



Tannis 2390 Stevenage Drive - Transportation Impact Assessment Report





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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Sysco Tannis – 2390 Stevenage Drive

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December 11, 2018

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TIA Report

1. SCREENING FORM

The screening form was prepared for the subject development and included as part of the subsequent report. The screening form confirmed the need for a Transportation Impact Assessment (TIA) based on the Trip Generation and Safety triggers, given that the proposed development consists of an additional 12,857m² of industrial use (total of 23,033 m²), located close to a horizontal curvature on Stevenage Drive. The screening form is provided in Appendix A.

2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1. PROPOSED DEVELOPMENT

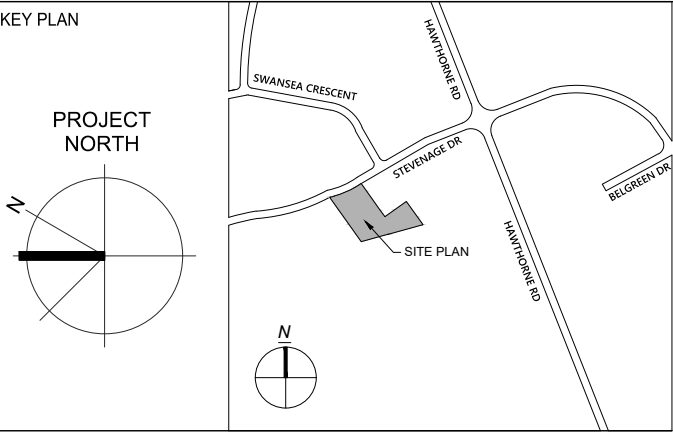
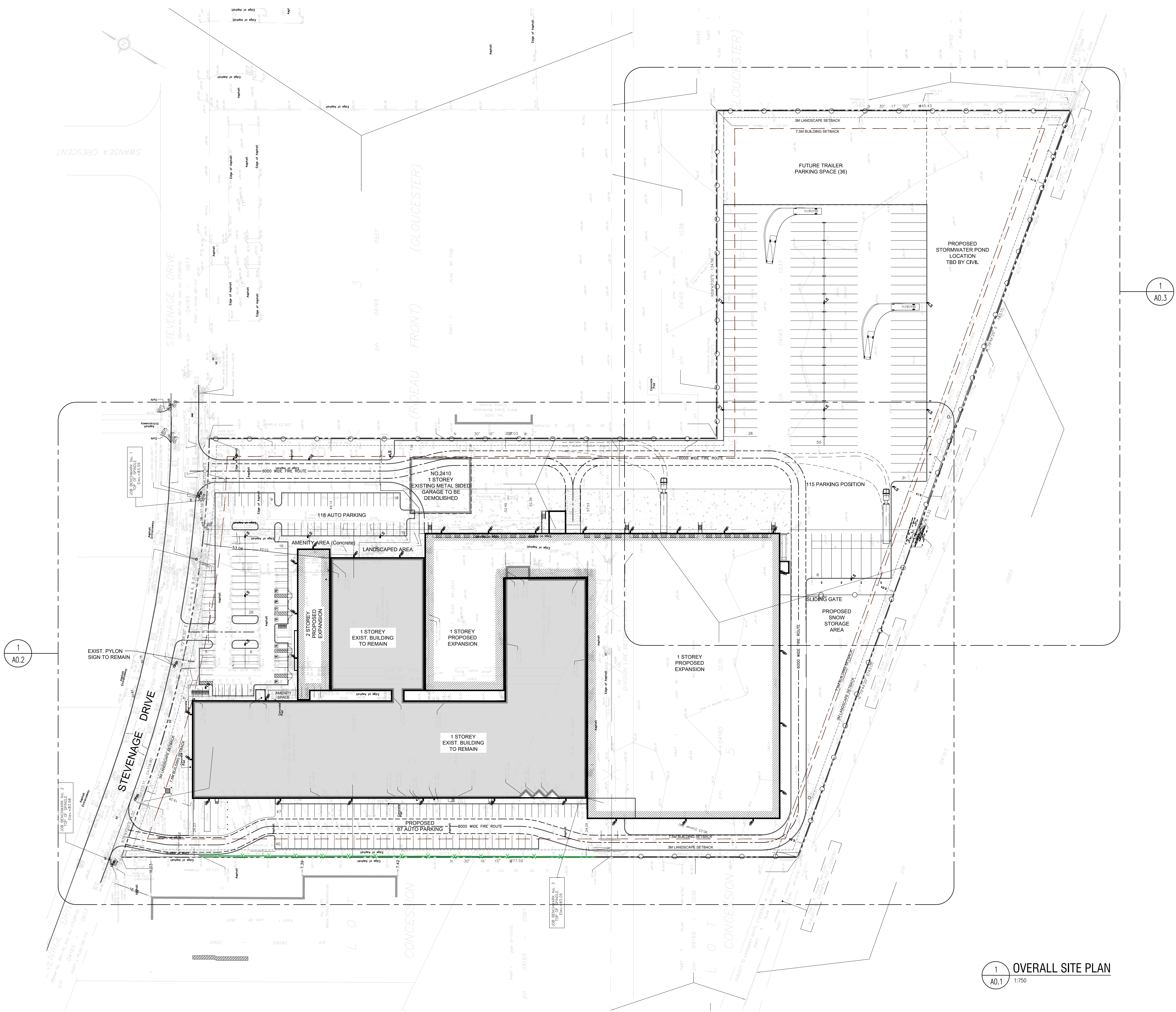
Sysco Tannis is proposing to expand the existing facilities located at 2390 Stevenage Drive, by adding approximately 13,617m² of dry docks, cold docks, dry warehouse, cooler, mechanical room, battery charging, employee amenities and offices. The proposal includes the enlargement of the parking area at the front of the facility from 69 existing spaces to 205 spaces, removal of the vegetation to the south of the site, and the expansion of the truck/trailer parking area at the rear of the property. The site is in Ward 10, Gloucester-Southgate, and is designated as Heavy Industrial Zone according to the Part 11, sec. 201-202 of the Zoning By-Law No. 2008-250. The site local context is illustrated in Figure 1.

Figure 1: Local Context



For this assessment, horizon years have been assumed to be the year 2020, representing full build-out and year 2025, representing the plus five years horizon. Access to site will be provided via three accesses located on: i) Stevenage Drive at the west boundary of the site, approximately 540 m to the west of Hawthorne Road, ii) Stevenage Drive approximately 470 m to the west of Hawthorne Road and iii) on Stevenage Drive, approximately 415 m to the west of Hawthorne Road. The site plan is illustrated in Figure 2.

REV	DATE	DESCRIPTION
01	AUG 30, 2018	ISSUED FOR REVIEW
02	SEPT 11, 2018	ISSUED FOR SITE PLAN APPROVAL



Glenn Piotrowski Architect



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PROJECT
SYSCO TANNIS
FACILITY EXPANSION & SITE PLAN
MODIFICATIONS

2390 STEVENAGE DRIVE, OTTAWA,
ON K1G 3W3

SHEET TITLE
OVERALL SITE PLAN

DRAWN BY PY
DATE
SCALE 1:750
PROJECT NO.
SHEET NO.

A0.1

3. EXISTING CONDITIONS

3.1. AREA ROAD NETWORK

The following City-owned roads are within the study area network:

Hawthorne Road is a north-south arterial road, which extends from Somme Street in the south to Walkley Road in the north where it continues as Russel Road. Within the study area, Hawthorne Road has a five-lane cross section with two lanes per direction and a center two-way left-turn lane. Sidewalks are provided on the west side of the roadway and auxiliary turn lanes are provided at major intersections. The posted speed limit within the study area is 70 km/h.

Stevenage Drive is classified as an east-west local roadway that extends from Belgreen Drive in the east to Swansea Crescent in the west. Within the study area, Stevenage Drive has a two-lane cross section. The unposted speed limit is understood to be 50 km/h.

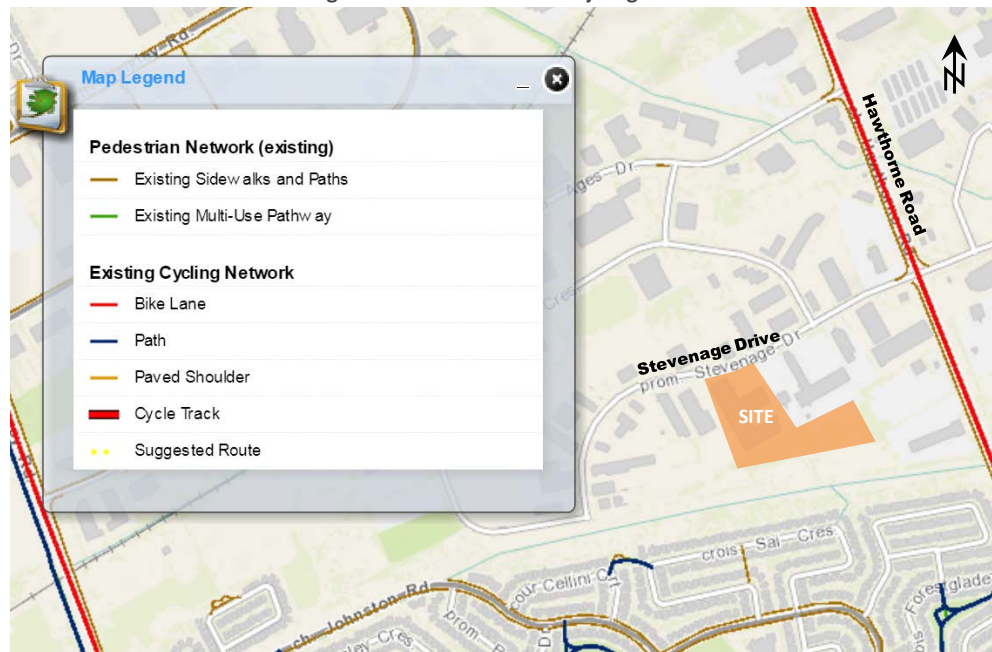
3.2. PEDESTRIAN AND CYCLING NETWORK

Given the area heavy industrial context, both pedestrian and cycling facilities are limited.

Pedestrian facilities are not provided on Stevenage Road within the are of study. Concrete sidewalks are provided on the west side of Hawthorne Road with pedestrian crossings on all approaches of the Hawthorne/Stevenage intersection. An interrupted paved boulevard approximately 1.2 m wide is provided on the east side of Hawthorne Road within the are of study.

Regarding cyclists, a curbside bike lane in each direction is provided along Hawthorne Road. Figure 3 depicts the existing area pedestrian and cycling network.

Figure 3: Area Pedestrian and Cycling Network

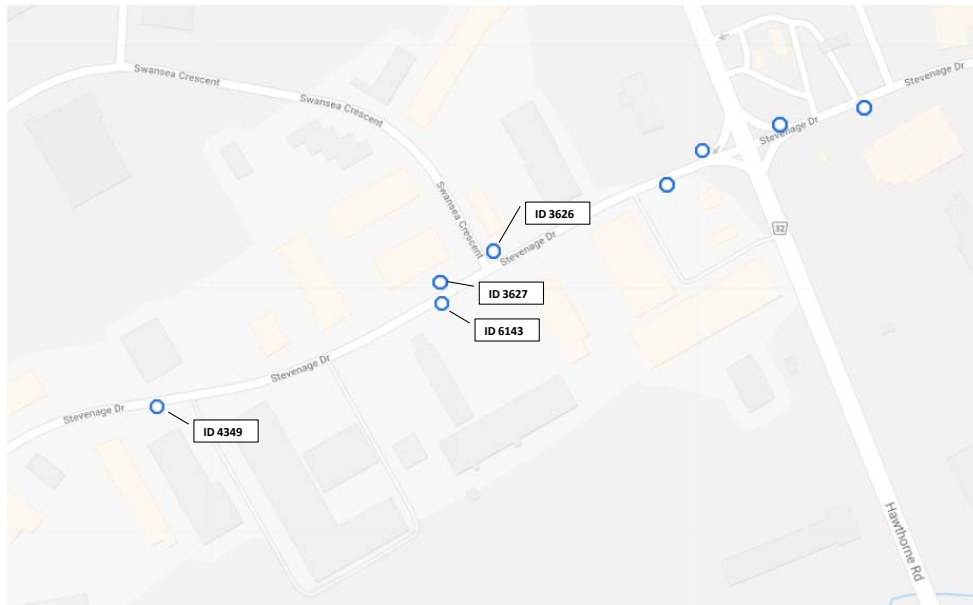


<http://maps.ottawa.ca/geoottawa/>, accessed July 25th, 2018.

3.3. TRANSIT NETWORK

Transit service within the vicinity of the site is currently provided by OC Transpo Local Route #47. Bus stops are provided on Stevenage Drive at Swansea Crescent, approximately 220 m from the site. An additional stop is provided on Stevenage Drive, approximately 200 m west of the site, as depicted in Figure 4.

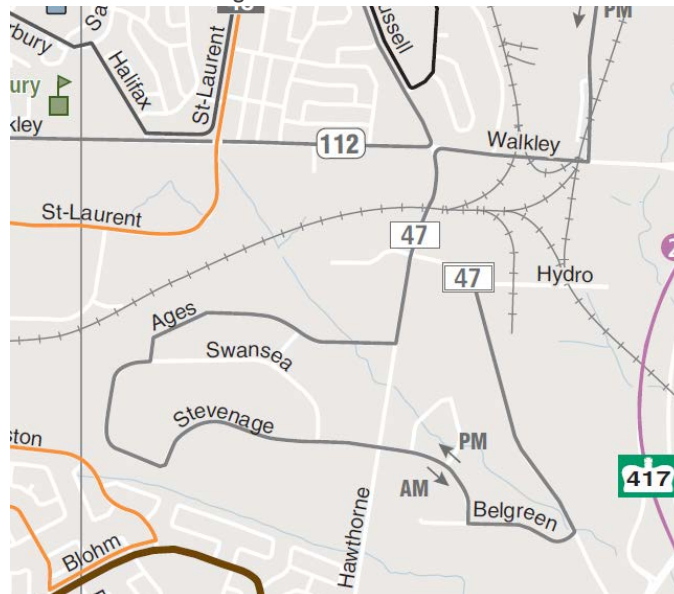
Figure 4: OC Transpo Existing Bus Stops



www.octranspo.ca, accessed July 25th, 2018.

Local Routes #47 provides Monday to Friday service during the morning and evening hours. Morning service is provided between 06:00 hrs to 09:00 hrs with two to three buses per hour, and evening service between 18:00 hrs to 19:59 hrs, with two to three buses per hour.

Figure 5: Area Transit Network

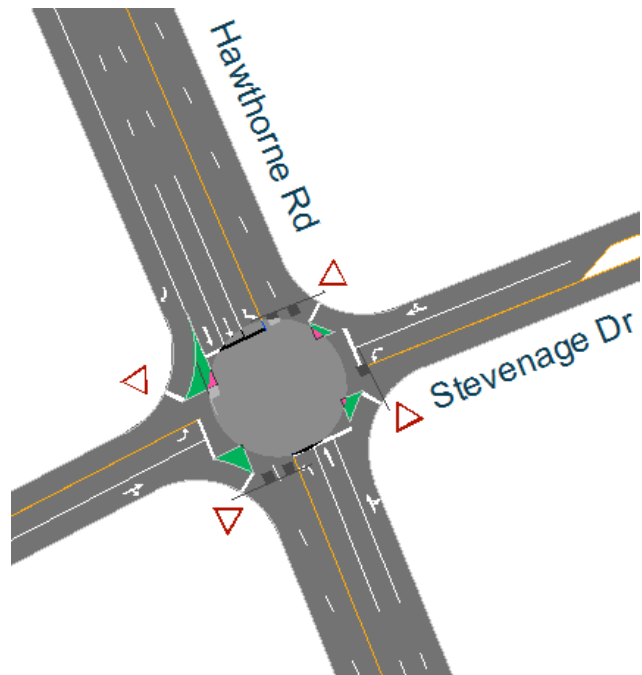


www.octranspo.ca, accessed July 25th, 2018.

3.4. EXISTING STUDY AREA INTERSECTION

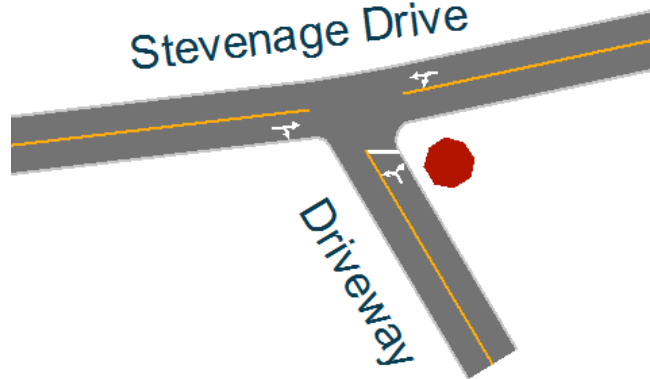
Hawthorne Road/Stevenage Drive

The Hawthorne Road/Stevenage Drive intersection is a signalized four-legged intersection. The eastbound and westbound approaches consist of a single left-turn lane, a through lane and a channelized right-turn lane. The northbound and southbound approaches consist of a single left-turn lane, two through lanes, a pocket bike lane and a channelized right-turn lane with no receiving lane. All movements are permitted at this location.



Stevenage Drive/Access Driveways (3 locations)

Stevenage Drive/Access #1 is an unsignalized 'T' intersection. All approaches consist of a single full-movement lane. All movements are permitted at this location.



3.5. EXISTING INTERSECTION VOLUMES

The existing peak hour traffic volumes (illustrated in Figure 6 below) were obtained from the City of Ottawa for the year 2016. Traffic volume counts are provided in Appendix B.

Figure 6: Existing Peak Hour Traffic Volumes

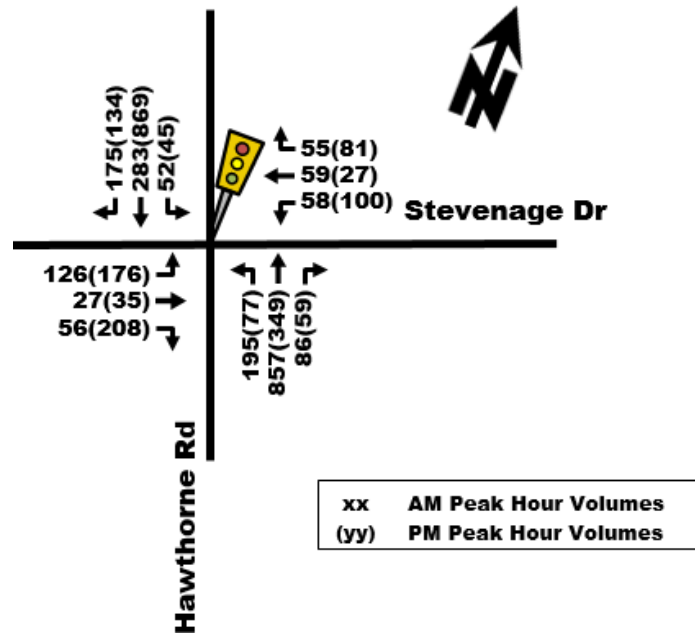


Table 1 provides a summary of the existing traffic operations at study area intersections based on the SYNCHRO (V10) traffic analysis software. The subject intersection was assessed in terms of the volume-to-capacity (v/c) ratio for signalized intersections, delay (s) for stop-controlled and roundabout intersections, and the corresponding Level of Service (LoS) for the critical movement(s). The subject intersection 'as a whole' was assessed based on a weighted v/c ratio or delay, and the SYNCHRO model output of existing conditions is provided within Appendix C.

Table 1: Existing Performance at the Hawthorne/Stevenage Intersection

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Hawthorne / Stevenage	B(D)	0.67(0.84)	EBL(WBL)	13.2(18.4)	A(A)	0.46(0.49)
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

As shown in Table 1, study area intersections 'as a whole' are currently operating at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements' at the Hawthorne/Stevenage intersection, the eastbound left turn movement is operating at an acceptable LoS 'B' in the morning peak hour and the westbound left turn movement is operating at an acceptable LoS 'D' during the afternoon peak hour.

3.6. EXISTING ROAD SAFETY CONDITIONS

Collision history for study area (2013 to 2017, inclusive) was obtained from the City of Ottawa. A total of 43 collisions have been reported within the study area. The majority (79%, or 34) of collisions involved property damage while the remaining (21%, or 9) collisions involved non-fatal injuries.

Regarding the type of collision, turning movement accounted for 51% (or 22 collisions) of collisions, rear end accounted for 21% (or 9 collisions) of collisions, angle accounted for 19% (or 8 collisions) of collisions, single vehicle other accounted for 5% (or 2 collisions) of collisions and single vehicle unattended and sideswipe accounted for 2% (or 1 collision) of collisions.

Over the five-year period, collisions observed at the following locations include:

- **Hawthorne Road at Stevenage Drive** - A total of 31 collisions were registered. The types of collisions cited by police included: turning movement (58% or 18 collisions), rear end (29% or 9 collisions), angle (10% or 3 collisions) and sideswipe (3% or 1 collisions). The majority of turning movement collisions involved northbound left or southbound left vehicles colliding with southbound through or northbound through vehicles. Out of the 9 rear end collisions, 4 involved northbound vehicles;
- **Stevenage Drive, between Swansea Crescent and Hawthorne Road** - A total of 5 collisions were registered. The types of collisions cited by police included: turning movement (40% or 2 collisions), angle (40% or 2 collisions) and single vehicle unattended (20% or 1 collision);
- **Stevenage Drive, between Swansea Crescent and Swansea Crescent** - A total of 4 collisions were registered. The types of collisions cited by police included: turning movement (50% or 2 collisions), angle (25% or 1 collision) and single vehicle other (25% or 1 collision); and
- **Stevenage Drive at Swansea Crescent** - A total of 3 collisions were registered. The types of collisions cited by police included: angle (67% or 2 collisions) and single vehicle other (33% or 1 collision). All collisions happened during poor weather conditions (freezing rain, rain, and snow).

A standard unit of measure for assessing collisions at an intersection is based on the number collisions per million entering vehicles (MEV). The reported collision rate for the study area intersections are as follows:

- Stevenage Drive, between Swansea Crescent and Swansea Crescent – 0.73 MEV;
- Hawthorne Road at Stevenage Drive – 0.64 MEV;
- Stevenage Drive, between Swansea Crescent and Hawthorne Road – 0.54 MEV; and,
- Stevenage Drive at Swansea Crescent – 0.33 MEV.

Based on the available data, there does not appear to be any prevailing safety issues within the study area. The source of the collision data is provided by the City of Ottawa and related analysis is provided within Appendix D.

3.7. EXISTING AREA TRAFFIC MANAGEMENT MEASURES

No area traffic management measures are identified within the area of study.

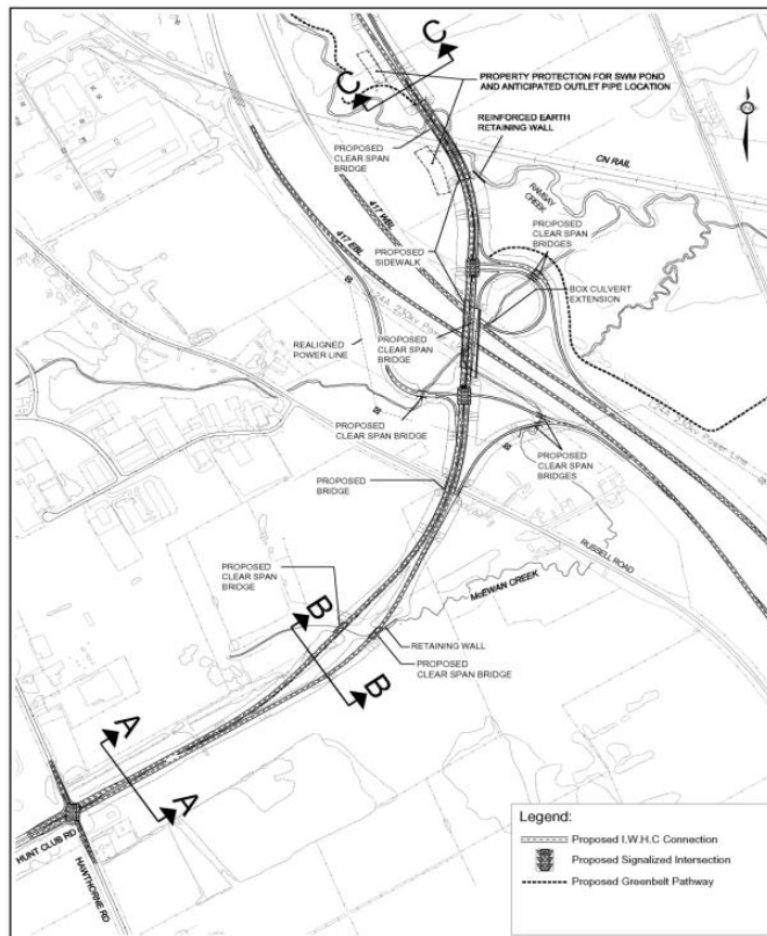
4. PLANNED CONDITIONS

4.1. PLANNED STUDY AREA TRANSPORTATION NETWORK CHANGES

Innes-Walkley-Hunt Club Road Connection

Map 6 of the Transportation Master Plan – Road Network - Urban identifies the Hunt Club Road extension to Walkley Road and Innes Road, east of highway 417. In November 2007, the City of Ottawa Transportation Committee recommended the Council to receive the joint City/Ontario Ministry of Transportation Environmental Assessment Study of the Innes-Walkley-Hunt Club Connection. According to the recommended plan, the Innes-Walkley-Hunt Club connection would be implemented as a Parkway extending northeast from the Hunt Club-Highway 417 interchange to Innes Road at Green's Creek. Figure 7 illustrates the recommended plan. The Hunt Club-Highway 417 interchange has been completed, and the Innes-Walkley-Hunt Club Connection is not listed in the City of Ottawa Construction and Infrastructure projects web platform.

Figure 7: Innes-Walkley-Hunt Club Connection Recommended Plan



<http://www.ottawa.ca/calendar/ottawa/citycouncil/occ/2007/12-07/trc/ACS2007-PTE-POL-0070.htm>, accessed July 26th, 2018.

Future Cycling Facilities

The 2013 City of Ottawa Cycling Plan identifies Hawthorne Road as a 'Spine' Route. Within the ultimate cycling network, a north-south pathway link is planned at the Walkley Rail Corridor that would enable connectivity between Ages Drive and the Walkley Rail Corridor planned Major Pathway.

4.2. OTHER AREA DEVELOPMENTS

4.2.1. 3000-3100 SWANSEA CRESCENT

The City of Ottawa received a Site Plan application on December 18, 2015 to construct a 10,800 square metre warehouse addition to the existing warehouse facility, as well as a new loading and parking area at the west end of the subject property. The corresponding traffic brief (prepared by Cornerstone Builders Ltd.) estimated 24 veh/h and 20 veh/h during morning and afternoon peak hours respectively. Although this development has been completed, the associated traffic generated has not been accounted in traffic counts provided by the City of Ottawa. As such, they will be input into the foregoing analysis as additional volumes at Stevenage/Hawthorne.

4.3. TRANSIT

As mentioned previously, transit is served within the area with bus stops for local route #47 on Stevenage Drive, with transit stops located approximately 200 to 220 m from the site

4.4. NETWORK CONCEPT

The Hawthorne Screenline, SL-13, is in proximity to the proposed development, capturing north-south traffic on Hawthorne Road. The Russell Screenline, SL-14, is also in proximity to the proposed development, capturing east-west traffic on Hunt Club Road towards Highway 417. It is not anticipated that this development will have significant impacts to these Screenlines.

4.5. INTERSECTION DESIGN

The proposed site will access Stevenage Drive through four private driveways. The Strategy Report will review and document the access requirements if required.

5. TIME PERIODS

Given the land use of the proposed development, the weekday morning and afternoon peak hours will be analyzed.

6. HORIZON YEARS

For the purposes of this analysis the site full build-out date is assumed to be year 2020. The plus five years horizon will be analyzed for year 2025.

7. EXEMPTIONS REVIEW

Based on the foregoing analysis and review of the existing conditions, it is recommended that any future work within the context of this TIA excludes the following modules and elements summarized in Table 2.

Table 2: Exemptions Review Summary

Module	Element	Exemption Consideration
4.1 Development Design	4.1.3 New Street Networks	Not required for applications involving site plans.
4.2. Parking	4.2.2 Spillover Parking	Site expected to meet parking requirements.
4.8 Review of Network Concept	All elements	This development is not expected to generate 200-person trips more than the permitted zoning for the site.

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

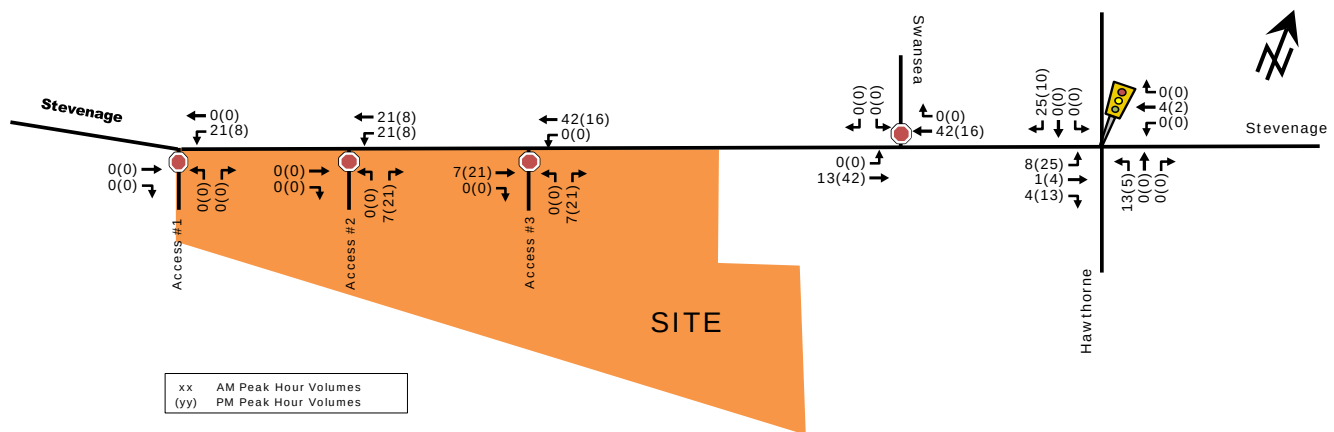
Considering the existing traffic distribution at Hawthorne/Stevenage intersection, the site trip distribution is outlined next:

- 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.

9.2.1. PROJECTED BACKGROUND 2020 OPERATIONS

Figure 9 illustrates the future background traffic volumes for the year 2020, including both background growth and other area developments. Table 6 summarizes the future background operations for the 2020 future background traffic volumes. The SYNCHRO model output of 2020 background conditions are provided within Appendix E.

Figure 9: Projected Background 2020 Traffic Volumes

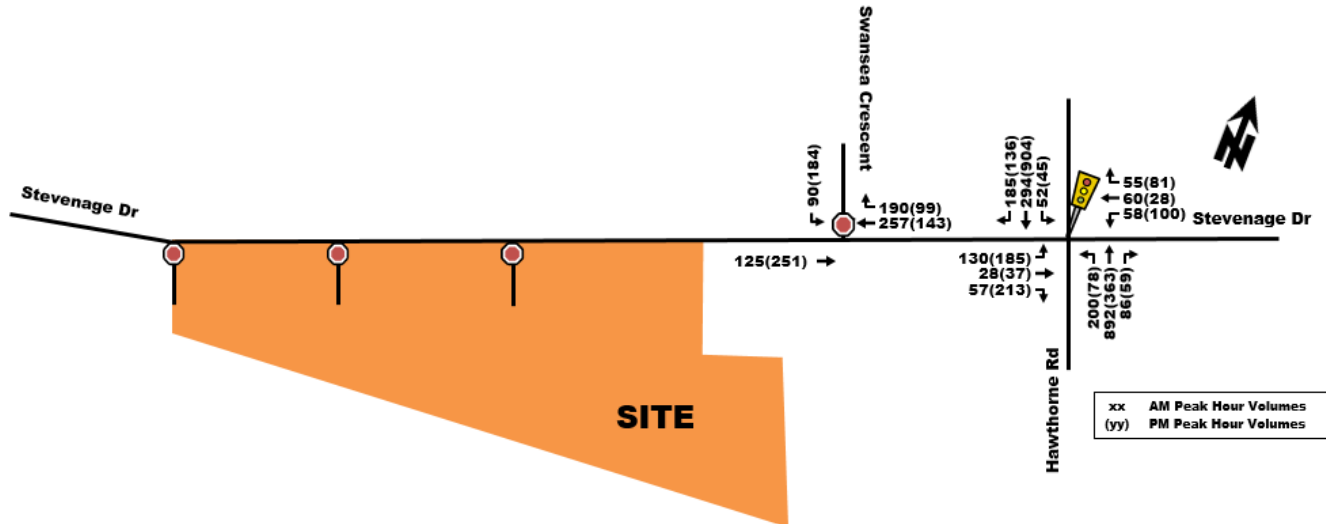


Table 6: Projected Background 2020 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Hawthorne/Stevenage	B(C)	0.62(0.73)	EBL(EBL)	13.6(17.8)	A(A)	0.47(0.50)

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.

As shown in Table 6, the Hawthorne/Stevenage intersection ‘as a whole’ is projected to continue operating at an excellent LoS ‘A’ during the weekday peak hours. With regard to the ‘critical movements’, the eastbound left-turn movement is operating at a LoS ‘B’ during the morning peak hour and a LoS ‘C’ during the afternoon peak hour.

9.2.2. PROJECTED BACKGROUND 2025 OPERATIONS

Figure 10 illustrates the future background traffic volumes for the year 2025, including both background growth and other area developments generated traffic. Table 7 summarizes the future background operations for the year 2025 future background traffic volumes. The SYNCHRO model output of 2025 background conditions are provided within Appendix F.

Figure 10: Projected Background 2025 Traffic Volumes

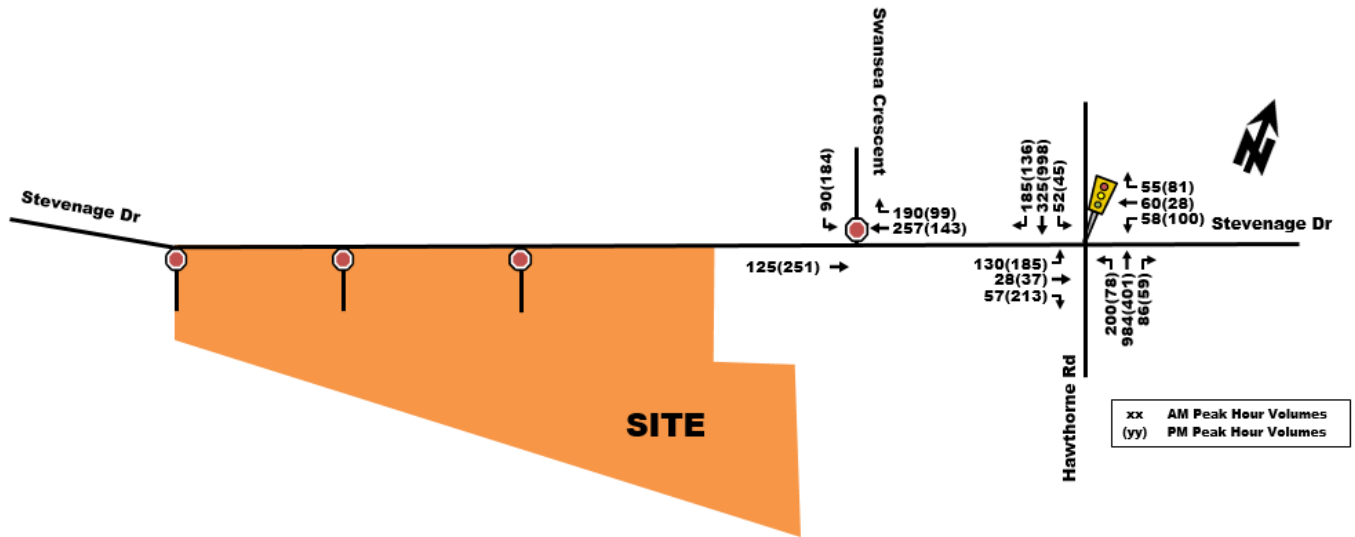


Table 7: Projected Background 2025 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Hawthorne/Stevenage	B(C)	0.62(0.73)	EBL(EBL)	13.8(18.1)	A(A)	0.52(0.54)

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.

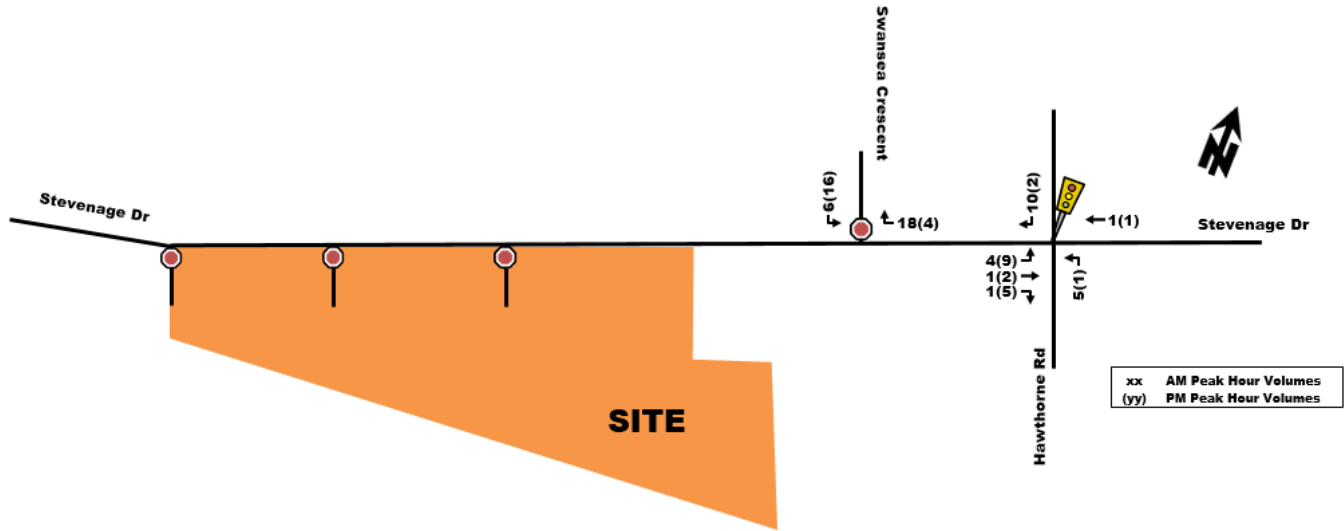
As shown in Table 7, the Hawthorne/Stevenage intersection 'as a whole' is projected to continue operating at an excellent LoS 'A' during the weekday peak hours. With regard to the 'critical movements', the eastbound left-turn movement is operating at a LoS 'B' during the morning peak hour and a LoS 'C' during the afternoon peak hour.

9.3. OTHER AREA DEVELOPMENTS

9.3.1. 3000 SWANSEA CRESCENT

As discussed in Section 4.1, The City of Ottawa received a Site Plan application on December 18, 2015 to construct a 10,800 square metre warehouse addition to the existing warehouse facility, as well as a new loading and parking area at the west end of the subject property. Although this development has been completed, the associated traffic generated has not been accounted in the 2016 traffic counts provided by the City of Ottawa. Therefore, the trip generation from the Traffic Brief (2015), illustrated in Figure 11, was included in the background traffic conditions.

Figure 11: 3000 Swansea Crescent Projected Traffic Volumes



10. DEMAND RATIONALIZATION

Considering adjacent area transportation network and that less than 80 car-trips are anticipated for this site, need and opportunity for demand rationalization of this site is limited.

11. DEVELOPMENT DESIGN

11.1. DESIGN FOR SUSTAINABLE MODES

Vehicle parking is proposed in a surface parking lot. A total of 205 parking spaces will be provided, including an additional 136 for the expansion. With regard to bicycle parking, a minimum of 18 bicycle parking spaces are required to meet the City's Bylaw Requirements.

Transit service within the vicinity of the site is currently provided by OC Transpo Local Route #47. Bus stops are provided on Stevenage Drive at Swansea Crescent, approximately 220 m from the site. An additional stop is provided on Stevenage Drive, approximately 200 m west of the site, as depicted in Figure 4.

Sidewalk facilities within the vicinity of the site are provided along both sides of Hawthorne Road. There are currently no pedestrian facilities provided on Stevenage Drive.

11.2. CIRCULATION AND ACCESS

Three existing driveway accesses will be used to access the site, with an existing fourth access removed along the frontage of the subject site. All three of these accesses will be full-movement driveways. A 6.0m fire route has been provided around the site and truck movements within the site can be facilitated at the loading doors/docks and permit vehicles to circulate the site.

12. PARKING

12.1. PARKING SUPPLY

Vehicle Parking

A total of 205 parking spaces in a surface parking lot are proposed to serve the users of the proposed development. This amount of parking meets the City's minimum By-Law requirements for a warehouse within Area C, identified on the City's Schedule 1A.

The majority of parking spaces (205 spaces) are noted to at minimum 5.2 m in length and 2.6 m in width. These parking space dimensions meet the City's By-Law requirements. A total of eight parking spaces are provided as accessible parking spaces.

Bicycle Parking

Approximately 18 bicycle parking spaces are required to meet the City's minimum requirement with respect to the City's By-Law.

13. BOUNDARY STREET DESIGN

The boundary street for the development is Stevenage Drive. At this time, there has not been any complete street concept prepared for this street. The existing roadway's geometry consists of the following features:

- 1 vehicle travel lanes in each direction;
- Less than 3,000 vehicles per day per lane;
- Unposted speed limit of 50km/h; and,
- 5.5 m wide lanes.

The multi-modal level of service analysis for the road segment along the boundary street adjacent to the site is summarized in Table 8, with detail analysis provided in Appendix G. The existing MMLoS targets for the Employment Area were used for this site and are shown in Table 8.

Table 8: MMLoS – Boundary Street Segments, Employment Area

Road Segment	Level of Service							
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TkLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TLOS	Target
Stevenage Drive	F	C	D	No target	D	No Target	B	D

As shown in Table 8, the pedestrian target level of service is not currently met and the truck level of service is met along Stevenage Drive. As there are no transit priority measures planned for Stevenage Drive and it does not form part of the cycling network, there are no target levels of service for transit or cyclists.

With regard to pedestrians, the target PLoS 'C' could be met along Stevenage Drive with the addition of a 1.8m sidewalk.

14.ACCESS INTERSECTION DESIGN

14.1. LOCATION AND DESIGN OF ACCESS

Three existing driveway accesses will be used to access the site, with an existing fourth access removed along the frontage of the subject site. All three of these accesses will be full-movement driveways with shared lanes (e.g. shared left-through on Stevenage, shared left-right from the site). No auxiliary lanes are proposed to support the site.

14.2. INTERSECTION CONTROL

Based on the projected number of vehicles traveling to/from the site's driveway, YIELD-control on the minor approach (site driveway) is recommended. No further traffic control or turn lanes are warranted at all site driveways.

14.3. INTERSECTION DESIGN

14.3.1. STOPPING SIGHT-DISTANCE

Stopping sight distances will be assessed at the sites driveways of Access #1 and Access #3. The vehicles used in this analysis include passenger vehicles at Access #1 and WB20 sized trucks for Access #3. Sight distances were determined according to the 2017 Transportation Association of Canada Geometric Design Guide for Canadian Roads-Chapter 9, for both outbound left and right turns. Stevenage Drive has an assumed operating speed of 50 km/h for the purposes of this analysis.

Table 9 displays the recommended sight distances, whereas Figure 12 and Figure 13 illustrate the resulting sight distances at Access#1 and Access#3, respectively.

Table 9: Site-Access Sight-Distance

Vehicle Type	Recommended Intersection Sight Distance with Yield Control (m)	
	Left Turn	Right Turn
Passenger Vehicle	115	115
WB 20 Truck	170	170
Notes Assumed operating speed: 50 km/h. Left-turns and right-turns correspond to outbound vehicles from the minor approach. Sight distances are for vehicles on the main road (Stevenage).		

Figure 12: Access #1 Sight Triangle for Passenger Vehicles Turning Right or Left with Yield Control from Minor

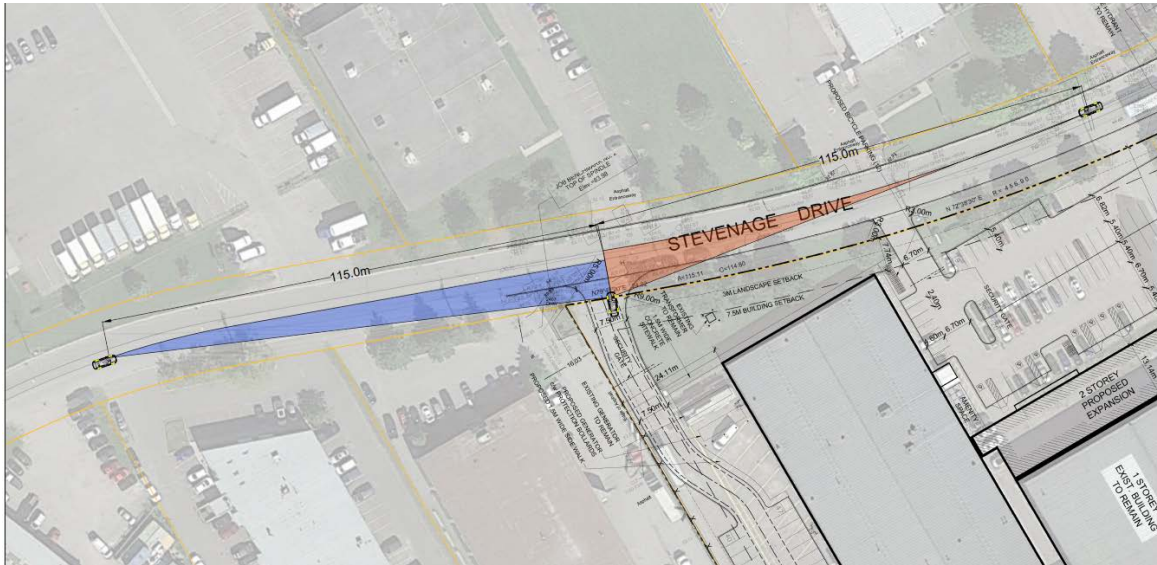
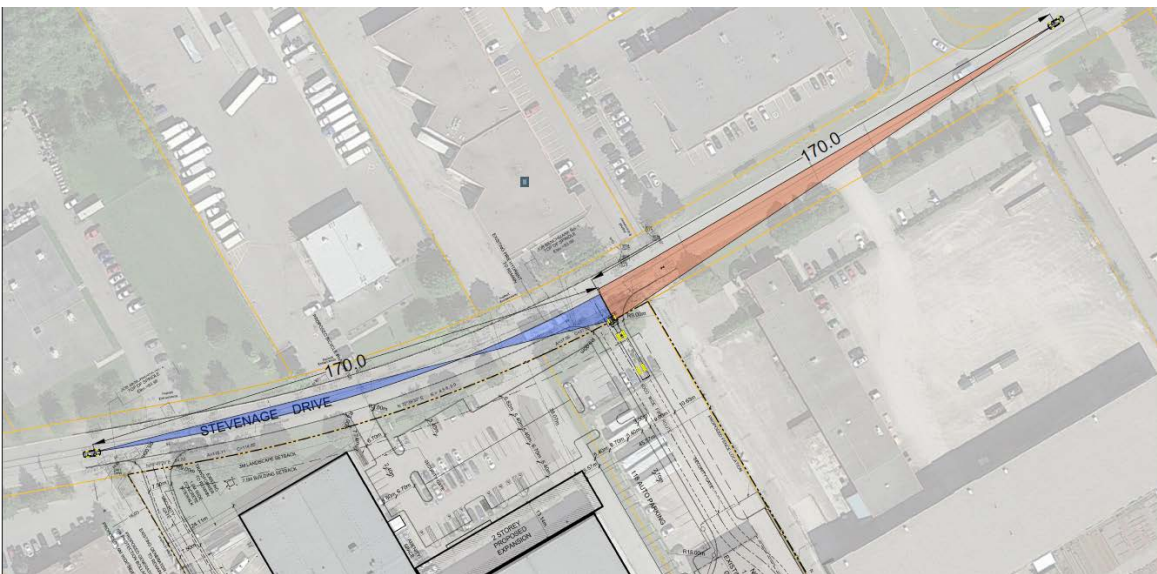


Figure 13: Access #3 Sight Triangle for WB20 Truck Turning Right or Left with Yield Control from Minor

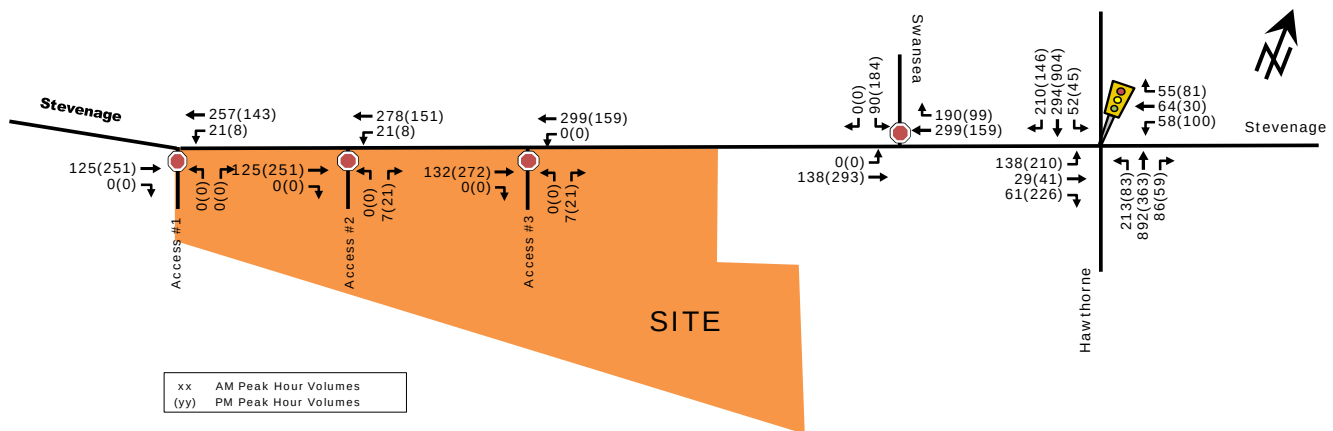


Based on the foregoing analysis, both locations meet minimum recommended sight distances.

14.3.2. TOTAL PROJECTED 2020 CONDITIONS – FULL BUILD-OUT

The total projected 2020 traffic volumes were derived by superimposing the site-generated traffic volumes onto 2020 background traffic volumes. The resulting total projected 2020 traffic volumes are illustrated in Figure 14.

Figure 14: Total Projected 2020 Traffic Volumes



The following Table 11 provides a summary of the total projected operations at the study area intersection based on the SYNCHRO (V10) traffic analysis software for Phase 1 build-out year 2020. The SYNCHRO model output of 2020 projected conditions is provided within Appendix H.

Table 10: Total Projected 2020 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Hawthorne/Stevenage	B(C)	0.65(0.77)	EBL(EBL)	14.0(18.5)	A(A)	0.49(0.52)
Stevenage/Access 1	A(A)	0.6(0.4)	WB(WB)	0.4(0.2)	A(A)	-
Stevenage/Access 2	A(A)	9.0(9.8)	NB(NB)	0.5(0.6)	A(A)	-
Stevenage/Access 3	A(A)	9.0(10.0)	NB(NB)	0.1(0.5)	A(A)	-
Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.						

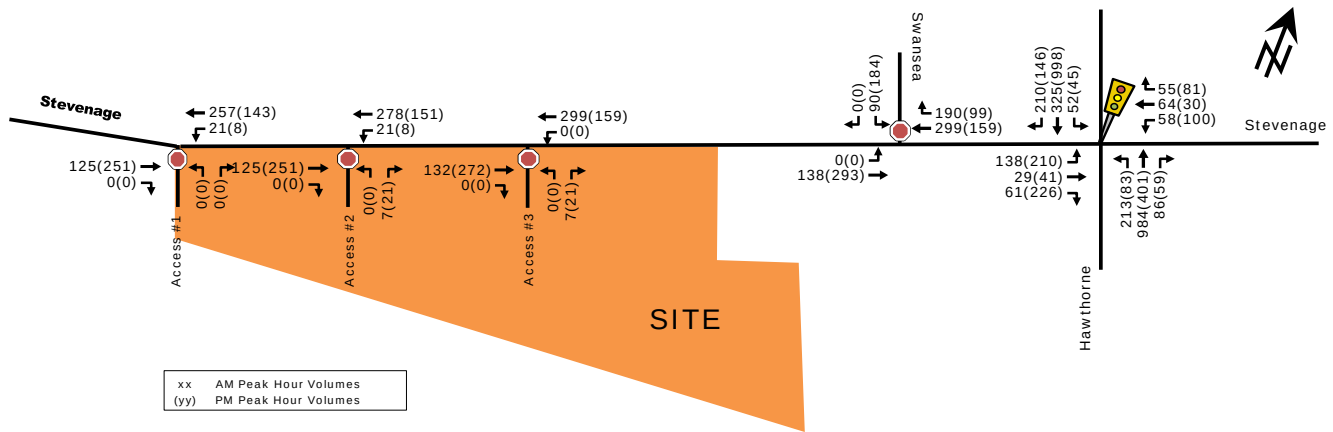
As shown in Table 11, the Hawthorne/Stevenage intersection is projected to continue operating similar to existing conditions, with slight increases in v/c and delays due to site-generated trips and background traffic. The intersection is projected to continue to operate 'as a whole' with a LoS 'A'. Critical movements at this intersection are projected to operate at a LoS 'B' during the morning peak hour and LoS 'C' during the afternoon peak hour.

The three unsignalized Site Access intersection are also projected to operate 'as a whole' with a LoS 'A'. Critical movements are also projected to operate at LoS 'A' with minimal delays.

14.3.3. TOTAL PROJECTED 2025 CONDITIONS – FULL BUILD-OUT + 5 YEARS

The total projected 2025 traffic volumes were derived by superimposing the site-generated traffic volumes onto 2025 background traffic volumes. The resulting total projected 2025 traffic volumes are illustrated in Figure 15.

Figure 15: Total Projected 2025 Traffic Volumes



The following Table 11 provides a summary of the total projected operations at the study area intersection based on the SYNCHRO (V10) traffic analysis software at full-site build out. The SYNCHRO model output of 2025 projected conditions is provided within Appendix I.

Table 11: Total Projected 2025 Performance at Study Area Intersections

Intersection	Weekday AM Peak (PM Peak)					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Hawthorne/Stevenage	B(C)	0.65(0.77)	EBL(EBL)	14.3(19.0)	A(A)	0.53(0.56)
Stevenage/Access 1	A(A)	0.6(0.4)	WBT(WBT)	0.4(0.2)	A(A)	-
Stevenage/Access 2	A(A)	9.0(9.8)	NB(NB)	0.5(0.6)	A(A)	-
Stevenage/Access 3	A(A)	9.0(10.0)	NB(NB)	0.1(0.5)	A(A)	-

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.

As shown in Table 12, the Hawthorne/Stevenage intersection is projected to continue operating similar to existing conditions and the three unsignalized Site Access intersections are also projected to operate similar to the 2020 conditions.

15. NEIGHBOURHOOD TRAFFIC MANAGEMENT

The main access route to the proposed development includes Hawthorne Road, which is a designated arterial roadway and Stevenage Drive, which is a designated local roadway. A secondary access route includes Hawthorne Road to Ages Drive which connects to Legacy Road, which then connects to Swansea Crescent and leads to Stevenage Drive. The closest access to the arterial road network to/from the area of study is the Stevenage/Hawthorne signalized intersection. Traffic volumes on Stevenage Drive are currently above the City of Ottawa threshold by more than 300 veh/h established for local roads, which indicates a potential need to manage existing traffic in the area. SYNCHRO analysis at the proposed accesses (Section 14.3) indicates appropriate levels of service and low anticipated delays.

Considering the secondary access route includes other local roads and interaction with a significantly larger number of driveways and intersections, as compared with the main access route, it is recommended that access to/from the subject development be managed via Stevenage Drive. Although Stevenage Drive is designated as a local roadway, in practice it functions as a collector roadway for the surrounding industrial uses and distributes industrial-related traffic to the adjacent arterial network. No residential uses and related activities are identified in the area. As such, no neighbourhood traffic management measures are considered necessary for this corridor.

It is worth noting that directional closures are not recommended at this location due to the limited number of access routes to/from the arterial network and the heavy industrial character of the area.

16. TRANSIT

Total “new” two-way transit trips are approximately 10 persons/h during the weekday peak hours. This amount of person trips can be accommodated on the existing transit route that travels adjacent to the site.

17. INTERSECTION DESIGN

17.1. INTERSECTION CONTROL

The Hawthorne and Stevenage intersection is projected to operate at acceptable levels of service in the forecasted horizons, therefore, no modifications are recommended.

17.2. INTERSECTION DESIGN

The MMLoS analysis for the signalized Hawthorne and Stevenage intersection is summarized in Table 12. The detailed MMLoS analysis is provided as Appendix G.

Table 12: MMLoS – Signalized Hawthorne/Stevenage Intersection, Existing Conditions

Intersection	Level of Service							
	Pedestrian (PLOS)		Bicycle (BLOS)		Transit (TLOS)		Truck (TKLOS)	
	PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target
Hawthorne/ Stevenage	F	C	F	C	B	No target	C	B

The letters identified in red text in Table 12 do not meet the MMLoS targets for their designated area (general urban area). Within the study area there are no existing transit priority measures, as such, there is no target TLOS for this intersection. To meet the level of service targets at the intersection the following conceptual measures would be required:

- Pedestrian – No conceptual measures will reduce the pedestrian crossing delay to meet the MMLoS targets and no geometric changes will improve the PETSI scores to meet the MMLoS targets
- Bicycles – Providing 2-stage left-turn boxes on Hawthorne would improve these approaches to a BLOS ‘A’, and bike lanes on Stevenage would improve the BLOS to a ‘B’
- Trucks – The TkLOS cannot be met for the right turn movements from Hawthorne to Stevenage as an addition receiving lane would be required to improve from the TrLOS ‘C’

It should be noted that these elements are not a recommendation of elements to be implemented but are only provided as a reference to modifications required to reach the targets. Given there are limited potential improvements for pedestrians and cyclists at the Hawthorne/Stevenage intersection and given the industrial location of the site, no modifications to the Hawthorne/Stevenage intersection are recommended as part of this development.

18. SUMMARY OF IMPROVEMENTS INDICATED AND MODIFICATIONS OPTIONS

Based on the analysis herein, the following conclusions are provided:

Proposed Site

- The proposed development consists a 12,857m² expansion of the existing facilities to a total of 23,033 m²;

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- A total of 109 additional parking spaces will be provided with the expansion, totalling 205 spaces on site;
- A total of 18 bicycle parking spaces will be provided;
- The proposed expansion is estimated to be completed by 2020 and generate approximately 70-75 two-way person-trips per hour during the weekday peak hours; and
- Three existing accesses will be used to access the site via full-movement driveways, and a fourth access will be removed during the expansion.

Existing and Background Conditions

- The Hawthorne and Stevenage intersection currently operates at a level of service 'A' during peak hours;
- The pedestrian and cycling facilities at this location result in levels of service 'F' given the intersection timing, geometric size, speeds and volumes;
- Stevenage does not meet the MMLOS targets for pedestrian level of service as no sidewalk is currently provided;
- Based on the future growth to the north of the proposed site, a 2% traffic growth factor per annum was applied along Hawthorne, along with adjacent developments to account for future growth; and,
- No transit priority is present in the study area.

Projected Conditions

- Based on the forecasted conditions, the study area intersections will operate similar to the existing conditions.

Site Plan

- The number of vehicle and bicycle parking spaces meets the City's minimum By-Law requirement;
- Three existing site driveways will provide access to the site and be full-movement driveways. A fourth access will be removed as part of the proposed expansion; and
- No issues noted with respect to site circulation, truck turning movements or sight lines.

Boundary Streets

- No improvements are recommended for Stevenage to address any MMLOS deficiencies.

Transit Capacity

- No issues with the existing transit service capacity is noted for the existing or projected total conditions.

Study Area Intersection Design

- No improvements are recommended for the adjacent study area intersection at Hawthorne and Stevenage to address the existing MMLOS deficiencies.

Based on the foregoing, the proposed development is recommended to proceed from a transportation perspective.

Prepared By:



Andrés Pena, M.Sc.
Engineering Intern

Reviewed By:



Mark Baker, P.Eng., PM
Senior Transportation Engineer

Attachments

Appendix A

Screening Form

City of Ottawa 2017 TIA Guidelines

TIA Screening Form

Date

25-Jul-18

Project

2390 Stevenage Drive

Project Number

476830

Results of Screening	Yes/No
Development Satisfies the Trip Generation Trigger	Yes
Development Satisfies the Location Trigger	No
Development Satisfies the Safety Trigger	Yes

Module 1.1 - Description of Proposed Development	
Municipal Address	2390 Stevenage Drive.
Description of location	Existing Tannis food warehousing and distribution facilities with corresponding parking and loading areas.
Land Use	Industrial
Development Size	19,764 Sq.m. of industrial use, as part of the Tannis food distribution centre expansion.
Number of Accesses and Locations	Proposal includes four access points to Stevenage Drive, distributed along site frontage.
Development Phasing	Single Phase
Buildout Year	2020
Sketch Plan / Site Plan	See attached

Module 1.2 - Trip Generation Trigger	
Land Use Type	Industrial
Development Size	19,764 sq. m
Trip Generation Trigger Met?	Yes

Module 1.3 - Location Triggers	
Development Proposes a new driveway to a boundary street that is designated as part of the City's Transit Priority, Rapid Transit, or Spine Bicycle Networks (See Sheet 3)	No
Development is in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone. (See Sheet 3)	No
Location Trigger Met?	No

Module 1.4 - Safety Triggers	
Posted Speed Limit on any boundary road	<80 km/h
Horizontal / Vertical Curvature on a boundary street limits sight lines at a proposed driveway	Yes
A proposed driveway is 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) or within auxiliary lanes of an intersection;	No
A proposed driveway makes use of an existing median break that serves an existing site	No
There is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development	No
The development includes a drive-thru facility	No
Safety Trigger Met?	Yes

Harte, Andrew

From: Pena-cabra, Andres
Sent: Monday, August 13, 2018 11:51 AM
To: Harte, Andrew
Subject: FW: Tannis Food Distributors 2390 Stevenage Drive - TIA Screening-Scoping Report

Fyi,

Andrés Pena
Engineer in Training
1223 Michael St, Suite 100, Gloucester, ON K1J7T2
andres.pena-cabra@parsons.com +1 613.738.4160

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From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: Monday, August 13, 2018 11:47 AM
To: Pena-cabra, Andres <Andres.Pena-cabra@parsons.com>
Cc: Bernier, John <John.Bernier@ottawa.ca>
Subject: RE: Tannis Food Distributors 2390 Stevenage Drive - TIA Screening-Scoping Report

Andres,

Please proceed with the next step.

And address the fourth access which does not meet the Private Approach By-Law, based on property frontage length.

Thank you,

Wally Dubyk
Project Manager - Transportation Approvals
Development Review, Central & South Branches
613-580-2424 x13783

From: Pena-cabra, Andres <Andres.Pena-cabra@parsons.com>
Sent: Thursday, August 09, 2018 4:51 PM
To: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Cc: Harte, Andrew <Andrew.Harte@parsons.com>; Nahas, Rani <Rani.Nahas@parsons.com>
Subject: Tannis Food Distributors 2390 Stevenage Drive - TIA Screening-Scoping Report

Good afternoon Wally,

Please find attached the Screening and Scoping Report for the Tannis Food Distributors' proposed expansion of 2390 Stevenage Drive facilities.

Andrew Harte is currently on vacation and will be returning on August 13th.

However, If you have any questions or comments, feel free to give me a call or let me know a good time to call, and I will take note of your questions/comments and pass along to Andrew when he gets back.

Thank you,

Andrés Pena

Engineer in Training

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Appendix B

City of Ottawa Traffic Data



Turning Movement Count - 15 Minute Summary Report

HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 2
Eastbound: 0 Westbound: 0

HAWTHORNE RD

STEVENAGE DR

Time Period	Northbound			Southbound			Eastbound			Westbound									Grand Total
	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	
07:00 07:15	36	126	22	184	13	44	31	88	272	31	12	17	60	11	20	20	51	111	383
07:15 07:30	51	172	18	241	12	58	39	109	350	30	11	19	60	16	14	25	55	115	465
07:30 07:45	49	187	20	256	14	56	44	114	370	33	8	13	54	14	18	14	46	100	470
07:45 08:00	59	213	23	295	19	71	40	130	425	38	10	10	58	14	22	12	48	106	531
08:00 08:15	47	187	22	256	12	56	36	104	360	30	6	16	52	16	12	11	39	91	451
08:15 08:30	46	240	16	302	10	88	38	136	438	21	7	9	37	12	13	15	40	77	515
08:30 08:45	43	217	25	285	11	68	61	140	425	37	4	21	62	16	12	17	45	107	532
08:45 09:00	49	161	14	224	11	65	45	121	345	47	13	26	86	9	14	8	31	117	462
09:00 09:15	30	131	20	181	13	77	48	138	319	48	9	15	72	7	14	15	36	108	427
09:15 09:30	30	111	17	158	9	83	37	129	287	58	8	22	88	11	8	14	33	121	408
09:30 09:45	25	143	16	184	18	72	38	128	312	44	4	15	63	8	6	16	30	93	405
09:45 10:00	17	136	20	173	17	66	47	130	303	38	11	17	66	9	7	20	36	102	405
11:30 11:45	19	93	18	130	15	74	36	126	256	36	8	20	64	19	3	25	47	111	367
11:45 12:00	24	97	15	136	8	91	54	153	289	47	12	13	72	8	13	20	41	113	402
12:00 12:15	10	104	16	130	20	104	46	170	300	39	23	32	94	11	16	11	38	132	432
12:15 12:30	21	94	19	134	18	113	48	179	313	33	6	21	60	12	8	15	35	95	408
12:30 12:45	14	99	19	132	19	88	48	155	287	36	11	13	60	11	17	18	46	106	393
12:45 13:00	30	98	22	150	17	100	39	156	306	39	7	25	71	12	9	13	34	105	411
13:00 13:15	27	127	16	170	10	113	50	173	343	49	12	20	81	16	11	22	49	130	473
13:15 13:30	24	89	18	131	15	108	57	180	311	44	13	30	87	9	4	18	31	118	429
15:00 15:15	30	97	17	144	12	130	44	186	330	41	6	38	85	18	4	13	35	120	450
15:15 15:30	15	123	19	157	7	149	41	198	355	51	8	50	109	10	7	19	36	145	500
15:30 15:45	17	86	18	121	19	172	29	220	341	24	12	38	74	15	10	12	37	111	452
15:45 16:00	23	92	14	129	12	186	33	231	360	38	18	45	101	15	17	12	44	145	505
16:00 16:15	11	99	16	126	6	169	34	209	335	44	12	60	116	11	7	25	43	159	494
16:15 16:30	23	77	17	117	9	221	30	260	377	30	8	45	83	14	8	15	37	120	497
16:30 16:45	13	85	23	121	8	185	37	230	351	39	15	54	108	32	12	20	64	172	523
16:45 17:00	26	99	8	133	14	191	27	232	365	51	7	40	98	26	6	25	57	155	520
17:00 17:15	15	88	11	114	14	272	40	326	440	56	5	69	130	28	1	21	50	180	620
17:15 17:30	17	80	18	115	10	186	34	230	345	25	7	38	70	17	5	14	36	106	451
17:30 17:45	22	100	6	128	8	149	28	185	313	31	3	34	68	16	6	19	41	109	422
17:45 18:00	16	73	8	97	6	132	19	157	254	29	2	18	49	9	4	6	19	68	322
TOTAL:	879	3924	551	5354	406	3737	1278	5423	10777	1237	298	903	2438	452	328	530	1310	3748	14525

Note: U-Turns are included in Totals.

Comment:



Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36598

HAWTHORNE RD @ STEVENAGE DR

Count Date: Wednesday, December 07, 2016

Start Time: 07:00

Time Period	HAWTHORNE RD			STEVENAGE DR			Grand Total
	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	
07:00 08:00	0	0	0	0	0	0	0
08:00 09:00	0	0	0	0	0	0	0
09:00 10:00	0	1	1	0	0	0	1
11:30 12:30	0	0	0	0	0	0	0
12:30 13:30	0	0	0	0	0	0	0
15:00 16:00	0	0	0	0	0	0	0
16:00 17:00	0	0	0	0	0	0	0
17:00 18:00	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	1

Comment:

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

Transportation Services - Traffic Services

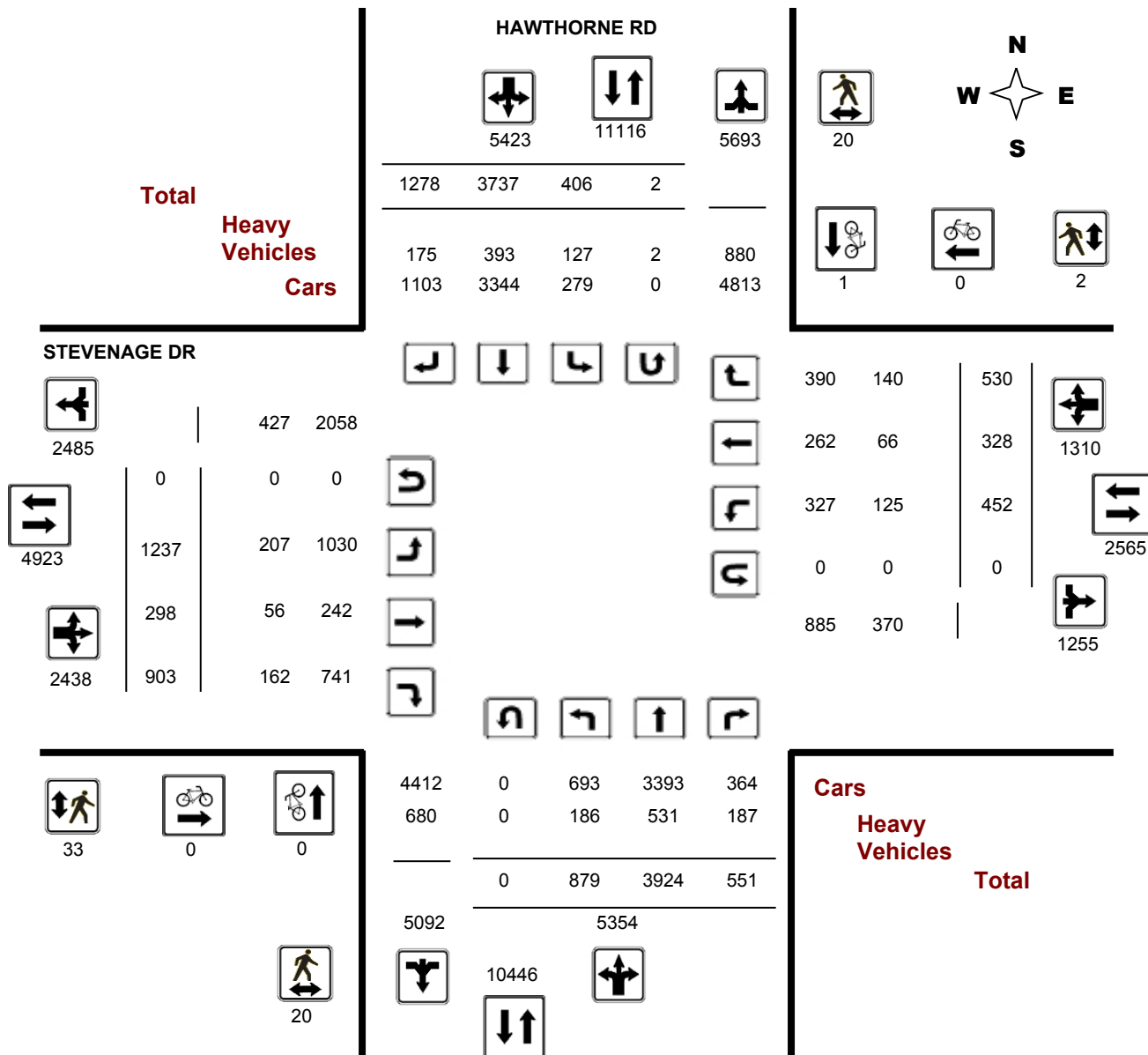
Turning Movement Count - Full Study Diagram

HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

WO#: 36598

Device: Miovision





Transportation Services - Traffic Services

W.O.
36598

Turning Movement Count - Heavy Vehicle Report

HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

HAWTHORNE RD										STEVENAGE DR											
Time Period	Northbound			Southbound			S TOT	STR TOT	Eastbound			Westbound			W TOT	STR TOT	Grand Total				
	LT	ST	RT	N TOT	LT	ST			RT	LT	ST	RT	E TOT	LT				ST	RT		
07:00	08:00	9	64	16	89	17	56	16	89	178	30	7	25	62	24	4	31	59	121	299	
08:00	09:00	18	114	30	162	9	62	16	87	249	29	10	28	67	22	9	14	45	112	361	
09:00	10:00	23	92	22	137	20	52	24	96	233	70	14	25	109	16	5	24	45	154	387	
11:30	12:30	14	56	34	104	23	37	21	82	186	13	11	20	44	13	7	26	46	90	276	
12:30	13:30	16	45	24	85	19	42	24	85	170	26	3	11	40	12	10	18	40	80	250	
15:00	16:00	39	63	23	125	13	63	24	101	226	18	8	19	45	11	12	12	35	80	306	
16:00	17:00	25	64	26	115	13	39	23	75	190	11	3	18	32	12	13	10	35	67	257	
17:00	18:00	42	33	12	87	13	42	27	82	169	10	0	16	26	15	6	5	26	52	221	
Sub Total		186	531	187	904	127	393	175	697	1601	207	56	162	425	125	66	140	331	756	2357	
U-Turns (Heavy Vehicles)					0				2	2				0				0	0	2	
Total		186	531	187	0	127	393	175	699	1603	207	56	162	425	125	66	140	331	756	2359	

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



Transportation Services - Traffic Services

Work Order

36598

Turning Movement Count - Pedestrian Volume Report

HAWTHORNE RD @ STEVENAGE DR

Count Date: Wednesday, December 07, 2016

Start Time: 07:00

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	1	2	3	3	0	3	6
07:15 07:30	7	7	14	4	1	5	19
07:30 07:45	0	0	0	0	0	0	0
07:45 08:00	2	0	2	1	0	1	3
07:00 08:00	10	9	19	8	1	9	28
08:00 08:15	1	0	1	2	0	2	3
08:15 08:30	1	0	1	1	0	1	2
08:30 08:45	0	0	0	0	0	0	0
08:45 09:00	0	0	0	0	0	0	0
08:00 09:00	2	0	2	3	0	3	5
09:00 09:15	1	1	2	1	0	1	3
09:15 09:30	0	2	2	1	0	1	3
09:30 09:45	0	1	1	1	0	1	2
09:45 10:00	0	0	0	0	0	0	0
09:00 10:00	1	4	5	3	0	3	8
11:30 11:45	0	1	1	4	0	4	5
11:45 12:00	1	1	2	2	1	3	5
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	1	0	1	1	0	1	2
11:30 12:30	2	2	4	7	1	8	12
12:30 12:45	2	0	2	1	0	1	3
12:45 13:00	0	0	0	0	0	0	0
13:00 13:15	0	1	1	0	0	0	1
13:15 13:30	1	0	1	0	0	0	1
12:30 13:30	3	1	4	1	0	1	5
15:00 15:15	0	0	0	2	0	2	2
15:15 15:30	0	0	0	1	0	1	1
15:30 15:45	0	2	2	0	0	0	2
15:45 16:00	0	0	0	0	0	0	0
15:00 16:00	0	2	2	3	0	3	5
16:00 16:15	0	0	0	3	0	3	3
16:15 16:30	0	0	0	0	0	0	0
16:30 16:45	0	0	0	1	0	1	1
16:45 17:00	0	1	1	2	0	2	3
16:00 17:00	0	1	1	6	0	6	7
17:00 17:15	0	1	1	1	0	1	2
17:15 17:30	0	0	0	0	0	0	0
17:30 17:45	1	0	1	0	0	0	1
17:45 18:00	1	0	1	1	0	1	2
17:00 18:00	2	1	3	2	0	2	5
Total	20	20	40	33	2	35	75

Comment:

Turning Movement Count - Full Study Summary Report

HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

Total Observed U-Turns

AADT Factor

Northbound: 0 Southbound: 2
Eastbound: 0 Westbound: 0
1.00

Full Study

HAWTHORNE RD										STEVENAGE DR											
Northbound					Southbound					Eastbound					Westbound						
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total		
07:00 08:00	195	698	83	976	58	229	154	441	1417	132	41	59	232	55	74	71	200	432	1849		
08:00 09:00	185	805	77	1067	44	277	180	501	1568	135	30	72	237	53	51	51	155	392	1960		
09:00 10:00	102	521	73	696	57	298	170	525	1221	188	32	69	289	35	35	65	135	424	1645		
11:30 12:30	74	388	68	530	61	382	184	627	1157	155	49	86	290	50	40	71	161	451	1608		
12:30 13:30	95	413	75	583	61	409	194	664	1247	168	43	88	299	48	41	71	160	459	1706		
15:00 16:00	85	398	68	551	50	637	147	834	1385	154	44	171	369	58	38	56	152	521	1906		
16:00 17:00	73	360	64	497	37	766	128	931	1428	164	42	199	405	83	33	85	201	606	2034		
17:00 18:00	70	341	43	454	38	739	121	898	1352	141	17	159	317	70	16	60	146	463	1815		
Sub Total	879	3924	551	5354	406	3737	1278	5421	10775	1237	298	903	2438	452	328	530	1310	3748	14523		
U Turns				0				2	2				0				0	0	2		
Total	879	3924	551	5354	406	3737	1278	5423	10777	1237	298	903	2438	452	328	530	1310	3748	14525		
EQ 12Hr	1222	5454	766	7442	564	5194	1776	7538	14980	1719	414	1255	3389	628	456	737	1821	5210	20190		
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													1.39								
AVG 12Hr	1222	5454	766	7442	564	5194	1776	7538	14980	1719	414	1255	3389	628	456	737	1821	5210	20190		
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													1.00								
AVG 24Hr	1601	7145	1003	9749	739	6805	2327	9875	19624	2252	543	1644	4439	823	597	965	2385	6824	26448		
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													1.31								

Comments:

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



Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

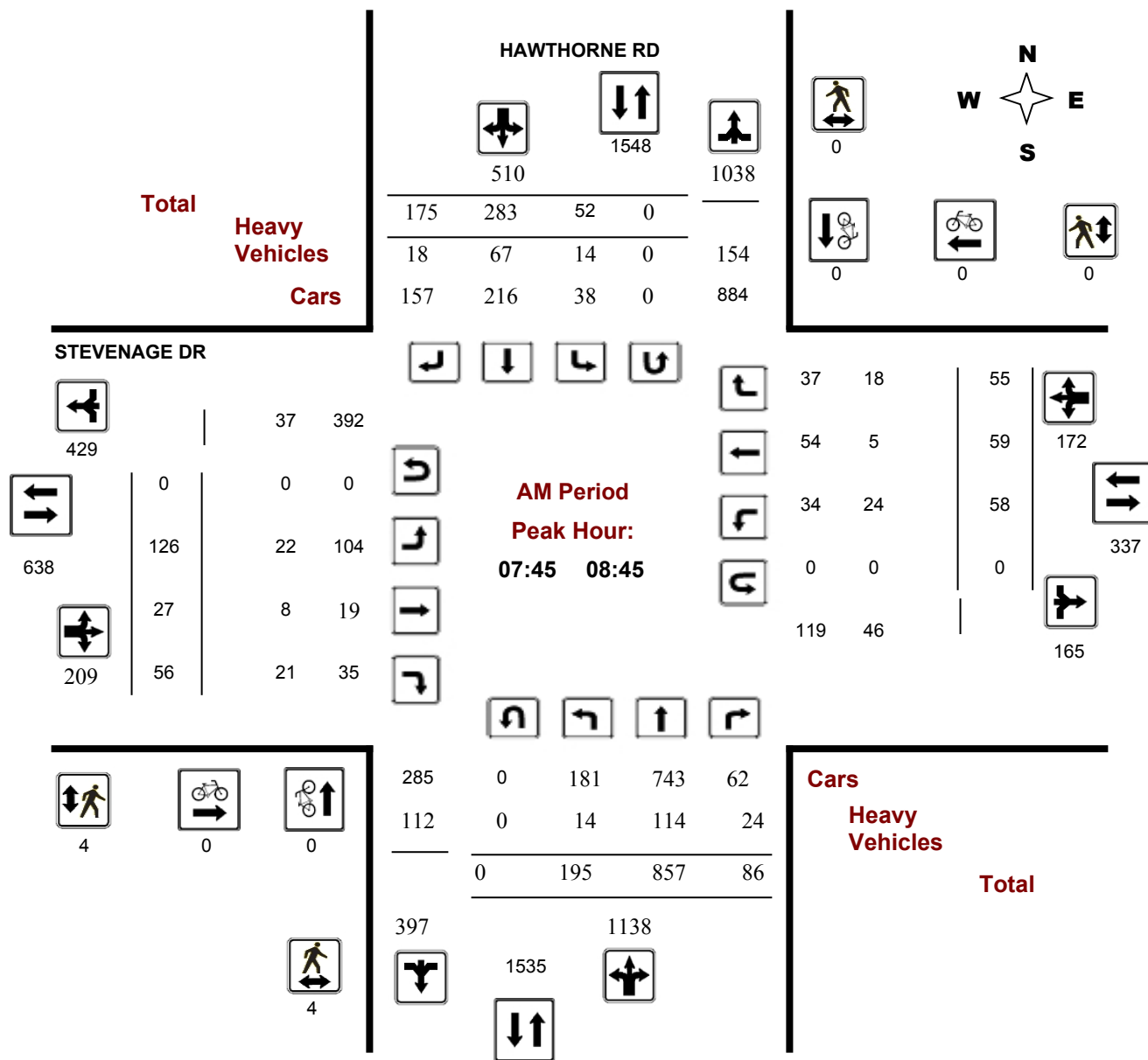
HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

Start Time: 07:00

WO No: 36598

Device: Miovision

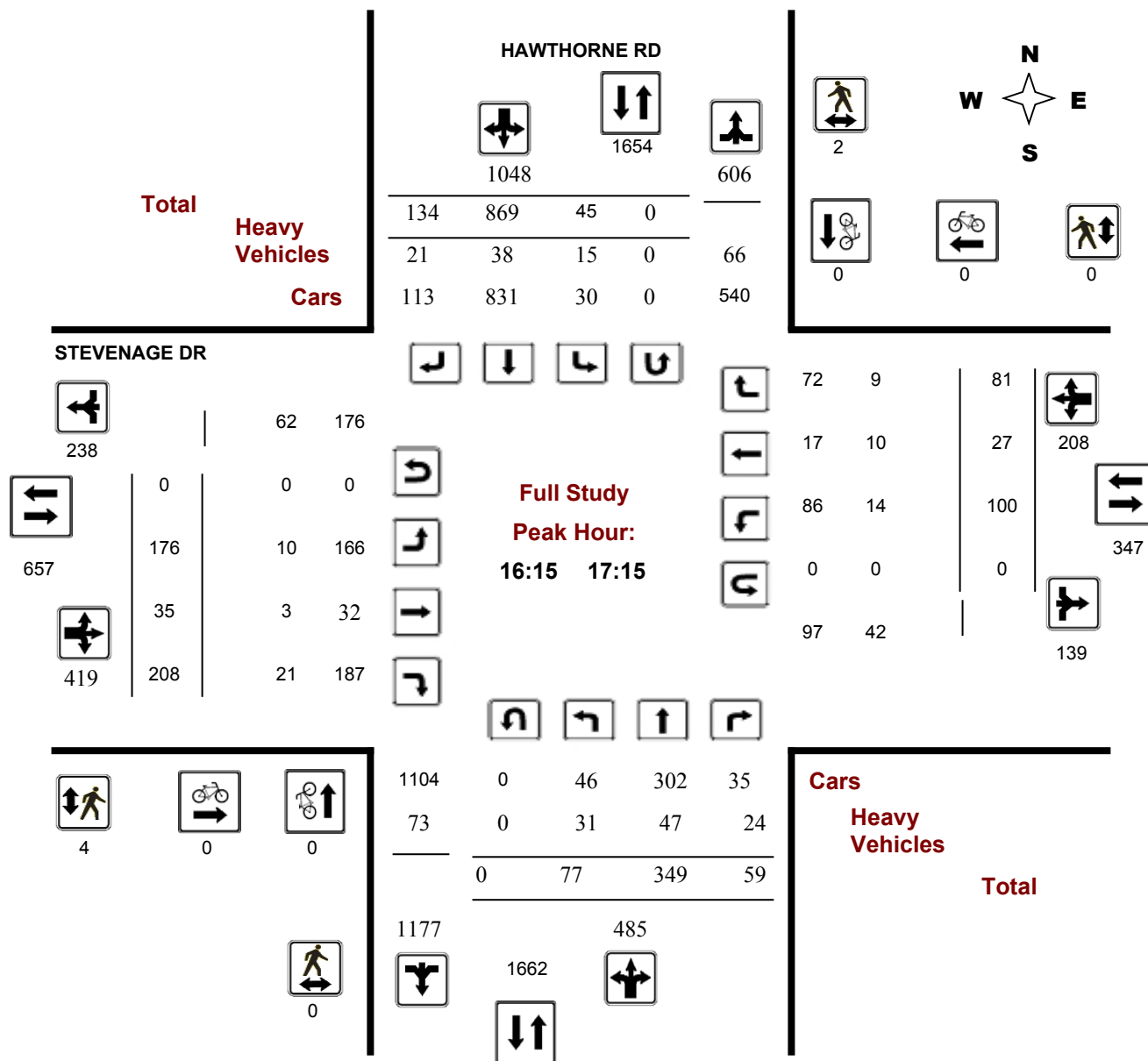


Survey Date: Wednesday, December 07, 2016

Start Time: 07:00

WO No: 36598

Device: Miovision

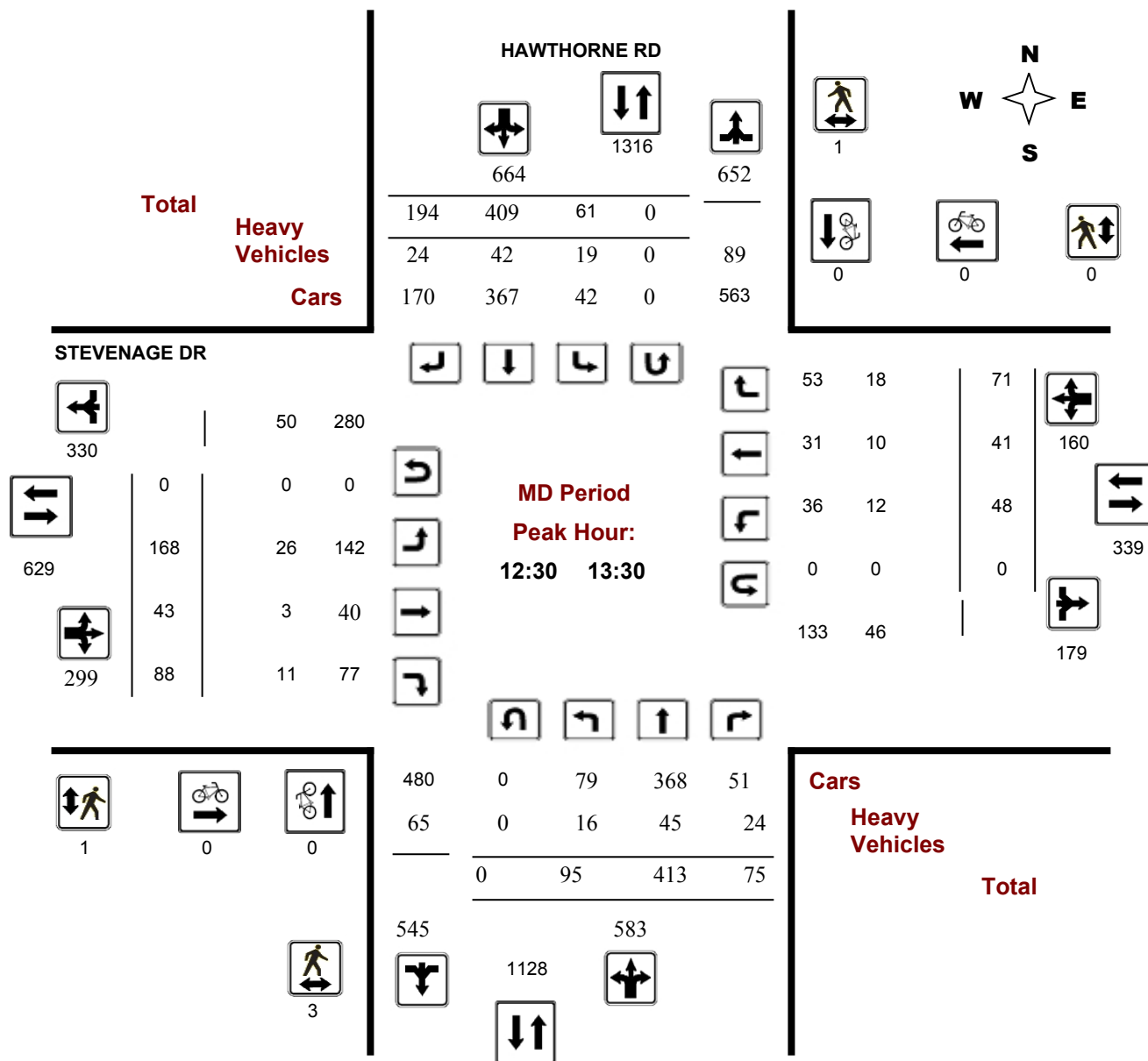


Survey Date: Wednesday, December 07, 2016

Start Time: 07:00

WO No: 36598

Device: Miovision





Transportation Services - Traffic Services

Turning Movement Count - Full Study Peak Hour Diagram

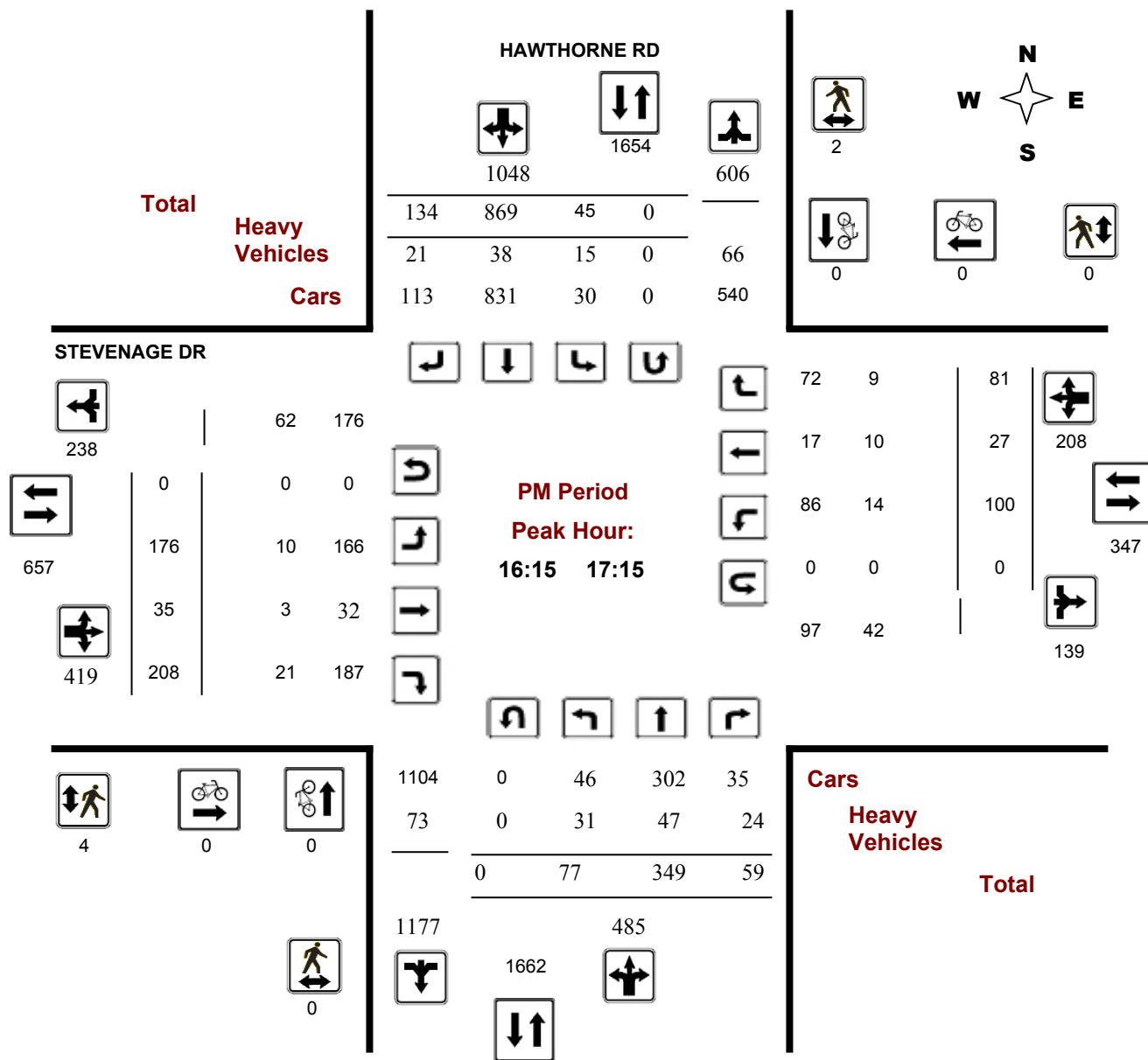
HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

Start Time: 07:00

WO No: 36598

Device: Miovision



Turning Movement Count - 15 Min U-Turn Total Report

HAWTHORNE RD @ STEVENAGE DR

Survey Date: Wednesday, December 07, 2016

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

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Operations Unit

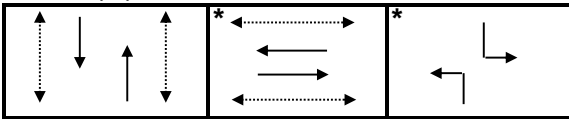
Intersection:	<i>Main:</i> Hawthorne	<i>Side:</i> Stevenage
Controller:	MS 3200	TSD: 6325
Author:	Sarah Saade	Date: 01-Aug-18

Existing Timing Plans†

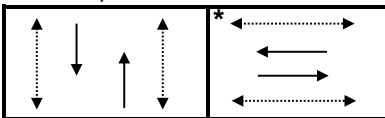
	Plan					Ped Minimum Time		
	AM Peak 1	Off Peak 2	PM Peak 3	Night 4	Weekend 5	Walk	DW	A+R
Cycle	90	85	95	65	80			
Offset	0	0	0	0	0			
NB Thru	40	35	45	40	55	20	7	4.2+1.3
SB Thru	40	35	45	40	55	20	7	4.2+1.3
EB Thru	35	35	35	25	25	7	12	3.3+2.4
WB Thru	35	35	35	25	25	7	12	3.3+2.4
NB Left	15	15	15	-	-	-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

Phasing Sequence‡

Plans: 1, 2, 3



Plans: 4, 5



Schedule

Weekday		Saturday		Sunday	
Time	Plan	Time	Plan	Time	Plan
0:15	4	0:15	4	0:15	4
6:30	1	6:30	2	6:30	2
9:30	2	11:00	5	21:00	4
15:00	3	19:30	2		
18:30	2	22:00	4		
21:30	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)

Appendix C

SYNCHRO Capacity Analysis: Existing Conditions

Existing AM
1: Stevenage Dr & Hawthorne Rd

08/09/2018



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	126	27	58	59	195	857	52	283	175
Future Volume (vph)	126	27	58	59	195	857	52	283	175
Lane Group Flow (vph)	137	90	63	124	212	1025	57	308	190
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	40.0	15.0	40.0	40.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	16.7%	44.4%	16.7%	44.4%	44.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	-1.7	-1.7	-1.7	-1.7	-1.7	-1.5	-1.7	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effect Green (s)	17.1	17.1	17.1	17.1	64.0	55.0	58.2	50.0	50.0
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.71	0.61	0.65	0.56	0.56
v/c Ratio	0.61	0.25	0.25	0.33	0.27	0.47	0.14	0.15	0.20
Control Delay	44.6	13.5	31.7	19.0	5.6	11.9	5.8	11.3	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	13.5	31.7	19.0	5.6	11.9	5.8	11.3	2.8
LOS	D	B	C	B	A	B	A	B	A
Approach Delay		32.3		23.3		10.8		7.8	
Approach LOS		C		C		B		A	
Queue Length 50th (m)	22.0	4.2	9.4	9.9	9.6	48.6	2.3	12.4	0.0
Queue Length 95th (m)	37.1	14.9	18.5	22.4	21.6	80.0	7.1	24.6	11.0
Internal Link Dist (m)		320.4		83.5		167.6		180.6	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	403	615	451	638	810	2160	466	1989	950
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	0.34	0.15	0.14	0.19	0.26	0.47	0.12	0.15	0.20

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 13.3

Intersection LOS: B

Intersection Capacity Utilization 57.2%

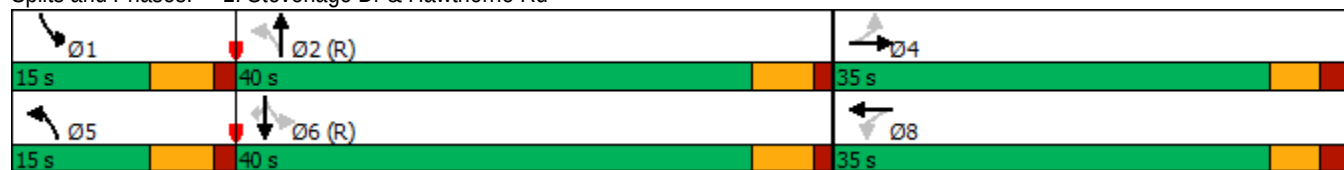
ICU Level of Service B

Analysis Period (min) 15

Existing AM
1: Stevenage Dr & Hawthorne Rd

08/09/2018

Splits and Phases: 1: Stevenage Dr & Hawthorne Rd



Existing PM
1: Stevenage Dr & Hawthorne Rd

08/09/2018



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	176	35	100	27	77	349	45	869	134
Future Volume (vph)	176	35	100	27	77	349	45	869	134
Lane Group Flow (vph)	191	264	109	117	84	443	49	945	146
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	45.0	15.0	45.0	45.0
Total Split (%)	36.8%	36.8%	36.8%	36.8%	15.8%	47.4%	15.8%	47.4%	47.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	5.7	5.5	5.7	5.5	5.5
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effect Green (s)	19.8	19.8	19.8	19.8	60.9	56.3	58.5	53.3	53.3
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.64	0.59	0.62	0.56	0.56
v/c Ratio	0.72	0.51	0.74	0.28	0.22	0.21	0.08	0.47	0.16
Control Delay	48.9	9.7	61.2	11.2	8.4	11.1	7.5	15.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	9.7	61.2	11.2	8.4	11.1	7.5	15.7	3.2
LOS	D	A	E	B	A	B	A	B	A
Approach Delay		26.1		35.3		10.6		13.7	
Approach LOS		C		D		B		B	
Queue Length 50th (m)	33.0	5.7	18.9	4.3	4.6	19.3	2.6	53.4	0.0
Queue Length 95th (m)	49.6	23.0	34.0	15.9	12.5	35.5	8.3	89.5	10.4
Internal Link Dist (m)		320.4		83.5		167.6		166.9	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	395	662	220	570	414	2085	678	2008	938
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	0.48	0.40	0.50	0.21	0.20	0.21	0.07	0.47	0.16

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 17.5

Intersection LOS: B

Intersection Capacity Utilization 70.1%

ICU Level of Service C

Analysis Period (min) 15

Existing PM
1: Stevenage Dr & Hawthorne Rd

08/09/2018

Splits and Phases: 1: Stevenage Dr & Hawthorne Rd



Appendix D

Collision Data and Analysis

Total Area

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	6	18	1	6	0	2	1	0	34
Non-fatal injury	3	4	0	2	0	0	0	0	9
Non reportable	0	0	0	0	0	0	0	0	0
Total	9	22	1	8	0	2	1	0	43
	# 2 or 21%	# 1 or 51%	# 5 or 2%	# 3 or 19%	# 7 or 0%	# 4 or 5%	# 5 or 2%	# 7 or 0%	

79%
21%
0%
100%

HAWTHORNE RD / STEVENAGE DR

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2017	31	34,176	1825	0.50

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	6	14	1	1	0	0	0	0	22
Non-fatal injury	3	4	0	2	0	0	0	0	9
Non reportable	0	0	0	0	0	0	0	0	0
Total	9	18	1	3	0	0	0	0	31
	29%	58%	3%	10%	0%	0%	0%	0%	

71%
29%
0%
100%

STEVENAGE DR / SWANSEA CRES

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2017	3	2,391	1825	0.69

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	0	0	2	0	1	0	0	3
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	0	0	0	2	0	1	0	0	3
	0%	0%	0%	67%	0%	33%	0%	0%	

100%
0%
0%
100%

STEVENAGE DR, SWANSEA CRES to HAWTHORNE RD

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2017	5	2,391	1825	1.15

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	2	0	2	0	0	1	0	5
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	0	2	0	2	0	0	1	0	5

100%
0%
0%
100%

STEVENAGE DR, SWANSEA CRES to SWANSEA CRES

Years	Total # Collisions	24 Hr AADT Veh Volume	Days	Collisions/MEV
2013-2017	4	2,391	1825	0.92

Classification of Accident	Rear End	Turning Movement	Sideswipe	Angle	Approaching	Single Vehicle (other)	Single vehicle (Unattended vehicle)	Other	Total
P.D. only	0	2	0	1	0	1	0	0	4
Non-fatal injury	0	0	0	0	0	0	0	0	0
Non reportable	0	0	0	0	0	0	0	0	0
Total	0	2	0	1	0	1	0	0	4
	0%	50%	0%	25%	0%	25%	0%	0%	

100%
0%
0%
100%

Appendix E

SYNCHRO Capacity Analysis: 2020 Background Conditions

BG 2020 AM
1: Hawthorne & Stevenage Drive

08/14/2018

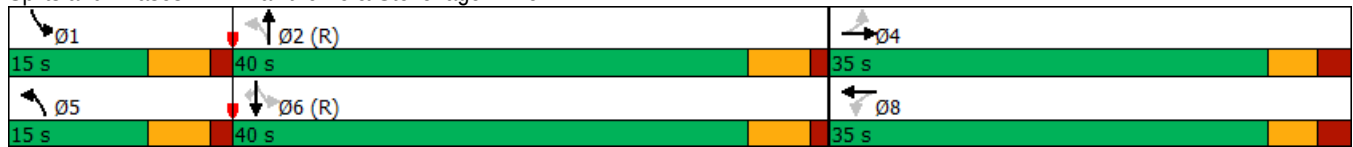
									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	130	28	58	60	200	892	52	294	185
Future Volume (vph)	130	28	58	60	200	892	52	294	185
Lane Group Flow (vph)	141	92	63	125	217	1063	57	320	201
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases		4		8	5	2	1	6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	40.0	15.0	40.0	40.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	16.7%	44.4%	16.7%	44.4%	44.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	-1.7	-1.7	-1.7	-1.7	-1.7	-1.5	-1.7	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	17.4	17.4	17.4	17.4	63.8	54.7	57.8	49.6	49.6
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.71	0.61	0.64	0.55	0.55
v/c Ratio	0.62	0.25	0.25	0.33	0.28	0.49	0.14	0.16	0.21
Control Delay	44.7	13.4	31.4	19.1	5.8	12.4	6.0	11.6	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	13.4	31.4	19.1	5.8	12.4	6.0	11.6	2.8
LOS	D	B	C	B	A	B	A	B	A
Approach Delay		32.4		23.2		11.3		8.0	
Approach LOS		C		C		B		A	
Queue Length 50th (m)	22.6	4.3	9.3	10.2	10.0	51.8	2.4	13.1	0.0
Queue Length 95th (m)	38.1	15.1	18.4	22.5	22.5	84.9	7.2	25.7	11.4
Internal Link Dist (m)		320.4		83.5		167.6		180.6	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	403	616	449	638	797	2151	451	1973	949
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	0.35	0.15	0.14	0.20	0.27	0.49	0.13	0.16	0.21

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.62
 Intersection Signal Delay: 13.6
 Intersection Capacity Utilization 57.7%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 1: Hawthorne & Stevenage Drive



BG 2020 PM
1: Hawthorne & Stevenage Drive

08/14/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	185	37	100	28	78	363	45	904	136
Future Volume (vph)	185	37	100	28	78	363	45	904	136
Lane Group Flow (vph)	201	272	109	118	85	459	49	983	148
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	45.0	15.0	45.0	45.0
Total Split (%)	36.8%	36.8%	36.8%	36.8%	15.8%	47.4%	15.8%	47.4%	47.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	5.7	5.5	5.7	5.5	5.5
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	20.5	20.5	20.5	20.5	60.3	55.6	57.9	52.6	52.6
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.63	0.59	0.61	0.55	0.55
v/c Ratio	0.73	0.51	0.72	0.28	0.24	0.22	0.08	0.50	0.16
Control Delay	49.1	9.5	58.7	11.0	8.9	11.6	7.8	16.4	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.1	9.5	58.7	11.0	8.9	11.6	7.8	16.4	3.3
LOS	D	A	E	B	A	B	A	B	A
Approach Delay		26.3		33.9		11.1		14.4	
Approach LOS		C		C		B		B	
Queue Length 50th (m)	34.7	6.0	18.8	4.5	4.8	20.7	2.7	57.4	0.0
Queue Length 95th (m)	51.8	23.2	33.7	15.9	12.9	37.6	8.4	95.6	10.7
Internal Link Dist (m)		320.4		83.5		167.6		166.9	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	394	666	217	570	394	2061	664	1983	929
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	0.51	0.41	0.50	0.21	0.22	0.22	0.07	0.50	0.16

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 17.8

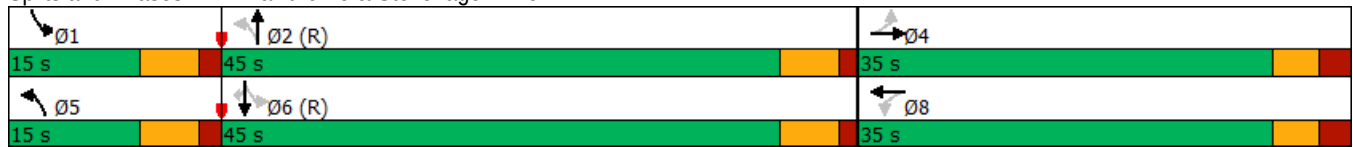
Intersection LOS: B

Intersection Capacity Utilization 71.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Hawthorne & Stevenage Drive



Appendix F

SYNCHRO Capacity Analysis: 2025 Background Conditions

BG 2025 AM
1: Hawthorne & Stevenage Drive

08/14/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	130	28	58	60	200	984	52	325	185
Future Volume (vph)	130	28	58	60	200	984	52	325	185
Lane Group Flow (vph)	141	92	63	125	217	1163	57	353	201
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	40.0	15.0	40.0	40.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	16.7%	44.4%	16.7%	44.4%	44.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	-1.7	-1.7	-1.7	-1.7	-1.7	-1.5	-1.7	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	17.4	17.4	17.4	17.4	63.8	54.7	57.8	49.6	49.6
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.71	0.61	0.64	0.55	0.55
v/c Ratio	0.62	0.25	0.25	0.33	0.28	0.54	0.16	0.18	0.21
Control Delay	44.7	13.4	31.4	19.1	5.8	13.1	6.2	11.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	13.4	31.4	19.1	5.8	13.1	6.2	11.7	2.8
LOS	D	B	C	B	A	B	A	B	A
Approach Delay		32.4		23.2		11.9		8.2	
Approach LOS		C		C		B		A	
Queue Length 50th (m)	22.6	4.3	9.3	10.2	10.0	59.1	2.4	14.6	0.0
Queue Length 95th (m)	38.1	15.1	18.4	22.5	22.5	96.6	7.2	28.3	11.4
Internal Link Dist (m)		320.4		83.5		167.6		180.6	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	403	616	449	638	775	2153	417	1973	949
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	0.35	0.15	0.14	0.20	0.28	0.54	0.14	0.18	0.21

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 13.8

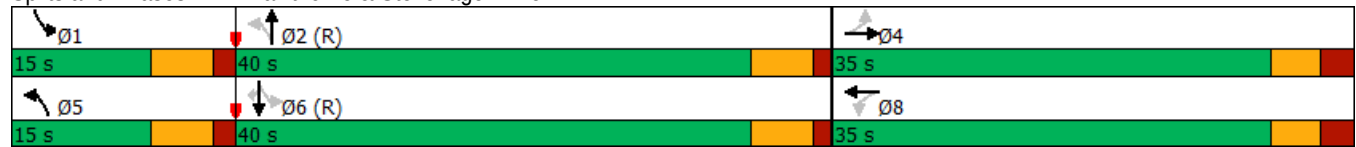
Intersection LOS: B

Intersection Capacity Utilization 58.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Hawthorne & Stevenage Drive



BG 2025 PM
1: Hawthorne & Stevenage Drive

08/14/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	185	37	100	28	78	401	45	998	136
Future Volume (vph)	185	37	100	28	78	401	45	998	136
Lane Group Flow (vph)	201	272	109	118	85	500	49	1085	148
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	45.0	15.0	45.0	45.0
Total Split (%)	36.8%	36.8%	36.8%	36.8%	15.8%	47.4%	15.8%	47.4%	47.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	5.7	5.5	5.7	5.5	5.5
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	20.5	20.5	20.5	20.5	60.3	55.6	57.9	52.6	52.6
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.63	0.59	0.61	0.55	0.55
v/c Ratio	0.73	0.51	0.72	0.28	0.26	0.24	0.08	0.55	0.16
Control Delay	49.1	9.5	58.7	11.0	9.3	11.8	7.8	17.3	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.1	9.5	58.7	11.0	9.3	11.8	7.8	17.3	3.3
LOS	D	A	E	B	A	B	A	B	A
Approach Delay		26.3		33.9		11.4		15.3	
Approach LOS		C		C		B		B	
Queue Length 50th (m)	34.7	6.0	18.8	4.5	4.8	23.0	2.7	65.8	0.0
Queue Length 95th (m)	51.8	23.2	33.7	15.9	12.9	41.4	8.4	109.2	10.7
Internal Link Dist (m)		320.4		83.5		167.6		166.9	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	394	666	217	570	360	2064	645	1983	929
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	0.51	0.41	0.50	0.21	0.24	0.24	0.08	0.55	0.16

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 18.1

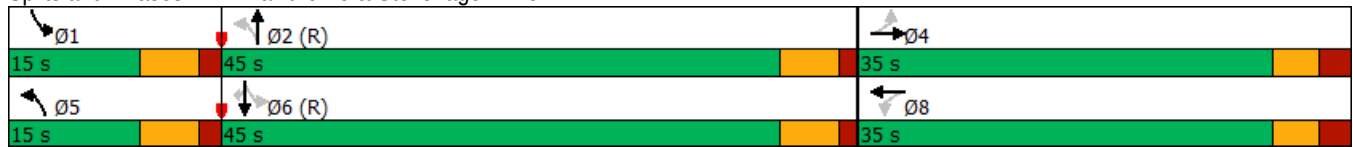
Intersection LOS: B

Intersection Capacity Utilization 74.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Hawthorne & Stevenage Drive



Appendix G

MMLOS Analysis

Multi-Modal Level of Service - Intersections Form

Consultant
Scenario
Comments

PARSONS
2390 Stevenage Drive TIA

Project
Date

476830-01000
Aug-18

INTERSECTIONS		Hawthorne/Stevenage			
Crossing Side		NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	7	7	5	5
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Protected/ Permissive	Protected/ Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RTOR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane	Conv'tl without Receiving Lane
	Corner Radius	15-25m	15-25m	15-25m	15-25m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	6	6	39	39
	Ped. Exposure to Traffic LoS	F	F	E	E
	Cycle Length	90	90	90	90
	Effective Walk Time	17	17	28	28
	Average Pedestrian Delay	30	30	21	21
	Pedestrian Delay LoS	D	D	C	C
	Level of Service	F	F	E	E
		F			
Approach From		NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	Not Applicable	Not Applicable	≤ 50 m	≤ 50 m
	Right Turning Speed	Not Applicable	Not Applicable	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	Not Applicable	Not Applicable	D	D
	Separated or Mixed Traffic	Separated	Separated	Mixed Traffic	Mixed Traffic
	Left Turn Approach	≥ 2 lanes crossed	≥ 2 lanes crossed	No lane crossed	No lane crossed
	Operating Speed	≥ 60 km/h	≥ 60 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	F	F	B	B
	Level of Service	F	F	D	D
		F			
Transit	Average Signal Delay			≤ 10 sec	≤ 10 sec
	Level of Service	-	-	B	B
		B			
Truck	Effective Corner Radius	> 15 m	> 15 m	> 15 m	> 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	≥ 2	≥ 2
	Level of Service	C	C	A	A
		C			
Auto	Volume to Capacity Ratio				
	Level of Service	-			

Multi-Modal Level of Service - Segments Form

Consultant
Scenario
Comments

PARSONS
2390 Stevenage Drive

Project
Date

476830-01
Aug-18

SEGMENTS		Street A	Stevenage	Section
			1	2
Pedestrian	Sidewalk Width	-	no sidewalk	1.8 m
	Boulevard Width		n/a	< 0.5 m
	Avg Daily Curb Lane Traffic Volume		≤ 3000	≤ 3000
	Operating Speed		> 50 to 60 km/h	> 50 to 60 km/h
	On-Street Parking		yes	yes
	Exposure to Traffic PLoS		F	C
	Effective Sidewalk Width			
	Pedestrian Volume			
	Crowding PLoS		-	-
Level of Service	-	-		
Bicycle	Type of Cycling Facility	D	Mixed Traffic	
	Number of Travel Lanes		≤ 2 (no centreline)	
	Operating Speed		≥ 50 to 60 km/h	
	# of Lanes & Operating Speed LoS		D	-
	Bike Lane (+ Parking Lane) Width			
	Bike Lane Width LoS		-	-
	Bike Lane Blockages			
	Blockage LoS		-	-
	Median Refuge Width (no median = < 1.8 m)		< 1.8 m refuge	
	No. of Lanes at Unsignalized Crossing		≤ 3 lanes	
	Sidestreet Operating Speed		≤ 40 km/h	
	Unsignalized Crossing - Lowest LoS		A	-
	Level of Service		D	-
Transit	Facility Type	D	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≥ 0.8	
	Level of Service		D	-
Truck	Truck Lane Width	B	> 3.7 m	
	Travel Lanes per Direction		1	
	Level of Service		B	-

Appendix H

SYNCHRO Capacity Analysis: 2020 Total Conditions

FT 2020 AM
1: Hawthorne & Stevenage Drive

09/05/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	138	29	58	64	211	892	52	294	210
Future Volume (vph)	138	29	58	64	211	892	52	294	210
Lane Group Flow (vph)	150	98	63	130	229	1063	57	320	228
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	40.0	15.0	40.0	40.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	16.7%	44.4%	16.7%	44.4%	44.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	-1.7	-1.7	-1.7	-1.7	-1.7	-1.5	-1.7	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	18.1	18.1	18.1	18.1	63.4	54.0	56.7	48.6	48.6
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.70	0.60	0.63	0.54	0.54
v/c Ratio	0.65	0.25	0.24	0.33	0.29	0.50	0.15	0.17	0.24
Control Delay	45.3	12.9	30.6	19.8	6.2	12.9	6.4	12.3	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	12.9	30.6	19.8	6.2	12.9	6.4	12.3	2.9
LOS	D	B	C	B	A	B	A	B	A
Approach Delay		32.5		23.3		11.7		8.2	
Approach LOS		C		C		B		A	
Queue Length 50th (m)	24.1	4.6	9.3	11.4	11.1	53.2	2.5	13.6	0.0
Queue Length 95th (m)	39.6	15.4	18.2	23.8	24.6	87.3	7.5	26.7	12.6
Internal Link Dist (m)		363.9		83.5		167.6		180.6	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	398	619	443	637	791	2125	444	1931	945
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	0.38	0.16	0.14	0.20	0.29	0.50	0.13	0.17	0.24

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 14.0
 Intersection Capacity Utilization 58.7%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 1: Hawthorne & Stevenage Drive



Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	125	0	21	257	0	0
Future Vol, veh/h	125	0	21	257	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	136	0	23	279	0	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	136	0	461	136
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	325	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1448	-	559	913
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	732	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1448	-	548	913
Mov Cap-2 Maneuver	-	-	-	-	548	-
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	732	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		0	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1448	-	
HCM Lane V/C Ratio	-	-	-	0.016	-	
HCM Control Delay (s)	0	-	-	7.5	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	-	-	-	0	-	

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	125	0	21	278	0	7
Future Vol, veh/h	125	0	21	278	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	136	0	23	302	0	8
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	136	0	484	136
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	348	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1448	-	542	913
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	715	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1448	-	532	913
Mov Cap-2 Maneuver	-	-	-	-	532	-
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	715	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		9	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	913	-	-	1448	-	
HCM Lane V/C Ratio	0.008	-	-	0.016	-	
HCM Control Delay (s)	9	-	-	7.5	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0	-	-	0	-	

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	132	0	0	299	0	7
Future Vol, veh/h	132	0	0	299	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	143	0	0	325	0	8
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	143	0	468	143
Stage 1	-	-	-	-	143	-
Stage 2	-	-	-	-	325	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1440	-	553	905
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	732	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1440	-	553	905
Mov Cap-2 Maneuver	-	-	-	-	553	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	732	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		9	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	905	-	-	1440	-	
HCM Lane V/C Ratio	0.008	-	-	-	-	
HCM Control Delay (s)	9	-	-	0	-	
HCM Lane LOS	A	-	-	A	-	
HCM 95th %tile Q(veh)	0	-	-	0	-	

FT 2020 PM
1: Hawthorne & Stevenage Drive

09/05/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	210	41	100	30	83	363	45	904	146
Future Volume (vph)	210	41	100	30	83	363	45	904	146
Lane Group Flow (vph)	228	291	109	121	90	459	49	983	159
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	45.0	15.0	45.0	45.0
Total Split (%)	36.8%	36.8%	36.8%	36.8%	15.8%	47.4%	15.8%	47.4%	47.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	5.7	5.5	5.7	5.5	5.5
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	22.2	22.2	22.2	22.2	58.7	53.9	56.1	50.8	50.8
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.62	0.57	0.59	0.53	0.53
v/c Ratio	0.77	0.51	0.69	0.27	0.26	0.23	0.08	0.51	0.18
Control Delay	50.2	9.3	53.6	10.8	9.7	12.3	8.4	17.6	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.2	9.3	53.6	10.8	9.7	12.3	8.4	17.6	3.4
LOS	D	A	D	B	A	B	A	B	A
Approach Delay		27.2		31.1		11.9		15.3	
Approach LOS		C		C		B		B	
Queue Length 50th (m)	38.7	6.8	18.1	4.7	5.7	22.3	3.0	62.1	0.0
Queue Length 95th (m)	59.1	25.3	34.2	16.4	13.5	37.6	8.4	95.6	11.1
Internal Link Dist (m)		363.9		83.5		167.6		166.9	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	393	675	210	572	380	1998	646	1913	907
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	0.58	0.43	0.52	0.21	0.24	0.23	0.08	0.51	0.18

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 95

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 18.5

Intersection LOS: B

Intersection Capacity Utilization 72.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Hawthorne & Stevenage Drive



Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	251	0	8	143	0	0
Future Vol, veh/h	251	0	8	143	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	273	0	9	155	0	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	273	0	446	273
Stage 1	-	-	-	-	273	-
Stage 2	-	-	-	-	173	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1290	-	570	766
Stage 1	-	-	-	-	773	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1290	-	565	766
Mov Cap-2 Maneuver	-	-	-	-	565	-
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	857	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		0	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1290	-	
HCM Lane V/C Ratio	-	-	-	0.007	-	
HCM Control Delay (s)	0	-	-	7.8	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	-	-	-	0	-	

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	251	0	8	151	0	21
Future Vol, veh/h	251	0	8	151	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	273	0	9	164	0	23
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	273	0	455	273
Stage 1	-	-	-	-	273	-
Stage 2	-	-	-	-	182	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1290	-	563	766
Stage 1	-	-	-	-	773	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1290	-	558	766
Mov Cap-2 Maneuver	-	-	-	-	558	-
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	849	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		9.8	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	766	-	-	1290	-	
HCM Lane V/C Ratio	0.03	-	-	0.007	-	
HCM Control Delay (s)	9.8	-	-	7.8	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	272	0	0	159	0	21
Future Vol, veh/h	272	0	0	159	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	296	0	0	173	0	23
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	296	0	469	296
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	173	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1265	-	553	743
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1265	-	553	743
Mov Cap-2 Maneuver	-	-	-	-	553	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	857	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	743	-	-	1265	-	
HCM Lane V/C Ratio	0.031	-	-	-	-	
HCM Control Delay (s)	10	-	-	0	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Appendix I

SYNCHRO Capacity Analysis: 2025 Total Conditions

Timings

1: Stevenage Drive

09/05/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	138	29	58	64	213	984	52	325	210
Future Volume (vph)	138	29	58	64	213	984	52	325	210
Lane Group Flow (vph)	150	98	63	130	232	1163	57	353	228
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	40.0	15.0	40.0	40.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	16.7%	44.4%	16.7%	44.4%	44.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	-1.7	-1.7	-1.7	-1.7	-1.7	-1.5	-1.7	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	18.1	18.1	18.1	18.1	63.4	54.0	56.7	48.5	48.5
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.70	0.60	0.63	0.54	0.54
v/c Ratio	0.65	0.25	0.24	0.33	0.31	0.55	0.16	0.18	0.24
Control Delay	45.3	12.9	30.6	19.8	6.3	13.6	6.6	12.4	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	12.9	30.6	19.8	6.3	13.6	6.6	12.4	2.9
LOS	D	B	C	B	A	B	A	B	A
Approach Delay		32.5		23.3		12.4		8.5	
Approach LOS		C		C		B		A	
Queue Length 50th (m)	24.1	4.6	9.3	11.4	11.2	60.6	2.5	15.2	0.0
Queue Length 95th (m)	39.6	15.4	18.2	23.8	25.0	99.3	7.5	29.4	12.6
Internal Link Dist (m)		363.9		83.5		167.6		180.6	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	398	619	443	637	768	2127	410	1930	945
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	0.38	0.16	0.14	0.20	0.30	0.55	0.14	0.18	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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 14.3

Intersection LOS: B

Intersection Capacity Utilization 58.8%

ICU Level of Service B

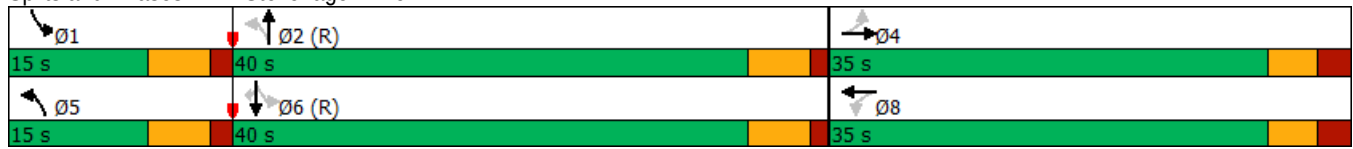
Analysis Period (min) 15

Timings

1: Stevenage Drive

09/05/2018

Splits and Phases: 1: Stevenage Drive



Intersection

Int Delay, s/veh 0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	125	0	21	257	0	0
Future Vol, veh/h	125	0	21	257	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	136	0	23	279	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	136
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1448
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1448
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1448	-
HCM Lane V/C Ratio	-	-	-	0.016	-
HCM Control Delay (s)	0	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

HCM 2010 TWSC
3: Access 2 & Stevenage Drive

09/05/2018

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	125	0	21	278	0	7
Future Vol, veh/h	125	0	21	278	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	136	0	23	302	0	8
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	136	0	484	136
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	348	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1448	-	542	913
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	715	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1448	-	532	913
Mov Cap-2 Maneuver	-	-	-	-	532	-
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	715	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		9	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	913	-	-	1448	-	
HCM Lane V/C Ratio	0.008	-	-	0.016	-	
HCM Control Delay (s)	9	-	-	7.5	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0	-	-	0	-	

HCM 2010 TWSC
4: Access 3 & Stevenage Drive

09/05/2018

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	132	0	0	299	0	7
Future Vol, veh/h	132	0	0	299	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	143	0	0	325	0	8
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	143	0	468	143
Stage 1	-	-	-	-	143	-
Stage 2	-	-	-	-	325	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1440	-	553	905
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	732	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1440	-	553	905
Mov Cap-2 Maneuver	-	-	-	-	553	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	732	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		9	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	905	-	-	1440	-	
HCM Lane V/C Ratio	0.008	-	-	-	-	
HCM Control Delay (s)	9	-	-	0	-	
HCM Lane LOS	A	-	-	A	-	
HCM 95th %tile Q(veh)	0	-	-	0	-	

FT 2025 PM
1: Hawthorne & Stevenage Drive

09/05/2018

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	210	41	100	30	83	401	45	998	146
Future Volume (vph)	210	41	100	30	83	401	45	998	146
Lane Group Flow (vph)	228	291	109	121	90	500	49	1085	159
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
Detector Phase	4	4	8	8	5	2	1	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	24.7	24.7	24.7	24.7	10.7	32.5	10.7	32.5	32.5
Total Split (s)	35.0	35.0	35.0	35.0	15.0	45.0	15.0	45.0	45.0
Total Split (%)	36.8%	36.8%	36.8%	36.8%	15.8%	47.4%	15.8%	47.4%	47.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.2	4.2	4.2	4.2	4.2
All-Red Time (s)	2.4	2.4	2.4	2.4	1.5	1.3	1.5	1.3	1.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	5.7	5.5	5.7	5.5	5.5
Lead/Lag					Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	C-Max
Act Effct Green (s)	22.1	22.1	22.1	22.1	58.7	54.0	56.1	50.8	50.8
Actuated g/C Ratio	0.23	0.23	0.23	0.23	0.62	0.57	0.59	0.53	0.53
v/c Ratio	0.77	0.52	0.69	0.27	0.29	0.25	0.08	0.57	0.18
Control Delay	50.4	10.2	53.9	10.8	10.2	12.6	8.4	18.5	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	10.2	53.9	10.8	10.2	12.6	8.4	18.5	3.4
LOS	D	B	D	B	B	B	A	B	A
Approach Delay		27.8		31.2		12.2		16.3	
Approach LOS		C		C		B		B	
Queue Length 50th (m)	38.7	8.4	18.1	4.7	5.7	24.8	3.0	71.3	0.0
Queue Length 95th (m)	59.1	27.4	34.2	16.4	13.5	41.4	8.4	109.2	11.1
Internal Link Dist (m)		363.9		83.5		167.6		166.9	
Turn Bay Length (m)	60.0		40.0						100.0
Base Capacity (vph)	393	668	210	572	347	2003	628	1915	907
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	0.58	0.44	0.52	0.21	0.26	0.25	0.08	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
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 19.0
 Intersection Capacity Utilization 75.4%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service D

Splits and Phases: 1: Hawthorne & Stevenage Drive



Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	251	0	8	143	0	0
Future Vol, veh/h	251	0	8	143	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	273	0	9	155	0	0
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	273	0	446	273
Stage 1	-	-	-	-	273	-
Stage 2	-	-	-	-	173	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1290	-	570	766
Stage 1	-	-	-	-	773	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1290	-	565	766
Mov Cap-2 Maneuver	-	-	-	-	565	-
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	857	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		0	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1290	-	
HCM Lane V/C Ratio	-	-	-	0.007	-	
HCM Control Delay (s)	0	-	-	7.8	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	-	-	-	0	-	

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	251	0	8	151	0	21
Future Vol, veh/h	251	0	8	151	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	273	0	9	164	0	23
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	273	0	455	273
Stage 1	-	-	-	-	273	-
Stage 2	-	-	-	-	182	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1290	-	563	766
Stage 1	-	-	-	-	773	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1290	-	558	766
Mov Cap-2 Maneuver	-	-	-	-	558	-
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	849	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		9.8	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	766	-	-	1290	-	
HCM Lane V/C Ratio	0.03	-	-	0.007	-	
HCM Control Delay (s)	9.8	-	-	7.8	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	272	0	0	159	0	21
Future Vol, veh/h	272	0	0	159	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	296	0	0	173	0	23
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	296	0	469	296
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	173	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1265	-	553	743
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1265	-	553	743
Mov Cap-2 Maneuver	-	-	-	-	553	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	857	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		10	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	743	-	-	1265	-	
HCM Lane V/C Ratio	0.031	-	-	-	-	
HCM Control Delay (s)	10	-	-	0	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Appendix J

City of Ottawa Correspondence

Pena-cabra, Andres

From: Baker, Mark
Sent: Wednesday, November 14, 2018 1:16 PM
To: Dubyk, Wally
Cc: Bernier, John; Pena-cabra, Andres; Benjamin Clare
Subject: RE: 2200-2410 Stevenage Rd - TIA Response

Hi Wally,

Thank you for the comments. We will review and provide a response in the finalized TIA submission.

Regards – Mark

From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: Wednesday, November 14, 2018 12:35 PM
To: Baker, Mark <Mark.Baker@parsons.com>
Cc: Bernier, John <John.Bernier@ottawa.ca>
Subject: 2200-2410 Stevenage Rd - TIA Response

2200 – 2410 Stevenage Road
Transportation Impact Assessment, Dated September 10, 2018
Site Plan A0.1, Revision #2, Dated September 11, 2018

D07-12-18-0135

Please address the following comments;

Module 4.6 must be included in the TIA report. Traffic volumes on Stevenage Drive are higher than the threshold of 120 vehicles during peak hour identified in the module.

The safety trigger was met in the TIA screening. Verify that the accesses meet the stopping sight distances.

Thank you,

Wally Dubyk
Project Manager - Transportation Approvals
Development Review, Central & South Branches
613-580-2424 x13783

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