderson Road
 - Northbound approach (AM peak)
 - Westbound approach (AM peak)

Recommended Modifications

Several modifications have been identified for consideration. The need and timing will be confirmed at site plan submission. Functional designs of required road modifications to accommodate the development will be included in the site plan submissions. The modifications that have been identified for consideration are:

Existing/Background Traffic:

These modifications are identified for the City's/MTO's consideration without added site development.

- Install dual eastbound and westbound left turn lanes on Hunt Club Road at Hawthorne Road to improve the level of service and accommodate the existing and projected queues without and with site generated trips.
- Consider installation of a roundabout at the Russell Road/Anderson Road intersection to accommodate existing and projected traffic without and with site generated trips.
- Install traffic signals at the Walkley Road/Highway 417 northbound and southbound off-ramps to accommodate existing and projected traffic without and with site generated trips.
- Modify the right turn ramp for Highway 417 eastbound off-ramp onto Hunt Club Road with an increased radius or a second lane to accommodate projected traffic without and with site generated trips.

Site Traffic:

These modifications are identified to accommodate site generated trips.

- Install a left turn protected/permissive phase southbound on Russell Road at the Hawthorne intersection. This is expected to be required to accommodate site generated trips.
- Install southbound left turn lanes on Russell Road at both connections to the parcel hub (Civic #4055) to accommodate site generated trips.
- Install a northbound left turn lane on Russell Road at Belgreen Drive, warranted with site development. As development progresses in the Russell Road corridor and with the addition of new site accesses, it is expected that the operating speed may decrease and the posted speed of 60 km/h further north on Russell Road should be extended.
- Install an eastbound left turn lane and traffic signals at the Street 1 connection to Hunt Club Road to accommodate site generated trips.

Required Road Modification Approvals (RMA) for these potential modifications will be prepared at site plan when the details of the individual sites are known.

NOVATECH

Prepared by:



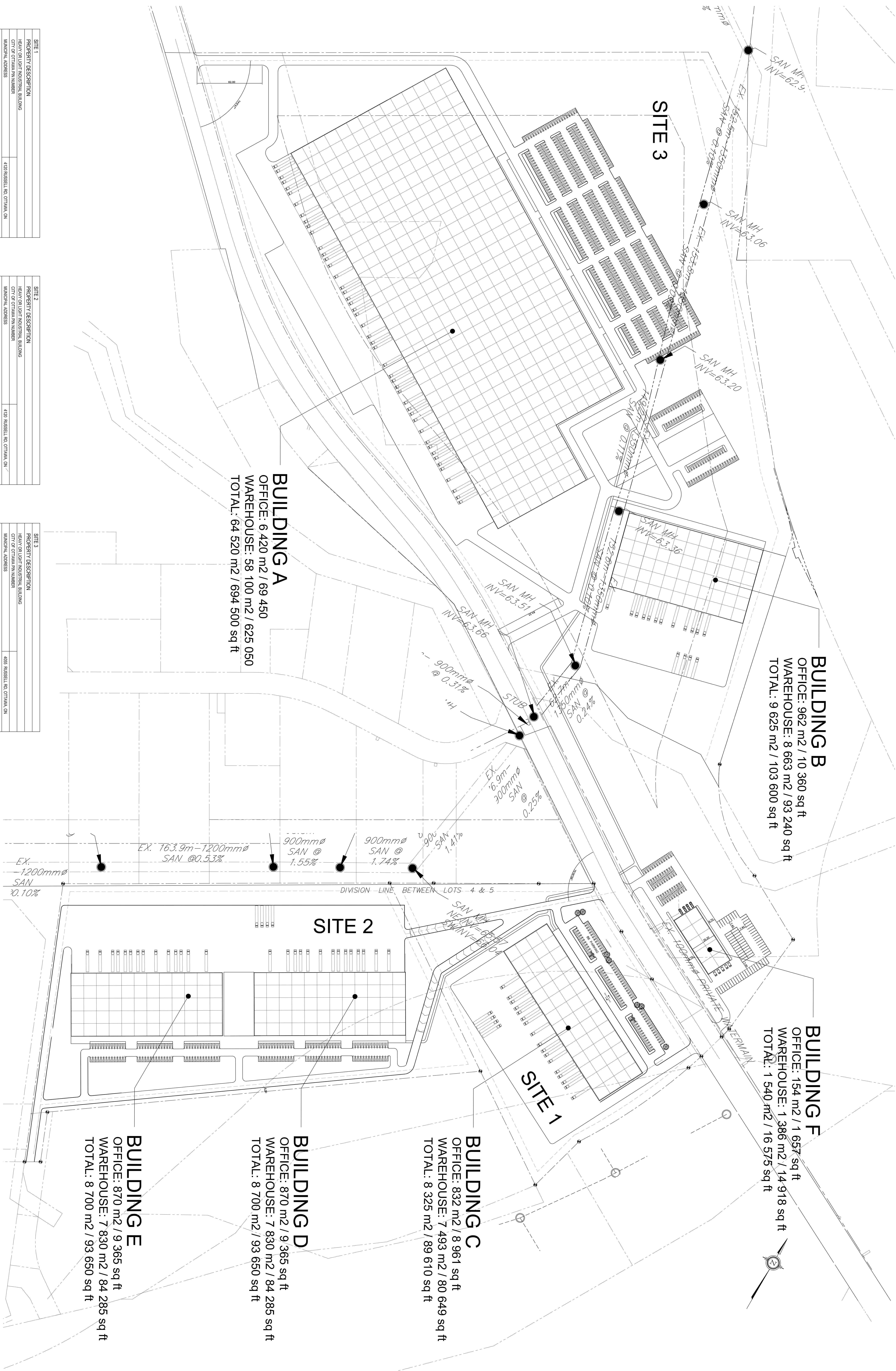
Patrick Hatton, P.Eng.
Project Manager | Transportation/Traffic

APPENDIX A

Concept Plan

| | |
|-------------------------------------|----------------------------------|
| SITE 1 | |
| PROPERTY DESCRIPTION | |
| HEAVY OIL LIGHT INDUSTRIAL BUILDING | |
| APPLICANT NAME | |
| 4120 BUSSELL RD, OTTAWA, ON | |
| MUNICIPAL ADDRESS | |
| SITE INFORMATION | |
| LOT AREA: | 46,632 m ² |
| LOT COVER: | 10.5% |
| LOT CEMENT: | 18.0 m |
| BUILDING INFORMATION | |
| BUILDING AREA: | 8,625 m ² |
| RELATION OF FLOOR AREA (94%) | 8,625 m ² |
| LIGHT INDUSTRIAL BUILDING | |
| ZONING TABLE | IN |
| PROPOSED ZONING BY LAW | REQUIRED |
| MINIMUM LOT AREA: | 4,000 m ² |
| MINIMUM LOT WIDTH: | 30 m |
| MINIMUM LOT DEPTH: | 120 m |
| MINIMUM FRONT SETBACK: | 12 m |
| SIDE YARD SETBACK: | 7.5 m |
| REAR YARD SETBACK: | 25 m |
| MINIMUM REAR AND SIDE BACK: | 6 m |
| MAXIMUM BUILDING HEIGHT: | 12 m |
| MAXIMUM FLOOR SPACE INDEX: | 2.0 |
| DESIGNING INFO: | PROPOSED |
| DATE OF DESIGN: | 2,711 m ² |
| DATE OF LOT AREA: | 17.5% (existing use 10%) |
| DATE OF FLOOR AREA: | 17.5% (existing use 10%) |
| VEHICLE PARKING REQUIREMENTS | PROPOSED |
| VEHICLE PARKING REQUIREMENTS | 8 per 1,000 m ² (94%) |
| VEHICLE PARKING (SCHEDULE 1A) | 83 spaces required |

| SITE 2 | |
|-------------------------|---|
| PROPERTY DESCRIPTION | 410 RUSSELL CO. OFFICE BLDG |
| APPLICANT'S NAME | 410 RUSSELL CO. OFFICE BLDG |
| PROPERTY ADDRESS | |
| SITE INFORMATION | |
| LOT AREA: | 74,744 sq ft |
| LOT DEPTH: | 186 ft |
| LOT FRONT: | 376 ft |
| LOT PERIM: | 1,071 ft |
| BUILDING INFORMATION | |
| BUILDING AREA: | 17,000 sq ft |
| BUILDING TYPE: | OFFICE BLDG |
| LEAF AREA (sq ft): | 14,000 sq ft |
| BUILDING INFORMATION | |
| JOINTING TYPE: | BM |
| CONCRETE JOINTING TYPE: | REINFORCED |
| CONCRETE JOINTING TYPE: | POSTTENSIONED |
| MINIMUM OF REBAR: | 4,000# |
| MINIMUM OF REBAR: | 20 in |
| MINIMUM OF REBAR: | 14 in |
| MINIMUM OF REBAR: | 12 in |
| MINIMUM OF REBAR: | 10 in |
| MINIMUM OF REBAR: | 8 in |
| MINIMUM OF REBAR: | 6 in |
| MINIMUM OF REBAR: | 4 in |
| MINIMUM OF REBAR: | 2 in |
| MINIMUM OF REBAR: | 1 in |
| MINIMUM OF REBAR: | 0.5 in |
| MINIMUM OF REBAR: | 0.25 in |
| MINIMUM OF REBAR: | 0.125 in |
| MINIMUM OF REBAR: | 0.0625 in |
| MINIMUM OF REBAR: | 0.03125 in |
| MINIMUM OF REBAR: | 0.015625 in |
| MINIMUM OF REBAR: | 0.0078125 in |
| MINIMUM OF REBAR: | 0.00390625 in |
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APPENDIX B

TIA Screening Form



City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

| | |
|------------------------------------|--|
| Municipal Address | 4055 and 4120 Russell Road |
| Description of Location | Along Russell Road north of Hunt Club Overpass |
| Land Use Classification | Industrial |
| Development Size (units) | |
| Development Size (m ²) | ~101,410m ² of industrial (warehouse) |
| Number of Accesses and Locations | 6 accesses to Russell Road (2 north of Belgreen Drive, 4 south of Belgreen Drive), 1 access to Hunt Club Road (east of Hydro Ottawa, future signalized Access) |
| Phase of Development | |
| Buildout Year | 2023 |

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

| Land Use Type | Minimum Development Size |
|-------------------------------------|--------------------------|
| Single-family homes | 40 units |
| Townhomes or apartments | 90 units |
| Office | 3,500 m ² |
| Industrial | 5,000 m ² |
| Fast-food restaurant or coffee shop | 100 m ² |
| Destination retail | 1,000 m ² |
| Gas station or convenience market | 75 m ² |

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

| | Yes | No |
|--|-----|----|
| 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? | ✓ | |
| Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?* | | ✓ |

*DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

| | Yes | No |
|---|-----|----|
| Are posted speed limits on a boundary street are 80 km/hr or greater? | ✓ | |
| Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway? | ✓ | |
| 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)? | | ✓ |
| Is the proposed driveway within auxiliary lanes of an intersection? | | ✓ |
| Does the proposed driveway make use of an existing median break that serves an existing site? | ✓ | |
| Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development? | | ✓ |
| Does the development include a drive-thru facility? | | ✓ |

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

| | Yes | No |
|---|-----|----|
| Does the development satisfy the Trip Generation Trigger? | ✓ | |
| Does the development satisfy the Location Trigger? | ✓ | |
| Does the development satisfy the Safety Trigger? | ✓ | |

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

APPENDIX C

OC Transpo System Information

47

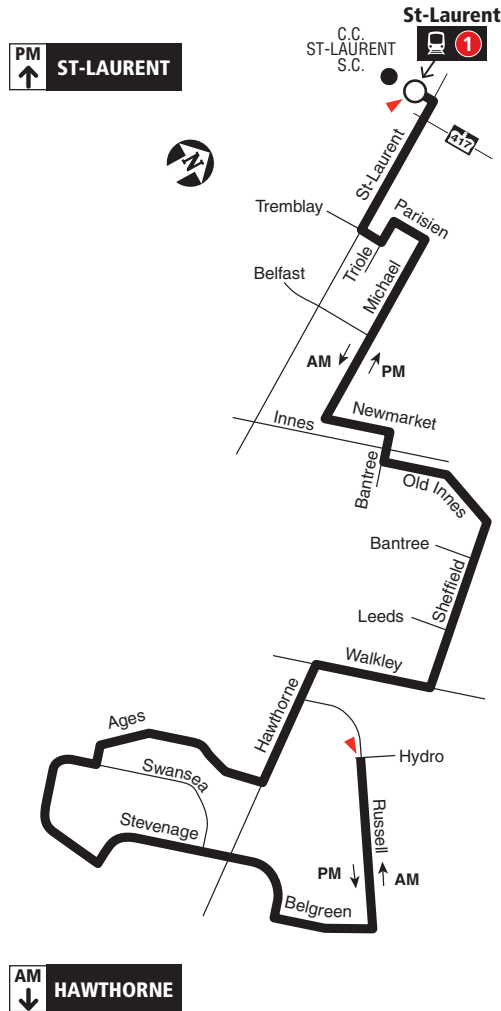
Local

**HAWTHORNE
ST-LAURENT**

Monday to Friday / Lundi au vendredi

Peak periods only

Périodes de pointe seulement



2019.06

Schedule / Horaire613-560-1000

Text / Texto560560

plus your four digit bus stop number / plus votre numéro d'arrêt à quatre chiffres

Customer Service

Service à la clientèle **613-741-4390**

Lost and Found / Objets perdus..... **613-563-4011**

Security / Sécurité **613-741-2478**

Effective June 25, 2017

En vigueur 25 juin 2017



INFO 613-741-4390
octranspo.com



98

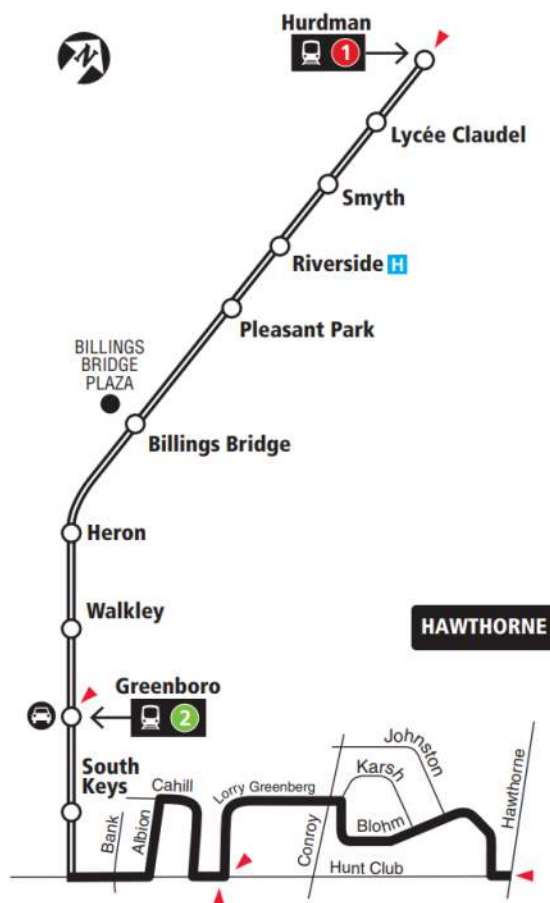
HAWTHORNE
HURDMAN

Rapid^e

7 days a week / 7 jours par semaine

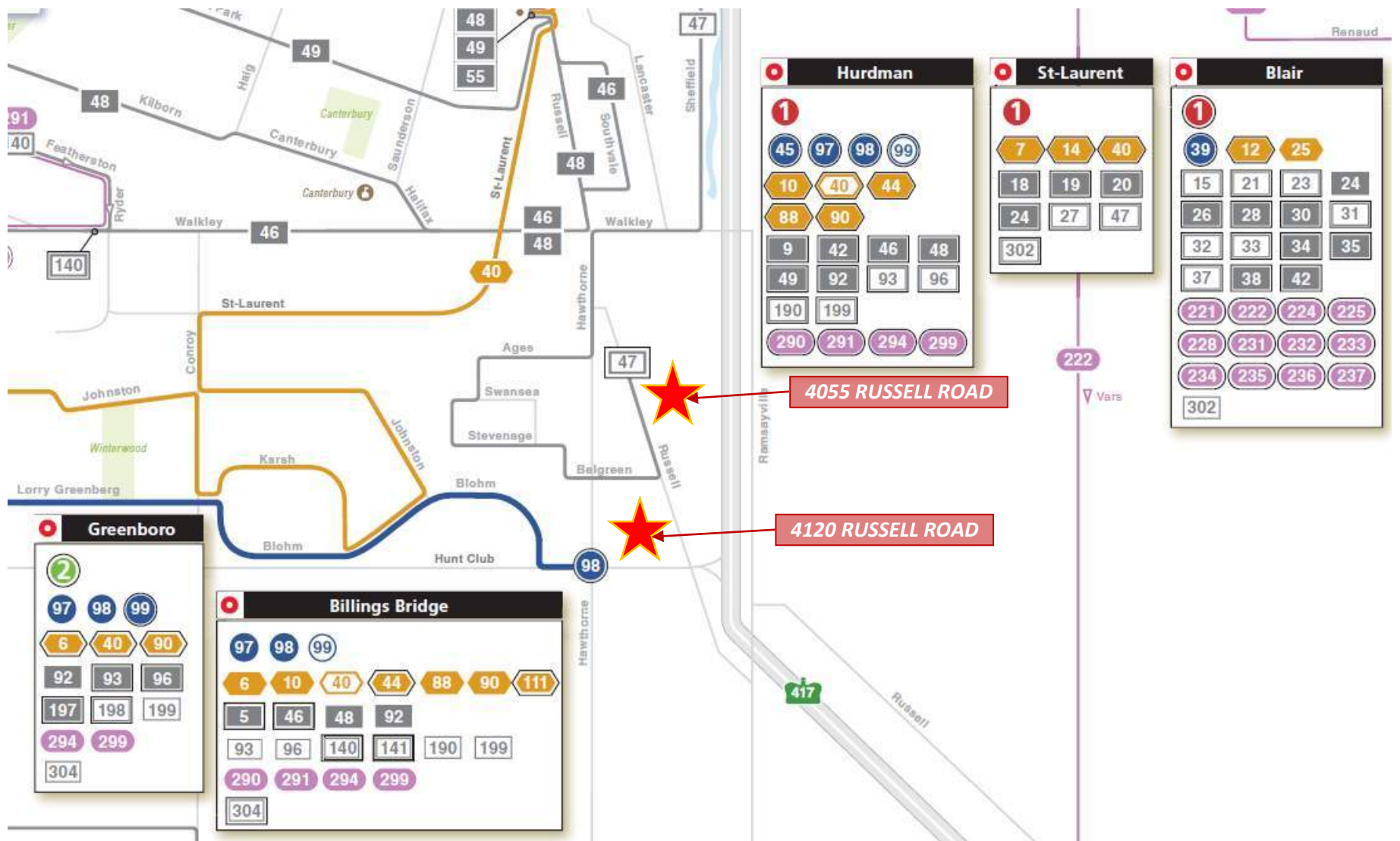
All day service
Service toute la journée

HURDMAN



HAWTHORNE

-  Transitway & Station
-  Park & Ride | Parc-o-bus
-  Timepoint | Heures de passage



APPENDIX D

Traffic Count Data and Long-Range Snapshots

Turning Movement Count - Peak Hour Diagram

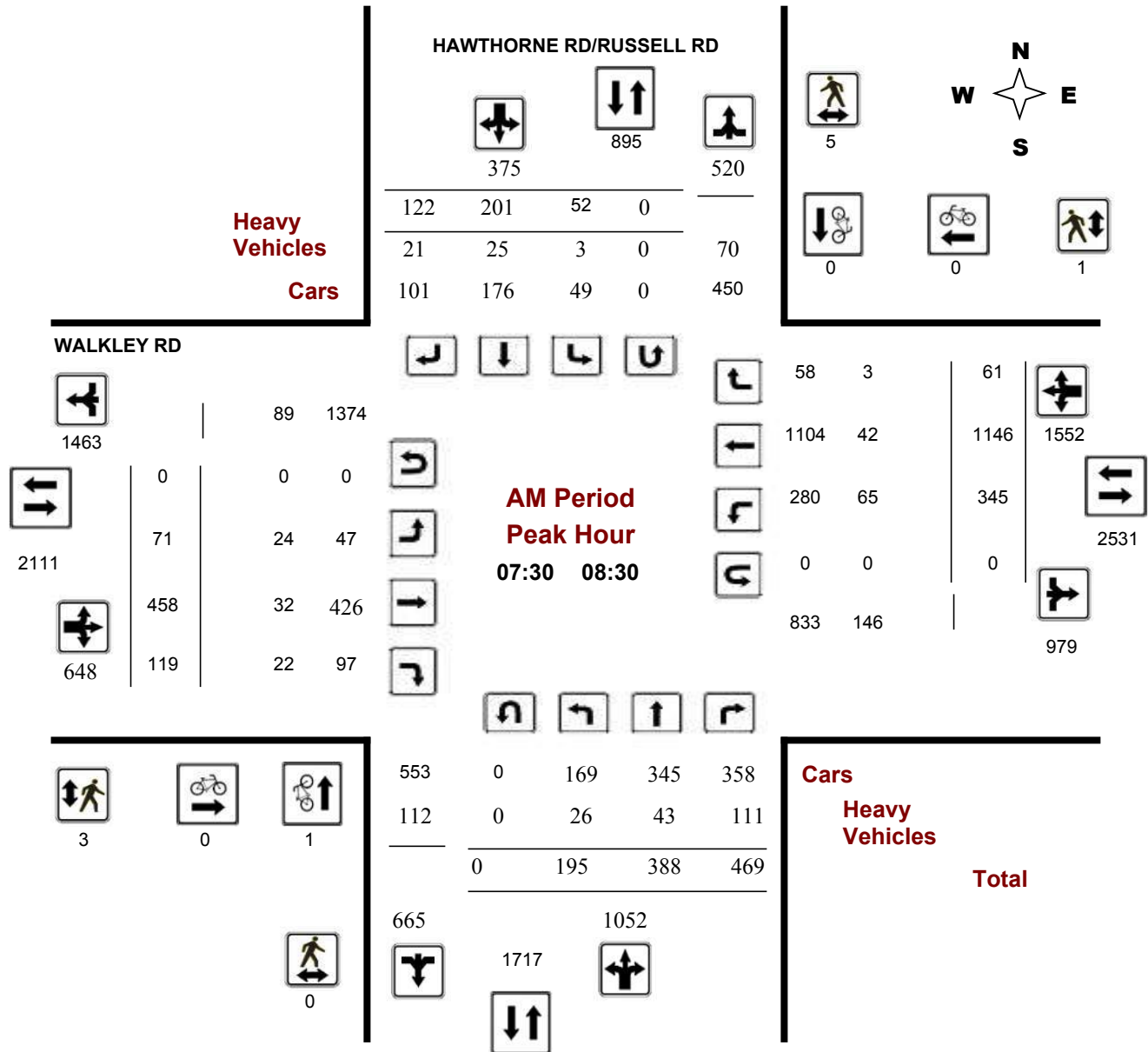
HAWTHORNE RD/RUSSELL RD @ WALKLEY RD

Survey Date: Thursday, February 22, 2018

Start Time: 07:00

WO No: 37561

Device: Miovision



Turning Movement Count - Peak Hour Diagram

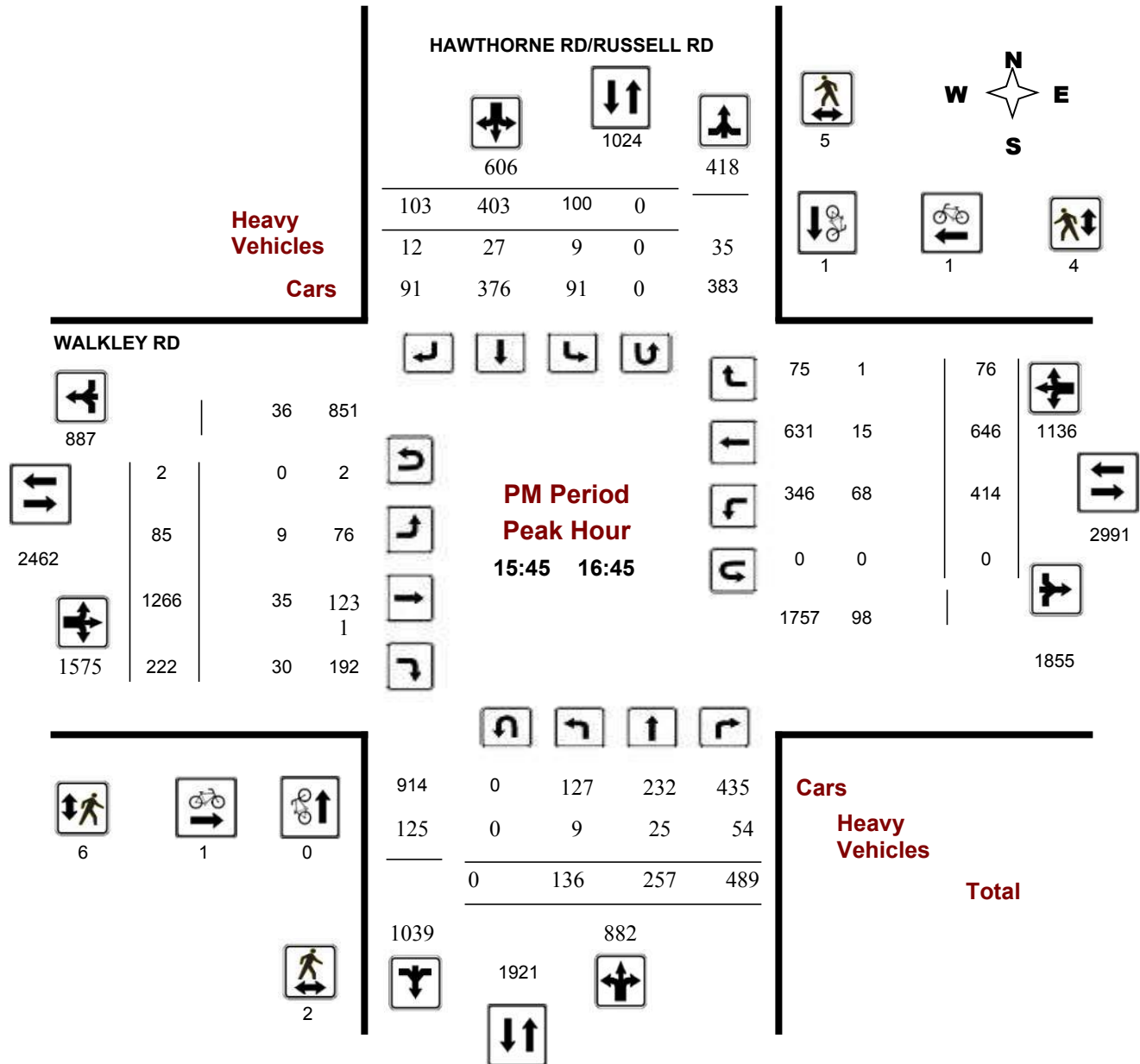
HAWTHORNE RD/RUSSELL RD @ WALKLEY RD

Survey Date: Thursday, February 22, 2018

Start Time: 07:00

WO No: 37561

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

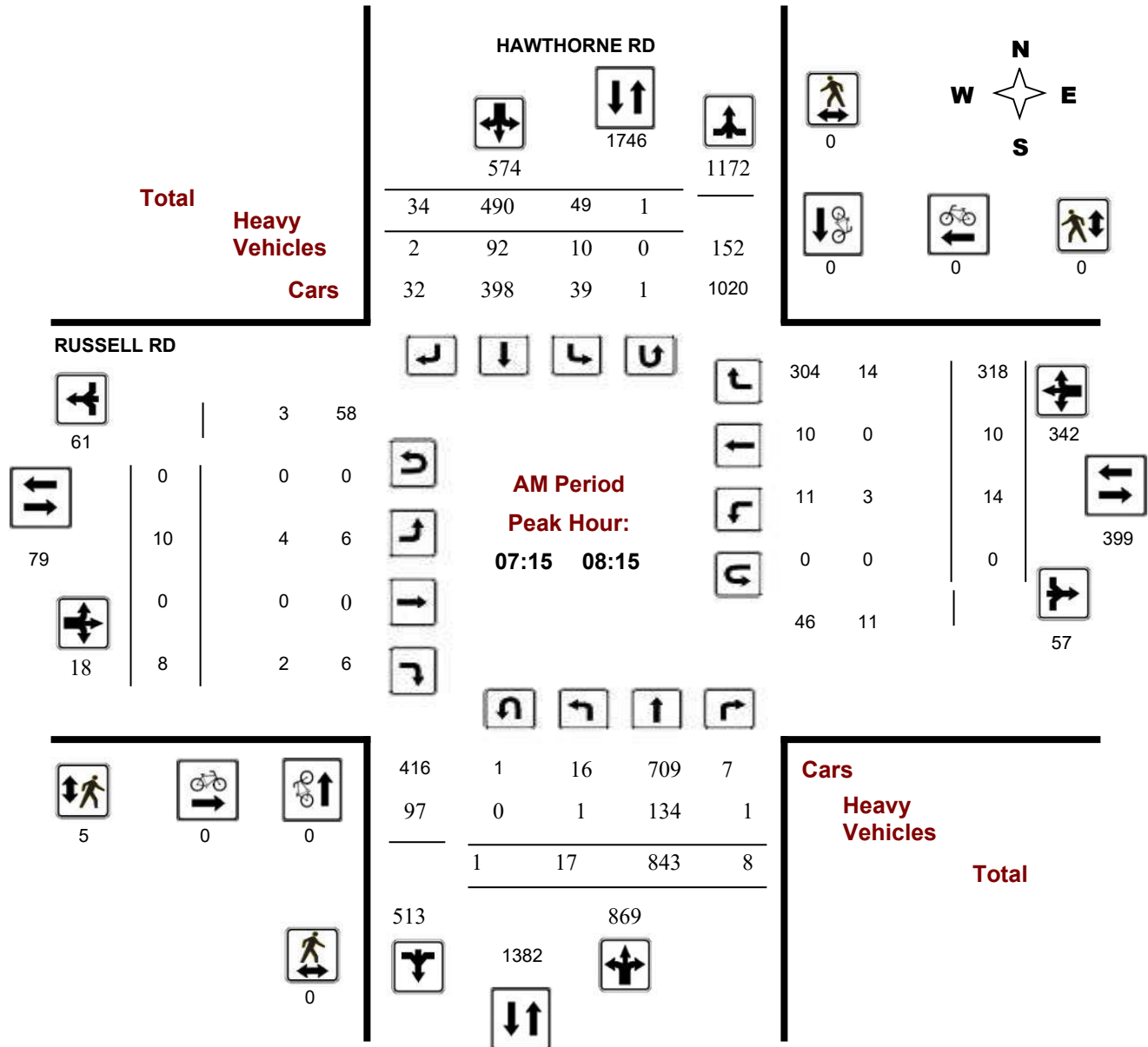
HAWTHORNE RD @ RUSSELL RD

Survey Date: Wednesday, January 30, 2019

Start Time: 07:00

WO No: 38330

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

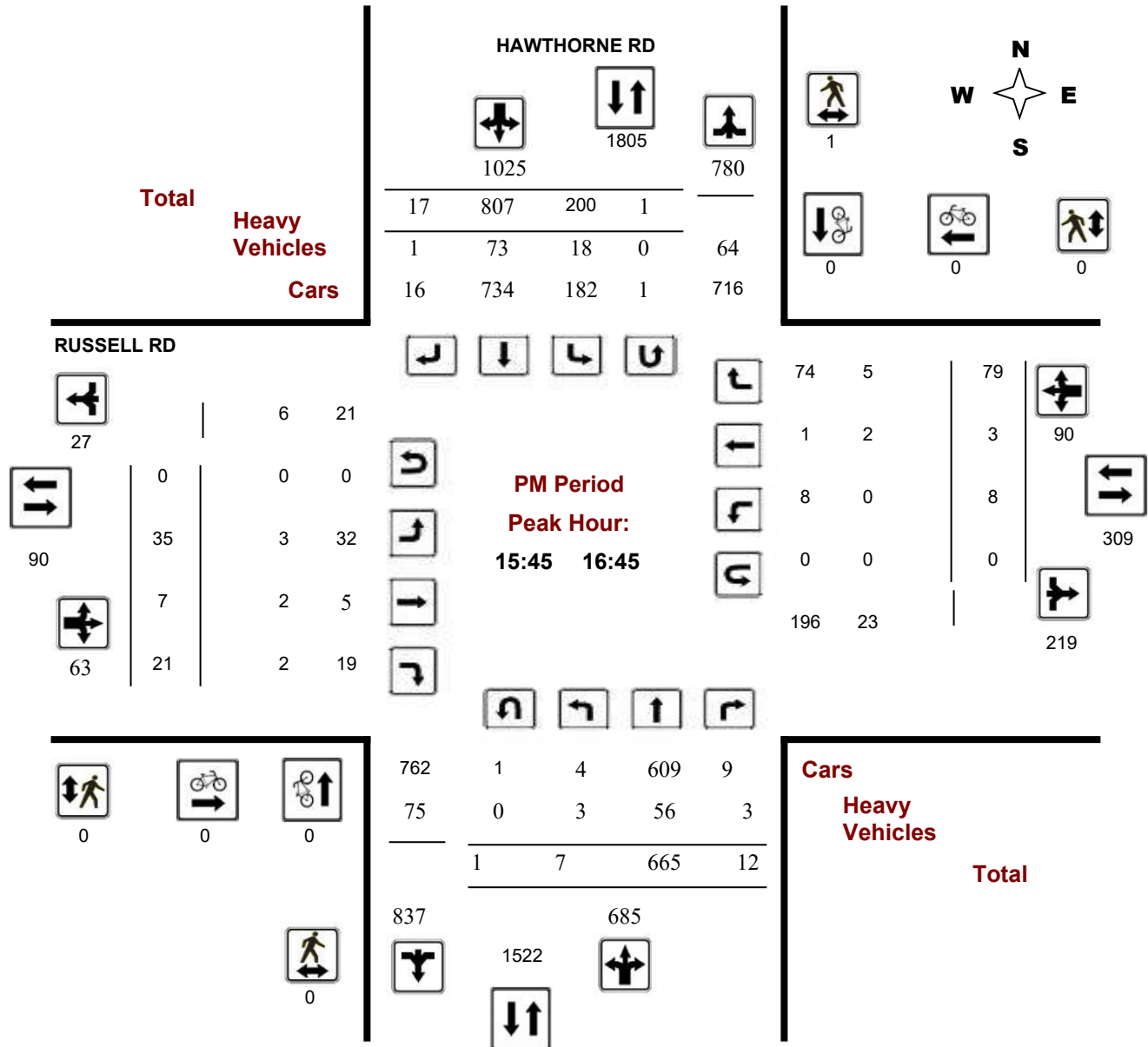
HAWTHORNE RD @ RUSSELL RD

Survey Date: Wednesday, January 30, 2019

Start Time: 07:00

WO No: 38330

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

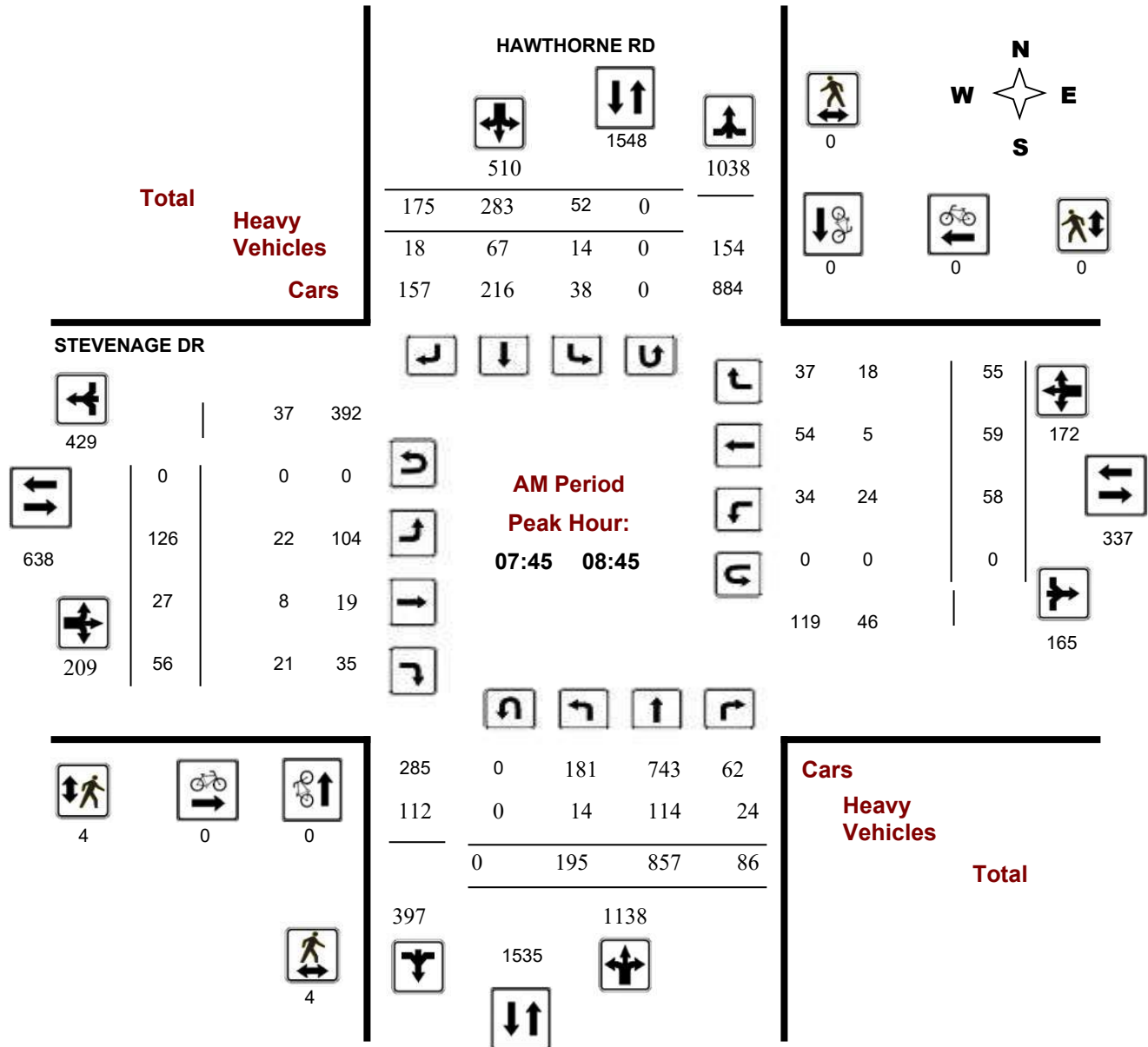
HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

Start Time: 07:00

WO No: 36598

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

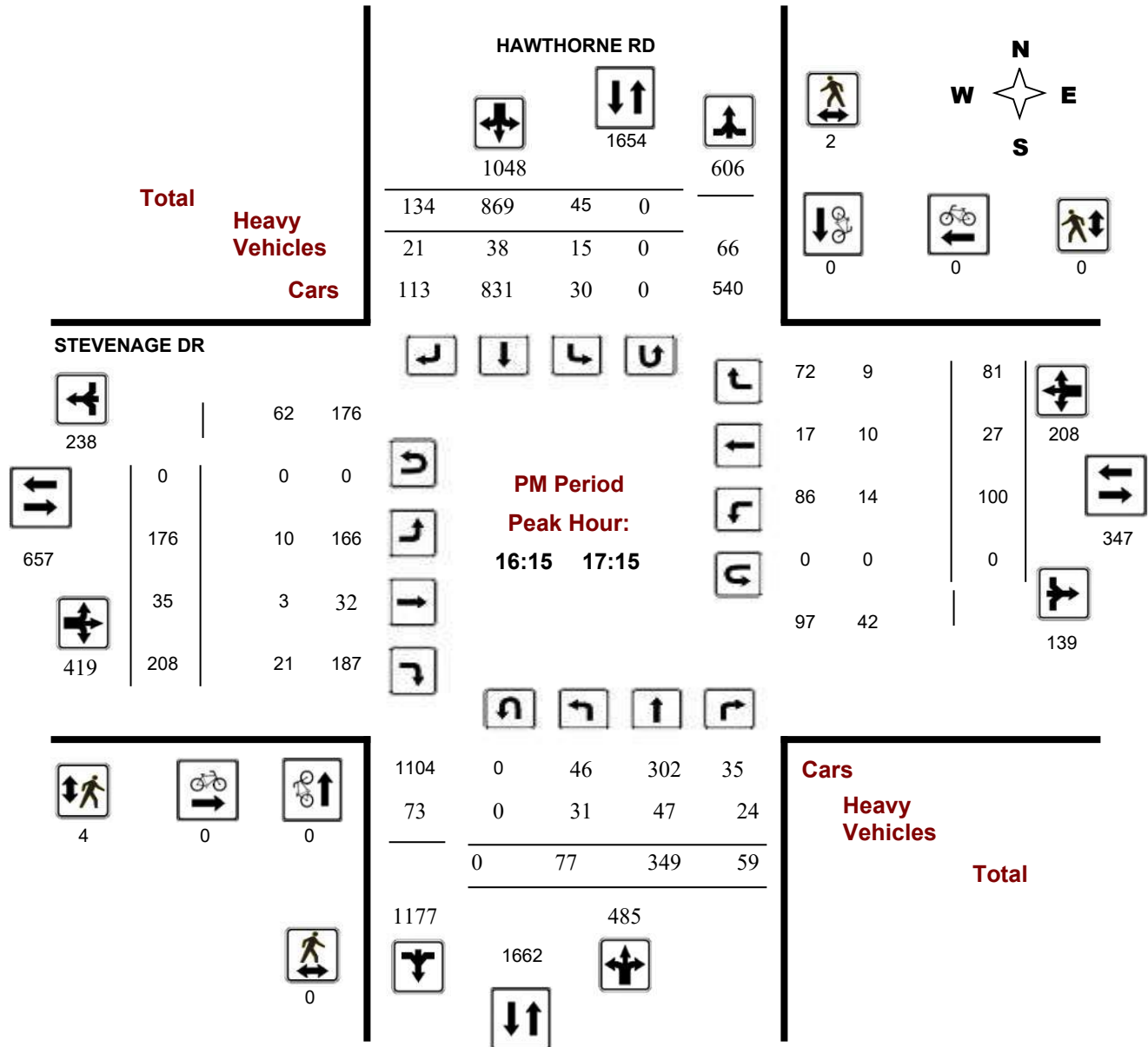
HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

Start Time: 07:00

WO No: 36598

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

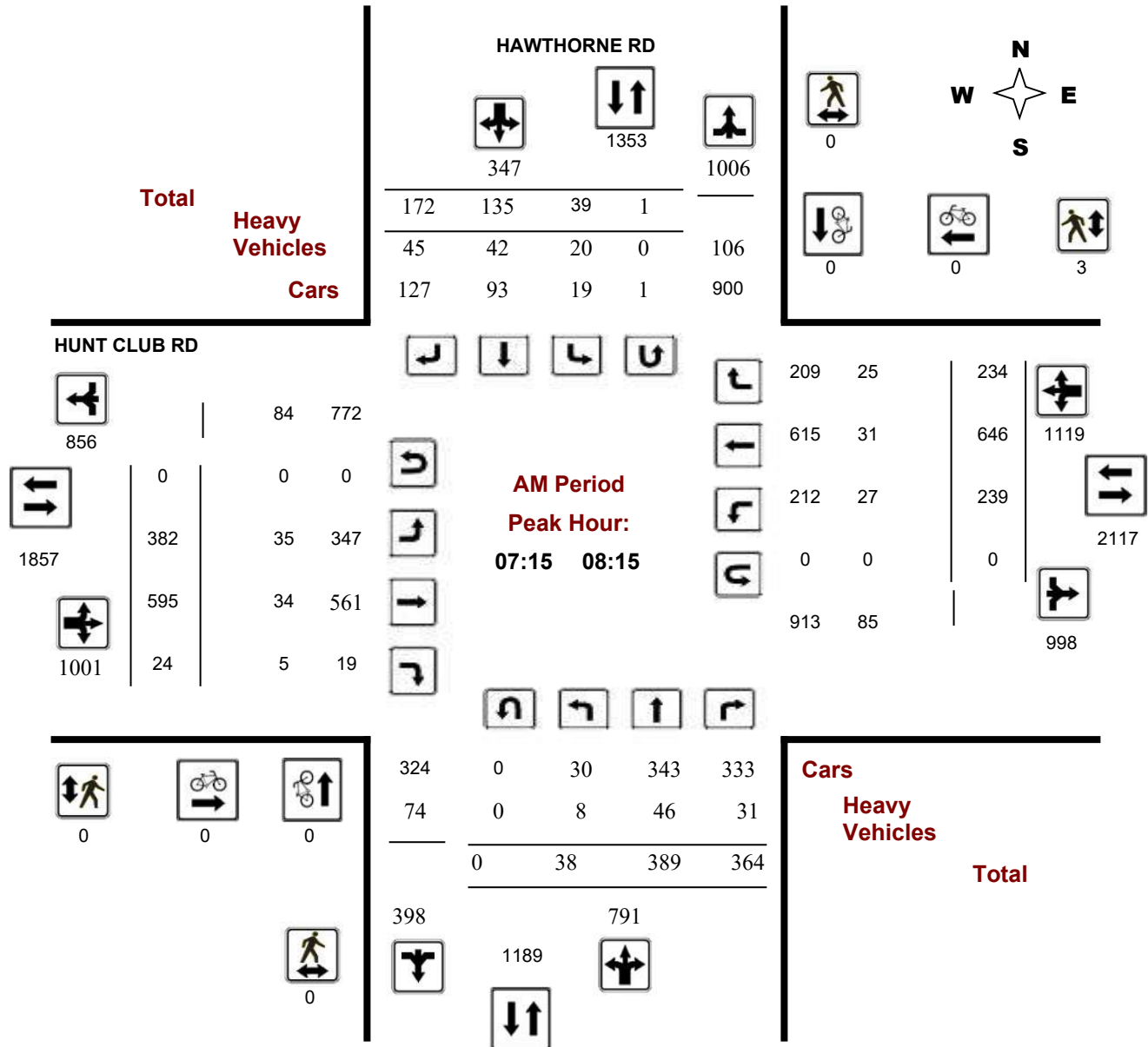
HAWTHORNE RD @ HUNT CLUB RD

Survey Date: Tuesday, July 24, 2018

Start Time: 07:00

WO No: 37991

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

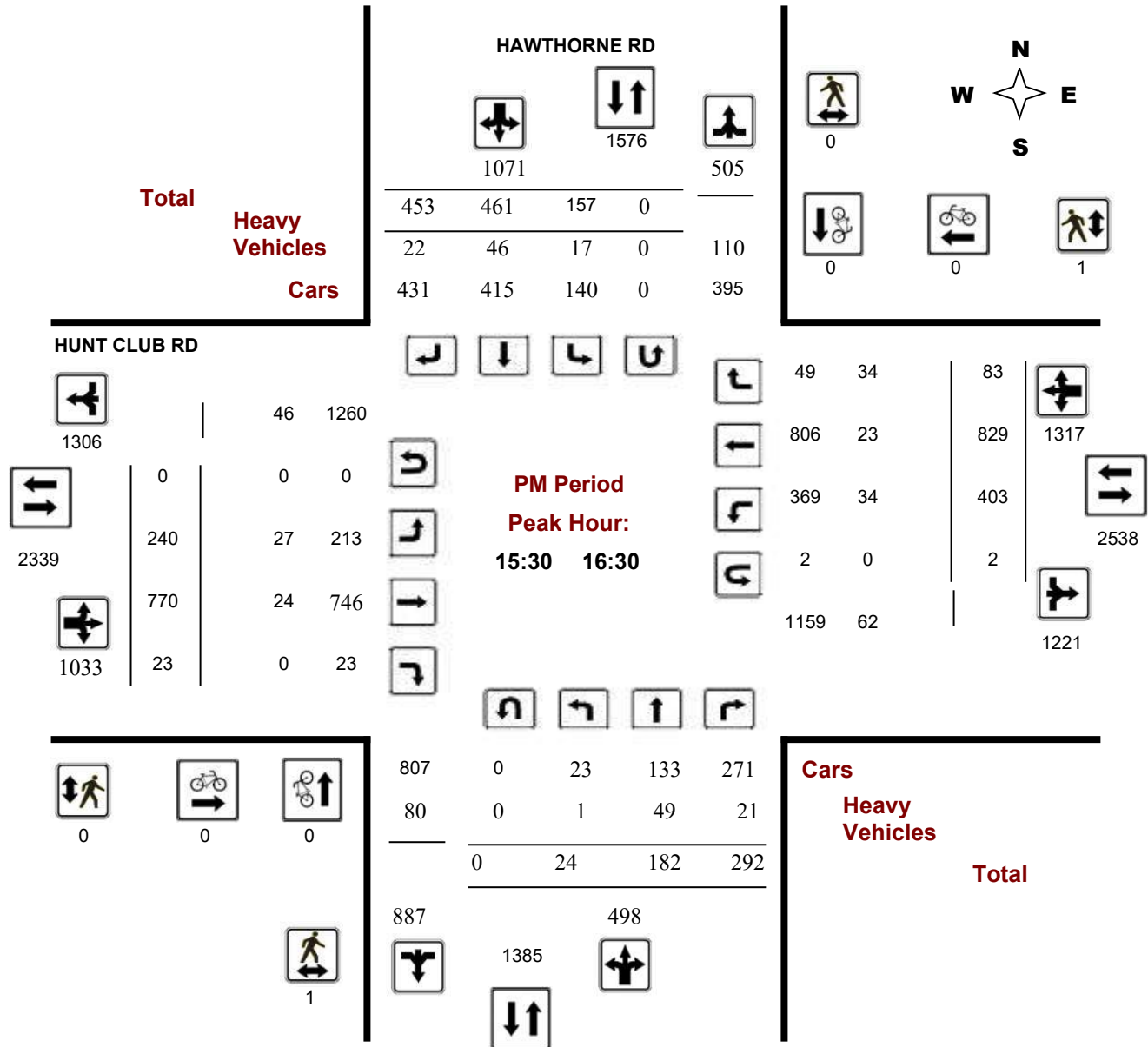
HAWTHORNE RD @ HUNT CLUB RD

Survey Date: Tuesday, July 24, 2018

Start Time: 07:00

WO No: 37991

Device: Miovision





Turning Movement Count Summary, AM and PM Peak Hour Flow Diagrams

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

Belgreen Drive & Russell Road

Ramsayville, ON

All Vehicles

(Except Bicycles & Electric Scooters)

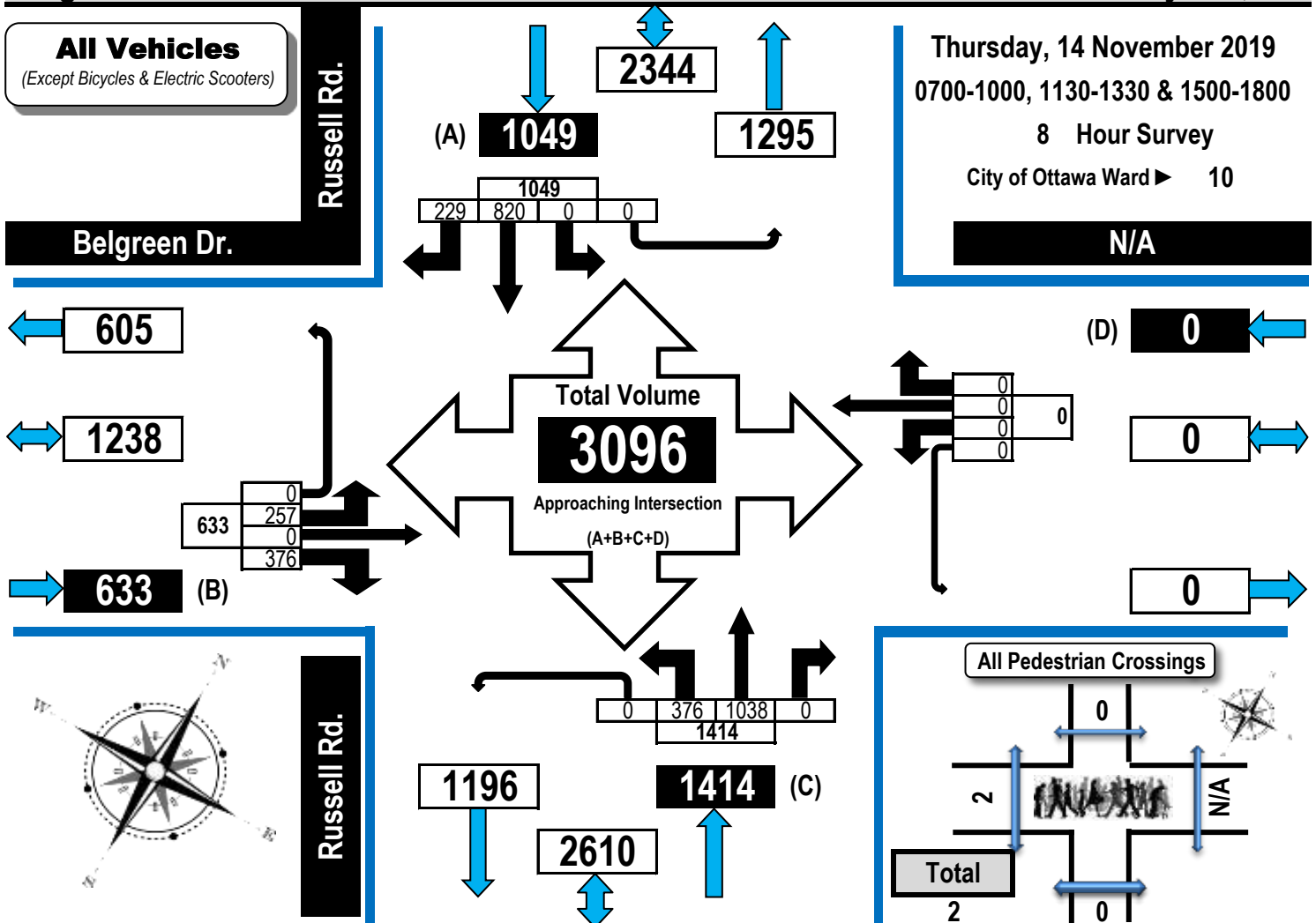
Thursday, 14 November 2019

0700-1000, 1130-1330 & 1500-1800

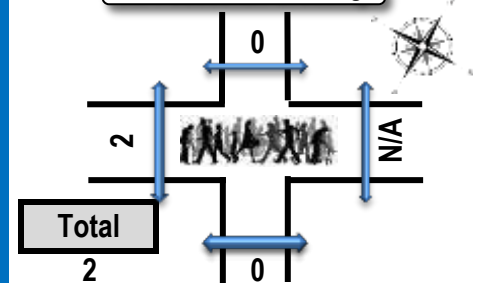
8 Hour Survey

City of Ottawa Ward 10

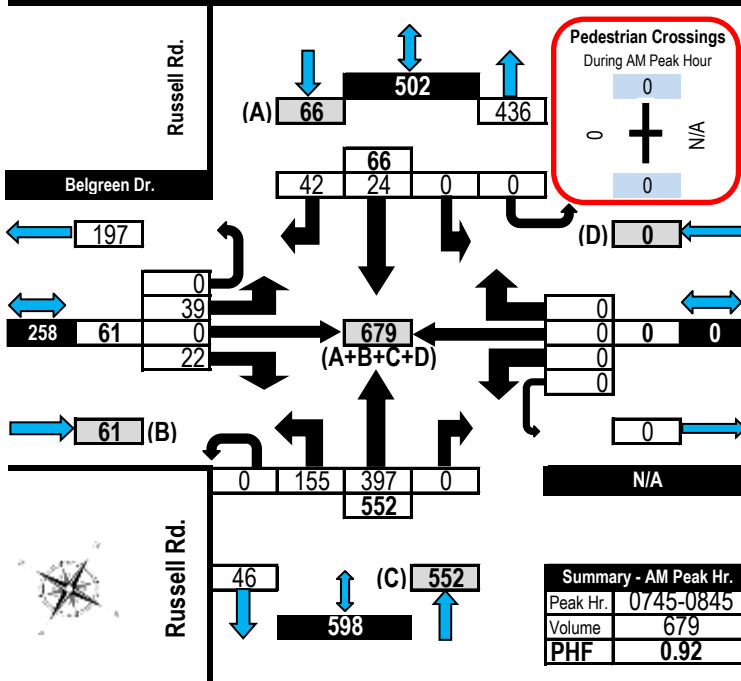
N/A



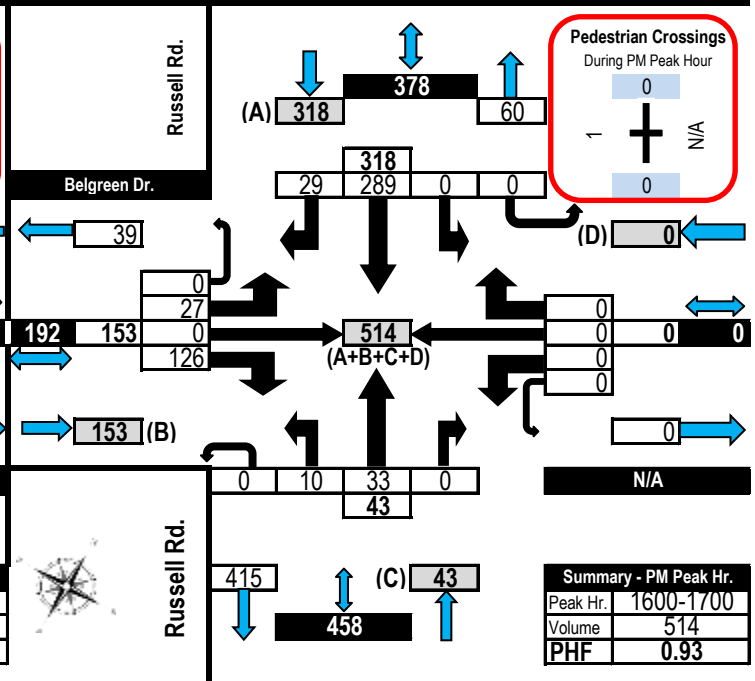
All Pedestrian Crossings



AM Peak Hour Flow Diagram



PM Peak Hour Flow Diagram





Turning Movement Count Summary Report AADT and Expansion Factors

Automobiles, Taxis,
Light Trucks, Vans,
SUV's, Motorcycles,
Heavy Trucks, Buses,
and School Buses

Belgreen Drive & Russell Road

Ramsayville, ON

Survey Date: Thursday, 14 November 2019

Start Time: 0700

AADT Factor: 0.9

Weather AM: Light snow -9°C

Survey Duration: 8 Hrs.

Survey Hours: 0700-1000, 1130-1330 & 1500-1800

Weather PM: Overcast 0°C

Surveyor(s): Carmody

| Belgreen Dr. | | | | | | N/A | | | | | | Russell Rd. | | | | | | Russell Rd. | | | | | |
|--------------|-----|----|-----|----|---------|-----------|----|----|----|---------|--------------|-------------|------|----|----|---------|----|-------------|-----|----|---------|--------------|-------------|
| Eastbound | | | | | | Westbound | | | | | | Northbound | | | | | | Southbound | | | | | |
| Time Period | LT | ST | RT | UT | E/B Tot | LT | ST | RT | UT | W/B Tot | Street Total | LT | ST | RT | UT | N/B Tot | LT | ST | RT | UT | S/B Tot | Street Total | Grand Total |
| 0700-0800 | 23 | 0 | 7 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 30 | 109 | 415 | 0 | 0 | 524 | 0 | 19 | 30 | 0 | 49 | 573 | 603 |
| 0800-0900 | 45 | 0 | 24 | 0 | 69 | 0 | 0 | 0 | 0 | 0 | 69 | 153 | 340 | 0 | 0 | 493 | 0 | 26 | 38 | 0 | 64 | 557 | 626 |
| 0900-1000 | 67 | 0 | 41 | 0 | 108 | 0 | 0 | 0 | 0 | 0 | 108 | 48 | 130 | 0 | 0 | 178 | 0 | 37 | 26 | 0 | 63 | 241 | 349 |
| 1130-1230 | 21 | 0 | 21 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 42 | 23 | 30 | 0 | 0 | 53 | 0 | 33 | 27 | 0 | 60 | 113 | 155 |
| 1230-1330 | 28 | 0 | 15 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 43 | 12 | 32 | 0 | 0 | 44 | 0 | 36 | 25 | 0 | 61 | 105 | 148 |
| 1500-1600 | 19 | 0 | 78 | 0 | 97 | 0 | 0 | 0 | 0 | 0 | 97 | 11 | 29 | 0 | 0 | 40 | 0 | 192 | 30 | 0 | 222 | 262 | 359 |
| 1600-1700 | 27 | 0 | 126 | 0 | 153 | 0 | 0 | 0 | 0 | 0 | 153 | 10 | 33 | 0 | 0 | 43 | 0 | 289 | 29 | 0 | 318 | 361 | 514 |
| 1700-1800 | 27 | 0 | 64 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 91 | 10 | 29 | 0 | 0 | 39 | 0 | 188 | 24 | 0 | 212 | 251 | 342 |
| Totals | 257 | 0 | 376 | 0 | 633 | 0 | 0 | 0 | 0 | 0 | 633 | 376 | 1038 | 0 | 0 | 1414 | 0 | 820 | 229 | 0 | 1049 | 2463 | 3096 |

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor

Applicable to the Day and Month of the Turning Movement Count

Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

| Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➔ 12 expansion factor of 1.39 | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----|---|-----|---|------|---|---|---|---|---|------|-----|------|---|---|------|---|------|-----|---|------|------|------|
| Equ. 12 Hr | 357 | 0 | 523 | 0 | 880 | 0 | 0 | 0 | 0 | 0 | 880 | 523 | 1443 | 0 | 0 | 1965 | 0 | 1140 | 318 | 0 | 1458 | 3424 | 4303 |
| Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 0.9 | | | | | | | | | | | | | | | | | | | | | | | |
| AADT 12-hr | 322 | 0 | 470 | 0 | 792 | 0 | 0 | 0 | 0 | 0 | 792 | 470 | 1299 | 0 | 0 | 1769 | 0 | 1026 | 286 | 0 | 1312 | 3081 | 3873 |
| 24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➔ 24 expansion factor of 1.31 | | | | | | | | | | | | | | | | | | | | | | | |
| AADT 24 Hr | 421 | 0 | 616 | 0 | 1037 | 0 | 0 | 0 | 0 | 0 | 1037 | 616 | 1701 | 0 | 0 | 2317 | 0 | 1344 | 375 | 0 | 1719 | 4036 | 5074 |

AADT and expansion factors provided by the City of Ottawa

| AM Peak Hour Factor ➡ 0.92 | | | | | | | | | | | | Highest Hourly Vehicle Volume Between 0700h & 1000h | | | | | | | | | | | |
|-----------------------------|----|----|-----|----|-----|----|----|----|----|-----|-------|---|-----|----|----|-----|----|-----|----|----|-----|-------|-------|
| AM Peak Hr | LT | ST | RT | UT | TOT | LT | ST | RT | UT | TOT | S.TOT | LT | ST | RT | UT | TOT | LT | ST | RT | UT | TOT | S.TOT | G.TOT |
| 0745-0845 | 39 | 0 | 22 | 0 | 61 | 0 | 0 | 0 | 0 | 0 | 61 | 155 | 397 | 0 | 0 | 552 | 0 | 24 | 42 | 0 | 66 | 618 | 679 |
| OFF Peak Hour Factor ➡ 0.84 | | | | | | | | | | | | Highest Hourly Vehicle Volume Between 1130h & 1330h | | | | | | | | | | | |
| OFF Peak Hr | LT | ST | RT | UT | TOT | LT | ST | RT | UT | TOT | S.TOT | LT | ST | RT | UT | TOT | LT | ST | RT | UT | TOT | S.TOT | G.TOT |
| 1145-1245 | 26 | 0 | 25 | 0 | 51 | 0 | 0 | 0 | 0 | 0 | 51 | 21 | 30 | 0 | 0 | 51 | 0 | 33 | 29 | 0 | 62 | 113 | 164 |
| PM Peak Hour Factor ➡ 0.93 | | | | | | | | | | | | Highest Hourly Vehicle Volume Between 1500h & 1800h | | | | | | | | | | | |
| PM Peak Hr | LT | ST | RT | UT | TOT | LT | ST | RT | UT | TOT | S.TOT | LT | ST | RT | UT | TOT | LT | ST | RT | UT | TOT | S.TOT | G.TOT |
| 1600-1700 | 27 | 0 | 126 | 0 | 153 | 0 | 0 | 0 | 0 | 0 | 153 | 10 | 33 | 0 | 0 | 43 | 0 | 289 | 29 | 0 | 318 | 361 | 514 |

Comments:

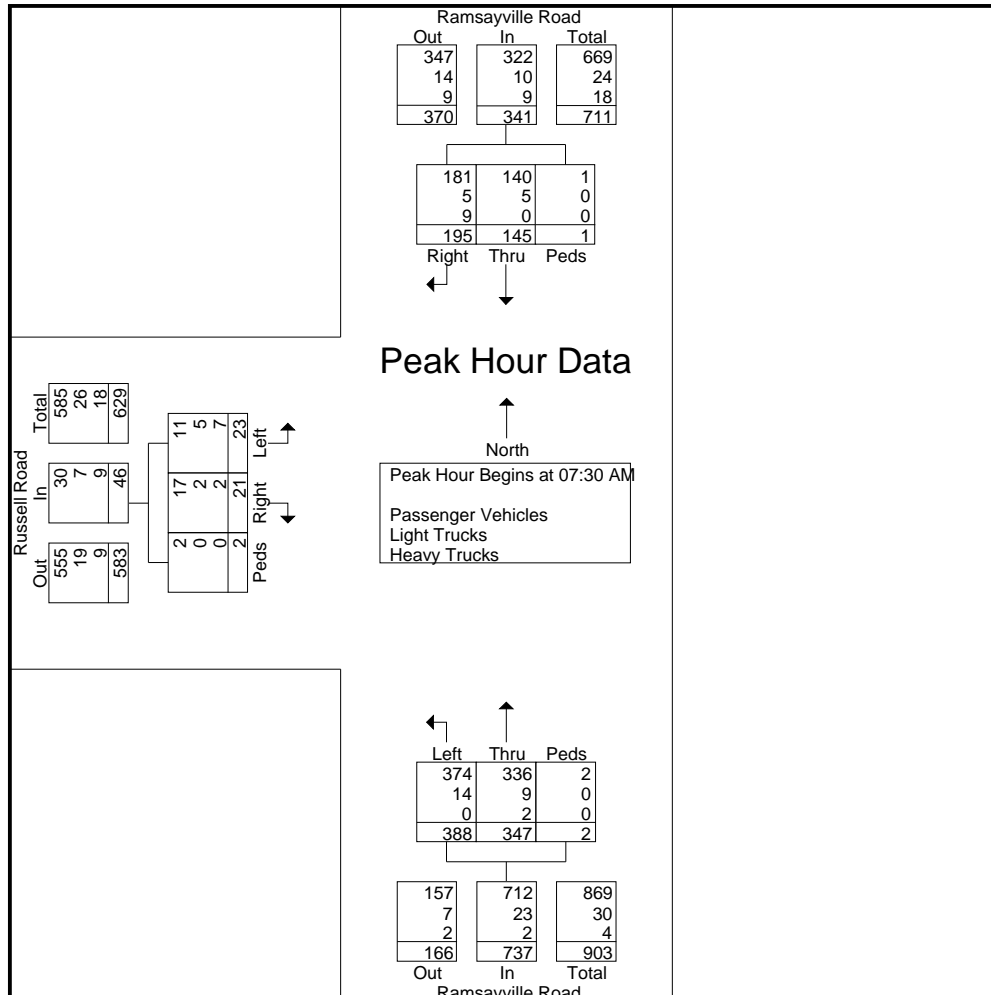
Some northbound drivers pass northbound left-turning vehicles waiting to turn onto Belgreen Drive by using the east shoulder. A few southbound drivers pass southbound right-turning vehicles - in some cases heavy vehicles - and cannot see if there are any eastbound right-turning vehicles from Belgreen Drive occurring at the same time. There were no bicycles. The heavy vehicle total includes 36 buses - primarily school buses with some OC Transpo buses.

Notes:

1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2. When expansion and AADT factors are applied, the results will differ slightly due to rounding.

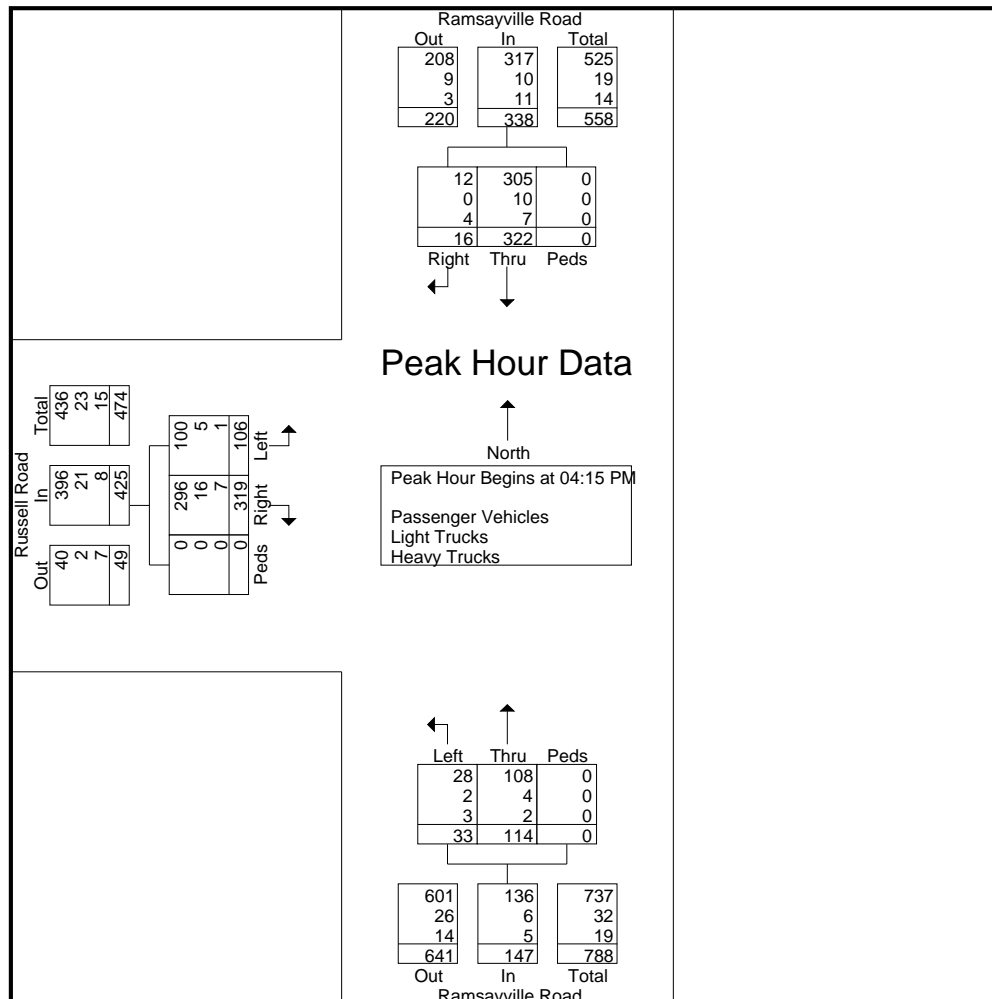
File Name : Ramsayville_Russell
Site Code : 00119124
Start Date : 11/14/2019
Page No : 4

| | Ramsayville Road From North | | | | Ramsayville Road From South | | | | Russell Road From West | | | | |
|--|--------------------------------|------|------|------------|--------------------------------|------|------|------------|---------------------------|------|------|------------|------------|
| Start Time | Right | Thru | Peds | App. Total | Thru | Left | Peds | App. Total | Right | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1 | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | |
| 07:30 AM | 39 | 28 | 0 | 67 | 91 | 132 | 0 | 223 | 6 | 2 | 0 | 8 | 298 |
| 07:45 AM | 43 | 39 | 0 | 82 | 89 | 90 | 0 | 179 | 1 | 10 | 0 | 11 | 272 |
| 08:00 AM | 47 | 35 | 0 | 82 | 95 | 91 | 2 | 188 | 5 | 8 | 2 | 15 | 285 |
| 08:15 AM | 66 | 43 | 1 | 110 | 72 | 75 | 0 | 147 | 9 | 3 | 0 | 12 | 269 |
| Total Volume | 195 | 145 | 1 | 341 | 347 | 388 | 2 | 737 | 21 | 23 | 2 | 46 | 1124 |
| % App. Total | 57.2 | 42.5 | 0.3 | | 47.1 | 52.6 | 0.3 | | 45.7 | 50 | 4.3 | | |
| PHF | .739 | .843 | .250 | .775 | .913 | .735 | .250 | .826 | .583 | .575 | .250 | .767 | .943 |
| Passenger Vehicles | 181 | 140 | 1 | 322 | 336 | 374 | 2 | 712 | 17 | 11 | 2 | 30 | 1064 |
| % Passenger Vehicles | 92.8 | 96.6 | 100 | 94.4 | 96.8 | 96.4 | 100 | 96.6 | 81.0 | 47.8 | 100 | 65.2 | 94.7 |
| Light Trucks | 5 | 5 | 0 | 10 | 9 | 14 | 0 | 23 | 2 | 5 | 0 | 7 | 40 |
| % Light Trucks | 2.6 | 3.4 | 0 | 2.9 | 2.6 | 3.6 | 0 | 3.1 | 9.5 | 21.7 | 0 | 15.2 | 3.6 |
| Heavy Trucks | 9 | 0 | 0 | 9 | 2 | 0 | 0 | 2 | 2 | 7 | 0 | 9 | 20 |
| % Heavy Trucks | 4.6 | 0 | 0 | 2.6 | 0.6 | 0 | 0 | 0.3 | 9.5 | 30.4 | 0 | 19.6 | 1.8 |



File Name : Ramsayville_Russell
Site Code : 00119124
Start Date : 11/14/2019
Page No : 6

| | Ramsayville Road From North | | | | Ramsayville Road From South | | | | Russell Road From West | | | | |
|--|--------------------------------|------|------|------------|--------------------------------|------|------|------------|---------------------------|------|------|------------|------------|
| Start Time | Right | Thru | Peds | App. Total | Thru | Left | Peds | App. Total | Right | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:15 PM | | | | | | | | | | | | | |
| 04:15 PM | 5 | 80 | 0 | 85 | 30 | 7 | 0 | 37 | 64 | 35 | 0 | 99 | 221 |
| 04:30 PM | 4 | 87 | 0 | 91 | 32 | 9 | 0 | 41 | 99 | 22 | 0 | 121 | 253 |
| 04:45 PM | 2 | 73 | 0 | 75 | 20 | 8 | 0 | 28 | 83 | 29 | 0 | 112 | 215 |
| 05:00 PM | 5 | 82 | 0 | 87 | 32 | 9 | 0 | 41 | 73 | 20 | 0 | 93 | 221 |
| Total Volume | 16 | 322 | 0 | 338 | 114 | 33 | 0 | 147 | 319 | 106 | 0 | 425 | 910 |
| % App. Total | 4.7 | 95.3 | 0 | | 77.6 | 22.4 | 0 | | 75.1 | 24.9 | 0 | | |
| PHF | .800 | .925 | .000 | .929 | .891 | .917 | .000 | .896 | .806 | .757 | .000 | .878 | .899 |
| Passenger Vehicles | 12 | 305 | 0 | 317 | 108 | 28 | 0 | 136 | 296 | 100 | 0 | 396 | 849 |
| % Passenger Vehicles | 75.0 | 94.7 | 0 | 93.8 | 94.7 | 84.8 | 0 | 92.5 | 92.8 | 94.3 | 0 | 93.2 | 93.3 |
| Light Trucks | 0 | 10 | 0 | 10 | 4 | 2 | 0 | 6 | 16 | 5 | 0 | 21 | 37 |
| % Light Trucks | 0 | 3.1 | 0 | 3.0 | 3.5 | 6.1 | 0 | 4.1 | 5.0 | 4.7 | 0 | 4.9 | 4.1 |
| Heavy Trucks | 4 | 7 | 0 | 11 | 2 | 3 | 0 | 5 | 7 | 1 | 0 | 8 | 24 |
| % Heavy Trucks | 25.0 | 2.2 | 0 | 3.3 | 1.8 | 9.1 | 0 | 3.4 | 2.2 | 0.9 | 0 | 1.9 | 2.6 |

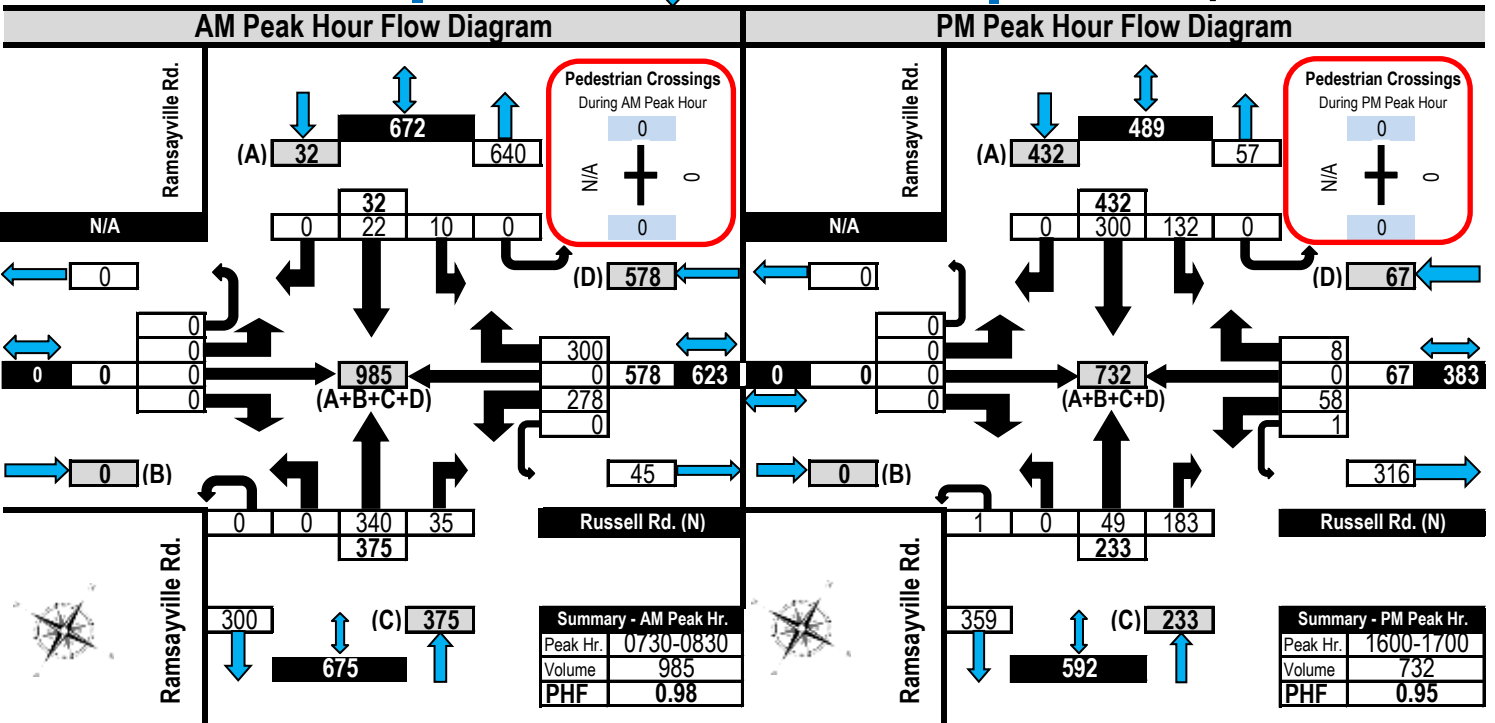
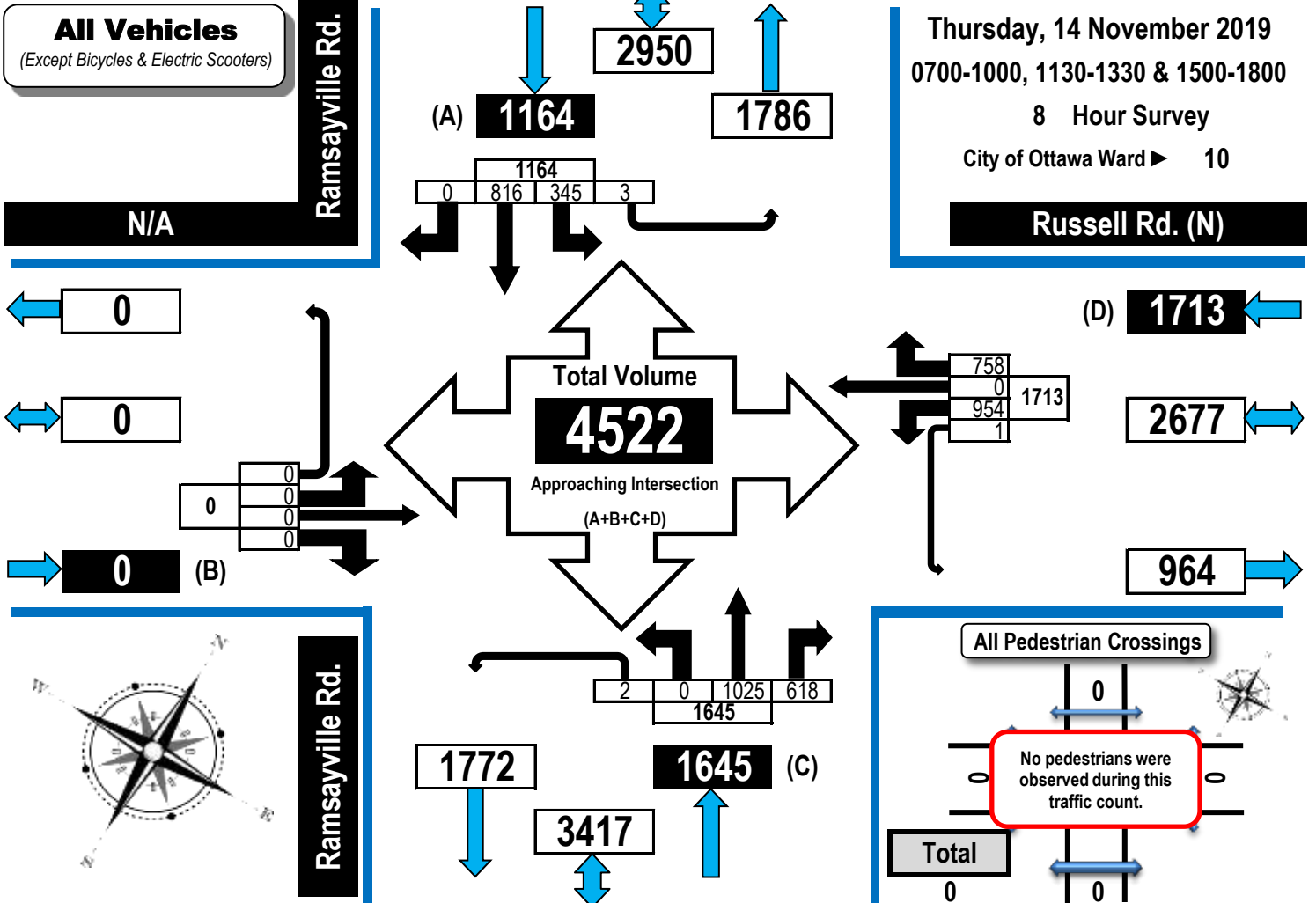




Turning Movement Count Summary, AM and PM Peak Hour Flow Diagrams

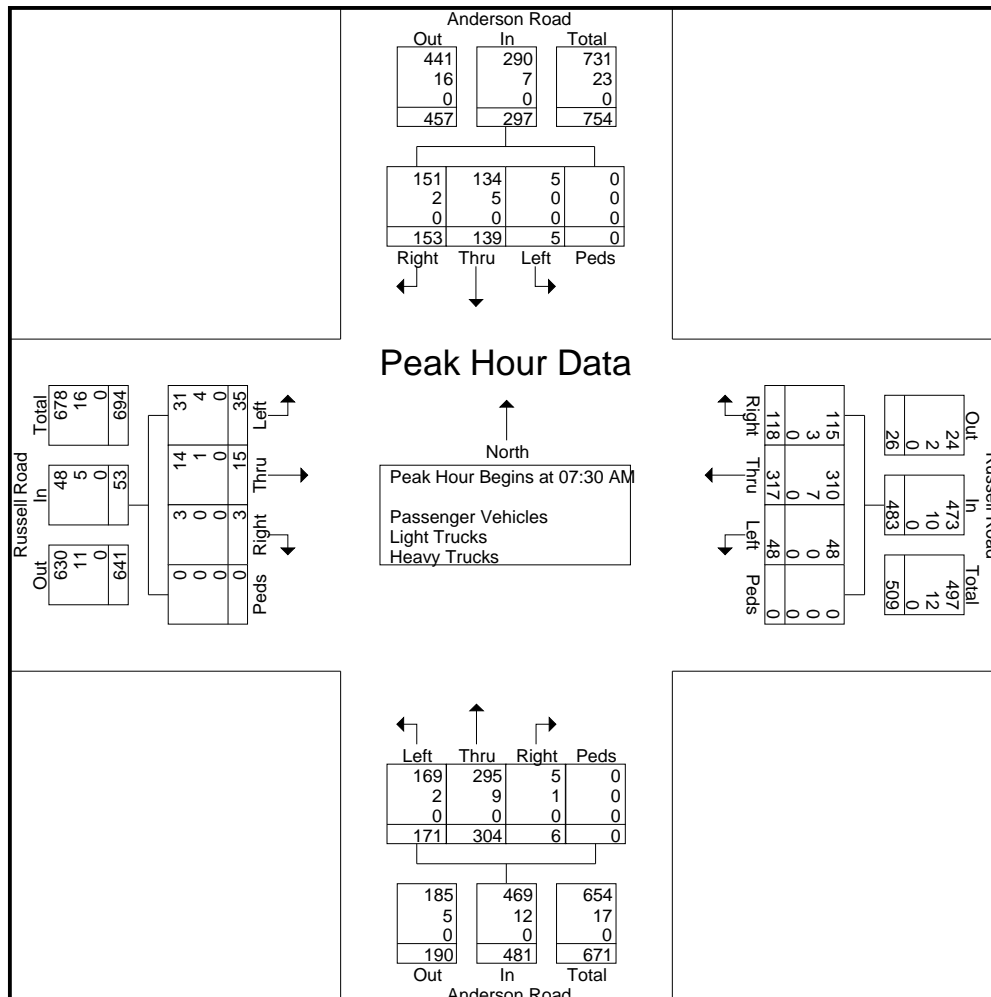
Automobiles, Taxis, Light
Trucks, Vans, SUV's,
Motorcycles, Heavy Trucks,
Buses, and School Buses

Ramsayville Road & Russell Road (North) Ramsayville, ON



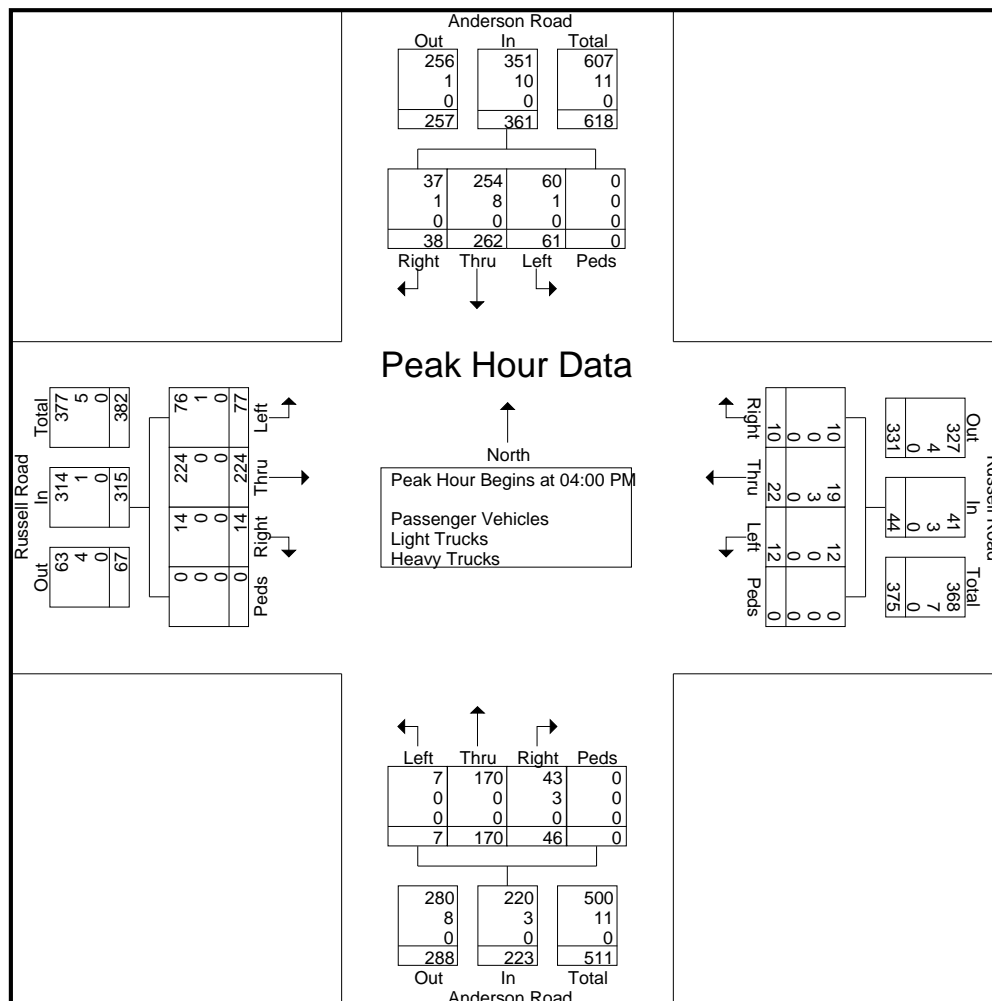
File Name : Russell_Anderson
Site Code : 00119124
Start Date : 11/14/2019
Page No : 4

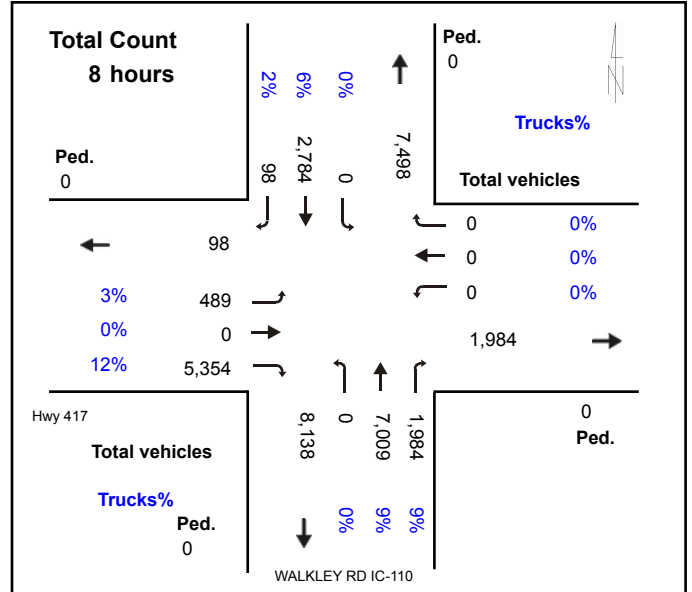
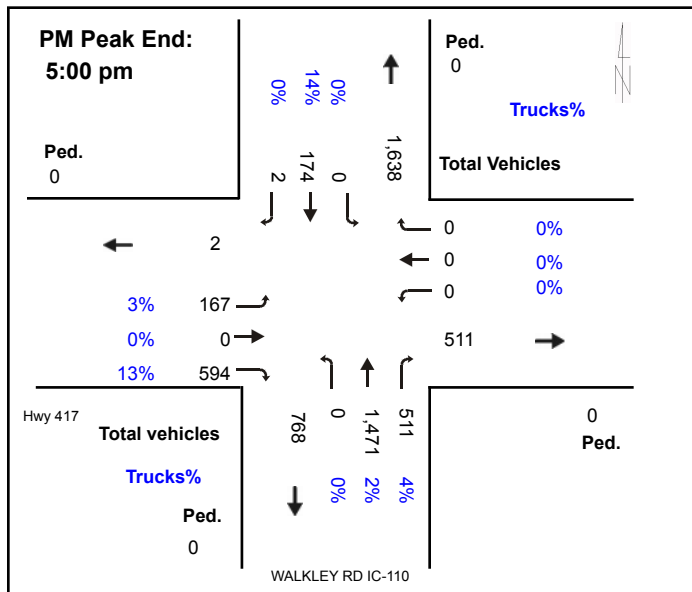
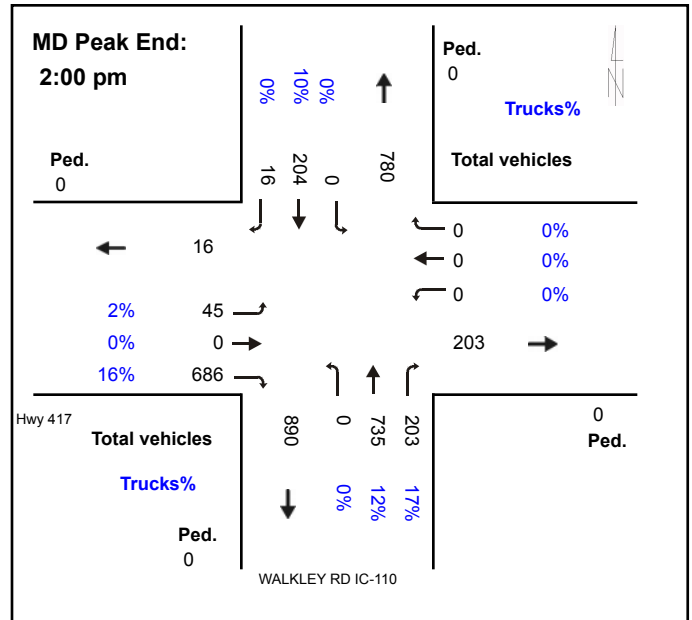
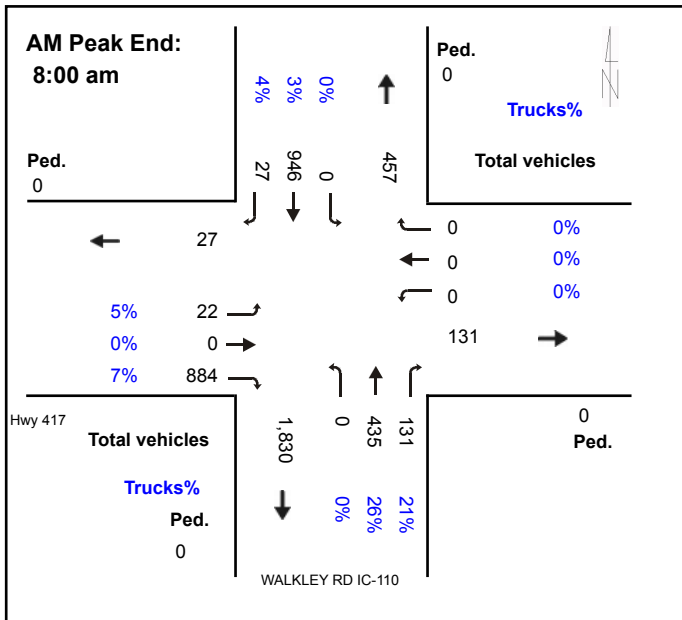
| | Anderson Road From North | | | | | Russell Road From East | | | | | Anderson Road From South | | | | | Russell Road From West | | | | | |
|--|-----------------------------|-----------|----------|------|------------|---------------------------|-----------|-----------|------|------------|-----------------------------|-----------|-----------|------|------------|---------------------------|----------|-----------|------|------------|------------|
| Start Time | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 23 | 34 | 0 | 0 | 57 | 31 | 96 | 9 | 0 | 136 | 3 | 79 | 37 | 0 | 119 | 0 | 4 | 6 | 0 | 10 | 322 |
| 07:45 AM | 35 | 24 | 3 | 0 | 62 | 32 | 85 | 10 | 0 | 127 | 1 | 72 | 51 | 0 | 124 | 0 | 4 | 6 | 0 | 10 | 323 |
| 08:00 AM | 60 | 36 | 1 | 0 | 97 | 21 | 84 | 11 | 0 | 116 | 0 | 58 | 55 | 0 | 113 | 1 | 3 | 10 | 0 | 14 | 340 |
| 08:15 AM | 35 | 45 | 1 | 0 | 81 | 34 | 52 | 18 | 0 | 104 | 2 | 95 | 28 | 0 | 125 | 2 | 4 | 13 | 0 | 19 | 329 |
| Total Volume | 153 | 139 | 5 | 0 | 297 | 118 | 317 | 48 | 0 | 483 | 6 | 304 | 171 | 0 | 481 | 3 | 15 | 35 | 0 | 53 | 1314 |
| % App. Total | 51.5 | 46.8 | 1.7 | 0 | | 24.4 | 65.6 | 9.9 | 0 | | 1.2 | 63.2 | 35.6 | 0 | | 5.7 | 28.3 | 66 | 0 | | |
| PHF | .638 | .772 | .417 | .000 | .765 | .868 | .826 | .667 | .000 | .888 | .500 | .800 | .777 | .000 | .962 | .375 | .938 | .673 | .000 | .697 | .966 |
| Passenger Vehicles | 151 | 134 | 5 | 0 | 290 | 115 | 310 | 48 | 0 | 473 | 5 | 295 | 169 | 0 | 469 | 3 | 14 | 31 | 0 | 48 | 1280 |
| % Passenger Vehicles | 98.7 | 96.4 | 100 | 0 | 97.6 | 97.5 | 97.8 | 100 | 0 | 97.9 | 83.3 | 97.0 | 98.8 | 0 | 97.5 | 100 | 93.3 | 88.6 | 0 | 90.6 | 97.4 |
| Light Trucks | 2 | 5 | 0 | 0 | 7 | 3 | 7 | 0 | 0 | 10 | 1 | 9 | 2 | 0 | 12 | 0 | 1 | 4 | 0 | 5 | 34 |
| % Light Trucks | 1.3 | 3.6 | 0 | 0 | 2.4 | 2.5 | 2.2 | 0 | 0 | 2.1 | 16.7 | 3.0 | 1.2 | 0 | 2.5 | 0 | 6.7 | 11.4 | 0 | 9.4 | 2.6 |
| Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

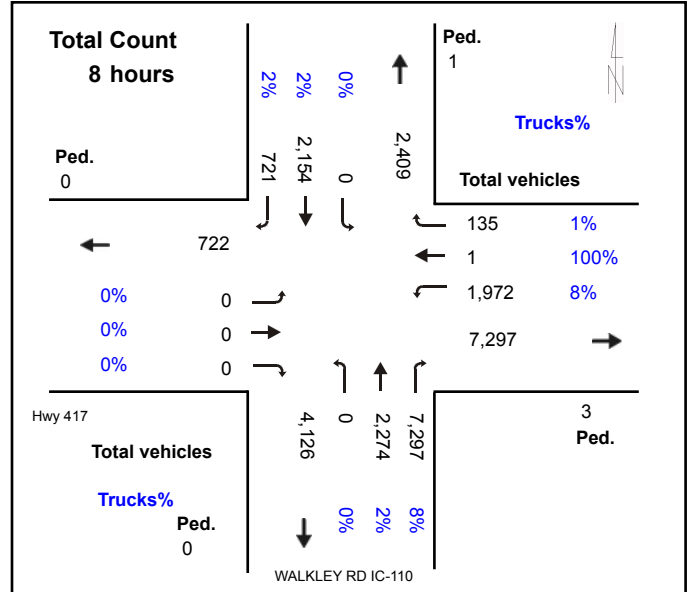
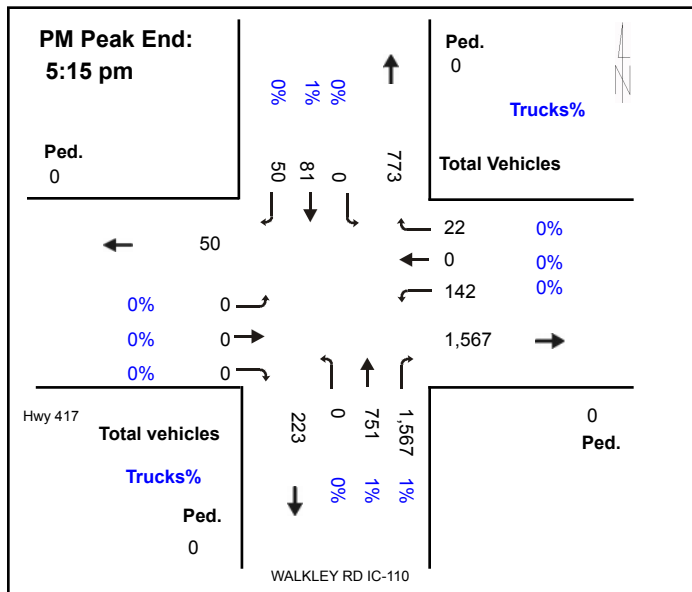
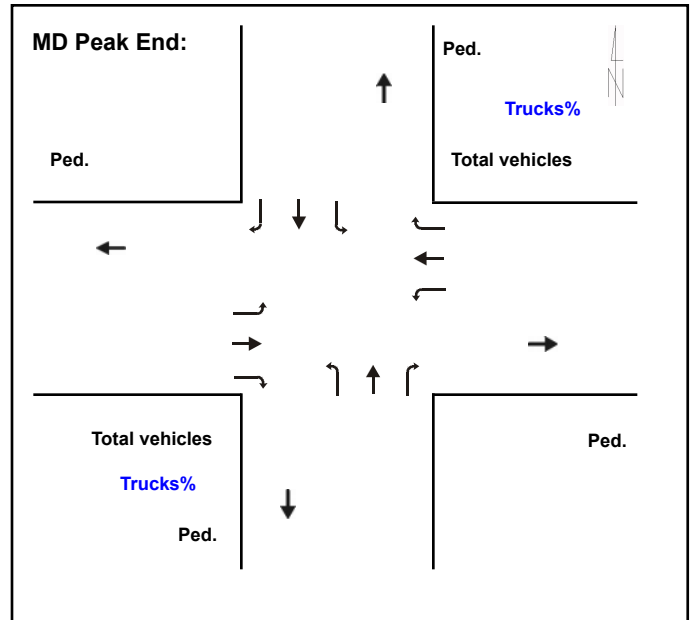
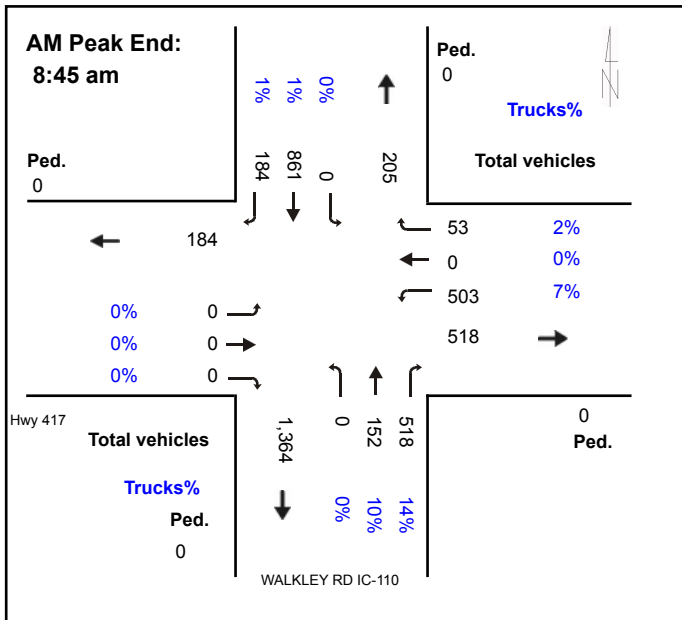


File Name : Russell_Anderson
Site Code : 00119124
Start Date : 11/14/2019
Page No : 6

| | Anderson Road From North | | | | | Russell Road From East | | | | | Anderson Road From South | | | | | Russell Road From West | | | | | |
|--|-----------------------------|------|------|------|------------|---------------------------|------|------|------|------------|-----------------------------|------|------|------|------------|---------------------------|------|------|------|------------|------------|
| Start Time | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:00 PM | 8 | 61 | 25 | 0 | 94 | 5 | 9 | 0 | 0 | 14 | 13 | 41 | 3 | 0 | 57 | 6 | 54 | 19 | 0 | 79 | 244 |
| 04:15 PM | 7 | 80 | 16 | 0 | 103 | 1 | 4 | 3 | 0 | 8 | 19 | 48 | 2 | 0 | 69 | 4 | 57 | 21 | 0 | 82 | 262 |
| 04:30 PM | 10 | 64 | 13 | 0 | 87 | 2 | 3 | 5 | 0 | 10 | 4 | 33 | 1 | 0 | 38 | 1 | 54 | 17 | 0 | 72 | 207 |
| 04:45 PM | 13 | 57 | 7 | 0 | 77 | 2 | 6 | 4 | 0 | 12 | 10 | 48 | 1 | 0 | 59 | 3 | 59 | 20 | 0 | 82 | 230 |
| Total Volume | 38 | 262 | 61 | 0 | 361 | 10 | 22 | 12 | 0 | 44 | 46 | 170 | 7 | 0 | 223 | 14 | 224 | 77 | 0 | 315 | 943 |
| % App. Total | 10.5 | 72.6 | 16.9 | 0 | | 22.7 | 50 | 27.3 | 0 | | 20.6 | 76.2 | 3.1 | 0 | | 4.4 | 71.1 | 24.4 | 0 | | |
| PHF | .731 | .819 | .610 | .000 | .876 | .500 | .611 | .600 | .000 | .786 | .605 | .885 | .583 | .000 | .808 | .583 | .949 | .917 | .000 | .960 | .900 |
| Passenger Vehicles | 37 | 254 | 60 | 0 | 351 | 10 | 19 | 12 | 0 | 41 | 43 | 170 | 7 | 0 | 220 | 14 | 224 | 76 | 0 | 314 | 926 |
| % Passenger Vehicles | 97.4 | 96.9 | 98.4 | 0 | 97.2 | 100 | 86.4 | 100 | 0 | 93.2 | 93.5 | 100 | 100 | 0 | 98.7 | 100 | 100 | 98.7 | 0 | 99.7 | 98.2 |
| Light Trucks | 1 | 8 | 1 | 0 | 10 | 0 | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 1 | 17 |
| % Light Trucks | 2.6 | 3.1 | 1.6 | 0 | 2.8 | 0 | 13.6 | 0 | 0 | 6.8 | 6.5 | 0 | 0 | 0 | 1.3 | 0 | 0 | 1.3 | 0 | 0.3 | 1.8 |
| Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Heavy Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |







TRANS Regional Model

2011 Version V 1.12 - last updated January 18, 2018


AM Peak Hour Total Traffic Volume

Walkley Rd.

Scenario 11112

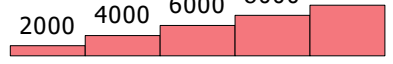
Modifications from base version:
none

User Initials: JF
Preparation Date: August 8, 2018





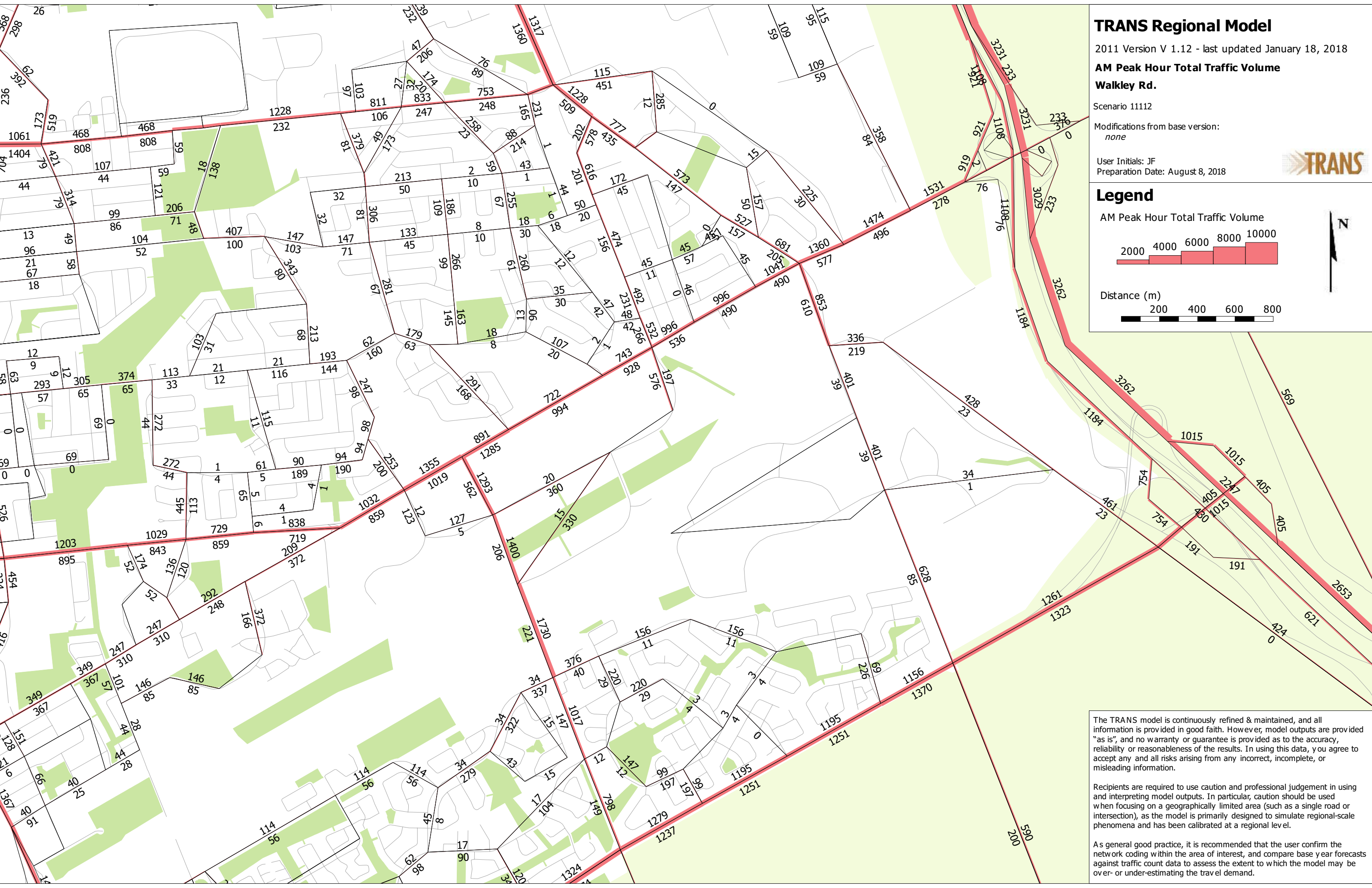
Legend

AM Peak Hour Total Traffic Volume



Distance (m)





The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided “as is”, and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.

TRANS Regional Model

2031 Version V 1.12 - last updated January 18, 2018

AM Peak Hour Total Traffic Volume
Walkley Rd.

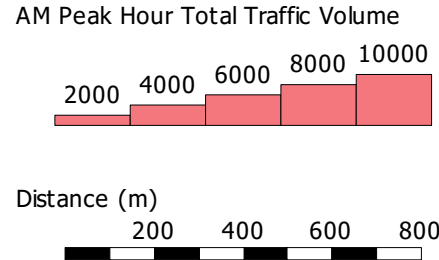
Scenario 12334

Modifications from base version:
none

User Initials: JF
Preparation Date: August 8, 2018



Legend



The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.

APPENDIX E

Collision Records



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: ANDERSON RD @ RUSSELL RD

Traffic Control: Stop sign

Total Collisions: 5

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuvre | Vehicle type | First Event | No. Ped |
|------------------------|-------------|-------------|------------------|----------------|----------|---------------------|---------------------------|---------------------|---------|
| 2014-Sep-30, Tue,06:30 | Clear | Rear end | Non-fatal injury | Dry | West | Slowing or stopping | Pick-up truck | Other motor vehicle | |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle | |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle | |
| 2014-Jul-15, Tue,16:55 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Pick-up truck | Other motor vehicle | |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle | |
| 2016-Aug-04, Thu,16:06 | Clear | Angle | Non-fatal injury | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle | |
| | | | | | North | Going ahead | Pick-up truck | Other motor vehicle | |
| 2016-May-26, Thu,11:39 | Clear | Rear end | P.D. only | Dry | South | Going ahead | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Slowing or stopping | Automobile, station wagon | Other motor vehicle | |
| 2016-Sep-12, Mon,12:15 | Clear | Angle | Non-fatal injury | Dry | East | Turning left | Passenger van | Other motor vehicle | |
| | | | | | South | Going ahead | Pick-up truck | Other motor vehicle | |

Location: BELGREEN DR @ RUSSELL RD

Traffic Control: Stop sign

Total Collisions: 1

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuvre | Vehicle type | First Event | No. Ped |
|------------------------|-------------|-------------|----------------|----------------|----------|-------------------|---------------------------|--------------|---------|
| 2017-Sep-24, Sun,07:06 | Clear | SMV other | P.D. only | Dry | South | Going ahead | Automobile, station wagon | Ran off road | |

Location: HAWTHORNE RD @ HUNT CLUB RD

Traffic Control: Traffic signal

Total Collisions: 144

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuvre | Vehicle type | First Event | No. Ped |
|------------------------|-------------|------------------|------------------|----------------|----------|---------------------|---------------------------|---------------------|---------|
| 2014-Jan-09, Thu,10:35 | Clear | Approaching | P.D. only | Dry | North | Going ahead | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Going ahead | Municipal transit bus | Other motor vehicle | |
| 2014-Feb-18, Tue,06:33 | Snow | Rear end | P.D. only | Loose snow | East | Turning left | Automobile, station wagon | Other motor vehicle | |
| | | | | | East | Turning left | Pick-up truck | Other motor vehicle | |
| 2014-Aug-27, Wed,21:58 | Clear | Sideswipe | P.D. only | Dry | South | Changing lanes | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Slowing or stopping | Automobile, station wagon | Other motor vehicle | |
| 2014-Sep-03, Wed,07:41 | Clear | Turning movement | Non-fatal injury | Dry | West | Turning left | Pick-up truck | Other motor vehicle | |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2014-Sep-07, Sun,16:34 | Clear | Turning movement | P.D. only | Dry | West | Turning left | Automobile, station wagon | Other motor vehicle | |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle | |

| | | | | | | | | |
|------------------------|---------------|------------------|------------------|-----|-------|----------------|---------------------------|---------------------|
| 2014-Sep-10, Wed,15:51 | Clear | Turning movement | P.D. only | Dry | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Apr-26, Sat,11:47 | Clear | Turning movement | P.D. only | Wet | South | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Going ahead | Pick-up truck | Other motor vehicle |
| 2014-Sep-11, Thu,16:14 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2014-Sep-21, Sun,18:30 | Clear | Turning movement | P.D. only | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning left | Automobile, station wagon | Other motor vehicle |
| 2014-May-06, Tue,07:27 | Freezing Rain | Sideswipe | P.D. only | Wet | East | Changing lanes | Pick-up truck | Other motor vehicle |
| | | | | | East | Turning left | Automobile, station wagon | Other motor vehicle |
| 2014-May-26, Mon,09:00 | Clear | Turning movement | P.D. only | Wet | East | Turning left | Truck and trailer | Other motor vehicle |
| | | | | | East | Turning left | Automobile, station wagon | Other motor vehicle |
| 2014-Oct-07, Tue,18:11 | Clear | Turning movement | Non-fatal injury | Dry | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|---------------------|---------------------------|---------------------|
| 2014-Oct-21, Tue,06:30 | Rain | Turning movement | P.D. only | Wet | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Nov-19, Wed,15:26 | Clear | Rear end | P.D. only | Dry | East | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning right | Automobile, station wagon | Other motor vehicle |
| 2014-Dec-30, Tue,08:51 | Clear | Angle | P.D. only | Dry | North | Turning right | Truck and trailer | Other motor vehicle |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Sep-26, Fri,18:35 | Clear | Turning movement | Non-fatal injury | Dry | East | Turning left | Passenger van | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |
| 2014-Jun-27, Fri,14:40 | Clear | Turning movement | Non-fatal injury | Dry | North | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | South | Slowing or stopping | Truck - dump | Other motor vehicle |
| 2014-Sep-06, Sat,15:40 | Clear | Angle | Non-fatal injury | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Pick-up truck | Other motor vehicle |
| 2014-Dec-04, Thu,17:11 | Clear | Rear end | Non-fatal injury | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|----------|------------------|-------------|-------|---------------------|---------------------------|---------------------|
| 2015-Jan-08, Thu,07:45 | Snow | Rear end | P.D. only | Packed snow | East | Turning left | Passenger van | Other motor vehicle |
| | | | | | East | Turning left | Pick-up truck | Other motor vehicle |
| 2015-Jan-22, Thu,15:23 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Unknown | Other motor vehicle |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle |
| 2015-Jan-28, Wed,08:00 | Clear | Rear end | P.D. only | Dry | South | Turning right | Passenger van | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2015-Jan-31, Sat,16:00 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Feb-25, Wed,14:18 | Clear | Rear end | Non-fatal injury | Wet | East | Slowing or stopping | Truck - closed | Other motor vehicle |
| | | | | | East | Stopped | Passenger van | Other motor vehicle |
| 2015-Mar-06, Fri,16:34 | Clear | Other | P.D. only | Dry | North | Reversing | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2015-Mar-07, Sat,09:40 | Clear | Angle | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|---------------------|---------------------------|---------------------|
| 2015-Mar-21, Sat,14:45 | Rain | Rear end | P.D. only | Wet | West | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Delivery van | Other motor vehicle |
| 2015-Mar-31, Tue,14:00 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Apr-22, Wed,18:10 | Clear | Turning movement | P.D. only | Dry | North | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2015-May-04, Mon,03:22 | Clear | Angle | Non-fatal injury | Dry | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2015-Jun-04, Thu,21:20 | Clear | Sideswipe | P.D. only | Dry | West | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2015-Jan-08, Thu,12:04 | Snow | Rear end | P.D. only | Ice | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2014-Sep-24, Wed,20:08 | Clear | Turning movement | Non-fatal injury | Dry | East | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|---------------|---------------------------|---------------------|
| 2014-Oct-16, Thu,05:54 | Clear | Turning movement | P.D. only | Wet | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Dec-24, Wed,19:56 | Rain | Rear end | P.D. only | Wet | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2014-Aug-27, Wed,18:33 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Unknown | Other motor vehicle |
| 2015-Sep-17, Thu,13:06 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Passenger van | Other motor vehicle |
| 2015-May-05, Tue,12:46 | Clear | Rear end | Non-fatal injury | Dry | West | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Apr-30, Thu,17:12 | Clear | Sideswipe | P.D. only | Dry | West | Unknown | Unknown | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2015-Jul-06, Mon,12:11 | Clear | Rear end | Non-fatal injury | Dry | East | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning right | Delivery van | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|----------------|---------------------------|---------------------|
| 2015-Jul-20, Mon,15:35 | Clear | Turning movement | P.D. only | Dry | North | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | East | Turning left | Automobile, station wagon | Other motor vehicle |
| 2015-May-21, Thu,11:15 | Clear | Sideswipe | P.D. only | Dry | West | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Motorcycle | Other motor vehicle |
| 2015-Aug-27, Thu,15:00 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Delivery van | Other motor vehicle |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle |
| 2015-Jul-28, Tue,15:00 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2015-Oct-07, Wed,08:40 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Oct-09, Fri,11:30 | Rain | Rear end | Non-fatal injury | Wet | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Aug-13, Thu,10:05 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|---------------------|------------------------------|------------------------|
| 2015-Nov-08, Sun,17:32 | Clear | Turning movement | Non-fatal injury | Dry | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |
| 2015-Nov-25, Wed,08:15 | Clear | Sideswipe | P.D. only | Dry | North | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2015-Aug-25, Tue,22:05 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Dec-02, Wed,17:17 | Clear | Rear end | P.D. only | Wet | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| 2016-Jan-05, Tue,09:40 | Clear | Rear end | P.D. only | Dry | West | Slowing or stopping | Pick-up truck | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Feb-15, Mon,17:22 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Sep-01, Tue,15:06 | Clear | Angle | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|---------------|-----------|-----------|-----|-------|---------------|------------------------------|--------------------------|
| 2016-Mar-25, Fri,03:15 | Freezing Rain | SMV other | P.D. only | Ice | West | Going ahead | Automobile, station wagon | Pole (utility, power) |
| 2016-Jan-20, Wed,07:25 | Clear | Rear end | P.D. only | Dry | East | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | East | Turning left | Pick-up truck | Other motor vehicle |
| 2016-Mar-15, Tue,18:53 | Rain | Rear end | P.D. only | Wet | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Mar-16, Wed,16:41 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Feb-25, Thu,20:09 | Clear | Rear end | P.D. only | Ice | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Mar-09, Wed,14:31 | Rain | Rear end | P.D. only | Wet | West | Turning right | Delivery van | Other motor vehicle |
| | | | | | West | Turning right | Passenger van | Other motor vehicle |
| 2016-May-09, Mon,13:43 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2016-May-15, Sun,01:09 | Clear | SMV other | P.D. only | Dry | South | Turning right | Automobile, station wagon | Curb |

| | | | | | | | | |
|------------------------|-------|-----------|-----------|-----|-------|----------------|---------------------------|---------------------|
| 2016-May-04, Wed,11:43 | Clear | Sideswipe | P.D. only | Dry | East | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Going ahead | Pick-up truck | Other motor vehicle |
| 2016-May-18, Wed,09:57 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |
| 2016-May-18, Wed,06:00 | Clear | Angle | P.D. only | Dry | North | Going ahead | Passenger van | Other motor vehicle |
| | | | | | West | Turning right | Truck and trailer | Other motor vehicle |
| 2016-Jun-27, Mon,11:45 | Clear | Rear end | P.D. only | Dry | South | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | South | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Jun-07, Tue,06:46 | Clear | Rear end | P.D. only | Dry | East | Unknown | Unknown | Other motor vehicle |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle |
| 2016-Jul-19, Tue,15:20 | Clear | Sideswipe | P.D. only | Dry | West | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Turning left | Automobile, station wagon | Other motor vehicle |
| 2016-Jul-22, Fri,15:47 | Clear | Angle | P.D. only | Dry | East | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | North | Turning left | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|------------|-------|---------------------|---------------------------|---------------------|
| 2016-Nov-06, Sun,16:25 | Clear | Rear end | P.D. only | Dry | West | Merging | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Merging | Automobile, station wagon | Other motor vehicle |
| 2016-Dec-21, Wed,15:57 | Clear | Rear end | P.D. only | Dry | East | Turning left | Unknown | Other motor vehicle |
| | | | | | East | Turning left | Automobile, station wagon | Other motor vehicle |
| 2016-Dec-20, Tue,15:23 | Clear | Turning movement | P.D. only | Wet | East | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |
| 2016-Jul-21, Thu,21:58 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Jul-02, Sat,17:20 | Clear | Rear end | P.D. only | Dry | West | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | West | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Dec-05, Mon,17:22 | Clear | Rear end | Non-fatal injury | Loose snow | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Nov-16, Wed,09:41 | Clear | Rear end | P.D. only | Dry | East | Slowing or stopping | Pick-up truck | Other motor vehicle |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|-----------|------------------|-----|-------|---------------------|------------------------------|------------------------|
| 2016-May-14, Sat,02:40 | Clear | SMV other | P.D. only | Dry | South | Turning right | Automobile, station wagon | Curb |
| 2016-Jan-19, Tue,08:16 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |
| 2016-Jul-12, Tue,16:56 | Clear | Rear end | P.D. only | Dry | East | Slowing or stopping | Pick-up truck | Other motor vehicle |
| | | | | | East | Slowing or stopping | Truck - closed | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Sep-02, Fri,17:54 | Clear | Rear end | Non-fatal injury | Dry | South | Turning right | Delivery van | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2016-Oct-09, Sun,14:57 | Clear | Rear end | P.D. only | Dry | West | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | West | Turning right | Pick-up truck | Other motor vehicle |
| 2016-Nov-07, Mon,06:45 | Clear | Rear end | P.D. only | Dry | West | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | West | Turning right | Pick-up truck | Other motor vehicle |
| 2016-Nov-16, Wed,16:10 | Clear | Rear end | P.D. only | Dry | North | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Pick-up truck | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|---------------|---------------------------|---------------------|
| 2017-Jan-05, Thu,09:26 | Clear | Rear end | P.D. only | Ice | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |
| 2017-Jan-14, Sat,11:30 | Clear | Turning movement | P.D. only | Dry | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Passenger van | Other motor vehicle |
| 2016-Jan-29, Fri,20:11 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Passenger van | Other motor vehicle |
| 2017-Mar-04, Sat,22:48 | Clear | Rear end | Non-fatal injury | Dry | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Feb-17, Wed,14:00 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2017-Mar-22, Wed,18:12 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Aug-10, Thu,19:45 | Clear | Rear end | P.D. only | Dry | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | | |
|------------------------|-------|-----------|------------------|-----|-------|---------------------|---------------------------|---------------------|---|
| 2017-Apr-24, Mon,11:56 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle | |
| | | | | | South | Turning right | Truck - closed | Other motor vehicle | |
| 2017-Apr-26, Wed,17:28 | Clear | Rear end | P.D. only | Dry | South | Turning right | Pick-up truck | Other motor vehicle | |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle | |
| 2017-May-02, Tue,15:50 | Clear | Rear end | P.D. only | Wet | South | Turning right | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle | |
| 2017-May-05, Fri,11:30 | Clear | Sideswipe | P.D. only | Wet | West | Changing lanes | Pick-up truck | Other motor vehicle | |
| | | | | | West | Going ahead | Truck - closed | Other motor vehicle | |
| 2017-May-20, Sat,12:52 | Clear | SMV other | Non-fatal injury | Dry | South | Going ahead | Automobile, station wagon | Pedestrian | 1 |
| 2017-May-23, Tue,14:35 | Clear | Rear end | Non-fatal injury | Dry | West | Going ahead | Tow truck | Other motor vehicle | |
| | | | | | West | Slowing or stopping | Automobile, station wagon | Other motor vehicle | |
| 2017-Sep-24, Sun,11:11 | Clear | Rear end | Non-fatal injury | Dry | West | Turning right | Automobile, station wagon | Other motor vehicle | |
| | | | | | West | Turning right | Automobile, station wagon | Other motor vehicle | |
| 2017-May-27, Sat,19:01 | Clear | Rear end | Non-fatal injury | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle | |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|---------------------|------------------------------|------------------------|
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Oct-07, Sat,08:53 | Clear | Rear end | Non-fatal injury | Dry | North | Turning right | Truck-other | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Feb-03, Fri,17:15 | Clear | Rear end | P.D. only | Dry | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2017-Jun-14, Wed,11:28 | Clear | Angle | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |
| 2017-Jun-08, Thu,15:17 | Clear | Turning movement | Non-fatal injury | Dry | South | Going ahead | Passenger van | Other motor vehicle |
| | | | | | North | Turning left | Automobile, station wagon | Other motor vehicle |
| 2017-Jan-20, Fri,13:41 | Clear | Other | P.D. only | Wet | West | Reversing | Truck - tractor | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2017-Oct-18, Wed,17:45 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Jul-07, Fri,15:38 | Clear | Rear end | P.D. only | Dry | South | Slowing or stopping | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-------|-------|---------------------|---------------------------|---------------------|
| | | | | | South | Stopped | Pick-up truck | Other motor vehicle |
| 2017-Jan-05, Thu,16:20 | Clear | Rear end | Non-fatal injury | Ice | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Dec-01, Fri,14:31 | Clear | Rear end | P.D. only | Dry | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Truck - dump | Other motor vehicle |
| 2017-Dec-27, Wed,10:24 | Clear | Turning movement | P.D. only | Wet | South | Turning left | Truck - tractor | Other motor vehicle |
| | | | | | North | Going ahead | Passenger van | Other motor vehicle |
| 2017-Dec-12, Tue,14:21 | Snow | Rear end | P.D. only | Slush | West | Slowing or stopping | Truck - open | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2017-Dec-21, Thu,12:30 | Clear | Other | P.D. only | Dry | South | Unknown | Unknown | Construction marker |
| | | | | | South | Going ahead | Construction equipment | Construction marker |
| 2018-Jan-05, Fri,11:38 | Clear | Rear end | P.D. only | Dry | South | Turning right | Delivery van | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Feb-13, Mon,13:04 | Clear | Rear end | P.D. only | Slush | South | Turning right | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|-----------|------------------|----------------|-------|---------------|------------------------------|------------------------|
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Feb-14, Tue,22:50 | Snow | Rear end | Non-reportable | Packed snow | North | Turning right | Automobile, station wagon | Skidding/sliding |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Feb-27, Mon,16:40 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2017-Mar-16, Thu,15:53 | Clear | Rear end | Non-fatal injury | Dry | West | Turning right | Delivery van | Other motor vehicle |
| | | | | | West | Turning right | Pick-up truck | Other motor vehicle |
| 2017-Apr-09, Sun,13:15 | Clear | Rear end | P.D. only | Dry | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning left | Pick-up truck | Other motor vehicle |
| 2017-Jul-22, Sat,12:25 | Clear | Rear end | Non-fatal injury | Dry | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Oct-21, Sat,14:42 | Clear | Rear end | P.D. only | Dry | West | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Nov-03, Fri,12:58 | Rain | Sideswipe | P.D. only | Wet | North | Going ahead | Bus (other) | Curb |

| | | | | | | | | |
|------------------------|-------|------------------|-----------|-----|-------|----------------|------------------------------|------------------------|
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2017-Nov-04, Sat,15:27 | Clear | Rear end | P.D. only | Dry | West | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Turning left | Automobile, station wagon | Other motor vehicle |
| 2017-Nov-24, Fri,15:27 | Clear | Sideswipe | P.D. only | Dry | East | Changing lanes | Unknown | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Mar-01, Thu,20:40 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Jan-02, Tue,08:03 | Clear | Sideswipe | P.D. only | Ice | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Going ahead | Passenger van | Other motor vehicle |
| 2018-Jan-03, Wed,15:23 | Rain | Angle | P.D. only | Wet | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Truck and trailer | Other motor vehicle |
| 2018-May-08, Tue,17:01 | Clear | Sideswipe | P.D. only | Dry | West | Changing lanes | Truck - dump | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2018-Feb-12, Mon,15:35 | Clear | Turning movement | P.D. only | Dry | South | Going ahead | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|-------------------------|-------|------------------|------------------|-----|-------|---------------|---------------------------|---------------------|
| | | | | | North | Turning left | Pick-up truck | Other motor vehicle |
| 2018-Jun-09, Sat, 19:06 | Clear | Turning movement | Non-fatal injury | Dry | North | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Aug-20, Mon, 17:45 | Clear | Rear end | P.D. only | Dry | South | Unknown | Unknown | Other motor vehicle |
| | | | | | South | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Sep-11, Tue, 00:23 | Rain | SMV other | P.D. only | Wet | East | Going ahead | Automobile, station wagon | Ran off road |
| 2018-Sep-16, Sun, 12:33 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Tow truck | Other motor vehicle |
| 2018-Sep-18, Tue, 17:44 | Clear | Rear end | Non-fatal injury | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Delivery van | Other motor vehicle |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle |
| 2018-Nov-29, Thu, 16:39 | Clear | Turning movement | P.D. only | Wet | South | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | South | Stopped | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|----------|------------------|-------|-------|---------------------|---------------------------|---------------------|
| 2018-Nov-27, Tue,16:43 | Snow | Rear end | Non-fatal injury | Wet | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2018-Nov-22, Thu,11:49 | Clear | Rear end | P.D. only | Dry | East | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle |
| 2018-Oct-31, Wed,13:11 | Rain | Rear end | P.D. only | Wet | North | Turning right | Truck - closed | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2018-Nov-13, Tue,06:45 | Snow | Rear end | P.D. only | Wet | North | Going ahead | Truck - tank | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Nov-13, Tue,17:15 | Rain | Rear end | P.D. only | Wet | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Nov-08, Thu,20:51 | Snow | Rear end | P.D. only | Slush | North | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2018-Dec-21, Fri,15:07 | Clear | Angle | Non-fatal injury | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|-----------|-----------|-----|-------|----------------|---------------------------|---------------------|
| 2018-Dec-03, Mon,08:36 | Rain | Other | P.D. only | Wet | West | Reversing | Unknown | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2015-Aug-26, Wed,13:00 | Clear | Sideswipe | P.D. only | Dry | East | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning left | Pick-up truck | Other motor vehicle |
| 2018-Nov-07, Wed,20:45 | Rain | Rear end | P.D. only | Wet | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Unknown | Other motor vehicle |
| 2018-Apr-19, Thu,13:50 | Clear | Rear end | P.D. only | Dry | East | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Sep-14, Fri,08:07 | Clear | Sideswipe | P.D. only | Dry | South | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning left | Truck - dump | Other motor vehicle |

Location: HAWTHORNE RD @ RUSSELL RD

Traffic Control: Traffic signal

Total Collisions: 4

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuvre | Vehicle type | First Event | No. Ped |
|------------------------|-------------|------------------|------------------|----------------|----------|-------------------|---------------------------|---------------------|---------|
| 2014-May-07, Wed,11:00 | Clear | Turning movement | P.D. only | Dry | South | Turning left | Truck and trailer | Other motor vehicle | |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2015-Sep-26, Sat,10:39 | Clear | Turning movement | Non-fatal injury | Dry | South | Turning left | Pick-up truck | Other motor vehicle | |

| | | | | | | | | |
|------------------------|-------|-----------|-----------|-----|-------|-------------|---------------------------|---------------------|
| | | | | | North | Going ahead | Pick-up truck | Other motor vehicle |
| 2016-Jun-28, Tue,09:18 | Clear | Rear end | P.D. only | Dry | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Pick-up truck | Other motor vehicle |
| 2018-Aug-21, Tue,16:13 | Rain | Sideswipe | P.D. only | Wet | South | Merging | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |

Location: HAWTHORNE RD @ STEVENAGE DR

Traffic Control: Traffic signal

Total Collisions: 24

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuver | Vehicle type | First Event | No. Ped |
|------------------------|-------------|------------------|----------------|----------------|----------|---------------------|---------------------------|---------------------|---------|
| 2014-Feb-19, Wed,16:39 | Clear | Turning movement | P.D. only | Wet | North | Turning left | Pick-up truck | Other motor vehicle | |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2014-Mar-12, Wed,15:30 | Snow | Turning movement | P.D. only | Loose snow | North | Turning left | Pick-up truck | Other motor vehicle | |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2014-Jun-11, Wed,15:21 | Rain | Turning movement | P.D. only | Wet | South | Turning left | Truck - open | Other motor vehicle | |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2014-Aug-18, Mon,22:43 | Clear | Rear end | P.D. only | Dry | South | Slowing or stopping | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Slowing or stopping | Passenger van | Other motor vehicle | |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|---------------|---------------------------|---------------------|
| 2014-Nov-20, Thu,17:50 | Clear | Turning movement | P.D. only | Dry | South | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Going ahead | Pick-up truck | Other motor vehicle |
| 2014-Jul-30, Wed,12:37 | Clear | Turning movement | Non-fatal injury | Dry | South | Going ahead | Motorcycle | Other motor vehicle |
| | | | | | North | Turning left | Pick-up truck | Other motor vehicle |
| 2015-May-08, Fri,18:50 | Clear | Rear end | Non-fatal injury | Dry | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning left | Pick-up truck | Other motor vehicle |
| 2015-May-26, Tue,09:58 | Clear | Turning movement | P.D. only | Dry | North | Turning left | Delivery van | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2015-Aug-11, Tue,18:17 | Rain | Rear end | P.D. only | Wet | East | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | East | Turning right | Pick-up truck | Other motor vehicle |
| 2015-Dec-01, Tue,11:35 | Clear | Angle | Non-fatal injury | Dry | North | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | East | Turning left | Truck and trailer | Other motor vehicle |
| | | | | | West | Turning left | Pick-up truck | Other motor vehicle |
| 2016-Jan-14, Thu,12:48 | Clear | Angle | Non-fatal injury | Wet | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Delivery van | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-------|-------|----------------|---------------------------|---------------------|
| 2016-Feb-09, Tue,06:50 | Snow | Turning movement | P.D. only | Slush | North | Turning right | Truck - tractor | Other motor vehicle |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2016-Apr-06, Wed,13:36 | Snow | Turning movement | P.D. only | Wet | North | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | South | Going ahead | Truck and trailer | Other motor vehicle |
| 2016-Apr-22, Fri,06:19 | Rain | Turning movement | P.D. only | Wet | South | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Going ahead | Pick-up truck | Other motor vehicle |
| 2016-May-13, Fri,08:30 | Rain | Turning movement | P.D. only | Wet | West | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | East | Turning right | Truck - tractor | Other motor vehicle |
| 2017-Apr-21, Fri,04:28 | Rain | Turning movement | Non-fatal injury | Wet | North | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2017-Aug-16, Wed,18:07 | Clear | Sideswipe | P.D. only | Dry | South | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Changing lanes | Automobile, station wagon | Other motor vehicle |
| 2017-Jun-14, Wed,12:45 | Clear | Turning movement | P.D. only | Dry | East | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|---------------|------------------|------------------|------------|-------|---------------------|---------------------------|---------------------|
| 2017-Mar-29, Wed,08:17 | Clear | Rear end | P.D. only | Dry | North | Going ahead | Truck - dump | Other motor vehicle |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2018-Jan-08, Mon,06:30 | Snow | Turning movement | P.D. only | Loose snow | East | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |
| 2018-Jun-19, Tue,15:25 | Clear | Angle | Non-fatal injury | Dry | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Truck - closed | Other motor vehicle |
| 2018-Nov-16, Fri,17:31 | Snow | Sideswipe | P.D. only | Loose snow | South | Going ahead | Delivery van | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2018-Dec-21, Fri,13:10 | Freezing Rain | Rear end | P.D. only | Wet | North | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Unknown | Unknown | Other motor vehicle |
| 2018-Jan-17, Wed,06:02 | Snow | Turning movement | P.D. only | Slush | North | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |

Location: HAWTHORNE RD/RUSSELL RD @ WALKLEY RD

Traffic Control: Traffic signal

Total Collisions: 106

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuver | Vehicle type | First Event | No. Ped |
|------------------------|-------------|------------------|------------------|----------------|----------|-------------------|---------------------------|---------------------|---------|
| 2014-Feb-17, Mon,19:29 | Clear | Turning movement | Non-fatal injury | Dry | North | Turning left | Automobile, station wagon | Other motor vehicle | |

| | | | | | | | | |
|------------------------|-------|-----------|------------------|----------------|-------|---------------------|------------------------------|------------------------|
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Feb-16, Sun,15:50 | Clear | Rear end | P.D. only | Dry | North | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2014-Mar-05, Wed,18:40 | Clear | Rear end | P.D. only | Ice | West | Changing lanes | Pick-up truck | Other motor vehicle |
| | | | | | West | Turning left | Automobile, station wagon | Other motor vehicle |
| 2014-Mar-30, Sun,15:01 | Snow | SMV other | P.D. only | Packed snow | South | Turning right | Automobile, station wagon | Skidding/sliding |
| 2014-May-02, Fri,02:34 | Clear | Angle | Non-fatal injury | Dry | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Apr-14, Mon,15:52 | Rain | Rear end | P.D. only | Wet | West | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | West | Slowing or stopping | Pick-up truck | Other motor vehicle |
| 2014-May-29, Thu,18:00 | Clear | Rear end | Non-fatal injury | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2014-Jun-15, Sun,15:00 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|-----------|------------------|-----|-------|---------------------|---------------------------|---------------------|
| 2014-Jul-12, Sat,15:12 | Clear | Rear end | P.D. only | Dry | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| 2014-Aug-08, Fri,13:00 | Clear | Rear end | P.D. only | Dry | North | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2014-Aug-26, Tue,07:24 | Clear | Rear end | Non-fatal injury | Dry | North | Going ahead | Truck - closed | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2014-Aug-12, Tue,17:05 | Rain | Sideswipe | P.D. only | Wet | West | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Turning left | Pick-up truck | Other motor vehicle |
| 2014-Sep-26, Fri,15:30 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2014-Oct-16, Thu,09:45 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Delivery van | Other motor vehicle |
| 2014-Oct-01, Wed,18:05 | Clear | Rear end | P.D. only | Dry | East | Unknown | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Unknown | Truck - closed | Other motor vehicle |

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|------------------------|-------|-----------|-----------|-----|-------|----------------|---------------------------|---------------------|
| 2014-Dec-26, Fri,14:01 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |
| 2014-Dec-31, Wed,08:00 | Clear | Rear end | P.D. only | Dry | North | Turning right | Truck - closed | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |
| 2014-Dec-17, Wed,13:15 | Rain | Rear end | P.D. only | Wet | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2014-Apr-12, Sat,09:29 | Clear | Sideswipe | P.D. only | Dry | North | Changing lanes | Truck - dump | Other motor vehicle |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Jun-05, Thu,18:20 | Clear | Sideswipe | P.D. only | Dry | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Dec-16, Tue,13:17 | Rain | Rear end | P.D. only | Wet | South | Going ahead | Construction equipment | Other motor vehicle |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2014-Apr-26, Sat,09:35 | Clear | Rear end | P.D. only | Dry | North | Turning right | Unknown | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|-----|-------|----------------|---------------------------|---------------------|
| 2014-Apr-30, Wed,17:33 | Clear | Rear end | P.D. only | Dry | East | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning right | Automobile, station wagon | Other motor vehicle |
| 2014-Feb-04, Tue,15:32 | Clear | Sideswipe | P.D. only | Dry | West | Turning left | Truck and trailer | Other motor vehicle |
| | | | | | West | Turning left | Automobile, station wagon | Other motor vehicle |
| 2014-Feb-11, Tue,08:30 | Clear | Rear end | P.D. only | Dry | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Passenger van | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | West | Stopped | Pick-up truck | Other motor vehicle |
| 2014-Mar-27, Thu,11:19 | Clear | Rear end | P.D. only | Dry | South | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning left | Pick-up truck | Other motor vehicle |
| 2014-May-26, Mon,09:11 | Clear | Other | P.D. only | Dry | East | Reversing | Truck - open | Other motor vehicle |
| | | | | | West | Turning left | Passenger van | Other motor vehicle |
| 2014-Jun-02, Mon,16:48 | Clear | Turning movement | Non-fatal injury | Dry | North | Turning right | Truck and trailer | Cyclist |
| | | | | | North | Going ahead | Bicycle | Other motor vehicle |
| 2014-Jun-23, Mon,17:39 | Clear | Sideswipe | P.D. only | Dry | North | Changing lanes | Automobile, station wagon | Other motor vehicle |

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|------------------------|---------------|-----------|------------------|-------------|-------|---------------------|---------------------------|---------------------|
| | | | | | North | Turning left | Truck - dump | Other motor vehicle |
| 2014-Oct-17, Fri,15:58 | Rain | Sideswipe | Non-fatal injury | Wet | East | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| 2014-Dec-16, Tue,17:15 | Freezing Rain | Sideswipe | P.D. only | Wet | South | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning left | Pick-up truck | Other motor vehicle |
| 2015-Jan-12, Mon,16:16 | Clear | Rear end | P.D. only | Packed snow | North | Going ahead | Unknown | Other motor vehicle |
| | | | | | North | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| 2015-Jan-12, Mon,15:37 | Snow | Rear end | P.D. only | Loose snow | South | Turning right | Truck - closed | Other motor vehicle |
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Feb-07, Sat,11:40 | Clear | Angle | P.D. only | Slush | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning left | Truck - closed | Other motor vehicle |
| 2015-Feb-14, Sat,12:45 | Snow | Sideswipe | P.D. only | Loose snow | West | Unknown | Pick-up truck | Other motor vehicle |
| | | | | | West | Unknown | Automobile, station wagon | Other motor vehicle |
| 2015-Mar-25, Wed,10:20 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |

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|------------------------|-------|-----------|------------------|-----|-------|---------------------|------------------------------|------------------------|
| | | | | | South | Turning right | Automobile, station wagon | Other motor vehicle |
| 2015-Apr-04, Sat,22:27 | Clear | Rear end | Non-fatal injury | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Slowing or stopping | Pick-up truck | Other motor vehicle |
| 2015-May-07, Thu,13:13 | Clear | Sideswipe | P.D. only | Dry | East | Changing lanes | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Truck and trailer | Other motor vehicle |
| 2015-Jun-04, Thu,09:56 | Clear | Angle | P.D. only | Dry | North | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | East | Going ahead | Pick-up truck | Other motor vehicle |
| 2015-Jul-22, Wed,09:29 | Clear | Rear end | Non-fatal injury | Dry | East | Unknown | Unknown | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2015-Jun-18, Thu,10:54 | Clear | Rear end | P.D. only | Dry | North | Slowing or stopping | Passenger van | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2015-May-23, Sat,13:27 | Clear | Angle | P.D. only | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Going ahead | Police vehicle | Other motor vehicle |
| 2015-Sep-08, Tue,07:27 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Truck and trailer | Other motor vehicle |

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|------------------------|-------|----------|------------------|-------|-------|---------------------|---------------------------|---------------------|
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Passenger van | Other motor vehicle |
| 2015-Jul-21, Tue,10:29 | Rain | Rear end | P.D. only | Wet | East | Slowing or stopping | Truck and trailer | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2015-Nov-03, Tue,15:57 | Clear | Rear end | Non-fatal injury | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| 2015-Nov-27, Fri,16:20 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |
| 2015-Nov-09, Mon,14:10 | Clear | Rear end | P.D. only | Dry | East | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning right | Pick-up truck | Other motor vehicle |
| 2015-Nov-13, Fri,14:04 | Rain | Rear end | P.D. only | Wet | South | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2015-Nov-24, Tue,12:25 | Snow | Rear end | P.D. only | Slush | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |

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|------------------------|-------|------------------|------------------|-------|-------|---------------------|---------------------------|---------------------|
| 2015-Dec-22, Tue,16:13 | Rain | Rear end | Non-fatal injury | Wet | East | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2014-Aug-12, Tue,17:23 | Rain | Rear end | P.D. only | Wet | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Feb-16, Tue,06:50 | Snow | Rear end | P.D. only | Slush | East | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | East | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| 2016-Mar-01, Tue,18:56 | Snow | Turning movement | P.D. only | Slush | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Turning left | Truck - tractor | Other motor vehicle |
| 2016-Mar-11, Fri,15:40 | Clear | Rear end | Non-fatal injury | Dry | North | Turning right | Delivery van | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |
| 2016-Apr-12, Tue,06:21 | Clear | Angle | Non-fatal injury | Dry | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Going ahead | Pick-up truck | Other motor vehicle |
| 2016-May-03, Tue,08:02 | Clear | Rear end | Non-fatal injury | Dry | North | Turning right | Pick-up truck | Other motor vehicle |
| | | | | | North | Turning right | Pick-up truck | Other motor vehicle |

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|------------------------|-------|------------------|------------------|-----|-------|----------------|---------------------------|---------------------|
| 2016-May-06, Fri,10:22 | Clear | Rear end | P.D. only | Dry | East | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning right | Pick-up truck | Other motor vehicle |
| 2016-May-13, Fri,08:01 | Rain | Rear end | P.D. only | Wet | North | Turning right | Delivery van | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Jun-20, Mon,07:44 | Clear | Other | P.D. only | Dry | East | Reversing | Truck - tractor | Other motor vehicle |
| | | | | | West | Stopped | Truck - tractor | Other motor vehicle |
| 2016-Sep-11, Sun,20:10 | Clear | Rear end | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Turning right | Pick-up truck | Other motor vehicle |
| 2016-Sep-27, Tue,15:45 | Clear | Rear end | Non-fatal injury | Dry | East | Going ahead | Motorcycle | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Sep-28, Wed,10:57 | Clear | Sideswipe | P.D. only | Dry | West | Changing lanes | Truck and trailer | Other motor vehicle |
| | | | | | West | Going ahead | Truck - open | Other motor vehicle |
| 2016-Sep-30, Fri,15:53 | Clear | Turning movement | Non-fatal injury | Dry | East | Turning left | Pick-up truck | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |

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|------------------------|-------|-------------|-----------|-------------|-------|---------------|---------------------------|---------------------|
| 2016-Oct-05, Wed,18:45 | Clear | Angle | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2016-Oct-19, Wed,17:46 | Clear | Approaching | P.D. only | Dry | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Dec-16, Fri,06:52 | Clear | Rear end | P.D. only | Wet | South | Turning right | Truck - closed | Other motor vehicle |
| | | | | | South | Turning right | Truck - closed | Other motor vehicle |
| | | | | | South | Turning right | Truck - closed | Other motor vehicle |
| 2016-Dec-17, Sat,13:33 | Snow | SMV other | P.D. only | Packed snow | North | Going ahead | Automobile, station wagon | Animal - wild |
| 2016-Dec-05, Mon,05:55 | Snow | Other | P.D. only | Packed snow | North | Turning right | Pick-up truck | Skidding/sliding |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2016-Jul-22, Fri,14:43 | Clear | Other | P.D. only | Dry | West | Reversing | Truck - tractor | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Sep-14, Wed,17:30 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |

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|------------------------|---------------|------------------|------------------|-------------|-------|---------------------|---------------------------|---------------------|
| 2017-Mar-29, Wed,16:57 | Clear | Rear end | P.D. only | Dry | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Stopped | Passenger van | Other motor vehicle |
| 2017-Feb-05, Sun,15:29 | Drifting Snow | Rear end | P.D. only | Packed snow | West | Slowing or stopping | Police vehicle | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2016-Nov-07, Mon,16:24 | Clear | Rear end | P.D. only | Dry | West | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2017-Jan-05, Thu,14:17 | Clear | Rear end | P.D. only | Loose snow | North | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2017-Mar-24, Fri,09:39 | Snow | Rear end | P.D. only | Loose snow | West | Slowing or stopping | Pick-up truck | Other motor vehicle |
| | | | | | West | Stopped | Pick-up truck | Other motor vehicle |
| 2017-Mar-14, Tue,15:45 | Clear | Sideswipe | P.D. only | Dry | West | Unknown | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Unknown | Pick-up truck | Other motor vehicle |
| 2017-Mar-28, Tue,11:25 | Clear | Turning movement | Non-fatal injury | Wet | East | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | West | Turning left | Ambulance | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|-----------|-----------|-----|-------|---------------------|---------------------------|---------------------|
| 2017-Aug-14, Mon,09:16 | Clear | Rear end | P.D. only | Dry | South | Going ahead | Other | Other motor vehicle |
| | | | | | South | Stopped | Truck - tractor | Other motor vehicle |
| 2017-Feb-02, Thu,08:49 | Clear | Rear end | P.D. only | Dry | North | Going ahead | Delivery van | Other motor vehicle |
| | | | | | North | Stopped | Passenger van | Other motor vehicle |
| 2017-Jul-11, Tue,09:32 | Clear | Rear end | P.D. only | Dry | East | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Turning right | Automobile, station wagon | Other motor vehicle |
| 2017-Jun-27, Tue,17:00 | Clear | Sideswipe | P.D. only | Dry | West | Changing lanes | Passenger van | Other motor vehicle |
| | | | | | West | Going ahead | Pick-up truck | Other motor vehicle |
| 2017-Nov-10, Fri,16:45 | Clear | Sideswipe | P.D. only | Dry | North | Turning left | Unknown | Other motor vehicle |
| | | | | | North | Turning left | Truck - tractor | Other motor vehicle |
| 2017-Nov-23, Thu,06:23 | Clear | Sideswipe | P.D. only | Dry | West | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Delivery van | Other motor vehicle |
| 2017-Nov-30, Thu,20:37 | Rain | Angle | P.D. only | Wet | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|-------|------------------|------------------|------------|-------|---------------------|---------------------------|---------------------|
| 2017-Jan-17, Tue,14:00 | Clear | Sideswipe | P.D. only | Dry | West | Turning left | Truck - tractor | Other motor vehicle |
| | | | | | West | Turning left | Pick-up truck | Other motor vehicle |
| 2017-Dec-28, Thu,12:05 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Truck - dump | Other motor vehicle |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2017-Oct-20, Fri,14:42 | Clear | Sideswipe | P.D. only | Dry | North | Turning right | Passenger van | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2018-Feb-01, Thu,11:51 | Snow | Rear end | P.D. only | Ice | North | Slowing or stopping | Passenger van | Skidding/sliding |
| | | | | | North | Stopped | Pick-up truck | Other motor vehicle |
| 2018-Jan-07, Sun,18:08 | Snow | Turning movement | P.D. only | Loose snow | West | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Going ahead | Ambulance | Other motor vehicle |
| 2018-Jan-09, Tue,05:59 | Snow | Sideswipe | Non-fatal injury | Loose snow | West | Turning left | Truck - dump | Other motor vehicle |
| | | | | | West | Turning left | Automobile, station wagon | Other motor vehicle |
| 2018-Jan-25, Thu,12:50 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|---------------|----------|------------------|------------|-------|---------------------|---------------------------|---------------------|
| 2018-May-29, Tue,12:33 | Clear | Rear end | P.D. only | Dry | East | Stopped | Pick-up truck | Other motor vehicle |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2018-Jun-04, Mon,12:00 | Rain | Rear end | P.D. only | Wet | South | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | South | Unknown | Unknown | Other motor vehicle |
| 2018-Jun-11, Mon,12:19 | Clear | Rear end | P.D. only | Dry | West | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Slowing or stopping | Automobile, station wagon | Other motor vehicle |
| 2018-Jul-09, Mon,08:35 | Clear | Rear end | Non-fatal injury | Dry | West | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Turning right | Pick-up truck | Other motor vehicle |
| 2018-Nov-28, Wed,12:28 | Rain | Other | P.D. only | Wet | South | Reversing | Pick-up truck | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Nov-20, Tue,08:45 | Freezing Rain | Rear end | P.D. only | Loose snow | North | Unknown | Unknown | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Unknown | Unknown | Other motor vehicle |
| 2018-Nov-09, Fri,17:30 | Snow | Rear end | P.D. only | Ice | South | Going ahead | Truck - closed | Other motor vehicle |
| | | | | | South | Stopped | Automobile, station wagon | Other motor vehicle |

| | | | | | | | | |
|------------------------|---------------|-----------|------------------|-------------|-------|----------------|---------------------------|---------------------|
| 2018-Dec-19, Wed,09:23 | Clear | Rear end | P.D. only | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2018-Dec-17, Mon,12:22 | Snow | Sideswipe | P.D. only | Loose snow | North | Changing lanes | Delivery van | Other motor vehicle |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| 2018-Sep-12, Wed,15:06 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Pick-up truck | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Dec-13, Thu,21:33 | Clear | Rear end | Non-fatal injury | Dry | North | Turning right | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Turning right | Delivery van | Other motor vehicle |
| 2018-May-23, Wed,10:06 | Clear | Other | P.D. only | Dry | East | Reversing | Automobile, station wagon | Other motor vehicle |
| | | | | | West | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Dec-14, Fri,13:30 | Freezing Rain | Rear end | P.D. only | Ice | North | Turning right | Passenger van | Other motor vehicle |
| | | | | | North | Turning right | Automobile, station wagon | Other motor vehicle |
| 2016-Dec-05, Mon,06:10 | Snow | Rear end | P.D. only | Packed snow | North | Turning right | Pick-up truck | Skidding/sliding |
| | | | | | North | Turning right | Truck - closed | Other motor vehicle |

| | | | | | | | | |
|------------------------|------|----------|------------------|-----|------|-------------|---------------------------|---------------------|
| 2017-Apr-15, Sat,16:18 | Rain | Rear end | Non-fatal injury | Wet | East | Going ahead | Municipal transit bus | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |

Location: HUNT CLUB RD @ HWY417 HUNT CLUB IC109 RAMP52

Traffic Control: Stop sign

Total Collisions: 8

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuver | Vehicle type | First Event | No. Ped |
|------------------------|-------------|-------------|------------------|----------------|----------|---------------------|---------------------------|---------------------|---------|
| 2016-Jun-24, Fri,18:08 | Clear | Angle | P.D. only | Dry | South | Turning right | Automobile, station wagon | Other motor vehicle | |
| | | | | | West | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2016-Dec-14, Wed,17:30 | Clear | Rear end | Non-fatal injury | Dry | West | Slowing or stopping | Pick-up truck | Other motor vehicle | |
| | | | | | West | Turning right | Automobile, station wagon | Other motor vehicle | |
| 2015-Dec-11, Fri,02:00 | Clear | SMV other | P.D. only | Dry | East | Turning right | Passenger van | Curb | |
| 2015-Jan-26, Mon,16:00 | Clear | Rear end | P.D. only | Dry | East | Slowing or stopping | Automobile, station wagon | Other motor vehicle | |
| | | | | | East | Stopped | Pick-up truck | Other motor vehicle | |
| 2015-Apr-28, Tue,15:45 | Clear | Rear end | Non-fatal injury | Dry | East | Going ahead | Pick-up truck | Other motor vehicle | |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle | |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle | |
| 2015-Jan-26, Mon,16:30 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Automobile, station wagon | Other motor vehicle | |

| | | | | | | | | |
|------------------------|-------|----------|-----------|-------|-------|-------------|------------------------------|------------------------|
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2015-Jan-31, Sat,16:00 | Clear | Rear end | P.D. only | Slush | East | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Stopped | Automobile, station wagon | Other motor vehicle |
| 2018-Sep-08, Sat,12:31 | Clear | Rear end | P.D. only | Dry | North | Going ahead | Automobile, station wagon | Other motor vehicle |
| | | | | | North | Stopped | Automobile, station wagon | Other motor vehicle |

Location: RAMSAYVILLE RD @ RUSSELL RD N

Traffic Control: Stop sign

Total Collisions: 8

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuver | Vehicle type | First Event | No. Ped |
|------------------------|-------------|------------------|------------------|-------------------------|----------|---------------------|------------------------------|------------------------|---------|
| 2014-Aug-12, Tue,19:23 | Rain | SMV other | Non-fatal injury | Wet | West | Going ahead | Automobile, station wagon | Ran off road | |
| 2014-Sep-21, Sun,14:43 | Rain | SMV other | P.D. only | Wet | West | Going ahead | Automobile, station wagon | Ran off road | |
| 2015-Aug-09, Sun,13:59 | Clear | SMV other | Non-fatal injury | Loose sand or gravel | West | Slowing or stopping | Motorcycle | Skidding/sliding | |
| 2016-Nov-20, Sun,08:58 | Rain | Turning movement | P.D. only | Wet | North | Going ahead | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Turning left | Passenger van | Other motor vehicle | |
| 2017-Mar-10, Fri,01:23 | Clear | SMV other | Non-fatal injury | Dry | West | Slowing or stopping | Pick-up truck | Ran off road | |
| 2018-Jan-16, Tue,13:40 | Clear | SMV other | P.D. only | Wet | West | Going ahead | Pick-up truck | Skidding/sliding | |

| | | | | | | | | |
|------------------------|-------|-----------|------------------|-----|-------|-------------|------------------------------|----------------|
| 2018-Aug-22, Wed,06:51 | Rain | SMV other | P.D. only | Wet | North | Going ahead | Automobile, station wagon | Debris on road |
| 2018-Aug-23, Thu,18:39 | Clear | SMV other | Non-fatal injury | Dry | North | Going ahead | Motorcycle | Ran off road |

Location: RAMSAYVILLE RD @ RUSSELL RD S

Traffic Control: Stop sign

Total Collisions: 3

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuver | Vehicle type | First Event | No. Ped |
|------------------------|-------------|------------------|------------------|----------------|----------|---------------------|------------------------------|------------------------|---------|
| 2015-Jul-27, Mon,19:37 | Clear | Angle | P.D. only | Dry | East | Turning right | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2017-Jun-19, Mon,10:07 | Clear | SMV other | P.D. only | Dry | East | Slowing or stopping | Municipal transit bus | Ran off road | |
| 2018-Dec-04, Tue,07:30 | Clear | Turning movement | Non-fatal injury | Dry | North | Turning left | Automobile, station wagon | Other motor vehicle | |
| | | | | | South | Going ahead | Automobile, station wagon | Other motor vehicle | |



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Location: HWY 417 WALKLEY IC110R57 @ WALKLEY EXTENSION R

Traffic Control: Stop sign

Total Collisions: 7

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuvre | Vehicle type | First Event | No. Ped |
|------------------------|-------------|-------------|------------------|----------------|----------|---------------------|---------------------------|---------------------|---------|
| 2018-Dec-04, Tue,15:45 | Clear | Angle | P.D. only | Dry | South | Turning left | Automobile, station wagon | Other motor vehicle | |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2017-Sep-25, Mon,16:13 | Clear | Rear end | P.D. only | Dry | East | Going ahead | Passenger van | Other motor vehicle | |
| | | | | | East | Slowing or stopping | Automobile, station wagon | Other motor vehicle | |
| 2016-Dec-07, Wed,16:12 | Clear | Angle | P.D. only | Wet | South | Turning left | Automobile, station wagon | Other motor vehicle | |
| | | | | | West | Going ahead | Delivery van | Other motor vehicle | |
| 2016-Aug-02, Tue,11:38 | Clear | Rear end | Non-fatal injury | Dry | East | Making "U" turn | Police vehicle | Other motor vehicle | |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2016-Jul-03, Sun,21:24 | Clear | Angle | P.D. only | Dry | South | Turning left | Automobile, station wagon | Other motor vehicle | |
| | | | | | West | Going ahead | Motorcycle | Other motor vehicle | |
| 2016-Apr-06, Wed,14:57 | Snow | Angle | P.D. only | Slush | South | Turning left | Pick-up truck | Other motor vehicle | |

| | | | | | | | | |
|------------------------|-------|-------|-----------|-----|-------|--------------|---------------------------|---------------------|
| | | | | | East | Going ahead | Pick-up truck | Other motor vehicle |
| 2015-Dec-14, Mon,13:00 | Clear | Angle | P.D. only | Dry | South | Turning left | Automobile, station wagon | Other motor vehicle |
| | | | | | East | Going ahead | Pick-up truck | Other motor vehicle |

Location: HWY 417 WALKLEY IC110R64 @ WALKLEY EXTENSION R

Traffic Control: Stop sign

Total Collisions: 5

| Date/Day/Time | Environment | Impact Type | Classification | Surface Cond'n | Veh. Dir | Vehicle Manoeuvre | Vehicle type | First Event | No. Ped |
|------------------------|-------------|------------------|----------------|----------------|----------|-------------------|---------------------------|---------------------|---------|
| 2018-Jun-20, Wed,18:10 | Clear | Turning movement | P.D. only | Dry | East | Making "U" turn | Unknown | Other motor vehicle | |
| | | | | | East | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2018-May-22, Tue,10:37 | Clear | Angle | P.D. only | Dry | North | Turning left | Pick-up truck | Other motor vehicle | |
| | | | | | East | Going ahead | Delivery van | Other motor vehicle | |
| 2017-Dec-16, Sat,07:56 | Snow | Sideswipe | P.D. only | Slush | North | Changing lanes | Snow plow | Other motor vehicle | |
| | | | | | North | Going ahead | Automobile, station wagon | Other motor vehicle | |
| 2017-Sep-09, Sat,12:23 | Clear | Sideswipe | P.D. only | Dry | North | Unknown | Automobile, station wagon | Other motor vehicle | |
| | | | | | North | Unknown | Unknown | Other motor vehicle | |
| 2016-Jul-04, Mon,13:34 | Clear | SMV other | P.D. only | Dry | West | Turning left | Automobile, station wagon | Ran off road | |

APPENDIX F

Excerpts from Relevant Traffic Studies

3.3 SITE TRAFFIC GENERATION

3.3.1 Land Use and Trip Generation Rates

The *Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition)* was used to estimate traffic generated by the subject site. The ITE land use codes 945 – Gas Station with Convenience Market and 934 – Fast-Food Restaurant with Drive-Through Window were thought to be most representative of the proposed land uses.

Table 1 summarizes the anticipated site trips.

Table 1 Trips Generated by the Proposed Commercial Development

| ITE LAND USE | | | MORNING PEAK HOUR | | | AFTERNOON PEAK HOUR | | |
|--|-------------------------------|-----|-------------------|-------|-------|---------------------|-------|-------|
| | | | In | Out | Total | In | Out | Total |
| ITE Trip Generation Rates | | | | | | | | |
| 945 – Gas Station with Convenience Market | Gross Floor Area (1000's ft²) | 1.3 | 41.89 | 41.07 | 82.13 | 48.74 | 48.74 | 97.47 |
| 934 – Fast-Food Restaurant with Drive-Through Window | Gross Floor Area (1000's ft²) | 1.4 | 23.16 | 22.26 | 45.42 | 16.98 | 15.67 | 32.65 |
| Trips Generated | | | | | | | | |
| 945 – Gas Station with Convenience Market | Trip Gen | | 54 | 53 | 107 | 63 | 63 | 126 |
| 934 – Fast-Food Restaurant with Drive-Through Window | Trip Gen | | 32 | 31 | 63 | 24 | 22 | 46 |
| Pass-By and Internal Capture | | | | | | | | |
| 945 – Gas Station with Convenience Market | Auto Trips | | 54 | 53 | 107 | 63 | 63 | 126 |
| | Pass-By | 80% | 43 | 43 | 86 | 51 | 51 | 102 |
| | Internal Capture | 0% | 0 | 0 | 0 | 0 | 0 | 0 |
| | Net New Auto Trips | | 11 | 10 | 21 | 12 | 12 | 24 |
| 934 – Fast-Food Restaurant with Drive-Through Window | Auto Trips | | 32 | 31 | 63 | 24 | 22 | 46 |
| | Pass-By | 50% | 16 | 16 | 32 | 12 | 11 | 23 |
| | Internal Capture | 50% | 16 | 16 | 32 | 12 | 11 | 23 |
| | Net New Auto Trips | | 0 | 0 | 0 | 0 | 0 | 0 |
| Net New Auto Trips | | | | | | | | |
| Total Development | Auto Trips | | 86 | 84 | 170 | 87 | 85 | 172 |
| | Pass-By Trips | | 59 | 59 | 118 | 63 | 62 | 125 |
| | Internal Capture Trips | | 16 | 15 | 31 | 12 | 11 | 23 |
| | Net New Auto Trips | | 11 | 10 | 21 | 12 | 12 | 24 |

3.3.2 Pass-By and Internal Capture

Pass-by trips are considered intermediate stops between an origin and a destination. They are site trips that are drawn from existing traffic volumes on the road network that are “passing-by” the site. While the overall total number of trips generated by a given development remains the same, the pass-by site trips are deducted from existing / background volumes and added to the site access locations to reflect this.

Based on a combination of technical sources and professional judgement, it was assumed that the gas station and convenience store will have a pass-by rate of 80% while the fast food restaurant will have a pass-by rate of 50%.

Figure 8 illustrates the pass-by trips the proposed development is anticipated to generate.

When predicting site trips that are associated with different land use types on the same site, the interaction between those land use types must be accounted for to reflect the synergy between uses. Internal capture trips – also referred to as “shared-use” trips - are trips which are shared between two or more uses on the same site. A portion of the generated trips for each individual land use, therefore, are drawn from the adjacent land uses on the same site and primarily by the “anchor” land use. Internal capture adjustments were made to account for vehicles that visit more than one use within the subject commercial development. Since these trips are contained within the subject site, accounting for each trip separately on the roadway network would result in “double-counting”. For this reason, land uses that may have associated shared-use trips between one another ultimately have their net new trips adjusted.

Within the proposed commercial development, the trips that are subject to internal capture adjustments are the trips generated from the fast food restaurant. No adjustments were made to the gas station as this land use is considered to be the site anchor. An assumed internal capture rate of 50% was assumed for the fast food restaurant.

Following the application of the pass-by and internal capture adjustments, the commercial development is expected to generate approximately 21 and 24 net new auto trips (two-way) during the AM and PM peak hours, respectively.

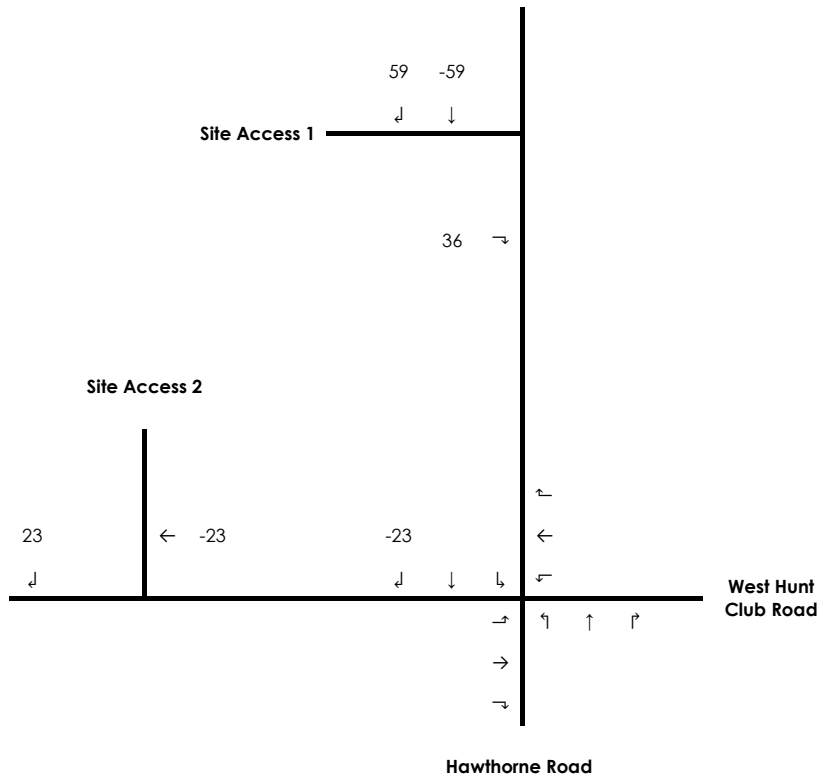
Figure 9 illustrates the net new site trips the proposed commercial development is anticipated to generate.

3.3.3 Traffic Distribution and Assignment

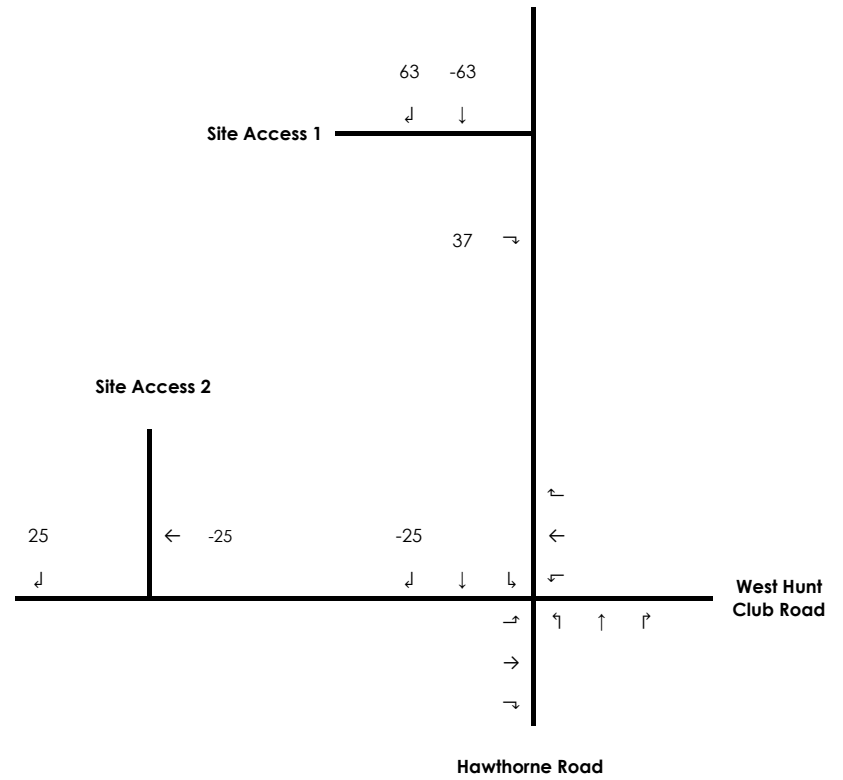
The distribution of traffic to / from the study area was determined through examination of the current traffic patterns at the Hunt Club Road at Hawthorne Road intersection.

Figure 10 illustrates the total site traffic volumes the proposed commercial development is anticipated to generate.

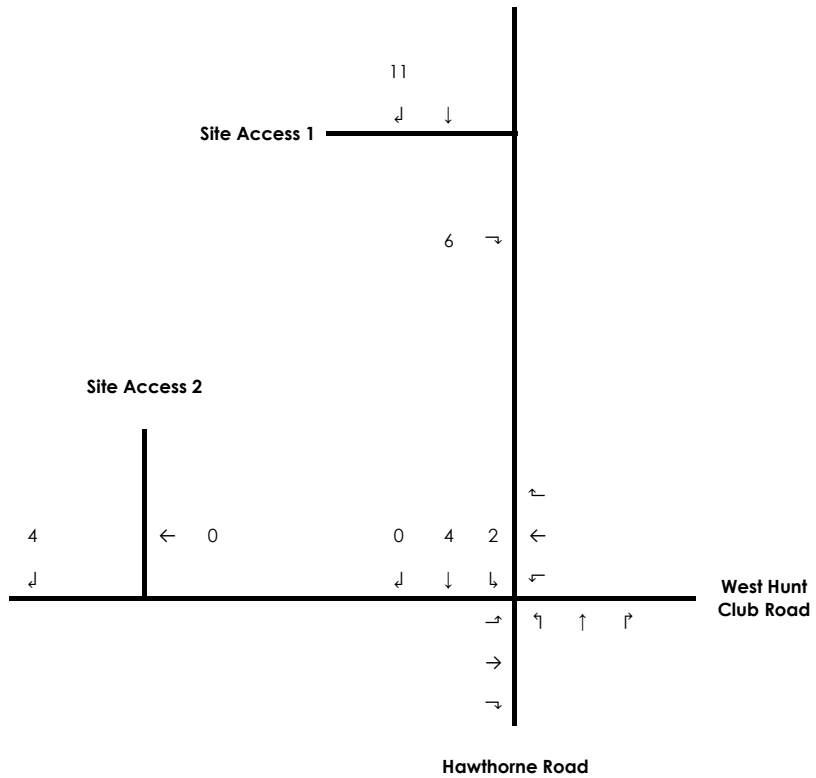
AM Peak Hour



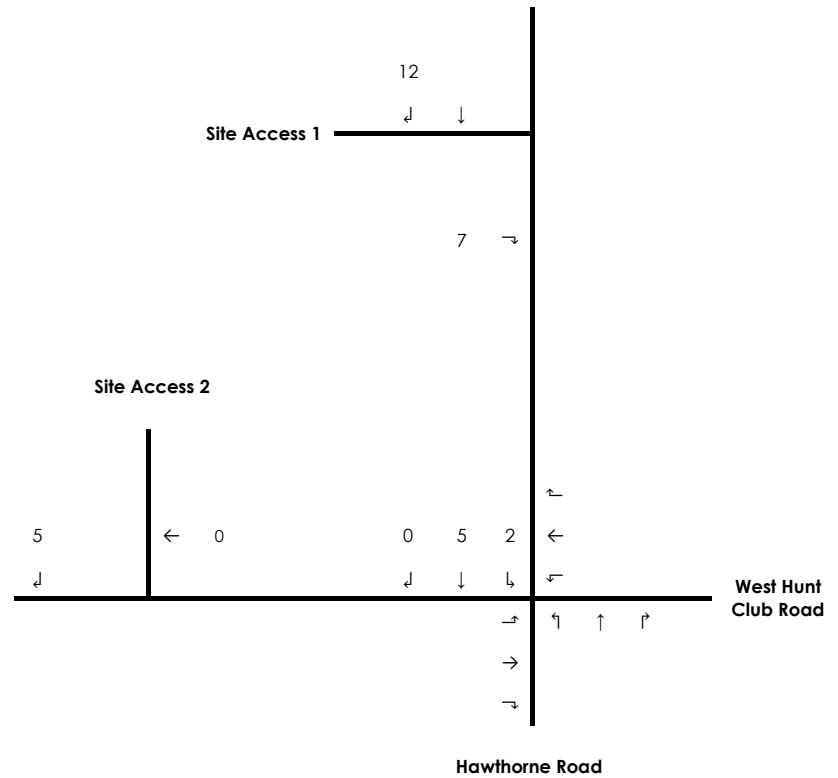
PM Peak Hour



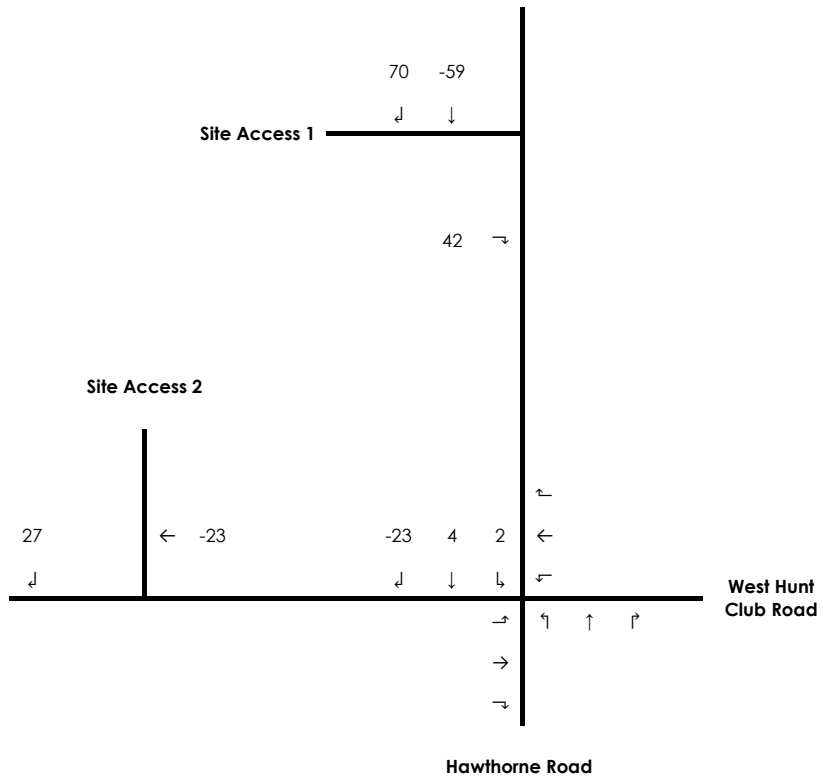
AM Peak Hour



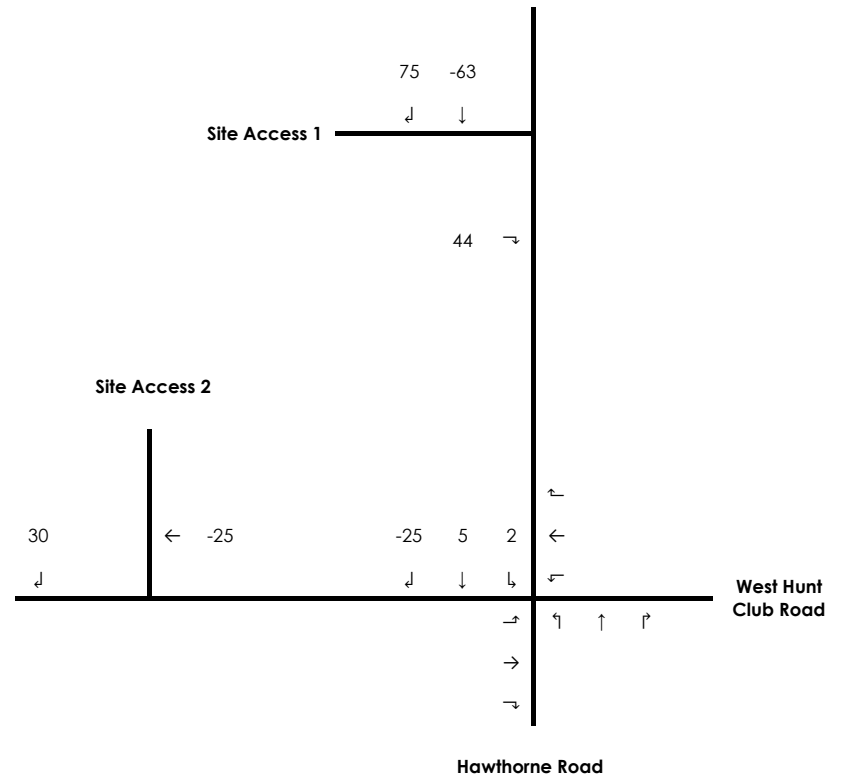
PM Peak Hour



AM Peak Hour



PM Peak Hour



reduction in traffic volumes through the Walkley/Russell intersection and on Russell Road adjacent to the site. We are also not aware of any other meaningful new development projects in close proximity to the site.

3.0 STUDY AREA AND TIME PERIODS

As the proposed development is an extremely low traffic generator (10 veh/h and 30 veh/h during morning and afternoon peak hours respectively) and as its only traffic impact is on the immediate adjacent section of southbound Russell Road, the study area is the Walkley/Russell intersection and Russell Road adjacent to the site.

Again, as site-generated traffic is very low and spread out throughout the day, only the weekday morning and afternoon peak hours are analyzed as this is when background traffic on Russell Road is highest. As the project is expected to be built in 2018 and operational in 2018/19, and as site traffic is so low (it does not meet the TIA Guidelines trip generation trigger), no horizon year analysis was considered necessary. If there are any real or perceived traffic operations issues associated with the proposed development, they can be fully assessed based on current volumes.

4.0 EXEMPTIONS REVIEW

Based on the type and size of the proposed development for which a Site Plan Application is being submitted, the following identifies which analyses are required and which are exempt in further analysis/modules, according to the City's new TIA Guidelines.

Design Review Component:

Development Design

- Circulation and Access REQUIRED
- New Street Networks EXEMPT

Parking

- Parking Supply REQUIRED
- Spillover Parking EXEMPT

Network Impact Component:

Development Design

- Transportation Demand Management EXEMPT
- Neighbourhood Traffic Management EXEMPT
- Network Concept EXEMPT

In summary, as this submission accompanies a Site Plan Application for a very low traffic generator, the only items that need any level of assessment are on-site operation and the design of the site driveway connection to Russell Road.

5.0 DEVELOPMENT GENERATED TRAFFIC

5.1 Vehicle Trip Generation

Using appropriate trip generation rates (Table 1) from a number of relevant land uses identified in the 9th Edition ITE Trip Generation Manual, the resultant two-way peak hour site-trip generation for the proposed 2,323 m² tile warehouse and 929 m² retail showroom is estimated to be in the range of 10 to 35 veh/h two-way total.

Table 1: Peak Hour Trip Generation Rates

| Land Use | Average Rate AM (PM) | Trip Generation Two-Way AM (PM) |
|--------------------------|-------------------------|------------------------------------|
| General Light Industrial | 0.92 (0.97) | 33 (35) veh/h |
| Manufacturing | 0.73 (0.73) | 26 (26) veh/h |
| Warehousing | 0.30 (0.32) | 11 (12) veh/h |

Our familiarity with other Ottawa area tile warehouses is that the estimated peak hour vehicle trip generation using the ITE trip rates is in the correct range. For analysis purposes, we are assuming 10 veh/h in and 5 veh/h out during the morning peak hour and 15 veh/h in and 15 veh/h out during the afternoon peak hour.

Weekend peak hour trip generation is determined to be the same as the afternoon peak hour, however, as Saturday traffic is less than weekday traffic on Russell Road adjacent to the site, this time period was not assessed.

5.2 Modal Shares

Given the site's location, somewhat remote from any significant residential development, combined with the type and weight of products being sold, we do not foresee any patron walking/cycling component. For similar reasons, even though there are adjacent bus routes, we foresee very low, if any, transit ridership. We would expect transit ridership would be primarily employees and would be in the 0 to 3 person range during peak hours, as summarized in Table 2.

Table 2: Future Mode Share Targets for the Development

| Travel Mode | Mode Share Target | Rationale |
|----------------|-------------------|---|
| Transit | 15% | Some employees may use transit but no customers due to products sold. |
| Walking | 0% | Due to somewhat remote location, type of business and products sold. |
| Cycling | 0% | Due to somewhat remote location, type of business and products sold. |
| Auto Passenger | 20% | Often 2 persons/car looking at product. |
| Auto Driver | 65% | Highly car-oriented due to location, and type of product sold. |

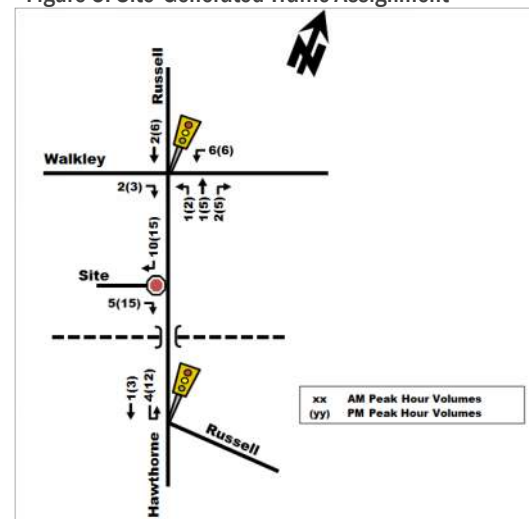
5.3 Trip Distribution and Assignment

As the proposed site driveway is on Russell Road and would be restricted to right-in/right-out only, trip distribution and assignment is quite straight-forward. It has been assumed that site-generated traffic at the Russell I/Walkley and Russell/Hawthorne intersections would distribute similar to the distribution of existing volumes at this intersection as depicted in Figure 5.

5.4 Pass-By Traffic

Due to the site's location and type of products it sells, it is considered a "destination" site and we do not foresee any pass-by traffic.

Figure 5: Site-Generated Traffic Assignment



8. DEVELOPMENT GENERATED TRAVEL DEMAND

8.1. TRIP GENERATION AND MODE SHARES

8.1.1. TRIP GENERATION

Appropriate trip generation rates for the proposed development were obtained from the ITE Trip Generation Manual, 10th Edition and are summarized in Table 3.

Table 3: ITE Trip Generation Manual, 10th Ed. Vehicle Trip Generation Rates for Warehousing Land Use

| Land Use | Data Source | Fitted Curve Equation | |
|-------------|-------------|-----------------------|-----------------------|
| | | AM Peak | PM Peak |
| Warehousing | ITE 150 | $T = 0.12(x) + 25.32$ | $T = 0.12(x) + 27.82$ |

As ITE trip generation surveys only record vehicle trips and typically reflect highly suburban locations (with little to no access by travel modes other than private automobiles), adjustment factors appropriate to the Ottawa study area context were applied to attain estimates of person trips for the subject development.

Using the ITE Trip Generation rate, the total amount of vehicle trips generated by the proposed development were projected and the results are summarized in Table 4. To convert ITE vehicle trip rates to person trips, an auto occupancy factor and a non-auto trip factor were applied to the ITE vehicle trip rates. Our review of available literature suggests that a combined factor of approximately 1.3 is considered reasonable to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. As such, the person trip generation for the subject development is summarized in Table 4.

Table 4: Site Person Trip Generation

| Land Use | Data Source | Area | AM Peak (Person Trips/hr) | | | PM Peak (Person Trips/hr) | | |
|-------------|-------------|-------------------------|---------------------------|-----|-------|---------------------------|-----|-------|
| | | | In | Out | Total | In | Out | Total |
| Warehousing | ITE 150 | 256,106 ft ² | 55 | 17 | 72 | 20 | 55 | 75 |

8.1.2. MODE SHARES

Using the Person-Trips projected in Table 4 and the modal share percentages from the 2011 NCR Household Origin – Destination Survey for Hunt Club, the modal share for the proposed development is summarized in Table 5.

Table 5: Site Trip Generation by Mode of Transportation

| Travel Mode | Mode Share | AM Peak (Person Trips/hr) | | | PM Peak (Person Trips/hr) | | |
|-------------------------------|------------|---------------------------|-----------|-----------|---------------------------|-----------|-----------|
| | | In | Out | Total | In | Out | Total |
| Auto Driver | 76% | 42 | 13 | 55 | 16 | 42 | 58 |
| Auto Passenger | 10% | 6 | 2 | 8 | 2 | 6 | 8 |
| Transit | 14% | 7 | 2 | 9 | 2 | 7 | 9 |
| Non-motorized | 0% | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Person Trips | 100% | 55 | 17 | 72 | 20 | 55 | 75 |
| Less Pass-by (0%) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Total 'New' Auto Trips | | 42 | 13 | 55 | 16 | 42 | 58 |

As shown in Table 5, based on the Modified ITE's Person-Trip Generation method and the 2011 NCR Household Origin – Destination Survey for Hunt Club, the proposed site is projected to generate approximately 70-75 two-way person-trips per hour during the weekday peak hours. Approximately 55 two-way vehicles per hour will be accessing/leaving the site during

the weekday peak hours and 10 two-way trips will be made by transit. Considering the heavy industrial character of the area and adjacent transportation network, no active mode trips are expected during the peak hours for this site.

8.2. TRIP DISTRIBUTION

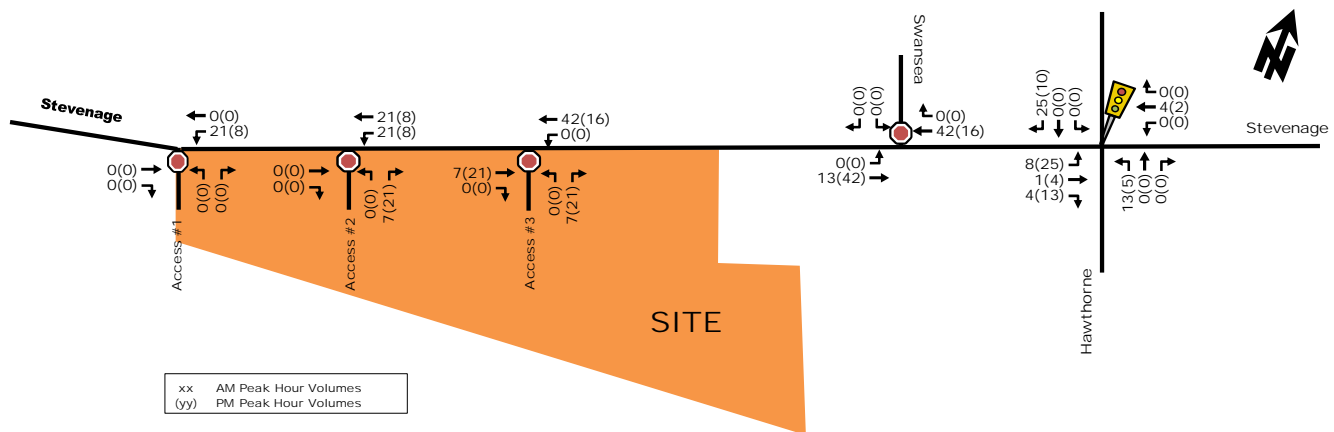
Considering the existing traffic distribution at Hawthorne/Stevenage intersection, the site trip distribution is outlined next:

- 60% To/From the North;
 - 30% To/From the South; and
 - 10% To/From the East
- 100%

8.3. TRIP ASSIGNMENT

Based on this distribution, site-generated traffic at full build-out (2020) was assigned to the existing adjacent network and is illustrated in Figure 8.

Figure 8: Full Build-Out Site-Generated Traffic (year 2020)



9. BACKGROUND NETWORK TRAVEL DEMAND

9.1. TRANSPORTATION NETWORK PLANS

The transportation network changes have been discussed within Section 4.1 and none are anticipated to impact the transportation analysis for this development.

9.2. BACKGROUND GROWTH

Regarding background traffic growth, historical traffic count data for years 2007, 2012, and 2015 was provided by the City of Ottawa at the Hawthorne/Hunt Club intersection. Detailed analysis of trends at Hunt Club/Hawthorne intersection indicated low reliability of data, most likely due to the recent (2014) construction of the Hunt Club/Highway 417 interchange. For this reason, and given our knowledge of the area, a 2% annual growth rate has been assumed. This growth rate is consistent with the City of Ottawa intersection traffic growth rates.

With respect to Stevenage Drive, given a low level of new development has been observed within the past 5 years, a 0% growth will be assumed for the analysis horizon.

5.0 FORECASTING

5.1 Development-Generated Travel Demand

5.1.1 Trip Generation

Currently, the subject site is occupied by approximately 40,389 ft² of retail space, 76,652 ft² of office space, and 302,002 ft² of warehouse space. The proposed reconfiguration of the site will contain approximately 30,962 ft² retail space, 187,087 ft² of office space, and 182,685 ft² of warehouse space. Trips generated by these land uses have been estimated using the *ITE Trip Generation Manual, 10th Edition*. Retail trips have been estimated based on the Free-Standing Discount Store land use (land use 815), office trips have been estimated based on the General Office Building land use (land use 710), and warehouse trips have been estimated based on the Warehousing land use (land use 150). It is noted that only a portion of the existing parking is required for the remaining warehouse use. As future development for this part of the subject site is unknown at this time, it is proposed that the existing parking be retained and remain vacant. The vacant parking in excess of the warehouse parking will not serve the existing or proposed land uses and is not expected to generate trips.

The estimated number of trips generated by the existing development and proposed redevelopment are shown in **Table 3**.

Table 3: Person Trip Generation

| Land Use | ITE Code | GFA | AM Peak (PPH ⁽¹⁾) | | | PM Peak (PPH) | | |
|-------------------------------|----------|-------------|-------------------------------|-----|-----|---------------|-----|-----|
| | | | IN | OUT | TOT | IN | OUT | TOT |
| Existing Development | | | | | | | | |
| Free-Standing Discount Store | 815 | 40,389 ft² | 41 | 19 | 60 | 125 | 125 | 250 |
| General Office Building | 710 | 76,652 ft² | 109 | 18 | 127 | 18 | 95 | 113 |
| Warehousing | 150 | 302,002 ft² | 61 | 18 | 79 | 22 | 60 | 82 |
| Total | | | 211 | 55 | 266 | 165 | 280 | 445 |
| Proposed Redevelopment | | | | | | | | |
| Free-Standing Discount Store | 815 | 30,962 ft² | 32 | 14 | 46 | 95 | 95 | 190 |
| General Office Building | 710 | 187,087 ft² | 223 | 36 | 259 | 42 | 222 | 264 |
| Warehousing | 150 | 182,685 ft² | 46 | 14 | 60 | 17 | 47 | 64 |
| Total | | | 301 | 64 | 365 | 154 | 364 | 518 |
| Difference | | | 90 | 9 | 99 | -11 | 84 | 73 |

1. PPH: Persons Per Hour – ITE Trip to Person Trip Factor of 1.28 has been applied, consistent with the 2017 TIA Guidelines

From the previous table, the proposed redevelopment is projected to generate an additional 99 person trips during the AM peak hour and 73 person trips during the PM peak hour.

The modal shares for the existing development and proposed redevelopment are anticipated to be consistent with the modal shares outlined in the *2011 TRANS O-D Survey Report*, specific to the Alta Vista region. The modal share values applied to the existing and proposed office space are based on all trips to/within the Alta Vista district in the AM peak hour and all trips from/within the Alta Vista district in the PM peak hour, with an increase to the auto driver share based on location of the subject site. The modal share values applied to the retail and warehousing spaces are based on all

observed trips to/within the Alta Vista district. A full breakdown of the projected net increase in person trips by modal share are shown in **Table 4**.

Table 4: Person Trips by Modal Share

| Travel Mode | Modal Share | AM Peak | | | PM Peak | | |
|--------------------------|-------------|---------|-----|-----|---------|-----|-----|
| | | IN | OUT | TOT | IN | OUT | TOT |
| Existing Development | | | | | | | |
| Retail Person Trips | | 41 | 19 | 60 | 125 | 125 | 250 |
| Auto Driver | 60% | 25 | 11 | 36 | 75 | 75 | 150 |
| Auto Passenger | 15% | 6 | 3 | 9 | 19 | 19 | 38 |
| Transit | 20% | 8 | 4 | 12 | 25 | 25 | 50 |
| Non-Auto | 5% | 2 | 1 | 3 | 6 | 6 | 12 |
| Office Person Trips | | 109 | 18 | 127 | 18 | 95 | 113 |
| Auto Driver | 65% | 71 | 11 | 82 | 11 | 62 | 73 |
| Auto Passenger | 15% | 16 | 3 | 19 | 3 | 14 | 17 |
| Transit | 15% | 16 | 3 | 19 | 3 | 14 | 17 |
| Non-Auto | 5% | 6 | 1 | 7 | 1 | 5 | 6 |
| Warehouse Person Trips | | 61 | 18 | 79 | 22 | 60 | 82 |
| Auto Driver | 60% | 36 | 11 | 47 | 14 | 36 | 50 |
| Auto Passenger | 15% | 9 | 3 | 12 | 3 | 9 | 12 |
| Transit | 20% | 13 | 3 | 16 | 4 | 12 | 16 |
| Non-Auto | 5% | 3 | 1 | 4 | 1 | 3 | 4 |
| Auto Driver (Total) | | 132 | 33 | 165 | 100 | 173 | 273 |
| Auto Passenger (Total) | | 31 | 9 | 40 | 25 | 42 | 67 |
| Transit (Total) | | 37 | 10 | 47 | 32 | 51 | 83 |
| Non-Auto (Total) | | 11 | 3 | 14 | 8 | 14 | 22 |
| Proposed Redevelopment | | | | | | | |
| Retail Person Trips | | 32 | 14 | 46 | 95 | 95 | 190 |
| Auto Driver | 60% | 19 | 8 | 27 | 56 | 56 | 112 |
| Auto Passenger | 15% | 5 | 2 | 7 | 15 | 15 | 30 |
| Transit | 20% | 6 | 3 | 9 | 20 | 20 | 40 |
| Non-Auto | 5% | 2 | 1 | 3 | 4 | 4 | 8 |
| Office Person Trips | | 223 | 36 | 259 | 42 | 222 | 264 |
| Auto Driver | 65% | 145 | 24 | 169 | 28 | 145 | 173 |
| Auto Passenger | 15% | 33 | 5 | 38 | 6 | 33 | 39 |
| Transit | 15% | 33 | 5 | 38 | 6 | 33 | 39 |
| Non-Auto | 5% | 12 | 2 | 14 | 2 | 11 | 13 |
| Warehouse Person Trips | | 46 | 14 | 60 | 17 | 47 | 64 |
| Auto Driver | 60% | 28 | 8 | 36 | 10 | 28 | 38 |
| Auto Passenger | 15% | 7 | 2 | 9 | 3 | 7 | 10 |
| Transit | 20% | 9 | 3 | 12 | 3 | 10 | 13 |
| Non-Auto | 5% | 2 | 1 | 3 | 1 | 2 | 3 |
| Auto Driver (Total) | | 192 | 40 | 232 | 94 | 229 | 323 |
| Auto Passenger (Total) | | 45 | 9 | 54 | 24 | 55 | 79 |
| Transit (Total) | | 48 | 11 | 59 | 29 | 63 | 92 |
| Non-Auto (Total) | | 16 | 4 | 20 | 7 | 17 | 24 |
| Auto Driver (Difference) | | 60 | 7 | 67 | -6 | 56 | 50 |
| Auto Pass. (Difference) | | 14 | 0 | 14 | -1 | 13 | 12 |
| Transit (Difference) | | 11 | 1 | 12 | -3 | 12 | 9 |
| Non-Auto (Difference) | | 5 | 1 | 6 | -1 | 3 | 2 |

From the previous table, the proposed redevelopment is anticipated to generate an additional 67 vehicle trips during the AM peak hour and 50 vehicle trips during the PM peak hour.

A percentage of the trips generated by the proposed redevelopment are anticipated to be internally captured (for example, office workers making a trip to the retail store). It is likely that the number of trips of this nature will only make up a small proportion of the overall site-generated trip volume, and as such, no deduction has been made to account for internally-captured trips. All trips generated by the subject site are assumed to have an origin or destination beyond the subject site. This simplifying assumption also allows for a more conservative analysis.

The retail land use is expected to generate two types of external peak hour trips: primary and pass-by trips. Primary trips are made for the specific purpose of visiting the site, while pass-by trips are made as intermediate stops on the way to another destination. Peak hour pass-by trips have been estimated based on a pass-by rate of 17%, which is the average rate identified in the *ITE Trip Generation Handbook, 3rd Edition* for the Free-Standing Discount Store land use. The pass-by trips generated by the retail store are part of the observed background traffic, and do not constitute new trips on the adjacent road network.

The primary and pass-by trip generation for the existing and proposed retail stores is summarized in **Table 5**.

Table 5: Primary and Pass-By Trips

| Trip Type | AM Peak | | | PM Peak | | |
|--------------------------------------|-----------|----------|-----------|-----------|-----------|------------|
| | IN | OUT | TOT | IN | OUT | TOT |
| <i>Existing Retail Vehicle Trips</i> | 25 | 11 | 36 | 75 | 75 | 150 |
| Pass-by (17%) | 3 | 3 | 6 | 13 | 13 | 26 |
| Primary (83%) | 22 | 8 | 30 | 62 | 62 | 124 |
| <i>Proposed Retail Vehicle Trips</i> | 19 | 8 | 27 | 56 | 56 | 112 |
| Pass-by (17%) | 2 | 2 | 4 | 10 | 10 | 20 |
| Primary (83%) | 17 | 6 | 23 | 46 | 46 | 92 |

5.1.2 Trip Distribution

The assumed distribution of trips generated by the subject site has been derived from existing traffic patterns within the study area. Each land use is anticipated to draw its respective trips from different areas. Considerations for each trip distribution is described below.

The distribution of trips generated by the retail land use anticipates a higher draw of customers in the areas proximally north and west of the subject site, and is based on the off-peak traffic counts within the study area.

The distribution of trips generated by the office and warehouse land uses is anticipated to follow the traffic patterns associated with the typical commute (arriving at work during the AM peak hour and departing from work during the PM peak hour).

The trip distribution for each land use is described as follows:

Retail Distribution

- 20% to/from the north via St. Laurent Boulevard
- 10% to/from the north via Russell Road
- 10% to/from the south via St. Laurent Boulevard
- 15% to/from the south via Russell Road
- 15% to/from the east via Walkley Road
- 30% to/from the west via Walkley Road

Office/Warehouse Distribution

- 10% to/from the north via St. Laurent Boulevard
- 10% to/from the north via Russell Road
- 15% to/from the south via Russell Road
- 45% to/from the east via Walkley Road
- 20% to/from the west via Walkley Road

5.1.3 Trip Assignment

The trip assignment in existing conditions and future conditions is assumed to be different, as a new signalized access is proposed at Melfort Street, and the existing access on Walkley Road will become a RIRO access by modifying the existing median.

In existing conditions, the easternmost access on Walkley Road restricts inbound left turns during the PM peak hour, requiring all inbound traffic from the east to enter via the access on Banton Street.

Trips generated by the existing development will be assigned to the accesses as follows:

Full-Movement Access at Banton Street

- 75% of trips arriving and departing to the north and south via St. Laurent Boulevard and the west via Walkley Road;
- 25% of AM peak trips arriving and departing to the north and south via Russell Road and the east via Walkley Road;
- 100% of PM peak trips arriving and 25% of PM peak trips departing to the north and south via Russell Road and the east via Walkley Road.

Full-Movement Access at Walkley Road (PM inbound left turns restricted)

- 25% of trips arriving and departing to the north and south via St. Laurent Boulevard and the west via Walkley Road;
- 75% of AM peak trips arriving and departing to the north and south via Russell Road and the east via Walkley Road;
- 75% of PM peak trips departing to the north and south via Russell Road and the east via Walkley Road.

In future conditions, the easternmost access on Walkley Road will become right-in/right-out only, and will exclusively access parking designated for retail customers. Employees will be directed to not park in this area, meaning no office or warehouse trips have been assigned to this access. The proposed signalized access at Walkley Road/Melfort Street will act as the main entrance and exit to the site, and the existing access on Banton Street will remain in place. Both of these driveways provide access to office and warehouse parking, as well as warehouse loading at the rear of the site. Therefore, office and warehouse trips have been assigned to both accesses.

Trips generated by the proposed redevelopment will be assigned to the accesses as follows:

Full-Movement Access at Banton Street

- 30% of office trips arriving and departing to the north and south via St. Laurent Boulevard and the west via Walkley Road;
- 100% of warehouse trips arriving and departing to the north and south via St. Laurent Boulevard and the west via Walkley Road.

Full-Movement Access at Walkley Road/Melfort Street

- 50% of retail trips arriving and 100% of retail trips departing to the north and south via St. Laurent Boulevard and the west via Walkley Road;
- 100% of retail trips arriving and 50% of retail trips departing to the north and south via Russell Road and the east via Walkley Road;
- 70% of office trips arriving and departing to the north and south via St. Laurent Boulevard and the west via Walkley Road;
- 100% of office trips arriving and departing to the north and south via Russell Road and the east via Walkley Road;
- 100% of warehouse trips arriving and departing to the north and south via Russell Road and the east via Walkley Road.

RIRO Access at Walkley Road

- 50% of retail trips arriving from the north and south via St. Laurent Boulevard and the west via Walkley Road;
- 50% of retail trips departing to the north and south via Russell Road and the east via Walkley Road.

Pass-by trips generated by the existing development have been distributed evenly to the accesses at Banton Street and Walkley Road. Pass-by trips generated by the proposed redevelopment have been assigned to the proposed signalized access at Walkley Road/Melfort Street.

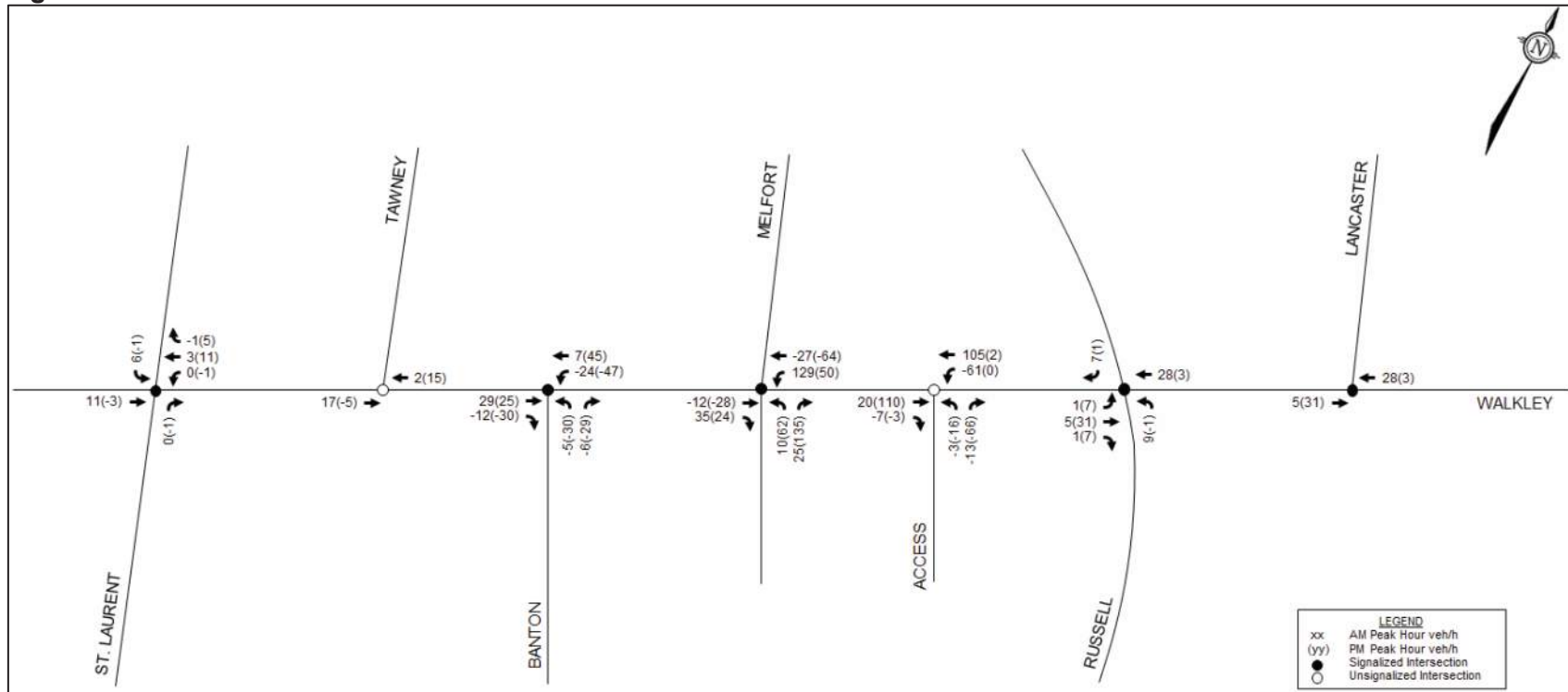
It is anticipated that most vehicular traffic generated by the neighbourhoods north of Walkley Road currently avoid accessing Walkley Road from Melfort Street, given the high traffic volumes on Walkley Road. The analysis conservatively assumes more left-turning vehicular traffic will enter and exit Melfort Street in future background and total traffic conditions, upon implementation of the proposed four-way traffic signal.

5.2 Background Traffic

5.2.1 General Background Growth Rate

A rate of background growth has been established through a review of the City of Ottawa's 2013 TMP and Strategic Long Range Model (comparing snapshots of 2011 and 2031 AM peak volumes). The snapshots suggest a growth rate of -0.5% to 1.5% per annum on arterial roadways within the study area. For the 'Inner Suburbs' area of Ottawa, Exhibit 2.10 of the 2013 TMP projects a population growth rate of approximately 0.3% per annum and an employment growth rate of approximately 1.1% per annum. To reflect the study area's development as an employment area, a 1% background growth rate has been applied to Walkley Road, St. Laurent Boulevard, and Russell Road. A 0% growth rate has been applied to all other roadways within the study area.

Figure 9: Net Site-Generated Traffic



APPENDIX G

Multi-Modal Level Of Service (MMLOS)

Segment Level of Service**Pedestrian Level of Service (PLOS)**

| Direction | Sidewalk Width | Boulevard Width | Motor Vehicle Traffic Volume (AADT) | Presence of On-Street Parking | Operating Speed | Segment PLOS |
|-----------------------|----------------|-----------------|-------------------------------------|-------------------------------|-----------------|--------------|
| Russell Road | | | | | | |
| North | None | N/A | > 3,000 vpd | No | >60 km/h | F |
| South | None | N/A | > 3,000 vpd | No | >60 km/h | F |
| Hunt Club Road | | | | | | |
| North | None | N/A | > 3,000 vpd | No | >60 km/h | F |
| South | None | N/A | > 3,000 vpd | No | >60 km/h | F |

Bicycle Level of Service (BLOS)

| Bike Route | Type of Bikeway | Travel Lanes | Centreline Markings | Operating Speed | Segment BLOS |
|---|-----------------|--------------|---------------------|-----------------|--------------|
| Russell Road | | | | | |
| None | Mixed Traffic | 2 | Yes | >60 km/h | F |
| Hunt Club Road WB¹ | | | | | |
| Spine | Mixed Traffic | 4 | Median | >70 km/h | F |
| Note: 1. Eastbound Bicyclists are restricted on Hunt Club in front of the site. | | | | | |

Truck Level of Service (TkLOS)

| Curb Lane Width | Travel Lanes | Segment TkLOS |
|-----------------------|--------------------------|---------------|
| Russell Road | | |
| 3.25m | 2 travel lanes | C |
| Hunt Club Road | | |
| 3.25m | More than 2 travel lanes | A |

National Capital Business Park –MMLOS Analysis – Existing

Intersection MMLOS Pedestrian Level of Service

| Criteria | North Approach | | South Approach | | East Approach | | West Approach | |
|----------------------------------|--------------------------------|------|--------------------------------|------|--------------------------------|------|--------------------------------|------|
| Walkley at Russell | | | | | | | | |
| PETSİ SCORE | | | | | | | | |
| CROSSING DISTANCE CONDITIONS | | | | | | | | |
| Median > 2.4m in Width | No | -10 | No | -10 | No | -10 | No | -10 |
| Lanes Crossed (3.5m Lane Width) | 10 + | | 10 + | | 10 + | | 10 + | |
| SIGNAL PHASING AND TIMING | | | | | | | | |
| Left Turn Conflict | Protected | 0 | Protected | 0 | Protected | 0 | Protected | 0 |
| Right Turn Conflict | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 |
| Right Turn on Red | N/A | 0 | N/A | 0 | RTOR Allowed | -3 | N/A | 0 |
| Leading Pedestrian Interval | No | -2 | No | -2 | No | -2 | No | -2 |
| CORNER RADIUS | | | | | | | | |
| Parallel Radius | > 25m | -9 | > 25m | -9 | > 15m to 25m | -8 | > 15m to 25m | -8 |
| Parallel Right Turn Channel | No Right Turn Channel | -4 | Conventional without Receiving | 0 | Conventional without Receiving | 0 | Conventional without Receiving | 0 |
| Perpendicular Radius | > 15m to 25m | -8 | > 15m to 25m | -8 | N/A | 0 | > 25m | -9 |
| Perpendicular Right Turn Channel | Conventional without Receiving | 0 | Conventional without Receiving | 0 | N/A | 0 | Conventional without Receiving | 0 |
| CROSSING TREATMENT | | | | | | | | |
| Treatment | Standard | -7 | Standard | -7 | Standard | -7 | Standard | -7 |
| PETSİ SCORE | | -45 | | | -41 | | | -41 |
| LOS | | F | | | F | | | F |
| DELAY SCORE | | | | | | | | |
| Cycle Length | | 150 | | 150 | | 150 | | 150 |
| Pedestrian Walk Time | | 40.3 | | 19.7 | | 12.6 | | 12.6 |
| DELAY SCORE | | 40.1 | 56.6 | | 62.9 | | 62.9 | |
| LOS | | E | E | | F | | F | |
| OVERALL | | F | F | | F | | F | |

| Criteria | North Approach | | South Approach | | East Approach | | West Approach | |
|----------------------------------|--------------------------------|-----|--------------------------------|-----|--------------------------------|------|--------------------------------|------|
| Russell at Hawthorne | | | | | | | | |
| PETSİ SCORE | | | | | | | | |
| CROSSING DISTANCE CONDITIONS | | | | | | | | |
| Median > 2.4m in Width | No | -10 | No | -10 | No | -10 | No | 6 |
| Lanes Crossed (3.5m Lane Width) | 10 + | | 10 + | | 10 + | | 9 | |
| SIGNAL PHASING AND TIMING | | | | | | | | |
| Left Turn Conflict | Permissive | -8 | Permissive | -8 | Permissive | -8 | Permissive | -8 |
| Right Turn Conflict | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 |
| Right Turn on Red | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 |
| Leading Pedestrian Interval | No | -2 | No | -2 | No | -2 | No | -2 |
| CORNER RADIUS | | | | | | | | |
| Parallel Radius | > 15m to 25m | -8 | > 15m to 25m | -8 | > 25m | -9 | > 25m | -9 |
| Parallel Right Turn Channel | Conventional without Receiving | 0 | Conventional with Receiving | -3 | Conventional without Receiving | 0 | Conventional without Receiving | 0 |
| Perpendicular Radius | > 25m | -9 | > 25m | -9 | > 15m to 25m | -8 | > 15m to 25m | -8 |
| Perpendicular Right Turn Channel | Conventional without Receiving | 0 | Conventional without Receiving | 0 | Conventional without Receiving | 0 | Conventional with Receiving | -3 |
| CROSSING TREATMENT | | | | | | | | |
| Treatment | Standard | -7 | Standard | -7 | Standard | -7 | Standard | -7 |
| PETSİ SCORE | | -49 | | | -52 | | | -36 |
| LOS | | F | | | F | | | F |
| DELAY SCORE | | | | | | | | |
| Cycle Length | | 90 | | 90 | | 80 | | 80 |
| Pedestrian Walk Time | | 7.3 | | 7.3 | | 42.5 | | 42.5 |
| DELAY SCORE | | 38 | | | 38 | | | 8.8 |
| LOS | | D | | | D | | | A |
| OVERALL | | F | | | F | | | F |

National Capital Business Park –MMLOS Analysis – Existing

| Criteria | North Approach | | South Approach | | East Approach | | West Approach | |
|----------------------------------|--------------------------------|------|--------------------------------|-----|--------------------------------|-------------|--------------------------------|-----|
| Hawthorne at Stevenage | | | | | | | | |
| PETSİ SCORE | | | | | | | | |
| CROSSING DISTANCE CONDITIONS | | | | | | | | |
| Median > 2.4m in Width | No | -10 | No | -10 | No | -10 | No | -10 |
| Lanes Crossed (3.5m Lane Width) | 10 + | | 10 + | | 10 + | | 10 + | |
| SIGNAL PHASING AND TIMING | | | | | | | | |
| Left Turn Conflict | Permissive | -8 | Permissive | -8 | Perm + Prot | -8 | Perm + Prot | -8 |
| Right Turn Conflict | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 |
| Right Turn on Red | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 |
| Leading Pedestrian Interval | No | -2 | No | -2 | No | -2 | No | -2 |
| CORNER RADIUS | | | | | | | | |
| Parallel Radius | > 25m | -9 | > 15m to 25m | -8 | > 25m | -9 | > 15m to 25m | -8 |
| Parallel Right Turn Channel | Conventional without Receiving | 0 | Conventional without Receiving | 0 | Conventional without Receiving | 0 | Conventional without Receiving | 0 |
| Perpendicular Radius | > 15m to 25m | -8 | > 25m | -9 | > 25m | -9 | > 15m to 25m | -8 |
| Perpendicular Right Turn Channel | Conventional without Receiving | 0 | Conventional without Receiving | 0 | Conventional without Receiving | 0 | Conventional without Receiving | 0 |
| CROSSING TREATMENT | | | | | | | | |
| Treatment | Standard | -7 | Standard | -7 | Standard | -7 | Standard | -7 |
| PETSİ SCORE | | -49 | PETSİ SCORE | | -49 | PETSİ SCORE | | -48 |
| LOS | | F | LOS | | F | LOS | | F |
| DELAY SCORE | | | | | | | | |
| Cycle Length | 95 | | 95 | | 90 | | 90 | |
| Pedestrian Walk Time | 17.3 | | 17.3 | | 27.5 | | 27.5 | |
| DELAY SCORE | | 31.8 | 31.8 | | 21.7 | | 21.7 | |
| LOS | | D | D | | C | | C | |
| OVERALL | | F | F | | F | | F | |

| Criteria | North Approach | | South Approach | | East Approach | | West Approach | |
|----------------------------------|--------------------------------|-------|--------------------------------|-------|---------------------|-------------|--------------------------------|-------|
| Hunt Club at Hawthorne | | | | | | | | |
| PETSİ SCORE | | | | | | | | |
| CROSSING DISTANCE CONDITIONS | | | | | | | | |
| Median > 2.4m in Width | No | -10 | No | -10 | No | -10 | No | -10 |
| Lanes Crossed (3.5m Lane Width) | 10 + | | 10 + | | 10 + | | 10 + | |
| SIGNAL PHASING AND TIMING | | | | | | | | |
| Left Turn Conflict | Protected | 0 | Protected | 0 | Perm + Prot | -8 | Perm + Prot | -8 |
| Right Turn Conflict | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 | Permissive or Yield | -5 |
| Right Turn on Red | N/A | 0 | N/A | 0 | N/A | 0 | N/A | 0 |
| Leading Pedestrian Interval | No | -2 | No | -2 | No | -2 | No | -2 |
| CORNER RADIUS | | | | | | | | |
| Parallel Radius | > 15m to 25m | -8 | > 15m to 25m | -8 | > 15m to 25m | -8 | > 25m | -9 |
| Parallel Right Turn Channel | Smart Channel | 2 | Conventional without Receiving | 0 | Smart Channel | 2 | Conventional without Receiving | 0 |
| Perpendicular Radius | > 25m | -9 | > 15m to 25m | -8 | > 15m to 25m | -8 | > 15m to 25m | -8 |
| Perpendicular Right Turn Channel | Conventional without Receiving | 0 | Smart Channel | 2 | Smart Channel | 2 | Conventional without Receiving | 0 |
| CROSSING TREATMENT | | | | | | | | |
| Treatment | Standard | -7 | Standard | -7 | Standard | -7 | Standard | -7 |
| PETSİ SCORE | | -39 | PETSİ SCORE | | -38 | PETSİ SCORE | | -49 |
| LOS | | F | LOS | | F | LOS | | F |
| DELAY SCORE | | | | | | | | |
| Cycle Length | | 140.4 | | 140.4 | | 145.4 | | 145.4 |
| Pedestrian Walk Time | | 16 | | 16 | | 6 | | 6 |
| DELAY SCORE | | 55.1 | DELAY SCORE | | 55.1 | DELAY SCORE | | 66.8 |
| LOS | | E | LOS | | E | LOS | | F |
| OVERALL | | F | OVERALL | | F | OVERALL | | F |

Bicycle Level of Service

| Approach | Bikeway Facility Type | Criteria | Travel Lanes and/or Speed ¹ | BLOS |
|------------------------------------|------------------------|---------------------------------|--|------|
| Walkley at Russell – F Overall | | | | |
| North Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane 25m to 50m; turning speed ≤25km/h | D |
| | | Left turn accommodation | Dual left turn lanes | F |
| South Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane 25m to 50m; turning speed ≤25km/h | D |
| | | Left turn accommodation | Dual left turn lanes | F |
| East Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane 25m to 50m; turning speed ≤25km/h | D |
| | | Left turn accommodation | Dual left turn lanes | F |
| West Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane longer than 50m | F |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |
| Russell at Hawthorne – F Overall | | | | |
| North Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane to the right of bike lane and <50m, turning speed ≤ 25km/h | B |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |
| South Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane to the right of bike lane and <50m, turning speed ≤ 25km/h | B |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |
| East Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane longer than 50m | F |
| | | Left turn accommodation | 1 lane crossed; ≥ 50km/hr | D |
| West Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane < 50m, turning speed ≤ 25km/h | D |
| | | Left turn accommodation | 1 lane crossed; 50km/hr | D |
| Hawthorne at Stevenage – F Overall | | | | |
| North Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane to the right of bike lane >50m, turning speed ≤ 30km/h | D |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |

| Approach | Bikeway Facility Type | Criteria | Travel Lanes and/or Speed ¹ | BLOS |
|------------------------------------|------------------------|---------------------------------|--|------|
| South Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane to the right of bike lane <50m, turning speed ≤ 25km/h | B |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |
| East Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane < 50m, turning speed ≤ 25km/h | D |
| | | Left turn accommodation | 1 lane crossed; 50km/hr | D |
| West Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane <50m, turning speed ≤ 25km/h | D |
| | | Left turn accommodation | 1 lane crossed; 50km/hr | D |
| Hunt Club at Hawthorne – F Overall | | | | |
| North Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane to the right of bike lane >50m, turning speed ≤ 30km/h | D |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |
| South Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane to the right of bike lane, turning speed ≤ 25km/h | B |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |
| East Approach | Pocket Bike Lane | Right turn lane characteristics | Right turn lane to the right of bike lane >50m, turning speed ≤ 30km/h | D |
| | | Left turn accommodation | 2 or more lanes crossed; ≥ 50km/hr | F |
| West Approach | Mixed Traffic Approach | Right turn lane characteristics | Right turn lane <50m, turning speed ≤ 25km/h | D |
| | | Left turn accommodation | 2 lanes crossed; ≥ 50km/hr | F |

Truck Level of Service

| Approach | Effective Corner Radius (m) | Number of Receiving Lanes on Departure from Intersection | LOS |
|--|-----------------------------|--|-----|
| <i>Walkley at Russell – A Overall</i> | | | |
| North Approach | > 15m | 2+ | A |
| South Approach | > 15m | 2+ | A |
| East Approach | > 15m | 2+ | A |
| West Approach | > 15m | 2+ | A |
| <i>Russell at Hawthorne – C Overall</i> | | | |
| North Approach | > 15m | 1 | C |
| South Approach | > 15m | 1 | C |
| East Approach | > 15m | 2+ | A |
| West Approach | > 15m | 2+ | A |
| <i>Hawthorne at Stevenage – C Overall</i> | | | |
| North Approach | > 15m | 1 | C |
| South Approach | > 15m | 1 | C |
| East Approach | > 15m | 2+ | A |
| West Approach | > 15m | 2+ | A |
| <i>Hunt Club at Hawthorne – A Overall</i> | | | |
| North Approach | > 15m | 2+ | A |
| South Approach | > 15m | 2+ | A |
| East Approach | > 15m | 2+ | A |
| West Approach | > 15m | 2+ | A |

Auto LOS

| Intersection | AM Peak | | | PM Peak | | |
|---|-------------------|----------|------------|-------------------|----------|------------|
| | Max. v/c or delay | LOS | Mvmt | Max. v/c or delay | LOS | Mvmt |
| Russell at Walkley | 0.85 | D | NBL | 1.46 | F | WBL |
| Russell at Hawthorne | 0.84 | D | WBR | 0.45 | A | SBL |
| Hawthorne at Stevenage | 0.66 | B | EBL | 0.71 | C | WBL |
| Hawthorne at Hunt Club | 1.04 | F | NBT | 0.99 | E | WBL |
| Russell at Belgreen ¹ | 18 sec | C | NB | 12 sec | B | NB |
| Hunt Club at Hwy 417 Off-ramp ¹ | 36 sec | E | EBL | 26 sec | D | EBL |
| Ramsayville at Russell (S) ¹ | 60 sec | F | EB | 30 sec | D | EB |
| Ramsayville at Russell (N) ¹ | 38 sec | E | WB | 14 sec | B | SB |
| Russell at Anderson ¹ | 78 sec | F | NB | 17 sec | C | SB |
| Walkley at Highway 417 SB Off-ramp ¹ | 33 sec | D | SBL | 64 sec | F | SBL |
| Walkey at Highway 417 NB Off-ramp ¹ | 239 sec | F | NB | 34 sec | D | NB |

APPENDIX H

Existing Signal Timings

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

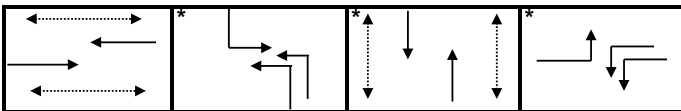
| | | |
|----------------------|----------------------|--------------------------------|
| Intersection: | <i>Main:</i> Walkley | <i>Side:</i> Russell/Hawthorne |
| Controller: | MS-3200 | TSD: 5326 |
| Author: | Sarah Saade | Date: 07-Aug-18 |

Existing Timing Plans†

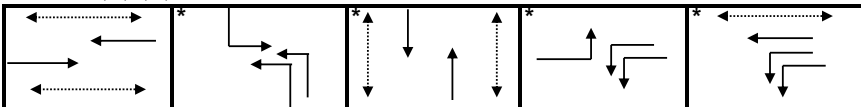
| | Plan | | | | | | Ped Minimum Time | | |
|---------------|--------------|-----------------|---------------|--------------|------------|--------------|------------------|----|---------|
| | AM Peak 1 | AM Peak 2 10 | Off Peak 2 | PM Peak 3 | Night 4 | Weekend 5 | Walk | DW | A+R |
| Cycle | 130 | 150 | 120 | 130 | 120 | 100 | | | |
| Offset | 19 | 102 | 21 | 35 | X | 52 | | | |
| EB Thru | 39 | 45 | 38 | 58 | 33 | 35 | 7 | 18 | 3.3+4.0 |
| WB Thru | 54.6 | 65.6 | 45.6 | 66 | 33 | 35 | 7 | 18 | 3.3+4.0 |
| NBLT (fp) | 16 | 20 | 15 | 17 | 14 | 13 | - | - | 3.3+4.3 |
| SBLT (fp) | 16 | 20 | 15 | 17 | 14 | 13 | - | - | 3.3+4.3 |
| NB Thru | 35 | 40 | 35 | 35 | 35 | 35 | 7 | 20 | 3.3+4.1 |
| SB Thru | 35 | 40 | 35 | 35 | 35 | 35 | 7 | 20 | 3.3+4.1 |
| EBLT (fp) | 24.4 | 24.4 | 24.4 | 12 | 24.4 | 17 | - | - | 3.3+3.1 |
| WBLT (fp) | 40 | 45 | 32 | 20 | 38 | 17 | - | - | 3.3+3.1 |

Phasing Sequence‡

Plan: 4



Plan: 1, 2, 3, 5, 10



NOTE:

- 1) In plans 1, 4 & 5, if the pedestrian phase is not actuated, the NS movement will be forced off after 15 seconds of green time and the extra time will go to the next phase whereas for plans 2 & 3, it will be 18 seconds.
- 2) For all plans, the EBL phase only receives 18 seconds of green time, regardless of the split time allocated

Schedule

Weekday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 1 |
| 7:00 | 10 |
| 9:30 | 2 |
| 15:00 | 3 |
| 18:30 | 2 |
| 21:30 | 4 |

Saturday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 2 |
| 11:00 | 5 |
| 19:30 | 2 |
| 22:00 | 4 |

Sunday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 2 |
| 21:00 | 4 |

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◀.....▶ Pedestrian signal

Cost is \$56.50 (\$50 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

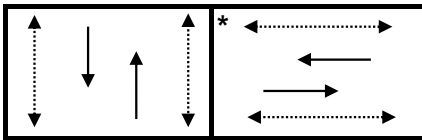
| | | |
|----------------------|------------------------|--------------------------|
| Intersection: | <i>Main:</i> Hawthorne | <i>Side:</i> Russell |
| Controller: | ATC 3 | TSD: 5722 |
| Author: | Ahmed Abdullah | Date: 28-Oct-2019 |

Existing Timing Plans†

| | Plan | | | | | Ped Minimum Time | | |
|---------------|--------------|---------------|--------------|------------|--------------|------------------|----|---------|
| | AM Peak 1 | Off Peak 2 | PM Peak 3 | Night 4 | Weekend 5 | Walk | DW | A+R |
| Cycle | 90 | 85 | 80 | 70 | 70 | | | |
| Offset | 23 | 34 | 16 | X | 34 | | | |
| NB Thru | 64 | 59 | 54 | 44 | 44 | 15 | 5 | 4.2+2.3 |
| SB Thru | 64 | 59 | 54 | 44 | 44 | 15 | 5 | 4.2+2.3 |
| EB Thru | 26 | 26 | 26 | 26 | 26 | 7 | 13 | 3.7+2.0 |
| WB Thru | 26 | 26 | 26 | 26 | 26 | 7 | 13 | 3.7+2.0 |

Phasing Sequence‡

Plan: All



Schedule

Weekday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 1 |
| 9:30 | 2 |
| 15:00 | 3 |
| 18:30 | 2 |
| 21:30 | 4 |

Saturday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 2 |
| 11:00 | 5 |
| 19:30 | 2 |
| 22:00 | 4 |

Sunday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 2 |
| 21:00 | 4 |

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

←.....→ Pedestrian signal

Cost is \$57.63 (\$51 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

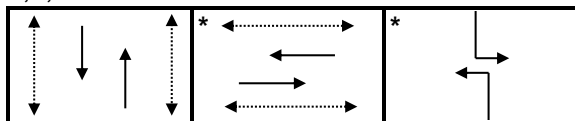
| | | |
|----------------------|------------------------|--------------------------|
| Intersection: | <i>Main:</i> Hawthorne | <i>Side:</i> Stevenage |
| Controller: | MS 3200 | TSD: 6325 |
| Author: | Ahmed Abdullah | Date: 28-Oct-2019 |

Existing Timing Plans[†]

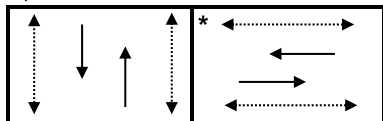
| | Plan | | | | | Ped Minimum Time | | |
|---------------|--------------|---------------|--------------|------------|--------------|------------------|----|---------|
| | AM Peak 1 | Off Peak 2 | PM Peak 3 | Night 4 | Weekend 5 | Walk | DW | A+R |
| Cycle | 90 | 85 | 95 | 65 | 80 | | | |
| Offset | 0 | 0 | 0 | 0 | 0 | | | |
| NB Thru | 40 | 35 | 45 | 40 | 55 | 20 | 7 | 4.2+1.3 |
| SB Thru | 40 | 35 | 45 | 40 | 55 | 20 | 7 | 4.2+1.3 |
| EB Thru | 35 | 35 | 35 | 25 | 25 | 7 | 12 | 3.3+2.4 |
| WB Thru | 35 | 35 | 35 | 25 | 25 | 7 | 12 | 3.3+2.4 |
| NB Left | 15 | 15 | 15 | - | - | - | - | 4.2+1.5 |
| SB Left | 15 | 15 | 15 | - | - | - | - | 4.2+1.5 |

Phasing Sequence[‡]

Plan: 1, 2, 3



4, 5



Schedule

Weekday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 1 |
| 9:30 | 2 |
| 15:00 | 3 |
| 18:30 | 2 |
| 21:30 | 4 |

Saturday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 2 |
| 11:00 | 5 |
| 19:30 | 2 |
| 22:00 | 4 |

Sunday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 2 |
| 21:00 | 4 |

Notes

†: Time for each direction includes amber and all red intervals
‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄.....► Pedestrian signal

Cost is \$57.63 (\$51 + HST)

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

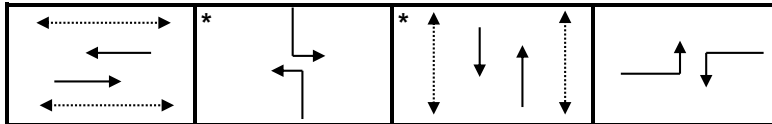
| | | |
|----------------------|------------------------|--------------------------|
| Intersection: | <i>Main:</i> Hunt Club | <i>Side:</i> Hawthorne |
| Controller: | ATC 3 | TSD: 6024 |
| Author: | Ahmed Abdullah | Date: 28-Oct-2019 |

Existing Timing Plans†

| | Plan | | | | | Ped Minimum Time | | |
|---------------|--------------|---------------|--------------|------------|--------------|------------------|----|---------|
| | AM Peak 1 | Off Peak 2 | PM Peak 3 | Night 4 | Weekend 5 | Walk | DW | A+R |
| Cycle | Free | Free | Free | Free | Free | | | |
| Offset | X | X | X | X | X | | | |
| EB Thru | 41.4 | 36.4 | 48.4 | 31.4 | 36.4 | 7 | 19 | 4.6+1.8 |
| WB Thru | 41.4 | 36.4 | 56.4 | 31.4 | 36.4 | 7 | 19 | 4.6+1.8 |
| NB Left | 21.3 | 21.3 | 21.3 | 16.3 | 16.3 | - | - | 4.2+2.1 |
| SB Left | 21.3 | 21.3 | 21.3 | 16.3 | 16.3 | - | - | 4.2+2.1 |
| NB Thru | 36.3 | 26.3 | 31.3 | 26.3 | 26.3 | 7 | 19 | 4.2+2.1 |
| SB Thru | 36.3 | 26.3 | 31.3 | 26.3 | 26.3 | 7 | 19 | 4.2+2.1 |
| EB Left (fp) | 41.4 | 41.4 | 36.4 | 31.4 | 31.4 | - | - | 4.6+1.8 |
| WB Left (fp) | 41.4 | 41.4 | 44.4 | 31.4 | 31.4 | - | - | 4.6+1.8 |

Phasing Sequence‡

Plan: All



Notes: 1) All plans have a minimum recall of 26 seconds green for the EW Thru movement

Schedule

| Weekday | | Saturday | | Sunday | |
|---------|------|----------|------|--------|------|
| Time | Plan | Time | Plan | Time | Plan |
| 0:10 | 4 | 0:10 | 4 | 0:10 | 4 |
| 6:00 | 1 | 8:30 | 5 | 8:30 | 5 |
| 9:30 | 2 | 19:00 | 2 | 19:00 | 2 |
| 15:00 | 3 | 20:00 | 4 | 20:00 | 4 |
| 19:00 | 2 | | | | |
| 22:00 | 4 | | | | |

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◀.....▶ Pedestrian signal

Cost is \$57.63 (\$51 + HST)

APPENDIX I

Left Turn and Signal Warrants, Roundabout Evaluation

| | | | | | | | | | | | | | |
|----------------------------------|-----------------------------|------|------|------|-----|-----|-----|-----|--------------------|-------------|-----|------|--------------|
| B. TRAFFIC CROSSING MAJOR STREET | 50 | 75 | 50 | 75 | 584 | 428 | 236 | 165 | 130 | 146 | 149 | 130 | TOTAL ACROSS |
| | (40) | (60) | (40) | (60) | | | | | | | | | |
| | 100% FULFILLED | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 800 | |
| | 80% FULFILLED | | | | | | | | | | | 0 | |
| | ACTUAL % IF BELOW 80% VALUE | | | | | | | | | | | 0 | |
| | | | | | | | | | | TOTAL DOWN: | | | 800 |
| | | | | | | | | | AVERAGE (TOTAL/8): | | | 100% | |

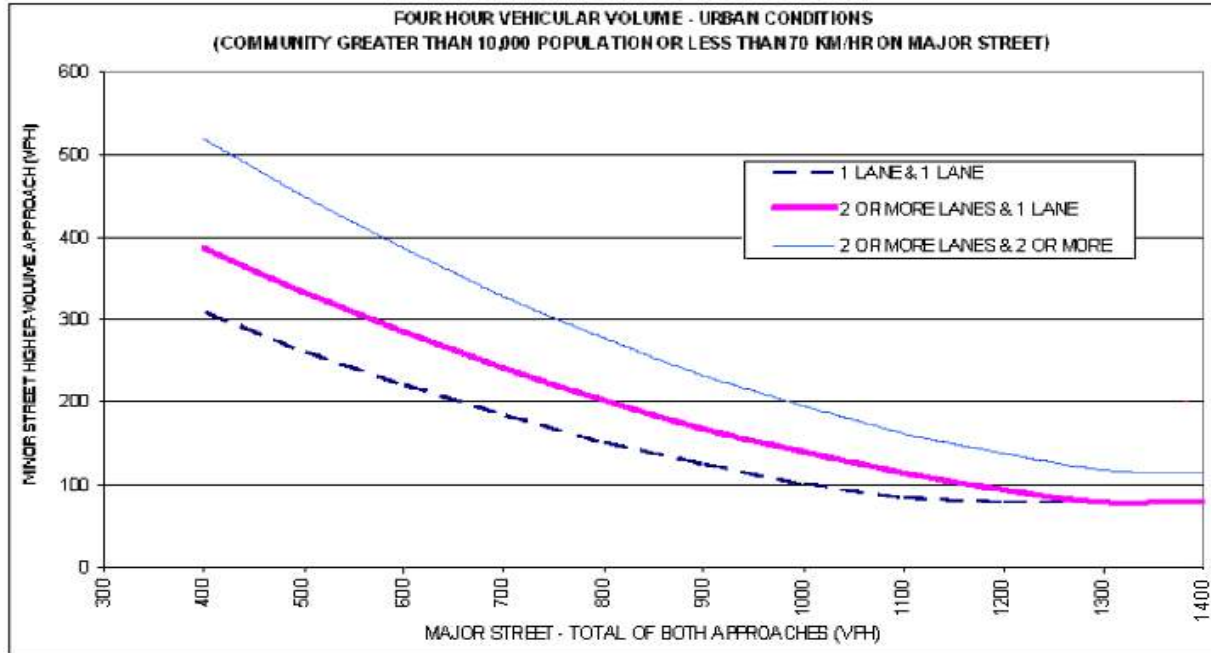
TRAFFIC SIGNAL JUSTIFICATION

LOCATION: Walkley Road at 417 NB Off-ramp

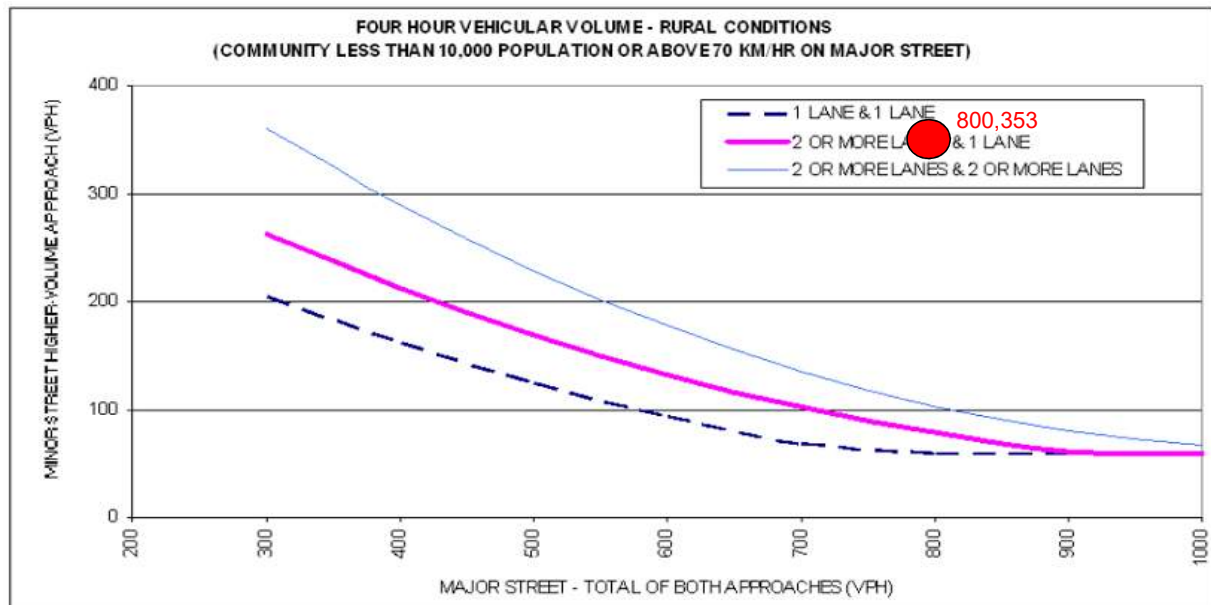
DATE: April 30, 2020

JUSTIFICATION 4 – Minimum Four-Hour Vehicle Volume

A. Restricted Flow



B. Free Flow



TRAFFIC SIGNAL JUSTIFICATION

LOCATION: Walkley Road at 417 NB Off-ramp

DATE: April 30, 2020

| JUSTIFICATION | DESCRIPTION | Minimum Requirement | | Compliance | |
|-------------------------------------|---|--------------------------------------|--------------------------------------|-------------|-------------------------|
| | | Free Flow | Restricted Flow | Sectional % | Entire % ⁽²⁾ |
| | | Operating Speed ≥ 70km/h | Operating Speed < 70 km/h | | |
| 1. MINIMUM VEHICULAR WARRANT | A. Vehicle volume, all approaches for each of the heaviest 8 hours of an average day, and ----- | 480 600 (2 or more lane approach) | 720 900 (2 or more lane approach) | 87% | 87% |
| | B. Vehicle volume, along minor street, for each of the same 8 hours. | 120 180 (tee intersection) | 170 255 (tee intersection) | 87% | |
| 2. DELAY TO CROSS TRAFFIC | A. Vehicle volume, along major street for each for the heaviest 8 hours of an average day, and ----- | 480 600 (2 or more lane approach) | 720 900 (2 or more lane approach) | 71% | 71% |
| | B ⁽¹⁾ . Combined vehicle and pedestrian volume <u>crossing</u> the major street for each of the same 8 hours | 50 | 75 | 100% | |
| 3. VOLUME/DELAY COMBINATION | The above Justifications (1 and 2) both satisfied to the extent of 80% or more | No | | | |
| 4. MINIMUM FOUR HOUR VEHICLE VOLUME | Plotted point representing hourly volume for minor approach vs. major approach for four highest hours of an average day fall above the applicable curve | Yes | | | |
| 5. COLLISION EXPERIENCE | A. Total reported accidents of types susceptible to correction by a traffic signal, per 12 month period averaged over a 36 month period, and ----- | 5 | | | |
| | B. Adequate trial of less restrictive remedies, where satisfactory observance and enforcement have failed to reduce the number of accidents | No | | | |
| 6. PEDESTRIAN VOLUME AND DELAY | A. Plotted point representing 8 hour pedestrian volume vs. 8 hour vehicular volume fall in justified zone, and ----- | No | | | |
| | B. Plotted point representing 8 hour volume of pedestrian experiencing delays of 10 s or more vs. 8 hour pedestrian volume fall in justified zone | No | | | |

| | | | | | | | | | | | | | | |
|----|-------------------------------------|-----------------------------|------|------|------|-----|-----|-----|----|--------------------|-----|-------------|------|-----------------|
| B. | TRAFFIC CROSSING MAJOR STREET | 50 | 75 | 50 | 75 | 453 | 282 | 143 | 66 | 61 | 201 | 313 | 201 | TOTAL ACROSS |
| | | (40) | (60) | (40) | (60) | | | | | | | | | |
| | | 100% FULFILLED | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 800 |
| | | 80% FULFILLED | | | | | | | | | | | | 0 |
| | | ACTUAL % IF BELOW 80% VALUE | | | | | | | | | | | | 0 |
| | | | | | | | | | | | | TOTAL DOWN: | | |
| | | | | | | | | | | AVERAGE (TOTAL/8): | | | 100% | |

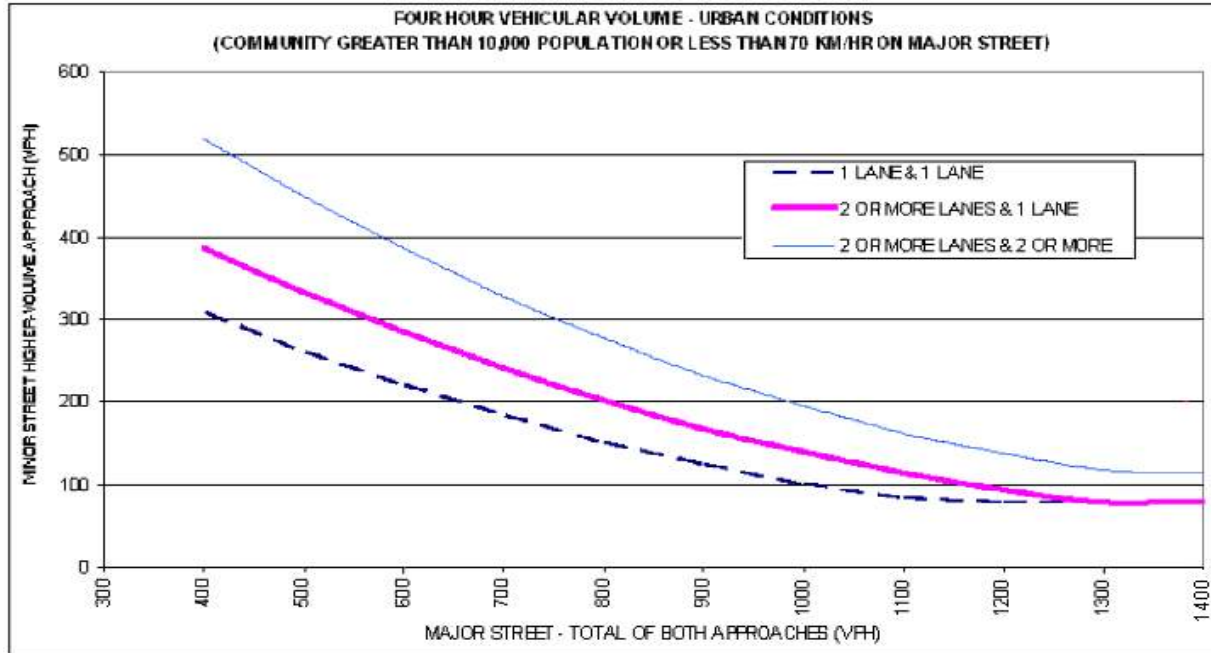
TRAFFIC SIGNAL JUSTIFICATION

LOCATION: Anderson Road at Russell Road

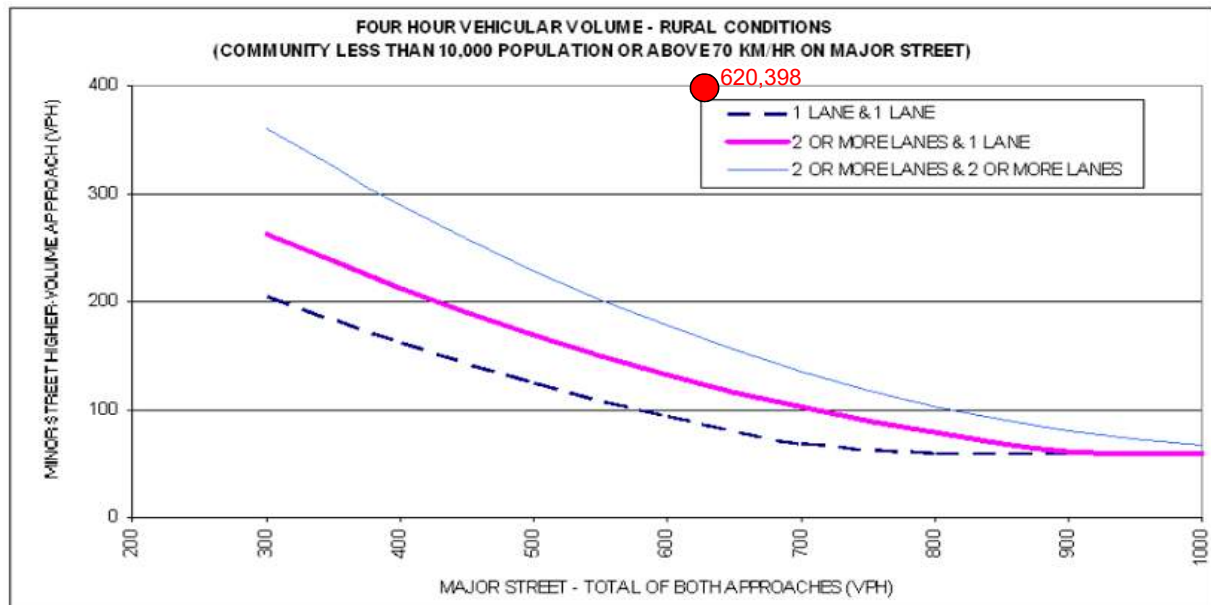
DATE: April 28, 2020

JUSTIFICATION 4 – Minimum Four-Hour Vehicle Volume

A. Restricted Flow



B. Free Flow



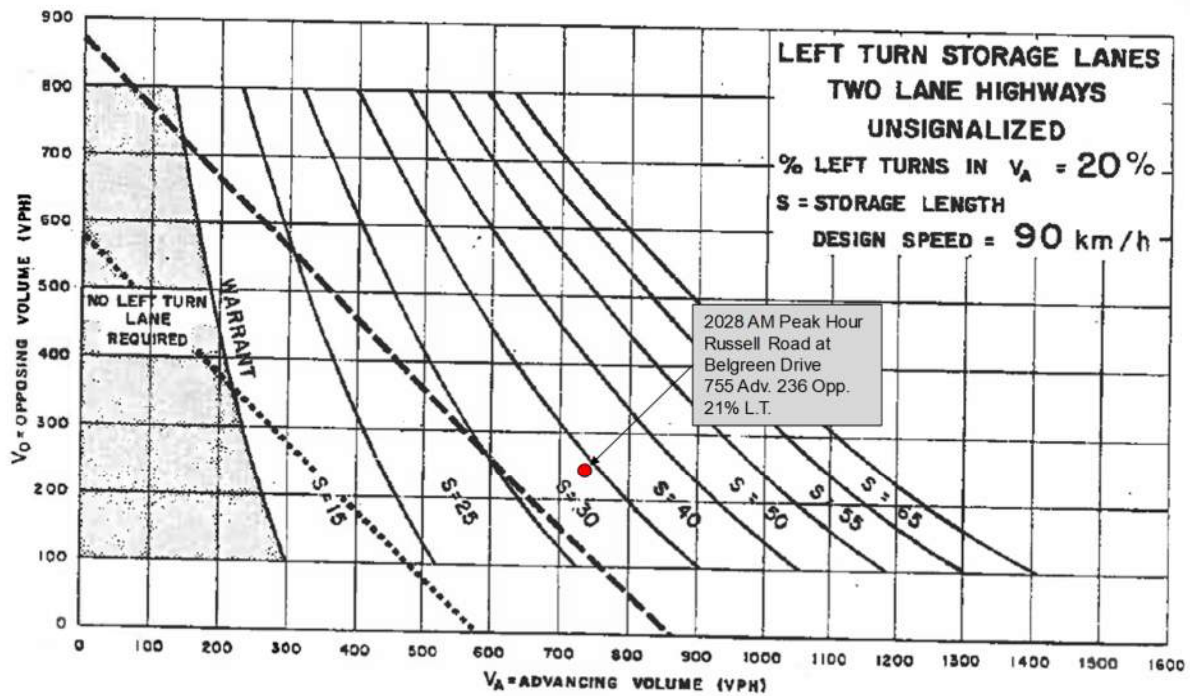
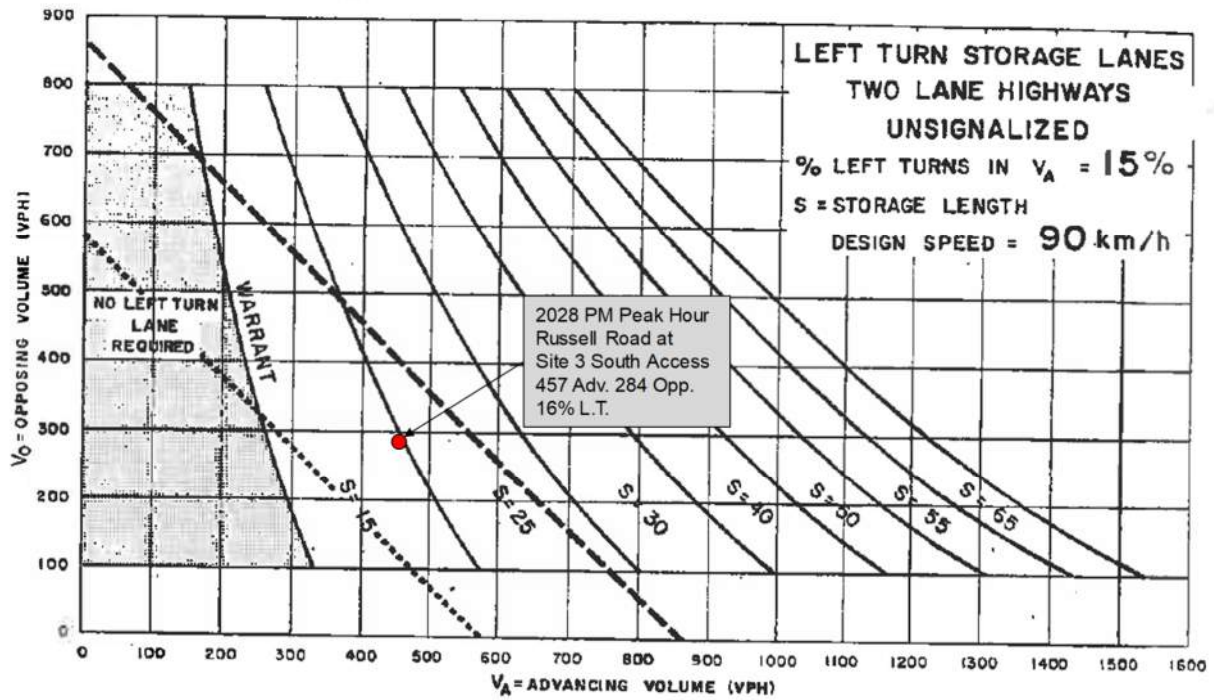
TRAFFIC SIGNAL JUSTIFICATION

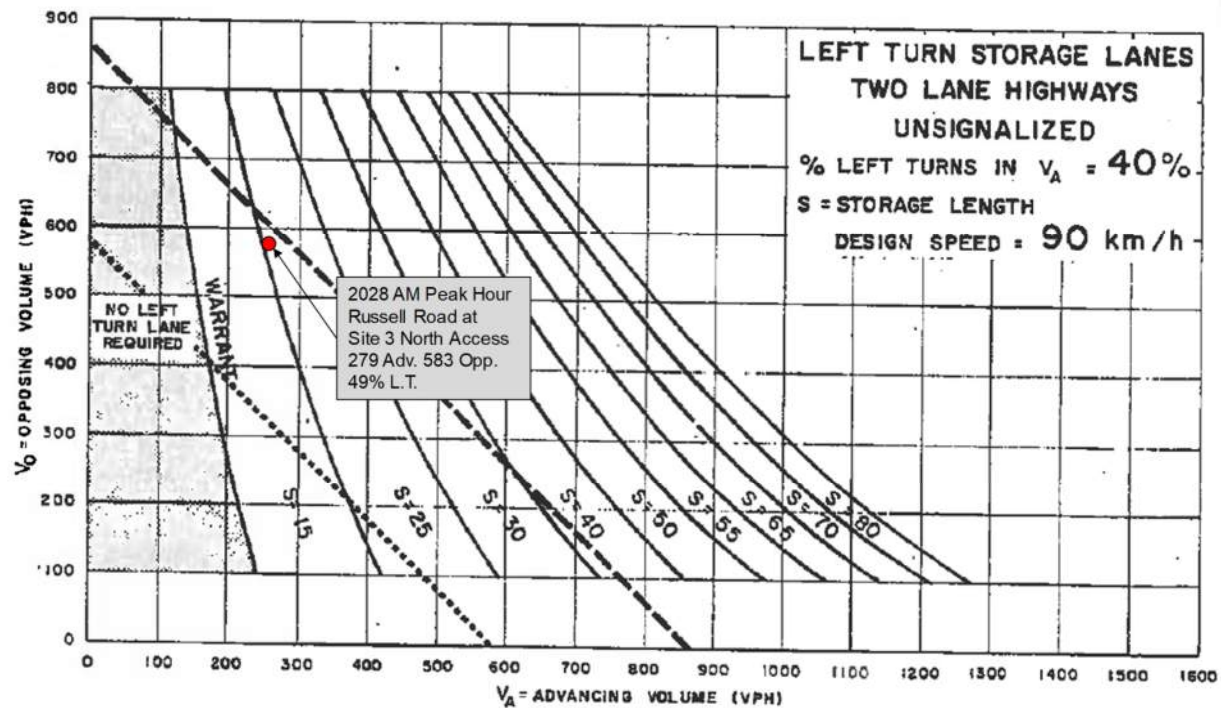
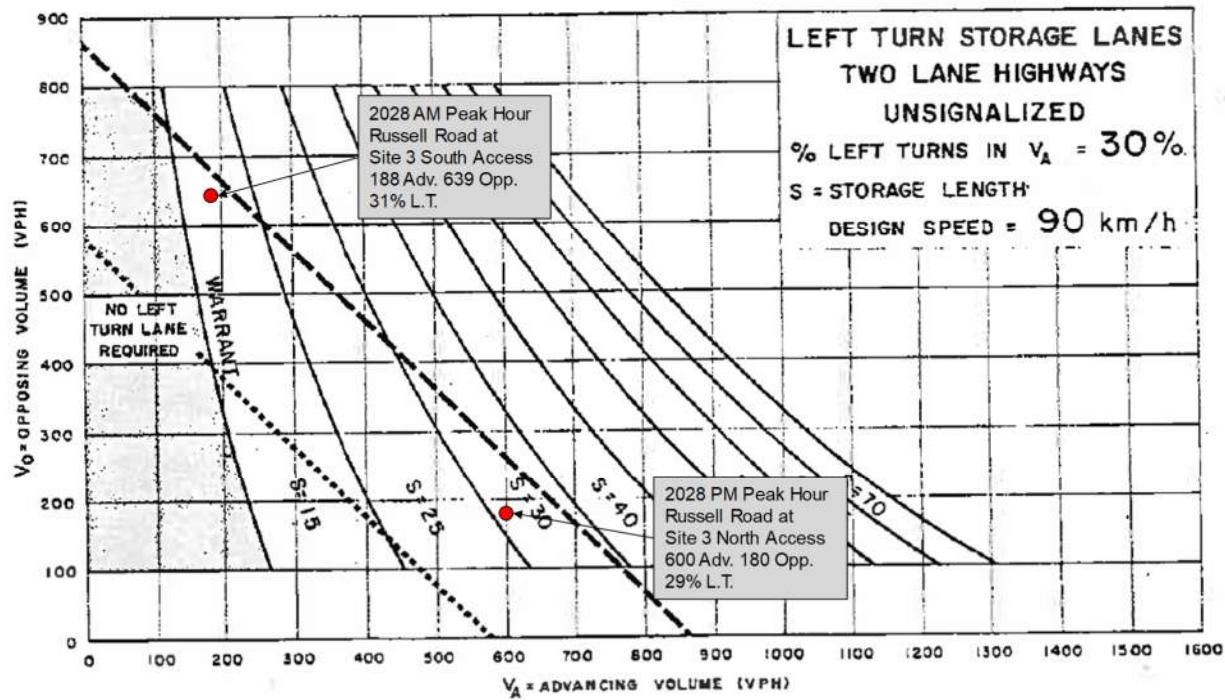
LOCATION: Anderson Road at Russell Road

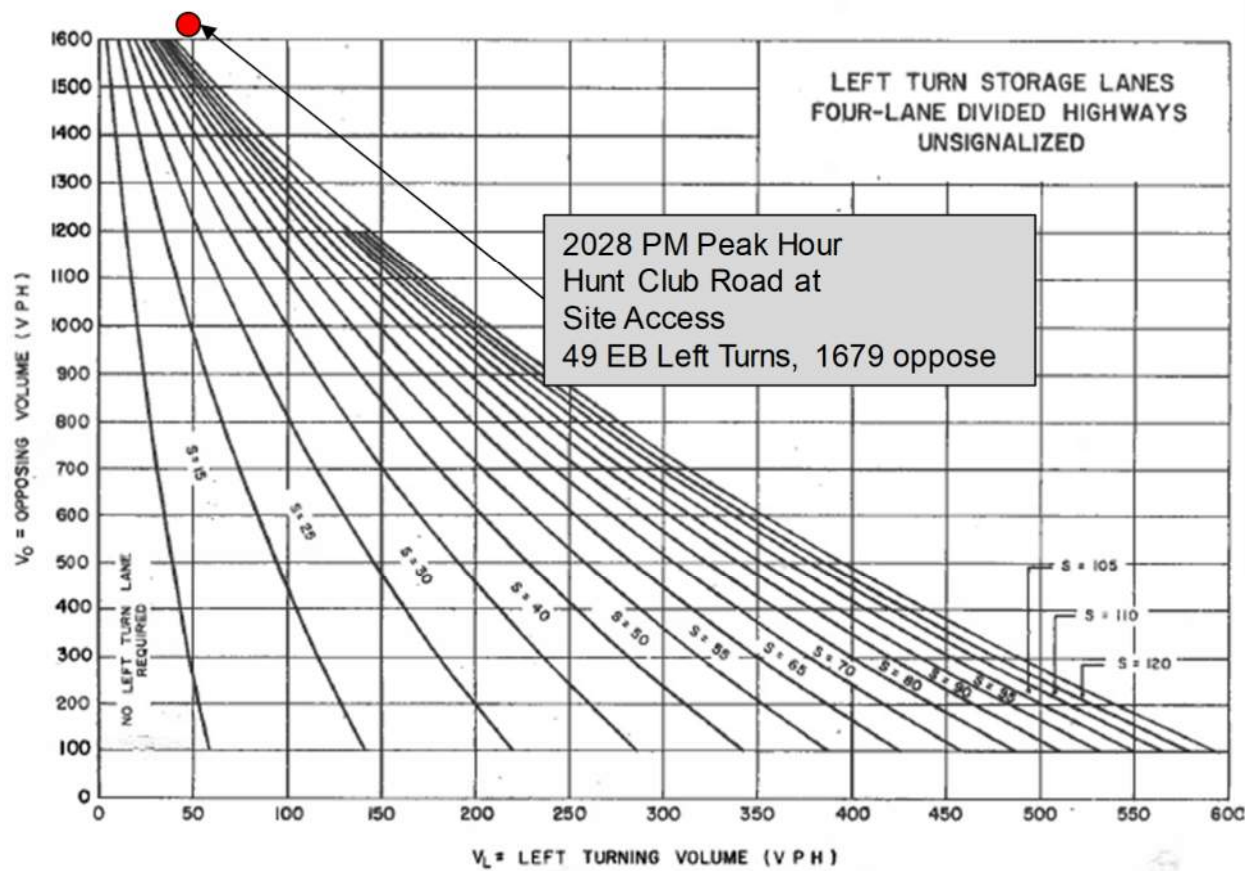
DATE: April 28, 2020

| JUSTIFICATION | DESCRIPTION | Minimum Requirement | | Compliance | |
|-------------------------------------|---|--------------------------------------|--------------------------------------|-------------|-------------------------|
| | | Free Flow | Restricted Flow | Sectional % | Entire % ⁽²⁾ |
| | | Operating Speed ≥ 70km/h | Operating Speed < 70 km/h | | |
| 1. MINIMUM VEHICULAR WARRANT | A. Vehicle volume, all approaches for each of the heaviest 8 hours of an average day, and | 480 600 (2 or more lane approach) | 720 900 (2 or more lane approach) | 90% | 90% |
| | B. Vehicle volume, along minor street, for each of the same 8 hours. | 120 180 (tee intersection) | 170 255 (tee intersection) | 95% | |
| 2. DELAY TO CROSS TRAFFIC | A. Vehicle volume, along major street for each for the heaviest 8 hours of an average day, and | 480 600 (2 or more lane approach) | 720 900 (2 or more lane approach) | 79% | 79% |
| | B ⁽¹⁾ . Combined vehicle and pedestrian volume <u>crossing</u> the major street for each of the same 8 hours | 50 | 75 | 100% | |
| 3. VOLUME/DELAY COMBINATION | The above Justifications (1 and 2) both satisfied to the extent of 80% or more | No | | | |
| 4. MINIMUM FOUR HOUR VEHICLE VOLUME | Plotted point representing hourly volume for minor approach vs. major approach for four highest hours of an average day fall above the applicable curve | Yes | | | |
| 5. COLLISION EXPERIENCE | A. Total reported accidents of types susceptible to correction by a traffic signal, per 12 month period averaged over a 36 month period, and | 5 | | | |
| | B. Adequate trial of less restrictive remedies, where satisfactory observance and enforcement have failed to reduce the number of accidents | No | | | |
| 6. PEDESTRIAN VOLUME AND DELAY | A. Plotted point representing 8 hour pedestrian volume vs. 8 hour vehicular volume fall in justified zone, and | No | | | |
| | B. Plotted point representing 8 hour volume of pedestrian experiencing delays of 10 s or more vs. 8 hour pedestrian volume fall in justified zone | No | | | |

| | | | | | | | | | | | | | |
|---|-----------------------------|------|------|------|-----|-----|-----|-----|--------------------|-----|-----|----|-----------------|
| B. TRAFFIC CROSSING MAJOR STREET | 50 | 75 | 50 | 75 | 22 | 15 | 12 | 30 | 45 | 120 | 167 | 78 | TOTAL ACROSS |
| | (40) | (60) | (40) | (60) | | | | | | | | | |
| | 100% FULFILLED | | | | | | | | | ✓ | ✓ | ✓ | 300 |
| | 80% FULFILLED | | | | | | | | | ✓ | | | 80 |
| | ACTUAL % IF BELOW 80% VALUE | | | | 44% | 30% | 24% | 60% | | | | | 158 |
| | | | | | | | | | TOTAL DOWN: | | | | 538 |
| | | | | | | | | | AVERAGE (TOTAL/8): | | | | 67% |







City of Ottawa Roundabout Initial Feasibility Screening Tool

The intent of this screening tool is to provide a relatively quick assessment of the feasibility of a roundabout at a particular intersection in comparison to other appropriate forms of traffic control or road modifications including all-way stop control, traffic signals, auxiliary lanes, etc. The intended outcome of this tool is to provide enough information to assist staff in deciding whether or not to proceed with an Intersection Control Study to investigate the feasibility of a roundabout in more detail.

| | | |
|---|---|--|
| 1 | Project Name: | National Capital Business Park |
| 2 | Intersection: | Russell Road and Anderson Road |
| 3 | Location and Description of Intersection: Lane configuration, total or approach AADT, distance to nearby intersection(s), etc. Attach or sketch a diagram and include existing and/or horizon-year turning movements. If an existing intersection then indicate type of control. | Existing All-Way STOP with single lane approaches in a rural area Existing and projected volumes are included in the TIA. |
| 4 | What traditional modifications are proposed? All-way stop control, traffic signals, auxiliary lanes, etc. Attach or sketch a diagram if necessary. | Signalization is warranted. |
| 5 | What size of roundabout is being considered? Describe, and attach a Roundabout Traffic Flow Worksheet. | Four legged, Single Lane Roundabout |
| 6 | Why is a roundabout being considered? | Signalization is warranted, consider a roundabout per City Policy. |

- 7 Are there contra-indications for a roundabout? If “Yes” is indicated for one or more of the contra-indications then a roundabout may be problematic at the subject intersection. That is not to say that a roundabout is not possible, just that there may be difficulties or high costs.

| No. | Contra-Indication | Outcome |
|-----|--|---|
| 1 | Is there insufficient property at the intersection (i.e. less than 44 metres diameter if considering a single-lane roundabout, and less than 60 metres if considering a two-lane roundabout) or property constraints that would require demolition of adjacent structures? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 2 | Are there any instances where stopping sight distance (SSD) of a roundabout yield line may not be attainable (i.e. the intersection is on a crest vertical curve)? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 3 | Is there an existing uncontrolled approach with a grade in excess of 4 percent? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 4 | Is the intersection located within a coordinated signal system? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 5 | Is there a closely-spaced traffic signal or railway crossing that could not be controlled with a nearby roundabout? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 6 | Are significant differences in directional flows or any situations of sudden high demand expected? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 7 | Are there known visually-impaired pedestrians that cross this intersection? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |

- 8 Are there suitability factors for a roundabout? If “Yes” is indicated for two or more of the suitability factors then a roundabout should be technically feasible at the subject intersection.

| No. | Suitability Factor | Outcome |
|-----|--|---|
| 1 | Does the intersection currently experience an average collision frequency of more than 1.5 injury crashes per year, or a collision rate in excess of 1 injury crash per 1 million vehicles entering (MVE)? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 2 | Has there been a fatal crash at the intersection in the last 10 years? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 3 | Are capacity problems currently being experienced, or expected in the future? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| 4 | Are traffic signals warranted, or expected to be warranted in the future? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| 5 | Does the intersection have more than 4 legs, or unusual geometry? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| 6 | Will planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate left-turn lanes)? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| 7 | Is the intersection located at a transition between rural and urban environments (i.e. an urban boundary) such that a roundabout could act as a means of speed transition? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |

- 9 Conclusions/recommendation whether to proceed with an Intersection Control Study:

The Feasibility results indicate that the City should proceed with an Intersection Control Study.

DRAFT

























APPENDIX J

Traffic Analysis Reports

4055 & 4120 Russell Road

1: Russell & Walkley

Existing Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 71 | 458 | 119 | 345 | 1146 | 61 | 195 | 388 | 469 | 52 | 201 | 122 |
| Future Volume (vph) | 71 | 458 | 119 | 345 | 1146 | 61 | 195 | 388 | 469 | 52 | 201 | 122 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3082 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 180 | | | 134 | | | 521 | | | 180 |
| Lane Group Flow (vph) | 79 | 509 | 132 | 383 | 1273 | 68 | 217 | 431 | 521 | 58 | 223 | 136 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.5 | 58.2 | 58.2 | 24.4 | 69.1 | 69.1 | 12.4 | 33.3 | 33.3 | 8.1 | 26.3 | 26.3 |
| Actuated g/c Ratio | 0.09 | 0.39 | 0.39 | 0.16 | 0.46 | 0.46 | 0.08 | 0.22 | 0.22 | 0.05 | 0.18 | 0.18 |
| v/c Ratio | 0.64 | 0.40 | 0.21 | 0.78 | 0.80 | 0.09 | 0.85 | 0.60 | 0.75 | 0.33 | 0.40 | 0.35 |
| Control Delay | 87.8 | 36.7 | 2.1 | 71.4 | 41.4 | 0.2 | 96.3 | 56.2 | 11.2 | 72.9 | 55.5 | 4.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 87.8 | 36.7 | 2.1 | 71.4 | 41.4 | 0.2 | 96.3 | 56.2 | 11.2 | 72.9 | 55.5 | 4.5 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 36.0 | | | 46.5 | | | 43.6 | | | 41.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 21.2 | 55.3 | 0.0 | 52.5 | 164.2 | 0.0 | 30.7 | 55.7 | 0.0 | 8.0 | 27.8 | 0.0 |
| Queue Length 95th (m) | 37.0 | 77.0 | 4.5 | 66.1 | #220.4 | 0.0 | #50.9 | 72.2 | 35.2 | 14.8 | 39.0 | 6.0 |
| Internal Link Dist (m) | | 485.7 | | | 361.7 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1283 | 626 | 775 | 1582 | 758 | 255 | 732 | 701 | 270 | 693 | 437 |
| 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 | 0.48 | 0.40 | 0.21 | 0.49 | 0.80 | 0.09 | 0.85 | 0.59 | 0.74 | 0.21 | 0.32 | 0.31 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 43.2

Intersection LOS: D

Intersection Capacity Utilization 77.4%

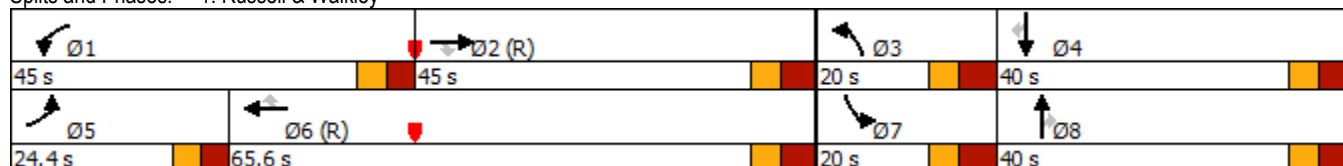
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.























Splits and Phases: 1: Russell & Walkley



4055 & 4120 Russell Road

2: Hawthorne & Russell

Existing Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 14 | 10 | 318 | 17 | 843 | 8 | 49 | 490 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 14 | 10 | 318 | 17 | 843 | 8 | 49 | 490 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3104 | 0 | 1488 | 2984 | 0 |
| Flt Permitted | 0.750 | | | 0.752 | | | 0.433 | | | 0.278 | | |
| Satd. Flow (perm) | 1007 | 1278 | 0 | 1178 | 1790 | 1522 | 771 | 3104 | 0 | 436 | 2984 | 0 |
| Satd. Flow (RTOR) | | 355 | | | | 159 | | 2 | | | 16 | |
| Lane Group Flow (vph) | 11 | 9 | 0 | 16 | 11 | 353 | 19 | 946 | 0 | 54 | 582 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 64.0 | 64.0 | | 64.0 | 64.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 17.3 | 17.3 | | 17.3 | 17.3 | 17.3 | 60.5 | 60.5 | | 60.5 | 60.5 | |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | 0.19 | 0.67 | 0.67 | | 0.67 | 0.67 | |
| v/c Ratio | 0.06 | 0.02 | | 0.07 | 0.03 | 0.84 | 0.04 | 0.45 | | 0.18 | 0.29 | |
| Control Delay | 28.4 | 0.0 | | 28.6 | 27.6 | 37.2 | 4.0 | 4.8 | | 8.5 | 6.7 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 28.4 | 0.0 | | 28.6 | 27.6 | 37.2 | 4.0 | 4.8 | | 8.5 | 6.7 | |
| LOS | C | A | | C | C | D | A | A | | A | A | |
| Approach Delay | | 15.6 | | | 36.5 | | | 4.8 | | | 6.9 | |
| Approach LOS | | B | | | D | | | A | | | A | |
| Queue Length 50th (m) | 1.4 | 0.0 | | 2.0 | 1.4 | 28.9 | 0.5 | 14.1 | | 3.2 | 18.9 | |
| Queue Length 95th (m) | 5.3 | 0.0 | | 6.7 | 5.2 | #65.6 | m1.0 | 17.6 | | 8.3 | 26.4 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 227 | 563 | | 265 | 403 | 466 | 518 | 2088 | | 293 | 2012 | |
| 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 | 0.05 | 0.02 | | 0.06 | 0.03 | 0.76 | 0.04 | 0.45 | | 0.18 | 0.29 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 23 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 11.6

Intersection LOS: B

Intersection Capacity Utilization 68.9%

ICU Level of Service C













Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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






















Splits and Phases: 2: Hawthorne & Russell

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø2 (R) | | | Ø4 | | |
| 64 s | | | 26 s | | |
|  |  |  |  |  |  |
| Ø6 (R) | | | Ø8 | | |
| 64 s | | | 26 s | | |

4055 & 4120 Russell Road

3: Hawthorne & Stevenage

Existing Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 126 | 27 | 56 | 58 | 59 | 55 | 195 | 857 | 86 | 52 | 283 | 175 |
| Future Volume (vph) | 126 | 27 | 56 | 58 | 59 | 55 | 195 | 857 | 86 | 52 | 283 | 175 |
| Satd. Flow (prot) | 1553 | 1221 | 0 | 1276 | 1459 | 0 | 1669 | 3087 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.676 | | | 0.697 | | | 0.516 | | | 0.224 | | |
| Satd. Flow (perm) | 1105 | 1221 | 0 | 931 | 1459 | 0 | 903 | 3087 | 0 | 337 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 62 | | | 55 | | | 14 | | | | 194 |
| Lane Group Flow (vph) | 140 | 92 | 0 | 64 | 127 | 0 | 217 | 1048 | 0 | 58 | 314 | 194 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 17.4 | 17.4 | | 17.4 | 17.4 | | 59.3 | 51.1 | | 52.6 | 45.9 | 45.9 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.66 | 0.57 | | 0.58 | 0.51 | 0.51 |
| v/c Ratio | 0.66 | 0.32 | | 0.36 | 0.39 | | 0.32 | 0.60 | | 0.21 | 0.22 | 0.24 |
| Control Delay | 47.0 | 14.7 | | 34.8 | 20.4 | | 7.8 | 16.8 | | 4.2 | 10.2 | 6.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.0 | 14.7 | | 34.8 | 20.4 | | 7.8 | 16.8 | | 4.2 | 10.2 | 6.7 |
| LOS | D | B | | C | C | | A | B | | A | B | A |
| Approach Delay | | 34.2 | | | 25.2 | | | 15.2 | | | 8.4 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 21.0 | 4.0 | | 9.0 | 9.9 | | 10.8 | 54.9 | | 2.0 | 14.6 | 5.4 |
| Queue Length 95th (m) | 34.1 | 13.8 | | 17.4 | 21.2 | | 25.3 | 96.6 | | 2.0 | 28.3 | 24.9 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 359 | 439 | | 303 | 512 | | 686 | 1757 | | 319 | 1458 | 816 |
| 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 | 0.39 | 0.21 | | 0.21 | 0.25 | | 0.32 | 0.60 | | 0.18 | 0.22 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 16.3







Intersection LOS: B

Intersection Capacity Utilization 62.2%

ICU Level of Service B























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | |
|---|---|--|
|  |  |  |
| Ø1 | Ø2 (R) | Ø4 |
| 15 s | 40 s | 35 s |
|  |  |  |
| Ø5 | Ø6 (R) | Ø8 |
| 15 s | 40 s | 35 s |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

Existing Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 382 | 595 | 24 | 239 | 646 | 234 | 38 | 389 | 364 | 39 | 135 | 172 |
| Future Volume (vph) | 382 | 595 | 24 | 239 | 646 | 234 | 38 | 389 | 364 | 39 | 135 | 172 |
| Satd. Flow (prot) | 1639 | 3332 | 0 | 1595 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.657 | | | 0.129 | | |
| Satd. Flow (perm) | 1639 | 3332 | 0 | 1595 | 3402 | 1440 | 1029 | 2974 | 0 | 162 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 3 | | | | 260 | | 153 | | | | 191 |
| Lane Group Flow (vph) | 424 | 688 | 0 | 266 | 718 | 260 | 42 | 836 | 0 | 43 | 150 | 191 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 41.4 | 41.4 | | 41.4 | 41.4 | 41.4 | 21.3 | 36.3 | | 21.3 | 36.3 | 36.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 35.2 | 42.0 | | 26.5 | 33.2 | 33.2 | 36.9 | 30.2 | | 38.4 | 30.9 | 30.9 |
| Actuated g/C Ratio | 0.27 | 0.32 | | 0.20 | 0.25 | 0.25 | 0.28 | 0.23 | | 0.29 | 0.24 | 0.24 |
| v/c Ratio | 0.96 | 0.64 | | 0.82 | 0.83 | 0.46 | 0.13 | 1.04 | | 0.37 | 0.23 | 0.43 |
| Control Delay | 81.4 | 43.1 | | 70.3 | 55.5 | 7.5 | 31.5 | 81.5 | | 39.8 | 42.8 | 8.9 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 81.4 | 43.1 | | 70.3 | 55.5 | 7.5 | 31.5 | 81.5 | | 39.8 | 42.8 | 8.9 |
| LOS | F | D | | E | E | A | C | F | | D | D | A |
| Approach Delay | | 57.7 | | | 48.6 | | | 79.1 | | | 25.6 | |
| Approach LOS | | E | | | D | | | E | | | C | |
| Queue Length 50th (m) | 103.7 | 75.6 | | 62.6 | 86.8 | 0.0 | 7.0 | ~102.3 | | 7.2 | 15.8 | 0.0 |
| Queue Length 95th (m) | #171.2 | 107.0 | | 88.4 | 112.0 | 20.1 | 14.8 | #144.8 | | 15.4 | 25.5 | 18.3 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 443 | 1076 | | 431 | 920 | 579 | 381 | 807 | | 171 | 653 | 449 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.96 | 0.64 | | 0.62 | 0.78 | 0.45 | 0.11 | 1.04 | | 0.25 | 0.23 | 0.43 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 130.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 56.4

Intersection LOS: E

Intersection Capacity Utilization 90.4%

ICU Level of Service E

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.










Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|---|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |











4055 & 4120 Russell Road
5: Belgreen & Russell

Existing Traffic AM Peak Hour

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 24 | 42 | 155 | 397 | 39 | 22 |
| Future Volume (Veh/h) | 24 | 42 | 155 | 397 | 39 | 22 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 27 | 47 | 172 | 441 | 43 | 24 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 74 | | 836 | 50 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 74 | | 836 | 50 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.5 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.9 | 3.5 |
| p0 queue free % | | | 89 | | 83 | 97 |
| cM capacity (veh/h) | | | 1519 | | 258 | 956 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 74 | 613 | 67 | | | |
| Volume Left | 0 | 172 | 43 | | | |
| Volume Right | 47 | 0 | 24 | | | |
| cSH | 1700 | 1519 | 350 | | | |
| Volume to Capacity | 0.04 | 0.11 | 0.19 | | | |
| Queue Length 95th (m) | 0.0 | 2.7 | 4.9 | | | |
| Control Delay (s) | 0.0 | 3.0 | 17.7 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 3.0 | 17.7 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.0 | | | |
| Intersection Capacity Utilization | | | 48.1% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |










4055 & 4120 Russell Road
6: Hunt Club & Hwy 417 Offramp

Existing Traffic AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 2 | 796 | 0 | 817 | 623 | 0 |
| Future Volume (Veh/h) | 2 | 796 | 0 | 817 | 623 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 2 | 884 | 0 | 908 | 692 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1600 | 692 | 692 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1600 | 692 | 692 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 98 | 0 | 100 | | | |
| cM capacity (veh/h) | 117 | 432 | 912 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 2 | 884 | 908 | 692 | | |
| Volume Left | 2 | 0 | 0 | 0 | | |
| Volume Right | 0 | 884 | 0 | 0 | | |
| cSH | 117 | 432 | 1700 | 1700 | | |
| Volume to Capacity | 0.02 | 2.05 | 0.53 | 0.41 | | |
| Queue Length 95th (m) | 0.4 | 432.9 | 0.0 | 0.0 | | |
| Control Delay (s) | 36.2 | 499.5 | 0.0 | 0.0 | | |
| Lane LOS | E | F | | | | |
| Approach Delay (s) | 498.5 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | | 177.7 | | |
| Intersection Capacity Utilization | | | | 93.3% | ICU Level of Service | F |
| Analysis Period (min) | | | | 15 | | |

4055 & 4120 Russell Road
7: Ramsayville & Russell

Existing Traffic AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 23 | 21 | 388 | 347 | 145 | 195 |
| Future Volume (Veh/h) | 23 | 21 | 388 | 347 | 145 | 195 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 26 | 23 | 431 | 386 | 161 | 217 |
| Pedestrians | | | | 2 | | |
| Lane Width (m) | | | | 4.0 | | |
| Walking Speed (m/s) | | | | 1.0 | | |
| Percent Blockage | | | | 0 | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1518 | 272 | 378 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1518 | 272 | 378 | | | |
| tC, single (s) | 6.9 | 6.4 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 4.0 | 3.5 | 2.2 | | | |
| p0 queue free % | 60 | 97 | 63 | | | |
| cM capacity (veh/h) | 64 | 724 | 1170 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 49 | 817 | 378 | | | |
| Volume Left | 26 | 431 | 0 | | | |
| Volume Right | 23 | 0 | 217 | | | |
| cSH | 113 | 1170 | 1700 | | | |
| Volume to Capacity | 0.43 | 0.37 | 0.22 | | | |
| Queue Length 95th (m) | 13.1 | 12.0 | 0.0 | | | |
| Control Delay (s) | 59.6 | 7.4 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | 59.6 | 7.4 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 7.2 | | | | |
| Intersection Capacity Utilization | | 76.6% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |

4055 & 4120 Russell Road
10: Walkley & SB off-ramp







Existing Traffic AM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 435 | 946 | 0 | 22 | 884 |
| Future Volume (Veh/h) | 0 | 435 | 946 | 0 | 22 | 884 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 0 | 483 | 1051 | 0 | 24 | 982 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1051 | | | | 1292 | 526 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1051 | | | | 1292 | 526 |
| tC, single (s) | 4.1 | | | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 84 | 0 |
| cM capacity (veh/h) | 658 | | | | 155 | 497 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 242 | 242 | 526 | 526 | 24 | 982 |
| Volume Left | 0 | 0 | 0 | 0 | 24 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 982 |
| cSH | 1700 | 1700 | 1700 | 1700 | 155 | 497 |
| Volume to Capacity | 0.14 | 0.14 | 0.31 | 0.31 | 0.16 | 1.98 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 463.5 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 32.5 | 465.9 |
| Lane LOS | | | | | D | F |
| Approach Delay (s) | 0.0 | | 0.0 | | 455.6 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 180.4 | | | |
| Intersection Capacity Utilization | | | 92.0% | | ICU Level of Service | F |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
11: NB Off-ramp & Walkley




Existing Traffic AM Peak Hour

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↓ | |
| Traffic Volume (veh/h) | 152 | 0 | 0 | 861 | 503 | 53 |
| Future Volume (Veh/h) | 152 | 0 | 0 | 861 | 503 | 53 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 169 | 0 | 0 | 957 | 559 | 59 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 169 | | 648 | 84 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 169 | | 648 | 84 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 0 | 94 |
| cM capacity (veh/h) | | | 1406 | | 403 | 958 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 84 | 84 | 478 | 478 | 618 | |
| Volume Left | 0 | 0 | 0 | 0 | 559 | |
| Volume Right | 0 | 0 | 0 | 0 | 59 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 427 | |
| Volume to Capacity | 0.05 | 0.05 | 0.28 | 0.28 | 1.45 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 219.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 239.1 | |
| Lane LOS | | | | | F | |
| Approach Delay (s) | 0.0 | | 0.0 | | 239.1 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 84.7 | | | |
| Intersection Capacity Utilization | | | 92.0% | ICU Level of Service | | F |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
8: Ramsayville & Russell N

Existing Traffic AM Peak Hour

| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 29.8 |
| Intersection LOS | D |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 278 | 300 | 340 | 35 | 10 | 22 |
| Future Vol, veh/h | 278 | 300 | 340 | 35 | 10 | 22 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 4 | 1 | 1 | 15 | 1 | 20 |
| Mvmt Flow | 309 | 333 | 378 | 39 | 11 | 24 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |





| Approach | WB | NB | SB |
|----------------------------|------|------|----|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 37.8 | 19.1 | 10 |
| HCM LOS | E | C | A |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 48% | 31% |
| Vol Thru, % | 91% | 0% | 69% |
| Vol Right, % | 9% | 52% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 375 | 578 | 32 |
| LT Vol | 0 | 278 | 10 |
| Through Vol | 340 | 0 | 22 |
| RT Vol | 35 | 300 | 0 |
| Lane Flow Rate | 417 | 642 | 36 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.658 | 0.909 | 0.064 |
| Departure Headway (Hd) | 5.685 | 5.093 | 6.505 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 633 | 713 | 548 |
| Service Time | 3.731 | 3.132 | 4.578 |
| HCM Lane V/C Ratio | 0.659 | 0.9 | 0.066 |
| HCM Control Delay | 19.1 | 37.8 | 10 |
| HCM Lane LOS | C | E | A |
| HCM 95th-tile Q | 4.9 | 12 | 0.2 |

4055 & 4120 Russell Road
9: Anderson & Russell

Existing Traffic AM Peak Hour

| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 58.9 |
| Intersection LOS | F |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---------------------|------|---|------|------|---|------|------|---|------|------|---|------|
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 35 | 15 | 3 | 48 | 317 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Future Vol, veh/h | 35 | 15 | 3 | 48 | 317 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 11 | 7 | 1 | 1 | 2 | 3 | 1 | 3 | 17 | 1 | 4 | 2 |
| Mvmt Flow | 39 | 17 | 3 | 53 | 352 | 131 | 190 | 338 | 7 | 6 | 154 | 170 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |

























| Approach | EB | WB | NB | SB |
|----------------------------|------|------|------|------|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 1 | 1 | 1 | 1 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 1 | 1 | 1 | 1 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 1 | 1 | 1 | 1 |
| HCM Control Delay | 13.8 | 66.9 | 78.3 | 22.7 |
| HCM LOS | B | F | F | C |

| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, % | 36% | 66% | 10% | 2% |
| Vol Thru, % | 63% | 28% | 66% | 47% |
| Vol Right, % | 1% | 6% | 24% | 52% |
| Sign Control | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 481 | 53 | 483 | 297 |
| LT Vol | 171 | 35 | 48 | 5 |
| Through Vol | 304 | 15 | 317 | 139 |
| RT Vol | 6 | 3 | 118 | 153 |
| Lane Flow Rate | 534 | 59 | 537 | 330 |
| Geometry Grp | 1 | 1 | 1 | 1 |
| Degree of Util (X) | 1.043 | 0.146 | 1.004 | 0.647 |
| Departure Headway (Hd) | 7.023 | 9.269 | 6.957 | 7.293 |
| Convergence, Y/N | Yes | Yes | Yes | Yes |
| Cap | 513 | 389 | 526 | 498 |
| Service Time | 5.091 | 7.269 | 4.957 | 5.293 |
| HCM Lane V/C Ratio | 1.041 | 0.152 | 1.021 | 0.663 |
| HCM Control Delay | 78.3 | 13.8 | 66.9 | 22.7 |
| HCM Lane LOS | F | B | F | C |
| HCM 95th-tile Q | 15.5 | 0.5 | 14.1 | 4.5 |

4055 & 4120 Russell Road

1: Russell & Walkley

Existing Traffic AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 71 | 458 | 119 | 345 | 1146 | 61 | 195 | 388 | 469 | 52 | 201 | 122 |
| Future Volume (vph) | 71 | 458 | 119 | 345 | 1146 | 61 | 195 | 388 | 469 | 52 | 201 | 122 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3082 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 180 | | | 134 | | | 521 | | | 180 |
| Lane Group Flow (vph) | 79 | 509 | 132 | 383 | 1273 | 68 | 217 | 431 | 521 | 58 | 223 | 136 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.5 | 58.2 | 58.2 | 24.4 | 69.1 | 69.1 | 12.4 | 33.3 | 33.3 | 8.1 | 26.3 | 26.3 |
| Actuated g/c Ratio | 0.09 | 0.39 | 0.39 | 0.16 | 0.46 | 0.46 | 0.08 | 0.22 | 0.22 | 0.05 | 0.18 | 0.18 |
| v/c Ratio | 0.64 | 0.40 | 0.21 | 0.78 | 0.80 | 0.09 | 0.85 | 0.60 | 0.75 | 0.33 | 0.40 | 0.35 |
| Control Delay | 87.8 | 36.7 | 2.1 | 71.4 | 41.4 | 0.2 | 96.3 | 56.2 | 11.2 | 72.9 | 55.5 | 4.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 87.8 | 36.7 | 2.1 | 71.4 | 41.4 | 0.2 | 96.3 | 56.2 | 11.2 | 72.9 | 55.5 | 4.5 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 36.0 | | | 46.5 | | | 43.6 | | | 41.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 21.2 | 55.3 | 0.0 | 52.5 | 164.2 | 0.0 | 30.7 | 55.7 | 0.0 | 8.0 | 27.8 | 0.0 |
| Queue Length 95th (m) | 37.0 | 77.0 | 4.5 | 66.1 | #220.4 | 0.0 | #50.9 | 72.2 | 35.2 | 14.8 | 39.0 | 6.0 |
| Internal Link Dist (m) | | 485.7 | | | 361.7 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1283 | 626 | 775 | 1582 | 758 | 255 | 732 | 701 | 270 | 693 | 437 |
| 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 | 0.48 | 0.40 | 0.21 | 0.49 | 0.80 | 0.09 | 0.85 | 0.59 | 0.74 | 0.21 | 0.32 | 0.31 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 43.2

Intersection LOS: D

Intersection Capacity Utilization 77.4%









ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

























Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 45 s | 45 s | 20 s | 40 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 24.4 s | 65.6 s | 20 s | 40 s |

4055 & 4120 Russell Road

1: Russell & Walkley

Existing Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 85 | 1266 | 222 | 414 | 646 | 76 | 136 | 257 | 489 | 100 | 403 | 103 |
| Future Volume (vph) | 85 | 1266 | 222 | 414 | 646 | 76 | 136 | 257 | 489 | 100 | 403 | 103 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3011 | 3468 | 1535 | 3154 | 3338 | 1402 | 3217 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 247 | | | 154 | | | 207 | | | 207 |
| Lane Group Flow (vph) | 94 | 1407 | 247 | 460 | 718 | 84 | 151 | 286 | 543 | 111 | 448 | 114 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 12.0 | 58.0 | 58.0 | 20.0 | 66.0 | 66.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 5.6 | 50.7 | 50.7 | 13.6 | 58.7 | 58.7 | 9.2 | 28.2 | 28.2 | 8.8 | 27.8 | 27.8 |
| Actuated g/c Ratio | 0.04 | 0.39 | 0.39 | 0.10 | 0.45 | 0.45 | 0.07 | 0.22 | 0.22 | 0.07 | 0.21 | 0.21 |
| v/c Ratio | 1.36 | 1.04 | 0.36 | 1.46 | 0.46 | 0.11 | 0.68 | 0.40 | 1.17 | 0.51 | 0.64 | 0.25 |
| Control Delay | 277.0 | 74.6 | 4.6 | 264.1 | 25.9 | 0.3 | 74.5 | 45.7 | 123.9 | 66.8 | 51.6 | 1.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 277.0 | 74.6 | 4.6 | 264.1 | 25.9 | 0.3 | 74.5 | 45.7 | 123.9 | 66.8 | 51.6 | 1.3 |
| LOS | F | E | A | F | C | A | E | D | F | E | D | A |
| Approach Delay | | 75.6 | | | 111.0 | | | 93.5 | | | 45.6 | |
| Approach LOS | | E | | | F | | | F | | | D | |
| Queue Length 50th (m) | ~29.1 | ~188.5 | 0.0 | ~76.4 | 60.5 | 0.0 | 18.1 | 30.8 | ~112.7 | 13.1 | 51.2 | 0.0 |
| Queue Length 95th (m) | #61.4 | #227.7 | 15.0 | #107.0 | 75.8 | 0.0 | #28.7 | 43.4 | #176.4 | 22.1 | 67.9 | 0.0 |
| Internal Link Dist (m) | | 485.7 | | | 397.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 69 | 1352 | 684 | 315 | 1565 | 777 | 229 | 724 | 466 | 234 | 695 | 461 |
| 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 | 1.36 | 1.04 | 0.36 | 1.46 | 0.46 | 0.11 | 0.66 | 0.40 | 1.17 | 0.47 | 0.64 | 0.25 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.46

Intersection Signal Delay: 84.6

Intersection LOS: F

Intersection Capacity Utilization 92.1%

ICU Level of Service F

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.






















Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|---|---|
|  |  |  |  |
| 20 s | 58 s | 17 s | 35 s |
|  |  |  |  |
| 12 s | 66 s | 17 s | 35 s |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  | |
| Traffic Volume (vph) | 35 | 7 | 21 | 8 | 3 | 79 | 7 | 665 | 12 | 200 | 807 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 8 | 3 | 79 | 7 | 665 | 12 | 200 | 807 | 17 |
| Satd. Flow (prot) | 1624 | 1468 | 0 | 1768 | 1139 | 1508 | 1232 | 3289 | 0 | 1639 | 3270 | 0 |
| Flt Permitted | 0.756 | | | 0.737 | | | 0.303 | | | 0.366 | | |
| Satd. Flow (perm) | 1291 | 1468 | 0 | 1372 | 1139 | 1488 | 393 | 3289 | 0 | 631 | 3270 | 0 |
| Satd. Flow (RTOR) | | 23 | | | | 88 | | 4 | | | 5 | |
| Lane Group Flow (vph) | 39 | 31 | 0 | 9 | 3 | 88 | 8 | 752 | 0 | 222 | 916 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 54.0 | 54.0 | | 54.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 12.0 | 12.0 | | 12.0 | 12.0 | 12.0 | 60.2 | 60.2 | | 60.2 | 60.2 | |
| Actuated g/C Ratio | 0.15 | 0.15 | | 0.15 | 0.15 | 0.15 | 0.75 | 0.75 | | 0.75 | 0.75 | |
| v/c Ratio | 0.20 | 0.13 | | 0.04 | 0.02 | 0.30 | 0.03 | 0.30 | | 0.47 | 0.37 | |
| Control Delay | 30.8 | 15.2 | | 27.0 | 26.3 | 9.3 | 5.4 | 5.1 | | 10.8 | 5.6 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 30.8 | 15.2 | | 27.0 | 26.3 | 9.3 | 5.4 | 5.1 | | 10.8 | 5.6 | |
| LOS | C | B | | C | C | A | A | A | | B | A | |
| Approach Delay | | 23.9 | | | 11.4 | | | 5.1 | | | 6.6 | |
| Approach LOS | | C | | | B | | | A | | | A | |
| Queue Length 50th (m) | 5.0 | 1.0 | | 1.1 | 0.4 | 0.0 | 0.3 | 16.0 | | 10.8 | 20.9 | |
| Queue Length 95th (m) | 11.0 | 6.6 | | 4.1 | 2.1 | 9.5 | 2.0 | 35.6 | | 39.4 | 45.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 389 | | 348 | 289 | 443 | 295 | 2477 | | 475 | 2463 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.12 | 0.08 | | 0.03 | 0.01 | 0.20 | 0.03 | 0.30 | | 0.47 | 0.37 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 16 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 6.9





Intersection LOS: A

Intersection Capacity Utilization 56.7%

ICU Level of Service B






















Analysis Period (min) 15

Splits and Phases: 2: Hawthorne & Russell

| | |
|--|--|
|  Ø2 (R) |  Ø4 |
| 54 s | 26 s |
|  Ø6 (R) |  Ø8 |
| 54 s | 26 s |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

Existing Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 176 | 35 | 208 | 100 | 27 | 81 | 77 | 349 | 59 | 45 | 869 | 134 |
| Future Volume (vph) | 176 | 35 | 208 | 100 | 27 | 81 | 77 | 349 | 59 | 45 | 869 | 134 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1425 | 0 | 1323 | 3064 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.680 | | | 0.405 | | | 0.212 | | | 0.490 | | |
| Satd. Flow (perm) | 1192 | 1490 | 0 | 668 | 1425 | 0 | 295 | 3064 | 0 | 682 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 231 | | | 90 | | | 25 | | | | 149 |
| Lane Group Flow (vph) | 196 | 270 | 0 | 111 | 120 | 0 | 86 | 454 | 0 | 50 | 966 | 149 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.4 | 22.4 | | 22.4 | 22.4 | | 58.3 | 53.3 | | 55.9 | 50.2 | 50.2 |
| Actuated g/c Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.70 | 0.51 | | 0.71 | 0.30 | | 0.32 | 0.26 | | 0.11 | 0.54 | 0.19 |
| Control Delay | 45.5 | 9.3 | | 55.6 | 10.7 | | 11.6 | 13.2 | | 9.0 | 18.7 | 3.6 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.5 | 9.3 | | 55.6 | 10.7 | | 11.6 | 13.2 | | 9.0 | 18.7 | 3.6 |
| LOS | D | A | | E | B | | B | B | | A | B | A |
| Approach Delay | | 24.6 | | | 32.3 | | | 13.0 | | | 16.3 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.0 | 5.1 | | 17.0 | 3.9 | | 5.2 | 21.0 | | 2.9 | 58.2 | 0.0 |
| Queue Length 95th (m) | 47.4 | 21.8 | | 32.2 | 14.9 | | 12.5 | 36.0 | | 8.1 | 88.3 | 10.1 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 367 | 619 | | 206 | 501 | | 282 | 1728 | | 474 | 1797 | 784 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.44 | | 0.54 | 0.24 | | 0.30 | 0.26 | | 0.11 | 0.54 | 0.19 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.7

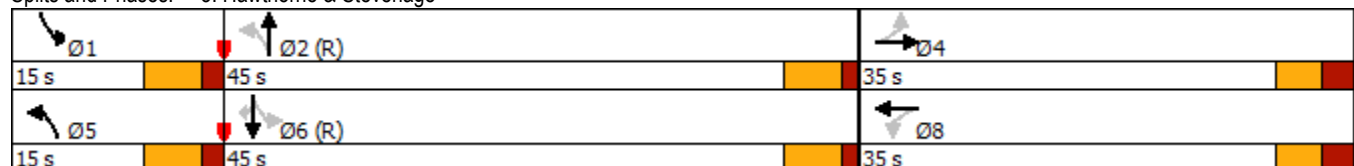
Intersection LOS: B























Intersection Capacity Utilization 72.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 240 | 770 | 23 | 403 | 829 | 83 | 24 | 182 | 292 | 157 | 461 | 453 |
| Future Volume (vph) | 240 | 770 | 23 | 403 | 829 | 83 | 24 | 182 | 292 | 157 | 461 | 453 |
| Satd. Flow (prot) | 1595 | 3422 | 0 | 1654 | 3468 | 1141 | 1717 | 2808 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.404 | | | 0.134 | | |
| Satd. Flow (perm) | 1595 | 3422 | 0 | 1653 | 3468 | 1141 | 730 | 2808 | 0 | 227 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 242 | | | | 503 |
| Lane Group Flow (vph) | 267 | 882 | 0 | 448 | 921 | 92 | 27 | 526 | 0 | 174 | 512 | 503 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 26.7 | 40.3 | | 38.2 | 51.7 | 51.7 | 28.4 | 21.3 | | 42.0 | 33.8 | 33.8 |
| Actuated g/c Ratio | 0.19 | 0.29 | | 0.27 | 0.37 | 0.37 | 0.20 | 0.15 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 0.88 | 0.89 | | 0.99 | 0.72 | 0.19 | 0.14 | 0.83 | | 0.83 | 0.65 | 0.67 |
| Control Delay | 83.2 | 60.2 | | 91.3 | 43.1 | 3.3 | 36.7 | 42.7 | | 69.6 | 53.5 | 8.8 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 83.2 | 60.2 | | 91.3 | 43.1 | 3.3 | 36.7 | 42.7 | | 69.6 | 53.5 | 8.8 |
| LOS | F | E | | F | D | A | D | D | | E | D | A |
| Approach Delay | | 65.5 | | | 55.3 | | | 42.4 | | | 37.0 | |
| Approach LOS | | E | | | E | | | D | | | D | |
| Queue Length 50th (m) | 67.4 | 116.5 | | ~125.3 | 113.1 | 0.0 | 5.0 | 39.0 | | 35.4 | 66.2 | 0.0 |
| Queue Length 95th (m) | #108.9 | #151.6 | | #190.8 | 139.6 | 6.2 | 11.7 | 58.7 | | #67.5 | 86.2 | 30.6 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 344 | 1035 | | 452 | 1284 | 497 | 296 | 721 | | 217 | 785 | 749 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.78 | 0.85 | | 0.99 | 0.72 | 0.19 | 0.09 | 0.73 | | 0.80 | 0.65 | 0.67 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 139.7

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 51.4

Intersection LOS: D

Intersection Capacity Utilization 92.7%

ICU Level of Service F

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.










Queue shown is maximum after two cycles.











95th percentile volume exceeds capacity, queue may be longer.










Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|--|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 44.4 s | 48.4 s | 21.3 s | 32.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 36.4 s | 56.4 s | 21.3 s | 32.3 s |







| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 289 | 29 | 10 | 33 | 27 | 126 |
| Future Volume (Veh/h) | 289 | 29 | 10 | 33 | 27 | 126 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 321 | 32 | 11 | 37 | 30 | 140 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 353 | | 396 | 337 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 353 | | 396 | 337 |
| tC, single (s) | | | 4.2 | | 6.6 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.3 | | 3.7 | 3.3 |
| p0 queue free % | | | 99 | | 95 | 80 |
| cM capacity (veh/h) | | | 1163 | | 570 | 703 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 353 | 48 | 170 | | | |
| Volume Left | 0 | 11 | 30 | | | |
| Volume Right | 32 | 0 | 140 | | | |
| cSH | 1700 | 1163 | 675 | | | |
| Volume to Capacity | 0.21 | 0.01 | 0.25 | | | |
| Queue Length 95th (m) | 0.0 | 0.2 | 7.0 | | | |
| Control Delay (s) | 0.0 | 1.9 | 12.1 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.9 | 12.1 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.8 | | | |
| Intersection Capacity Utilization | | | 34.4% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 11 | 1291 | 0 | 1016 | 137 | 0 |
| Future Volume (Veh/h) | 11 | 1291 | 0 | 1016 | 137 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 12 | 1434 | 0 | 1129 | 152 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1281 | 152 | 152 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1281 | 152 | 152 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 93 | 0 | 100 | | | |
| cM capacity (veh/h) | 184 | 881 | 1441 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 12 | 1434 | 1129 | 152 | | |
| Volume Left | 12 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1434 | 0 | 0 | | |
| cSH | 184 | 881 | 1700 | 1700 | | |
| Volume to Capacity | 0.07 | 1.63 | 0.66 | 0.09 | | |
| Queue Length 95th (m) | 1.5 | 533.1 | 0.0 | 0.0 | | |
| Control Delay (s) | 26.0 | 301.6 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 299.3 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 158.7 | | | |
| Intersection Capacity Utilization | | | 98.7% | ICU Level of Service | F | |
| Analysis Period (min) | | | 15 | | | |




| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 106 | 319 | 33 | 114 | 322 | 16 |
| Future Volume (Veh/h) | 106 | 319 | 33 | 114 | 322 | 16 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 118 | 354 | 37 | 127 | 358 | 18 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 568 | 367 | 376 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 568 | 367 | 376 | | | |
| tC, single (s) | 6.5 | 6.3 | 4.2 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.4 | 2.3 | | | |
| p0 queue free % | 74 | 47 | 97 | | | |
| cM capacity (veh/h) | 462 | 667 | 1115 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 472 | 164 | 376 | | | |
| Volume Left | 118 | 37 | 0 | | | |
| Volume Right | 354 | 0 | 18 | | | |
| cSH | 600 | 1115 | 1700 | | | |
| Volume to Capacity | 0.79 | 0.03 | 0.22 | | | |
| Queue Length 95th (m) | 52.6 | 0.7 | 0.0 | | | |
| Control Delay (s) | 29.5 | 2.1 | 0.0 | | | |
| Lane LOS | D | A | | | | |
| Approach Delay (s) | 29.5 | 2.1 | 0.0 | | | |
| Approach LOS | D | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 14.1 | | | |
| Intersection Capacity Utilization | | 64.1% | | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↘ | ↗ |
| Traffic Volume (veh/h) | 0 | 1471 | 174 | 0 | 167 | 594 |
| Future Volume (Veh/h) | 0 | 1471 | 174 | 0 | 167 | 594 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 0 | 1634 | 193 | 0 | 186 | 660 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 193 | | | | 1010 | 96 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 193 | | | | 1010 | 96 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 20 | 29 |
| cM capacity (veh/h) | 1356 | | | | 231 | 931 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 817 | 817 | 96 | 96 | 186 | 660 |
| Volume Left | 0 | 0 | 0 | 0 | 186 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 660 |
| cSH | 1700 | 1700 | 1700 | 1700 | 231 | 931 |
| Volume to Capacity | 0.48 | 0.48 | 0.06 | 0.06 | 0.80 | 0.71 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 42.0 | 43.2 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 63.7 | 17.7 |
| Lane LOS | | | | | F | C |
| Approach Delay (s) | 0.0 | | 0.0 | | 27.8 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 8.8 | | | |
| Intersection Capacity Utilization | | | 59.4% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |





| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 751 | 0 | 0 | 81 | 142 | 22 |
| Future Volume (Veh/h) | 751 | 0 | 0 | 81 | 142 | 22 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 834 | 0 | 0 | 90 | 158 | 24 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 834 | | 879 | 417 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 834 | | 879 | 417 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 44 | 96 |
| cM capacity (veh/h) | | | 776 | | 281 | 576 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 417 | 417 | 45 | 45 | 182 | |
| Volume Left | 0 | 0 | 0 | 0 | 158 | |
| Volume Right | 0 | 0 | 0 | 0 | 24 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 302 | |
| Volume to Capacity | 0.25 | 0.25 | 0.03 | 0.03 | 0.60 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 25.7 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 33.5 | |
| Lane LOS | | | | | D | |
| Approach Delay (s) | 0.0 | | 0.0 | | 33.5 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.5 | | | |
| Intersection Capacity Utilization | | | 59.4% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

| Intersection | |
|---------------------------|----|
| Intersection Delay, s/veh | 12 |
| Intersection LOS | B |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 58 | 8 | 49 | 183 | 132 | 300 |
| Future Vol, veh/h | 58 | 8 | 49 | 183 | 132 | 300 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 10 | 1 | 7 | 4 | 2 | 2 |
| Mvmt Flow | 64 | 9 | 54 | 203 | 147 | 333 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|----------------------------|-----|-----|------|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 9.6 | 9.2 | 13.9 |
| HCM LOS | A | A | B |

























| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 88% | 31% |
| Vol Thru, % | 21% | 0% | 69% |
| Vol Right, % | 79% | 12% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 232 | 66 | 432 |
| LT Vol | 0 | 58 | 132 |
| Through Vol | 49 | 0 | 300 |
| RT Vol | 183 | 8 | 0 |
| Lane Flow Rate | 258 | 73 | 480 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.306 | 0.117 | 0.596 |
| Departure Headway (Hd) | 4.267 | 5.752 | 4.467 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 840 | 620 | 806 |
| Service Time | 2.3 | 3.814 | 2.496 |
| HCM Lane V/C Ratio | 0.307 | 0.118 | 0.596 |
| HCM Control Delay | 9.2 | 9.6 | 13.9 |
| HCM Lane LOS | A | A | B |
| HCM 95th-tile Q | 1.3 | 0.4 | 4 |

| Intersection | | | | | | | | | | | | |
|----------------------------|-------|---|-------|-------|---|------|------|---|------|------|---|------|
| Intersection Delay, s/veh | 15.5 | | | | | | | | | | | |
| Intersection LOS | C | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 77 | 224 | 14 | 12 | 22 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Future Vol, veh/h | 77 | 224 | 14 | 12 | 22 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 2 | 1 | 1 | 1 | 14 | 1 | 1 | 1 | 7 | 2 | 3 | 4 |
| Mvmt Flow | 86 | 249 | 16 | 13 | 24 | 11 | 8 | 189 | 51 | 68 | 291 | 42 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 16.3 | | | 10.1 | | | 12.4 | | | 17.3 | | |
| HCM LOS | C | | | B | | | B | | | C | | |
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | | | | | | | | |
| Vol Left, % | 3% | 24% | 27% | 17% | | | | | | | | |
| Vol Thru, % | 76% | 71% | 50% | 73% | | | | | | | | |
| Vol Right, % | 21% | 4% | 23% | 11% | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | | | | | | | | |
| Traffic Vol by Lane | 223 | 315 | 44 | 361 | | | | | | | | |
| LT Vol | 7 | 77 | 12 | 61 | | | | | | | | |
| Through Vol | 170 | 224 | 22 | 262 | | | | | | | | |
| RT Vol | 46 | 14 | 10 | 38 | | | | | | | | |
| Lane Flow Rate | 248 | 350 | 49 | 401 | | | | | | | | |
| Geometry Grp | 1 | 1 | 1 | 1 | | | | | | | | |
| Degree of Util (X) | 0.392 | 0.567 | 0.088 | 0.618 | | | | | | | | |
| Departure Headway (Hd) | 5.691 | 5.833 | 6.5 | 5.544 | | | | | | | | |
| Convergence, Y/N | Yes | Yes | Yes | Yes | | | | | | | | |
| Cap | 627 | 616 | 554 | 646 | | | | | | | | |
| Service Time | 3.768 | 3.902 | 4.5 | 3.611 | | | | | | | | |
| HCM Lane V/C Ratio | 0.396 | 0.568 | 0.088 | 0.621 | | | | | | | | |
| HCM Control Delay | 12.4 | 16.3 | 10.1 | 17.3 | | | | | | | | |
| HCM Lane LOS | B | C | B | C | | | | | | | | |
| HCM 95th-tile Q | 1.9 | 3.5 | 0.3 | 4.3 | | | | | | | | |

4055 & 4120 Russell Road

1: Russell & Walkley

Existing Traffic PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 85 | 1101 | 222 | 304 | 646 | 76 | 136 | 257 | 359 | 100 | 403 | 103 |
| Future Volume (vph) | 85 | 1101 | 222 | 304 | 646 | 76 | 136 | 257 | 359 | 100 | 403 | 103 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3010 | 3468 | 1535 | 3154 | 3338 | 1402 | 3217 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 247 | | | 154 | | | 207 | | | 207 |
| Lane Group Flow (vph) | 94 | 1223 | 247 | 338 | 718 | 84 | 151 | 286 | 399 | 111 | 448 | 114 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 13.0 | 58.0 | 58.0 | 20.0 | 65.0 | 65.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 9.3 | 50.8 | 50.8 | 16.2 | 57.7 | 57.7 | 9.2 | 25.5 | 25.5 | 8.8 | 25.1 | 25.1 |
| Actuated g/c Ratio | 0.07 | 0.39 | 0.39 | 0.12 | 0.44 | 0.44 | 0.07 | 0.20 | 0.20 | 0.07 | 0.19 | 0.19 |
| v/c Ratio | 0.82 | 0.90 | 0.36 | 0.90 | 0.47 | 0.11 | 0.68 | 0.44 | 0.90 | 0.51 | 0.71 | 0.26 |
| Control Delay | 105.7 | 47.8 | 4.6 | 83.1 | 26.6 | 0.3 | 74.5 | 47.7 | 48.9 | 66.8 | 55.6 | 1.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 105.7 | 47.8 | 4.6 | 83.1 | 26.6 | 0.3 | 74.5 | 47.7 | 48.9 | 66.8 | 55.6 | 1.4 |
| LOS | F | D | A | F | C | A | E | D | D | E | E | A |
| Approach Delay | | 44.5 | | | 41.4 | | | 53.1 | | | 48.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | ~26.1 | 141.7 | 0.0 | ~45.5 | 61.3 | 0.0 | 18.1 | 30.8 | 47.0 | 13.1 | 51.2 | 0.0 |
| Queue Length 95th (m) | #58.4 | #174.8 | 15.0 | #73.1 | 77.0 | 0.0 | #28.7 | 43.4 | #98.7 | 22.1 | 67.9 | 0.0 |
| Internal Link Dist (m) | | 485.7 | | | 397.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 115 | 1354 | 684 | 376 | 1539 | 766 | 229 | 708 | 460 | 234 | 689 | 459 |
| 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 | 0.82 | 0.90 | 0.36 | 0.90 | 0.47 | 0.11 | 0.66 | 0.40 | 0.87 | 0.47 | 0.65 | 0.25 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 46.0

Intersection LOS: D

Intersection Capacity Utilization 83.1%

ICU Level of Service E

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

























Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|---|---|
|  |  |  |  |
| 20 s | 58 s | 17 s | 35 s |
|  |  |  |  |
| 13 s | 65 s | 17 s | 35 s |

4055 & 4120 Russell Road

1: Russell & Walkley

2023 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 76 | 486 | 135 | 391 | 1231 | 64 | 216 | 409 | 500 | 55 | 219 | 135 |
| Future Volume (vph) | 76 | 486 | 135 | 391 | 1231 | 64 | 216 | 409 | 500 | 55 | 219 | 135 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3082 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 180 | | | 134 | | | 500 | | | 180 |
| Lane Group Flow (vph) | 76 | 486 | 135 | 391 | 1231 | 64 | 216 | 409 | 500 | 55 | 219 | 135 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.3 | 58.6 | 58.6 | 24.8 | 70.1 | 70.1 | 12.4 | 32.7 | 32.7 | 7.9 | 25.5 | 25.5 |
| Actuated g/c Ratio | 0.09 | 0.39 | 0.39 | 0.17 | 0.47 | 0.47 | 0.08 | 0.22 | 0.22 | 0.05 | 0.17 | 0.17 |
| v/c Ratio | 0.63 | 0.38 | 0.21 | 0.79 | 0.77 | 0.08 | 0.85 | 0.58 | 0.74 | 0.32 | 0.40 | 0.35 |
| Control Delay | 87.4 | 36.1 | 2.3 | 71.3 | 39.1 | 0.2 | 95.8 | 56.1 | 11.2 | 72.9 | 56.2 | 4.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 87.4 | 36.1 | 2.3 | 71.3 | 39.1 | 0.2 | 95.8 | 56.1 | 11.2 | 72.9 | 56.2 | 4.5 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 35.2 | | | 45.1 | | | 43.7 | | | 41.4 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 20.4 | 51.5 | 0.0 | 53.6 | 151.4 | 0.0 | 30.6 | 53.2 | 0.0 | 7.6 | 27.8 | 0.0 |
| Queue Length 95th (m) | 35.5 | 73.6 | 5.1 | 67.1 | #207.8 | 0.0 | #50.6 | 68.4 | 33.6 | 14.4 | 38.3 | 5.7 |
| Internal Link Dist (m) | | 485.7 | | | 361.7 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1290 | 629 | 775 | 1606 | 768 | 255 | 726 | 683 | 270 | 693 | 437 |
| 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 | 0.46 | 0.38 | 0.21 | 0.50 | 0.77 | 0.08 | 0.85 | 0.56 | 0.73 | 0.20 | 0.32 | 0.31 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 42.6

Intersection LOS: D

Intersection Capacity Utilization 80.7%









ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.























Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|--|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 45 s | 45 s | 20 s | 40 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 24.4 s | 65.6 s | 20 s | 40 s |

4055 & 4120 Russell Road 2: Hawthorne & Russell

2023 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 15 | 10 | 334 | 17 | 891 | 8 | 51 | 548 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 15 | 10 | 334 | 17 | 891 | 8 | 51 | 548 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3104 | 0 | 1488 | 2985 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.433 | | | 0.298 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 771 | 3104 | 0 | 467 | 2985 | 0 |
| Satd. Flow (RTOR) | | 352 | | | | 175 | | 2 | | | 14 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 15 | 10 | 334 | 17 | 899 | 0 | 51 | 582 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 64.0 | 64.0 | | 64.0 | 64.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 16.2 | 16.2 | | 16.2 | 16.2 | 16.2 | 61.6 | 61.6 | | 61.6 | 61.6 | |
| Actuated g/c Ratio | 0.18 | 0.18 | | 0.18 | 0.18 | 0.18 | 0.68 | 0.68 | | 0.68 | 0.68 | |
| v/c Ratio | 0.06 | 0.02 | | 0.07 | 0.03 | 0.80 | 0.03 | 0.42 | | 0.16 | 0.28 | |
| Control Delay | 28.6 | 0.0 | | 28.9 | 27.9 | 31.1 | 3.9 | 4.9 | | 7.7 | 6.4 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 28.6 | 0.0 | | 28.9 | 27.9 | 31.1 | 3.9 | 4.9 | | 7.7 | 6.4 | |
| LOS | C | A | | C | C | C | A | A | | A | A | |
| Approach Delay | | 15.9 | | | 30.9 | | | 4.9 | | | 6.5 | |
| Approach LOS | | B | | | C | | | A | | | A | |
| Queue Length 50th (m) | 1.3 | 0.0 | | 2.0 | 1.3 | 23.7 | 0.5 | 13.1 | | 2.7 | 17.1 | |
| Queue Length 95th (m) | 5.0 | 0.0 | | 6.5 | 5.0 | 50.4 | m1.0 | 16.5 | | 7.7 | 26.5 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 227 | 560 | | 265 | 403 | 478 | 527 | 2124 | | 319 | 2047 | |
| 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 | 0.04 | 0.01 | | 0.06 | 0.02 | 0.70 | 0.03 | 0.42 | | 0.16 | 0.28 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 23 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 10.4

Intersection LOS: B









Intersection Capacity Utilization 71.3%

ICU Level of Service C

Analysis Period (min) 15

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






















Splits and Phases: 2: Hawthorne & Russell

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø2 (R) | | | Ø4 |
| 64 s | | | 26 s |
|  |  |  |  |
| Ø6 (R) | | | Ø8 |
| 64 s | | | 26 s |

4055 & 4120 Russell Road

3: Hawthorne & Stevenage

2023 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 923 | 86 | 52 | 316 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 923 | 86 | 52 | 316 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3092 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.503 | | | 0.252 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 880 | 3092 | 0 | 379 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 13 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 208 | 1009 | 0 | 52 | 316 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.4 | 46.4 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.31 | 0.54 | | 0.17 | 0.21 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.4 | 14.6 | | 3.4 | 10.1 | 6.8 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.4 | 14.6 | | 3.4 | 10.1 | 6.8 |
| LOS | D | B | | C | C | | A | B | | A | B | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 13.4 | | | 8.3 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 10.0 | 50.7 | | 0.7 | 14.3 | 3.6 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.8 | 89.0 | | 1.1 | 28.5 | 25.4 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 684 | 1860 | | 342 | 1474 | 826 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.30 | 0.54 | | 0.15 | 0.21 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.1







Intersection LOS: B

Intersection Capacity Utilization 63.4%

ICU Level of Service B

Analysis Period (min) 15























Splits and Phases: 3: Hawthorne & Stevenage

| | | |
|---|---|--|
|  |  |  |
| Ø1 | Ø2 (R) | Ø4 |
| 15 s | 40 s | 35 s |
|  |  |  |
| Ø5 | Ø6 (R) | Ø8 |
| 15 s | 40 s | 35 s |

4055 & 4120 Russell Road

4: Hawthorne & Hunt Club

2023 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 416 | 625 | 25 | 251 | 678 | 246 | 40 | 412 | 382 | 43 | 147 | 163 |
| Future Volume (vph) | 416 | 625 | 25 | 251 | 678 | 246 | 40 | 412 | 382 | 43 | 147 | 163 |
| Satd. Flow (prot) | 1639 | 3333 | 0 | 1595 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.659 | | | 0.129 | | |
| Satd. Flow (perm) | 1639 | 3333 | 0 | 1595 | 3402 | 1440 | 1032 | 2974 | 0 | 162 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 3 | | | | 246 | | 152 | | | | 163 |
| Lane Group Flow (vph) | 416 | 650 | 0 | 251 | 678 | 246 | 40 | 794 | 0 | 43 | 147 | 163 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 41.4 | 41.4 | | 41.4 | 41.4 | 41.4 | 21.3 | 36.3 | | 21.3 | 36.3 | 36.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 35.2 | 42.5 | | 25.5 | 32.8 | 32.8 | 36.8 | 30.2 | | 38.5 | 31.1 | 31.1 |
| Actuated g/c Ratio | 0.27 | 0.33 | | 0.20 | 0.25 | 0.25 | 0.28 | 0.23 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 0.93 | 0.59 | | 0.80 | 0.79 | 0.45 | 0.12 | 0.98 | | 0.37 | 0.22 | 0.38 |
| Control Delay | 76.9 | 41.3 | | 69.1 | 53.4 | 7.5 | 31.4 | 68.3 | | 39.6 | 42.5 | 8.9 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 76.9 | 41.3 | | 69.1 | 53.4 | 7.5 | 31.4 | 68.3 | | 39.6 | 42.5 | 8.9 |
| LOS | E | D | | E | D | A | C | E | | D | D | A |
| Approach Delay | | 55.2 | | | 47.1 | | | 66.5 | | | 26.7 | |
| Approach LOS | | E | | | D | | | E | | | C | |
| Queue Length 50th (m) | 101.1 | 69.4 | | 59.1 | 80.7 | 0.0 | 6.6 | ~88.8 | | 7.2 | 15.4 | 0.0 |
| Queue Length 95th (m) | #166.5 | 100.1 | | 83.2 | 104.8 | 19.4 | 14.4 | #133.1 | | 15.4 | 25.0 | 16.9 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 445 | 1094 | | 433 | 924 | 570 | 383 | 808 | | 172 | 657 | 429 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.93 | 0.59 | | 0.58 | 0.73 | 0.43 | 0.10 | 0.98 | | 0.25 | 0.22 | 0.38 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 129.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 52.3

Intersection LOS: D

Intersection Capacity Utilization 94.6%

ICU Level of Service F

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.










Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|---|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |











4055 & 4120 Russell Road
5: Belgreen & Russell

2023 Future Background AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 25 | 42 | 155 | 416 | 39 | 22 |
| Future Volume (Veh/h) | 25 | 42 | 155 | 416 | 39 | 22 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 25 | 42 | 155 | 416 | 39 | 22 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 67 | | 772 | 46 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 67 | | 772 | 46 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.5 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.9 | 3.5 |
| p0 queue free % | | | 90 | | 86 | 98 |
| cM capacity (veh/h) | | | 1528 | | 287 | 962 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 67 | 571 | 61 | | | |
| Volume Left | 0 | 155 | 39 | | | |
| Volume Right | 42 | 0 | 22 | | | |
| cSH | 1700 | 1528 | 384 | | | |
| Volume to Capacity | 0.04 | 0.10 | 0.16 | | | |
| Queue Length 95th (m) | 0.0 | 2.4 | 3.9 | | | |
| Control Delay (s) | 0.0 | 2.8 | 16.1 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 2.8 | 16.1 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.7 | | | |
| Intersection Capacity Utilization | | | 49.2% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










4055 & 4120 Russell Road
6: Hunt Club & Hwy 417 Offramp

2023 Future Background AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 2 | 828 | 0 | 850 | 648 | 0 |
| Future Volume (Veh/h) | 2 | 828 | 0 | 850 | 648 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 828 | 0 | 850 | 648 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1498 | 648 | 648 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1498 | 648 | 648 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 99 | 0 | 100 | | | |
| cM capacity (veh/h) | 135 | 458 | 947 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 2 | 828 | 850 | 648 | | |
| Volume Left | 2 | 0 | 0 | 0 | | |
| Volume Right | 0 | 828 | 0 | 0 | | |
| cSH | 135 | 458 | 1700 | 1700 | | |
| Volume to Capacity | 0.01 | 1.81 | 0.50 | 0.38 | | |
| Queue Length 95th (m) | 0.3 | 365.3 | 0.0 | 0.0 | | |
| Control Delay (s) | 32.0 | 392.9 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 392.1 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | | 139.8 | | |
| Intersection Capacity Utilization | | | | 96.8% | ICU Level of Service | F |
| Analysis Period (min) | | | | 15 | | |

4055 & 4120 Russell Road
7: Ramsayville & Russell

2023 Future Background AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 24 | 21 | 390 | 347 | 145 | 204 |
| Future Volume (Veh/h) | 24 | 21 | 390 | 347 | 145 | 204 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 24 | 21 | 390 | 347 | 145 | 204 |
| Pedestrians | | | | 2 | | |
| Lane Width (m) | | | | 4.0 | | |
| Walking Speed (m/s) | | | | 1.0 | | |
| Percent Blockage | | | | 0 | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1374 | 249 | 349 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1374 | 249 | 349 | | | |
| tC, single (s) | 6.9 | 6.4 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 4.0 | 3.5 | 2.2 | | | |
| p0 queue free % | 72 | 97 | 67 | | | |
| cM capacity (veh/h) | 86 | 746 | 1199 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 45 | 737 | 349 | | | |
| Volume Left | 24 | 390 | 0 | | | |
| Volume Right | 21 | 0 | 204 | | | |
| cSH | 146 | 1199 | 1700 | | | |
| Volume to Capacity | 0.31 | 0.33 | 0.21 | | | |
| Queue Length 95th (m) | 8.6 | 10.0 | 0.0 | | | |
| Control Delay (s) | 40.4 | 6.8 | 0.0 | | | |
| Lane LOS | E | A | | | | |
| Approach Delay (s) | 40.4 | 6.8 | 0.0 | | | |
| Approach LOS | E | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 6.0 | | | |
| Intersection Capacity Utilization | | | 77.3% | ICU Level of Service | | D |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
10: Walkley & SB off-ramp







2023 Future Background AM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 463 | 994 | 0 | 23 | 966 |
| Future Volume (Veh/h) | 0 | 463 | 994 | 0 | 23 | 966 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 463 | 994 | 0 | 23 | 966 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 994 | | | | 1226 | 497 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 994 | | | | 1226 | 497 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 86 | 0 |
| cM capacity (veh/h) | 674 | | | | 167 | 511 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 232 | 232 | 497 | 497 | 23 | 966 |
| Volume Left | 0 | 0 | 0 | 0 | 23 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 966 |
| cSH | 1700 | 1700 | 1700 | 1700 | 167 | 511 |
| Volume to Capacity | 0.14 | 0.14 | 0.29 | 0.29 | 0.14 | 1.89 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 438.9 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 30.0 | 427.8 |
| Lane LOS | | | | | D | F |
| Approach Delay (s) | 0.0 | | 0.0 | | 418.5 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 169.2 | | | |
| Intersection Capacity Utilization | | | 98.8% | | ICU Level of Service | F |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
11: NB Off-ramp & Walkley




2023 Future Background AM Peak Hour

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↓ | |
| Traffic Volume (veh/h) | 164 | 0 | 0 | 930 | 553 | 57 |
| Future Volume (Veh/h) | 164 | 0 | 0 | 930 | 553 | 57 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 164 | 0 | 0 | 930 | 553 | 57 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 164 | | 629 | 82 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 164 | | 629 | 82 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 0 | 94 |
| cM capacity (veh/h) | | | 1390 | | 408 | 952 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 82 | 82 | 465 | 465 | 610 | |
| Volume Left | 0 | 0 | 0 | 0 | 553 | |
| Volume Right | 0 | 0 | 0 | 0 | 57 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 431 | |
| Volume to Capacity | 0.05 | 0.05 | 0.27 | 0.27 | 1.42 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 210.3 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 225.9 | |
| Lane LOS | | | | | F | |
| Approach Delay (s) | 0.0 | | 0.0 | | 225.9 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 80.9 | | | |
| Intersection Capacity Utilization | | | 98.8% | ICU Level of Service | | F |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
8: Ramsayville & Russell N

2023 Future Background AM Peak Hour

| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 21.5 |
| Intersection LOS | C |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 290 | 300 | 340 | 36 | 10 | 22 |
| Future Vol, veh/h | 290 | 300 | 340 | 36 | 10 | 22 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 4 | 1 | 1 | 15 | 1 | 20 |
| Mvmt Flow | 290 | 300 | 340 | 36 | 10 | 22 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |





| Approach | WB | NB | SB |
|----------------------------|------|------|-----|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 25.9 | 15.7 | 9.6 |
| HCM LOS | D | C | A |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 49% | 31% |
| Vol Thru, % | 90% | 0% | 69% |
| Vol Right, % | 10% | 51% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 376 | 590 | 32 |
| LT Vol | 0 | 290 | 10 |
| Through Vol | 340 | 0 | 22 |
| RT Vol | 36 | 300 | 0 |
| Lane Flow Rate | 376 | 590 | 32 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.573 | 0.814 | 0.055 |
| Departure Headway (Hd) | 5.485 | 4.965 | 6.2 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 658 | 732 | 575 |
| Service Time | 3.529 | 2.965 | 4.263 |
| HCM Lane V/C Ratio | 0.571 | 0.806 | 0.056 |
| HCM Control Delay | 15.7 | 25.9 | 9.6 |
| HCM Lane LOS | C | D | A |
| HCM 95th-tile Q | 3.6 | 8.7 | 0.2 |

4055 & 4120 Russell Road
9: Anderson & Russell

2023 Future Background AM Peak Hour

| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 34.1 |
| Intersection LOS | D |

























| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|---|------|------|---|------|------|---|------|------|---|------|
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 35 | 16 | 3 | 48 | 331 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Future Vol, veh/h | 35 | 16 | 3 | 48 | 331 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 11 | 7 | 1 | 1 | 2 | 3 | 1 | 3 | 17 | 1 | 4 | 2 |
| Mvmt Flow | 35 | 16 | 3 | 48 | 331 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 12.5 | | | 40.6 | | | 40 | | | 17.5 | | |
| HCM LOS | B | | | E | | | E | | | C | | |

| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, % | 36% | 65% | 10% | 2% |
| Vol Thru, % | 63% | 30% | 67% | 47% |
| Vol Right, % | 1% | 6% | 24% | 52% |
| Sign Control | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 481 | 54 | 497 | 297 |
| LT Vol | 171 | 35 | 48 | 5 |
| Through Vol | 304 | 16 | 331 | 139 |
| RT Vol | 6 | 3 | 118 | 153 |
| Lane Flow Rate | 481 | 54 | 497 | 297 |
| Geometry Grp | 1 | 1 | 1 | 1 |
| Degree of Util (X) | 0.876 | 0.125 | 0.885 | 0.546 |
| Departure Headway (Hd) | 6.558 | 8.342 | 6.411 | 6.619 |
| Convergence, Y/N | Yes | Yes | Yes | Yes |
| Cap | 548 | 433 | 562 | 541 |
| Service Time | 4.639 | 6.342 | 4.487 | 4.715 |
| HCM Lane V/C Ratio | 0.878 | 0.125 | 0.884 | 0.549 |
| HCM Control Delay | 40 | 12.5 | 40.6 | 17.5 |
| HCM Lane LOS | E | B | E | C |
| HCM 95th-tile Q | 9.8 | 0.4 | 10.2 | 3.3 |

4055 & 4120 Russell Road

1: Russell & Walkley

2023 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 76 | 486 | 135 | 391 | 1231 | 64 | 216 | 409 | 500 | 55 | 219 | 135 |
| Future Volume (vph) | 76 | 486 | 135 | 391 | 1231 | 64 | 216 | 409 | 500 | 55 | 219 | 135 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3082 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 180 | | | 134 | | | 500 | | | 180 |
| Lane Group Flow (vph) | 76 | 486 | 135 | 391 | 1231 | 64 | 216 | 409 | 500 | 55 | 219 | 135 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.3 | 58.6 | 58.6 | 24.8 | 70.1 | 70.1 | 12.4 | 32.7 | 32.7 | 7.9 | 25.5 | 25.5 |
| Actuated g/c Ratio | 0.09 | 0.39 | 0.39 | 0.17 | 0.47 | 0.47 | 0.08 | 0.22 | 0.22 | 0.05 | 0.17 | 0.17 |
| v/c Ratio | 0.63 | 0.38 | 0.21 | 0.79 | 0.77 | 0.08 | 0.85 | 0.58 | 0.74 | 0.32 | 0.40 | 0.35 |
| Control Delay | 87.4 | 36.1 | 2.3 | 71.3 | 39.1 | 0.2 | 95.8 | 56.1 | 11.2 | 72.9 | 56.2 | 4.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 87.4 | 36.1 | 2.3 | 71.3 | 39.1 | 0.2 | 95.8 | 56.1 | 11.2 | 72.9 | 56.2 | 4.5 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 35.2 | | | 45.1 | | | 43.7 | | | 41.4 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 20.4 | 51.5 | 0.0 | 53.6 | 151.4 | 0.0 | 30.6 | 53.2 | 0.0 | 7.6 | 27.8 | 0.0 |
| Queue Length 95th (m) | 35.5 | 73.6 | 5.1 | 67.1 | #207.8 | 0.0 | #50.6 | 68.4 | 33.6 | 14.4 | 38.3 | 5.7 |
| Internal Link Dist (m) | | 485.7 | | | 361.7 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1290 | 629 | 775 | 1606 | 768 | 255 | 726 | 683 | 270 | 693 | 437 |
| 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 | 0.46 | 0.38 | 0.21 | 0.50 | 0.77 | 0.08 | 0.85 | 0.56 | 0.73 | 0.20 | 0.32 | 0.31 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 42.6

Intersection LOS: D

Intersection Capacity Utilization 80.7%









ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.























Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|--|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 45 s | 45 s | 20 s | 40 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 24.4 s | 65.6 s | 20 s | 40 s |

4055 & 4120 Russell Road

2: Hawthorne & Russell

2023 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 15 | 10 | 334 | 17 | 891 | 8 | 51 | 548 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 15 | 10 | 334 | 17 | 891 | 8 | 51 | 548 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3104 | 0 | 1488 | 2985 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.433 | | | 0.298 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 771 | 3104 | 0 | 467 | 2985 | 0 |
| Satd. Flow (RTOR) | | 352 | | | | 175 | | 2 | | | 14 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 15 | 10 | 334 | 17 | 899 | 0 | 51 | 582 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 64.0 | 64.0 | | 64.0 | 64.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 16.2 | 16.2 | | 16.2 | 16.2 | 16.2 | 61.6 | 61.6 | | 61.6 | 61.6 | |
| Actuated g/C Ratio | 0.18 | 0.18 | | 0.18 | 0.18 | 0.18 | 0.68 | 0.68 | | 0.68 | 0.68 | |
| v/c Ratio | 0.06 | 0.02 | | 0.07 | 0.03 | 0.80 | 0.03 | 0.42 | | 0.16 | 0.28 | |
| Control Delay | 28.6 | 0.0 | | 28.9 | 27.9 | 31.1 | 3.9 | 4.9 | | 7.7 | 6.4 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 28.6 | 0.0 | | 28.9 | 27.9 | 31.1 | 3.9 | 4.9 | | 7.7 | 6.4 | |
| LOS | C | A | | C | C | C | A | A | | A | A | |
| Approach Delay | | 15.9 | | | 30.9 | | | 4.9 | | | 6.5 | |
| Approach LOS | | B | | | C | | | A | | | A | |
| Queue Length 50th (m) | 1.3 | 0.0 | | 2.0 | 1.3 | 23.7 | 0.5 | 13.1 | | 2.7 | 17.1 | |
| Queue Length 95th (m) | 5.0 | 0.0 | | 6.5 | 5.0 | 50.4 | m1.0 | 16.5 | | 7.7 | 26.5 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 227 | 560 | | 265 | 403 | 478 | 527 | 2124 | | 319 | 2047 | |
| 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 | 0.04 | 0.01 | | 0.06 | 0.02 | 0.70 | 0.03 | 0.42 | | 0.16 | 0.28 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 23 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 10.4

Intersection LOS: B









Intersection Capacity Utilization 71.3%

ICU Level of Service C

Analysis Period (min) 15

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






















Splits and Phases: 2: Hawthorne & Russell

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø2 (R) | | | Ø4 |
| 64 s | | | 26 s |
|  |  |  |  |
| Ø6 (R) | | | Ø8 |
| 64 s | | | 26 s |

4055 & 4120 Russell Road

3: Hawthorne & Stevenage

2023 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 206 | 923 | 86 | 52 | 316 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 206 | 923 | 86 | 52 | 316 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3092 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.503 | | | 0.252 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 880 | 3092 | 0 | 379 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 13 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 206 | 1009 | 0 | 52 | 316 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.5 | 46.5 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.30 | 0.54 | | 0.17 | 0.21 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.4 | 14.6 | | 3.4 | 10.1 | 6.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.4 | 14.6 | | 3.4 | 10.1 | 6.7 |
| LOS | D | B | | C | C | | A | B | | A | B | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 13.4 | | | 8.3 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 9.9 | 50.7 | | 0.7 | 14.3 | 3.6 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.6 | 89.0 | | 1.1 | 28.5 | 25.4 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 684 | 1860 | | 342 | 1476 | 827 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.30 | 0.54 | | 0.15 | 0.21 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.1

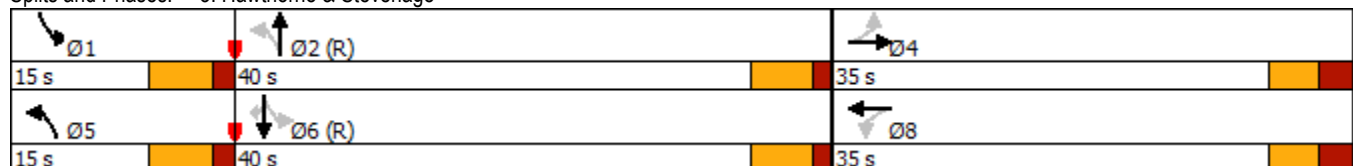
Intersection LOS: B

Intersection Capacity Utilization 63.3%

ICU Level of Service B























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



4055 & 4120 Russell Road 4: Hawthorne & Hunt Club

2023 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 416 | 625 | 25 | 251 | 678 | 246 | 40 | 412 | 382 | 43 | 147 | 163 |
| Future Volume (vph) | 416 | 625 | 25 | 251 | 678 | 246 | 40 | 412 | 382 | 43 | 147 | 163 |
| Satd. Flow (prot) | 3179 | 3333 | 0 | 3094 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.659 | | | 0.128 | | |
| Satd. Flow (perm) | 3179 | 3333 | 0 | 3094 | 3402 | 1440 | 1032 | 2974 | 0 | 160 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 3 | | | | 246 | | 152 | | | | 163 |
| Lane Group Flow (vph) | 416 | 650 | 0 | 251 | 678 | 246 | 40 | 794 | 0 | 43 | 147 | 163 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 41.4 | 41.4 | | 41.4 | 41.4 | 41.4 | 21.3 | 36.3 | | 21.3 | 36.3 | 36.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 20.3 | 37.8 | | 14.8 | 32.2 | 32.2 | 36.7 | 30.5 | | 38.1 | 31.2 | 31.2 |
| Actuated g/C Ratio | 0.18 | 0.33 | | 0.13 | 0.28 | 0.28 | 0.32 | 0.27 | | 0.33 | 0.27 | 0.27 |
| v/c Ratio | 0.74 | 0.59 | | 0.63 | 0.71 | 0.42 | 0.11 | 0.88 | | 0.34 | 0.20 | 0.35 |
| Control Delay | 53.8 | 35.1 | | 56.0 | 42.7 | 6.8 | 26.1 | 45.9 | | 32.8 | 36.0 | 8.0 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 53.8 | 35.1 | | 56.0 | 42.7 | 6.8 | 26.1 | 45.9 | | 32.8 | 36.0 | 8.0 |
| LOS | D | D | | E | D | A | C | D | | C | D | A |
| Approach Delay | | 42.4 | | | 38.0 | | | 45.0 | | | 22.7 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Queue Length 50th (m) | 44.4 | 59.7 | | 26.9 | 67.9 | 0.0 | 5.5 | 73.4 | | 6.0 | 13.1 | 0.0 |
| Queue Length 95th (m) | 61.9 | 85.0 | | 40.7 | 96.9 | 18.5 | 13.4 | #121.5 | | 14.3 | 23.3 | 16.3 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 992 | 1144 | | 965 | 1061 | 618 | 435 | 906 | | 196 | 751 | 468 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.42 | 0.57 | | 0.26 | 0.64 | 0.40 | 0.09 | 0.88 | | 0.22 | 0.20 | 0.35 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 114.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 39.5

Intersection LOS: D

Intersection Capacity Utilization 82.8%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|---|---|--|---|
|  |  |  |  |
| Ø3 | Ø4 | Ø1 | Ø2 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |
|  |  |  |  |
| Ø7 | Ø8 | Ø5 | Ø6 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |

4055 & 4120 Russell Road
10: Walkley & SB off-ramp

2023 Future Background AM Peak Hour Mod



| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (vph) | 0 | 463 | 994 | 0 | 23 | 936 |
| Future Volume (vph) | 0 | 463 | 994 | 0 | 23 | 936 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 388 |
| Lane Group Flow (vph) | 0 | 463 | 994 | 0 | 23 | 936 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 87.0 | 87.0 | | 33.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 107.6 | 107.6 | | 7.2 | 120.0 |
| Actuated g/C Ratio | | 0.90 | 0.90 | | 0.06 | 1.00 |
| v/c Ratio | | 0.15 | 0.33 | | 0.23 | 0.61 |
| Control Delay | | 1.6 | 4.6 | | 58.3 | 1.9 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 1.6 | 4.6 | | 58.3 | 1.9 |
| LOS | | A | A | | E | A |
| Approach Delay | | 1.6 | 4.6 | | 3.2 | |
| Approach LOS | | A | A | | A | |
| Queue Length 50th (m) | | 7.4 | 42.6 | | 4.9 | 0.0 |
| Queue Length 95th (m) | | 11.7 | 61.1 | | 12.4 | 0.0 |
| Internal Link Dist (m) | | 708.0 | 344.3 | | 267.0 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 3049 | 3049 | | 378 | 1522 |
| 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 | | 0.15 | 0.33 | | 0.06 | 0.61 |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 78 (65%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 3.5

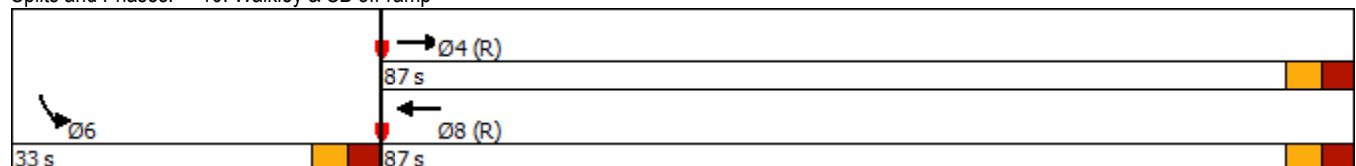
Intersection LOS: A

Intersection Capacity Utilization 73.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Walkley & SB off-ramp



4055 & 4120 Russell Road
11: NB Off-ramp & Walkley

2023 Future Background AM Peak Hour Mod

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 164 | 0 | 0 | 930 | 553 | 57 |
| Future Volume (vph) | 164 | 0 | 0 | 930 | 553 | 57 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Flt Permitted | | | | | 0.957 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Satd. Flow (RTOR) | | | | | 6 | |
| Lane Group Flow (vph) | 164 | 0 | 0 | 930 | 610 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 53.0 | | | 53.0 | 67.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 44.6 | | | 44.6 | 62.8 | |
| Actuated g/C Ratio | 0.37 | | | 0.37 | 0.52 | |
| v/c Ratio | 0.13 | | | 0.74 | 0.69 | |
| Control Delay | 24.2 | | | 36.4 | 26.7 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 24.2 | | | 36.4 | 26.7 | |
| LOS | C | | | D | C | |
| Approach Delay | 24.2 | | | 36.4 | 26.7 | |
| Approach LOS | C | | | D | C | |
| Queue Length 50th (m) | 12.2 | | | 88.2 | 97.9 | |
| Queue Length 95th (m) | 19.3 | | | 109.7 | 138.5 | |
| Internal Link Dist (m) | 344.3 | | | 347.3 | 355.2 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1323 | | | 1323 | 887 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.12 | | | 0.70 | 0.69 | |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 31.8

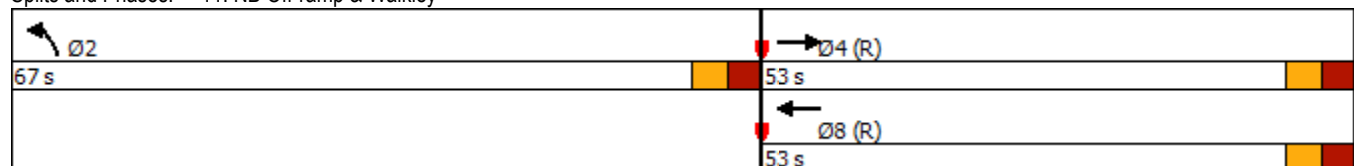
Intersection LOS: C

Intersection Capacity Utilization 73.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: NB Off-ramp & Walkley



Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|---------------------------------|-----------------------------|
| 119124 | 2023 PHF Flow Profile (veh) |
| 2023 Background Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| AM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|-------------------------------|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | Average Delay (sec/veh) | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB - Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2023 AM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 171 | 304 | 6 | 0 | 3.0 | 1.00 | 0.900 |
| 2 | EB - Russell | 0 | 35 | 16 | 3 | 0 | 3.0 | 1.00 | 0.900 |
| 3 | NB- Anderson | 0 | 5 | 139 | 153 | 0 | 3.0 | 1.00 | 0.900 |
| 4 | WB - Russell | 0 | 48 | 331 | 118 | 0 | 3.0 | 1.00 | 0.900 |

Operational Results

Geometry for Target Input

Geometry Options for 2023 AM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 AM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 AM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 AM Peak

| Leg 4 - WB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2023 AM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 481 | | 384 | | 292 | | 749 | 0.6422 |
| 2 | EB - Russell | None | 54 | | 522 | | 342 | | 677 | 0.0797 |
| 3 | NB- Anderson | None | 297 | | 222 | | 355 | | 833 | 0.3567 |
| 4 | WB - Russell | None | 497 | | 179 | | 340 | | 855 | 0.5814 |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 12.30 | | 12.30 | 5.81 | | B | | B |
| 2 | EB - Russell | None | 5.53 | | 5.53 | 0.26 | | A | | A |
| 3 | NB- Anderson | None | 6.34 | | 6.34 | 1.64 | | A | | A |
| 4 | WB - Russell | None | 9.27 | | 9.27 | 4.24 | | A | | A |

2023 AM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 534 | | 425 | | 324 | 728 | | 0.7346 | |
| 2 | EB - Russell | None | 60 | | 578 | | 379 | 649 | | 0.0925 | |
| 3 | NB- Anderson | None | 330 | | 245 | | 392 | 820 | | 0.4022 | |
| 4 | WB - Russell | None | 552 | | 199 | | 376 | 845 | | 0.6538 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 13.93 | | 13.93 | 5.81 | | B | | B |
| 2 | EB - Russell | None | 5.57 | | 5.57 | 0.26 | | A | | A |
| 3 | NB- Anderson | None | 6.48 | | 6.48 | 1.64 | | A | | A |
| 4 | WB - Russell | None | 9.99 | | 9.99 | 4.24 | | A | | A |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|--------|-------|--------|-------|------|-------|-------|--------|-------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 96 | 1360 | 248 | 453 | 681 | 80 | 148 | 279 | 535 | 105 | 434 | 109 |
| Future Volume (vph) | 96 | 1360 | 248 | 453 | 681 | 80 | 148 | 279 | 535 | 105 | 434 | 109 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3011 | 3468 | 1535 | 3154 | 3338 | 1402 | 3217 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 248 | | | 154 | | | 207 | | | 207 |
| Lane Group Flow (vph) | 96 | 1360 | 248 | 453 | 681 | 80 | 148 | 279 | 535 | 105 | 434 | 109 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 12.0 | 58.0 | 58.0 | 20.0 | 66.0 | 66.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 5.6 | 50.7 | 50.7 | 13.6 | 58.7 | 58.7 | 9.1 | 28.3 | 28.3 | 8.7 | 27.9 | 27.9 |
| Actuated g/c Ratio | 0.04 | 0.39 | 0.39 | 0.10 | 0.45 | 0.45 | 0.07 | 0.22 | 0.22 | 0.07 | 0.21 | 0.21 |
| v/c Ratio | 1.39 | 1.01 | 0.36 | 1.44 | 0.44 | 0.10 | 0.66 | 0.38 | 1.15 | 0.48 | 0.62 | 0.24 |
| Control Delay | 287.3 | 65.5 | 4.7 | 255.2 | 25.4 | 0.3 | 73.8 | 45.5 | 117.1 | 66.0 | 51.0 | 1.2 |
| 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 | 287.3 | 65.5 | 4.7 | 255.2 | 25.4 | 0.3 | 73.8 | 45.5 | 117.1 | 66.0 | 51.0 | 1.2 |
| LOS | F | E | A | F | C | A | E | D | F | E | D | A |
| Approach Delay | | 69.1 | | | 109.5 | | | 89.7 | | | 45.0 | |
| Approach LOS | | E | | | F | | | F | | | D | |
| Queue Length 50th (m) | ~30.1 | ~169.4 | 0.0 | ~74.6 | 56.6 | 0.0 | 17.8 | 30.0 | ~108.7 | 12.4 | 49.4 | 0.0 |
| Queue Length 95th (m) | #62.9 | #215.3 | 15.1 | #104.9 | 71.3 | 0.0 | 28.1 | 42.5 | #171.9 | 21.2 | 65.7 | 0.0 |
| Internal Link Dist (m) | | 485.7 | | | 397.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 69 | 1352 | 684 | 315 | 1565 | 777 | 229 | 725 | 466 | 234 | 695 | 461 |
| 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 | 1.39 | 1.01 | 0.36 | 1.44 | 0.44 | 0.10 | 0.65 | 0.38 | 1.15 | 0.45 | 0.62 | 0.24 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.44

Intersection Signal Delay: 80.9

Intersection LOS: F

Intersection Capacity Utilization 97.8%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.























Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | | | | | |
|------|----|------|--------|------|----|------|----|
| | Ø1 | | Ø2 (R) | | Ø3 | | Ø4 |
| 20 s | | 58 s | | 17 s | | 35 s | |
| | Ø5 | | Ø6 (R) | | Ø7 | | Ø8 |
| 12 s | | 66 s | | 17 s | | 35 s | |

4055 & 4120 Russell Road
2: Hawthorne & Russell

2023 Future Background PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 35 | 7 | 21 | 8 | 3 | 82 | 7 | 716 | 12 | 210 | 869 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 8 | 3 | 82 | 7 | 716 | 12 | 210 | 869 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3292 | 0 | 1639 | 3270 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.318 | | | 0.375 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 412 | 3292 | 0 | 647 | 3270 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 82 | | 4 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 8 | 3 | 82 | 7 | 728 | 0 | 210 | 886 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 54.0 | 54.0 | | 54.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 10.1 | 10.1 | | 10.1 | 10.1 | 10.1 | 62.1 | 62.1 | | 62.1 | 62.1 | |
| Actuated g/C Ratio | 0.13 | 0.13 | | 0.13 | 0.13 | 0.13 | 0.78 | 0.78 | | 0.78 | 0.78 | |
| v/c Ratio | 0.21 | 0.14 | | 0.05 | 0.02 | 0.32 | 0.02 | 0.28 | | 0.42 | 0.35 | |
| Control Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.7 | 3.4 | 3.8 | | 7.5 | 4.2 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.7 | 3.4 | 3.8 | | 7.5 | 4.2 | |
| LOS | C | B | | C | C | B | A | A | | A | A | |
| Approach Delay | | 27.6 | | | 14.0 | | | 3.8 | | | 4.8 | |
| Approach LOS | | C | | | B | | | A | | | A | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 1.0 | 0.4 | 0.0 | 0.2 | 15.3 | | 9.8 | 20.1 | |
| Queue Length 95th (m) | 11.9 | 7.2 | | 4.4 | 2.5 | 10.7 | 1.1 | 21.9 | | 22.5 | 28.1 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 438 | 319 | 2557 | | 502 | 2540 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.02 | 0.01 | 0.19 | 0.02 | 0.28 | | 0.42 | 0.35 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 16 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 5.6













Intersection LOS: A

Intersection Capacity Utilization 58.6%

ICU Level of Service B






















Analysis Period (min) 15

Splits and Phases: 2: Hawthorne & Russell

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø2 (R) | | | Ø4 | | |
| 54 s | | | 26 s | | |
|  |  |  |  |  |  |
| Ø6 (R) | | | Ø8 | | |
| 54 s | | | 26 s | | |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2023 Future Background PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 372 | 59 | 45 | 950 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 372 | 59 | 45 | 950 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3069 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.217 | | | 0.501 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 302 | 3069 | 0 | 698 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 23 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 431 | 0 | 45 | 950 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.31 | 0.25 | | 0.10 | 0.53 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.4 | 13.2 | | 9.0 | 18.6 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.4 | 13.2 | | 9.0 | 18.6 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 12.9 | | | 16.4 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 19.8 | | 2.6 | 57.1 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 34.0 | | 7.5 | 86.4 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 286 | 1728 | | 482 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.29 | 0.25 | | 0.09 | 0.53 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.3









Intersection LOS: B

Intersection Capacity Utilization 76.2%

ICU Level of Service D























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | | Ø4 |
| 15 s | 45 s | | 35 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | | Ø8 |
| 15 s | 45 s | | 35 s |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2023 Future Background PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 254 | 809 | 24 | 423 | 870 | 87 | 25 | 193 | 307 | 167 | 494 | 467 |
| Future Volume (vph) | 254 | 809 | 24 | 423 | 870 | 87 | 25 | 193 | 307 | 167 | 494 | 467 |
| Satd. Flow (prot) | 1595 | 3422 | 0 | 1654 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.428 | | | 0.150 | | |
| Satd. Flow (perm) | 1595 | 3422 | 0 | 1653 | 3468 | 1141 | 774 | 2807 | 0 | 254 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 242 | | | | 467 |
| Lane Group Flow (vph) | 254 | 833 | 0 | 423 | 870 | 87 | 25 | 500 | 0 | 167 | 494 | 467 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 25.7 | 39.1 | | 37.7 | 51.1 | 51.1 | 27.2 | 20.2 | | 40.5 | 32.6 | 32.6 |
| Actuated g/C Ratio | 0.19 | 0.29 | | 0.28 | 0.37 | 0.37 | 0.20 | 0.15 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 0.85 | 0.85 | | 0.93 | 0.67 | 0.17 | 0.12 | 0.81 | | 0.78 | 0.64 | 0.65 |
| Control Delay | 79.3 | 55.9 | | 76.8 | 40.5 | 2.8 | 36.6 | 39.5 | | 63.0 | 52.7 | 8.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 79.3 | 55.9 | | 76.8 | 40.5 | 2.8 | 36.6 | 39.5 | | 63.0 | 52.7 | 8.7 |
| LOS | E | E | | E | D | A | D | D | | E | D | A |
| Approach Delay | | 61.4 | | | 49.2 | | | 39.4 | | | 36.0 | |
| Approach LOS | | E | | | D | | | D | | | D | |
| Queue Length 50th (m) | 63.1 | 105.2 | | 107.8 | 99.5 | 0.0 | 4.6 | 34.9 | | 33.7 | 63.3 | 0.0 |
| Queue Length 95th (m) | #101.1 | 134.2 | | #175.8 | 130.0 | 5.1 | 11.1 | 53.8 | | #58.7 | 82.8 | 29.4 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 353 | 1062 | | 464 | 1304 | 503 | 304 | 734 | | 225 | 773 | 718 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.72 | 0.78 | | 0.91 | 0.67 | 0.17 | 0.08 | 0.68 | | 0.74 | 0.64 | 0.65 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 136.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 47.6

Intersection LOS: D

Intersection Capacity Utilization 96.4%









ICU Level of Service F










Analysis Period (min) 15











95th percentile volume exceeds capacity, queue may be longer.










Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | | | | | |
|---|----|---|----|---|----|---|----|
|  | Ø3 |  | Ø4 |  | Ø1 |  | Ø2 |
| 44.4 s | | 48.4 s | | 21.3 s | | 32.3 s | |
|  | Ø7 |  | Ø8 |  | Ø5 |  | Ø6 |
| 36.4 s | | 56.4 s | | 21.3 s | | 32.3 s | |







| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 303 | 29 | 10 | 34 | 27 | 126 |
| Future Volume (Veh/h) | 303 | 29 | 10 | 34 | 27 | 126 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 303 | 29 | 10 | 34 | 27 | 126 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 332 | | 372 | 318 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 332 | | 372 | 318 |
| tC, single (s) | | | 4.2 | | 6.6 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.3 | | 3.7 | 3.3 |
| p0 queue free % | | | 99 | | 95 | 83 |
| cM capacity (veh/h) | | | 1184 | | 590 | 721 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 332 | 44 | 153 | | | |
| Volume Left | 0 | 10 | 27 | | | |
| Volume Right | 29 | 0 | 126 | | | |
| cSH | 1700 | 1184 | 694 | | | |
| Volume to Capacity | 0.20 | 0.01 | 0.22 | | | |
| Queue Length 95th (m) | 0.0 | 0.2 | 5.9 | | | |
| Control Delay (s) | 0.0 | 1.9 | 11.7 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.9 | 11.7 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.5 | | | |
| Intersection Capacity Utilization | | | 35.1% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 11 | 1343 | 0 | 1057 | 142 | 0 |
| Future Volume (Veh/h) | 11 | 1343 | 0 | 1057 | 142 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 11 | 1343 | 0 | 1057 | 142 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1199 | 142 | 142 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1199 | 142 | 142 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 95 | 0 | 100 | | | |
| cM capacity (veh/h) | 206 | 893 | 1453 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 11 | 1343 | 1057 | 142 | | |
| Volume Left | 11 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1343 | 0 | 0 | | |
| cSH | 206 | 893 | 1700 | 1700 | | |
| Volume to Capacity | 0.05 | 1.50 | 0.62 | 0.08 | | |
| Queue Length 95th (m) | 1.2 | 449.1 | 0.0 | 0.0 | | |
| Control Delay (s) | 23.5 | 247.6 | 0.0 | 0.0 | | |
| Lane LOS | C | F | | | | |
| Approach Delay (s) | 245.7 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 130.3 | | | |
| Intersection Capacity Utilization | | | 102.3% | ICU Level of Service | G | |
| Analysis Period (min) | | | 15 | | | |




| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 110 | 321 | 33 | 114 | 322 | 17 |
| Future Volume (Veh/h) | 110 | 321 | 33 | 114 | 322 | 17 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 110 | 321 | 33 | 114 | 322 | 17 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 510 | 330 | 339 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 510 | 330 | 339 | | | |
| tC, single (s) | 6.5 | 6.3 | 4.2 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.4 | 2.3 | | | |
| p0 queue free % | 78 | 54 | 97 | | | |
| cM capacity (veh/h) | 501 | 700 | 1151 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 431 | 147 | 339 | | | |
| Volume Left | 110 | 33 | 0 | | | |
| Volume Right | 321 | 0 | 17 | | | |
| cSH | 635 | 1151 | 1700 | | | |
| Volume to Capacity | 0.68 | 0.03 | 0.20 | | | |
| Queue Length 95th (m) | 36.7 | 0.6 | 0.0 | | | |
| Control Delay (s) | 21.8 | 2.0 | 0.0 | | | |
| Lane LOS | C | A | | | | |
| Approach Delay (s) | 21.8 | 2.0 | 0.0 | | | |
| Approach LOS | C | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 10.6 | | | |
| Intersection Capacity Utilization | | | 64.5% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 1574 | 184 | 0 | 174 | 636 |
| Future Volume (Veh/h) | 0 | 1574 | 184 | 0 | 174 | 636 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 1574 | 184 | 0 | 174 | 636 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 184 | | | | 971 | 92 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 184 | | | | 971 | 92 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 29 | 32 |
| cM capacity (veh/h) | 1367 | | | | 245 | 938 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 787 | 787 | 92 | 92 | 174 | 636 |
| Volume Left | 0 | 0 | 0 | 0 | 174 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 636 |
| cSH | 1700 | 1700 | 1700 | 1700 | 245 | 938 |
| Volume to Capacity | 0.46 | 0.46 | 0.05 | 0.05 | 0.71 | 0.68 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 33.4 | 38.6 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 49.1 | 16.5 |
| Lane LOS | | | | | E | C |
| Approach Delay (s) | 0.0 | | 0.0 | | 23.5 | |
| Approach LOS | | | | | C | |
| Intersection Summary | | | | | | |
| Average Delay | | | 7.4 | | | |
| Intersection Capacity Utilization | | | 62.8% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |





| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 811 | 0 | 0 | 87 | 156 | 24 |
| Future Volume (Veh/h) | 811 | 0 | 0 | 87 | 156 | 24 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 811 | 0 | 0 | 87 | 156 | 24 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 811 | | 854 | 406 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 811 | | 854 | 406 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 47 | 96 |
| cM capacity (veh/h) | | | 792 | | 292 | 586 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 406 | 406 | 44 | 44 | 180 | |
| Volume Left | 0 | 0 | 0 | 0 | 156 | |
| Volume Right | 0 | 0 | 0 | 0 | 24 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 313 | |
| Volume to Capacity | 0.24 | 0.24 | 0.03 | 0.03 | 0.58 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 23.7 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 31.0 | |
| Lane LOS | | | | | D | |
| Approach Delay (s) | 0.0 | | 0.0 | | 31.0 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.2 | | | |
| Intersection Capacity Utilization | | | 62.8% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

| Intersection | |
|---------------------------|----|
| Intersection Delay, s/veh | 11 |
| Intersection LOS | B |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 60 | 8 | 49 | 190 | 132 | 300 |
| Future Vol, veh/h | 60 | 8 | 49 | 190 | 132 | 300 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 10 | 1 | 7 | 4 | 2 | 2 |
| Mvmt Flow | 60 | 8 | 49 | 190 | 132 | 300 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|----------------------------|-----|-----|------|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 9.3 | 8.8 | 12.4 |
| HCM LOS | A | A | B |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 88% | 31% |
| Vol Thru, % | 21% | 0% | 69% |
| Vol Right, % | 79% | 12% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 239 | 68 | 432 |
| LT Vol | 0 | 60 | 132 |
| Through Vol | 49 | 0 | 300 |
| RT Vol | 190 | 8 | 0 |
| Lane Flow Rate | 239 | 68 | 432 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.278 | 0.106 | 0.531 |
| Departure Headway (Hd) | 4.188 | 5.611 | 4.425 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 858 | 637 | 816 |
| Service Time | 2.215 | 3.659 | 2.449 |
| HCM Lane V/C Ratio | 0.279 | 0.107 | 0.529 |
| HCM Control Delay | 8.8 | 9.3 | 12.4 |
| HCM Lane LOS | A | A | B |
| HCM 95th-tile Q | 1.1 | 0.4 | 3.2 |

| Intersection | | | | | | | | | | | | |
|----------------------------|-------|---|-------|-------|---|------|------|---|------|------|---|------|
| Intersection Delay, s/veh | 13.5 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 77 | 233 | 14 | 12 | 23 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Future Vol, veh/h | 77 | 233 | 14 | 12 | 23 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 2 | 1 | 1 | 1 | 14 | 1 | 1 | 1 | 7 | 2 | 3 | 4 |
| Mvmt Flow | 77 | 233 | 14 | 12 | 23 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 14.3 | | | 9.6 | | | 11.3 | | | 14.5 | | |
| HCM LOS | B | | | A | | | B | | | B | | |
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | | | | | | | | |
| Vol Left, % | 3% | 24% | 27% | 17% | | | | | | | | |
| Vol Thru, % | 76% | 72% | 51% | 73% | | | | | | | | |
| Vol Right, % | 21% | 4% | 22% | 11% | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | | | | | | | | |
| Traffic Vol by Lane | 223 | 324 | 45 | 361 | | | | | | | | |
| LT Vol | 7 | 77 | 12 | 61 | | | | | | | | |
| Through Vol | 170 | 233 | 23 | 262 | | | | | | | | |
| RT Vol | 46 | 14 | 10 | 38 | | | | | | | | |
| Lane Flow Rate | 223 | 324 | 45 | 361 | | | | | | | | |
| Geometry Grp | 1 | 1 | 1 | 1 | | | | | | | | |
| Degree of Util (X) | 0.338 | 0.504 | 0.076 | 0.537 | | | | | | | | |
| Departure Headway (Hd) | 5.46 | 5.604 | 6.055 | 5.351 | | | | | | | | |
| Convergence, Y/N | Yes | Yes | Yes | Yes | | | | | | | | |
| Cap | 656 | 642 | 589 | 671 | | | | | | | | |
| Service Time | 3.511 | 3.652 | 4.125 | 3.395 | | | | | | | | |
| HCM Lane V/C Ratio | 0.34 | 0.505 | 0.076 | 0.538 | | | | | | | | |
| HCM Control Delay | 11.3 | 14.3 | 9.6 | 14.5 | | | | | | | | |
| HCM Lane LOS | B | B | A | B | | | | | | | | |
| HCM 95th-tile Q | 1.5 | 2.8 | 0.2 | 3.2 | | | | | | | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|--------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 96 | 1240 | 248 | 325 | 681 | 80 | 148 | 279 | 370 | 105 | 434 | 109 |
| Future Volume (vph) | 96 | 1240 | 248 | 325 | 681 | 80 | 148 | 279 | 370 | 105 | 434 | 109 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3010 | 3468 | 1535 | 3154 | 3338 | 1402 | 3217 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 248 | | | 154 | | | 169 | | | 154 |
| Lane Group Flow (vph) | 96 | 1240 | 248 | 325 | 681 | 80 | 148 | 279 | 370 | 105 | 434 | 109 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 15.0 | 58.0 | 58.0 | 20.0 | 63.0 | 63.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 9.5 | 51.4 | 51.4 | 15.7 | 57.5 | 57.5 | 9.1 | 25.5 | 25.5 | 8.7 | 25.1 | 25.1 |
| Actuated g/c Ratio | 0.07 | 0.40 | 0.40 | 0.12 | 0.44 | 0.44 | 0.07 | 0.20 | 0.20 | 0.07 | 0.19 | 0.19 |
| v/c Ratio | 0.81 | 0.90 | 0.36 | 0.90 | 0.44 | 0.10 | 0.66 | 0.43 | 0.90 | 0.48 | 0.69 | 0.28 |
| Control Delay | 103.9 | 47.6 | 4.6 | 83.7 | 26.7 | 0.3 | 73.8 | 47.5 | 53.0 | 66.0 | 54.8 | 3.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 103.9 | 47.6 | 4.6 | 83.7 | 26.7 | 0.3 | 73.8 | 47.5 | 53.0 | 66.0 | 54.8 | 3.6 |
| LOS | F | D | A | F | C | A | E | D | D | E | D | A |
| Approach Delay | | 44.3 | | | 41.8 | | | 54.9 | | | 48.0 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 22.9 | 144.8 | 0.0 | ~42.3 | 59.2 | 0.0 | 17.8 | 30.0 | 48.6 | 12.4 | 49.4 | 0.0 |
| Queue Length 95th (m) | #53.8 | #184.4 | 15.1 | #69.5 | 74.6 | 0.0 | 28.1 | 42.5 | #97.9 | 21.2 | 65.7 | 4.8 |
| Internal Link Dist (m) | | 485.7 | | | 397.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 118 | 1371 | 690 | 363 | 1534 | 765 | 229 | 708 | 430 | 234 | 689 | 417 |
| 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 | 0.81 | 0.90 | 0.36 | 0.90 | 0.44 | 0.10 | 0.65 | 0.39 | 0.86 | 0.45 | 0.63 | 0.26 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 46.3

Intersection LOS: D

Intersection Capacity Utilization 88.8%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.






















Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | | | | | |
|------|----|------|--------|------|----|------|----|
| | Ø1 | | Ø2 (R) | | Ø3 | | Ø4 |
| 20 s | | 58 s | | 17 s | | 35 s | |
| | Ø5 | | Ø6 (R) | | Ø7 | | Ø8 |
| 15 s | | 63 s | | 17 s | | 35 s | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  | |
| Traffic Volume (vph) | 35 | 7 | 21 | 8 | 3 | 82 | 7 | 716 | 12 | 210 | 869 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 8 | 3 | 82 | 7 | 716 | 12 | 210 | 869 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3292 | 0 | 1639 | 3270 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.318 | | | 0.375 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 412 | 3292 | 0 | 647 | 3270 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 82 | | 4 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 8 | 3 | 82 | 7 | 728 | 0 | 210 | 886 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 54.0 | 54.0 | | 54.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 10.1 | 10.1 | | 10.1 | 10.1 | 10.1 | 62.1 | 62.1 | | 62.1 | 62.1 | |
| Actuated g/C Ratio | 0.13 | 0.13 | | 0.13 | 0.13 | 0.13 | 0.78 | 0.78 | | 0.78 | 0.78 | |
| v/c Ratio | 0.21 | 0.14 | | 0.05 | 0.02 | 0.32 | 0.02 | 0.28 | | 0.42 | 0.35 | |
| Control Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.7 | 3.4 | 3.8 | | 7.5 | 4.2 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.7 | 3.4 | 3.8 | | 7.5 | 4.2 | |
| LOS | C | B | | C | C | B | A | A | | A | A | |
| Approach Delay | | 27.6 | | | 14.0 | | | 3.8 | | | 4.8 | |
| Approach LOS | | C | | | B | | | A | | | A | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 1.0 | 0.4 | 0.0 | 0.2 | 15.3 | | 9.8 | 20.1 | |
| Queue Length 95th (m) | 11.9 | 7.2 | | 4.4 | 2.5 | 10.7 | 1.1 | 21.9 | | 22.5 | 28.1 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 438 | 319 | 2557 | | 502 | 2540 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.02 | 0.01 | 0.19 | 0.02 | 0.28 | | 0.42 | 0.35 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 16 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 5.6













Intersection LOS: A

Intersection Capacity Utilization 58.6%

ICU Level of Service B






















Analysis Period (min) 15

Splits and Phases: 2: Hawthorne & Russell

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø2 (R) | | | Ø4 | | |
| 54 s | | | 26 s | | |
|  |  |  |  |  |  |
| Ø6 (R) | | | Ø8 | | |
| 54 s | | | 26 s | | |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2023 Future Background PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 372 | 59 | 45 | 950 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 372 | 59 | 45 | 950 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3069 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.217 | | | 0.501 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 302 | 3069 | 0 | 698 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 23 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 431 | 0 | 45 | 950 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.31 | 0.25 | | 0.10 | 0.53 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.4 | 13.2 | | 9.0 | 18.6 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.4 | 13.2 | | 9.0 | 18.6 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 12.9 | | | 16.4 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 19.8 | | 2.6 | 57.1 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 34.0 | | 7.5 | 86.4 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 286 | 1728 | | 482 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.29 | 0.25 | | 0.09 | 0.53 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.3







Intersection LOS: B

Intersection Capacity Utilization 76.2%

ICU Level of Service D























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | |
|---|---|--|
|  |  |  |
| Ø1 | Ø2 (R) | Ø4 |
| 15 s | 45 s | 35 s |
|  |  |  |
| Ø5 | Ø6 (R) | Ø8 |
| 15 s | 45 s | 35 s |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2023 Future Background PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 254 | 809 | 24 | 423 | 870 | 87 | 25 | 193 | 307 | 167 | 494 | 467 |
| Future Volume (vph) | 254 | 809 | 24 | 423 | 870 | 87 | 25 | 193 | 307 | 167 | 494 | 467 |
| Satd. Flow (prot) | 3094 | 3422 | 0 | 3208 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.471 | | | 0.195 | | |
| Satd. Flow (perm) | 3094 | 3422 | 0 | 3205 | 3468 | 1141 | 851 | 2807 | 0 | 330 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 242 | | | | 467 |
| Lane Group Flow (vph) | 254 | 833 | 0 | 423 | 870 | 87 | 25 | 500 | 0 | 167 | 494 | 467 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 15.4 | 36.6 | | 21.3 | 42.5 | 42.5 | 25.7 | 18.8 | | 38.6 | 31.2 | 31.2 |
| Actuated g/c Ratio | 0.13 | 0.31 | | 0.18 | 0.37 | 0.37 | 0.22 | 0.16 | | 0.33 | 0.27 | 0.27 |
| v/c Ratio | 0.62 | 0.77 | | 0.72 | 0.69 | 0.18 | 0.10 | 0.76 | | 0.65 | 0.57 | 0.62 |
| Control Delay | 57.1 | 42.9 | | 53.7 | 35.4 | 2.8 | 30.5 | 32.6 | | 43.3 | 42.6 | 7.8 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 57.1 | 42.9 | | 53.7 | 35.4 | 2.8 | 30.5 | 32.6 | | 43.3 | 42.6 | 7.8 |
| LOS | E | D | | D | D | A | C | C | | D | D | A |
| Approach Delay | | 46.2 | | | 38.9 | | | 32.5 | | | 28.3 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Queue Length 50th (m) | 27.6 | 84.7 | | 45.6 | 82.4 | 0.0 | 3.7 | 28.8 | | 26.9 | 52.0 | 0.0 |
| Queue Length 95th (m) | 43.5 | 122.8 | | 66.1 | 117.9 | 4.9 | 10.2 | 50.2 | | 47.9 | 76.3 | 27.7 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 823 | 1276 | | 1080 | 1537 | 572 | 366 | 833 | | 279 | 871 | 750 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.31 | 0.65 | | 0.39 | 0.57 | 0.15 | 0.07 | 0.60 | | 0.60 | 0.57 | 0.62 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 116.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 37.1









Intersection LOS: D

Intersection Capacity Utilization 84.4%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø3 | Ø4 | Ø1 | Ø2 |
| 44.4 s | 48.4 s | 21.3 s | 32.3 s |
|  |  |  |  |
| Ø7 | Ø8 | Ø5 | Ø6 |
| 36.4 s | 56.4 s | 21.3 s | 32.3 s |



| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (vph) | 0 | 1574 | 184 | 0 | 174 | 636 |
| Future Volume (vph) | 0 | 1574 | 184 | 0 | 174 | 636 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 636 |
| Lane Group Flow (vph) | 0 | 1574 | 184 | 0 | 174 | 636 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 57.0 | 57.0 | | 33.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 62.9 | 62.9 | | 14.5 | 90.0 |
| Actuated g/C Ratio | | 0.70 | 0.70 | | 0.16 | 1.00 |
| v/c Ratio | | 0.66 | 0.08 | | 0.64 | 0.42 |
| Control Delay | | 10.0 | 5.0 | | 45.3 | 0.8 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 10.0 | 5.0 | | 45.3 | 0.8 |
| LOS | | B | A | | D | A |
| Approach Delay | | 10.0 | 5.0 | | 10.4 | |
| Approach LOS | | B | A | | B | |
| Queue Length 50th (m) | | 63.3 | 5.1 | | 26.2 | 0.0 |
| Queue Length 95th (m) | | 103.1 | 7.6 | | 41.6 | 0.0 |
| Internal Link Dist (m) | | 667.9 | 357.7 | | 275.3 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 2377 | 2377 | | 504 | 1522 |
| 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 | | 0.66 | 0.08 | | 0.35 | 0.42 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 9.8

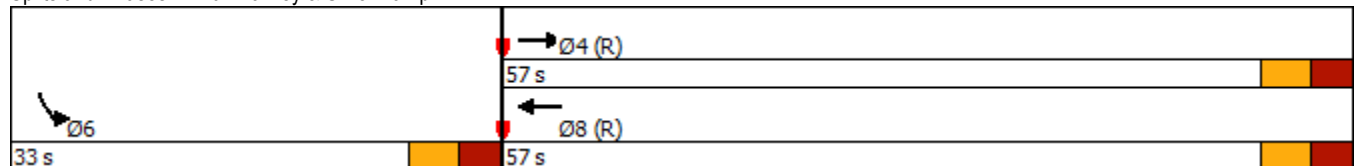
Intersection LOS: A

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Walkley & SB off-ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 811 | 0 | 0 | 87 | 156 | 24 |
| Future Volume (vph) | 811 | 0 | 0 | 87 | 156 | 24 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Flt Permitted | | | | | 0.958 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Satd. Flow (RTOR) | | | | | 9 | |
| Lane Group Flow (vph) | 811 | 0 | 0 | 87 | 180 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 54.0 | | | 54.0 | 36.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 37.0 | | | 37.0 | 40.4 | |
| Actuated g/C Ratio | 0.41 | | | 0.41 | 0.45 | |
| v/c Ratio | 0.58 | | | 0.06 | 0.24 | |
| Control Delay | 16.9 | | | 13.8 | 18.0 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 16.9 | | | 13.8 | 18.0 | |
| LOS | B | | | B | B | |
| Approach Delay | 16.9 | | | 13.8 | 18.0 | |
| Approach LOS | B | | | B | B | |
| Queue Length 50th (m) | 54.0 | | | 4.2 | 16.2 | |
| Queue Length 95th (m) | 46.0 | | | 6.4 | 35.4 | |
| Internal Link Dist (m) | 357.7 | | | 203.8 | 376.5 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1803 | | | 1803 | 760 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.45 | | | 0.05 | 0.24 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 16.8

Intersection LOS: B

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: NB Off-ramp & Walkley

| | |
|----------|------|
| ↖ Ø2 (R) | → Ø4 |
| 36 s | 54 s |
| | ← Ø8 |
| | 54 s |

Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|---------------------------------|-----------------------------|
| 119124 | 2023 PHF Flow Profile (veh) |
| 2023 Background Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| PM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target Average Delay (sec/veh) | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|---|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB - Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2023 PM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 61 | 262 | 38 | 0 | 3.0 | 1.00 | 1.000 |
| 2 | EB - Russell | 0 | 77 | 233 | 14 | 0 | 3.0 | 1.00 | 1.000 |
| 3 | NB- Anderson | 0 | 7 | 170 | 46 | 0 | 3.0 | 1.00 | 1.000 |
| 4 | WB - Russell | 0 | 12 | 23 | 10 | 0 | 3.0 | 1.00 | 1.000 |

Operational Results

Geometry for Target Input

Geometry Options for 2023 PM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 PM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 PM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 PM Peak

| Leg 4 - WB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2023 PM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 42 | | 257 | 926 | | 0.3900 | |
| 2 | EB - Russell | None | 324 | | 335 | | 68 | 774 | | 0.4185 | |
| 3 | NB- Anderson | None | 223 | | 371 | | 288 | 755 | | 0.2952 | |
| 4 | WB - Russell | None | 45 | | 254 | | 340 | 816 | | 0.0551 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.05 | | 6.05 | 1.58 | | A | | A |
| 2 | EB - Russell | None | 7.56 | | 7.56 | 1.77 | | A | | A |
| 3 | NB- Anderson | None | 6.46 | | 6.46 | 1.05 | | A | | A |
| 4 | WB - Russell | None | 4.52 | | 4.52 | 0.15 | | A | | A |

























2023 PM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 42 | | 257 | 926 | | 0.3900 | |
| 2 | EB - Russell | None | 324 | | 335 | | 68 | 774 | | 0.4185 | |
| 3 | NB- Anderson | None | 223 | | 371 | | 288 | 755 | | 0.2952 | |
| 4 | WB - Russell | None | 45 | | 254 | | 340 | 816 | | 0.0551 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.06 | | 6.06 | 1.58 | | A | | A |
| 2 | EB - Russell | None | 7.58 | | 7.58 | 1.77 | | A | | A |
| 3 | NB- Anderson | None | 6.47 | | 6.47 | 1.05 | | A | | A |
| 4 | WB - Russell | None | 4.52 | | 4.52 | 0.15 | | A | | A |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 76 | 486 | 198 | 464 | 1231 | 64 | 269 | 445 | 568 | 55 | 259 | 135 |
| Future Volume (vph) | 76 | 486 | 198 | 464 | 1231 | 64 | 269 | 445 | 568 | 55 | 259 | 135 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3083 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 198 | | | 134 | | | 535 | | | 180 |
| Lane Group Flow (vph) | 76 | 486 | 198 | 464 | 1231 | 64 | 269 | 445 | 568 | 55 | 259 | 135 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.3 | 53.1 | 53.1 | 28.5 | 68.3 | 68.3 | 12.4 | 34.5 | 34.5 | 7.9 | 27.3 | 27.3 |
| Actuated g/C Ratio | 0.09 | 0.35 | 0.35 | 0.19 | 0.46 | 0.46 | 0.08 | 0.23 | 0.23 | 0.05 | 0.18 | 0.18 |
| v/c Ratio | 0.63 | 0.42 | 0.33 | 0.81 | 0.79 | 0.09 | 1.05 | 0.60 | 0.80 | 0.32 | 0.45 | 0.34 |
| Control Delay | 87.4 | 40.5 | 6.7 | 69.4 | 41.0 | 0.2 | 135.2 | 55.4 | 14.8 | 72.9 | 55.9 | 4.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 87.4 | 40.5 | 6.7 | 69.4 | 41.0 | 0.2 | 135.2 | 55.4 | 14.8 | 72.9 | 55.9 | 4.3 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 36.4 | | | 47.0 | | | 54.2 | | | 42.5 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 20.4 | 56.0 | 0.0 | 63.5 | 159.5 | 0.0 | ~41.3 | 56.5 | 7.0 | 7.6 | 32.1 | 0.0 |
| Queue Length 95th (m) | 35.5 | 77.2 | 18.0 | 76.9 | #207.8 | 0.0 | #68.2 | 74.6 | 52.9 | 14.4 | 44.8 | 5.7 |
| Internal Link Dist (m) | | 485.7 | | | 404.4 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1170 | 598 | 775 | 1564 | 751 | 255 | 744 | 715 | 270 | 693 | 437 |
| 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 | 0.46 | 0.42 | 0.33 | 0.60 | 0.79 | 0.09 | 1.05 | 0.60 | 0.79 | 0.20 | 0.37 | 0.31 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 46.8

Intersection LOS: D

Intersection Capacity Utilization 82.1%

ICU Level of Service E

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.























Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|--|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 45 s | 45 s | 20 s | 40 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 24.4 s | 65.6 s | 20 s | 40 s |

4055 & 4120 Russell Road
2: Hawthorne & Russell

2023 Total Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 40 | 10 | 490 | 17 | 891 | 43 | 227 | 548 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 40 | 10 | 490 | 17 | 891 | 43 | 227 | 548 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3091 | 0 | 1488 | 2985 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.431 | | | 0.276 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 768 | 3091 | 0 | 432 | 2985 | 0 |
| Satd. Flow (RTOR) | | 352 | | | | 175 | | 11 | | | 14 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 40 | 10 | 490 | 17 | 934 | 0 | 227 | 582 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 64.0 | 64.0 | | 64.0 | 64.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 20.3 | 20.3 | | 20.3 | 20.3 | 20.3 | 57.5 | 57.5 | | 57.5 | 57.5 | |
| Actuated g/C Ratio | 0.23 | 0.23 | | 0.23 | 0.23 | 0.23 | 0.64 | 0.64 | | 0.64 | 0.64 | |
| v/c Ratio | 0.04 | 0.01 | | 0.15 | 0.02 | 1.03 | 0.03 | 0.47 | | 0.82 | 0.30 | |
| Control Delay | 28.1 | 0.0 | | 29.8 | 27.5 | 72.0 | 3.9 | 6.6 | | 39.9 | 7.6 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 28.1 | 0.0 | | 29.8 | 27.5 | 72.0 | 3.9 | 6.6 | | 39.9 | 7.6 | |
| LOS | C | A | | C | C | E | A | A | | D | A | |
| Approach Delay | | 15.6 | | | 68.0 | | | 6.5 | | | 16.7 | |
| Approach LOS | | B | | | E | | | A | | | B | |
| Queue Length 50th (m) | 1.3 | 0.0 | | 5.1 | 1.3 | ~60.2 | 0.5 | 13.0 | | 24.7 | 19.0 | |
| Queue Length 95th (m) | 5.0 | 0.0 | | 12.8 | 5.0 | #114.3 | m0.9 | 16.2 | | #69.6 | 26.5 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 227 | 560 | | 265 | 403 | 478 | 490 | 1978 | | 276 | 1912 | |
| 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 | 0.04 | 0.01 | | 0.15 | 0.02 | 1.03 | 0.03 | 0.47 | | 0.82 | 0.30 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 23 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 24.5

Intersection LOS: C

Intersection Capacity Utilization 82.7%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

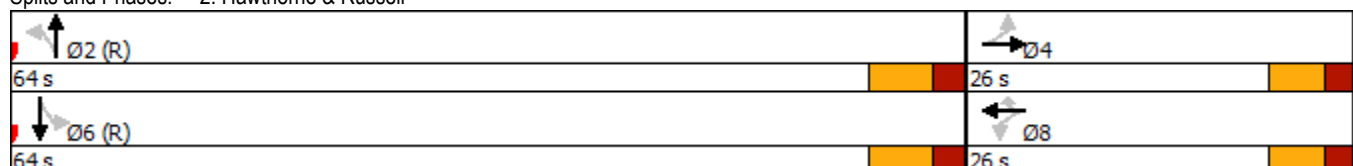
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 2: Hawthorne & Russell



4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2023 Total Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 958 | 86 | 52 | 350 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 958 | 86 | 52 | 350 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3096 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.487 | | | 0.239 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 852 | 3096 | 0 | 359 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 12 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 208 | 1044 | 0 | 52 | 350 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.4 | 46.4 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.31 | 0.56 | | 0.18 | 0.24 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 4.9 | 10.6 | 6.0 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 4.9 | 10.6 | 6.0 |
| LOS | D | B | | C | C | | A | B | | A | B | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 13.7 | | | 8.6 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 10.0 | 53.5 | | 1.5 | 16.8 | 5.1 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.8 | 93.6 | | 2.2 | 32.4 | 23.5 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 669 | 1863 | | 332 | 1474 | 826 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.31 | 0.56 | | 0.16 | 0.24 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.2

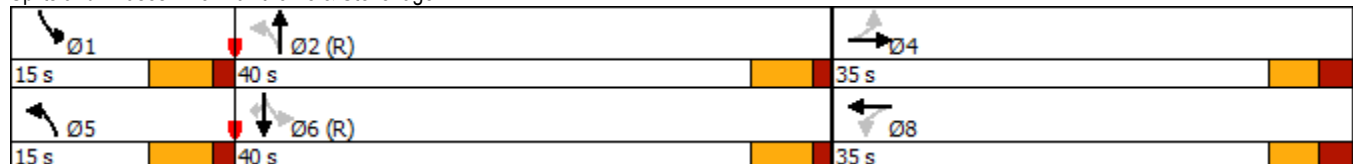
Intersection LOS: B

Intersection Capacity Utilization 63.8%

ICU Level of Service B























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2023 Total Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 451 | 673 | 25 | 251 | 715 | 246 | 40 | 412 | 382 | 43 | 147 | 197 |
| Future Volume (vph) | 451 | 673 | 25 | 251 | 715 | 246 | 40 | 412 | 382 | 43 | 147 | 197 |
| Satd. Flow (prot) | 1639 | 3337 | 0 | 1595 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.659 | | | 0.129 | | |
| Satd. Flow (perm) | 1639 | 3337 | 0 | 1595 | 3402 | 1440 | 1032 | 2974 | 0 | 162 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 2 | | | | 246 | | 152 | | | | 197 |
| Lane Group Flow (vph) | 451 | 698 | 0 | 251 | 715 | 246 | 40 | 794 | 0 | 43 | 147 | 197 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 41.4 | 41.4 | | 41.4 | 41.4 | 41.4 | 21.3 | 36.3 | | 21.3 | 36.3 | 36.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 35.2 | 42.9 | | 25.6 | 33.2 | 33.2 | 36.8 | 30.2 | | 38.5 | 31.1 | 31.1 |
| Actuated g/C Ratio | 0.27 | 0.33 | | 0.20 | 0.25 | 0.25 | 0.28 | 0.23 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 1.02 | 0.63 | | 0.80 | 0.82 | 0.45 | 0.13 | 0.99 | | 0.37 | 0.22 | 0.43 |
| Control Delay | 95.0 | 42.4 | | 69.3 | 55.3 | 7.5 | 31.4 | 69.0 | | 39.7 | 42.7 | 8.8 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 95.0 | 42.4 | | 69.3 | 55.3 | 7.5 | 31.4 | 69.0 | | 39.7 | 42.7 | 8.8 |
| LOS | F | D | | E | E | A | C | E | | D | D | A |
| Approach Delay | | 63.0 | | | 48.5 | | | 67.2 | | | 25.1 | |
| Approach LOS | | E | | | D | | | E | | | C | |
| Queue Length 50th (m) | ~120.2 | 76.0 | | 59.1 | 86.3 | 0.0 | 6.6 | ~88.8 | | 7.2 | 15.4 | 0.0 |
| Queue Length 95th (m) | #186.8 | 108.8 | | 83.2 | 111.5 | 19.4 | 14.4 | #133.1 | | 15.4 | 25.0 | 18.8 |
| Internal Link Dist (m) | | 420.4 | | | 459.3 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 443 | 1100 | | 431 | 921 | 569 | 382 | 806 | | 171 | 655 | 454 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.02 | 0.63 | | 0.58 | 0.78 | 0.43 | 0.10 | 0.99 | | 0.25 | 0.22 | 0.43 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 130.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 55.0

Intersection LOS: E

Intersection Capacity Utilization 97.7%

ICU Level of Service F

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.











Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|--|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (vph) | 48 | 1050 | 1476 | 117 | 92 | 37 |
| Future Volume (vph) | 48 | 1050 | 1476 | 117 | 92 | 37 |
| Satd. Flow (prot) | 1701 | 3402 | 3364 | 0 | 1662 | 0 |
| Flt Permitted | 0.117 | | | | 0.966 | |
| Satd. Flow (perm) | 209 | 3402 | 3364 | 0 | 1662 | 0 |
| Satd. Flow (RTOR) | | | 14 | | 6 | |
| Lane Group Flow (vph) | 48 | 1050 | 1593 | 0 | 129 | 0 |
| Turn Type | Perm | NA | NA | | Prot | |
| Protected Phases | | 2 | 6 | | 4 | |
| Permitted Phases | 2 | | | | | |
| Total Split (s) | 34.0 | 34.0 | 34.0 | | 36.2 | |
| Total Lost Time (s) | 6.4 | 6.4 | 6.4 | | 5.8 | |
| Act Effct Green (s) | 51.1 | 51.1 | 51.1 | | 10.6 | |
| Actuated g/C Ratio | 0.73 | 0.73 | 0.73 | | 0.15 | |
| v/c Ratio | 0.32 | 0.42 | 0.65 | | 0.50 | |
| Control Delay | 13.5 | 6.1 | 8.7 | | 32.1 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | |
| Total Delay | 13.5 | 6.1 | 8.7 | | 32.1 | |
| LOS | B | A | A | | C | |
| Approach Delay | | 6.4 | 8.7 | | 32.1 | |
| Approach LOS | | A | A | | C | |
| Queue Length 50th (m) | 2.0 | 26.1 | 51.5 | | 13.8 | |
| Queue Length 95th (m) | 11.0 | 45.3 | 89.5 | | 25.7 | |
| Internal Link Dist (m) | | 459.3 | 853.4 | | 137.8 | |
| Turn Bay Length (m) | 30.0 | | | | 30.0 | |
| Base Capacity (vph) | 152 | 2474 | 2450 | | 723 | |
| 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 | 0.32 | 0.42 | 0.65 | | 0.18 | |

Intersection Summary

Cycle Length: 70.2

Actuated Cycle Length: 70.2

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 8.9



















Intersection LOS: A










Intersection Capacity Utilization 64.9%











ICU Level of Service C










Analysis Period (min) 15

Splits and Phases: 12: Hunt Club & Access

| | | |
|---|---|---|
|  |  |  |
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|  |  |  |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 193 | 42 | 155 | 580 | 39 | 22 |
| Future Volume (Veh/h) | 193 | 42 | 155 | 580 | 39 | 22 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 193 | 42 | 155 | 580 | 39 | 22 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 235 | | 1104 | 214 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 235 | | 1104 | 214 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.5 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.9 | 3.5 |
| p0 queue free % | | | 88 | | 78 | 97 |
| cM capacity (veh/h) | | | 1326 | | 175 | 771 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 235 | 735 | 61 | | | |
| Volume Left | 0 | 155 | 39 | | | |
| Volume Right | 42 | 0 | 22 | | | |
| cSH | 1700 | 1326 | 242 | | | |
| Volume to Capacity | 0.14 | 0.12 | 0.25 | | | |
| Queue Length 95th (m) | 0.0 | 2.8 | 6.8 | | | |
| Control Delay (s) | 0.0 | 2.8 | 24.8 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 2.8 | 24.8 | | | |
| Approach LOS | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.5 | | | |
| Intersection Capacity Utilization | | | 68.4% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 2 | 921 | 0 | 923 | 671 | 0 |
| Future Volume (Veh/h) | 2 | 921 | 0 | 923 | 671 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 921 | 0 | 923 | 671 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1594 | 671 | 671 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1594 | 671 | 671 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 98 | 0 | 100 | | | |
| cM capacity (veh/h) | 118 | 444 | 929 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 2 | 921 | 923 | 671 | | |
| Volume Left | 2 | 0 | 0 | 0 | | |
| Volume Right | 0 | 921 | 0 | 0 | | |
| cSH | 118 | 444 | 1700 | 1700 | | |
| Volume to Capacity | 0.02 | 2.07 | 0.54 | 0.39 | | |
| Queue Length 95th (m) | 0.4 | 454.3 | 0.0 | 0.0 | | |
| Control Delay (s) | 35.9 | 510.9 | 0.0 | 0.0 | | |
| Lane LOS | E | F | | | | |
| Approach Delay (s) | 509.9 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 187.0 | | | |
| Intersection Capacity Utilization | | | 104.1% | ICU Level of Service | G | |
| Analysis Period (min) | | | 15 | | | |






| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 41 | 39 | 411 | 347 | 145 | 222 |
| Future Volume (Veh/h) | 41 | 39 | 411 | 347 | 145 | 222 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 41 | 39 | 411 | 347 | 145 | 222 |
| Pedestrians | | | | 2 | | |
| Lane Width (m) | | | | 4.0 | | |
| Walking Speed (m/s) | | | | 1.0 | | |
| Percent Blockage | | | | 0 | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1425 | 258 | 367 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1425 | 258 | 367 | | | |
| tC, single (s) | 6.9 | 6.4 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 4.0 | 3.5 | 2.2 | | | |
| p0 queue free % | 46 | 95 | 65 | | | |
| cM capacity (veh/h) | 77 | 737 | 1181 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 80 | 758 | 367 | | | |
| Volume Left | 41 | 411 | 0 | | | |
| Volume Right | 39 | 0 | 222 | | | |
| cSH | 136 | 1181 | 1700 | | | |
| Volume to Capacity | 0.59 | 0.35 | 0.22 | | | |
| Queue Length 95th (m) | 21.0 | 11.0 | 0.0 | | | |
| Control Delay (s) | 63.8 | 7.2 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | 63.8 | 7.2 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 8.7 | | | |
| Intersection Capacity Utilization | | | 81.3% | ICU Level of Service | | D |
| Analysis Period (min) | | | 15 | | | |







| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|--------|------|----------------------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 531 | 994 | 0 | 23 | 1039 |
| Future Volume (Veh/h) | 0 | 531 | 994 | 0 | 23 | 1039 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 531 | 994 | 0 | 23 | 1039 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 994 | | | | 1260 | 497 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 994 | | | | 1260 | 497 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 85 | 0 |
| cM capacity (veh/h) | 674 | | | | 158 | 511 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 266 | 266 | 497 | 497 | 23 | 1039 |
| Volume Left | 0 | 0 | 0 | 0 | 23 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 1039 |
| cSH | 1700 | 1700 | 1700 | 1700 | 158 | 511 |
| Volume to Capacity | 0.16 | 0.16 | 0.29 | 0.29 | 0.15 | 2.03 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 | 500.5 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 31.5 | 491.1 |
| Lane LOS | | | | | D | F |
| Approach Delay (s) | 0.0 | | 0.0 | | 481.2 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 197.5 | | | |
| Intersection Capacity Utilization | | | 103.6% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |

















| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|--------|------|----------------------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (veh/h) | 164 | 0 | 0 | 930 | 553 | 57 |
| Future Volume (Veh/h) | 164 | 0 | 0 | 930 | 553 | 57 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 164 | 0 | 0 | 930 | 553 | 57 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 164 | | 629 | 82 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 164 | | 629 | 82 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 0 | 94 |
| cM capacity (veh/h) | | | 1390 | | 408 | 952 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 82 | 82 | 465 | 465 | 610 | |
| Volume Left | 0 | 0 | 0 | 0 | 553 | |
| Volume Right | 0 | 0 | 0 | 0 | 57 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 431 | |
| Volume to Capacity | 0.05 | 0.05 | 0.27 | 0.27 | 1.42 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 210.3 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 225.9 | |
| Lane LOS | | | | | F | |
| Approach Delay (s) | 0.0 | | 0.0 | | 225.9 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 80.9 | | | |
| Intersection Capacity Utilization | | | 103.6% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |



















| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|---|
| Lane Configurations |  |  |  | |  |  |
| Traffic Volume (veh/h) | 136 | 142 | 515 | 48 | 45 | 129 |
| Future Volume (Veh/h) | 136 | 142 | 515 | 48 | 45 | 129 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 136 | 142 | 515 | 48 | 45 | 129 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 563 | | | | 953 | 539 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 563 | | | | 953 | 539 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 86 | | | | 82 | 76 |
| cM capacity (veh/h) | 994 | | | | 245 | 537 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | SB 2 | |
| Volume Total | 136 | 142 | 563 | 45 | 129 | |
| Volume Left | 136 | 0 | 0 | 45 | 0 | |
| Volume Right | 0 | 0 | 48 | 0 | 129 | |
| cSH | 994 | 1700 | 1700 | 245 | 537 | |
| Volume to Capacity | 0.14 | 0.08 | 0.33 | 0.18 | 0.24 | |
| Queue Length 95th (m) | 3.3 | 0.0 | 0.0 | 4.6 | 6.5 | |
| Control Delay (s) | 9.2 | 0.0 | 0.0 | 23.0 | 13.8 | |
| Lane LOS | A | | | C | B | |
| Approach Delay (s) | 4.5 | | 0.0 | 16.2 | | |
| Approach LOS | | | | C | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.0 | | | |
| Intersection Capacity Utilization | | | 53.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |






| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|------|
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (veh/h) | 58 | 129 | 508 | 111 | 106 | 55 |
| Future Volume (Veh/h) | 58 | 129 | 508 | 111 | 106 | 55 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 58 | 129 | 508 | 111 | 106 | 55 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 619 | | | | 808 | 564 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 619 | | | | 808 | 564 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 94 | | | | 67 | 89 |
| cM capacity (veh/h) | 947 | | | | 325 | 520 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | | |
| Volume Total | 58 | 129 | 619 | 161 | | |
| Volume Left | 58 | 0 | 0 | 106 | | |
| Volume Right | 0 | 0 | 111 | 55 | | |
| cSH | 947 | 1700 | 1700 | 373 | | |
| Volume to Capacity | 0.06 | 0.08 | 0.36 | 0.43 | | |
| Queue Length 95th (m) | 1.4 | 0.0 | 0.0 | 14.8 | | |
| Control Delay (s) | 9.0 | 0.0 | 0.0 | 21.8 | | |
| Lane LOS | A | | | C | | |
| Approach Delay (s) | 2.8 | | 0.0 | 21.8 | | |
| Approach LOS | | | | C | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.2 | | | |
| Intersection Capacity Utilization | | | 58.5% | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 1 | 85 | 131 | 2 | 607 | 0 | 128 | 2 | 1 | 0 | 1 | 0 |
| Future Volume (Veh/h) | 1 | 85 | 131 | 2 | 607 | 0 | 128 | 2 | 1 | 0 | 1 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1 | 85 | 131 | 2 | 607 | 0 | 128 | 2 | 1 | 0 | 1 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 607 | | | 216 | | | 764 | 764 | 150 | 766 | 829 | 607 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 607 | | | 216 | | | 764 | 764 | 150 | 766 | 829 | 607 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 59 | 99 | 100 | 100 | 100 | 100 |
| cM capacity (veh/h) | 957 | | | 1336 | | | 315 | 330 | 888 | 314 | 302 | 491 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 217 | 609 | 131 | 1 | | | | | | | | |
| Volume Left | 1 | 2 | 128 | 0 | | | | | | | | |
| Volume Right | 131 | 0 | 1 | 0 | | | | | | | | |
| cSH | 957 | 1336 | 317 | 302 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.41 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 13.6 | 0.1 | | | | | | | | |
| Control Delay (s) | 0.1 | 0.0 | 24.1 | 17.0 | | | | | | | | |
| Lane LOS | A | A | C | C | | | | | | | | |
| Approach Delay (s) | 0.1 | 0.0 | 24.1 | 17.0 | | | | | | | | |
| Approach LOS | | | C | C | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 3.4 | | | | | | | | | |
| Intersection Capacity Utilization | | | 56.2% | ICU Level of Service | | | | | B | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |





| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 1 | 82 | 3 | 1 | 608 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Future Volume (Veh/h) | 1 | 82 | 3 | 1 | 608 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1 | 82 | 3 | 1 | 608 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | None | | | None | | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 608 | | | 85 | | | 696 | 696 | 84 | 696 | 697 | 608 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 608 | | | 85 | | | 696 | 696 | 84 | 696 | 697 | 608 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 100 | 100 | 100 | 100 | 100 | 100 |
| cM capacity (veh/h) | 956 | | | 1493 | | | 352 | 361 | 968 | 352 | 360 | 490 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 86 | 609 | 1 | 0 | | | | | | | | |
| Volume Left | 1 | 1 | 1 | 0 | | | | | | | | |
| Volume Right | 3 | 0 | 0 | 0 | | | | | | | | |
| cSH | 956 | 1493 | 352 | 1700 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.1 | 0.0 | | | | | | | | |
| Control Delay (s) | 0.1 | 0.0 | 15.3 | 0.0 | | | | | | | | |
| Lane LOS | A | A | C | A | | | | | | | | |
| Approach Delay (s) | 0.1 | 0.0 | 15.3 | 0.0 | | | | | | | | |
| Approach LOS | | | C | A | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 0.1 | | | | | | | | | |
| Intersection Capacity Utilization | | | 44.4% | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 23.8 |
| Intersection LOS | C |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 308 | 300 | 340 | 53 | 10 | 22 |
| Future Vol, veh/h | 308 | 300 | 340 | 53 | 10 | 22 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 4 | 1 | 1 | 15 | 1 | 20 |
| Mvmt Flow | 308 | 300 | 340 | 53 | 10 | 22 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|----------------------------|------|------|-----|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 29.1 | 16.7 | 9.7 |
| HCM LOS | D | C | A |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 51% | 31% |
| Vol Thru, % | 87% | 0% | 69% |
| Vol Right, % | 13% | 49% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 393 | 608 | 32 |
| LT Vol | 0 | 308 | 10 |
| Through Vol | 340 | 0 | 22 |
| RT Vol | 53 | 300 | 0 |
| Lane Flow Rate | 393 | 608 | 32 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.604 | 0.845 | 0.056 |
| Departure Headway (Hd) | 5.53 | 5.004 | 6.31 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 652 | 724 | 566 |
| Service Time | 3.568 | 3.038 | 4.369 |
| HCM Lane V/C Ratio | 0.603 | 0.84 | 0.057 |
| HCM Control Delay | 16.7 | 29.1 | 9.7 |
| HCM Lane LOS | C | D | A |
| HCM 95th-tile Q | 4.1 | 9.6 | 0.2 |

























| Intersection | | | | | | | | | | | | |
|----------------------------|-------|---|-------|-------|---|------|------|---|------|------|---|------|
| Intersection Delay, s/veh | 41.7 | | | | | | | | | | | |
| Intersection LOS | E | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 35 | 16 | 20 | 48 | 331 | 118 | 189 | 304 | 6 | 5 | 139 | 153 |
| Future Vol, veh/h | 35 | 16 | 20 | 48 | 331 | 118 | 189 | 304 | 6 | 5 | 139 | 153 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 11 | 7 | 1 | 1 | 2 | 3 | 1 | 3 | 17 | 1 | 4 | 2 |
| Mvmt Flow | 35 | 16 | 20 | 48 | 331 | 118 | 189 | 304 | 6 | 5 | 139 | 153 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 13.1 | | | 48.2 | | | 52.8 | | | 19 | | |
| HCM LOS | B | | | E | | | F | | | C | | |
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | | | | | | | | |
| Vol Left, % | 38% | 49% | 10% | 2% | | | | | | | | |
| Vol Thru, % | 61% | 23% | 67% | 47% | | | | | | | | |
| Vol Right, % | 1% | 28% | 24% | 52% | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | | | | | | | | |
| Traffic Vol by Lane | 499 | 71 | 497 | 297 | | | | | | | | |
| LT Vol | 189 | 35 | 48 | 5 | | | | | | | | |
| Through Vol | 304 | 16 | 331 | 139 | | | | | | | | |
| RT Vol | 6 | 20 | 118 | 153 | | | | | | | | |
| Lane Flow Rate | 499 | 71 | 497 | 297 | | | | | | | | |
| Geometry Grp | 1 | 1 | 1 | 1 | | | | | | | | |
| Degree of Util (X) | 0.945 | 0.165 | 0.924 | 0.572 | | | | | | | | |
| Departure Headway (Hd) | 6.816 | 8.386 | 6.694 | 6.937 | | | | | | | | |
| Convergence, Y/N | Yes | Yes | Yes | Yes | | | | | | | | |
| Cap | 534 | 425 | 542 | 520 | | | | | | | | |
| Service Time | 4.849 | 6.48 | 4.723 | 5.006 | | | | | | | | |
| HCM Lane V/C Ratio | 0.934 | 0.167 | 0.917 | 0.571 | | | | | | | | |
| HCM Control Delay | 52.8 | 13.1 | 48.2 | 19 | | | | | | | | |
| HCM Lane LOS | F | B | E | C | | | | | | | | |
| HCM 95th-tile Q | 12 | 0.6 | 11.3 | 3.6 | | | | | | | | |

4055 & 4120 Russell Road
12: Hunt Club & Access

2023 Total Traffic AM Peak Hour Unsignalized



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|--------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 48 | 1050 | 1485 | 117 | 92 | 37 |
| Future Volume (Veh/h) | 48 | 1050 | 1485 | 117 | 92 | 37 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 48 | 1050 | 1485 | 117 | 92 | 37 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1602 | | | | 2164 | 801 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1602 | | | | 2164 | 801 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 88 | | | | 0 | 88 |
| cM capacity (veh/h) | 391 | | | | 34 | 321 |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | WB 2 | SB 1 |
| Volume Total | 48 | 525 | 525 | 990 | 612 | 129 |
| Volume Left | 48 | 0 | 0 | 0 | 0 | 92 |
| Volume Right | 0 | 0 | 0 | 0 | 117 | 37 |
| cSH | 391 | 1700 | 1700 | 1700 | 1700 | 46 |
| Volume to Capacity | 0.12 | 0.31 | 0.31 | 0.58 | 0.36 | 2.82 |
| Queue Length 95th (m) | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 97.2 |
| Control Delay (s) | 15.5 | 0.0 | 0.0 | 0.0 | 0.0 | 1011.3 |
| Lane LOS | C | | | | | F |
| Approach Delay (s) | 0.7 | | | 0.0 | | 1011.3 |
| Approach LOS | | | | | | F |
| Intersection Summary | | | | | | |
| Average Delay | | | 46.4 | | | |
| Intersection Capacity Utilization | | | 61.7% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 76 | 486 | 198 | 464 | 1231 | 64 | 269 | 445 | 568 | 55 | 259 | 135 |
| Future Volume (vph) | 76 | 486 | 198 | 464 | 1231 | 64 | 269 | 445 | 568 | 55 | 259 | 135 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3083 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 198 | | | 134 | | | 535 | | | 180 |
| Lane Group Flow (vph) | 76 | 486 | 198 | 464 | 1231 | 64 | 269 | 445 | 568 | 55 | 259 | 135 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 23.0 | 40.0 | 40.0 | 20.0 | 37.0 | 37.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.3 | 52.7 | 52.7 | 28.5 | 68.0 | 68.0 | 15.1 | 34.8 | 34.8 | 7.9 | 24.9 | 24.9 |
| Actuated g/c Ratio | 0.09 | 0.35 | 0.35 | 0.19 | 0.45 | 0.45 | 0.10 | 0.23 | 0.23 | 0.05 | 0.17 | 0.17 |
| v/c Ratio | 0.63 | 0.42 | 0.33 | 0.81 | 0.79 | 0.09 | 0.86 | 0.60 | 0.79 | 0.32 | 0.49 | 0.36 |
| Control Delay | 87.4 | 40.7 | 6.7 | 69.4 | 41.3 | 0.2 | 91.8 | 55.1 | 14.7 | 72.9 | 59.0 | 4.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 87.4 | 40.7 | 6.7 | 69.4 | 41.3 | 0.2 | 91.8 | 55.1 | 14.7 | 72.9 | 59.0 | 4.7 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 36.5 | | | 47.2 | | | 44.9 | | | 44.4 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 20.4 | 56.0 | 0.0 | 63.5 | 159.5 | 0.0 | 37.9 | 56.5 | 7.0 | 7.6 | 33.0 | 0.0 |
| Queue Length 95th (m) | 35.5 | 77.2 | 18.0 | 76.9 | #207.8 | 0.0 | #59.1 | 74.6 | 52.9 | 14.4 | 46.0 | 5.9 |
| Internal Link Dist (m) | | 485.7 | | | 404.4 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1162 | 596 | 775 | 1556 | 748 | 317 | 752 | 717 | 270 | 629 | 413 |
| 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 | 0.46 | 0.42 | 0.33 | 0.60 | 0.79 | 0.09 | 0.85 | 0.59 | 0.79 | 0.20 | 0.41 | 0.33 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 44.3

Intersection LOS: D

Intersection Capacity Utilization 82.1%

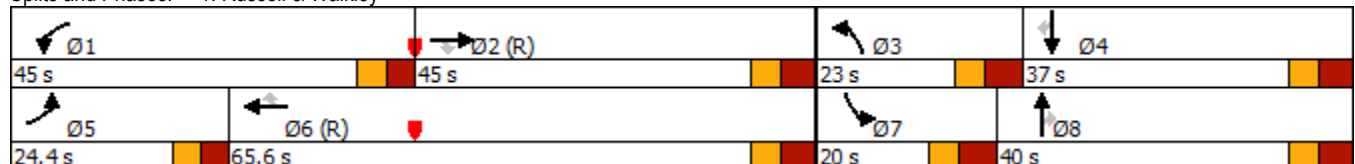
ICU Level of Service E























Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley



| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 40 | 10 | 490 | 17 | 891 | 43 | 227 | 548 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 40 | 10 | 490 | 17 | 891 | 43 | 227 | 548 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3091 | 0 | 1488 | 2985 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.433 | | | 0.195 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 771 | 3091 | 0 | 306 | 2985 | 0 |
| Satd. Flow (RTOR) | | 331 | | | | 363 | | 6 | | | 13 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 40 | 10 | 490 | 17 | 934 | 0 | 227 | 582 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 29.0 | 29.0 | | 29.0 | 29.0 | 29.0 | 40.0 | 40.0 | | 21.0 | 61.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.3 | 6.5 | |
| Act Effct Green (s) | 17.7 | 17.7 | | 17.7 | 17.7 | 17.7 | 42.4 | 42.4 | | 60.3 | 60.1 | |
| Actuated g/C Ratio | 0.20 | 0.20 | | 0.20 | 0.20 | 0.20 | 0.47 | 0.47 | | 0.67 | 0.67 | |
| v/c Ratio | 0.05 | 0.02 | | 0.17 | 0.03 | 0.83 | 0.05 | 0.64 | | 0.64 | 0.29 | |
| Control Delay | 26.3 | 0.0 | | 29.1 | 25.7 | 21.7 | 30.0 | 31.6 | | 16.8 | 7.3 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 26.3 | 0.0 | | 29.1 | 25.7 | 21.7 | 30.0 | 31.6 | | 16.8 | 7.3 | |
| LOS | C | A | | C | C | C | C | C | | B | A | |
| Approach Delay | | 14.6 | | | 22.3 | | | 31.6 | | | 10.0 | |
| Approach LOS | | B | | | C | | | C | | | A | |
| Queue Length 50th (m) | 1.3 | 0.0 | | 5.2 | 1.3 | 17.4 | 1.9 | 67.8 | | 13.3 | 18.6 | |
| Queue Length 95th (m) | 4.8 | 0.0 | | 12.2 | 4.7 | 51.3 | m5.1 | 103.3 | | 29.7 | 29.6 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 260 | 576 | | 304 | 463 | 663 | 363 | 1459 | | 398 | 1996 | |
| 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 | 0.04 | 0.01 | | 0.13 | 0.02 | 0.74 | 0.05 | 0.64 | | 0.57 | 0.29 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 21.7

Intersection LOS: C

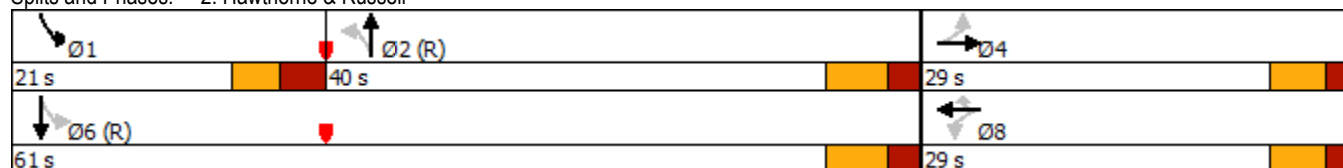
Intersection Capacity Utilization 82.7%

ICU Level of Service E

Analysis Period (min) 15






















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

Splits and Phases: 2: Hawthorne & Russell



4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2023 Total Traffic AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 958 | 86 | 52 | 350 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 958 | 86 | 52 | 350 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3096 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.487 | | | 0.239 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 852 | 3096 | 0 | 359 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 12 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 208 | 1044 | 0 | 52 | 350 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.4 | 46.4 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.31 | 0.56 | | 0.18 | 0.24 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 7.8 | 12.6 | 2.4 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 7.8 | 12.6 | 2.4 |
| LOS | D | B | | C | C | | A | B | | A | B | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 13.7 | | | 8.8 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 10.0 | 53.5 | | 2.1 | 13.7 | 0.0 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.8 | 93.6 | | 7.6 | 22.2 | 6.7 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 669 | 1863 | | 332 | 1474 | 826 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.31 | 0.56 | | 0.16 | 0.24 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.3

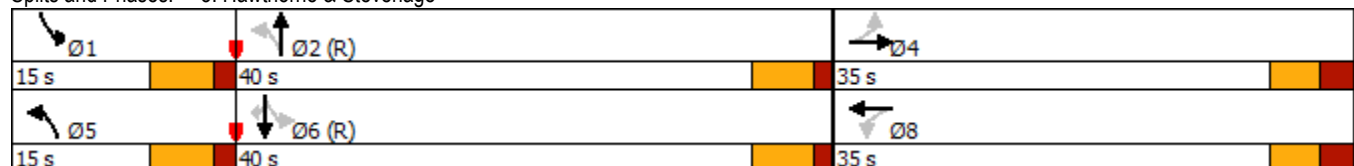
Intersection LOS: B

Intersection Capacity Utilization 63.8%

ICU Level of Service B























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2023 Total Traffic AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 451 | 673 | 25 | 251 | 715 | 246 | 40 | 412 | 382 | 43 | 147 | 197 |
| Future Volume (vph) | 451 | 673 | 25 | 251 | 715 | 246 | 40 | 412 | 382 | 43 | 147 | 197 |
| Satd. Flow (prot) | 3179 | 3337 | 0 | 3094 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.659 | | | 0.128 | | |
| Satd. Flow (perm) | 3179 | 3337 | 0 | 3094 | 3402 | 1440 | 1032 | 2974 | 0 | 160 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 2 | | | | 246 | | 152 | | | | 197 |
| Lane Group Flow (vph) | 451 | 698 | 0 | 251 | 715 | 246 | 40 | 794 | 0 | 43 | 147 | 197 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 41.4 | 41.4 | | 41.4 | 41.4 | 41.4 | 21.3 | 36.3 | | 21.3 | 36.3 | 36.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 21.8 | 39.8 | | 14.9 | 32.9 | 32.9 | 36.8 | 30.5 | | 38.2 | 31.3 | 31.3 |
| Actuated g/C Ratio | 0.19 | 0.34 | | 0.13 | 0.28 | 0.28 | 0.32 | 0.26 | | 0.33 | 0.27 | 0.27 |
| v/c Ratio | 0.76 | 0.61 | | 0.63 | 0.74 | 0.42 | 0.11 | 0.89 | | 0.34 | 0.20 | 0.40 |
| Control Delay | 54.5 | 35.5 | | 57.2 | 44.8 | 6.8 | 27.1 | 48.2 | | 33.9 | 37.1 | 8.1 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 54.5 | 35.5 | | 57.2 | 44.8 | 6.8 | 27.1 | 48.2 | | 33.9 | 37.1 | 8.1 |
| LOS | D | D | | E | D | A | C | D | | C | D | A |
| Approach Delay | | 43.0 | | | 39.7 | | | 47.2 | | | 22.0 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Queue Length 50th (m) | 48.8 | 65.5 | | 27.3 | 74.0 | 0.0 | 5.6 | 74.8 | | 6.1 | 13.3 | 0.0 |
| Queue Length 95th (m) | 67.1 | 92.6 | | 41.3 | 105.2 | 18.7 | 13.6 | #124.3 | | 14.5 | 23.6 | 18.0 |
| Internal Link Dist (m) | | 420.4 | | | 459.3 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 973 | 1174 | | 947 | 1041 | 611 | 427 | 892 | | 192 | 737 | 487 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.46 | 0.59 | | 0.27 | 0.69 | 0.40 | 0.09 | 0.89 | | 0.22 | 0.20 | 0.40 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 116.4

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 40.6

Intersection LOS: D

Intersection Capacity Utilization 84.9%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|---|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |

4055 & 4120 Russell Road
10: Walkley & Hwy 417 SB Off-Ramp

2023 Total Traffic AM Peak Hour Mod



| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↘ | ↗ |
| Traffic Volume (vph) | 0 | 731 | 994 | 0 | 23 | 1039 |
| Future Volume (vph) | 0 | 731 | 994 | 0 | 23 | 1039 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 371 |
| Lane Group Flow (vph) | 0 | 731 | 994 | 0 | 23 | 1039 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 90.0 | 90.0 | | 30.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 107.6 | 107.6 | | 7.2 | 120.0 |
| Actuated g/C Ratio | | 0.90 | 0.90 | | 0.06 | 1.00 |
| v/c Ratio | | 0.24 | 0.33 | | 0.23 | 0.68 |
| Control Delay | | 1.8 | 1.6 | | 58.3 | 2.5 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 1.8 | 1.6 | | 58.3 | 2.5 |
| LOS | | A | A | | E | A |
| Approach Delay | | 1.8 | 1.6 | | 3.7 | |
| Approach LOS | | A | A | | A | |
| Queue Length 50th (m) | | 13.0 | 20.5 | | 4.9 | 0.0 |
| Queue Length 95th (m) | | 19.4 | 16.4 | | 12.4 | 0.0 |
| Internal Link Dist (m) | | 667.8 | 354.1 | | 288.6 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 3049 | 3049 | | 335 | 1522 |
| 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 | | 0.24 | 0.33 | | 0.07 | 0.68 |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 2.5

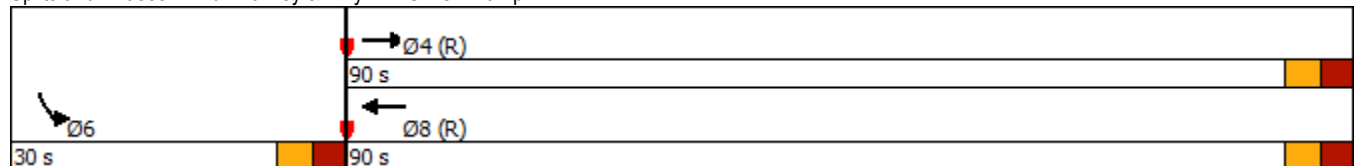
Intersection LOS: A

Intersection Capacity Utilization 73.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Walkley & Hwy 417 SB Off-Ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 164 | 0 | 0 | 930 | 553 | 57 |
| Future Volume (vph) | 164 | 0 | 0 | 930 | 553 | 57 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Flt Permitted | | | | | 0.957 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Satd. Flow (RTOR) | | | | | 6 | |
| Lane Group Flow (vph) | 164 | 0 | 0 | 930 | 610 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 51.0 | | | 51.0 | 69.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 43.3 | | | 43.3 | 64.1 | |
| Actuated g/C Ratio | 0.36 | | | 0.36 | 0.53 | |
| v/c Ratio | 0.13 | | | 0.76 | 0.67 | |
| Control Delay | 27.8 | | | 38.2 | 25.2 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 27.8 | | | 38.2 | 25.2 | |
| LOS | C | | | D | C | |
| Approach Delay | 27.8 | | | 38.2 | 25.2 | |
| Approach LOS | C | | | D | C | |
| Queue Length 50th (m) | 11.0 | | | 90.8 | 94.3 | |
| Queue Length 95th (m) | 22.5 | | | 113.0 | 133.4 | |
| Internal Link Dist (m) | 354.1 | | | 306.3 | 348.9 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1267 | | | 1267 | 906 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.13 | | | 0.73 | 0.67 | |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 69 (58%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 32.6

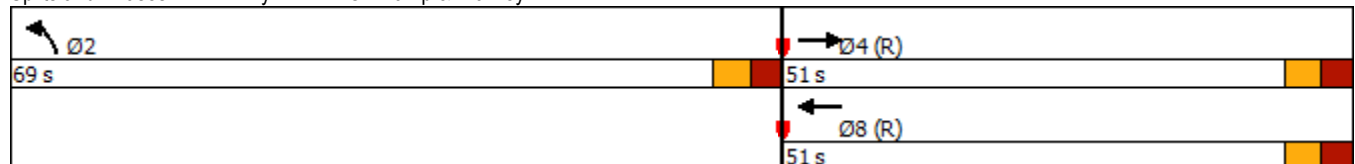
Intersection LOS: C

Intersection Capacity Utilization 73.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: Hwy 417 NB Off-Ramp & Walkley



Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|----------------------------|-----------------------------|
| 119124 | 2023 PHF Flow Profile (veh) |
| 2023 Total Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| AM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|-------------------------------|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | Average Delay (sec/veh) | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB - Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2023 AM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 5 | 139 | 153 | 0 | 3.0 | 1.00 | 0.900 |
| 2 | EB - Russell | 0 | 35 | 16 | 20 | 0 | 3.0 | 1.00 | 0.900 |
| 3 | NB- Anderson | 0 | 189 | 304 | 6 | 0 | 3.0 | 1.00 | 0.900 |
| 4 | WB - Russell | 0 | 48 | 331 | 118 | 0 | 3.0 | 1.00 | 0.900 |

Operational Results

Geometry for Target Input

Geometry Options for 2023 AM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 AM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 AM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 AM Peak

| Leg 4 - WB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2023 AM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 297 | | 568 | | 457 | 654 | | 0.4542 | |
| 2 | EB - Russell | None | 71 | | 192 | | 673 | 848 | | 0.0837 | |
| 3 | NB- Anderson | None | 499 | | 56 | | 207 | 918 | | 0.5434 | |
| 4 | WB - Russell | None | 497 | | 528 | | 27 | 674 | | 0.7369 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 9.46 | | 9.46 | 2.65 | | A | | A |
| 2 | EB - Russell | None | 4.44 | | 4.44 | 0.26 | | A | | A |
| 3 | NB- Anderson | None | 7.94 | | 7.94 | 3.54 | | A | | A |
| 4 | WB - Russell | None | 18.34 | | 18.34 | 9.96 | | C | | C |

























2023 AM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 330 | | 625 | | 505 | | 624 | 0.5285 |
| 2 | EB - Russell | None | 79 | | 212 | | 741 | | 838 | 0.0942 |
| 3 | NB- Anderson | None | 554 | | 62 | | 229 | | 915 | 0.6058 |
| 4 | WB - Russell | None | 552 | | 585 | | 30 | | 645 | 0.8565 |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 10.20 | | 10.20 | 2.65 | | B | | B |
| 2 | EB - Russell | None | 4.37 | | 4.37 | 0.26 | | A | | A |
| 3 | NB- Anderson | None | 8.36 | | 8.36 | 3.54 | | A | | A |
| 4 | WB - Russell | None | 22.55 | | 22.55 | 9.96 | | C | | C |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 96 | 1360 | 319 | 544 | 681 | 80 | 193 | 308 | 583 | 105 | 481 | 109 |
| Future Volume (vph) | 96 | 1360 | 319 | 544 | 681 | 80 | 193 | 308 | 583 | 105 | 481 | 109 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3011 | 3468 | 1535 | 3155 | 3338 | 1402 | 3218 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 262 | | | 154 | | | 207 | | | 207 |
| Lane Group Flow (vph) | 96 | 1360 | 319 | 544 | 681 | 80 | 193 | 308 | 583 | 105 | 481 | 109 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 12.0 | 58.0 | 58.0 | 20.0 | 66.0 | 66.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 5.6 | 50.7 | 50.7 | 13.6 | 58.7 | 58.7 | 9.4 | 28.3 | 28.3 | 8.7 | 27.6 | 27.6 |
| Actuated g/c Ratio | 0.04 | 0.39 | 0.39 | 0.10 | 0.45 | 0.45 | 0.07 | 0.22 | 0.22 | 0.07 | 0.21 | 0.21 |
| v/c Ratio | 1.39 | 1.01 | 0.46 | 1.73 | 0.44 | 0.10 | 0.84 | 0.42 | 1.25 | 0.48 | 0.70 | 0.24 |
| Control Delay | 287.3 | 65.5 | 8.2 | 374.3 | 25.4 | 0.3 | 89.3 | 46.2 | 157.2 | 66.0 | 53.6 | 1.2 |
| 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 | 287.3 | 65.5 | 8.2 | 374.3 | 25.4 | 0.3 | 89.3 | 46.2 | 157.2 | 66.0 | 53.6 | 1.2 |
| LOS | F | E | A | F | C | A | F | D | F | E | D | A |
| Approach Delay | | 67.2 | | | 169.3 | | | 113.5 | | | 47.2 | |
| Approach LOS | | E | | | F | | | F | | | D | |
| Queue Length 50th (m) | ~30.1 | ~169.4 | 8.5 | ~97.6 | 56.6 | 0.0 | 23.6 | 33.4 | ~132.6 | 12.4 | 55.7 | 0.0 |
| Queue Length 95th (m) | #62.9 | #215.3 | 29.8 | #129.7 | 71.3 | 0.0 | #42.2 | 46.6 | #197.3 | 21.2 | 73.2 | 0.0 |
| Internal Link Dist (m) | | 485.7 | | | 402.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 69 | 1352 | 693 | 315 | 1565 | 777 | 229 | 725 | 466 | 234 | 689 | 459 |
| 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 | 1.39 | 1.01 | 0.46 | 1.73 | 0.44 | 0.10 | 0.84 | 0.42 | 1.25 | 0.45 | 0.70 | 0.24 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.73

Intersection Signal Delay: 102.1

Intersection LOS: F

Intersection Capacity Utilization 101.4%

ICU Level of Service G

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.























Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|--|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 20 s | 58 s | 17 s | 35 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 12 s | 66 s | 17 s | 35 s |

4055 & 4120 Russell Road
2: Hawthorne & Russell

2023 Total Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 35 | 7 | 21 | 31 | 3 | 203 | 7 | 716 | 57 | 419 | 869 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 31 | 3 | 203 | 7 | 716 | 57 | 419 | 869 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3233 | 0 | 1639 | 3270 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.310 | | | 0.355 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 402 | 3233 | 0 | 612 | 3270 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 203 | | 18 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 31 | 3 | 203 | 7 | 773 | 0 | 419 | 886 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 54.0 | 54.0 | | 54.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 12.0 | 12.0 | | 12.0 | 12.0 | 12.0 | 55.8 | 55.8 | | 55.8 | 55.8 | |
| Actuated g/C Ratio | 0.15 | 0.15 | | 0.15 | 0.15 | 0.15 | 0.70 | 0.70 | | 0.70 | 0.70 | |
| v/c Ratio | 0.18 | 0.12 | | 0.15 | 0.02 | 0.51 | 0.03 | 0.34 | | 0.98 | 0.39 | |
| Control Delay | 30.3 | 15.3 | | 29.5 | 26.3 | 9.3 | 5.6 | 5.7 | | 56.2 | 6.1 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 30.3 | 15.3 | | 29.5 | 26.3 | 9.3 | 5.6 | 5.7 | | 56.2 | 6.1 | |
| LOS | C | B | | C | C | A | A | A | | E | A | |
| Approach Delay | | 23.6 | | | 12.2 | | | 5.7 | | | 22.2 | |
| Approach LOS | | C | | | B | | | A | | | C | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 4.0 | 0.4 | 0.0 | 0.2 | 16.3 | | 42.0 | 20.1 | |
| Queue Length 95th (m) | 10.2 | 6.1 | | 9.3 | 2.1 | 13.9 | 1.8 | 36.4 | | #117.8 | 43.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 529 | 280 | 2260 | | 427 | 2281 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.09 | 0.01 | 0.38 | 0.03 | 0.34 | | 0.98 | 0.39 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 16 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 15.8

Intersection LOS: B

Intersection Capacity Utilization 71.6%













ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.






















Queue shown is maximum after two cycles.

Splits and Phases: 2: Hawthorne & Russell

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø2 (R) | | | Ø4 | | |
| 54 s | | | 26 s | | |
|  |  |  |  |  |  |
| Ø6 (R) | | | Ø8 | | |
| 54 s | | | 26 s | | |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2023 Total Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 417 | 59 | 45 | 973 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 417 | 59 | 45 | 973 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3077 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.209 | | | 0.480 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 291 | 3077 | 0 | 668 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 20 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 476 | 0 | 45 | 973 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.31 | 0.27 | | 0.10 | 0.54 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.6 | 13.5 | | 9.0 | 18.9 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.6 | 13.5 | | 9.0 | 18.9 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 13.2 | | | 16.6 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 22.5 | | 2.6 | 59.0 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 38.0 | | 7.5 | 89.2 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 280 | 1731 | | 466 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.29 | 0.27 | | 0.10 | 0.54 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.4













Intersection LOS: B

Intersection Capacity Utilization 76.9%

ICU Level of Service D























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø1 | Ø2 (R) | | | Ø4 | |
| 15 s | 45 s | | | 35 s | |
|  |  |  |  |  |  |
| Ø5 | Ø6 (R) | | | Ø8 | |
| 15 s | 45 s | | | 35 s | |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2023 Total Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 299 | 858 | 24 | 423 | 906 | 87 | 25 | 193 | 307 | 167 | 494 | 490 |
| Future Volume (vph) | 299 | 858 | 24 | 423 | 906 | 87 | 25 | 193 | 307 | 167 | 494 | 490 |
| Satd. Flow (prot) | 1595 | 3422 | 0 | 1654 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.424 | | | 0.147 | | |
| Satd. Flow (perm) | 1595 | 3422 | 0 | 1653 | 3468 | 1141 | 766 | 2807 | 0 | 249 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 242 | | | | 490 |
| Lane Group Flow (vph) | 299 | 882 | 0 | 423 | 906 | 87 | 25 | 500 | 0 | 167 | 494 | 490 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 28.6 | 40.2 | | 37.8 | 49.5 | 49.5 | 27.2 | 20.2 | | 40.7 | 32.6 | 32.6 |
| Actuated g/c Ratio | 0.21 | 0.29 | | 0.27 | 0.36 | 0.36 | 0.20 | 0.15 | | 0.29 | 0.24 | 0.24 |
| v/c Ratio | 0.91 | 0.88 | | 0.93 | 0.73 | 0.18 | 0.13 | 0.81 | | 0.79 | 0.64 | 0.67 |
| Control Delay | 85.1 | 58.5 | | 78.6 | 43.7 | 2.9 | 36.7 | 40.0 | | 64.2 | 53.3 | 8.9 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 85.1 | 58.5 | | 78.6 | 43.7 | 2.9 | 36.7 | 40.0 | | 64.2 | 53.3 | 8.9 |
| LOS | F | E | | E | D | A | D | D | | E | D | A |
| Approach Delay | | 65.2 | | | 51.6 | | | 39.9 | | | 36.0 | |
| Approach LOS | | E | | | D | | | D | | | D | |
| Queue Length 50th (m) | 75.6 | 113.5 | | 107.8 | 107.4 | 0.0 | 4.6 | 34.9 | | 33.7 | 63.3 | 0.0 |
| Queue Length 95th (m) | #128.9 | #151.6 | | #175.8 | 136.9 | 5.1 | 11.1 | 53.8 | | #59.4 | 82.8 | 30.3 |
| Internal Link Dist (m) | | 420.4 | | | 461.0 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 348 | 1050 | | 458 | 1265 | 491 | 300 | 728 | | 222 | 767 | 734 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.86 | 0.84 | | 0.92 | 0.72 | 0.18 | 0.08 | 0.69 | | 0.75 | 0.64 | 0.67 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 138

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 49.7

Intersection LOS: D

Intersection Capacity Utilization 97.8%









ICU Level of Service F











Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | | | | | |
|---|----|---|----|---|----|---|----|
|  | Ø3 |  | Ø4 |  | Ø1 |  | Ø2 |
| 44.4 s | | 48.4 s | | 21.3 s | | 32.3 s | |
|  | Ø7 |  | Ø8 |  | Ø5 |  | Ø6 |
| 36.4 s | | 56.4 s | | 21.3 s | | 32.3 s | |

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (vph) | 49 | 1283 | 1485 | 123 | 87 | 36 |
| Future Volume (vph) | 49 | 1283 | 1485 | 123 | 87 | 36 |
| Satd. Flow (prot) | 1701 | 3402 | 3364 | 0 | 1660 | 0 |
| Flt Permitted | 0.118 | | | | 0.966 | |
| Satd. Flow (perm) | 211 | 3402 | 3364 | 0 | 1660 | 0 |
| Satd. Flow (RTOR) | | | 16 | | 16 | |
| Lane Group Flow (vph) | 49 | 1283 | 1608 | 0 | 123 | 0 |
| Turn Type | Perm | NA | NA | | Prot | |
| Protected Phases | | 2 | 6 | | 4 | |
| Permitted Phases | 2 | | | | | |
| Total Split (s) | 41.4 | 41.4 | 41.4 | | 31.8 | |
| Total Lost Time (s) | 6.4 | 6.4 | 6.4 | | 5.8 | |
| Act Effct Green (s) | 54.5 | 54.5 | 54.5 | | 10.1 | |
| Actuated g/C Ratio | 0.74 | 0.74 | 0.74 | | 0.14 | |
| v/c Ratio | 0.31 | 0.51 | 0.64 | | 0.51 | |
| Control Delay | 12.5 | 6.4 | 8.1 | | 31.9 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | |
| Total Delay | 12.5 | 6.4 | 8.1 | | 31.9 | |
| LOS | B | A | A | | C | |
| Approach Delay | | 6.6 | 8.1 | | 31.9 | |
| Approach LOS | | A | A | | C | |
| Queue Length 50th (m) | 2.0 | 34.4 | 50.7 | | 12.7 | |
| Queue Length 95th (m) | 10.6 | 58.7 | 87.5 | | 24.7 | |
| Internal Link Dist (m) | | 461.0 | 862.2 | | 131.3 | |
| Turn Bay Length (m) | 30.0 | | | | 30.0 | |
| Base Capacity (vph) | 157 | 2532 | 2507 | | 599 | |
| 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 | 0.31 | 0.51 | 0.64 | | 0.21 | |

Intersection Summary

Cycle Length: 73.2

Actuated Cycle Length: 73.2

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 8.4









Intersection LOS: A










Intersection Capacity Utilization 65.0%











ICU Level of Service C










Analysis Period (min) 15

Splits and Phases: 12: Hunt Club & Access

| | | |
|---|---|---|
|  |  |  |
|  |  |  |
| 41.4 s | | 31.8 s |
|  |  | |
| 41.4 s | | |







| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 413 | 29 | 10 | 254 | 27 | 126 |
| Future Volume (Veh/h) | 413 | 29 | 10 | 254 | 27 | 126 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 413 | 29 | 10 | 254 | 27 | 126 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 442 | | 702 | 428 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 442 | | 702 | 428 |
| tC, single (s) | | | 4.2 | | 6.6 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.3 | | 3.7 | 3.3 |
| p0 queue free % | | | 99 | | 93 | 80 |
| cM capacity (veh/h) | | | 1077 | | 375 | 625 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 442 | 264 | 153 | | | |
| Volume Left | 0 | 10 | 27 | | | |
| Volume Right | 29 | 0 | 126 | | | |
| cSH | 1700 | 1077 | 559 | | | |
| Volume to Capacity | 0.26 | 0.01 | 0.27 | | | |
| Queue Length 95th (m) | 0.0 | 0.2 | 7.7 | | | |
| Control Delay (s) | 0.0 | 0.4 | 13.8 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 0.4 | 13.8 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.6 | | | |
| Intersection Capacity Utilization | | | 41.3% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 11 | 1440 | 0 | 1125 | 167 | 0 |
| Future Volume (Veh/h) | 11 | 1440 | 0 | 1125 | 167 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 11 | 1440 | 0 | 1125 | 167 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1292 | 167 | 167 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1292 | 167 | 167 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 94 | 0 | 100 | | | |
| cM capacity (veh/h) | 181 | 864 | 1423 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 11 | 1440 | 1125 | 167 | | |
| Volume Left | 11 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1440 | 0 | 0 | | |
| cSH | 181 | 864 | 1700 | 1700 | | |
| Volume to Capacity | 0.06 | 1.67 | 0.66 | 0.10 | | |
| Queue Length 95th (m) | 1.3 | 551.7 | 0.0 | 0.0 | | |
| Control Delay (s) | 26.2 | 318.9 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 316.7 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 167.5 | | | |
| Intersection Capacity Utilization | | | 110.1% | ICU Level of Service | | H |
| Analysis Period (min) | | | 15 | | | |






| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 123 | 336 | 57 | 114 | 322 | 40 |
| Future Volume (Veh/h) | 123 | 336 | 57 | 114 | 322 | 40 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 123 | 336 | 57 | 114 | 322 | 40 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 570 | 342 | 362 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 570 | 342 | 362 | | | |
| tC, single (s) | 6.5 | 6.3 | 4.2 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.4 | 2.3 | | | |
| p0 queue free % | 73 | 51 | 95 | | | |
| cM capacity (veh/h) | 452 | 689 | 1128 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 459 | 171 | 362 | | | |
| Volume Left | 123 | 57 | 0 | | | |
| Volume Right | 336 | 0 | 40 | | | |
| cSH | 604 | 1128 | 1700 | | | |
| Volume to Capacity | 0.76 | 0.05 | 0.21 | | | |
| Queue Length 95th (m) | 48.1 | 1.1 | 0.0 | | | |
| Control Delay (s) | 27.3 | 3.1 | 0.0 | | | |
| Lane LOS | D | A | | | | |
| Approach Delay (s) | 27.3 | 3.1 | 0.0 | | | |
| Approach LOS | D | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 13.2 | | | |
| Intersection Capacity Utilization | | | 69.1% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |

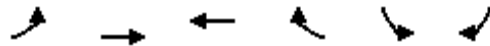






| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 1622 | 184 | 0 | 174 | 727 |
| Future Volume (Veh/h) | 0 | 1622 | 184 | 0 | 174 | 727 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 1622 | 184 | 0 | 174 | 727 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 184 | | | | 995 | 92 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 184 | | | | 995 | 92 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 26 | 22 |
| cM capacity (veh/h) | 1367 | | | | 236 | 938 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 811 | 811 | 92 | 92 | 174 | 727 |
| Volume Left | 0 | 0 | 0 | 0 | 174 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 727 |
| cSH | 1700 | 1700 | 1700 | 1700 | 236 | 938 |
| Volume to Capacity | 0.48 | 0.48 | 0.05 | 0.05 | 0.74 | 0.78 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 35.5 | 55.7 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 53.4 | 20.7 |
| Lane LOS | | | | | F | C |
| Approach Delay (s) | 0.0 | | 0.0 | | 27.0 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 9.0 | | | |
| Intersection Capacity Utilization | | | 64.2% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 811 | 0 | 0 | 87 | 156 | 24 |
| Future Volume (Veh/h) | 811 | 0 | 0 | 87 | 156 | 24 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 811 | 0 | 0 | 87 | 156 | 24 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 811 | | 854 | 406 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 811 | | 854 | 406 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 47 | 96 |
| cM capacity (veh/h) | | | 792 | | 292 | 586 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 406 | 406 | 44 | 44 | 180 | |
| Volume Left | 0 | 0 | 0 | 0 | 156 | |
| Volume Right | 0 | 0 | 0 | 0 | 24 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 313 | |
| Volume to Capacity | 0.24 | 0.24 | 0.03 | 0.03 | 0.58 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 23.7 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 31.0 | |
| Lane LOS | | | | | D | |
| Approach Delay (s) | 0.0 | | 0.0 | | 31.0 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 5.2 | | | |
| Intersection Capacity Utilization | | | 64.2% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |



















| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|---|
| Lane Configurations |  |  |  | |  |  |
| Traffic Volume (veh/h) | 174 | 412 | 116 | 61 | 31 | 89 |
| Future Volume (Veh/h) | 174 | 412 | 116 | 61 | 31 | 89 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 174 | 412 | 116 | 61 | 31 | 89 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 177 | | | | 906 | 146 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 177 | | | | 906 | 146 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 87 | | | | 88 | 90 |
| cM capacity (veh/h) | 1381 | | | | 264 | 893 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | SB 2 | |
| Volume Total | 174 | 412 | 177 | 31 | 89 | |
| Volume Left | 174 | 0 | 0 | 31 | 0 | |
| Volume Right | 0 | 0 | 61 | 0 | 89 | |
| cSH | 1381 | 1700 | 1700 | 264 | 893 | |
| Volume to Capacity | 0.13 | 0.24 | 0.10 | 0.12 | 0.10 | |
| Queue Length 95th (m) | 3.0 | 0.0 | 0.0 | 2.8 | 2.3 | |
| Control Delay (s) | 8.0 | 0.0 | 0.0 | 20.4 | 9.5 | |
| Lane LOS | A | | | C | A | |
| Approach Delay (s) | 2.4 | | 0.0 | 12.3 | | |
| Approach LOS | | | | B | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.2 | | | |
| Intersection Capacity Utilization | | | 33.9% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |



















| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|------|
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (veh/h) | 74 | 369 | 139 | 142 | 73 | 38 |
| Future Volume (Veh/h) | 74 | 369 | 139 | 142 | 73 | 38 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 74 | 369 | 139 | 142 | 73 | 38 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 281 | | | | 727 | 210 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 281 | | | | 727 | 210 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 94 | | | | 80 | 95 |
| cM capacity (veh/h) | 1264 | | | | 364 | 823 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | | |
| Volume Total | 74 | 369 | 281 | 111 | | |
| Volume Left | 74 | 0 | 0 | 73 | | |
| Volume Right | 0 | 0 | 142 | 38 | | |
| cSH | 1264 | 1700 | 1700 | 450 | | |
| Volume to Capacity | 0.06 | 0.22 | 0.17 | 0.25 | | |
| Queue Length 95th (m) | 1.3 | 0.0 | 0.0 | 6.7 | | |
| Control Delay (s) | 8.0 | 0.0 | 0.0 | 15.6 | | |
| Lane LOS | A | | | C | | |
| Approach Delay (s) | 1.3 | | 0.0 | 15.6 | | |
| Approach LOS | | | | C | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.8 | | | |
| Intersection Capacity Utilization | | | 37.9% | ICU Level of Service | | A |
| Analvsis Period (min) | | | 15 | | | |




4055 & 4120 Russell Road
15: Site 2/Building F & Russell

2023 Total Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 0 | 453 | 86 | 1 | 93 | 0 | 171 | 1 | 2 | 0 | 2 | 1 |
| Future Volume (Veh/h) | 0 | 453 | 86 | 1 | 93 | 0 | 171 | 1 | 2 | 0 | 2 | 1 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 453 | 86 | 1 | 93 | 0 | 171 | 1 | 2 | 0 | 2 | 1 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 93 | | | 539 | | | 593 | 591 | 496 | 594 | 634 | 93 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 93 | | | 539 | | | 593 | 591 | 496 | 594 | 634 | 93 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 58 | 100 | 100 | 100 | 99 | 100 |
| cM capacity (veh/h) | 1483 | | | 1014 | | | 411 | 415 | 568 | 410 | 392 | 956 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 539 | 94 | 174 | 3 | | | | | | | | |
| Volume Left | 0 | 1 | 171 | 0 | | | | | | | | |
| Volume Right | 86 | 0 | 2 | 1 | | | | | | | | |
| cSH | 1483 | 1014 | 412 | 488 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.42 | 0.01 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 14.4 | 0.1 | | | | | | | | |
| Control Delay (s) | 0.0 | 0.1 | 20.0 | 12.4 | | | | | | | | |
| Lane LOS | | A | C | B | | | | | | | | |
| Approach Delay (s) | 0.0 | 0.1 | 20.0 | 12.4 | | | | | | | | |
| Approach LOS | | | C | B | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 4.4 | | | | | | | | | |
| Intersection Capacity Utilization | | | 54.2% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |





| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 0 | 454 | 1 | 1 | 90 | 0 | 3 | 0 | 1 | 0 | 0 | 1 |
| Future Volume (Veh/h) | 0 | 454 | 1 | 1 | 90 | 0 | 3 | 0 | 1 | 0 | 0 | 1 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 454 | 1 | 1 | 90 | 0 | 3 | 0 | 1 | 0 | 0 | 1 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 90 | | | 455 | | | 548 | 546 | 454 | 548 | 547 | 90 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 90 | | | 455 | | | 548 | 546 | 454 | 548 | 547 | 90 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 99 | 100 | 100 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1486 | | | 1090 | | | 442 | 440 | 599 | 442 | 440 | 960 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 455 | 91 | 4 | 1 | | | | | | | | |
| Volume Left | 0 | 1 | 3 | 0 | | | | | | | | |
| Volume Right | 1 | 0 | 1 | 1 | | | | | | | | |
| cSH | 1486 | 1090 | 473 | 960 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.01 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.2 | 0.0 | | | | | | | | |
| Control Delay (s) | 0.0 | 0.1 | 12.7 | 8.8 | | | | | | | | |
| Lane LOS | | A | B | A | | | | | | | | |
| Approach Delay (s) | 0.0 | 0.1 | 12.7 | 8.8 | | | | | | | | |
| Approach LOS | | | B | A | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 0.1 | | | | | | | | | |
| Intersection Capacity Utilization | | | 35.3% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |











| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 11.2 |
| Intersection LOS | B |

























| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 83 | 8 | 49 | 203 | 132 | 300 |
| Future Vol, veh/h | 83 | 8 | 49 | 203 | 132 | 300 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 10 | 1 | 7 | 4 | 2 | 2 |
| Mvmt Flow | 83 | 8 | 49 | 203 | 132 | 300 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|----------------------------|-----|-----|------|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 9.7 | 9.1 | 12.8 |
| HCM LOS | A | A | B |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 91% | 31% |
| Vol Thru, % | 19% | 0% | 69% |
| Vol Right, % | 81% | 9% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 252 | 91 | 432 |
| LT Vol | 0 | 83 | 132 |
| Through Vol | 49 | 0 | 300 |
| RT Vol | 203 | 8 | 0 |
| Lane Flow Rate | 252 | 91 | 432 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.298 | 0.143 | 0.542 |
| Departure Headway (Hd) | 4.264 | 5.673 | 4.513 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 842 | 629 | 799 |
| Service Time | 2.299 | 3.734 | 2.544 |
| HCM Lane V/C Ratio | 0.299 | 0.145 | 0.541 |
| HCM Control Delay | 9.1 | 9.7 | 12.8 |
| HCM Lane LOS | A | A | B |
| HCM 95th-tile Q | 1.3 | 0.5 | 3.3 |

| Intersection | | | | | | | | | | | | |
|----------------------------|-------|---|-------|-------|---|------|------|---|------|------|---|------|
| Intersection Delay, s/veh | 14 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 77 | 233 | 27 | 12 | 23 | 10 | 30 | 170 | 46 | 61 | 262 | 38 |
| Future Vol, veh/h | 77 | 233 | 27 | 12 | 23 | 10 | 30 | 170 | 46 | 61 | 262 | 38 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 2 | 1 | 1 | 1 | 14 | 1 | 1 | 1 | 7 | 2 | 3 | 4 |
| Mvmt Flow | 77 | 233 | 27 | 12 | 23 | 10 | 30 | 170 | 46 | 61 | 262 | 38 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 15 | | | 9.8 | | | 12 | | | 14.9 | | |
| HCM LOS | B | | | A | | | B | | | B | | |
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | | | | | | | | |
| Vol Left, % | 12% | 23% | 27% | 17% | | | | | | | | |
| Vol Thru, % | 69% | 69% | 51% | 73% | | | | | | | | |
| Vol Right, % | 19% | 8% | 22% | 11% | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | | | | | | | | |
| Traffic Vol by Lane | 246 | 337 | 45 | 361 | | | | | | | | |
| LT Vol | 30 | 77 | 12 | 61 | | | | | | | | |
| Through Vol | 170 | 233 | 23 | 262 | | | | | | | | |
| RT Vol | 46 | 27 | 10 | 38 | | | | | | | | |
| Lane Flow Rate | 246 | 337 | 45 | 361 | | | | | | | | |
| Geometry Grp | 1 | 1 | 1 | 1 | | | | | | | | |
| Degree of Util (X) | 0.379 | 0.53 | 0.077 | 0.546 | | | | | | | | |
| Departure Headway (Hd) | 5.551 | 5.66 | 6.184 | 5.444 | | | | | | | | |
| Convergence, Y/N | Yes | Yes | Yes | Yes | | | | | | | | |
| Cap | 645 | 634 | 575 | 661 | | | | | | | | |
| Service Time | 3.61 | 3.713 | 4.266 | 3.497 | | | | | | | | |
| HCM Lane V/C Ratio | 0.381 | 0.532 | 0.078 | 0.546 | | | | | | | | |
| HCM Control Delay | 12 | 15 | 9.8 | 14.9 | | | | | | | | |
| HCM Lane LOS | B | B | A | B | | | | | | | | |
| HCM 95th-tile Q | 1.8 | 3.1 | 0.2 | 3.3 | | | | | | | | |

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (veh/h) | 49 | 1283 | 1485 | 123 | 87 | 36 |
| Future Volume (Veh/h) | 49 | 1283 | 1485 | 123 | 87 | 36 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 49 | 1283 | 1485 | 123 | 87 | 36 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1608 | | | | 2286 | 804 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1608 | | | | 2286 | 804 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 87 | | | | 0 | 89 |
| cM capacity (veh/h) | 389 | | | | 28 | 320 |
| Direction, Lane # | EB 1 | EB 2 | EB 3 | WB 1 | WB 2 | SB 1 |
| Volume Total | 49 | 642 | 642 | 990 | 618 | 123 |
| Volume Left | 49 | 0 | 0 | 0 | 0 | 87 |
| Volume Right | 0 | 0 | 0 | 0 | 123 | 36 |
| cSH | 389 | 1700 | 1700 | 1700 | 1700 | 38 |
| Volume to Capacity | 0.13 | 0.38 | 0.38 | 0.58 | 0.36 | 3.23 |
| Queue Length 95th (m) | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | Err |
| Control Delay (s) | 15.6 | 0.0 | 0.0 | 0.0 | 0.0 | Err |
| Lane LOS | C | | | | | F |
| Approach Delay (s) | 0.6 | | | 0.0 | | Err |
| Approach LOS | | | | | | F |
| Intersection Summary | | | | | | |
| Average Delay | | | 401.8 | | | |
| Intersection Capacity Utilization | | | 61.5% | | ICU Level of Service | B |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 96 | 1240 | 319 | 310 | 681 | 80 | 193 | 308 | 375 | 105 | 481 | 109 |
| Future Volume (vph) | 96 | 1240 | 319 | 310 | 681 | 80 | 193 | 308 | 375 | 105 | 481 | 109 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3010 | 3468 | 1535 | 3155 | 3338 | 1402 | 3218 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 258 | | | 154 | | | 169 | | | 154 |
| Lane Group Flow (vph) | 96 | 1240 | 319 | 310 | 681 | 80 | 193 | 308 | 375 | 105 | 481 | 109 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 15.0 | 58.0 | 58.0 | 20.0 | 63.0 | 63.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 9.4 | 51.5 | 51.5 | 14.9 | 57.0 | 57.0 | 9.4 | 26.2 | 26.2 | 8.7 | 25.6 | 25.6 |
| Actuated g/c Ratio | 0.07 | 0.40 | 0.40 | 0.11 | 0.44 | 0.44 | 0.07 | 0.20 | 0.20 | 0.07 | 0.20 | 0.20 |
| v/c Ratio | 0.83 | 0.90 | 0.46 | 0.90 | 0.45 | 0.11 | 0.84 | 0.46 | 0.90 | 0.48 | 0.75 | 0.27 |
| Control Delay | 106.8 | 47.4 | 8.5 | 85.9 | 27.0 | 0.3 | 89.3 | 47.8 | 52.5 | 66.0 | 57.2 | 3.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 106.8 | 47.4 | 8.5 | 85.9 | 27.0 | 0.3 | 89.3 | 47.8 | 52.5 | 66.0 | 57.2 | 3.6 |
| LOS | F | D | A | F | C | A | F | D | D | E | E | A |
| Approach Delay | | 43.4 | | | 42.1 | | | 58.9 | | | 50.1 | |
| Approach LOS | | D | | | D | | | E | | | D | |
| Queue Length 50th (m) | 22.9 | 144.8 | 9.1 | 38.2 | 59.2 | 0.0 | 23.6 | 33.4 | 50.0 | 12.4 | 55.7 | 0.0 |
| Queue Length 95th (m) | #53.8 | #184.4 | 30.7 | #65.3 | 74.6 | 0.0 | #42.2 | 46.6 | #100.9 | 21.2 | 73.2 | 4.8 |
| Internal Link Dist (m) | | 485.7 | | | 402.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 116 | 1373 | 697 | 344 | 1519 | 758 | 229 | 708 | 430 | 234 | 689 | 417 |
| 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 | 0.83 | 0.90 | 0.46 | 0.90 | 0.45 | 0.11 | 0.84 | 0.44 | 0.87 | 0.45 | 0.70 | 0.26 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 47.3

Intersection LOS: D

Intersection Capacity Utilization 90.8%

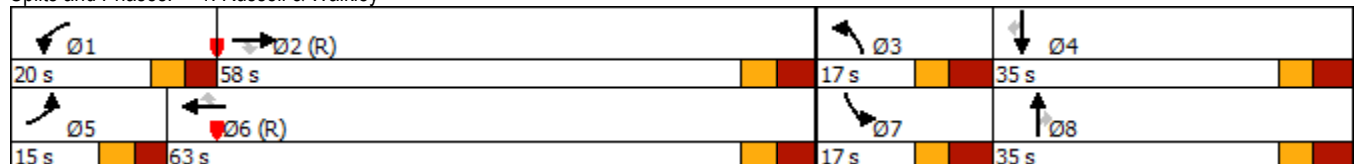
ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.























Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley



4055 & 4120 Russell Road
2: Hawthorne & Russell

2023 Total Traffic PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 35 | 7 | 21 | 31 | 3 | 203 | 7 | 716 | 57 | 419 | 869 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 31 | 3 | 203 | 7 | 716 | 57 | 419 | 869 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3233 | 0 | 1639 | 3270 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.321 | | | 0.222 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 416 | 3233 | 0 | 383 | 3270 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 203 | | 10 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 31 | 3 | 203 | 7 | 773 | 0 | 419 | 886 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 28.0 | 28.0 | | 26.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.3 | 6.5 | |
| Act Effct Green (s) | 12.0 | 12.0 | | 12.0 | 12.0 | 12.0 | 30.8 | 30.8 | | 56.0 | 55.8 | |
| Actuated g/C Ratio | 0.15 | 0.15 | | 0.15 | 0.15 | 0.15 | 0.38 | 0.38 | | 0.70 | 0.70 | |
| v/c Ratio | 0.18 | 0.12 | | 0.15 | 0.02 | 0.51 | 0.04 | 0.62 | | 0.75 | 0.39 | |
| Control Delay | 30.3 | 15.3 | | 29.5 | 26.3 | 9.3 | 21.0 | 24.5 | | 18.8 | 6.1 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 30.3 | 15.3 | | 29.5 | 26.3 | 9.3 | 21.0 | 24.5 | | 18.8 | 6.1 | |
| LOS | C | B | | C | C | A | C | C | | B | A | |
| Approach Delay | | 23.6 | | | 12.2 | | | 24.5 | | | 10.2 | |
| Approach LOS | | C | | | B | | | C | | | B | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 4.0 | 0.4 | 0.0 | 0.6 | 44.4 | | 21.1 | 20.1 | |
| Queue Length 95th (m) | 10.2 | 6.1 | | 9.3 | 2.1 | 13.9 | 3.5 | #82.8 | | #70.9 | 43.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 529 | 160 | 1252 | | 595 | 2281 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.09 | 0.01 | 0.38 | 0.04 | 0.62 | | 0.70 | 0.39 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 15.4

Intersection LOS: B

Intersection Capacity Utilization 71.5%

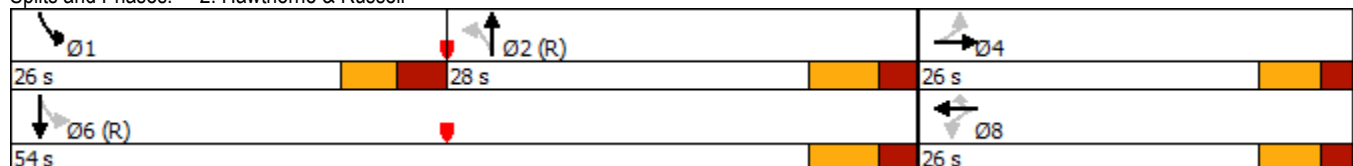
ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.






















Queue shown is maximum after two cycles.

Splits and Phases: 2: Hawthorne & Russell



4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2023 Total Traffic PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 417 | 59 | 45 | 973 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 417 | 59 | 45 | 973 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3077 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.209 | | | 0.480 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 291 | 3077 | 0 | 668 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 20 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 476 | 0 | 45 | 973 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.31 | 0.27 | | 0.10 | 0.54 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.6 | 13.5 | | 9.0 | 18.9 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.6 | 13.5 | | 9.0 | 18.9 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 13.2 | | | 16.6 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 22.5 | | 2.6 | 59.0 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 38.0 | | 7.5 | 89.2 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 280 | 1731 | | 466 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.29 | 0.27 | | 0.10 | 0.54 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.4













Intersection LOS: B

Intersection Capacity Utilization 76.9%

ICU Level of Service D























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | | | | |
|---|---|---|---|---|--|
|  |  |  |  |  |  |
| Ø1 | Ø2 (R) | | | Ø4 | |
| 15 s | 45 s | | | 35 s | |
|  |  |  |  |  |  |
| Ø5 | Ø6 (R) | | | Ø8 | |
| 15 s | 45 s | | | 35 s | |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2023 Total Traffic PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 299 | 858 | 24 | 423 | 906 | 87 | 25 | 193 | 307 | 167 | 494 | 490 |
| Future Volume (vph) | 299 | 858 | 24 | 423 | 906 | 87 | 25 | 193 | 307 | 167 | 494 | 490 |
| Satd. Flow (prot) | 3094 | 3422 | 0 | 3208 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.471 | | | 0.187 | | |
| Satd. Flow (perm) | 3094 | 3422 | 0 | 3206 | 3468 | 1141 | 851 | 2807 | 0 | 317 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 242 | | | | 490 |
| Lane Group Flow (vph) | 299 | 882 | 0 | 423 | 906 | 87 | 25 | 500 | 0 | 167 | 494 | 490 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 17.3 | 39.1 | | 21.7 | 43.4 | 43.4 | 25.9 | 19.0 | | 38.9 | 31.5 | 31.5 |
| Actuated g/C Ratio | 0.14 | 0.33 | | 0.18 | 0.36 | 0.36 | 0.22 | 0.16 | | 0.33 | 0.26 | 0.26 |
| v/c Ratio | 0.67 | 0.79 | | 0.73 | 0.72 | 0.18 | 0.11 | 0.77 | | 0.67 | 0.58 | 0.64 |
| Control Delay | 58.0 | 43.4 | | 55.4 | 37.5 | 2.9 | 31.8 | 33.8 | | 46.2 | 44.4 | 8.1 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 58.0 | 43.4 | | 55.4 | 37.5 | 2.9 | 31.8 | 33.8 | | 46.2 | 44.4 | 8.1 |
| LOS | E | D | | E | D | A | C | C | | D | D | A |
| Approach Delay | | 47.1 | | | 40.7 | | | 33.7 | | | 29.2 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Queue Length 50th (m) | 33.4 | 92.7 | | 47.0 | 90.3 | 0.0 | 3.8 | 29.8 | | 28.0 | 53.8 | 0.0 |
| Queue Length 95th (m) | 50.6 | 132.4 | | 67.6 | 128.0 | 5.0 | 10.5 | 51.3 | | #50.2 | 78.2 | 29.4 |
| Internal Link Dist (m) | | 420.4 | | | 461.0 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 800 | 1267 | | 1051 | 1495 | 559 | 357 | 817 | | 270 | 855 | 761 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.70 | | 0.40 | 0.61 | 0.16 | 0.07 | 0.61 | | 0.62 | 0.58 | 0.64 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 119.4

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 38.5

Intersection LOS: D

Intersection Capacity Utilization 85.8%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø3 | Ø4 | Ø1 | Ø2 |
| 44.4 s | 48.4 s | 21.3 s | 32.3 s |
|  |  |  |  |
| Ø7 | Ø8 | Ø5 | Ø6 |
| 36.4 s | 56.4 s | 21.3 s | 32.3 s |

4055 & 4120 Russell Road
10: Walkley & Hwy 417 SB Off-Ramp

2023 Total Traffic PM Peak Hour Mod

| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↘ | ↗ |
| Traffic Volume (vph) | 0 | 1622 | 184 | 0 | 174 | 727 |
| Future Volume (vph) | 0 | 1622 | 184 | 0 | 174 | 727 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 713 |
| Lane Group Flow (vph) | 0 | 1622 | 184 | 0 | 174 | 727 |
| Turn Type | | NA | NA | | Prot | Perm |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | 6 |
| Total Split (s) | | 56.0 | 56.0 | | 34.0 | 34.0 |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | 6.3 |
| Act Effct Green (s) | | 60.3 | 60.3 | | 17.1 | 17.1 |
| Actuated g/C Ratio | | 0.67 | 0.67 | | 0.19 | 0.19 |
| v/c Ratio | | 0.71 | 0.08 | | 0.54 | 0.84 |
| Control Delay | | 13.3 | 6.2 | | 37.6 | 12.6 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 13.3 | 6.2 | | 37.6 | 12.6 |
| LOS | | B | A | | D | B |
| Approach Delay | | 13.3 | 6.2 | | 17.4 | |
| Approach LOS | | B | A | | B | |
| Queue Length 50th (m) | | 72.7 | 5.2 | | 25.5 | 1.9 |
| Queue Length 95th (m) | | 140.3 | 8.5 | | 36.7 | 32.2 |
| Internal Link Dist (m) | | 664.4 | 343.7 | | 255.5 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 2280 | 2280 | | 523 | 961 |
| 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 | | 0.71 | 0.08 | | 0.33 | 0.76 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 14.2

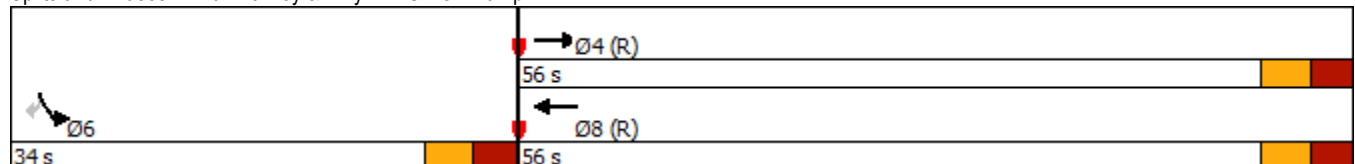
Intersection LOS: B

Intersection Capacity Utilization 68.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Walkley & Hwy 417 SB Off-Ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 811 | 0 | 0 | 87 | 156 | 24 |
| Future Volume (vph) | 811 | 0 | 0 | 87 | 156 | 24 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Flt Permitted | | | | | 0.958 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Satd. Flow (RTOR) | | | | | 9 | |
| Lane Group Flow (vph) | 811 | 0 | 0 | 87 | 180 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 54.0 | | | 54.0 | 36.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 37.0 | | | 37.0 | 40.4 | |
| Actuated g/C Ratio | 0.41 | | | 0.41 | 0.45 | |
| v/c Ratio | 0.58 | | | 0.06 | 0.24 | |
| Control Delay | 15.5 | | | 13.8 | 18.0 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 15.5 | | | 13.8 | 18.0 | |
| LOS | B | | | B | B | |
| Approach Delay | 15.5 | | | 13.8 | 18.0 | |
| Approach LOS | B | | | B | B | |
| Queue Length 50th (m) | 54.0 | | | 4.2 | 16.2 | |
| Queue Length 95th (m) | 26.9 | | | 6.4 | 35.4 | |
| Internal Link Dist (m) | 343.7 | | | 277.3 | 355.2 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1803 | | | 1803 | 760 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.45 | | | 0.05 | 0.24 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 15.8

Intersection LOS: B

Intersection Capacity Utilization 68.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: Hwy 417 NB Off-Ramp & Walkley

| | | |
|----------|--|------|
| ↖ Ø2 (R) | | → Ø4 |
| 36 s | | 54 s |
| | | ← Ø8 |
| | | 54 s |

Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|----------------------------|-----------------------------|
| 119124 | 2023 PHF Flow Profile (veh) |
| 2023 Total Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| PM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target Average Delay (sec/veh) | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|---|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB - Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2023 PM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 61 | 262 | 38 | 0 | 3.0 | 1.00 | 1.000 |
| 2 | EB - Russell | 0 | 77 | 233 | 27 | 0 | 3.0 | 1.00 | 1.000 |
| 3 | NB- Anderson | 0 | 30 | 170 | 46 | 0 | 3.0 | 1.00 | 1.000 |
| 4 | WB - Russell | 0 | 12 | 23 | 10 | 0 | 3.0 | 1.00 | 1.000 |

Operational Results

Geometry for Target Input

Geometry Options for 2023 PM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 PM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 PM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2023 PM Peak

| Leg 4 - WB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2023 PM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 65 | | 257 | 914 | | 0.3951 | |
| 2 | EB - Russell | None | 337 | | 335 | | 91 | 774 | | 0.4353 | |
| 3 | NB- Anderson | None | 246 | | 371 | | 301 | 755 | | 0.3256 | |
| 4 | WB - Russell | None | 45 | | 277 | | 340 | 804 | | 0.0560 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.18 | | 6.18 | 1.61 | | A | | A |
| 2 | EB - Russell | None | 7.77 | | 7.77 | 1.89 | | A | | A |
| 3 | NB- Anderson | None | 6.73 | | 6.73 | 1.20 | | A | | A |
| 4 | WB - Russell | None | 4.59 | | 4.59 | 0.15 | | A | | A |

2023 PM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 65 | | 257 | 914 | | 0.3951 | |
| 2 | EB - Russell | None | 337 | | 335 | | 91 | 774 | | 0.4353 | |
| 3 | NB- Anderson | None | 246 | | 371 | | 301 | 755 | | 0.3256 | |
| 4 | WB - Russell | None | 45 | | 277 | | 340 | 804 | | 0.0560 | |

























Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.19 | | 6.19 | 1.61 | | A | | A |
| 2 | EB - Russell | None | 7.79 | | 7.79 | 1.89 | | A | | A |
| 3 | NB- Anderson | None | 6.75 | | 6.75 | 1.20 | | A | | A |
| 4 | WB - Russell | None | 4.59 | | 4.59 | 0.15 | | A | | A |

4055 & 4120 Russell Road

1: Russell & Walkley

2028 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 79 | 509 | 141 | 409 | 1289 | 67 | 226 | 429 | 524 | 57 | 229 | 141 |
| Future Volume (vph) | 79 | 509 | 141 | 409 | 1289 | 67 | 226 | 429 | 524 | 57 | 229 | 141 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3082 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 180 | | | 134 | | | 524 | | | 180 |
| Lane Group Flow (vph) | 79 | 509 | 141 | 409 | 1289 | 67 | 226 | 429 | 524 | 57 | 229 | 141 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.5 | 56.9 | 56.9 | 25.7 | 69.1 | 69.1 | 12.4 | 33.4 | 33.4 | 8.0 | 26.3 | 26.3 |
| Actuated g/c Ratio | 0.09 | 0.38 | 0.38 | 0.17 | 0.46 | 0.46 | 0.08 | 0.22 | 0.22 | 0.05 | 0.18 | 0.18 |
| v/c Ratio | 0.64 | 0.41 | 0.23 | 0.79 | 0.82 | 0.09 | 0.89 | 0.60 | 0.75 | 0.33 | 0.41 | 0.36 |
| Control Delay | 87.8 | 37.7 | 2.8 | 71.0 | 41.9 | 0.2 | 100.8 | 56.0 | 11.3 | 72.9 | 55.8 | 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 | 0.0 |
| Total Delay | 87.8 | 37.7 | 2.8 | 71.0 | 41.9 | 0.2 | 100.8 | 56.0 | 11.3 | 72.9 | 55.8 | 5.1 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 36.4 | | | 47.0 | | | 44.7 | | | 41.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 21.2 | 56.0 | 0.0 | 56.1 | 167.0 | 0.0 | 32.1 | 55.4 | 0.0 | 7.9 | 28.7 | 0.0 |
| Queue Length 95th (m) | 37.0 | 78.0 | 6.6 | 69.7 | #224.9 | 0.0 | #53.9 | 71.8 | 34.8 | 14.6 | 40.0 | 7.3 |
| Internal Link Dist (m) | | 485.7 | | | 361.7 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1254 | 616 | 775 | 1581 | 758 | 255 | 732 | 703 | 270 | 693 | 437 |
| 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 | 0.48 | 0.41 | 0.23 | 0.53 | 0.82 | 0.09 | 0.89 | 0.59 | 0.75 | 0.21 | 0.33 | 0.32 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 43.9

Intersection LOS: D

Intersection Capacity Utilization 83.2%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.























Splits and Phases: 1: Russell & Walkley

| | | | |
|--|--|---|--|
|  Ø1 |  Ø2 (R) |  Ø3 |  Ø4 |
| 45 s | 45 s | 20 s | 40 s |
|  Ø5 |  Ø6 (R) |  Ø7 |  Ø8 |
| 24.4 s | 65.6 s | 20 s | 40 s |

4055 & 4120 Russell Road

2: Hawthorne & Russell

2028 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 15 | 10 | 350 | 17 | 933 | 9 | 53 | 572 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 15 | 10 | 350 | 17 | 933 | 9 | 53 | 572 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3104 | 0 | 1488 | 2988 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.423 | | | 0.280 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 754 | 3104 | 0 | 439 | 2988 | 0 |
| Satd. Flow (RTOR) | | 335 | | | | 160 | | 2 | | | 13 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 15 | 10 | 350 | 17 | 942 | 0 | 53 | 606 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 64.0 | 64.0 | | 64.0 | 64.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 17.1 | 17.1 | | 17.1 | 17.1 | 17.1 | 60.7 | 60.7 | | 60.7 | 60.7 | |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | 0.19 | 0.67 | 0.67 | | 0.67 | 0.67 | |
| v/c Ratio | 0.05 | 0.02 | | 0.07 | 0.03 | 0.84 | 0.03 | 0.45 | | 0.18 | 0.30 | |
| Control Delay | 28.3 | 0.0 | | 28.5 | 27.6 | 36.4 | 3.7 | 5.2 | | 8.4 | 6.8 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 28.3 | 0.0 | | 28.5 | 27.6 | 36.4 | 3.7 | 5.2 | | 8.4 | 6.8 | |
| LOS | C | A | | C | C | D | A | A | | A | A | |
| Approach Delay | | 15.7 | | | 35.8 | | | 5.1 | | | 6.9 | |
| Approach LOS | | B | | | D | | | A | | | A | |
| Queue Length 50th (m) | 1.3 | 0.0 | | 1.9 | 1.3 | 28.3 | 0.5 | 13.3 | | 3.1 | 19.7 | |
| Queue Length 95th (m) | 5.0 | 0.0 | | 6.5 | 5.0 | #64.7 | m0.9 | 16.5 | | 8.1 | 27.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 227 | 547 | | 265 | 403 | 467 | 508 | 2092 | | 295 | 2018 | |
| 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 | 0.04 | 0.01 | | 0.06 | 0.02 | 0.75 | 0.03 | 0.45 | | 0.18 | 0.30 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 23 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 11.5

Intersection LOS: B

Intersection Capacity Utilization 73.7%

ICU Level of Service D













Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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






















Splits and Phases: 2: Hawthorne & Russell

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø2 (R) | | | Ø4 | | |
| 64 s | | | 26 s | | |
|  |  |  |  |  |  |
| Ø6 (R) | | | Ø8 | | |
| 64 s | | | 26 s | | |

4055 & 4120 Russell Road

3: Hawthorne & Stevenage

2028 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 966 | 86 | 52 | 330 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 966 | 86 | 52 | 330 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3096 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.496 | | | 0.236 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 868 | 3096 | 0 | 355 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 12 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 208 | 1052 | 0 | 52 | 330 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.4 | 46.4 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.31 | 0.56 | | 0.18 | 0.22 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 3.8 | 9.8 | 6.6 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 3.8 | 9.8 | 6.6 |
| LOS | D | B | | C | C | | A | B | | A | A | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 13.8 | | | 8.2 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 10.0 | 54.1 | | 1.6 | 15.1 | 6.3 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.8 | 94.7 | | 1.1 | 29.7 | 25.7 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 678 | 1863 | | 329 | 1474 | 826 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.31 | 0.56 | | 0.16 | 0.22 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.2







Intersection LOS: B

Intersection Capacity Utilization 64.0%

ICU Level of Service B

Analysis Period (min) 15























Splits and Phases: 3: Hawthorne & Stevenage

| | | |
|---|---|--|
|  |  |  |
| Ø1 | Ø2 (R) | Ø4 |
| 15 s | 40 s | 35 s |
|  |  |  |
| Ø5 | Ø6 (R) | Ø8 |
| 15 s | 40 s | 35 s |

4055 & 4120 Russell Road

4: Hawthorne & Hunt Club

2028 Future Background AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 435 | 655 | 26 | 263 | 711 | 257 | 42 | 432 | 400 | 45 | 154 | 171 |
| Future Volume (vph) | 435 | 655 | 26 | 263 | 711 | 257 | 42 | 432 | 400 | 45 | 154 | 171 |
| Satd. Flow (prot) | 1639 | 3333 | 0 | 1595 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.654 | | | 0.129 | | |
| Satd. Flow (perm) | 1639 | 3333 | 0 | 1595 | 3402 | 1440 | 1025 | 2974 | 0 | 162 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 3 | | | | 257 | | 152 | | | | 171 |
| Lane Group Flow (vph) | 435 | 681 | 0 | 263 | 711 | 257 | 42 | 832 | 0 | 45 | 154 | 171 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 41.4 | 41.4 | | 41.4 | 41.4 | 41.4 | 21.3 | 36.3 | | 21.3 | 36.3 | 36.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 35.2 | 42.1 | | 26.3 | 33.2 | 33.2 | 36.9 | 30.2 | | 38.6 | 31.1 | 31.1 |
| Actuated g/C Ratio | 0.27 | 0.32 | | 0.20 | 0.25 | 0.25 | 0.28 | 0.23 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 0.98 | 0.63 | | 0.82 | 0.82 | 0.46 | 0.13 | 1.03 | | 0.38 | 0.24 | 0.39 |
| Control Delay | 86.8 | 42.8 | | 70.1 | 55.2 | 7.5 | 31.5 | 80.6 | | 40.2 | 42.9 | 8.9 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 86.8 | 42.8 | | 70.1 | 55.2 | 7.5 | 31.5 | 80.6 | | 40.2 | 42.9 | 8.9 |
| LOS | F | D | | E | E | A | C | F | | D | D | A |
| Approach Delay | | 60.0 | | | 48.5 | | | 78.2 | | | 26.8 | |
| Approach LOS | | E | | | D | | | E | | | C | |
| Queue Length 50th (m) | ~112.3 | 74.5 | | 61.9 | 85.8 | 0.0 | 7.0 | ~101.5 | | 7.6 | 16.2 | 0.0 |
| Queue Length 95th (m) | #177.9 | 105.8 | | 87.4 | 111.0 | 20.0 | 14.8 | #144.3 | | 15.9 | 26.0 | 17.5 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 443 | 1079 | | 431 | 920 | 577 | 380 | 806 | | 171 | 655 | 435 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.98 | 0.63 | | 0.61 | 0.77 | 0.45 | 0.11 | 1.03 | | 0.26 | 0.24 | 0.39 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 130.3

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 57.1

Intersection LOS: E

Intersection Capacity Utilization 97.8%

ICU Level of Service F

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.










Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|---|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |











4055 & 4120 Russell Road
5: Belgreen & Russell

2028 Future Background AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 26 | 42 | 155 | 436 | 39 | 22 |
| Future Volume (Veh/h) | 26 | 42 | 155 | 436 | 39 | 22 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 26 | 42 | 155 | 436 | 39 | 22 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 68 | | 793 | 47 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 68 | | 793 | 47 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.5 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.9 | 3.5 |
| p0 queue free % | | | 90 | | 86 | 98 |
| cM capacity (veh/h) | | | | | | |
| | | | 1527 | | 278 | 961 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 68 | 591 | 61 | | | |
| Volume Left | 0 | 155 | 39 | | | |
| Volume Right | 42 | 0 | 22 | | | |
| cSH | 1700 | 1527 | 374 | | | |
| Volume to Capacity | 0.04 | 0.10 | 0.16 | | | |
| Queue Length 95th (m) | 0.0 | 2.4 | 4.0 | | | |
| Control Delay (s) | 0.0 | 2.8 | 16.5 | | | |
| Lane LOS | | A | C | | | |
| Approach Delay (s) | 0.0 | 2.8 | 16.5 | | | |
| Approach LOS | | | | | | |
| | | | C | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | | | | |
| | | | 3.7 | | | |
| Intersection Capacity Utilization | | | | | | |
| | | | 50.3% | ICU Level of Service | | A |
| Analysis Period (min) | | | | | | |
| | | | 15 | | | |










4055 & 4120 Russell Road
6: Hunt Club & Hwy 417 Offramp

2028 Future Background AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 2 | 868 | 0 | 891 | 679 | 0 |
| Future Volume (Veh/h) | 2 | 868 | 0 | 891 | 679 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 868 | 0 | 891 | 679 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1570 | 679 | 679 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1570 | 679 | 679 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 98 | 0 | 100 | | | |
| cM capacity (veh/h) | 122 | 440 | 923 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 2 | 868 | 891 | 679 | | |
| Volume Left | 2 | 0 | 0 | 0 | | |
| Volume Right | 0 | 868 | 0 | 0 | | |
| cSH | 122 | 440 | 1700 | 1700 | | |
| Volume to Capacity | 0.02 | 1.97 | 0.52 | 0.40 | | |
| Queue Length 95th (m) | 0.3 | 413.3 | 0.0 | 0.0 | | |
| Control Delay (s) | 34.9 | 467.5 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 466.5 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 166.3 | | | |
| Intersection Capacity Utilization | | | 101.1% | ICU Level of Service | | G |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
7: Ramsayville & Russell

2028 Future Background AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 25 | 21 | 390 | 347 | 145 | 214 |
| Future Volume (Veh/h) | 25 | 21 | 390 | 347 | 145 | 214 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 25 | 21 | 390 | 347 | 145 | 214 |
| Pedestrians | | | | 2 | | |
| Lane Width (m) | | | | 4.0 | | |
| Walking Speed (m/s) | | | | 1.0 | | |
| Percent Blockage | | | | 0 | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1379 | 254 | 359 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1379 | 254 | 359 | | | |
| tC, single (s) | 6.9 | 6.4 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 4.0 | 3.5 | 2.2 | | | |
| p0 queue free % | 70 | 97 | 67 | | | |
| cM capacity (veh/h) | 85 | 741 | 1189 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 46 | 737 | 359 | | | |
| Volume Left | 25 | 390 | 0 | | | |
| Volume Right | 21 | 0 | 214 | | | |
| cSH | 142 | 1189 | 1700 | | | |
| Volume to Capacity | 0.32 | 0.33 | 0.21 | | | |
| Queue Length 95th (m) | 9.1 | 10.1 | 0.0 | | | |
| Control Delay (s) | 42.1 | 6.9 | 0.0 | | | |
| Lane LOS | E | A | | | | |
| Approach Delay (s) | 42.1 | 6.9 | 0.0 | | | |
| Approach LOS | E | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 6.1 | | | | |
| Intersection Capacity Utilization | | 77.9% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |

4055 & 4120 Russell Road
10: Walkley & SB off-ramp

2028 Future Background AM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|--------|------|----------------------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 485 | 1041 | 0 | 24 | 1011 |
| Future Volume (Veh/h) | 0 | 485 | 1041 | 0 | 24 | 1011 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 485 | 1041 | 0 | 24 | 1011 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1041 | | | | 1284 | 520 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1041 | | | | 1284 | 520 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 84 | 0 |
| cM capacity (veh/h) | 646 | | | | 153 | 493 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 242 | 242 | 520 | 520 | 24 | 1011 |
| Volume Left | 0 | 0 | 0 | 0 | 24 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 1011 |
| cSH | 1700 | 1700 | 1700 | 1700 | 153 | 493 |
| Volume to Capacity | 0.14 | 0.14 | 0.31 | 0.31 | 0.16 | 2.05 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 3.8 | 491.3 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 32.9 | 499.4 |
| Lane LOS | | | | | D | F |
| Approach Delay (s) | 0.0 | | 0.0 | | 488.6 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 197.4 | | | |
| Intersection Capacity Utilization | | | 103.1% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
11: NB Off-ramp & Walkley




2028 Future Background AM Peak Hour

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|--------|------|----------------------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (veh/h) | 172 | 0 | 0 | 973 | 578 | 60 |
| Future Volume (Veh/h) | 172 | 0 | 0 | 973 | 578 | 60 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 172 | 0 | 0 | 973 | 578 | 60 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 172 | | 658 | 86 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 172 | | 658 | 86 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 0 | 94 |
| cM capacity (veh/h) | | | 1381 | | 390 | 946 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 86 | 86 | 486 | 486 | 638 | |
| Volume Left | 0 | 0 | 0 | 0 | 578 | |
| Volume Right | 0 | 0 | 0 | 0 | 60 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 413 | |
| Volume to Capacity | 0.05 | 0.05 | 0.29 | 0.29 | 1.54 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 244.7 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 281.4 | |
| Lane LOS | | | | | F | |
| Approach Delay (s) | 0.0 | | 0.0 | | 281.4 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 100.7 | | | |
| Intersection Capacity Utilization | | | 103.1% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
8: Ramsayville & Russell N

2028 Future Background AM Peak Hour

| Intersection | |
|---------------------------|----|
| Intersection Delay, s/veh | 23 |
| Intersection LOS | C |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 304 | 300 | 340 | 38 | 10 | 22 |
| Future Vol, veh/h | 304 | 300 | 340 | 38 | 10 | 22 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 4 | 1 | 1 | 15 | 1 | 20 |
| Mvmt Flow | 304 | 300 | 340 | 38 | 10 | 22 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |





| Approach | WB | NB | SB |
|----------------------------|------|----|-----|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 28.1 | 16 | 9.7 |
| HCM LOS | D | C | A |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 50% | 31% |
| Vol Thru, % | 90% | 0% | 69% |
| Vol Right, % | 10% | 50% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 378 | 604 | 32 |
| LT Vol | 0 | 304 | 10 |
| Through Vol | 340 | 0 | 22 |
| RT Vol | 38 | 300 | 0 |
| Lane Flow Rate | 378 | 604 | 32 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.58 | 0.837 | 0.056 |
| Departure Headway (Hd) | 5.527 | 4.989 | 6.257 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 650 | 731 | 570 |
| Service Time | 3.573 | 2.989 | 4.322 |
| HCM Lane V/C Ratio | 0.582 | 0.826 | 0.056 |
| HCM Control Delay | 16 | 28.1 | 9.7 |
| HCM Lane LOS | C | D | A |
| HCM 95th-tile Q | 3.7 | 9.4 | 0.2 |

4055 & 4120 Russell Road
9: Anderson & Russell

2028 Future Background AM Peak Hour

| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 37.2 |
| Intersection LOS | E |

























| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------------|------|---|------|------|---|------|------|---|------|------|---|------|
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 35 | 16 | 3 | 48 | 347 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Future Vol, veh/h | 35 | 16 | 3 | 48 | 347 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 11 | 7 | 1 | 1 | 2 | 3 | 1 | 3 | 17 | 1 | 4 | 2 |
| Mvmt Flow | 35 | 16 | 3 | 48 | 347 | 118 | 171 | 304 | 6 | 5 | 139 | 153 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 12.7 | | | 46.2 | | | 42.1 | | | 18.2 | | |
| HCM LOS | B | | | E | | | E | | | C | | |

| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, % | 36% | 65% | 9% | 2% |
| Vol Thru, % | 63% | 30% | 68% | 47% |
| Vol Right, % | 1% | 6% | 23% | 52% |
| Sign Control | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 481 | 54 | 513 | 297 |
| LT Vol | 171 | 35 | 48 | 5 |
| Through Vol | 304 | 16 | 347 | 139 |
| RT Vol | 6 | 3 | 118 | 153 |
| Lane Flow Rate | 481 | 54 | 513 | 297 |
| Geometry Grp | 1 | 1 | 1 | 1 |
| Degree of Util (X) | 0.887 | 0.127 | 0.918 | 0.562 |
| Departure Headway (Hd) | 6.738 | 8.45 | 6.444 | 6.813 |
| Convergence, Y/N | Yes | Yes | Yes | Yes |
| Cap | 544 | 426 | 559 | 532 |
| Service Time | 4.738 | 6.473 | 4.538 | 4.813 |
| HCM Lane V/C Ratio | 0.884 | 0.127 | 0.918 | 0.558 |
| HCM Control Delay | 42.1 | 12.7 | 46.2 | 18.2 |
| HCM Lane LOS | E | B | E | C |
| HCM 95th-tile Q | 10.1 | 0.4 | 11.2 | 3.4 |

4055 & 4120 Russell Road

1: Russell & Walkley

2028 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 79 | 509 | 141 | 409 | 1289 | 67 | 226 | 429 | 524 | 57 | 229 | 141 |
| Future Volume (vph) | 79 | 509 | 141 | 409 | 1289 | 67 | 226 | 429 | 524 | 57 | 229 | 141 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3082 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 180 | | | 134 | | | 524 | | | 180 |
| Lane Group Flow (vph) | 79 | 509 | 141 | 409 | 1289 | 67 | 226 | 429 | 524 | 57 | 229 | 141 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.5 | 56.9 | 56.9 | 25.7 | 69.1 | 69.1 | 12.4 | 33.4 | 33.4 | 8.0 | 26.3 | 26.3 |
| Actuated g/c Ratio | 0.09 | 0.38 | 0.38 | 0.17 | 0.46 | 0.46 | 0.08 | 0.22 | 0.22 | 0.05 | 0.18 | 0.18 |
| v/c Ratio | 0.64 | 0.41 | 0.23 | 0.79 | 0.82 | 0.09 | 0.89 | 0.60 | 0.75 | 0.33 | 0.41 | 0.36 |
| Control Delay | 87.8 | 37.7 | 2.8 | 71.0 | 41.9 | 0.2 | 100.8 | 56.0 | 11.3 | 72.9 | 55.8 | 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 | 0.0 |
| Total Delay | 87.8 | 37.7 | 2.8 | 71.0 | 41.9 | 0.2 | 100.8 | 56.0 | 11.3 | 72.9 | 55.8 | 5.1 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 36.4 | | | 47.0 | | | 44.7 | | | 41.3 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 21.2 | 56.0 | 0.0 | 56.1 | 167.0 | 0.0 | 32.1 | 55.4 | 0.0 | 7.9 | 28.7 | 0.0 |
| Queue Length 95th (m) | 37.0 | 78.0 | 6.6 | 69.7 | #224.9 | 0.0 | #53.9 | 71.8 | 34.8 | 14.6 | 40.0 | 7.3 |
| Internal Link Dist (m) | | 485.7 | | | 361.7 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1254 | 616 | 775 | 1581 | 758 | 255 | 732 | 703 | 270 | 693 | 437 |
| 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 | 0.48 | 0.41 | 0.23 | 0.53 | 0.82 | 0.09 | 0.89 | 0.59 | 0.75 | 0.21 | 0.33 | 0.32 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 43.9

Intersection LOS: D

Intersection Capacity Utilization 83.2%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.























Splits and Phases: 1: Russell & Walkley

| | | | |
|--|--|---|--|
|  Ø1 |  Ø2 (R) |  Ø3 |  Ø4 |
| 45 s | 45 s | 20 s | 40 s |
|  Ø5 |  Ø6 (R) |  Ø7 |  Ø8 |
| 24.4 s | 65.6 s | 20 s | 40 s |

4055 & 4120 Russell Road

2: Hawthorne & Russell

2028 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 15 | 10 | 350 | 17 | 933 | 9 | 53 | 572 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 15 | 10 | 350 | 17 | 933 | 9 | 53 | 572 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3104 | 0 | 1488 | 2988 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.423 | | | 0.280 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 754 | 3104 | 0 | 439 | 2988 | 0 |
| Satd. Flow (RTOR) | | 335 | | | | 160 | | 2 | | | 13 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 15 | 10 | 350 | 17 | 942 | 0 | 53 | 606 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 64.0 | 64.0 | | 64.0 | 64.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 17.1 | 17.1 | | 17.1 | 17.1 | 17.1 | 60.7 | 60.7 | | 60.7 | 60.7 | |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | 0.19 | 0.67 | 0.67 | | 0.67 | 0.67 | |
| v/c Ratio | 0.05 | 0.02 | | 0.07 | 0.03 | 0.84 | 0.03 | 0.45 | | 0.18 | 0.30 | |
| Control Delay | 28.3 | 0.0 | | 28.5 | 27.6 | 36.4 | 3.7 | 5.2 | | 8.4 | 6.8 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 28.3 | 0.0 | | 28.5 | 27.6 | 36.4 | 3.7 | 5.2 | | 8.4 | 6.8 | |
| LOS | C | A | | C | C | D | A | A | | A | A | |
| Approach Delay | | 15.7 | | | 35.8 | | | 5.1 | | | 6.9 | |
| Approach LOS | | B | | | D | | | A | | | A | |
| Queue Length 50th (m) | 1.3 | 0.0 | | 1.9 | 1.3 | 28.3 | 0.5 | 13.3 | | 3.1 | 19.7 | |
| Queue Length 95th (m) | 5.0 | 0.0 | | 6.5 | 5.0 | #64.7 | m0.9 | 16.5 | | 8.1 | 27.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 227 | 547 | | 265 | 403 | 467 | 508 | 2092 | | 295 | 2018 | |
| 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 | 0.04 | 0.01 | | 0.06 | 0.02 | 0.75 | 0.03 | 0.45 | | 0.18 | 0.30 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 23 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 11.5

Intersection LOS: B

Intersection Capacity Utilization 73.7%

ICU Level of Service D













Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 2: Hawthorne & Russell

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø2 (R) | | | Ø4 | | |
| 64 s | | | 26 s | | |
|  |  |  |  |  |  |
| Ø6 (R) | | | Ø8 | | |
| 64 s | | | 26 s | | |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2028 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 966 | 86 | 52 | 330 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 966 | 86 | 52 | 330 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3096 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.496 | | | 0.236 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 868 | 3096 | 0 | 355 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 12 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 208 | 1052 | 0 | 52 | 330 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.4 | 46.4 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.31 | 0.56 | | 0.18 | 0.22 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 3.8 | 9.8 | 6.6 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.0 | | 3.8 | 9.8 | 6.6 |
| LOS | D | B | | C | C | | A | B | | A | A | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 13.8 | | | 8.2 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 10.0 | 54.1 | | 1.6 | 15.1 | 6.3 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.8 | 94.7 | | 1.1 | 29.7 | 25.7 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 678 | 1863 | | 329 | 1474 | 826 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.31 | 0.56 | | 0.16 | 0.22 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.2

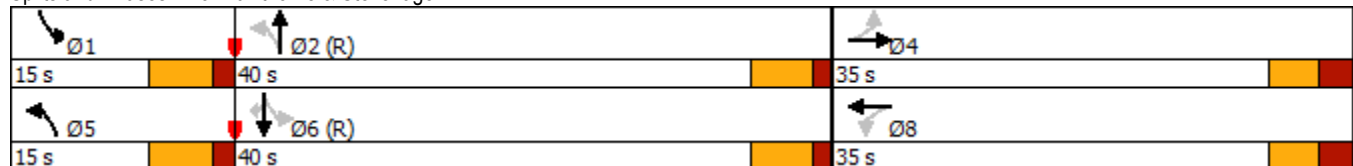
Intersection LOS: B

Intersection Capacity Utilization 64.0%

ICU Level of Service B























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2028 Future Background AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 435 | 655 | 26 | 263 | 711 | 257 | 42 | 432 | 400 | 45 | 154 | 171 |
| Future Volume (vph) | 435 | 655 | 26 | 263 | 711 | 257 | 42 | 432 | 400 | 45 | 154 | 171 |
| Satd. Flow (prot) | 3179 | 3333 | 0 | 3094 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.654 | | | 0.116 | | |
| Satd. Flow (perm) | 3179 | 3333 | 0 | 3094 | 3402 | 1440 | 1025 | 2974 | 0 | 145 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 3 | | | | 257 | | 156 | | | | 171 |
| Lane Group Flow (vph) | 435 | 681 | 0 | 263 | 711 | 257 | 42 | 832 | 0 | 45 | 154 | 171 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 37.0 | 42.0 | | 37.0 | 42.0 | 42.0 | 22.0 | 39.4 | | 22.0 | 39.4 | 39.4 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 21.7 | 39.3 | | 15.7 | 33.3 | 33.3 | 40.0 | 33.7 | | 41.5 | 34.4 | 34.4 |
| Actuated g/C Ratio | 0.18 | 0.33 | | 0.13 | 0.28 | 0.28 | 0.33 | 0.28 | | 0.35 | 0.29 | 0.29 |
| v/c Ratio | 0.76 | 0.62 | | 0.65 | 0.75 | 0.44 | 0.11 | 0.88 | | 0.36 | 0.20 | 0.35 |
| Control Delay | 56.6 | 37.8 | | 59.0 | 46.8 | 7.0 | 26.6 | 46.8 | | 34.4 | 36.4 | 7.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 56.6 | 37.8 | | 59.0 | 46.8 | 7.0 | 26.6 | 46.8 | | 34.4 | 36.4 | 7.7 |
| LOS | E | D | | E | D | A | C | D | | C | D | A |
| Approach Delay | | 45.1 | | | 41.1 | | | 45.8 | | | 22.9 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Queue Length 50th (m) | 48.8 | 67.0 | | 29.6 | 76.4 | 0.0 | 6.0 | 80.9 | | 6.5 | 14.1 | 0.0 |
| Queue Length 95th (m) | 67.0 | 94.2 | | 44.2 | 107.7 | 19.6 | 14.0 | #131.3 | | 15.1 | 24.6 | 16.6 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 825 | 1134 | | 803 | 1027 | 614 | 445 | 947 | | 194 | 788 | 488 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.53 | 0.60 | | 0.33 | 0.69 | 0.42 | 0.09 | 0.88 | | 0.23 | 0.20 | 0.35 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 120

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 41.6

Intersection LOS: D

Intersection Capacity Utilization 85.5%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø3 | Ø4 | Ø1 | Ø2 |
| 37 s | 42 s | 22 s | 39.4 s |
|  |  |  |  |
| Ø7 | Ø8 | Ø5 | Ø6 |
| 37 s | 42 s | 22 s | 39.4 s |

4055 & 4120 Russell Road
10: Walkley & SB off-ramp

2028 Future Background AM Peak Hour Mod



| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (vph) | 0 | 485 | 1041 | 0 | 24 | 1011 |
| Future Volume (vph) | 0 | 485 | 1041 | 0 | 24 | 1011 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 354 |
| Lane Group Flow (vph) | 0 | 485 | 1041 | 0 | 24 | 1011 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 91.0 | 91.0 | | 29.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 107.5 | 107.5 | | 7.3 | 120.0 |
| Actuated g/C Ratio | | 0.90 | 0.90 | | 0.06 | 1.00 |
| v/c Ratio | | 0.16 | 0.34 | | 0.24 | 0.66 |
| Control Delay | | 1.6 | 1.7 | | 58.5 | 2.3 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 1.6 | 1.7 | | 58.5 | 2.3 |
| LOS | | A | A | | E | A |
| Approach Delay | | 1.6 | 1.7 | | 3.6 | |
| Approach LOS | | A | A | | A | |
| Queue Length 50th (m) | | 7.8 | 20.7 | | 5.1 | 0.0 |
| Queue Length 95th (m) | | 12.3 | 21.0 | | 12.9 | 0.0 |
| Internal Link Dist (m) | | 708.0 | 344.3 | | 267.0 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 3047 | 3047 | | 321 | 1522 |
| 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 | | 0.16 | 0.34 | | 0.07 | 0.66 |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 2.5

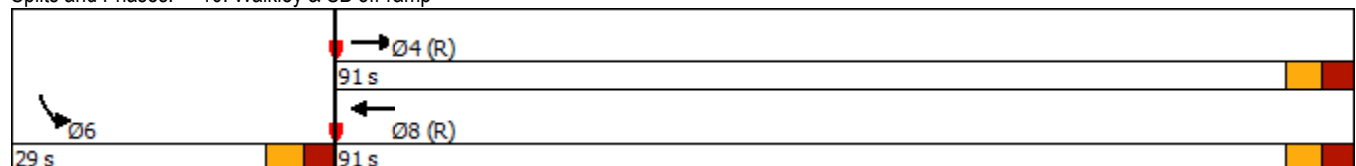
Intersection LOS: A

Intersection Capacity Utilization 76.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Walkley & SB off-ramp



4055 & 4120 Russell Road
11: NB Off-ramp & Walkley

2028 Future Background AM Peak Hour Mod

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 172 | 0 | 0 | 973 | 578 | 60 |
| Future Volume (vph) | 172 | 0 | 0 | 973 | 578 | 60 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Flt Permitted | | | | | 0.957 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Satd. Flow (RTOR) | | | | | 6 | |
| Lane Group Flow (vph) | 172 | 0 | 0 | 973 | 638 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 53.0 | | | 53.0 | 67.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 46.7 | | | 46.7 | 60.7 | |
| Actuated g/C Ratio | 0.39 | | | 0.39 | 0.51 | |
| v/c Ratio | 0.13 | | | 0.74 | 0.74 | |
| Control Delay | 22.6 | | | 35.4 | 29.8 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 22.6 | | | 35.4 | 29.8 | |
| LOS | C | | | D | C | |
| Approach Delay | 22.6 | | | 35.4 | 29.8 | |
| Approach LOS | C | | | D | C | |
| Queue Length 50th (m) | 10.8 | | | 93.8 | 105.1 | |
| Queue Length 95th (m) | 16.9 | | | 116.5 | 148.4 | |
| Internal Link Dist (m) | 344.3 | | | 347.3 | 355.2 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1323 | | | 1323 | 858 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.13 | | | 0.74 | 0.74 | |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 32.2

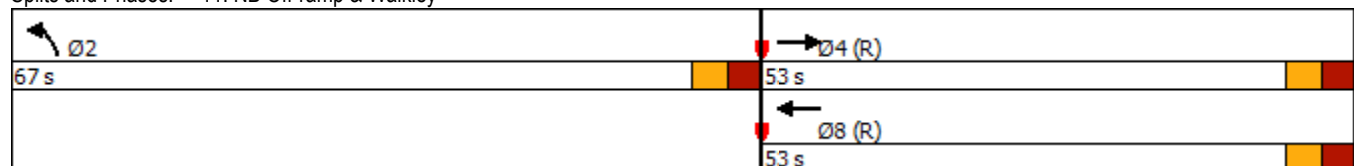
Intersection LOS: C

Intersection Capacity Utilization 76.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: NB Off-ramp & Walkley



Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|---------------------------------|-----------------------------|
| 119124 | 2028 PHF Flow Profile (veh) |
| 2028 Background Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| AM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target Average Delay (sec/veh) | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|---|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB- Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB- Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2028 AM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 5 | 139 | 153 | 0 | 3.0 | 1.00 | 0.900 |
| 2 | EB - Russell | 0 | 35 | 16 | 3 | 0 | 3.0 | 1.00 | 0.900 |
| 3 | NB- Anderson | 0 | 171 | 304 | 6 | 0 | 3.0 | 1.00 | 0.900 |
| 4 | WB- Russell | 0 | 48 | 347 | 118 | 0 | 3.0 | 1.00 | 0.900 |

Operational Results

Geometry for Target Input

Geometry Options for 2028 AM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 AM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 AM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 AM Peak

| Leg 4 - WB- Russell | | | | | |
|---------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2028 AM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 297 | | 566 | | 457 | 655 | | 0.4535 | |
| 2 | EB - Russell | None | 54 | | 192 | | 671 | 848 | | 0.0637 | |
| 3 | NB- Anderson | None | 481 | | 56 | | 190 | 918 | | 0.5238 | |
| 4 | WB- Russell | None | 513 | | 510 | | 27 | 684 | | 0.7503 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 9.44 | | 9.44 | 2.64 | | A | | A |
| 2 | EB - Russell | None | 4.34 | | 4.34 | 0.20 | | A | | A |
| 3 | NB- Anderson | None | 7.64 | | 7.64 | 3.26 | | A | | A |
| 4 | WB- Russell | None | 18.96 | | 18.96 | 10.70 | | C | | C |

























2028 AM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 330 | | 622 | | 505 | 626 | | 0.5273 | |
| 2 | EB - Russell | None | 60 | | 212 | | 739 | 838 | | 0.0716 | |
| 3 | NB- Anderson | None | 534 | | 62 | | 210 | 915 | | 0.5840 | |
| 4 | WB- Russell | None | 570 | | 565 | | 30 | 655 | | 0.8702 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 10.15 | | 10.15 | 2.64 | | B | | B |
| 2 | EB - Russell | None | 4.28 | | 4.28 | 0.20 | | A | | A |
| 3 | NB- Anderson | None | 7.99 | | 7.99 | 3.26 | | A | | A |
| 4 | WB- Russell | None | 23.45 | | 23.45 | 10.70 | | C | | C |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 101 | 1424 | 259 | 473 | 714 | 84 | 155 | 292 | 560 | 110 | 454 | 114 |
| Future Volume (vph) | 101 | 1424 | 259 | 473 | 714 | 84 | 155 | 292 | 560 | 110 | 454 | 114 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3011 | 3468 | 1535 | 3154 | 3338 | 1402 | 3217 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 259 | | | 154 | | | 207 | | | 207 |
| Lane Group Flow (vph) | 101 | 1424 | 259 | 473 | 714 | 84 | 155 | 292 | 560 | 110 | 454 | 114 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 12.0 | 58.0 | 58.0 | 20.0 | 66.0 | 66.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 5.6 | 50.7 | 50.7 | 13.6 | 58.7 | 58.7 | 9.2 | 28.2 | 28.2 | 8.8 | 27.8 | 27.8 |
| Actuated g/c Ratio | 0.04 | 0.39 | 0.39 | 0.10 | 0.45 | 0.45 | 0.07 | 0.22 | 0.22 | 0.07 | 0.21 | 0.21 |
| v/c Ratio | 1.46 | 1.05 | 0.37 | 1.50 | 0.46 | 0.11 | 0.69 | 0.40 | 1.20 | 0.50 | 0.65 | 0.25 |
| Control Delay | 313.7 | 78.4 | 4.7 | 280.8 | 25.8 | 0.3 | 75.3 | 45.8 | 137.7 | 66.7 | 51.9 | 1.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 313.7 | 78.4 | 4.7 | 280.8 | 25.8 | 0.3 | 75.3 | 45.8 | 137.7 | 66.7 | 51.9 | 1.3 |
| LOS | F | E | A | F | C | A | E | D | F | E | D | A |
| Approach Delay | | 81.0 | | | 119.0 | | | 101.5 | | | 45.8 | |
| Approach LOS | | F | | | F | | | F | | | D | |
| Queue Length 50th (m) | ~32.5 | ~192.8 | 0.0 | ~79.6 | 60.1 | 0.0 | 18.7 | 31.5 | ~121.1 | 13.0 | 52.0 | 0.0 |
| Queue Length 95th (m) | #65.9 | #232.1 | 15.2 | #110.5 | 75.3 | 0.0 | #30.8 | 44.3 | #185.4 | 22.0 | 68.7 | 0.0 |
| Internal Link Dist (m) | | 485.7 | | | 397.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 69 | 1352 | 691 | 315 | 1565 | 777 | 229 | 725 | 466 | 234 | 694 | 461 |
| 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 | 1.46 | 1.05 | 0.37 | 1.50 | 0.46 | 0.11 | 0.68 | 0.40 | 1.20 | 0.47 | 0.65 | 0.25 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.50

Intersection Signal Delay: 90.5

Intersection LOS: F

Intersection Capacity Utilization 101.3%

ICU Level of Service G

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.























Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 20 s | 58 s | 17 s | 35 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 12 s | 66 s | 17 s | 35 s |

4055 & 4120 Russell Road
2: Hawthorne & Russell

2028 Future Background PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 35 | 7 | 21 | 9 | 3 | 86 | 7 | 749 | 13 | 220 | 910 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 9 | 3 | 86 | 7 | 749 | 13 | 220 | 910 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3289 | 0 | 1639 | 3269 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.303 | | | 0.363 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 393 | 3289 | 0 | 626 | 3269 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 86 | | 4 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 9 | 3 | 86 | 7 | 762 | 0 | 220 | 927 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 54.0 | 54.0 | | 54.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 10.1 | 10.1 | | 10.1 | 10.1 | 10.1 | 62.1 | 62.1 | | 62.1 | 62.1 | |
| Actuated g/C Ratio | 0.13 | 0.13 | | 0.13 | 0.13 | 0.13 | 0.78 | 0.78 | | 0.78 | 0.78 | |
| v/c Ratio | 0.21 | 0.14 | | 0.05 | 0.02 | 0.33 | 0.02 | 0.30 | | 0.45 | 0.37 | |
| Control Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.6 | 3.4 | 3.9 | | 8.3 | 4.3 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.6 | 3.4 | 3.9 | | 8.3 | 4.3 | |
| LOS | C | B | | C | C | B | A | A | | A | A | |
| Approach Delay | | 27.6 | | | 14.0 | | | 3.9 | | | 5.0 | |
| Approach LOS | | C | | | B | | | A | | | A | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 1.1 | 0.4 | 0.0 | 0.2 | 16.3 | | 10.7 | 21.4 | |
| Queue Length 95th (m) | 11.9 | 7.2 | | 4.8 | 2.5 | 10.8 | 1.2 | 23.2 | | 25.3 | 29.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 441 | 304 | 2554 | | 486 | 2539 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.03 | 0.01 | 0.20 | 0.02 | 0.30 | | 0.45 | 0.37 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 16 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 5.7













Intersection LOS: A

Intersection Capacity Utilization 59.8%

ICU Level of Service B






















Analysis Period (min) 15

Splits and Phases: 2: Hawthorne & Russell

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Ø2 (R) | | | Ø4 | | |
| 54 s | | | 26 s | | |
|  |  |  |  |  |  |
| Ø6 (R) | | | Ø8 | | |
| 54 s | | | 26 s | | |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2028 Future Background PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 390 | 59 | 45 | 993 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 390 | 59 | 45 | 993 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3073 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.202 | | | 0.492 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 281 | 3073 | 0 | 685 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 22 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 449 | 0 | 45 | 993 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.32 | 0.26 | | 0.10 | 0.55 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.7 | 13.3 | | 9.0 | 19.1 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.7 | 13.3 | | 9.0 | 19.1 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 13.0 | | | 16.8 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 20.9 | | 2.6 | 60.8 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 35.6 | | 7.5 | 91.6 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 275 | 1730 | | 475 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.30 | 0.26 | | 0.09 | 0.55 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.5

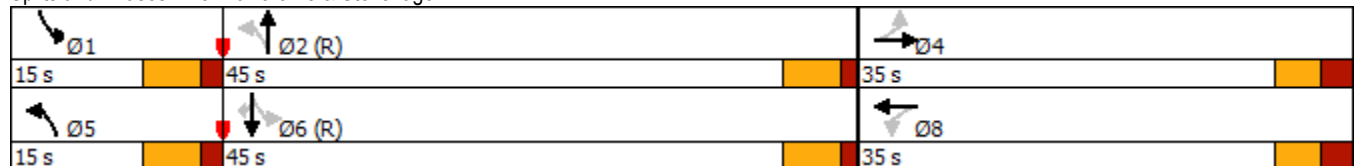
Intersection LOS: B























Intersection Capacity Utilization 77.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 266 | 847 | 25 | 443 | 912 | 91 | 26 | 202 | 321 | 175 | 517 | 489 |
| Future Volume (vph) | 266 | 847 | 25 | 443 | 912 | 91 | 26 | 202 | 321 | 175 | 517 | 489 |
| Satd. Flow (prot) | 1595 | 3422 | 0 | 1654 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.400 | | | 0.136 | | |
| Satd. Flow (perm) | 1595 | 3422 | 0 | 1653 | 3468 | 1141 | 723 | 2807 | 0 | 230 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 240 | | | | 489 |
| Lane Group Flow (vph) | 266 | 872 | 0 | 443 | 912 | 91 | 26 | 523 | 0 | 175 | 517 | 489 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 26.7 | 40.2 | | 38.2 | 51.7 | 51.7 | 28.4 | 21.3 | | 42.0 | 33.8 | 33.8 |
| Actuated g/c Ratio | 0.19 | 0.29 | | 0.27 | 0.37 | 0.37 | 0.20 | 0.15 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 0.87 | 0.88 | | 0.98 | 0.71 | 0.18 | 0.13 | 0.83 | | 0.83 | 0.66 | 0.66 |
| Control Delay | 82.8 | 59.4 | | 88.4 | 42.8 | 3.2 | 36.7 | 42.6 | | 69.7 | 53.6 | 8.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 82.8 | 59.4 | | 88.4 | 42.8 | 3.2 | 36.7 | 42.6 | | 69.7 | 53.6 | 8.7 |
| LOS | F | E | | F | D | A | D | D | | E | D | A |
| Approach Delay | | 64.9 | | | 54.3 | | | 42.4 | | | 37.4 | |
| Approach LOS | | E | | | D | | | D | | | D | |
| Queue Length 50th (m) | 67.1 | 114.8 | | ~122.6 | 111.5 | 0.0 | 4.8 | 38.8 | | 35.5 | 66.9 | 0.0 |
| Queue Length 95th (m) | #108.4 | #148.6 | | #188.0 | 137.8 | 6.0 | 11.5 | 58.6 | | #67.6 | 87.0 | 30.0 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 344 | 1036 | | 452 | 1284 | 497 | 295 | 720 | | 218 | 786 | 739 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.77 | 0.84 | | 0.98 | 0.71 | 0.18 | 0.09 | 0.73 | | 0.80 | 0.66 | 0.66 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 139.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 50.9

Intersection LOS: D

Intersection Capacity Utilization 99.9%

ICU Level of Service F

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.










Queue shown is maximum after two cycles.











95th percentile volume exceeds capacity, queue may be longer.










Queue shown is maximum after two cycles.

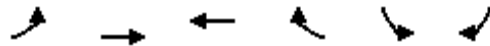
Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|--|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 44.4 s | 48.4 s | 21.3 s | 32.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 36.4 s | 56.4 s | 21.3 s | 32.3 s |







| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 317 | 29 | 10 | 36 | 27 | 126 |
| Future Volume (Veh/h) | 317 | 29 | 10 | 36 | 27 | 126 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 317 | 29 | 10 | 36 | 27 | 126 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 346 | | 388 | 332 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 346 | | 388 | 332 |
| tC, single (s) | | | 4.2 | | 6.6 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.3 | | 3.7 | 3.3 |
| p0 queue free % | | | 99 | | 95 | 82 |
| cM capacity (veh/h) | | | 1170 | | 577 | 708 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 346 | 46 | 153 | | | |
| Volume Left | 0 | 10 | 27 | | | |
| Volume Right | 29 | 0 | 126 | | | |
| cSH | 1700 | 1170 | 681 | | | |
| Volume to Capacity | 0.20 | 0.01 | 0.22 | | | |
| Queue Length 95th (m) | 0.0 | 0.2 | 6.0 | | | |
| Control Delay (s) | 0.0 | 1.8 | 11.8 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 1.8 | 11.8 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.5 | | | |
| Intersection Capacity Utilization | | | 35.9% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 11 | 1407 | 0 | 1107 | 149 | 0 |
| Future Volume (Veh/h) | 11 | 1407 | 0 | 1107 | 149 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 11 | 1407 | 0 | 1107 | 149 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1256 | 149 | 149 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1256 | 149 | 149 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 94 | 0 | 100 | | | |
| cM capacity (veh/h) | 190 | 885 | 1445 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 11 | 1407 | 1107 | 149 | | |
| Volume Left | 11 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1407 | 0 | 0 | | |
| cSH | 190 | 885 | 1700 | 1700 | | |
| Volume to Capacity | 0.06 | 1.59 | 0.65 | 0.09 | | |
| Queue Length 95th (m) | 1.3 | 508.0 | 0.0 | 0.0 | | |
| Control Delay (s) | 25.1 | 285.4 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 283.3 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 150.3 | | | |
| Intersection Capacity Utilization | | | 106.9% | ICU Level of Service | | G |
| Analysis Period (min) | | | 15 | | | |




| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 116 | 321 | 33 | 114 | 322 | 17 |
| Future Volume (Veh/h) | 116 | 321 | 33 | 114 | 322 | 17 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 116 | 321 | 33 | 114 | 322 | 17 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 510 | 330 | 339 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 510 | 330 | 339 | | | |
| tC, single (s) | 6.5 | 6.3 | 4.2 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.4 | 2.3 | | | |
| p0 queue free % | 77 | 54 | 97 | | | |
| cM capacity (veh/h) | 501 | 700 | 1151 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 437 | 147 | 339 | | | |
| Volume Left | 116 | 33 | 0 | | | |
| Volume Right | 321 | 0 | 17 | | | |
| cSH | 633 | 1151 | 1700 | | | |
| Volume to Capacity | 0.69 | 0.03 | 0.20 | | | |
| Queue Length 95th (m) | 38.3 | 0.6 | 0.0 | | | |
| Control Delay (s) | 22.4 | 2.0 | 0.0 | | | |
| Lane LOS | C | A | | | | |
| Approach Delay (s) | 22.4 | 2.0 | 0.0 | | | |
| Approach LOS | C | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 10.9 | | | |
| Intersection Capacity Utilization | | | 64.9% | ICU Level of Service | C | |
| Analysis Period (min) | | | 15 | | | |



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 1647 | 193 | 0 | 182 | 665 |
| Future Volume (Veh/h) | 0 | 1647 | 193 | 0 | 182 | 665 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 1647 | 193 | 0 | 182 | 665 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 193 | | | | 1016 | 96 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 193 | | | | 1016 | 96 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 20 | 29 |
| cM capacity (veh/h) | 1356 | | | | 229 | 931 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 824 | 824 | 96 | 96 | 182 | 665 |
| Volume Left | 0 | 0 | 0 | 0 | 182 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 665 |
| cSH | 1700 | 1700 | 1700 | 1700 | 229 | 931 |
| Volume to Capacity | 0.48 | 0.48 | 0.06 | 0.06 | 0.80 | 0.71 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 40.9 | 44.1 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 62.7 | 17.9 |
| Lane LOS | | | | | F | C |
| Approach Delay (s) | 0.0 | | 0.0 | | 27.5 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 8.7 | | | |
| Intersection Capacity Utilization | | | 65.4% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |





| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 849 | 0 | 0 | 92 | 163 | 25 |
| Future Volume (Veh/h) | 849 | 0 | 0 | 92 | 163 | 25 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 849 | 0 | 0 | 92 | 163 | 25 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 849 | | 895 | 424 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 849 | | 895 | 424 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 41 | 96 |
| cM capacity (veh/h) | | | 766 | | 275 | 570 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 424 | 424 | 46 | 46 | 188 | |
| Volume Left | 0 | 0 | 0 | 0 | 163 | |
| Volume Right | 0 | 0 | 0 | 0 | 25 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 295 | |
| Volume to Capacity | 0.25 | 0.25 | 0.03 | 0.03 | 0.64 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 28.3 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 36.4 | |
| Lane LOS | | | | | E | |
| Approach Delay (s) | 0.0 | | 0.0 | | 36.4 | |
| Approach LOS | | | | | E | |
| Intersection Summary | | | | | | |
| Average Delay | | | 6.1 | | | |
| Intersection Capacity Utilization | | | 65.4% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |























| Intersection | |
|---------------------------|----|
| Intersection Delay, s/veh | 11 |
| Intersection LOS | B |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 63 | 8 | 49 | 199 | 132 | 300 |
| Future Vol, veh/h | 63 | 8 | 49 | 199 | 132 | 300 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 10 | 1 | 7 | 4 | 2 | 2 |
| Mvmt Flow | 63 | 8 | 49 | 199 | 132 | 300 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|----------------------------|-----|-----|------|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 9.4 | 8.9 | 12.5 |
| HCM LOS | A | A | B |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 89% | 31% |
| Vol Thru, % | 20% | 0% | 69% |
| Vol Right, % | 80% | 11% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 248 | 71 | 432 |
| LT Vol | 0 | 63 | 132 |
| Through Vol | 49 | 0 | 300 |
| RT Vol | 199 | 8 | 0 |
| Lane Flow Rate | 248 | 71 | 432 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.289 | 0.111 | 0.533 |
| Departure Headway (Hd) | 4.196 | 5.633 | 4.444 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 856 | 635 | 812 |
| Service Time | 2.223 | 3.684 | 2.469 |
| HCM Lane V/C Ratio | 0.29 | 0.112 | 0.532 |
| HCM Control Delay | 8.9 | 9.4 | 12.5 |
| HCM Lane LOS | A | A | B |
| HCM 95th-tile Q | 1.2 | 0.4 | 3.2 |

| Intersection | | | | | | | | | | | | |
|----------------------------|-------|---|-------|-------|---|------|------|---|------|------|---|------|
| Intersection Delay, s/veh | 13.7 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 77 | 244 | 14 | 12 | 24 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Future Vol, veh/h | 77 | 244 | 14 | 12 | 24 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 2 | 1 | 1 | 1 | 14 | 1 | 1 | 1 | 7 | 2 | 3 | 4 |
| Mvmt Flow | 77 | 244 | 14 | 12 | 24 | 10 | 7 | 170 | 46 | 61 | 262 | 38 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | WB | | | NB | | | SB | | | | |
| Opposing Approach | WB | EB | | | SB | | | NB | | | | |
| Opposing Lanes | 1 | 1 | | | 1 | | | 1 | | | | |
| Conflicting Approach Left | SB | NB | | | EB | | | WB | | | | |
| Conflicting Lanes Left | 1 | 1 | | | 1 | | | 1 | | | | |
| Conflicting Approach Right | NB | SB | | | WB | | | EB | | | | |
| Conflicting Lanes Right | 1 | 1 | | | 1 | | | 1 | | | | |
| HCM Control Delay | 14.7 | 9.7 | | | 11.4 | | | 14.7 | | | | |
| HCM LOS | B | A | | | B | | | B | | | | |
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | | | | | | | | |
| Vol Left, % | 3% | 23% | 26% | 17% | | | | | | | | |
| Vol Thru, % | 76% | 73% | 52% | 73% | | | | | | | | |
| Vol Right, % | 21% | 4% | 22% | 11% | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | | | | | | | | |
| Traffic Vol by Lane | 223 | 335 | 46 | 361 | | | | | | | | |
| LT Vol | 7 | 77 | 12 | 61 | | | | | | | | |
| Through Vol | 170 | 244 | 24 | 262 | | | | | | | | |
| RT Vol | 46 | 14 | 10 | 38 | | | | | | | | |
| Lane Flow Rate | 223 | 335 | 46 | 361 | | | | | | | | |
| Geometry Grp | 1 | 1 | 1 | 1 | | | | | | | | |
| Degree of Util (X) | 0.341 | 0.523 | 0.078 | 0.541 | | | | | | | | |
| Departure Headway (Hd) | 5.505 | 5.617 | 6.093 | 5.392 | | | | | | | | |
| Convergence, Y/N | Yes | Yes | Yes | Yes | | | | | | | | |
| Cap | 651 | 640 | 584 | 668 | | | | | | | | |
| Service Time | 3.561 | 3.666 | 4.168 | 3.441 | | | | | | | | |
| HCM Lane V/C Ratio | 0.343 | 0.523 | 0.079 | 0.54 | | | | | | | | |
| HCM Control Delay | 11.4 | 14.7 | 9.7 | 14.7 | | | | | | | | |
| HCM Lane LOS | B | B | A | B | | | | | | | | |
| HCM 95th-tile Q | 1.5 | 3 | 0.3 | 3.3 | | | | | | | | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 35 | 7 | 21 | 9 | 3 | 86 | 7 | 749 | 13 | 220 | 910 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 9 | 3 | 86 | 7 | 749 | 13 | 220 | 910 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3289 | 0 | 1639 | 3269 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.303 | | | 0.363 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 393 | 3289 | 0 | 626 | 3269 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 86 | | 4 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 9 | 3 | 86 | 7 | 762 | 0 | 220 | 927 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 54.0 | 54.0 | | 54.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 10.1 | 10.1 | | 10.1 | 10.1 | 10.1 | 62.1 | 62.1 | | 62.1 | 62.1 | |
| Actuated g/C Ratio | 0.13 | 0.13 | | 0.13 | 0.13 | 0.13 | 0.78 | 0.78 | | 0.78 | 0.78 | |
| v/c Ratio | 0.21 | 0.14 | | 0.05 | 0.02 | 0.33 | 0.02 | 0.30 | | 0.45 | 0.37 | |
| Control Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.6 | 3.4 | 3.9 | | 8.3 | 4.3 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 34.9 | 18.4 | | 31.4 | 31.0 | 11.6 | 3.4 | 3.9 | | 8.3 | 4.3 | |
| LOS | C | B | | C | C | B | A | A | | A | A | |
| Approach Delay | | 27.6 | | | 14.0 | | | 3.9 | | | 5.0 | |
| Approach LOS | | C | | | B | | | A | | | A | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 1.1 | 0.4 | 0.0 | 0.2 | 16.3 | | 10.7 | 21.4 | |
| Queue Length 95th (m) | 11.9 | 7.2 | | 4.8 | 2.5 | 10.8 | 1.2 | 23.2 | | 25.3 | 29.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 441 | 304 | 2554 | | 486 | 2539 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.03 | 0.01 | 0.20 | 0.02 | 0.30 | | 0.45 | 0.37 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 16 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 5.7





Intersection LOS: A

Intersection Capacity Utilization 59.8%

ICU Level of Service B






















Analysis Period (min) 15

Splits and Phases: 2: Hawthorne & Russell

| | |
|--|--|
|  Ø2 (R) |  Ø4 |
| 54 s | 26 s |
|  Ø6 (R) |  Ø8 |
| 54 s | 26 s |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2028 Future Background PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 390 | 59 | 45 | 993 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 390 | 59 | 45 | 993 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3073 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.202 | | | 0.492 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 281 | 3073 | 0 | 685 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 22 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 449 | 0 | 45 | 993 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.32 | 0.26 | | 0.10 | 0.55 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.7 | 13.3 | | 9.0 | 19.1 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.7 | 13.3 | | 9.0 | 19.1 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 13.0 | | | 16.8 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 20.9 | | 2.6 | 60.8 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 35.6 | | 7.5 | 91.6 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 275 | 1730 | | 475 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.30 | 0.26 | | 0.09 | 0.55 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.5







Intersection LOS: B

Intersection Capacity Utilization 77.5%

ICU Level of Service D























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | |
|---|---|---|
|  |  |  |
| Ø1 | Ø2 (R) | Ø4 |
| 15 s | 45 s | 35 s |
|  |  |  |
| Ø5 | Ø6 (R) | Ø8 |
| 15 s | 45 s | 35 s |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2028 Future Background PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 266 | 847 | 25 | 443 | 912 | 91 | 26 | 202 | 321 | 175 | 517 | 489 |
| Future Volume (vph) | 266 | 847 | 25 | 443 | 912 | 91 | 26 | 202 | 321 | 175 | 517 | 489 |
| Satd. Flow (prot) | 3094 | 3422 | 0 | 3208 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.459 | | | 0.177 | | |
| Satd. Flow (perm) | 3094 | 3422 | 0 | 3205 | 3468 | 1141 | 830 | 2807 | 0 | 300 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 240 | | | | 489 |
| Lane Group Flow (vph) | 266 | 872 | 0 | 443 | 912 | 91 | 26 | 523 | 0 | 175 | 517 | 489 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 16.1 | 38.4 | | 22.5 | 44.7 | 44.7 | 27.1 | 20.2 | | 40.4 | 32.8 | 32.8 |
| Actuated g/C Ratio | 0.13 | 0.32 | | 0.19 | 0.37 | 0.37 | 0.22 | 0.17 | | 0.33 | 0.27 | 0.27 |
| v/c Ratio | 0.65 | 0.80 | | 0.74 | 0.71 | 0.18 | 0.11 | 0.78 | | 0.70 | 0.59 | 0.64 |
| Control Delay | 59.4 | 45.4 | | 56.0 | 37.1 | 3.1 | 31.2 | 35.4 | | 47.7 | 44.1 | 7.8 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.4 | 45.4 | | 56.0 | 37.1 | 3.1 | 31.2 | 35.4 | | 47.7 | 44.1 | 7.8 |
| LOS | E | D | | E | D | A | C | D | | D | D | A |
| Approach Delay | | 48.7 | | | 40.7 | | | 35.2 | | | 29.6 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Queue Length 50th (m) | 30.6 | 95.0 | | 50.7 | 92.2 | 0.0 | 4.0 | 33.6 | | 29.9 | 57.4 | 0.0 |
| Queue Length 95th (m) | 45.5 | 131.5 | | 69.3 | 126.2 | 5.8 | 10.6 | 55.0 | | #51.5 | 81.0 | 29.0 |
| Internal Link Dist (m) | | 420.4 | | | 1343.9 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 787 | 1224 | | 1034 | 1472 | 552 | 357 | 806 | | 266 | 882 | 769 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.34 | 0.71 | | 0.43 | 0.62 | 0.16 | 0.07 | 0.65 | | 0.66 | 0.59 | 0.64 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 120.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 39.1

Intersection LOS: D

Intersection Capacity Utilization 87.3%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|--|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 44.4 s | 48.4 s | 21.3 s | 32.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 36.4 s | 56.4 s | 21.3 s | 32.3 s |



| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (vph) | 0 | 1647 | 193 | 0 | 182 | 665 |
| Future Volume (vph) | 0 | 1647 | 193 | 0 | 182 | 665 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 665 |
| Lane Group Flow (vph) | 0 | 1647 | 193 | 0 | 182 | 665 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 65.0 | 65.0 | | 25.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 62.9 | 62.9 | | 14.5 | 90.0 |
| Actuated g/C Ratio | | 0.70 | 0.70 | | 0.16 | 1.00 |
| v/c Ratio | | 0.69 | 0.08 | | 0.67 | 0.44 |
| Control Delay | | 10.5 | 3.2 | | 47.1 | 0.9 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 10.5 | 3.2 | | 47.1 | 0.9 |
| LOS | | B | A | | D | A |
| Approach Delay | | 10.5 | 3.2 | | 10.8 | |
| Approach LOS | | B | A | | B | |
| Queue Length 50th (m) | | 70.0 | 1.3 | | 27.4 | 0.0 |
| Queue Length 95th (m) | | 106.6 | 7.1 | | 44.4 | 0.0 |
| Internal Link Dist (m) | | 667.9 | 357.7 | | 275.3 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 2379 | 2379 | | 353 | 1522 |
| 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 | | 0.69 | 0.08 | | 0.52 | 0.44 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 10.1

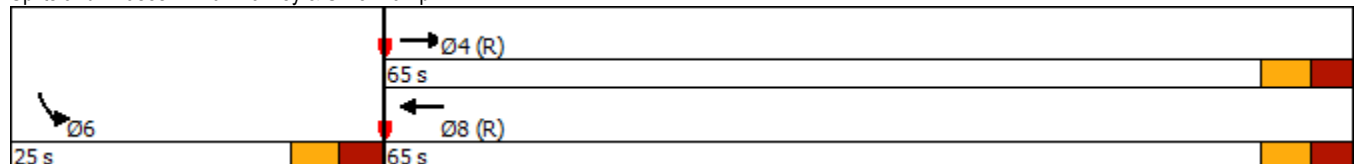
Intersection LOS: B

Intersection Capacity Utilization 69.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Walkley & SB off-ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 849 | 0 | 0 | 92 | 163 | 25 |
| Future Volume (vph) | 849 | 0 | 0 | 92 | 163 | 25 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Flt Permitted | | | | | 0.958 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Satd. Flow (RTOR) | | | | | 9 | |
| Lane Group Flow (vph) | 849 | 0 | 0 | 92 | 188 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 54.0 | | | 54.0 | 36.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 47.7 | | | 47.7 | 29.7 | |
| Actuated g/C Ratio | 0.53 | | | 0.53 | 0.33 | |
| v/c Ratio | 0.47 | | | 0.05 | 0.34 | |
| Control Delay | 14.8 | | | 10.4 | 23.7 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 14.8 | | | 10.4 | 23.7 | |
| LOS | B | | | B | C | |
| Approach Delay | 14.8 | | | 10.4 | 23.7 | |
| Approach LOS | B | | | B | C | |
| Queue Length 50th (m) | 32.1 | | | 3.5 | 21.2 | |
| Queue Length 95th (m) | 57.7 | | | 6.7 | 36.9 | |
| Internal Link Dist (m) | 357.7 | | | 203.8 | 376.5 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1803 | | | 1803 | 561 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.47 | | | 0.05 | 0.34 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 15.9

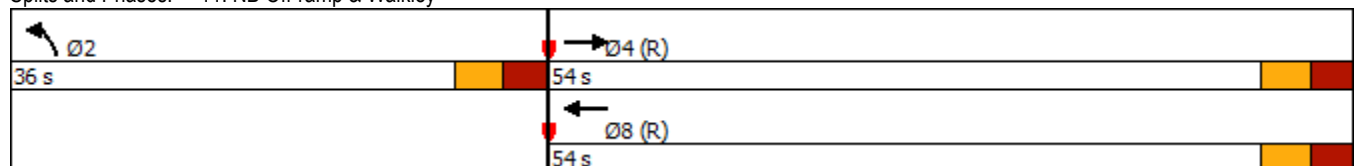
Intersection LOS: B

Intersection Capacity Utilization 69.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: NB Off-ramp & Walkley



Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|---------------------------------|-----------------------------|
| 119124 | 2028 PHF Flow Profile (veh) |
| 2028 Background Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| PM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target Average Delay (sec/veh) | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|---|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB- Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB- Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2028 PM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 61 | 262 | 38 | 0 | 3.0 | 1.00 | 1.000 |
| 2 | EB - Russell | 0 | 77 | 244 | 14 | 0 | 3.0 | 1.00 | 1.000 |
| 3 | NB- Anderson | 0 | 7 | 170 | 46 | 0 | 3.0 | 1.00 | 1.000 |
| 4 | WB- Russell | 0 | 12 | 24 | 10 | 0 | 3.0 | 1.00 | 1.000 |

Operational Results

Geometry for Target Input

Geometry Options for 2028 PM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 PM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 PM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 PM Peak

| Leg 4 - WB- Russell | | | | | |
|---------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2028 PM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 43 | | 257 | 925 | | 0.3902 | |
| 2 | EB - Russell | None | 335 | | 335 | | 69 | 774 | | 0.4328 | |
| 3 | NB- Anderson | None | 223 | | 382 | | 288 | 750 | | 0.2974 | |
| 4 | WB- Russell | None | 46 | | 254 | | 351 | 816 | | 0.0564 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.06 | | 6.06 | 1.58 | | A | | A |
| 2 | EB - Russell | None | 7.74 | | 7.74 | 1.87 | | A | | A |
| 3 | NB- Anderson | None | 6.53 | | 6.53 | 1.06 | | A | | A |
| 4 | WB- Russell | None | 4.52 | | 4.52 | 0.15 | | A | | A |

























2028 PM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 43 | | 257 | 925 | | 0.3902 | |
| 2 | EB - Russell | None | 335 | | 335 | | 69 | 774 | | 0.4328 | |
| 3 | NB- Anderson | None | 223 | | 382 | | 288 | 750 | | 0.2974 | |
| 4 | WB- Russell | None | 46 | | 254 | | 351 | 816 | | 0.0564 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.07 | | 6.07 | 1.58 | | A | | A |
| 2 | EB - Russell | None | 7.76 | | 7.76 | 1.87 | | A | | A |
| 3 | NB- Anderson | None | 6.54 | | 6.54 | 1.06 | | A | | A |
| 4 | WB- Russell | None | 4.53 | | 4.53 | 0.15 | | A | | A |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 79 | 509 | 204 | 482 | 1289 | 67 | 279 | 465 | 592 | 57 | 269 | 141 |
| Future Volume (vph) | 79 | 509 | 204 | 482 | 1289 | 67 | 279 | 465 | 592 | 57 | 269 | 141 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3083 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 204 | | | 134 | | | 528 | | | 180 |
| Lane Group Flow (vph) | 79 | 509 | 204 | 482 | 1289 | 67 | 279 | 465 | 592 | 57 | 269 | 141 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 20.0 | 40.0 | 40.0 | 20.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.5 | 51.8 | 51.8 | 29.4 | 67.6 | 67.6 | 12.4 | 34.8 | 34.8 | 8.0 | 27.7 | 27.7 |
| Actuated g/C Ratio | 0.09 | 0.35 | 0.35 | 0.20 | 0.45 | 0.45 | 0.08 | 0.23 | 0.23 | 0.05 | 0.18 | 0.18 |
| v/c Ratio | 0.64 | 0.45 | 0.34 | 0.82 | 0.83 | 0.09 | 1.09 | 0.62 | 0.83 | 0.33 | 0.46 | 0.35 |
| Control Delay | 87.8 | 42.0 | 6.9 | 69.1 | 43.6 | 0.2 | 145.1 | 55.8 | 18.6 | 72.9 | 55.9 | 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 | 87.8 | 42.0 | 6.9 | 69.1 | 43.6 | 0.2 | 145.1 | 55.8 | 18.6 | 72.9 | 55.9 | 4.9 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 37.5 | | | 48.7 | | | 57.9 | | | 42.6 | |
| Approach LOS | | D | | | D | | | E | | | D | |
| Queue Length 50th (m) | 21.2 | 59.7 | 0.0 | 65.9 | 172.3 | 0.0 | ~44.2 | 59.5 | 14.0 | 7.9 | 33.5 | 0.0 |
| Queue Length 95th (m) | 37.0 | 81.7 | 18.5 | 79.4 | #224.9 | 0.0 | #71.7 | 78.1 | 70.1 | 14.6 | 46.3 | 7.3 |
| Internal Link Dist (m) | | 485.7 | | | 404.4 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1141 | 593 | 775 | 1548 | 745 | 255 | 746 | 710 | 270 | 693 | 437 |
| 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 | 0.48 | 0.45 | 0.34 | 0.62 | 0.83 | 0.09 | 1.09 | 0.62 | 0.83 | 0.21 | 0.39 | 0.32 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 48.8

Intersection LOS: D

Intersection Capacity Utilization 84.2%

ICU Level of Service E

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.























Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 45 s | 45 s | 20 s | 40 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 24.4 s | 65.6 s | 20 s | 40 s |

4055 & 4120 Russell Road
2: Hawthorne & Russell

2028 Total Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 49 | 10 | 506 | 17 | 933 | 44 | 229 | 572 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 49 | 10 | 506 | 17 | 933 | 44 | 229 | 572 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3090 | 0 | 1488 | 2988 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.419 | | | 0.260 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 747 | 3090 | 0 | 407 | 2988 | 0 |
| Satd. Flow (RTOR) | | 335 | | | | 160 | | 10 | | | 13 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 49 | 10 | 506 | 17 | 977 | 0 | 229 | 606 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 64.0 | 64.0 | | 64.0 | 64.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 20.3 | 20.3 | | 20.3 | 20.3 | 20.3 | 57.5 | 57.5 | | 57.5 | 57.5 | |
| Actuated g/C Ratio | 0.23 | 0.23 | | 0.23 | 0.23 | 0.23 | 0.64 | 0.64 | | 0.64 | 0.64 | |
| v/c Ratio | 0.04 | 0.01 | | 0.18 | 0.02 | 1.08 | 0.04 | 0.49 | | 0.88 | 0.32 | |
| Control Delay | 28.1 | 0.0 | | 30.4 | 27.5 | 91.1 | 3.8 | 6.5 | | 50.3 | 7.7 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 28.1 | 0.0 | | 30.4 | 27.5 | 91.1 | 3.8 | 6.5 | | 50.3 | 7.7 | |
| LOS | C | A | | C | C | F | A | A | | D | A | |
| Approach Delay | | 15.6 | | | 84.7 | | | 6.5 | | | 19.4 | |
| Approach LOS | | B | | | F | | | A | | | B | |
| Queue Length 50th (m) | 1.3 | 0.0 | | 6.3 | 1.3 | ~69.8 | 0.4 | 13.1 | | 27.1 | 20.0 | |
| Queue Length 95th (m) | 5.0 | 0.0 | | 15.0 | 5.0 | #124.5 | m0.8 | 16.2 | | #72.6 | 27.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 227 | 547 | | 265 | 403 | 467 | 477 | 1977 | | 260 | 1913 | |
| 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 | 0.04 | 0.01 | | 0.18 | 0.02 | 1.08 | 0.04 | 0.49 | | 0.88 | 0.32 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 23 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 29.3

Intersection LOS: C

Intersection Capacity Utilization 85.0%

ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

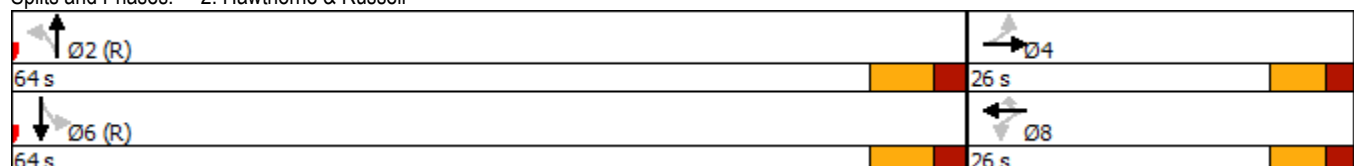
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 2: Hawthorne & Russell



4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2028 Total Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 1001 | 86 | 52 | 364 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 1001 | 86 | 52 | 364 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3097 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.480 | | | 0.223 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 840 | 3097 | 0 | 335 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 11 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 208 | 1087 | 0 | 52 | 364 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.4 | 46.4 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.32 | 0.58 | | 0.19 | 0.25 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.4 | | 5.2 | 10.9 | 5.9 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.4 | | 5.2 | 10.9 | 5.9 |
| LOS | D | B | | C | C | | A | B | | A | B | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 14.1 | | | 8.8 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 10.0 | 56.8 | | 1.5 | 17.8 | 5.6 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.8 | 99.5 | | 2.2 | 33.5 | 23.3 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 662 | 1863 | | 319 | 1474 | 826 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.31 | 0.58 | | 0.16 | 0.25 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.5

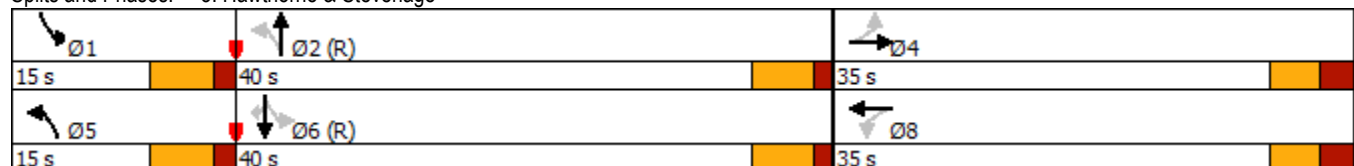
Intersection LOS: B

Intersection Capacity Utilization 65.0%

ICU Level of Service C























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2028 Total Traffic AM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 470 | 703 | 26 | 263 | 748 | 257 | 42 | 432 | 400 | 45 | 154 | 205 |
| Future Volume (vph) | 470 | 703 | 26 | 263 | 748 | 257 | 42 | 432 | 400 | 45 | 154 | 205 |
| Satd. Flow (prot) | 1639 | 3337 | 0 | 1595 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.654 | | | 0.129 | | |
| Satd. Flow (perm) | 1639 | 3337 | 0 | 1595 | 3402 | 1440 | 1025 | 2974 | 0 | 162 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 2 | | | | 257 | | 152 | | | | 205 |
| Lane Group Flow (vph) | 470 | 729 | 0 | 263 | 748 | 257 | 42 | 832 | 0 | 45 | 154 | 205 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 41.4 | 41.4 | | 41.4 | 41.4 | 41.4 | 21.3 | 36.3 | | 21.3 | 36.3 | 36.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 35.2 | 42.6 | | 26.4 | 33.8 | 33.8 | 36.9 | 30.2 | | 38.6 | 31.0 | 31.0 |
| Actuated g/C Ratio | 0.27 | 0.33 | | 0.20 | 0.26 | 0.26 | 0.28 | 0.23 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 1.07 | 0.67 | | 0.82 | 0.85 | 0.46 | 0.13 | 1.04 | | 0.38 | 0.24 | 0.45 |
| Control Delay | 107.9 | 43.9 | | 70.4 | 57.3 | 7.5 | 31.5 | 82.0 | | 40.2 | 43.0 | 8.9 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 107.9 | 43.9 | | 70.4 | 57.3 | 7.5 | 31.5 | 82.0 | | 40.2 | 43.0 | 8.9 |
| LOS | F | D | | E | E | A | C | F | | D | D | A |
| Approach Delay | | 69.0 | | | 49.9 | | | 79.6 | | | 25.4 | |
| Approach LOS | | E | | | D | | | E | | | C | |
| Queue Length 50th (m) | ~130.0 | 81.4 | | 61.9 | 91.5 | 0.0 | 7.0 | ~101.5 | | 7.6 | 16.2 | 0.0 |
| Queue Length 95th (m) | #197.7 | #117.1 | | 87.4 | #123.1 | 20.0 | 14.8 | #144.3 | | 15.9 | 26.0 | 19.2 |
| Internal Link Dist (m) | | 420.4 | | | 459.3 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 441 | 1087 | | 429 | 915 | 575 | 378 | 802 | | 170 | 652 | 459 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.07 | 0.67 | | 0.61 | 0.82 | 0.45 | 0.11 | 1.04 | | 0.26 | 0.24 | 0.45 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 130.8

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 60.3

Intersection LOS: E

Intersection Capacity Utilization 101.0%

ICU Level of Service G

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.











Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|---|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 41.4 s | 41.4 s | 21.3 s | 36.3 s |

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (vph) | 48 | 1100 | 1547 | 117 | 92 | 37 |
| Future Volume (vph) | 48 | 1100 | 1547 | 117 | 92 | 37 |
| Satd. Flow (prot) | 1701 | 3402 | 3364 | 0 | 1662 | 0 |
| Flt Permitted | 0.104 | | | | 0.966 | |
| Satd. Flow (perm) | 186 | 3402 | 3364 | 0 | 1662 | 0 |
| Satd. Flow (RTOR) | | | 13 | | 5 | |
| Lane Group Flow (vph) | 48 | 1100 | 1664 | 0 | 129 | 0 |
| Turn Type | Perm | NA | NA | | Prot | |
| Protected Phases | | 2 | 6 | | 4 | |
| Permitted Phases | 2 | | | | | |
| Total Split (s) | 34.0 | 34.0 | 34.0 | | 36.2 | |
| Total Lost Time (s) | 6.4 | 6.4 | 6.4 | | 5.8 | |
| Act Effct Green (s) | 51.0 | 51.0 | 51.0 | | 10.7 | |
| Actuated g/C Ratio | 0.73 | 0.73 | 0.73 | | 0.15 | |
| v/c Ratio | 0.36 | 0.44 | 0.68 | | 0.50 | |
| Control Delay | 16.4 | 6.3 | 9.3 | | 32.3 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | |
| Total Delay | 16.4 | 6.3 | 9.3 | | 32.3 | |
| LOS | B | A | A | | C | |
| Approach Delay | | 6.7 | 9.3 | | 32.3 | |
| Approach LOS | | A | A | | C | |
| Queue Length 50th (m) | 2.1 | 28.0 | 56.1 | | 14.0 | |
| Queue Length 95th (m) | #14.1 | 48.2 | 98.1 | | 25.8 | |
| Internal Link Dist (m) | | 459.3 | 853.4 | | 137.8 | |
| Turn Bay Length (m) | 30.0 | | | | 30.0 | |
| Base Capacity (vph) | 135 | 2473 | 2449 | | 722 | |
| 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 | 0.36 | 0.44 | 0.68 | | 0.18 | |

Intersection Summary

Cycle Length: 70.2

Actuated Cycle Length: 70.2

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 9.3

Intersection LOS: A

Intersection Capacity Utilization 67.0%












ICU Level of Service C










Analysis Period (min) 15











95th percentile volume exceeds capacity, queue may be longer.










Queue shown is maximum after two cycles.

Splits and Phases: 12: Hunt Club & Access

| | | | |
|---|---|---|---|
|  |  |  |  |
|  |  |  |  |
| 34 s | | | 36.2 s |
|  |  |  | |
| 34 s | | | |







| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 194 | 42 | 155 | 600 | 39 | 22 |
| Future Volume (Veh/h) | 194 | 42 | 155 | 600 | 39 | 22 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 194 | 42 | 155 | 600 | 39 | 22 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 236 | | 1125 | 215 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 236 | | 1125 | 215 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.5 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.9 | 3.5 |
| p0 queue free % | | | 88 | | 77 | 97 |
| cM capacity (veh/h) | | | 1325 | | 169 | 770 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 236 | 755 | 61 | | | |
| Volume Left | 0 | 155 | 39 | | | |
| Volume Right | 42 | 0 | 22 | | | |
| cSH | 1700 | 1325 | 236 | | | |
| Volume to Capacity | 0.14 | 0.12 | 0.26 | | | |
| Queue Length 95th (m) | 0.0 | 2.8 | 7.0 | | | |
| Control Delay (s) | 0.0 | 2.8 | 25.5 | | | |
| Lane LOS | | A | D | | | |
| Approach Delay (s) | 0.0 | 2.8 | 25.5 | | | |
| Approach LOS | | | D | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.5 | | | |
| Intersection Capacity Utilization | | | 69.6% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |

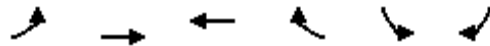
| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 2 | 961 | 0 | 964 | 702 | 0 |
| Future Volume (Veh/h) | 2 | 961 | 0 | 964 | 702 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 961 | 0 | 964 | 702 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1666 | 702 | 702 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1666 | 702 | 702 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 98 | 0 | 100 | | | |
| cM capacity (veh/h) | 107 | 426 | 905 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 2 | 961 | 964 | 702 | | |
| Volume Left | 2 | 0 | 0 | 0 | | |
| Volume Right | 0 | 961 | 0 | 0 | | |
| cSH | 107 | 426 | 1700 | 1700 | | |
| Volume to Capacity | 0.02 | 2.25 | 0.57 | 0.41 | | |
| Queue Length 95th (m) | 0.4 | 502.8 | 0.0 | 0.0 | | |
| Control Delay (s) | 39.3 | 592.2 | 0.0 | 0.0 | | |
| Lane LOS | E | F | | | | |
| Approach Delay (s) | 591.1 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 216.5 | | | |
| Intersection Capacity Utilization | | | 108.5% | ICU Level of Service | G | |
| Analysis Period (min) | | | 15 | | | |






| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 42 | 39 | 411 | 347 | 145 | 232 |
| Future Volume (Veh/h) | 42 | 39 | 411 | 347 | 145 | 232 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 42 | 39 | 411 | 347 | 145 | 232 |
| Pedestrians | | | | 2 | | |
| Lane Width (m) | | | | 4.0 | | |
| Walking Speed (m/s) | | | | 1.0 | | |
| Percent Blockage | | | | 0 | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1430 | 263 | 377 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1430 | 263 | 377 | | | |
| tC, single (s) | 6.9 | 6.4 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 4.0 | 3.5 | 2.2 | | | |
| p0 queue free % | 44 | 95 | 65 | | | |
| cM capacity (veh/h) | 76 | 732 | 1171 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 81 | 758 | 377 | | | |
| Volume Left | 42 | 411 | 0 | | | |
| Volume Right | 39 | 0 | 232 | | | |
| cSH | 133 | 1171 | 1700 | | | |
| Volume to Capacity | 0.61 | 0.35 | 0.22 | | | |
| Queue Length 95th (m) | 22.0 | 11.2 | 0.0 | | | |
| Control Delay (s) | 67.1 | 7.2 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | 67.1 | 7.2 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 9.0 | | | | |
| Intersection Capacity Utilization | | 82.0% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |








| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|--------|------|----------------------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 553 | 1041 | 0 | 24 | 1084 |
| Future Volume (Veh/h) | 0 | 553 | 1041 | 0 | 24 | 1084 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 553 | 1041 | 0 | 24 | 1084 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1041 | | | | 1318 | 520 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1041 | | | | 1318 | 520 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 83 | 0 |
| cM capacity (veh/h) | 646 | | | | 145 | 493 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 276 | 276 | 520 | 520 | 24 | 1084 |
| Volume Left | 0 | 0 | 0 | 0 | 24 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 1084 |
| cSH | 1700 | 1700 | 1700 | 1700 | 145 | 493 |
| Volume to Capacity | 0.16 | 0.16 | 0.31 | 0.31 | 0.17 | 2.20 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 553.3 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 34.7 | 565.3 |
| Lane LOS | | | | | D | F |
| Approach Delay (s) | 0.0 | | 0.0 | | 553.8 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 227.1 | | | |
| Intersection Capacity Utilization | | | 107.9% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |

















| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 172 | 0 | 0 | 973 | 578 | 60 |
| Future Volume (Veh/h) | 172 | 0 | 0 | 973 | 578 | 60 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 172 | 0 | 0 | 973 | 578 | 60 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 172 | | 658 | 86 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 172 | | 658 | 86 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 0 | 94 |
| cM capacity (veh/h) | | | 1381 | | 390 | 946 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 86 | 86 | 486 | 486 | 638 | |
| Volume Left | 0 | 0 | 0 | 0 | 578 | |
| Volume Right | 0 | 0 | 0 | 0 | 60 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 413 | |
| Volume to Capacity | 0.05 | 0.05 | 0.29 | 0.29 | 1.54 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 244.7 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 281.4 | |
| Lane LOS | | | | | F | |
| Approach Delay (s) | 0.0 | | 0.0 | | 281.4 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 100.7 | | | |
| Intersection Capacity Utilization | | | 107.9% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |



















| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|---|
| Lane Configurations |  |  |  | |  |  |
| Traffic Volume (veh/h) | 136 | 143 | 535 | 48 | 45 | 129 |
| Future Volume (Veh/h) | 136 | 143 | 535 | 48 | 45 | 129 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 136 | 143 | 535 | 48 | 45 | 129 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 583 | | | | 974 | 559 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 583 | | | | 974 | 559 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 86 | | | | 81 | 75 |
| cM capacity (veh/h) | 977 | | | | 237 | 523 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | SB 2 | |
| Volume Total | 136 | 143 | 583 | 45 | 129 | |
| Volume Left | 136 | 0 | 0 | 45 | 0 | |
| Volume Right | 0 | 0 | 48 | 0 | 129 | |
| cSH | 977 | 1700 | 1700 | 237 | 523 | |
| Volume to Capacity | 0.14 | 0.08 | 0.34 | 0.19 | 0.25 | |
| Queue Length 95th (m) | 3.4 | 0.0 | 0.0 | 4.8 | 6.7 | |
| Control Delay (s) | 9.3 | 0.0 | 0.0 | 23.7 | 14.1 | |
| Lane LOS | A | | | C | B | |
| Approach Delay (s) | 4.5 | | 0.0 | 16.6 | | |
| Approach LOS | | | | C | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.0 | | | |
| Intersection Capacity Utilization | | | 54.1% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |






| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|------|
| Lane Configurations |  |  |  | |   | |
| Traffic Volume (veh/h) | 58 | 130 | 528 | 111 | 106 | 55 |
| Future Volume (Veh/h) | 58 | 130 | 528 | 111 | 106 | 55 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 58 | 130 | 528 | 111 | 106 | 55 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 639 | | | | 830 | 584 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 639 | | | | 830 | 584 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 94 | | | | 66 | 89 |
| cM capacity (veh/h) | 931 | | | | 315 | 506 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | | |
| Volume Total | 58 | 130 | 639 | 161 | | |
| Volume Left | 58 | 0 | 0 | 106 | | |
| Volume Right | 0 | 0 | 111 | 55 | | |
| cSH | 931 | 1700 | 1700 | 362 | | |
| Volume to Capacity | 0.06 | 0.08 | 0.38 | 0.44 | | |
| Queue Length 95th (m) | 1.4 | 0.0 | 0.0 | 15.5 | | |
| Control Delay (s) | 9.1 | 0.0 | 0.0 | 22.7 | | |
| Lane LOS | A | | | C | | |
| Approach Delay (s) | 2.8 | | 0.0 | 22.7 | | |
| Approach LOS | | | | C | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.2 | | | |
| Intersection Capacity Utilization | | | 59.6% | ICU Level of Service | | B |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 1 | 86 | 131 | 2 | 627 | 0 | 128 | 2 | 1 | 0 | 1 | 0 |
| Future Volume (Veh/h) | 1 | 86 | 131 | 2 | 627 | 0 | 128 | 2 | 1 | 0 | 1 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1 | 86 | 131 | 2 | 627 | 0 | 128 | 2 | 1 | 0 | 1 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 627 | | | 217 | | | 785 | 784 | 152 | 786 | 850 | 627 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 627 | | | 217 | | | 785 | 784 | 152 | 786 | 850 | 627 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 58 | 99 | 100 | 100 | 100 | 100 |
| cM capacity (veh/h) | 940 | | | 1335 | | | 305 | 320 | 887 | 304 | 294 | 478 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 218 | 629 | 131 | 1 | | | | | | | | |
| Volume Left | 1 | 2 | 128 | 0 | | | | | | | | |
| Volume Right | 131 | 0 | 1 | 0 | | | | | | | | |
| cSH | 940 | 1335 | 307 | 294 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.43 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 14.3 | 0.1 | | | | | | | | |
| Control Delay (s) | 0.1 | 0.0 | 25.2 | 17.3 | | | | | | | | |
| Lane LOS | A | A | D | C | | | | | | | | |
| Approach Delay (s) | 0.1 | 0.0 | 25.2 | 17.3 | | | | | | | | |
| Approach LOS | | | D | C | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 3.4 | | | | | | | | | |
| Intersection Capacity Utilization | | | 57.3% | ICU Level of Service | B | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |





| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 1 | 83 | 3 | 1 | 628 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Future Volume (Veh/h) | 1 | 83 | 3 | 1 | 628 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1 | 83 | 3 | 1 | 628 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 628 | | | 86 | | | 716 | 716 | 84 | 716 | 718 | 628 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 628 | | | 86 | | | 716 | 716 | 84 | 716 | 718 | 628 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 100 | 100 | 100 | 100 | 100 | 100 |
| cM capacity (veh/h) | 940 | | | 1492 | | | 341 | 351 | 966 | 341 | 351 | 477 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 87 | 629 | 1 | 0 | | | | | | | | |
| Volume Left | 1 | 1 | 1 | 0 | | | | | | | | |
| Volume Right | 3 | 0 | 0 | 0 | | | | | | | | |
| cSH | 940 | 1492 | 341 | 1700 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.1 | 0.0 | | | | | | | | |
| Control Delay (s) | 0.1 | 0.0 | 15.6 | 0.0 | | | | | | | | |
| Lane LOS | A | A | C | A | | | | | | | | |
| Approach Delay (s) | 0.1 | 0.0 | 15.6 | 0.0 | | | | | | | | |
| Approach LOS | | | C | A | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 0.1 | | | | | | | | | |
| Intersection Capacity Utilization | | | 45.5% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

























| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 25.7 |
| Intersection LOS | D |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 322 | 300 | 340 | 55 | 10 | 22 |
| Future Vol, veh/h | 322 | 300 | 340 | 55 | 10 | 22 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 4 | 1 | 1 | 15 | 1 | 20 |
| Mvmt Flow | 322 | 300 | 340 | 55 | 10 | 22 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|----------------------------|----|------|-----|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 32 | 17.1 | 9.8 |
| HCM LOS | D | C | A |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 52% | 31% |
| Vol Thru, % | 86% | 0% | 69% |
| Vol Right, % | 14% | 48% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 395 | 622 | 32 |
| LT Vol | 0 | 322 | 10 |
| Through Vol | 340 | 0 | 22 |
| RT Vol | 55 | 300 | 0 |
| Lane Flow Rate | 395 | 622 | 32 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.612 | 0.869 | 0.057 |
| Departure Headway (Hd) | 5.575 | 5.028 | 6.369 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 648 | 722 | 560 |
| Service Time | 3.615 | 3.064 | 4.432 |
| HCM Lane V/C Ratio | 0.61 | 0.861 | 0.057 |
| HCM Control Delay | 17.1 | 32 | 9.8 |
| HCM Lane LOS | C | D | A |
| HCM 95th-tile Q | 4.2 | 10.5 | 0.2 |

| Intersection | | | | | | | | | | | | |
|----------------------------|-------|---|-------|-------|---|------|------|---|------|------|---|------|
| Intersection Delay, s/veh | 45.8 | | | | | | | | | | | |
| Intersection LOS | E | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 35 | 16 | 20 | 48 | 347 | 118 | 189 | 304 | 6 | 5 | 139 | 153 |
| Future Vol, veh/h | 35 | 16 | 20 | 48 | 347 | 118 | 189 | 304 | 6 | 5 | 139 | 153 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 11 | 7 | 1 | 1 | 2 | 3 | 1 | 3 | 17 | 1 | 4 | 2 |
| Mvmt Flow | 35 | 16 | 20 | 48 | 347 | 118 | 189 | 304 | 6 | 5 | 139 | 153 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 13.3 | | | 56.4 | | | 55.2 | | | 19.5 | | |
| HCM LOS | B | | | F | | | F | | | C | | |
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | | | | | | | | |
| Vol Left, % | 38% | 49% | 9% | 2% | | | | | | | | |
| Vol Thru, % | 61% | 23% | 68% | 47% | | | | | | | | |
| Vol Right, % | 1% | 28% | 23% | 52% | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | | | | | | | | |
| Traffic Vol by Lane | 499 | 71 | 513 | 297 | | | | | | | | |
| LT Vol | 189 | 35 | 48 | 5 | | | | | | | | |
| Through Vol | 304 | 16 | 347 | 139 | | | | | | | | |
| RT Vol | 6 | 20 | 118 | 153 | | | | | | | | |
| Lane Flow Rate | 499 | 71 | 513 | 297 | | | | | | | | |
| Geometry Grp | 1 | 1 | 1 | 1 | | | | | | | | |
| Degree of Util (X) | 0.954 | 0.168 | 0.964 | 0.581 | | | | | | | | |
| Departure Headway (Hd) | 6.886 | 8.607 | 6.763 | 7.041 | | | | | | | | |
| Convergence, Y/N | Yes | Yes | Yes | Yes | | | | | | | | |
| Cap | 524 | 420 | 539 | 511 | | | | | | | | |
| Service Time | 4.956 | 6.607 | 4.763 | 5.123 | | | | | | | | |
| HCM Lane V/C Ratio | 0.952 | 0.169 | 0.952 | 0.581 | | | | | | | | |
| HCM Control Delay | 55.2 | 13.3 | 56.4 | 19.5 | | | | | | | | |
| HCM Lane LOS | F | B | F | C | | | | | | | | |
| HCM 95th-tile Q | 12.2 | 0.6 | 12.7 | 3.7 | | | | | | | | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 79 | 509 | 204 | 482 | 1289 | 67 | 279 | 465 | 592 | 57 | 269 | 141 |
| Future Volume (vph) | 79 | 509 | 204 | 482 | 1289 | 67 | 279 | 465 | 592 | 57 | 269 | 141 |
| Satd. Flow (prot) | 1374 | 3307 | 1332 | 3013 | 3435 | 1522 | 3094 | 3218 | 1332 | 3269 | 3189 | 1390 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1372 | 3307 | 1332 | 3013 | 3435 | 1490 | 3083 | 3218 | 1314 | 3264 | 3189 | 1365 |
| Satd. Flow (RTOR) | | | 204 | | | 134 | | | 528 | | | 180 |
| Lane Group Flow (vph) | 79 | 509 | 204 | 482 | 1289 | 67 | 279 | 465 | 592 | 57 | 269 | 141 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 24.4 | 45.0 | 45.0 | 45.0 | 65.6 | 65.6 | 23.0 | 40.0 | 40.0 | 20.0 | 37.0 | 37.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 13.5 | 51.3 | 51.3 | 29.4 | 67.1 | 67.1 | 15.3 | 35.3 | 35.3 | 8.0 | 25.3 | 25.3 |
| Actuated g/C Ratio | 0.09 | 0.34 | 0.34 | 0.20 | 0.45 | 0.45 | 0.10 | 0.24 | 0.24 | 0.05 | 0.17 | 0.17 |
| v/c Ratio | 0.64 | 0.45 | 0.35 | 0.82 | 0.84 | 0.09 | 0.89 | 0.61 | 0.83 | 0.33 | 0.50 | 0.37 |
| Control Delay | 87.8 | 42.2 | 6.9 | 69.1 | 44.1 | 0.2 | 94.5 | 55.3 | 18.3 | 72.9 | 59.0 | 5.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 87.8 | 42.2 | 6.9 | 69.1 | 44.1 | 0.2 | 94.5 | 55.3 | 18.3 | 72.9 | 59.0 | 5.3 |
| LOS | F | D | A | E | D | A | F | E | B | E | E | A |
| Approach Delay | | 37.6 | | | 49.1 | | | 47.1 | | | 44.5 | |
| Approach LOS | | D | | | D | | | D | | | D | |
| Queue Length 50th (m) | 21.2 | 59.7 | 0.0 | 65.9 | 172.3 | 0.0 | 39.5 | 59.5 | 14.0 | 7.9 | 34.4 | 0.0 |
| Queue Length 95th (m) | 37.0 | 81.7 | 18.5 | 79.4 | #224.9 | 0.0 | #62.6 | 78.1 | 70.1 | 14.6 | 47.6 | 7.5 |
| Internal Link Dist (m) | | 485.7 | | | 404.4 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 164 | 1130 | 589 | 775 | 1537 | 741 | 317 | 757 | 713 | 270 | 629 | 413 |
| 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 | 0.48 | 0.45 | 0.35 | 0.62 | 0.84 | 0.09 | 0.88 | 0.61 | 0.83 | 0.21 | 0.43 | 0.34 |

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 102 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 46.0

Intersection LOS: D

Intersection Capacity Utilization 84.2%

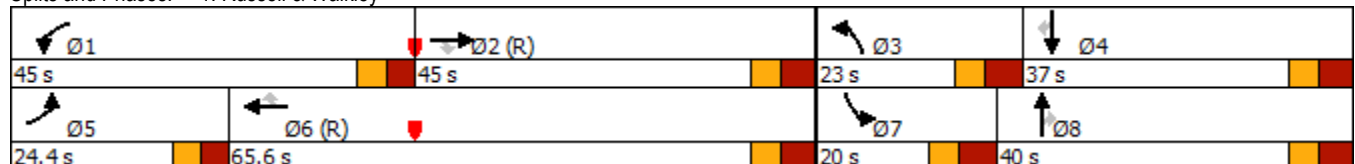
ICU Level of Service E























Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley



| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 10 | 0 | 8 | 49 | 10 | 506 | 17 | 933 | 44 | 229 | 572 | 34 |
| Future Volume (vph) | 10 | 0 | 8 | 49 | 10 | 506 | 17 | 933 | 44 | 229 | 572 | 34 |
| Satd. Flow (prot) | 1276 | 1278 | 0 | 1488 | 1790 | 1522 | 1701 | 3090 | 0 | 1488 | 2988 | 0 |
| Flt Permitted | 0.751 | | | 0.752 | | | 0.423 | | | 0.178 | | |
| Satd. Flow (perm) | 1008 | 1278 | 0 | 1178 | 1790 | 1522 | 754 | 3090 | 0 | 279 | 2988 | 0 |
| Satd. Flow (RTOR) | | 328 | | | | 352 | | 6 | | | 13 | |
| Lane Group Flow (vph) | 10 | 8 | 0 | 49 | 10 | 506 | 17 | 977 | 0 | 229 | 606 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 27.0 | 27.0 | | 27.0 | 27.0 | 27.0 | 42.0 | 42.0 | | 21.0 | 63.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.3 | 6.5 | |
| Act Effct Green (s) | 17.8 | 17.8 | | 17.8 | 17.8 | 17.8 | 42.1 | 42.1 | | 60.2 | 60.0 | |
| Actuated g/C Ratio | 0.20 | 0.20 | | 0.20 | 0.20 | 0.20 | 0.47 | 0.47 | | 0.67 | 0.67 | |
| v/c Ratio | 0.05 | 0.02 | | 0.21 | 0.03 | 0.87 | 0.05 | 0.67 | | 0.67 | 0.30 | |
| Control Delay | 27.4 | 0.0 | | 30.6 | 26.8 | 26.9 | 29.2 | 31.6 | | 18.8 | 7.2 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 27.4 | 0.0 | | 30.6 | 26.8 | 26.9 | 29.2 | 31.6 | | 18.8 | 7.2 | |
| LOS | C | A | | C | C | C | C | C | | B | A | |
| Approach Delay | | 15.2 | | | 27.3 | | | 31.6 | | | 10.4 | |
| Approach LOS | | B | | | C | | | C | | | B | |
| Queue Length 50th (m) | 1.2 | 0.0 | | 6.2 | 1.2 | 22.0 | 1.8 | 66.8 | | 14.4 | 20.8 | |
| Queue Length 95th (m) | 5.0 | 0.0 | | 14.8 | 4.9 | #70.9 | m5.0 | 107.4 | | 31.3 | 28.8 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 238 | 552 | | 278 | 423 | 628 | 352 | 1448 | | 384 | 1994 | |
| 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 | 0.04 | 0.01 | | 0.18 | 0.02 | 0.81 | 0.05 | 0.67 | | 0.60 | 0.30 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 23.1

Intersection LOS: C

Intersection Capacity Utilization 85.0%

ICU Level of Service E

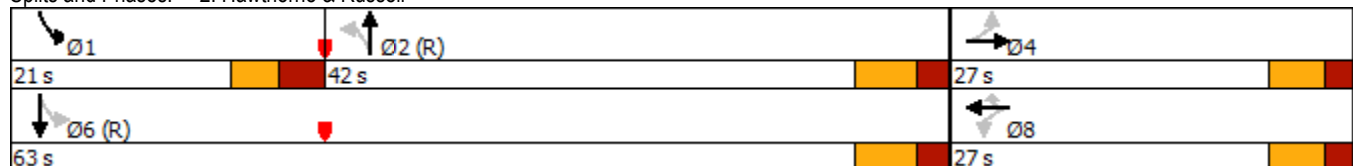
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.






















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

Splits and Phases: 2: Hawthorne & Russell



4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2028 Total Traffic AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 1001 | 86 | 52 | 364 | 200 |
| Future Volume (vph) | 134 | 28 | 60 | 58 | 63 | 55 | 208 | 1001 | 86 | 52 | 364 | 200 |
| Satd. Flow (prot) | 1553 | 1219 | 0 | 1276 | 1465 | 0 | 1669 | 3097 | 0 | 1429 | 2858 | 1453 |
| Flt Permitted | 0.681 | | | 0.700 | | | 0.480 | | | 0.223 | | |
| Satd. Flow (perm) | 1113 | 1219 | 0 | 935 | 1465 | 0 | 840 | 3097 | 0 | 335 | 2858 | 1414 |
| Satd. Flow (RTOR) | | 60 | | | 52 | | | 11 | | | | 200 |
| Lane Group Flow (vph) | 134 | 88 | 0 | 58 | 118 | 0 | 208 | 1087 | 0 | 52 | 364 | 200 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 40.0 | | 15.0 | 40.0 | 40.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 16.9 | 16.9 | | 16.9 | 16.9 | | 60.6 | 54.0 | | 53.0 | 46.4 | 46.4 |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.19 | 0.19 | | 0.67 | 0.60 | | 0.59 | 0.52 | 0.52 |
| v/c Ratio | 0.64 | 0.32 | | 0.33 | 0.37 | | 0.32 | 0.58 | | 0.19 | 0.25 | 0.24 |
| Control Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.4 | | 8.0 | 12.7 | 2.4 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.6 | 14.8 | | 34.5 | 20.5 | | 7.5 | 15.4 | | 8.0 | 12.7 | 2.4 |
| LOS | D | B | | C | C | | A | B | | A | B | A |
| Approach Delay | | 34.0 | | | 25.1 | | | 14.1 | | | 9.0 | |
| Approach LOS | | C | | | C | | | B | | | A | |
| Queue Length 50th (m) | 20.1 | 3.8 | | 8.2 | 9.1 | | 10.0 | 56.8 | | 2.1 | 14.3 | 0.0 |
| Queue Length 95th (m) | 33.0 | 13.4 | | 16.2 | 20.1 | | 23.8 | 99.5 | | 7.4 | 23.8 | 6.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 362 | 437 | | 304 | 512 | | 662 | 1863 | | 319 | 1474 | 826 |
| 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 | 0.37 | 0.20 | | 0.19 | 0.23 | | 0.31 | 0.58 | | 0.16 | 0.25 | 0.24 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.5

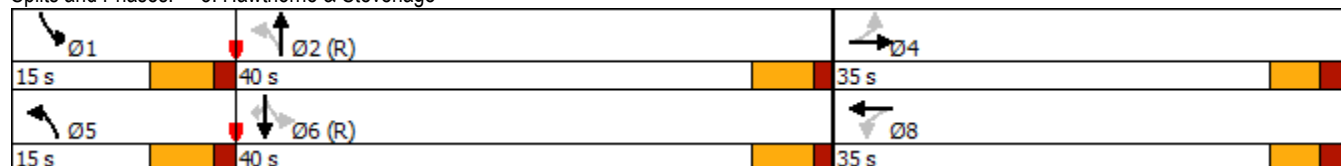
Intersection LOS: B

Intersection Capacity Utilization 65.0%

ICU Level of Service C























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage



4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2028 Total Traffic AM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 470 | 703 | 26 | 263 | 748 | 257 | 42 | 432 | 400 | 45 | 154 | 205 |
| Future Volume (vph) | 470 | 703 | 26 | 263 | 748 | 257 | 42 | 432 | 400 | 45 | 154 | 205 |
| Satd. Flow (prot) | 3179 | 3337 | 0 | 3094 | 3402 | 1440 | 1488 | 2974 | 0 | 1191 | 2748 | 1278 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.654 | | | 0.121 | | |
| Satd. Flow (perm) | 3179 | 3337 | 0 | 3094 | 3402 | 1440 | 1025 | 2974 | 0 | 152 | 2748 | 1278 |
| Satd. Flow (RTOR) | | 2 | | | | 257 | | 161 | | | | 205 |
| Lane Group Flow (vph) | 470 | 729 | 0 | 263 | 748 | 257 | 42 | 832 | 0 | 45 | 154 | 205 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 34.7 | 41.4 | | 34.7 | 41.4 | 41.4 | 21.3 | 43.0 | | 21.3 | 43.0 | 43.0 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 23.2 | 40.6 | | 16.1 | 33.5 | 33.5 | 41.4 | 35.1 | | 42.8 | 35.8 | 35.8 |
| Actuated g/C Ratio | 0.19 | 0.33 | | 0.13 | 0.27 | 0.27 | 0.34 | 0.28 | | 0.35 | 0.29 | 0.29 |
| v/c Ratio | 0.78 | 0.66 | | 0.65 | 0.81 | 0.44 | 0.11 | 0.86 | | 0.36 | 0.19 | 0.40 |
| Control Delay | 59.0 | 40.4 | | 60.7 | 51.4 | 7.3 | 26.1 | 45.4 | | 33.8 | 36.0 | 7.4 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 59.0 | 40.4 | | 60.7 | 51.4 | 7.3 | 26.1 | 45.4 | | 33.8 | 36.0 | 7.4 |
| LOS | E | D | | E | D | A | C | D | | C | D | A |
| Approach Delay | | 47.7 | | | 44.4 | | | 44.5 | | | 21.2 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Queue Length 50th (m) | 55.1 | 77.1 | | 30.9 | 87.1 | 0.0 | 6.1 | 81.6 | | 6.6 | 14.4 | 0.0 |
| Queue Length 95th (m) | 74.4 | 106.1 | | 44.8 | #122.2 | 19.9 | 13.7 | #123.5 | | 14.7 | 24.1 | 17.6 |
| Internal Link Dist (m) | | 420.4 | | | 459.3 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 749 | 1128 | | 729 | 991 | 602 | 440 | 1021 | | 187 | 856 | 539 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.63 | 0.65 | | 0.36 | 0.75 | 0.43 | 0.10 | 0.81 | | 0.24 | 0.18 | 0.38 |

Intersection Summary

Cycle Length: 140.4

Actuated Cycle Length: 123.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 43.0

Intersection LOS: D

Intersection Capacity Utilization 87.6%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.







Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|--|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 34.7 s | 41.4 s | 21.3 s | 43 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 34.7 s | 41.4 s | 21.3 s | 43 s |

4055 & 4120 Russell Road
10: Walkley & Hwy 417 SB Off-Ramp

2028 Total Traffic AM Peak Hour Mod

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | ↑↑ | ↑↑ | | ↓ | ↓ |
| Traffic Volume (vph) | 0 | 553 | 1041 | 0 | 24 | 1084 |
| Future Volume (vph) | 0 | 553 | 1041 | 0 | 24 | 1084 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 354 |
| Lane Group Flow (vph) | 0 | 553 | 1041 | 0 | 24 | 1084 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 91.0 | 91.0 | | 29.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 100.1 | 100.1 | | 7.3 | 120.0 |
| Actuated g/C Ratio | | 0.83 | 0.83 | | 0.06 | 1.00 |
| v/c Ratio | | 0.19 | 0.37 | | 0.24 | 0.71 |
| Control Delay | | 2.2 | 2.5 | | 58.5 | 2.9 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 2.2 | 2.5 | | 58.5 | 2.9 |
| LOS | | A | A | | E | A |
| Approach Delay | | 2.2 | 2.5 | | 4.1 | |
| Approach LOS | | A | A | | A | |
| Queue Length 50th (m) | | 9.3 | 20.7 | | 5.1 | 0.0 |
| Queue Length 95th (m) | | 14.2 | 21.0 | | 12.9 | 0.0 |
| Internal Link Dist (m) | | 667.8 | 354.1 | | 288.6 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 2838 | 2838 | | 321 | 1522 |
| 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 | | 0.19 | 0.37 | | 0.07 | 0.71 |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 3.1

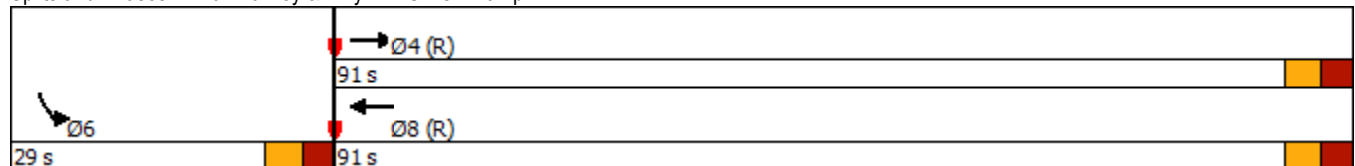
Intersection LOS: A

Intersection Capacity Utilization 76.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Walkley & Hwy 417 SB Off-Ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 172 | 0 | 0 | 973 | 578 | 60 |
| Future Volume (vph) | 172 | 0 | 0 | 973 | 578 | 60 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Flt Permitted | | | | | 0.957 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Satd. Flow (RTOR) | | | | | 6 | |
| Lane Group Flow (vph) | 172 | 0 | 0 | 973 | 638 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 53.0 | | | 53.0 | 67.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 46.7 | | | 46.7 | 60.7 | |
| Actuated g/C Ratio | 0.39 | | | 0.39 | 0.51 | |
| v/c Ratio | 0.13 | | | 0.74 | 0.74 | |
| Control Delay | 22.6 | | | 35.4 | 29.8 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 22.6 | | | 35.4 | 29.8 | |
| LOS | C | | | D | C | |
| Approach Delay | 22.6 | | | 35.4 | 29.8 | |
| Approach LOS | C | | | D | C | |
| Queue Length 50th (m) | 11.0 | | | 93.8 | 105.1 | |
| Queue Length 95th (m) | 16.8 | | | 116.5 | 148.4 | |
| Internal Link Dist (m) | 354.1 | | | 306.3 | 348.9 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1323 | | | 1323 | 858 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.13 | | | 0.74 | 0.74 | |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 32.2

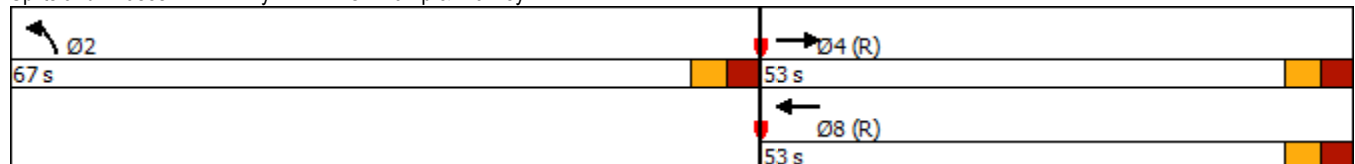
Intersection LOS: C

Intersection Capacity Utilization 76.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: Hwy 417 NB Off-Ramp & Walkley



Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|----------------------------|-----------------------------|
| 119124 | 2028 PHF Flow Profile (veh) |
| 2028 Total Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| AM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target Average Delay (sec/veh) | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|---|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB - Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2028 AM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 5 | 139 | 153 | 0 | 3.0 | 1.00 | 0.900 |
| 2 | EB - Russell | 0 | 35 | 16 | 20 | 0 | 3.0 | 1.00 | 0.900 |
| 3 | NB- Anderson | 0 | 189 | 304 | 6 | 0 | 3.0 | 1.00 | 0.900 |
| 4 | WB - Russell | 0 | 48 | 347 | 118 | 0 | 3.0 | 1.00 | 0.900 |

Operational Results

Geometry for Target Input

Geometry Options for 2028 AM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 AM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 AM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 AM Peak

| Leg 4 - WB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2028 AM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 297 | | 584 | | 457 | 646 | | 0.4601 | |
| 2 | EB - Russell | None | 71 | | 192 | | 689 | 848 | | 0.0837 | |
| 3 | NB- Anderson | None | 499 | | 56 | | 207 | 918 | | 0.5434 | |
| 4 | WB - Russell | None | 513 | | 528 | | 27 | 674 | | 0.7607 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 9.68 | | 9.68 | 2.72 | | A | | A |
| 2 | EB - Russell | None | 4.44 | | 4.44 | 0.26 | | A | | A |
| 3 | NB- Anderson | None | 7.94 | | 7.94 | 3.54 | | A | | A |
| 4 | WB - Russell | None | 20.01 | | 20.01 | 11.47 | | C | | C |

























2028 AM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 330 | | 641 | | 505 | 616 | | 0.5358 | |
| 2 | EB - Russell | None | 79 | | 212 | | 758 | 838 | | 0.0942 | |
| 3 | NB- Anderson | None | 554 | | 62 | | 228 | 915 | | 0.6058 | |
| 4 | WB - Russell | None | 570 | | 585 | | 30 | 645 | | 0.8841 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|-------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 10.46 | | 10.46 | 2.72 | | B | | B |
| 2 | EB - Russell | None | 4.37 | | 4.37 | 0.26 | | A | | A |
| 3 | NB- Anderson | None | 8.36 | | 8.36 | 3.54 | | A | | A |
| 4 | WB - Russell | None | 25.02 | | 25.02 | 11.47 | | D | | D |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 101 | 1424 | 330 | 564 | 714 | 84 | 200 | 321 | 608 | 110 | 501 | 114 |
| Future Volume (vph) | 101 | 1424 | 330 | 564 | 714 | 84 | 200 | 321 | 608 | 110 | 501 | 114 |
| Satd. Flow (prot) | 1609 | 3468 | 1390 | 3013 | 3468 | 1567 | 3179 | 3338 | 1427 | 3238 | 3247 | 1427 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 1604 | 3468 | 1368 | 3011 | 3468 | 1535 | 3156 | 3338 | 1402 | 3218 | 3247 | 1396 |
| Satd. Flow (RTOR) | | | 258 | | | 154 | | | 207 | | | 207 |
| Lane Group Flow (vph) | 101 | 1424 | 330 | 564 | 714 | 84 | 200 | 321 | 608 | 110 | 501 | 114 |
| Turn Type | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Permitted Phases | | | 2 | | | 6 | | | 8 | | | 4 |
| Total Split (s) | 12.0 | 58.0 | 58.0 | 20.0 | 66.0 | 66.0 | 17.0 | 35.0 | 35.0 | 17.0 | 35.0 | 35.0 |
| Total Lost Time (s) | 6.4 | 7.3 | 7.3 | 6.4 | 7.3 | 7.3 | 7.6 | 7.4 | 7.4 | 7.6 | 7.4 | 7.4 |
| Act Effct Green (s) | 5.6 | 50.7 | 50.7 | 13.6 | 58.7 | 58.7 | 9.4 | 28.2 | 28.2 | 8.8 | 27.6 | 27.6 |
| Actuated g/c Ratio | 0.04 | 0.39 | 0.39 | 0.10 | 0.45 | 0.45 | 0.07 | 0.22 | 0.22 | 0.07 | 0.21 | 0.21 |
| v/c Ratio | 1.46 | 1.05 | 0.48 | 1.79 | 0.46 | 0.11 | 0.87 | 0.44 | 1.30 | 0.50 | 0.73 | 0.25 |
| Control Delay | 313.7 | 78.4 | 9.3 | 401.2 | 25.8 | 0.3 | 93.6 | 46.5 | 179.4 | 66.7 | 54.7 | 1.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 313.7 | 78.4 | 9.3 | 401.2 | 25.8 | 0.3 | 93.6 | 46.5 | 179.4 | 66.7 | 54.7 | 1.3 |
| LOS | F | E | A | F | C | A | F | D | F | E | D | A |
| Approach Delay | | 78.9 | | | 179.7 | | | 126.4 | | | 48.1 | |
| Approach LOS | | E | | | F | | | F | | | D | |
| Queue Length 50th (m) | ~32.5 | ~192.8 | 10.9 | ~102.6 | 60.1 | 0.0 | 24.4 | 35.0 | ~145.0 | 13.0 | 58.4 | 0.0 |
| Queue Length 95th (m) | #65.9 | #232.1 | 33.3 | #135.3 | 75.3 | 0.0 | #44.2 | 48.4 | #210.3 | 22.0 | 76.5 | 0.0 |
| Internal Link Dist (m) | | 485.7 | | | 402.0 | | | 432.2 | | | 296.2 | |
| Turn Bay Length (m) | 85.0 | | 225.0 | 100.0 | | 45.0 | 140.0 | | 110.0 | 80.0 | | 55.0 |
| Base Capacity (vph) | 69 | 1352 | 690 | 315 | 1565 | 777 | 229 | 725 | 466 | 234 | 689 | 459 |
| 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 | 1.46 | 1.05 | 0.48 | 1.79 | 0.46 | 0.11 | 0.87 | 0.44 | 1.30 | 0.47 | 0.73 | 0.25 |

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 35 (27%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.79

Intersection Signal Delay: 112.1

Intersection LOS: F

Intersection Capacity Utilization 104.5%

ICU Level of Service G

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.























Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Russell & Walkley

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø1 | Ø2 (R) | Ø3 | Ø4 |
| 20 s | 58 s | 17 s | 35 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | Ø7 | Ø8 |
| 12 s | 66 s | 17 s | 35 s |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 35 | 7 | 21 | 32 | 3 | 207 | 7 | 749 | 58 | 429 | 910 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 32 | 3 | 207 | 7 | 749 | 58 | 429 | 910 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3234 | 0 | 1639 | 3269 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.294 | | | 0.341 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 381 | 3234 | 0 | 588 | 3269 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 207 | | 18 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 32 | 3 | 207 | 7 | 807 | 0 | 429 | 927 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 54.0 | 54.0 | | 54.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.5 | 6.5 | |
| Act Effct Green (s) | 12.0 | 12.0 | | 12.0 | 12.0 | 12.0 | 55.8 | 55.8 | | 55.8 | 55.8 | |
| Actuated g/C Ratio | 0.15 | 0.15 | | 0.15 | 0.15 | 0.15 | 0.70 | 0.70 | | 0.70 | 0.70 | |
| v/c Ratio | 0.18 | 0.12 | | 0.16 | 0.02 | 0.52 | 0.03 | 0.36 | | 1.05 | 0.41 | |
| Control Delay | 30.3 | 15.3 | | 29.6 | 26.3 | 9.3 | 5.6 | 5.8 | | 75.1 | 6.3 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 30.3 | 15.3 | | 29.6 | 26.3 | 9.3 | 5.6 | 5.8 | | 75.1 | 6.3 | |
| LOS | C | B | | C | C | A | A | A | | E | A | |
| Approach Delay | | 23.6 | | | 12.2 | | | 5.8 | | | 28.0 | |
| Approach LOS | | C | | | B | | | A | | | C | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 4.1 | 0.4 | 0.0 | 0.2 | 17.3 | | ~52.0 | 21.4 | |
| Queue Length 95th (m) | 10.2 | 6.1 | | 9.5 | 2.1 | 14.0 | 1.8 | 38.4 | | #74.9 | 46.5 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 532 | 265 | 2261 | | 409 | 2280 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.09 | 0.01 | 0.39 | 0.03 | 0.36 | | 1.05 | 0.41 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 16 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 19.1

Intersection LOS: B

Intersection Capacity Utilization 73.3%

ICU Level of Service D

Analysis Period (min) 15






















~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.






















Queue shown is maximum after two cycles.

Splits and Phases: 2: Hawthorne & Russell

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 54 s | | | | | | | | | | | | | | | | | | | | |
| 54 s | | | | | | | | | | | | | | | | | | | | |

4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2028 Total Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 435 | 59 | 45 | 1016 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 435 | 59 | 45 | 1016 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3081 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.193 | | | 0.471 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 268 | 3081 | 0 | 656 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 19 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 494 | 0 | 45 | 1016 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.33 | 0.29 | | 0.10 | 0.57 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 12.0 | 13.7 | | 9.0 | 19.3 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 12.0 | 13.7 | | 9.0 | 19.3 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 13.4 | | | 17.1 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 23.7 | | 2.6 | 62.7 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 39.6 | | 7.5 | 94.6 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 268 | 1732 | | 460 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.31 | 0.29 | | 0.10 | 0.57 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.6









Intersection LOS: B

Intersection Capacity Utilization 78.2%

ICU Level of Service D























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | | |
|---|---|---|--|
|  |  |  |  |
| Ø1 | Ø2 (R) | | Ø4 |
| 15 s | 45 s | | 35 s |
|  |  |  |  |
| Ø5 | Ø6 (R) | | Ø8 |
| 15 s | 45 s | | 35 s |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2028 Total Traffic PM Peak Hour

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 311 | 896 | 25 | 443 | 948 | 91 | 26 | 202 | 321 | 175 | 517 | 512 |
| Future Volume (vph) | 311 | 896 | 25 | 443 | 948 | 91 | 26 | 202 | 321 | 175 | 517 | 512 |
| Satd. Flow (prot) | 1595 | 3422 | 0 | 1654 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.397 | | | 0.134 | | |
| Satd. Flow (perm) | 1595 | 3422 | 0 | 1653 | 3468 | 1141 | 718 | 2807 | 0 | 227 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 240 | | | | 512 |
| Lane Group Flow (vph) | 311 | 921 | 0 | 443 | 948 | 91 | 26 | 523 | 0 | 175 | 517 | 512 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 29.3 | 41.2 | | 38.1 | 50.0 | 50.0 | 28.5 | 21.4 | | 42.1 | 33.9 | 33.9 |
| Actuated g/c Ratio | 0.21 | 0.29 | | 0.27 | 0.36 | 0.36 | 0.20 | 0.15 | | 0.30 | 0.24 | 0.24 |
| v/c Ratio | 0.94 | 0.92 | | 0.99 | 0.77 | 0.19 | 0.13 | 0.83 | | 0.84 | 0.66 | 0.68 |
| Control Delay | 90.9 | 62.9 | | 91.1 | 46.1 | 3.3 | 36.7 | 42.9 | | 70.8 | 54.0 | 8.9 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 90.9 | 62.9 | | 91.1 | 46.1 | 3.3 | 36.7 | 42.9 | | 70.8 | 54.0 | 8.9 |
| LOS | F | E | | F | D | A | D | D | | E | D | A |
| Approach Delay | | 70.0 | | | 56.9 | | | 42.6 | | | 37.3 | |
| Approach LOS | | E | | | E | | | D | | | D | |
| Queue Length 50th (m) | 81.3 | 123.6 | | ~122.6 | 117.6 | 0.0 | 4.8 | 38.8 | | 35.5 | 66.9 | 0.0 |
| Queue Length 95th (m) | #136.6 | #163.4 | | #188.0 | 144.9 | 6.0 | 11.5 | 58.6 | | #68.0 | 87.0 | 31.0 |
| Internal Link Dist (m) | | 420.4 | | | 461.0 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 341 | 1026 | | 448 | 1237 | 483 | 292 | 716 | | 215 | 783 | 755 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.91 | 0.90 | | 0.99 | 0.77 | 0.19 | 0.09 | 0.73 | | 0.81 | 0.66 | 0.68 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 140.6

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 53.5

Intersection LOS: D

Intersection Capacity Utilization 101.3%

ICU Level of Service G

Analysis Period (min) 15









~ Volume exceeds capacity, queue is theoretically infinite.











Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|--|--|--|--|
|  Ø3 |  Ø4 |  Ø1 |  Ø2 |
| 44.4 s | 48.4 s | 21.3 s | 32.3 s |
|  Ø7 |  Ø8 |  Ø5 |  Ø6 |
| 36.4 s | 56.4 s | 21.3 s | 32.3 s |

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (vph) | 49 | 1343 | 1556 | 123 | 87 | 36 |
| Future Volume (vph) | 49 | 1343 | 1556 | 123 | 87 | 36 |
| Satd. Flow (prot) | 1701 | 3402 | 3364 | 0 | 1660 | 0 |
| Flt Permitted | 0.105 | | | | 0.966 | |
| Satd. Flow (perm) | 188 | 3402 | 3364 | 0 | 1660 | 0 |
| Satd. Flow (RTOR) | | | 15 | | 13 | |
| Lane Group Flow (vph) | 49 | 1343 | 1679 | 0 | 123 | 0 |
| Turn Type | Perm | NA | NA | | Prot | |
| Protected Phases | | 2 | 6 | | 4 | |
| Permitted Phases | 2 | | | | | |
| Total Split (s) | 41.4 | 41.4 | 41.4 | | 31.8 | |
| Total Lost Time (s) | 6.4 | 6.4 | 6.4 | | 5.8 | |
| Act Effct Green (s) | 54.4 | 54.4 | 54.4 | | 10.2 | |
| Actuated g/C Ratio | 0.74 | 0.74 | 0.74 | | 0.14 | |
| v/c Ratio | 0.35 | 0.53 | 0.67 | | 0.51 | |
| Control Delay | 15.2 | 6.7 | 8.7 | | 32.5 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | |
| Total Delay | 15.2 | 6.7 | 8.7 | | 32.5 | |
| LOS | B | A | A | | C | |
| Approach Delay | | 7.0 | 8.7 | | 32.5 | |
| Approach LOS | | A | A | | C | |
| Queue Length 50th (m) | 2.1 | 37.3 | 55.7 | | 13.1 | |
| Queue Length 95th (m) | 12.6 | 63.8 | 96.8 | | 25.0 | |
| Internal Link Dist (m) | | 461.0 | 862.2 | | 131.3 | |
| Turn Bay Length (m) | 30.0 | | | | 30.0 | |
| Base Capacity (vph) | 139 | 2527 | 2503 | | 598 | |
| 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 | 0.35 | 0.53 | 0.67 | | 0.21 | |

Intersection Summary

Cycle Length: 73.2

Actuated Cycle Length: 73.2

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 8.9




Intersection LOS: A










Intersection Capacity Utilization 67.1%











ICU Level of Service C










Analysis Period (min) 15

Splits and Phases: 12: Hunt Club & Access

| | |
|---|---|
|  |  |
| Ø2 (R) | Ø4 |
| 41.4 s | 31.8 s |
|  | |
| Ø6 (R) | |
| 41.4 s | |







| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 427 | 29 | 10 | 256 | 27 | 126 |
| Future Volume (Veh/h) | 427 | 29 | 10 | 256 | 27 | 126 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 427 | 29 | 10 | 256 | 27 | 126 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 456 | | 718 | 442 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 456 | | 718 | 442 |
| tC, single (s) | | | 4.2 | | 6.6 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.3 | | 3.7 | 3.3 |
| p0 queue free % | | | 99 | | 93 | 79 |
| cM capacity (veh/h) | | | 1064 | | 367 | 614 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | | | |
| Volume Total | 456 | 266 | 153 | | | |
| Volume Left | 0 | 10 | 27 | | | |
| Volume Right | 29 | 0 | 126 | | | |
| cSH | 1700 | 1064 | 549 | | | |
| Volume to Capacity | 0.27 | 0.01 | 0.28 | | | |
| Queue Length 95th (m) | 0.0 | 0.2 | 7.9 | | | |
| Control Delay (s) | 0.0 | 0.4 | 14.1 | | | |
| Lane LOS | | A | B | | | |
| Approach Delay (s) | 0.0 | 0.4 | 14.1 | | | |
| Approach LOS | | | B | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.6 | | | |
| Intersection Capacity Utilization | | | 42.0% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 11 | 1516 | 0 | 1184 | 174 | 0 |
| Future Volume (Veh/h) | 11 | 1516 | 0 | 1184 | 174 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 11 | 1516 | 0 | 1184 | 174 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1358 | 174 | 174 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1358 | 174 | 174 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 93 | 0 | 100 | | | |
| cM capacity (veh/h) | 165 | 857 | 1415 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 11 | 1516 | 1184 | 174 | | |
| Volume Left | 11 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1516 | 0 | 0 | | |
| cSH | 165 | 857 | 1700 | 1700 | | |
| Volume to Capacity | 0.07 | 1.77 | 0.70 | 0.10 | | |
| Queue Length 95th (m) | 1.5 | 621.8 | 0.0 | 0.0 | | |
| Control Delay (s) | 28.4 | 365.0 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 362.6 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 191.9 | | | |
| Intersection Capacity Utilization | | | 115.4% | ICU Level of Service | | H |
| Analysis Period (min) | | | 15 | | | |






| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 129 | 336 | 57 | 114 | 322 | 40 |
| Future Volume (Veh/h) | 129 | 336 | 57 | 114 | 322 | 40 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 129 | 336 | 57 | 114 | 322 | 40 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 570 | 342 | 362 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 570 | 342 | 362 | | | |
| tC, single (s) | 6.5 | 6.3 | 4.2 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.4 | 2.3 | | | |
| p0 queue free % | 71 | 51 | 95 | | | |
| cM capacity (veh/h) | 452 | 689 | 1128 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 465 | 171 | 362 | | | |
| Volume Left | 129 | 57 | 0 | | | |
| Volume Right | 336 | 0 | 40 | | | |
| cSH | 602 | 1128 | 1700 | | | |
| Volume to Capacity | 0.77 | 0.05 | 0.21 | | | |
| Queue Length 95th (m) | 50.3 | 1.1 | 0.0 | | | |
| Control Delay (s) | 28.4 | 3.1 | 0.0 | | | |
| Lane LOS | D | A | | | | |
| Approach Delay (s) | 28.4 | 3.1 | 0.0 | | | |
| Approach LOS | D | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 13.7 | | | |
| Intersection Capacity Utilization | | | 69.5% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |

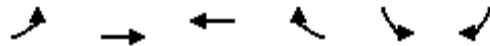






| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 1695 | 193 | 0 | 182 | 756 |
| Future Volume (Veh/h) | 0 | 1695 | 193 | 0 | 182 | 756 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 1695 | 193 | 0 | 182 | 756 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 193 | | | | 1040 | 96 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 193 | | | | 1040 | 96 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 18 | 19 |
| cM capacity (veh/h) | 1356 | | | | 221 | 931 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 848 | 848 | 96 | 96 | 182 | 756 |
| Volume Left | 0 | 0 | 0 | 0 | 182 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 756 |
| cSH | 1700 | 1700 | 1700 | 1700 | 221 | 931 |
| Volume to Capacity | 0.50 | 0.50 | 0.06 | 0.06 | 0.82 | 0.81 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 43.3 | 63.9 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 69.1 | 23.1 |
| Lane LOS | | | | | F | C |
| Approach Delay (s) | 0.0 | | 0.0 | | 32.0 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 10.6 | | | |
| Intersection Capacity Utilization | | | 66.8% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

















| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 849 | 0 | 0 | 92 | 163 | 25 |
| Future Volume (Veh/h) | 849 | 0 | 0 | 92 | 163 | 25 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 849 | 0 | 0 | 92 | 163 | 25 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 849 | | 895 | 424 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 849 | | 895 | 424 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 41 | 96 |
| cM capacity (veh/h) | | | 766 | | 275 | 570 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 424 | 424 | 46 | 46 | 188 | |
| Volume Left | 0 | 0 | 0 | 0 | 163 | |
| Volume Right | 0 | 0 | 0 | 0 | 25 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 295 | |
| Volume to Capacity | 0.25 | 0.25 | 0.03 | 0.03 | 0.64 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 28.3 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 36.4 | |
| Lane LOS | | | | | E | |
| Approach Delay (s) | 0.0 | | 0.0 | | 36.4 | |
| Approach LOS | | | | | E | |
| Intersection Summary | | | | | | |
| Average Delay | | | 6.1 | | | |
| Intersection Capacity Utilization | | | 66.8% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |



















| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|---|
| Lane Configurations |  |  |  | |  |  |
| Traffic Volume (veh/h) | 174 | 426 | 118 | 61 | 31 | 89 |
| Future Volume (Veh/h) | 174 | 426 | 118 | 61 | 31 | 89 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 174 | 426 | 118 | 61 | 31 | 89 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 179 | | | | 922 | 148 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 179 | | | | 922 | 148 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 87 | | | | 88 | 90 |
| cM capacity (veh/h) | 1379 | | | | 259 | 890 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | SB 2 | |
| Volume Total | 174 | 426 | 179 | 31 | 89 | |
| Volume Left | 174 | 0 | 0 | 31 | 0 | |
| Volume Right | 0 | 0 | 61 | 0 | 89 | |
| cSH | 1379 | 1700 | 1700 | 259 | 890 | |
| Volume to Capacity | 0.13 | 0.25 | 0.11 | 0.12 | 0.10 | |
| Queue Length 95th (m) | 3.0 | 0.0 | 0.0 | 2.8 | 2.3 | |
| Control Delay (s) | 8.0 | 0.0 | 0.0 | 20.8 | 9.5 | |
| Lane LOS | A | | | C | A | |
| Approach Delay (s) | 2.3 | | 0.0 | 12.4 | | |
| Approach LOS | | | | B | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.2 | | | |
| Intersection Capacity Utilization | | | 34.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |






| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|---|---|---|----------------------|---|------|
| Lane Configurations |  |  |  | |  | |
| Traffic Volume (veh/h) | 74 | 383 | 141 | 142 | 73 | 38 |
| Future Volume (Veh/h) | 74 | 383 | 141 | 142 | 73 | 38 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 74 | 383 | 141 | 142 | 73 | 38 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 283 | | | | 743 | 212 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 283 | | | | 743 | 212 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 94 | | | | 79 | 95 |
| cM capacity (veh/h) | 1262 | | | | 356 | 821 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | SB 1 | | |
| Volume Total | 74 | 383 | 283 | 111 | | |
| Volume Left | 74 | 0 | 0 | 73 | | |
| Volume Right | 0 | 0 | 142 | 38 | | |
| cSH | 1262 | 1700 | 1700 | 442 | | |
| Volume to Capacity | 0.06 | 0.23 | 0.17 | 0.25 | | |
| Queue Length 95th (m) | 1.3 | 0.0 | 0.0 | 6.9 | | |
| Control Delay (s) | 8.0 | 0.0 | 0.0 | 15.9 | | |
| Lane LOS | A | | | C | | |
| Approach Delay (s) | 1.3 | | 0.0 | 15.9 | | |
| Approach LOS | | | | C | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.8 | | | |
| Intersection Capacity Utilization | | | 38.1% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 0 | 467 | 86 | 1 | 95 | 0 | 171 | 1 | 2 | 0 | 2 | 1 |
| Future Volume (Veh/h) | 0 | 467 | 86 | 1 | 95 | 0 | 171 | 1 | 2 | 0 | 2 | 1 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 467 | 86 | 1 | 95 | 0 | 171 | 1 | 2 | 0 | 2 | 1 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | None | | | None | | | | | | | | |
| Median storage (veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 95 | | | 553 | | | 609 | 607 | 510 | 610 | 650 | 95 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 95 | | | 553 | | | 609 | 607 | 510 | 610 | 650 | 95 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 57 | 100 | 100 | 100 | 99 | 100 |
| cM capacity (veh/h) | 1480 | | | 1002 | | | 401 | 406 | 557 | 400 | 384 | 953 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 553 | 96 | 174 | 3 | | | | | | | | |
| Volume Left | 0 | 1 | 171 | 0 | | | | | | | | |
| Volume Right | 86 | 0 | 2 | 1 | | | | | | | | |
| cSH | 1480 | 1002 | 402 | 479 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.43 | 0.01 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 14.9 | 0.1 | | | | | | | | |
| Control Delay (s) | 0.0 | 0.1 | 20.6 | 12.6 | | | | | | | | |
| Lane LOS | | A | C | B | | | | | | | | |
| Approach Delay (s) | 0.0 | 0.1 | 20.6 | 12.6 | | | | | | | | |
| Approach LOS | | | C | B | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | 4.4 | | | | | | | | | | | |
| Intersection Capacity Utilization | 55.0% | | | ICU Level of Service | | | | | A | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |





| | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Volume (veh/h) | 0 | 468 | 1 | 1 | 92 | 0 | 3 | 0 | 1 | 0 | 0 | 1 |
| Future Volume (Veh/h) | 0 | 468 | 1 | 1 | 92 | 0 | 3 | 0 | 1 | 0 | 0 | 1 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 468 | 1 | 1 | 92 | 0 | 3 | 0 | 1 | 0 | 0 | 1 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 92 | | | 469 | | | 564 | 562 | 468 | 564 | 563 | 92 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 92 | | | 469 | | | 564 | 562 | 468 | 564 | 563 | 92 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 99 | 100 | 100 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1484 | | | 1077 | | | 431 | 431 | 589 | 431 | 431 | 957 |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 469 | 93 | 4 | 1 | | | | | | | | |
| Volume Left | 0 | 1 | 3 | 0 | | | | | | | | |
| Volume Right | 1 | 0 | 1 | 1 | | | | | | | | |
| cSH | 1484 | 1077 | 462 | 957 | | | | | | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.01 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.2 | 0.0 | | | | | | | | |
| Control Delay (s) | 0.0 | 0.1 | 12.9 | 8.8 | | | | | | | | |
| Lane LOS | | A | B | A | | | | | | | | |
| Approach Delay (s) | 0.0 | 0.1 | 12.9 | 8.8 | | | | | | | | |
| Approach LOS | | | B | A | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 0.1 | | | | | | | | | |
| Intersection Capacity Utilization | | | 36.1% | ICU Level of Service | | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |























| Intersection | |
|---------------------------|------|
| Intersection Delay, s/veh | 11.3 |
| Intersection LOS | B |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---------------------|---|------|---|------|------|---|
| Lane Configurations |  | |  | | |  |
| Traffic Vol, veh/h | 86 | 8 | 49 | 212 | 132 | 300 |
| Future Vol, veh/h | 86 | 8 | 49 | 212 | 132 | 300 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 10 | 1 | 7 | 4 | 2 | 2 |
| Mvmt Flow | 86 | 8 | 49 | 212 | 132 | 300 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|----------------------------|-----|-----|------|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 9.8 | 9.2 | 12.9 |
| HCM LOS | A | A | B |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|
| Vol Left, % | 0% | 91% | 31% |
| Vol Thru, % | 19% | 0% | 69% |
| Vol Right, % | 81% | 9% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 261 | 94 | 432 |
| LT Vol | 0 | 86 | 132 |
| Through Vol | 49 | 0 | 300 |
| RT Vol | 212 | 8 | 0 |
| Lane Flow Rate | 261 | 94 | 432 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.31 | 0.149 | 0.544 |
| Departure Headway (Hd) | 4.272 | 5.695 | 4.532 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 840 | 627 | 795 |
| Service Time | 2.31 | 3.759 | 2.567 |
| HCM Lane V/C Ratio | 0.311 | 0.15 | 0.543 |
| HCM Control Delay | 9.2 | 9.8 | 12.9 |
| HCM Lane LOS | A | A | B |
| HCM 95th-tile Q | 1.3 | 0.5 | 3.3 |

| Intersection | | | | | | | | | | | | |
|----------------------------|-------|---|-------|-------|---|------|------|---|------|------|---|------|
| Intersection Delay, s/veh | 13.8 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | |  | | |  | | |  | | |  | |
| Traffic Vol, veh/h | 77 | 224 | 27 | 12 | 24 | 10 | 30 | 170 | 46 | 61 | 262 | 38 |
| Future Vol, veh/h | 77 | 224 | 27 | 12 | 24 | 10 | 30 | 170 | 46 | 61 | 262 | 38 |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Heavy Vehicles, % | 2 | 1 | 1 | 1 | 14 | 1 | 1 | 1 | 7 | 2 | 3 | 4 |
| Mvmt Flow | 77 | 224 | 27 | 12 | 24 | 10 | 30 | 170 | 46 | 61 | 262 | 38 |
| Number of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Approach | EB | | | WB | | | NB | | | SB | | |
| Opposing Approach | WB | | | EB | | | SB | | | NB | | |
| Opposing Lanes | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Left | SB | | | NB | | | EB | | | WB | | |
| Conflicting Lanes Left | 1 | | | 1 | | | 1 | | | 1 | | |
| Conflicting Approach Right | NB | | | SB | | | WB | | | EB | | |
| Conflicting Lanes Right | 1 | | | 1 | | | 1 | | | 1 | | |
| HCM Control Delay | 14.6 | | | 9.8 | | | 11.9 | | | 14.8 | | |
| HCM LOS | B | | | A | | | B | | | B | | |
| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 | | | | | | | | |
| Vol Left, % | 12% | 23% | 26% | 17% | | | | | | | | |
| Vol Thru, % | 69% | 68% | 52% | 73% | | | | | | | | |
| Vol Right, % | 19% | 8% | 22% | 11% | | | | | | | | |
| Sign Control | Stop | Stop | Stop | Stop | | | | | | | | |
| Traffic Vol by Lane | 246 | 328 | 46 | 361 | | | | | | | | |
| LT Vol | 30 | 77 | 12 | 61 | | | | | | | | |
| Through Vol | 170 | 224 | 24 | 262 | | | | | | | | |
| RT Vol | 46 | 27 | 10 | 38 | | | | | | | | |
| Lane Flow Rate | 246 | 328 | 46 | 361 | | | | | | | | |
| Geometry Grp | 1 | 1 | 1 | 1 | | | | | | | | |
| Degree of Util (X) | 0.377 | 0.515 | 0.079 | 0.543 | | | | | | | | |
| Departure Headway (Hd) | 5.521 | 5.654 | 6.156 | 5.416 | | | | | | | | |
| Convergence, Y/N | Yes | Yes | Yes | Yes | | | | | | | | |
| Cap | 649 | 636 | 578 | 664 | | | | | | | | |
| Service Time | 3.578 | 3.707 | 4.236 | 3.467 | | | | | | | | |
| HCM Lane V/C Ratio | 0.379 | 0.516 | 0.08 | 0.544 | | | | | | | | |
| HCM Control Delay | 11.9 | 14.6 | 9.8 | 14.8 | | | | | | | | |
| HCM Lane LOS | B | B | A | B | | | | | | | | |
| HCM 95th-tile Q | 1.8 | 3 | 0.3 | 3.3 | | | | | | | | |

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  | |  |  |  |
| Traffic Volume (vph) | 35 | 7 | 21 | 32 | 3 | 207 | 7 | 749 | 58 | 429 | 910 | 17 |
| Future Volume (vph) | 35 | 7 | 21 | 32 | 3 | 207 | 7 | 749 | 58 | 429 | 910 | 17 |
| Satd. Flow (prot) | 1624 | 1466 | 0 | 1768 | 1139 | 1508 | 1232 | 3234 | 0 | 1639 | 3269 | 0 |
| Flt Permitted | 0.756 | | | 0.739 | | | 0.308 | | | 0.198 | | |
| Satd. Flow (perm) | 1291 | 1466 | 0 | 1376 | 1139 | 1488 | 399 | 3234 | 0 | 342 | 3269 | 0 |
| Satd. Flow (RTOR) | | 21 | | | | 207 | | 10 | | | 4 | |
| Lane Group Flow (vph) | 35 | 28 | 0 | 32 | 3 | 207 | 7 | 807 | 0 | 429 | 927 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Total Split (s) | 26.0 | 26.0 | | 26.0 | 26.0 | 26.0 | 29.0 | 29.0 | | 25.0 | 54.0 | |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | 5.7 | 6.5 | 6.5 | | 6.3 | 6.5 | |
| Act Effct Green (s) | 12.0 | 12.0 | | 12.0 | 12.0 | 12.0 | 29.5 | 29.5 | | 56.0 | 55.8 | |
| Actuated g/C Ratio | 0.15 | 0.15 | | 0.15 | 0.15 | 0.15 | 0.37 | 0.37 | | 0.70 | 0.70 | |
| v/c Ratio | 0.18 | 0.12 | | 0.16 | 0.02 | 0.52 | 0.05 | 0.67 | | 0.76 | 0.41 | |
| Control Delay | 30.3 | 15.3 | | 29.6 | 26.3 | 9.3 | 21.1 | 26.3 | | 21.6 | 6.3 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 30.3 | 15.3 | | 29.6 | 26.3 | 9.3 | 21.1 | 26.3 | | 21.6 | 6.3 | |
| LOS | C | B | | C | C | A | C | C | | C | A | |
| Approach Delay | | 23.6 | | | 12.2 | | | 26.3 | | | 11.1 | |
| Approach LOS | | C | | | B | | | C | | | B | |
| Queue Length 50th (m) | 4.5 | 0.9 | | 4.1 | 0.4 | 0.0 | 0.6 | 49.1 | | 26.2 | 21.4 | |
| Queue Length 95th (m) | 10.2 | 6.1 | | 9.5 | 2.1 | 14.0 | 3.5 | #85.3 | | #80.5 | 46.5 | |
| Internal Link Dist (m) | | 63.3 | | | 159.0 | | | 795.0 | | | 432.2 | |
| Turn Bay Length (m) | 20.0 | | | 40.0 | | 100.0 | 40.0 | | | 60.0 | | |
| Base Capacity (vph) | 327 | 387 | | 349 | 289 | 532 | 147 | 1200 | | 579 | 2280 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.11 | 0.07 | | 0.09 | 0.01 | 0.39 | 0.05 | 0.67 | | 0.74 | 0.41 | |

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 16.5

Intersection LOS: B

Intersection Capacity Utilization 73.1%

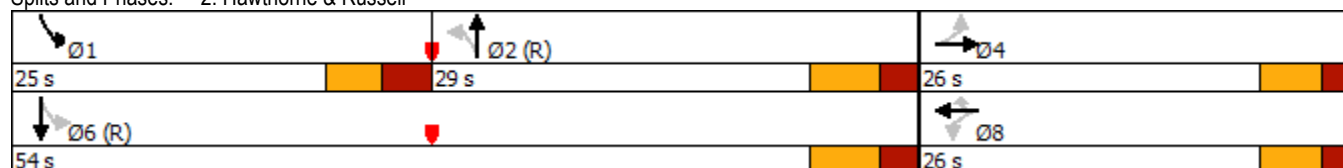
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.






















Queue shown is maximum after two cycles.

Splits and Phases: 2: Hawthorne & Russell



4055 & 4120 Russell Road
3: Hawthorne & Stevenage

2028 Total Traffic PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  | |  |  | |  |  |  |
| Traffic Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 424 | 59 | 45 | 990 | 144 |
| Future Volume (vph) | 201 | 39 | 221 | 100 | 29 | 81 | 82 | 424 | 59 | 45 | 990 | 144 |
| Satd. Flow (prot) | 1669 | 1490 | 0 | 1567 | 1426 | 0 | 1323 | 3081 | 0 | 1323 | 3402 | 1390 |
| Flt Permitted | 0.686 | | | 0.426 | | | 0.203 | | | 0.476 | | |
| Satd. Flow (perm) | 1202 | 1490 | 0 | 703 | 1426 | 0 | 282 | 3081 | 0 | 663 | 3402 | 1352 |
| Satd. Flow (RTOR) | | 221 | | | 81 | | | 20 | | | | 144 |
| Lane Group Flow (vph) | 201 | 260 | 0 | 100 | 110 | 0 | 82 | 483 | 0 | 45 | 990 | 144 |
| Turn Type | Perm | NA | | Perm | NA | | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | 6 |
| Total Split (s) | 35.0 | 35.0 | | 35.0 | 35.0 | | 15.0 | 45.0 | | 15.0 | 45.0 | 45.0 |
| Total Lost Time (s) | 5.7 | 5.7 | | 5.7 | 5.7 | | 5.7 | 5.5 | | 5.7 | 5.5 | 5.5 |
| Act Effct Green (s) | 22.6 | 22.6 | | 22.6 | 22.6 | | 58.2 | 53.2 | | 55.7 | 50.1 | 50.1 |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.61 | 0.56 | | 0.59 | 0.53 | 0.53 |
| v/c Ratio | 0.71 | 0.50 | | 0.60 | 0.27 | | 0.32 | 0.28 | | 0.10 | 0.55 | 0.18 |
| Control Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.7 | 13.6 | | 9.0 | 19.0 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.6 | 9.3 | | 45.8 | 11.0 | | 11.7 | 13.6 | | 9.0 | 19.0 | 3.7 |
| LOS | D | A | | D | B | | B | B | | A | B | A |
| Approach Delay | | 25.1 | | | 27.6 | | | 13.3 | | | 16.8 | |
| Approach LOS | | C | | | C | | | B | | | B | |
| Queue Length 50th (m) | 30.7 | 5.1 | | 14.8 | 3.8 | | 4.9 | 23.0 | | 2.6 | 60.5 | 0.0 |
| Queue Length 95th (m) | 48.7 | 21.5 | | 28.3 | 14.2 | | 12.0 | 38.6 | | 7.5 | 91.3 | 9.8 |
| Internal Link Dist (m) | | 201.3 | | | 257.1 | | | 958.8 | | | 795.0 | |
| Turn Bay Length (m) | 45.0 | | | 25.0 | | | 75.0 | | | 85.0 | | 85.0 |
| Base Capacity (vph) | 370 | 612 | | 216 | 495 | | 275 | 1733 | | 464 | 1792 | 780 |
| 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 | 0.54 | 0.42 | | 0.46 | 0.22 | | 0.30 | 0.28 | | 0.10 | 0.55 | 0.18 |

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 18.5







Intersection LOS: B

Intersection Capacity Utilization 77.4%

ICU Level of Service D
























Analysis Period (min) 15

Splits and Phases: 3: Hawthorne & Stevenage

| | | |
|---|---|---|
|  |  |  |
| Ø1 | Ø2 (R) | Ø4 |
| 15 s | 45 s | 35 s |
|  |  |  |
| Ø5 | Ø6 (R) | Ø8 |
| 15 s | 45 s | 35 s |

4055 & 4120 Russell Road
4: Hawthorne & Hunt Club

2028 Total Traffic PM Peak Hour Mod

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  | |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 311 | 896 | 25 | 443 | 948 | 91 | 26 | 202 | 321 | 175 | 517 | 512 |
| Future Volume (vph) | 311 | 896 | 25 | 443 | 948 | 91 | 26 | 202 | 321 | 175 | 517 | 512 |
| Satd. Flow (prot) | 3094 | 3422 | 0 | 3208 | 3468 | 1141 | 1717 | 2807 | 0 | 1609 | 3247 | 1522 |
| Flt Permitted | 0.950 | | | 0.950 | | | 0.448 | | | 0.171 | | |
| Satd. Flow (perm) | 3094 | 3422 | 0 | 3206 | 3468 | 1141 | 810 | 2807 | 0 | 289 | 3247 | 1522 |
| Satd. Flow (RTOR) | | 2 | | | | 119 | | 240 | | | | 512 |
| Lane Group Flow (vph) | 311 | 921 | 0 | 443 | 948 | 91 | 26 | 523 | 0 | 175 | 517 | 512 |
| Turn Type | Prot | NA | | Prot | NA | Perm | pm+pt | NA | | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 8 | 2 | | | 6 | | 6 |
| Total Split (s) | 36.4 | 48.4 | | 44.4 | 56.4 | 56.4 | 21.3 | 32.3 | | 21.3 | 32.3 | 32.3 |
| Total Lost Time (s) | 6.4 | 6.4 | | 6.4 | 6.4 | 6.4 | 6.3 | 6.3 | | 6.3 | 6.3 | 6.3 |
| Act Effct Green (s) | 18.1 | 41.1 | | 22.8 | 45.8 | 45.8 | 27.3 | 20.4 | | 40.7 | 33.1 | 33.1 |
| Actuated g/c Ratio | 0.15 | 0.33 | | 0.18 | 0.37 | 0.37 | 0.22 | 0.16 | | 0.33 | 0.27 | 0.27 |
| v/c Ratio | 0.69 | 0.81 | | 0.75 | 0.74 | 0.18 | 0.11 | 0.79 | | 0.72 | 0.60 | 0.66 |
| Control Delay | 60.4 | 45.9 | | 57.8 | 39.3 | 3.2 | 32.3 | 36.7 | | 50.7 | 45.7 | 8.1 |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 60.4 | 45.9 | | 57.8 | 39.3 | 3.2 | 32.3 | 36.7 | | 50.7 | 45.7 | 8.1 |
| LOS | E | D | | E | D | A | C | D | | D | D | A |
| Approach Delay | | 49.5 | | | 42.6 | | | 36.4 | | | 30.4 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Queue Length 50th (m) | 36.4 | 103.1 | | 51.7 | 100.4 | 0.0 | 4.1 | 34.3 | | 30.6 | 58.6 | 0.0 |
| Queue Length 95th (m) | 52.5 | 141.7 | | 70.4 | 136.7 | 5.8 | 10.8 | 56.0 | | #55.3 | 82.7 | 30.0 |
| Internal Link Dist (m) | | 420.4 | | | 461.0 | | | 595.0 | | | 958.8 | |
| Turn Bay Length (m) | 90.0 | | | 50.0 | | 80.0 | 50.0 | | | 80.0 | | 80.0 |
| Base Capacity (vph) | 763 | 1213 | | 1002 | 1425 | 538 | 344 | 788 | | 257 | 865 | 781 |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.41 | 0.76 | | 0.44 | 0.67 | 0.17 | 0.08 | 0.66 | | 0.68 | 0.60 | 0.66 |

Intersection Summary

Cycle Length: 146.4

Actuated Cycle Length: 124.1

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 40.5

Intersection LOS: D

Intersection Capacity Utilization 88.8%









ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.











Queue shown is maximum after two cycles.

Splits and Phases: 4: Hawthorne & Hunt Club

| | | | |
|---|---|---|---|
|  |  |  |  |
| Ø3 | Ø4 | Ø1 | Ø2 |
| 44.4 s | 48.4 s | 21.3 s | 32.3 s |
|  |  |  |  |
| Ø7 | Ø8 | Ø5 | Ø6 |
| 36.4 s | 56.4 s | 21.3 s | 32.3 s |

4055 & 4120 Russell Road
10: Walkley & Hwy 417 SB Off-Ramp

2028 Total Traffic PM Peak Hour Mod

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | |  |  | |  |  |
| Traffic Volume (vph) | 0 | 1695 | 193 | 0 | 182 | 756 |
| Future Volume (vph) | 0 | 1695 | 193 | 0 | 182 | 756 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 756 |
| Lane Group Flow (vph) | 0 | 1695 | 193 | 0 | 182 | 756 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 65.0 | 65.0 | | 25.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 58.7 | 58.7 | | 18.7 | 90.0 |
| Actuated g/C Ratio | | 0.65 | 0.65 | | 0.21 | 1.00 |
| v/c Ratio | | 0.76 | 0.09 | | 0.52 | 0.50 |
| Control Delay | | 13.8 | 6.1 | | 37.6 | 1.2 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 13.8 | 6.1 | | 37.6 | 1.2 |
| LOS | | B | A | | D | A |
| Approach Delay | | 13.8 | 6.1 | | 8.2 | |
| Approach LOS | | B | A | | A | |
| Queue Length 50th (m) | | 87.5 | 3.7 | | 25.9 | 0.0 |
| Queue Length 95th (m) | | 113.1 | 11.3 | | 44.4 | 0.0 |
| Internal Link Dist (m) | | 664.4 | 343.7 | | 255.5 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 2218 | 2218 | | 353 | 1522 |
| 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 | | 0.76 | 0.09 | | 0.52 | 0.50 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 33.8 (38%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 11.4

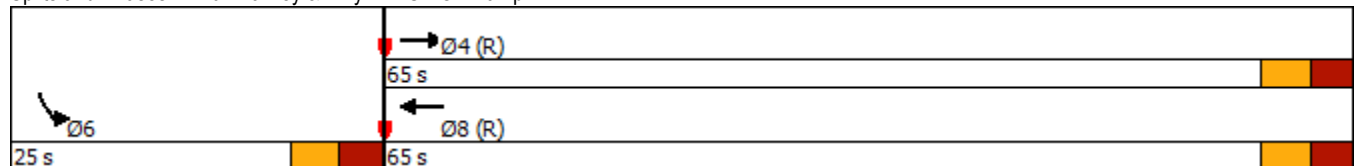
Intersection LOS: B

Intersection Capacity Utilization 70.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Walkley & Hwy 417 SB Off-Ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 849 | 0 | 0 | 92 | 163 | 25 |
| Future Volume (vph) | 849 | 0 | 0 | 92 | 163 | 25 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Flt Permitted | | | | | 0.958 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Satd. Flow (RTOR) | | | | | 9 | |
| Lane Group Flow (vph) | 849 | 0 | 0 | 92 | 188 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 56.0 | | | 56.0 | 34.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 62.5 | | | 62.5 | 14.9 | |
| Actuated g/C Ratio | 0.69 | | | 0.69 | 0.17 | |
| v/c Ratio | 0.36 | | | 0.04 | 0.66 | |
| Control Delay | 6.3 | | | 5.2 | 43.8 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 6.3 | | | 5.2 | 43.8 | |
| LOS | A | | | A | D | |
| Approach Delay | 6.3 | | | 5.2 | 43.8 | |
| Approach LOS | A | | | A | D | |
| Queue Length 50th (m) | 32.1 | | | 2.1 | 27.0 | |
| Queue Length 95th (m) | 51.3 | | | 5.1 | 43.0 | |
| Internal Link Dist (m) | 343.7 | | | 277.3 | 355.2 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 2361 | | | 2361 | 524 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.36 | | | 0.04 | 0.36 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 12.4

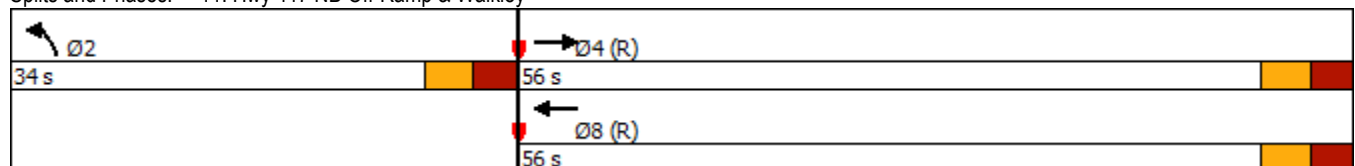
Intersection LOS: B

Intersection Capacity Utilization 70.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: Hwy 417 NB Off-Ramp & Walkley



Scheme Summary

Control Data

Control Data and Model Parameters

| | |
|----------------------------|-----------------------------|
| 119124 | 2028 PHF Flow Profile (veh) |
| 2028 Total Traffic Volumes | 7.5 min Time Slice |
| Rodel-Win1 | Queuing Delays (sec) |
| Right Hand Drive | Daylight conditions |
| PM Peak Hour | Peak 60/15 min Results |
| AVERAGE DELAY to Geometry | Output flows: Vehicles |
| Metric Units (m) | 85% Confidence Level |

Available Data

| | |
|--|-----|
| Entry Capacity Calibrated | No |
| Entry Capacity Modified | No |
| Crosswalks | No |
| Flows Factored | No |
| Approach/Exit Road Capacity Calibrated | No |
| Accidents | No |
| Accident Costs | No |
| Bypass Model | No |
| Bypass Calibration | No |
| Global Results | Yes |

Operational Data

Main Geometry (m)

Geometry and Design Target

| Leg | Leg Names | Approach Geometry (m) | | | | Target Average Delay (sec/veh) | Circulating and Exit Geom | | |
|-----|---------------|-----------------------|----------------|-----------------|------------|---|----------------------------|------------------|------------|
| | | Bearing (deg) | Grade Sep G | Half Width V | Lanes n | | Inscribed Diameter D | Half Width Vx | Lanes n |
| 1 | SB - Anderson | 0 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 2 | EB - Russell | 90 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 3 | NB- Anderson | 180 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |
| 4 | WB - Russell | 270 | 0 | 4.00 | 1 | 30 | 45.00 | 4.00 | 1 |

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity | | Entry Calibration | | Approach Road | | | Exit Road | | |
|-----|---------------|--------------------|-----------------|---------------------|-----------------|---------------|---------------------|-------------------|-----------|---------------------|-------------------|
| | | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | V (m) | Default Capacity | Calib Capacity | V (m) | Default Capacity | Calib Capacity |
| 1 | SB - Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 2 | EB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 3 | NB- Anderson | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |
| 4 | WB - Russell | 0 | 1.000 | 0 | 1.000 | 6.00 | 1960 | 0 | 4.00 | 1960 | 0 |

Traffic Flow Data (veh/hr)

2028 PM Peak Peak Hour Flows

| Leg | Leg Names | Turning Flows | | | | | Flow Modifiers | | |
|-----|---------------|---------------|--------|--------|--------|--------|----------------|-------------|------------------|
| | | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks % | Flow Factor | Peak Hour Factor |
| 1 | SB - Anderson | 0 | 61 | 262 | 38 | 0 | 3.0 | 1.00 | 1.000 |
| 2 | EB - Russell | 0 | 77 | 244 | 27 | 0 | 3.0 | 1.00 | 1.000 |
| 3 | NB- Anderson | 0 | 30 | 170 | 46 | 0 | 3.0 | 1.00 | 1.000 |
| 4 | WB - Russell | 0 | 12 | 24 | 10 | 0 | 3.0 | 1.00 | 1.000 |

Operational Results

Geometry for Target Input

Geometry Options for 2028 PM Peak

| Leg 1 - SB - Anderson | | | | | |
|-----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 PM Peak

| Leg 2 - EB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 PM Peak

| Leg 3 - NB- Anderson | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

Geometry Options for 2028 PM Peak

| Leg 4 - WB - Russell | | | | | |
|----------------------|----|----|----|----------|-----------|
| nv | ne | nc | nx | E (m) | L' (m) |
| 1 | 1 | 1 | 1 | 4.00 | 0.00 |

2028 PM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 66 | | 257 | | 913 | 0.3953 |
| 2 | EB - Russell | None | 348 | | 335 | | 92 | | 774 | 0.4495 |
| 3 | NB- Anderson | None | 246 | | 382 | | 301 | | 750 | 0.3281 |
| 4 | WB - Russell | None | 46 | | 277 | | 351 | | 804 | 0.0572 |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.18 | | 6.18 | 1.61 | | A | | A |
| 2 | EB - Russell | None | 7.96 | | 7.96 | 2.00 | | A | | A |
| 3 | NB- Anderson | None | 6.81 | | 6.81 | 1.22 | | A | | A |
| 4 | WB - Russell | None | 4.59 | | 4.59 | 0.16 | | A | | A |

2028 PM Peak - 15 minutes

Flows and Capacity











| Leg | Leg Names | Bypass Type | Flows (veh/hr) | | | | | Capacity (veh/hr) | | | |
|-----|---------------|-------------|----------------|--------|---------------|--------|-----------|-------------------|--------|-------------|--------|
| | | | Arrival Flow | | Opposing Flow | | Exit Flow | Capacity | | Average VCR | |
| | | | Entry | Bypass | Entry | Bypass | | Entry | Bypass | Entry | Bypass |
| 1 | SB - Anderson | None | 361 | | 66 | | 257 | 913 | | 0.3953 | |
| 2 | EB - Russell | None | 348 | | 335 | | 92 | 774 | | 0.4495 | |
| 3 | NB- Anderson | None | 246 | | 382 | | 301 | 750 | | 0.3281 | |
| 4 | WB - Russell | None | 46 | | 277 | | 351 | 804 | | 0.0572 | |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) | | | 95% Queue (veh) | | Level of Service | | |
|-----|---------------|-------------|---------------------|--------|------|-----------------|--------|------------------|--------|-----|
| | | | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | SB - Anderson | None | 6.20 | | 6.20 | 1.61 | | A | | A |
| 2 | EB - Russell | None | 7.98 | | 7.98 | 2.00 | | A | | A |
| 3 | NB- Anderson | None | 6.82 | | 6.82 | 1.22 | | A | | A |
| 4 | WB - Russell | None | 4.60 | | 4.60 | 0.16 | | A | | A |

4055 & 4120 Russell Road
6: Hunt Club & Hwy 417 Offramp

2033 Future Background AM Peak Hour

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 2 | 907 | 0 | 931 | 710 | 0 |
| Future Volume (Veh/h) | 2 | 907 | 0 | 931 | 710 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 907 | 0 | 931 | 710 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1641 | 710 | 710 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1641 | 710 | 710 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 98 | 0 | 100 | | | |
| cM capacity (veh/h) | 111 | 422 | 899 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 2 | 907 | 931 | 710 | | |
| Volume Left | 2 | 0 | 0 | 0 | | |
| Volume Right | 0 | 907 | 0 | 0 | | |
| cSH | 111 | 422 | 1700 | 1700 | | |
| Volume to Capacity | 0.02 | 2.15 | 0.55 | 0.42 | | |
| Queue Length 95th (m) | 0.4 | 460.6 | 0.0 | 0.0 | | |
| Control Delay (s) | 38.1 | 546.3 | 0.0 | 0.0 | | |
| Lane LOS | E | F | | | | |
| Approach Delay (s) | 545.2 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 194.3 | | | |
| Intersection Capacity Utilization | | | 105.4% | ICU Level of Service | G | |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
10: Walkley & SB off-ramp







2033 Future Background AM Peak Hour



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|--------|------|----------------------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 507 | 1088 | 0 | 25 | 1055 |
| Future Volume (Veh/h) | 0 | 507 | 1088 | 0 | 25 | 1055 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 507 | 1088 | 0 | 25 | 1055 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1088 | | | | 1342 | 544 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1088 | | | | 1342 | 544 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 82 | 0 |
| cM capacity (veh/h) | 620 | | | | 140 | 476 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 254 | 254 | 544 | 544 | 25 | 1055 |
| Volume Left | 0 | 0 | 0 | 0 | 25 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 1055 |
| cSH | 1700 | 1700 | 1700 | 1700 | 140 | 476 |
| Volume to Capacity | 0.15 | 0.15 | 0.32 | 0.32 | 0.18 | 2.22 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 4.4 | 542.8 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 36.3 | 574.4 |
| Lane LOS | | | | | E | F |
| Approach Delay (s) | 0.0 | | 0.0 | | 561.9 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 226.9 | | | |
| Intersection Capacity Utilization | | | 107.4% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
11: NB Off-ramp & Walkley

2033 Future Background AM Peak Hour

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Future Volume (Veh/h) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 179 | | 687 | 90 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 179 | | 687 | 90 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 0 | 93 |
| cM capacity (veh/h) | | | 1372 | | 374 | 941 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 90 | 90 | 508 | 508 | 667 | |
| Volume Left | 0 | 0 | 0 | 0 | 604 | |
| Volume Right | 0 | 0 | 0 | 0 | 63 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 397 | |
| Volume to Capacity | 0.05 | 0.05 | 0.30 | 0.30 | 1.68 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 280.2 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 341.6 | |
| Lane LOS | | | | | F | |
| Approach Delay (s) | 0.0 | | 0.0 | | 341.6 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 122.4 | | | |
| Intersection Capacity Utilization | | | 107.4% | | ICU Level of Service | G |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
10: Walkley & SB off-ramp

2033 Future Background AM Peak Hour Mod



| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (vph) | 0 | 507 | 1088 | 0 | 25 | 1055 |
| Future Volume (vph) | 0 | 507 | 1088 | 0 | 25 | 1055 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 320 |
| Lane Group Flow (vph) | 0 | 507 | 1088 | 0 | 25 | 1055 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 95.0 | 95.0 | | 25.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 107.5 | 107.5 | | 7.3 | 120.0 |
| Actuated g/C Ratio | | 0.90 | 0.90 | | 0.06 | 1.00 |
| v/c Ratio | | 0.17 | 0.36 | | 0.24 | 0.69 |
| Control Delay | | 1.7 | 3.8 | | 58.7 | 2.6 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 1.7 | 3.8 | | 58.7 | 2.6 |
| LOS | | A | A | | E | A |
| Approach Delay | | 1.7 | 3.8 | | 3.9 | |
| Approach LOS | | A | A | | A | |
| Queue Length 50th (m) | | 8.4 | 36.8 | | 5.3 | 0.0 |
| Queue Length 95th (m) | | 13.0 | 54.0 | | 13.3 | 0.0 |
| Internal Link Dist (m) | | 708.0 | 344.3 | | 267.0 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 3046 | 3046 | | 265 | 1522 |
| 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 | 0.36 | | 0.09 | 0.69 |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 3.5

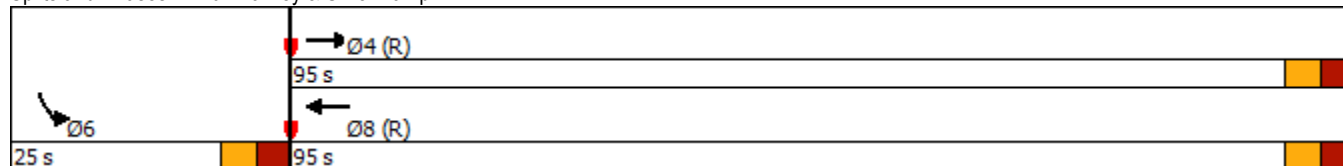
Intersection LOS: A

Intersection Capacity Utilization 79.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Walkley & SB off-ramp



4055 & 4120 Russell Road
11: NB Off-ramp & Walkley

2033 Future Background AM Peak Hour Mod

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Future Volume (vph) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Flt Permitted | | | | | 0.957 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Satd. Flow (RTOR) | | | | | 6 | |
| Lane Group Flow (vph) | 179 | 0 | 0 | 1016 | 667 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 53.0 | | | 53.0 | 67.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 46.7 | | | 46.7 | 60.7 | |
| Actuated g/C Ratio | 0.39 | | | 0.39 | 0.51 | |
| v/c Ratio | 0.14 | | | 0.77 | 0.78 | |
| Control Delay | 23.3 | | | 36.7 | 31.7 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 23.3 | | | 36.7 | 31.7 | |
| LOS | C | | | D | C | |
| Approach Delay | 23.3 | | | 36.7 | 31.7 | |
| Approach LOS | C | | | D | C | |
| Queue Length 50th (m) | 13.4 | | | 99.8 | 113.0 | |
| Queue Length 95th (m) | 20.8 | | | 123.3 | 160.0 | |
| Internal Link Dist (m) | 344.3 | | | 347.3 | 355.2 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1323 | | | 1323 | 858 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.14 | | | 0.77 | 0.78 | |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 69 (58%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 33.6

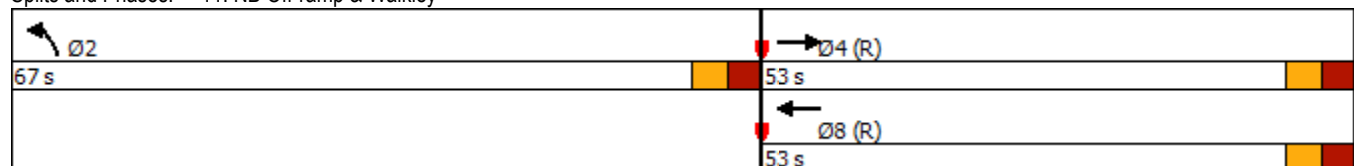
Intersection LOS: C











Intersection Capacity Utilization 79.5%

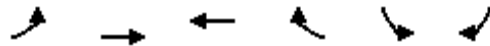
ICU Level of Service D

Analysis Period (min) 15







Splits and Phases: 11: NB Off-ramp & Walkley









| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 11 | 1472 | 0 | 1158 | 156 | 0 |
| Future Volume (Veh/h) | 11 | 1472 | 0 | 1158 | 156 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 11 | 1472 | 0 | 1158 | 156 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1314 | 156 | 156 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1314 | 156 | 156 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 94 | 0 | 100 | | | |
| cM capacity (veh/h) | 175 | 877 | 1436 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 11 | 1472 | 1158 | 156 | | |
| Volume Left | 11 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1472 | 0 | 0 | | |
| cSH | 175 | 877 | 1700 | 1700 | | |
| Volume to Capacity | 0.06 | 1.68 | 0.68 | 0.09 | | |
| Queue Length 95th (m) | 1.4 | 568.5 | 0.0 | 0.0 | | |
| Control Delay (s) | 26.9 | 324.5 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 322.3 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 170.9 | | | |
| Intersection Capacity Utilization | | | 111.5% | ICU Level of Service | H | |
| Analysis Period (min) | | | 15 | | | |



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 1721 | 201 | 0 | 190 | 695 |
| Future Volume (Veh/h) | 0 | 1721 | 201 | 0 | 190 | 695 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 1721 | 201 | 0 | 190 | 695 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 201 | | | | 1062 | 100 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 201 | | | | 1062 | 100 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 11 | 25 |
| cM capacity (veh/h) | 1347 | | | | 214 | 926 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 860 | 860 | 100 | 100 | 190 | 695 |
| Volume Left | 0 | 0 | 0 | 0 | 190 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 695 |
| cSH | 1700 | 1700 | 1700 | 1700 | 214 | 926 |
| Volume to Capacity | 0.51 | 0.51 | 0.06 | 0.06 | 0.89 | 0.75 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 49.6 | 50.6 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 82.5 | 19.6 |
| Lane LOS | | | | | F | C |
| Approach Delay (s) | 0.0 | | 0.0 | | 33.1 | |
| Approach LOS | | | | | D | |
| Intersection Summary | | | | | | |
| Average Delay | | | 10.4 | | | |
| Intersection Capacity Utilization | | | 68.0% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↓ | |
| Traffic Volume (veh/h) | 886 | 0 | 0 | 96 | 171 | 26 |
| Future Volume (Veh/h) | 886 | 0 | 0 | 96 | 171 | 26 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 886 | 0 | 0 | 96 | 171 | 26 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 886 | | 934 | 443 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 886 | | 934 | 443 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 34 | 95 |
| cM capacity (veh/h) | | | 741 | | 259 | 554 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 443 | 443 | 48 | 48 | 197 | |
| Volume Left | 0 | 0 | 0 | 0 | 171 | |
| Volume Right | 0 | 0 | 0 | 0 | 26 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 279 | |
| Volume to Capacity | 0.26 | 0.26 | 0.03 | 0.03 | 0.71 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 34.3 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 44.0 | |
| Lane LOS | | | | | E | |
| Approach Delay (s) | 0.0 | | 0.0 | | 44.0 | |
| Approach LOS | | | | | E | |
| Intersection Summary | | | | | | |
| Average Delay | | | 7.3 | | | |
| Intersection Capacity Utilization | | | 68.0% | ICU Level of Service | | C |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (vph) | 0 | 1721 | 201 | 0 | 190 | 695 |
| Future Volume (vph) | 0 | 1721 | 201 | 0 | 190 | 695 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 695 |
| Lane Group Flow (vph) | 0 | 1721 | 201 | 0 | 190 | 695 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 65.0 | 65.0 | | 25.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 62.6 | 62.6 | | 14.8 | 90.0 |
| Actuated g/C Ratio | | 0.70 | 0.70 | | 0.16 | 1.00 |
| v/c Ratio | | 0.73 | 0.08 | | 0.68 | 0.46 |
| Control Delay | | 11.4 | 7.6 | | 47.5 | 1.0 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 11.4 | 7.6 | | 47.5 | 1.0 |
| LOS | | B | A | | D | A |
| Approach Delay | | 11.4 | 7.6 | | 11.0 | |
| Approach LOS | | B | A | | B | |
| Queue Length 50th (m) | | 77.9 | 11.5 | | 28.7 | 0.0 |
| Queue Length 95th (m) | | 116.7 | 4.2 | | 46.2 | 0.0 |
| Internal Link Dist (m) | | 667.9 | 357.7 | | 275.3 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 2367 | 2367 | | 353 | 1522 |
| 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 | | 0.73 | 0.08 | | 0.54 | 0.46 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 11.0

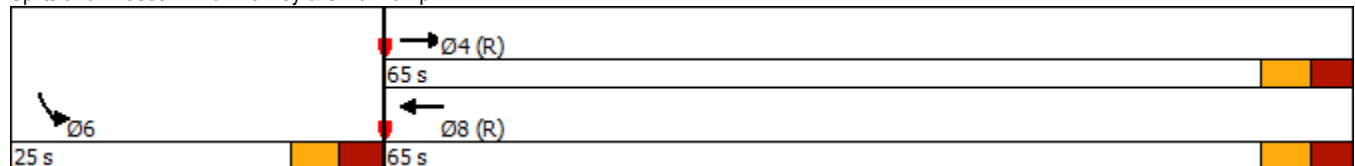
Intersection LOS: B

Intersection Capacity Utilization 71.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Walkley & SB off-ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 886 | 0 | 0 | 96 | 171 | 26 |
| Future Volume (vph) | 886 | 0 | 0 | 96 | 171 | 26 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Flt Permitted | | | | | 0.958 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Satd. Flow (RTOR) | | | | | 9 | |
| Lane Group Flow (vph) | 886 | 0 | 0 | 96 | 197 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 56.0 | | | 56.0 | 34.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 62.0 | | | 62.0 | 15.4 | |
| Actuated g/C Ratio | 0.69 | | | 0.69 | 0.17 | |
| v/c Ratio | 0.38 | | | 0.04 | 0.67 | |
| Control Delay | 11.6 | | | 5.4 | 43.7 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 11.6 | | | 5.4 | 43.7 | |
| LOS | B | | | A | D | |
| Approach Delay | 11.6 | | | 5.4 | 43.7 | |
| Approach LOS | B | | | A | D | |
| Queue Length 50th (m) | 45.2 | | | 2.2 | 28.3 | |
| Queue Length 95th (m) | 53.2 | | | 5.4 | 44.6 | |
| Internal Link Dist (m) | 357.7 | | | 203.8 | 376.5 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 2343 | | | 2343 | 524 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.38 | | | 0.04 | 0.38 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 16.5

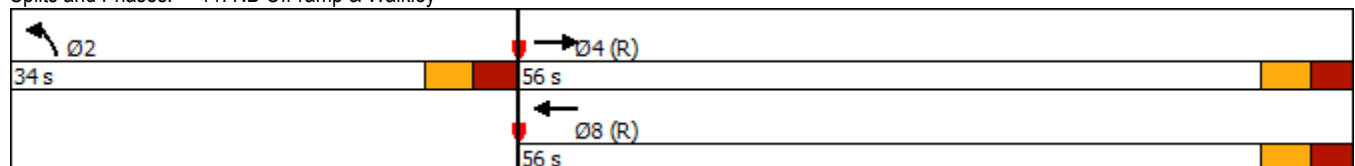
Intersection LOS: B











Intersection Capacity Utilization 71.8%

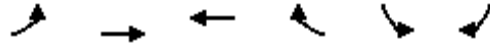
ICU Level of Service C

Analysis Period (min) 15







Splits and Phases: 11: NB Off-ramp & Walkley



| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 2 | 1000 | 0 | 1004 | 733 | 0 |
| Future Volume (Veh/h) | 2 | 1000 | 0 | 1004 | 733 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 1000 | 0 | 1004 | 733 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1737 | 733 | 733 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1737 | 733 | 733 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 98 | 0 | 100 | | | |
| cM capacity (veh/h) | 97 | 409 | 881 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 2 | 1000 | 1004 | 733 | | |
| Volume Left | 2 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1000 | 0 | 0 | | |
| cSH | 97 | 409 | 1700 | 1700 | | |
| Volume to Capacity | 0.02 | 2.44 | 0.59 | 0.43 | | |
| Queue Length 95th (m) | 0.4 | 550.3 | 0.0 | 0.0 | | |
| Control Delay (s) | 43.1 | 677.9 | 0.0 | 0.0 | | |
| Lane LOS | E | F | | | | |
| Approach Delay (s) | 676.7 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 247.5 | | | | |
| Intersection Capacity Utilization | | 112.7% | | ICU Level of Service | | H |
| Analysis Period (min) | | 15 | | | | |



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|--------|------|----------------------|-------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 575 | 1088 | 0 | 25 | 1128 |
| Future Volume (Veh/h) | 0 | 575 | 1088 | 0 | 25 | 1128 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 575 | 1088 | 0 | 25 | 1128 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1088 | | | | 1376 | 544 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1088 | | | | 1376 | 544 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 81 | 0 |
| cM capacity (veh/h) | 620 | | | | 133 | 476 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 288 | 288 | 544 | 544 | 25 | 1128 |
| Volume Left | 0 | 0 | 0 | 0 | 25 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 1128 |
| cSH | 1700 | 1700 | 1700 | 1700 | 133 | 476 |
| Volume to Capacity | 0.17 | 0.17 | 0.32 | 0.32 | 0.19 | 2.37 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 4.6 | 605.2 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 38.3 | 642.9 |
| Lane LOS | | | | | E | F |
| Approach Delay (s) | 0.0 | | 0.0 | | 629.7 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 257.8 | | | |
| Intersection Capacity Utilization | | | 112.1% | | ICU Level of Service | H |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Future Volume (Veh/h) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 179 | | 687 | 90 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 179 | | 687 | 90 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 0 | 93 |
| cM capacity (veh/h) | | | 1372 | | 374 | 941 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 90 | 90 | 508 | 508 | 667 | |
| Volume Left | 0 | 0 | 0 | 0 | 604 | |
| Volume Right | 0 | 0 | 0 | 0 | 63 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 397 | |
| Volume to Capacity | 0.05 | 0.05 | 0.30 | 0.30 | 1.68 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 280.2 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 341.6 | |
| Lane LOS | | | | | F | |
| Approach Delay (s) | 0.0 | | 0.0 | | 341.6 | |
| Approach LOS | | | | | F | |
| Intersection Summary | | | | | | |
| Average Delay | | | 122.4 | | | |
| Intersection Capacity Utilization | | | 112.1% | | ICU Level of Service | H |
| Analysis Period (min) | | | 15 | | | |

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Future Volume (vph) | 179 | 0 | 0 | 1016 | 604 | 63 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Flt Permitted | | | | | 0.957 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1691 | 0 |
| Satd. Flow (RTOR) | | | | | 6 | |
| Lane Group Flow (vph) | 179 | 0 | 0 | 1016 | 667 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 53.0 | | | 53.0 | 67.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 46.7 | | | 46.7 | 60.7 | |
| Actuated g/C Ratio | 0.39 | | | 0.39 | 0.51 | |
| v/c Ratio | 0.14 | | | 0.77 | 0.78 | |
| Control Delay | 20.0 | | | 36.7 | 31.7 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 20.0 | | | 36.7 | 31.7 | |
| LOS | B | | | D | C | |
| Approach Delay | 20.0 | | | 36.7 | 31.7 | |
| Approach LOS | B | | | D | C | |
| Queue Length 50th (m) | 13.4 | | | 99.8 | 113.0 | |
| Queue Length 95th (m) | 20.7 | | | 123.3 | 160.0 | |
| Internal Link Dist (m) | 354.1 | | | 306.3 | 348.9 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 1323 | | | 1323 | 858 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.14 | | | 0.77 | 0.78 | |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 69 (58%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 33.3

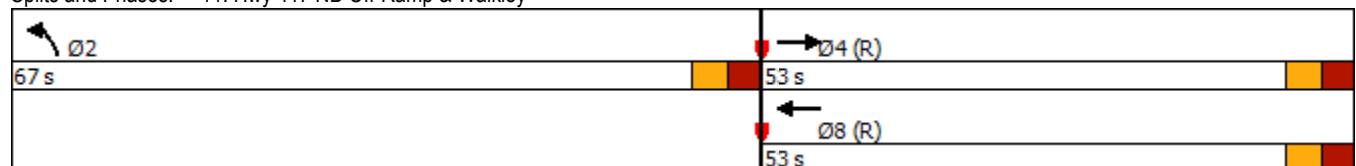
Intersection LOS: C











Intersection Capacity Utilization 79.5%

ICU Level of Service D

Analysis Period (min) 15







Splits and Phases: 11: Hwy 417 NB Off-Ramp & Walkley



| | | | | | | |
|-----------------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  |  | |  |  | |
| Traffic Volume (veh/h) | 11 | 1569 | 0 | 1226 | 181 | 0 |
| Future Volume (Veh/h) | 11 | 1569 | 0 | 1226 | 181 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 11 | 1569 | 0 | 1226 | 181 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1407 | 181 | 181 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1407 | 181 | 181 | | | |
| tC, single (s) | 6.4 | 6.3 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.4 | 2.2 | | | |
| p0 queue free % | 93 | 0 | 100 | | | |
| cM capacity (veh/h) | 154 | 849 | 1407 | | | |
| Direction, Lane # | EB 1 | EB 2 | NB 1 | SB 1 | | |
| Volume Total | 11 | 1569 | 1226 | 181 | | |
| Volume Left | 11 | 0 | 0 | 0 | | |
| Volume Right | 0 | 1569 | 0 | 0 | | |
| cSH | 154 | 849 | 1700 | 1700 | | |
| Volume to Capacity | 0.07 | 1.85 | 0.72 | 0.11 | | |
| Queue Length 95th (m) | 1.6 | 672.9 | 0.0 | 0.0 | | |
| Control Delay (s) | 30.2 | 400.0 | 0.0 | 0.0 | | |
| Lane LOS | D | F | | | | |
| Approach Delay (s) | 397.4 | | 0.0 | 0.0 | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 210.2 | | | |
| Intersection Capacity Utilization | | | 119.3% | ICU Level of Service | | H |
| Analysis Period (min) | | | 15 | | | |



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↑ | ↑ |
| Traffic Volume (veh/h) | 0 | 1769 | 201 | 0 | 190 | 786 |
| Future Volume (Veh/h) | 0 | 1769 | 201 | 0 | 190 | 786 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 1769 | 201 | 0 | 190 | 786 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 201 | | | | 1086 | 100 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 201 | | | | 1086 | 100 |
| tC, single (s) | 4.2 | | | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 8 | 15 |
| cM capacity (veh/h) | 1347 | | | | 206 | 926 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | SB 1 | SB 2 |
| Volume Total | 884 | 884 | 100 | 100 | 190 | 786 |
| Volume Left | 0 | 0 | 0 | 0 | 190 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 786 |
| cSH | 1700 | 1700 | 1700 | 1700 | 206 | 926 |
| Volume to Capacity | 0.52 | 0.52 | 0.06 | 0.06 | 0.92 | 0.85 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 52.4 | 73.7 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 91.6 | 26.3 |
| Lane LOS | | | | | F | D |
| Approach Delay (s) | 0.0 | | 0.0 | | 39.0 | |
| Approach LOS | | | | | E | |
| Intersection Summary | | | | | | |
| Average Delay | | | 12.9 | | | |
| Intersection Capacity Utilization | | | 69.4% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↑↑ | |
| Traffic Volume (veh/h) | 886 | 0 | 0 | 96 | 171 | 26 |
| Future Volume (Veh/h) | 886 | 0 | 0 | 96 | 171 | 26 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 886 | 0 | 0 | 96 | 171 | 26 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 886 | | 934 | 443 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 886 | | 934 | 443 |
| tC, single (s) | | | 4.2 | | 6.9 | 7.0 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 34 | 95 |
| cM capacity (veh/h) | | | 741 | | 259 | 554 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 443 | 443 | 48 | 48 | 197 | |
| Volume Left | 0 | 0 | 0 | 0 | 171 | |
| Volume Right | 0 | 0 | 0 | 0 | 26 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 279 | |
| Volume to Capacity | 0.26 | 0.26 | 0.03 | 0.03 | 0.71 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 34.3 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 44.0 | |
| Lane LOS | | | | | E | |
| Approach Delay (s) | 0.0 | | 0.0 | | 44.0 | |
| Approach LOS | | | | | E | |
| Intersection Summary | | | | | | |
| Average Delay | | | 7.3 | | | |
| Intersection Capacity Utilization | | | 69.4% | | ICU Level of Service | C |
| Analysis Period (min) | | | 15 | | | |

4055 & 4120 Russell Road
10: Walkley & Hwy 417 SB Off-Ramp

2033 Total Traffic PM Peak Hour Mod

| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|------------------------|-----|-------|-------|-----|-------|------|
| Lane Configurations | | ↑↑ | ↑↑ | | ↘ | ↗ |
| Traffic Volume (vph) | 0 | 1769 | 201 | 0 | 190 | 786 |
| Future Volume (vph) | 0 | 1769 | 201 | 0 | 190 | 786 |
| Satd. Flow (prot) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Flt Permitted | | | | | 0.950 | |
| Satd. Flow (perm) | 0 | 3402 | 3402 | 0 | 1701 | 1522 |
| Satd. Flow (RTOR) | | | | | | 786 |
| Lane Group Flow (vph) | 0 | 1769 | 201 | 0 | 190 | 786 |
| Turn Type | | NA | NA | | Prot | Free |
| Protected Phases | | 4 | 8 | | 6 | |
| Permitted Phases | | | | | | Free |
| Total Split (s) | | 65.0 | 65.0 | | 25.0 | |
| Total Lost Time (s) | | 6.3 | 6.3 | | 6.3 | |
| Act Effct Green (s) | | 62.6 | 62.6 | | 14.8 | 90.0 |
| Actuated g/C Ratio | | 0.70 | 0.70 | | 0.16 | 1.00 |
| v/c Ratio | | 0.75 | 0.08 | | 0.68 | 0.52 |
| Control Delay | | 11.9 | 2.9 | | 47.5 | 1.3 |
| Queue Delay | | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | | 11.9 | 2.9 | | 47.5 | 1.3 |
| LOS | | B | A | | D | A |
| Approach Delay | | 11.9 | 2.9 | | 10.3 | |
| Approach LOS | | B | A | | B | |
| Queue Length 50th (m) | | 82.2 | 1.4 | | 28.7 | 0.0 |
| Queue Length 95th (m) | | 123.6 | 5.7 | | 46.2 | 0.0 |
| Internal Link Dist (m) | | 664.4 | 343.7 | | 255.5 | |
| Turn Bay Length (m) | | | | | 100.0 | |
| Base Capacity (vph) | | 2367 | 2367 | | 353 | 1522 |
| 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 | | 0.75 | 0.08 | | 0.54 | 0.52 |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 10.8

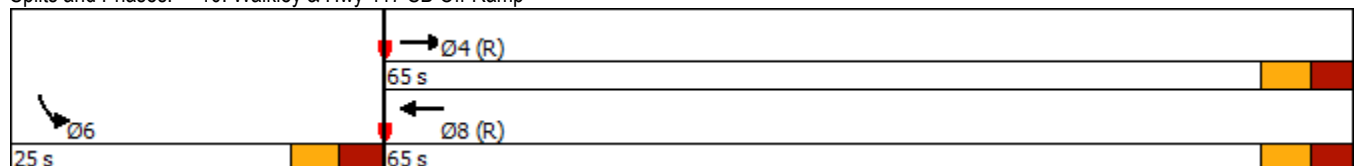
Intersection LOS: B

Intersection Capacity Utilization 73.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Walkley & Hwy 417 SB Off-Ramp



| | → | ↘ | ↙ | ← | ↖ | ↗ |
|------------------------|-------|-----|-----|-------|-------|-----|
| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | ↘↗ | |
| Traffic Volume (vph) | 886 | 0 | 0 | 96 | 171 | 26 |
| Future Volume (vph) | 886 | 0 | 0 | 96 | 171 | 26 |
| Satd. Flow (prot) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Flt Permitted | | | | | 0.958 | |
| Satd. Flow (perm) | 3402 | 0 | 0 | 3402 | 1684 | 0 |
| Satd. Flow (RTOR) | | | | | 9 | |
| Lane Group Flow (vph) | 886 | 0 | 0 | 96 | 197 | 0 |
| Turn Type | NA | | | NA | Prot | |
| Protected Phases | 4 | | | 8 | 2 | |
| Permitted Phases | | | | | | |
| Total Split (s) | 56.0 | | | 56.0 | 34.0 | |
| Total Lost Time (s) | 6.3 | | | 6.3 | 6.3 | |
| Act Effct Green (s) | 62.0 | | | 62.0 | 15.4 | |
| Actuated g/C Ratio | 0.69 | | | 0.69 | 0.17 | |
| v/c Ratio | 0.38 | | | 0.04 | 0.67 | |
| Control Delay | 8.4 | | | 5.4 | 43.7 | |
| Queue Delay | 0.0 | | | 0.0 | 0.0 | |
| Total Delay | 8.4 | | | 5.4 | 43.7 | |
| LOS | A | | | A | D | |
| Approach Delay | 8.4 | | | 5.4 | 43.7 | |
| Approach LOS | A | | | A | D | |
| Queue Length 50th (m) | 26.8 | | | 2.2 | 28.3 | |
| Queue Length 95th (m) | 53.3 | | | 5.4 | 44.6 | |
| Internal Link Dist (m) | 343.7 | | | 277.3 | 355.2 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 2343 | | | 2343 | 524 | |
| Starvation Cap Reductn | 0 | | | 0 | 0 | |
| Spillback Cap Reductn | 0 | | | 0 | 0 | |
| Storage Cap Reductn | 0 | | | 0 | 0 | |
| Reduced v/c Ratio | 0.38 | | | 0.04 | 0.38 | |

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 14.1

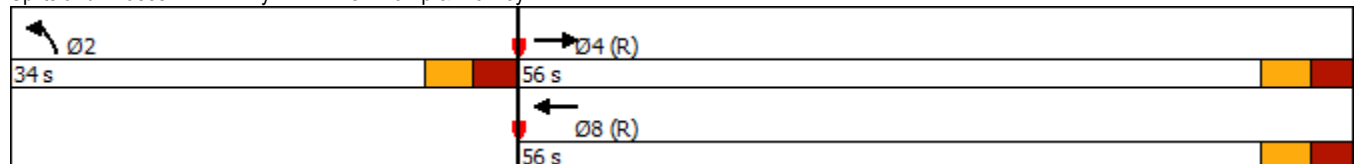
Intersection LOS: B

Intersection Capacity Utilization 73.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: Hwy 417 NB Off-Ramp & Walkley



6: Hunt Club & Hwy 417 Offramp Performance by movement

| Movement | EBL | EBR | NBT | SBT | All |
|--------------------|------|-----|-----|-----|-----|
| Denied Del/Veh (s) | 3.0 | 1.1 | 0.0 | 0.6 | 0.6 |
| Total Del/Veh (s) | 19.4 | 3.3 | 0.4 | 0.9 | 1.6 |

10: Walkley & Hwy 417 SB Off-Ramp Performance by movement

| Movement | EBT | WBT | SBL | SBR | All |
|--------------------|-----|-----|------|-----|-----|
| Denied Del/Veh (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Del/Veh (s) | 0.4 | 1.1 | 11.7 | 2.6 | 1.6 |

Total Zone Performance

| | |
|--------------------|------|
| Denied Del/Veh (s) | 0.6 |
| Total Del/Veh (s) | 13.4 |

Intersection: 6: Hunt Club & Hwy 417 Offramp

| Movement | EB |
|-----------------------|------|
| Directions Served | L |
| Maximum Queue (m) | 9.0 |
| Average Queue (m) | 0.9 |
| 95th Queue (m) | 5.3 |
| Link Distance (m) | |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | 85.0 |
| Storage Blk Time (%) | |
| Queuing Penalty (veh) | |

Intersection: 10: Walkley & Hwy 417 SB Off-Ramp

| Movement | SB |
|-----------------------|-------|
| Directions Served | L |
| Maximum Queue (m) | 17.9 |
| Average Queue (m) | 6.8 |
| 95th Queue (m) | 15.3 |
| Link Distance (m) | 227.6 |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | |
| Storage Blk Time (%) | |
| Queuing Penalty (veh) | |

Intersection: 48: Bend

| Movement | WB | WB | WB |
|-----------------------|-------|-------|-------|
| Directions Served | T | T | |
| Maximum Queue (m) | 13.2 | 34.8 | 1.8 |
| Average Queue (m) | 0.4 | 1.3 | 0.1 |
| 95th Queue (m) | 9.8 | 16.3 | 2.1 |
| Link Distance (m) | 157.1 | 157.1 | 157.1 |
| Upstream Blk Time (%) | | | |
| Queuing Penalty (veh) | | | |
| Storage Bay Dist (m) | | | |
| Storage Blk Time (%) | | | |
| Queuing Penalty (veh) | | | |

Zone Summary

Zone wide Queuing Penalty: 0

6: Hunt Club & Hwy 417 Offramp Performance by movement

| Movement | EBL | EBR | NBT | SBT | All |
|--------------------|------|------|-----|-----|-----|
| Denied Del/Veh (s) | 12.2 | 11.7 | 0.0 | 0.2 | 6.2 |
| Total Del/Veh (s) | 29.7 | 9.5 | 0.6 | 0.6 | 5.4 |

10: Walkley & Hwy 417 SB Off-Ramp Performance by movement

| Movement | EBT | WBT | SBL | SBR | All |
|--------------------|-----|-----|------|-----|-----|
| Denied Del/Veh (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Del/Veh (s) | 1.6 | 0.8 | 61.2 | 1.5 | 5.6 |

Total Zone Performance

| | |
|--------------------|-------|
| Denied Del/Veh (s) | 4.0 |
| Total Del/Veh (s) | 315.3 |

Intersection: 6: Hunt Club & Hwy 417 Offramp

| Movement | EB |
|-----------------------|------|
| Directions Served | L |
| Maximum Queue (m) | 14.2 |
| Average Queue (m) | 3.7 |
| 95th Queue (m) | 10.8 |
| Link Distance (m) | |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | 85.0 |
| Storage Blk Time (%) | |
| Queuing Penalty (veh) | |

Intersection: 10: Walkley & Hwy 417 SB Off-Ramp

| Movement | EB | SB |
|-----------------------|-------|-------|
| Directions Served | T | L |
| Maximum Queue (m) | 4.2 | 94.0 |
| Average Queue (m) | 0.2 | 43.9 |
| 95th Queue (m) | 2.5 | 87.6 |
| Link Distance (m) | 159.4 | 211.2 |
| Upstream Blk Time (%) | | |
| Queuing Penalty (veh) | | |
| Storage Bay Dist (m) | | |
| Storage Blk Time (%) | | |
| Queuing Penalty (veh) | | |

Zone Summary

| |
|------------------------------|
| Zone wide Queuing Penalty: 0 |
|------------------------------|

6: Hunt Club & Hwy 417 Offramp Performance by movement

| Movement | EBL | EBR | NBT | SBT | All |
|--------------------|------|-----|-----|-----|-----|
| Denied Del/Veh (s) | 2.7 | 1.3 | 0.0 | 0.7 | 0.7 |
| Total Del/Veh (s) | 27.3 | 3.8 | 0.5 | 1.0 | 1.9 |

10: Walkley & Hwy 417 SB Off-Ramp Performance by movement

| Movement | EBT | WBT | SBL | SBR | All |
|--------------------|-----|-----|------|-----|-----|
| Denied Del/Veh (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Del/Veh (s) | 0.4 | 1.1 | 12.6 | 2.9 | 1.8 |

Total Zone Performance

| | |
|--------------------|------|
| Denied Del/Veh (s) | 0.7 |
| Total Del/Veh (s) | 14.7 |

Intersection: 6: Hunt Club & Hwy 417 Offramp

| Movement | EB |
|-----------------------|------|
| Directions Served | L |
| Maximum Queue (m) | 9.0 |
| Average Queue (m) | 0.8 |
| 95th Queue (m) | 5.0 |
| Link Distance (m) | |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | 85.0 |
| Storage Blk Time (%) | |
| Queuing Penalty (veh) | |

Intersection: 10: Walkley & Hwy 417 SB Off-Ramp

| Movement | SB |
|-----------------------|-------|
| Directions Served | L |
| Maximum Queue (m) | 19.2 |
| Average Queue (m) | 7.2 |
| 95th Queue (m) | 16.5 |
| Link Distance (m) | 227.6 |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | |
| Storage Blk Time (%) | |
| Queuing Penalty (veh) | |

Intersection: 48: Bend

| Movement | WB | WB | WB |
|-----------------------|-------|-------|-------|
| Directions Served | T | T | |
| Maximum Queue (m) | 64.7 | 67.1 | 23.4 |
| Average Queue (m) | 2.9 | 4.8 | 0.8 |
| 95th Queue (m) | 25.9 | 35.3 | 13.2 |
| Link Distance (m) | 157.1 | 157.1 | 157.1 |
| Upstream Blk Time (%) | | | |
| Queuing Penalty (veh) | | | |
| Storage Bay Dist (m) | | | |
| Storage Blk Time (%) | | | |
| Queuing Penalty (veh) | | | |

Zone Summary

Zone wide Queuing Penalty: 0

6: Hunt Club & Hwy 417 Offramp Performance by movement

| Movement | EBL | EBR | NBT | SBT | All |
|--------------------|------|------|-----|-----|------|
| Denied Del/Veh (s) | 62.1 | 59.0 | 0.0 | 0.2 | 31.2 |
| Total Del/Veh (s) | 39.5 | 11.7 | 0.7 | 0.7 | 6.6 |

10: Walkley & Hwy 417 SB Off-Ramp Performance by movement

| Movement | EBT | WBT | SBL | SBR | All |
|--------------------|-----|-----|------|-----|-----|
| Denied Del/Veh (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Del/Veh (s) | 1.6 | 0.8 | 65.5 | 1.7 | 5.8 |

Total Zone Performance

| | |
|--------------------|-------|
| Denied Del/Veh (s) | 19.9 |
| Total Del/Veh (s) | 353.2 |

Intersection: 6: Hunt Club & Hwy 417 Offramp

| Movement | EB |
|-----------------------|------|
| Directions Served | L |
| Maximum Queue (m) | 14.2 |
| Average Queue (m) | 3.9 |
| 95th Queue (m) | 11.3 |
| Link Distance (m) | |
| Upstream Blk Time (%) | |
| Queuing Penalty (veh) | |
| Storage Bay Dist (m) | 85.0 |
| Storage Blk Time (%) | |
| Queuing Penalty (veh) | |

Intersection: 10: Walkley & Hwy 417 SB Off-Ramp

| Movement | EB | WB | SB |
|-----------------------|-------|-------|-------|
| Directions Served | T | T | L |
| Maximum Queue (m) | 3.4 | 1.2 | 98.4 |
| Average Queue (m) | 0.2 | 0.0 | 45.6 |
| 95th Queue (m) | 2.4 | 0.9 | 90.6 |
| Link Distance (m) | 159.4 | 360.2 | 211.2 |
| Upstream Blk Time (%) | | | |
| Queuing Penalty (veh) | | | |
| Storage Bay Dist (m) | | | |
| Storage Blk Time (%) | | | |
| Queuing Penalty (veh) | | | |

Zone Summary

| |
|------------------------------|
| Zone wide Queuing Penalty: 0 |
|------------------------------|