869 Brant-Waterloo Road

Traffic Impact Study FINAL REPORT

2081788 Ontario Corporation & Broos Properties

April 6, 2018

Prepared by:

HDR Corporation
100 York Blvd, Suite 300
Richmond Hill, ON L4B 1J8

Contents

Tables

Exhibits

Appendices

This page is intentionally left blank.

1 Introduction

The Official Plan of the Township of North Dumfries (the "Township") identifies the Ayr Urban Area as a primary focus for growth and development within the Township to the year 2031. Much of Township's recent residential developments have been centered around the Ayr Urban Area. In line with the Town's future growth plans, 869 Brant-Waterloo Road is a proposed residential development located in the community of Ayr within the Township in the Region of Waterloo (the "Region").

HDR Corporation has been retained by Broos Properties Ltd. to undertake a traffic study to support this development, which will consist of 302 single family detached units, 108 townhouse units, and 75 townhouse units in medium density residential blocks at full build-out. The site is located at the northeast quadrant of Swan Street and Brant-Waterloo Road as shown in **Exhibit 1**.

The development is expected to occur in phases, with the estimated build-out year of 2026. This report assesses the traffic impacts of the proposed development on existing and proposed intersections within the study area road network in the early phase of the development and after full build-out. This traffic study has been prepared in accordance with the Region of Waterloo Transportation Impact Study (TIS) guidelines and the Region of Waterloo Requirement for Capacity Analysis.

Exhibit 1 Site Location

1.1 Scope of Work

The scope of work for the traffic study was proposed as per discussions with Broos Properties and incorporates comments from the Township; as well as, a review of the study area considered in the 2013 traffic impact study for the adjacent Hilltop Estates Subdivision (Hilltop TIS), which was developed in consultation with the Township and Region. Following is a summary of the proposed scope submitted to the Township and Region and analyzed in this report:

Scenarios

Scenarios to be analyzed:

- Existing 2018 Traffic Conditions
- 2020 Background traffic conditions (includes road growth and traffic from approved or under construction background developments in the immediate area)
- 2020 Phase 1 traffic conditions with 139 units from the proposed development
- 2031 Background traffic conditions (includes road growth and traffic from approved or under construction background developments in the immediate area)
- 2031 Total traffic conditions (2031 background plus the proposed development)

Time Periods

Time periods that were analyzed are the development peak hours, which include:

- Weekday AM peak hour (between 7:00 AM and 9:00 AM)
- Weekday PM peak hour (between 4:00 PM and 6:00 PM)

Intersections

It should be noted that during Phase 1, this study assumes that there will be no connections to Swan Street via Leslie Davis Street, and to Brant-Waterloo Road via internal road network. A connection to Brant-Waterloo Road will be assumed in the 2031 scenarios through the internal road network; the need for a connection to Swan Street via Leslie Davis Street may be considered if capacity or operational issues are found at the intersection of Swan Street and Hilltop Drive. As such, the intersections analyzed for capacity purposes include:

External Road Network

- Robert Woolner Street and Leslie Davis Street
- Robert Woolner Street and Howard Marshall Street
- Robert Woolner Street and Gourlay Farm Lane
- Hilltop Drive and Howard Marshall Street
- Swan Street and Hilltop Drive
- Swan Street and Stanley Street
- Swan Street and Leslie Davis Drive
- Stanley Street and Northumberland Street
- Wrigley Road and Hilltop Drive
- Brant-Waterloo Road and Street A
- Brant-Waterloo Road and Robert Woolner Street
- Brant-Waterloo Road and Swan Street

Internal Road Network

- Leslie Davis Street and Street A as a traffic circle based on the BA Group's traffic calming study[1]
- Robert Woolner Street and Street A
- Robert Woolner Street /Street F and Freer Dr

1.2 Intersection Operations and Analysis Methodology

Intersection operations were assessed for the site driveways and study intersections using the software program Synchro 9, Traffic Signal Coordination Software Version 9, which employs methodologies from the ***Highway Capacity Manual (HCM 2000** and **HCM 2010)*** published by the Transportation Research Board National Research Council. There are currently no signalized intersection present in the existing road network within the study area. However, if a signalized intersection is warranted in under future conditions within the study area, Synchro can analyze both signalized and unsignalized intersections in a road corridor or network taking into account the spacing, interaction, queues and operations between intersections.

The two-way un-signalized intersection analysis considers two separate measures:

- the capacity of the critical movements, which is based on a volume to capacity ratio; and
- the level of service for the critical movements, which is based on the average control delay per vehicle for the various critical movements within the intersection.

The signalized intersection analysis also considers two separate measures of performance:

- the capacity of all intersection movements, which is based on a volume to capacity ratio; and
- the level of service for all intersection movements, which is based on the average control delay per vehicle for the various movements through the intersection and overall.

Level of service (LOS) is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection.

2 Existing Conditions

2.1 Site Context

The subject site is located in the northeast quadrant of Swan Street and Brant-Waterloo Road in a Designated Greenfield Area within the boundaries of the Ayr Urban Area. In the immediate area, the site is currently surrounded by agricultural lands to the south and the east, and existing residential development to the north. The Hilltop Estates Subdivision, also part of the Designated Greenfield Area borders the site on the west is currently under development. Due to the greenfield nature of the site, the existing road network and intersections in the study area are external to the site. The intersections within the study area are unsignalized and stop sign controlled.

[1] *Hilltop Subdivision 30T-14301 Stage 4 Traffic Calming Study*. BA Group. September 2017.

2.2 Existing Road Network

The study area road network is comprised of regional roads, as well as local roads serving the existing residential areas to the north of the site. The road network is described below and is also illustrated in **Exhibit 2**.

Northumberland Street (Regional Road 58)

Northumberland Street is a two-lane undivided arterial road which runs in a north south direction and with connection to Highway 401 to the north of community of Ayr. The road primarily provides access to residences and businesses along the corridor. Northumberland Street is under the jurisdiction of the Region of Waterloo and maintains a posted speed limit of 50 km/h. In the study area, Northumberland Street is identified as a main street neighborhood connector[2]. It forms an unsignalized "T"-intersection with Stanley Street controlled by stop signs on the southbound and westbound approaches. Each approach has shared movements, with the exception of the auxiliary westbound right-turn lane. There is a driveway for businesses on the south side of Stanley Street. Retail businesses line the west side of the southbound approach and north side of the westbound approach, which are served by angled parking spots on the respective sides.

Stanley Street-Main Street-Scott Street-Wrigley Road (Regional Road 49)

Stanley Street, Main Street, Scott Street and Wrigley Road generally form the east-west two-lane undivided Regional Road 49, also under the jurisdiction of the Region of Waterloo. Stanley Street is a main street neighbourhood connector, Main Street and Scott Street are main street rural connectors, and Wrigley Road is a rural connector2. Since there is no posted speed limit within the study area, it is assumed that the statutory 50 km/h limit applies.

Swan Street

Swan Street is a north-south two lane undivided road that is a continuation of Northumberland Street to the south of Stanley Street. This regional road is classified as a main street neighbourhood connector from its "T"-intersection with Stanley Street to approximately 150m south of the intersection, beyond which it becomes a main street rural connector. From the southern limits of the Ayr community towards Brant-Waterloo Road, the road is classified as a rural connector. This road has a posted speed limit of 50 km/h through the study area, which increases to 80 km/h beyond the limits of the Ayr community. At the "T"-intersection with Stanley Street, there is stop control on the northbound approach. There are no auxiliary left-turn or right-turn lanes on Swan Street or Stanley Street.

[2] Regional Road Classification. *Context Sensitive Regional Transportation Corridor Design Guidelines*. Region of Waterloo. March 2013.

Hilltop Drive

Hilltop Drive is a two lane undivided local road providing direct access to residential properties to the north of the subject site. The road runs east from its “T”-intersection with Swan Street with stop-control on the east leg. It then curves and runs north to another “T-“intersection with Wrigley Road. The south leg of this intersection is stop-controlled. Shared turn lanes are present on the eastbound and northbound approaches while an auxiliary left turn lane is provided on the westbound approach. The speed limit is assumed to be the statutory 50 km/h limit.

Howard Marshall Street

Howard Marshall Street is a two lane undivided local road within the residential subdivision to the north of the subject site providing driveway access to residential properties. It runs in a north-south direction forms an all-way stop-controlled intersection with Hilltop Drive on the east-west portion of Hilltop Drive. It is assumed that the statutory speed limit of 50 km/h also applies to this road.

Brant-Waterloo Road

Brant-Waterloo is the boundary road between the two jurisdictions of Region of Waterloo and the County of Brant. It is an east-west undivided road with a gravel surface type within the study area and without a posted speed limit. The assumed speed limit is 50 km/h. The road intersects with Swan Street and two-way stop control is provided on the Brant-Waterloo Road approaches.

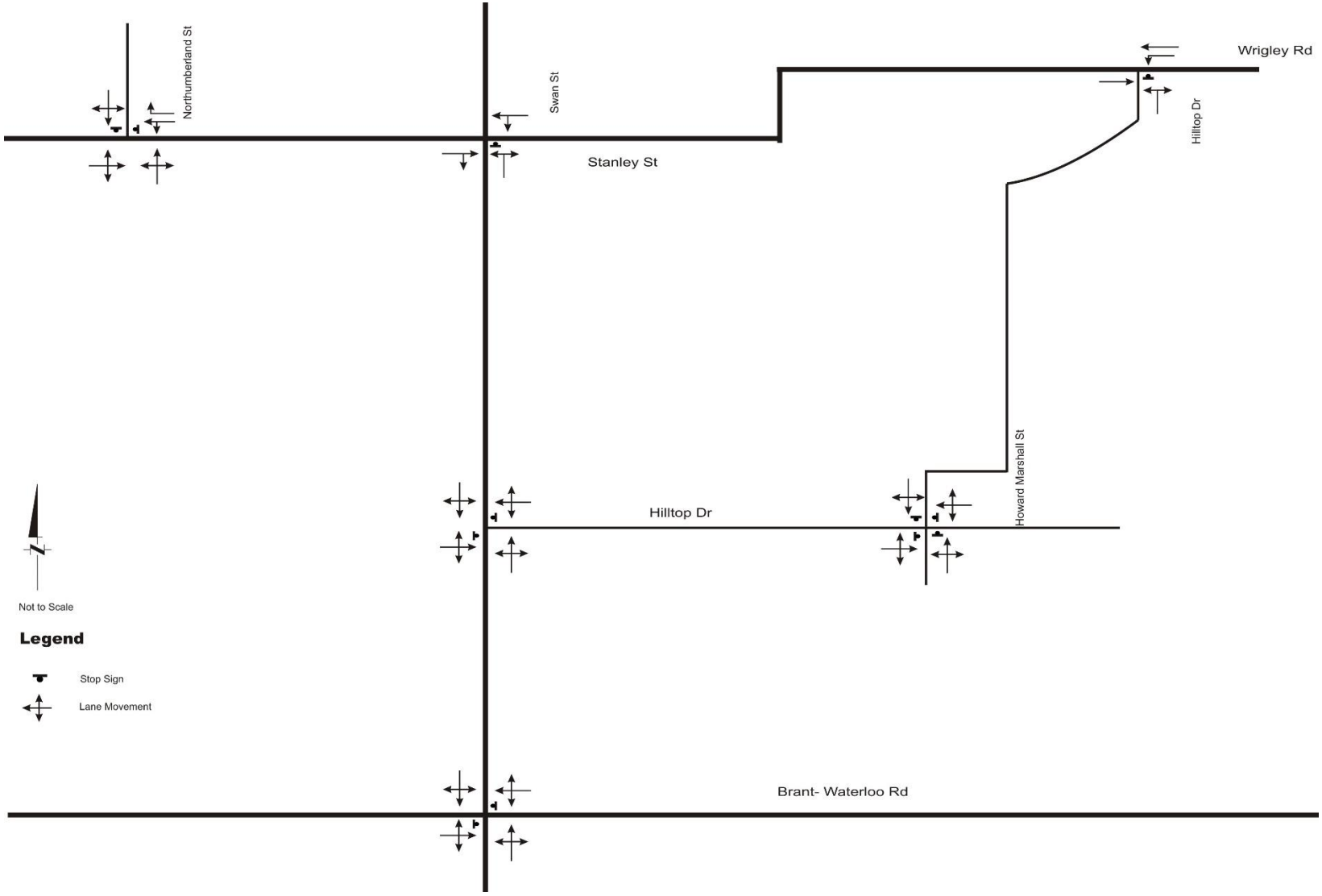


Exhibit 2 Existing Road Network

2.3 Active Transportation and Transit

Pedestrian facilities are present along one or both sides of the roads in the study area road network as described below:

- There are sidewalks on the both sides of Northumberland Drive.
- There are sidewalks on both sides of the street along Stanley Street, on the west side along Main Street, and on the south street of Scott Street and Wrigley Road ending just east of Hilltop Drive.
- Sidewalk is provided on the west side of Swan Street from Stanley Street southerly to Mitchell Street. South of Mitchel Street, sidewalk is provided on the east side down to Hilltop Drive. There are no sidewalks south of Hilltop Drive.
- There is a sidewalk on the south/west side of Hilltop Drive from Swan Street to Wrigley Road.
- There is a sidewalk on the west side of Howard Marshall Street.

Study area intersections generally do not have marked pedestrian crossings, except on some approaches at the intersections of Stanley Street with Northumberland and Swan Street.

There are no existing cycling routes within the study area as per the Township's Official Plan. Cyclists may be accommodated on Northumberland Street, Stanley-Scott-Wrigley Road and Swan Street where shoulders are present since the Official Plan designates these routes as planned cycling routes. In addition, the Region is undertaking a project to upgrade watermain and sanitary sewers beneath Northumberland Street, Stanley Street and Swan Street, presenting an opportunity for road reconstruction with enhanced pedestrian and cycling facilities[3]. The planned improvements include:

- New on-road cycling lanes on each side of Swan from Hilltop Drive northerly to past Mitchell Street;
- Shared use on-road cycling facilities including potential "sharrows", which are pavement markings along the center of travel lanes advising drivers to share the road with cyclists:
    - On Northumberland Street from Stanley Street northerly to Hall Street;
    - On Stanley Street from Northumberland Street to easterly to St. Andrew Street; and,
    - On Swan Street from Stanley Street northerly to Mitchell Street
- Construction of a new concrete sidewalk on the east side of Swan Street from Stanley Street to the existing sidewalk located midway between both intersections of Mitchell Street and Swan Street;
- Removal of the existing sidewalk on the west side of Swan Street;

Although a parking study is not considered within the scope of this traffic impact study, it is noted that part of the reconstruction project described above also includes replacing the existing angled parking on North on Northumberland Street and Stanley Street with on-road parallel parking. The proposed development will not impact this replacement plan.

[3] *Future Construction Projects.* Regional Council. January 11, 2017. http://www.regionofwaterloo.ca/en/gettingAround/FutureConstructionProjects.asp

There is no transit service within the study area or within the designated Ayr Urban Area and the Township.

2.4 Modal Split

The Hilltop TIS presented the modal split for the Hilltop Estates Subdivision based on 2006 Transportation Tomorrow Survey (TTS). Similarly, the modal split for the subject site (869 Brant-Waterloo Road) may considered to be represented by the modal split for residential trips to and from the Town of North Dumfries (2006 TTS Zone 7494). A review of 2011 TTS data confirmed that the following modal splits presented in the Hilltop TIS remain consistent in the more recent survey data.

Modal Split To/From TTS Zone 7494	
Mode Choice	**%**
Auto	80%
Transit	0%
School Bus	13%
Walk	5%
Cycle	2%
Total	100%

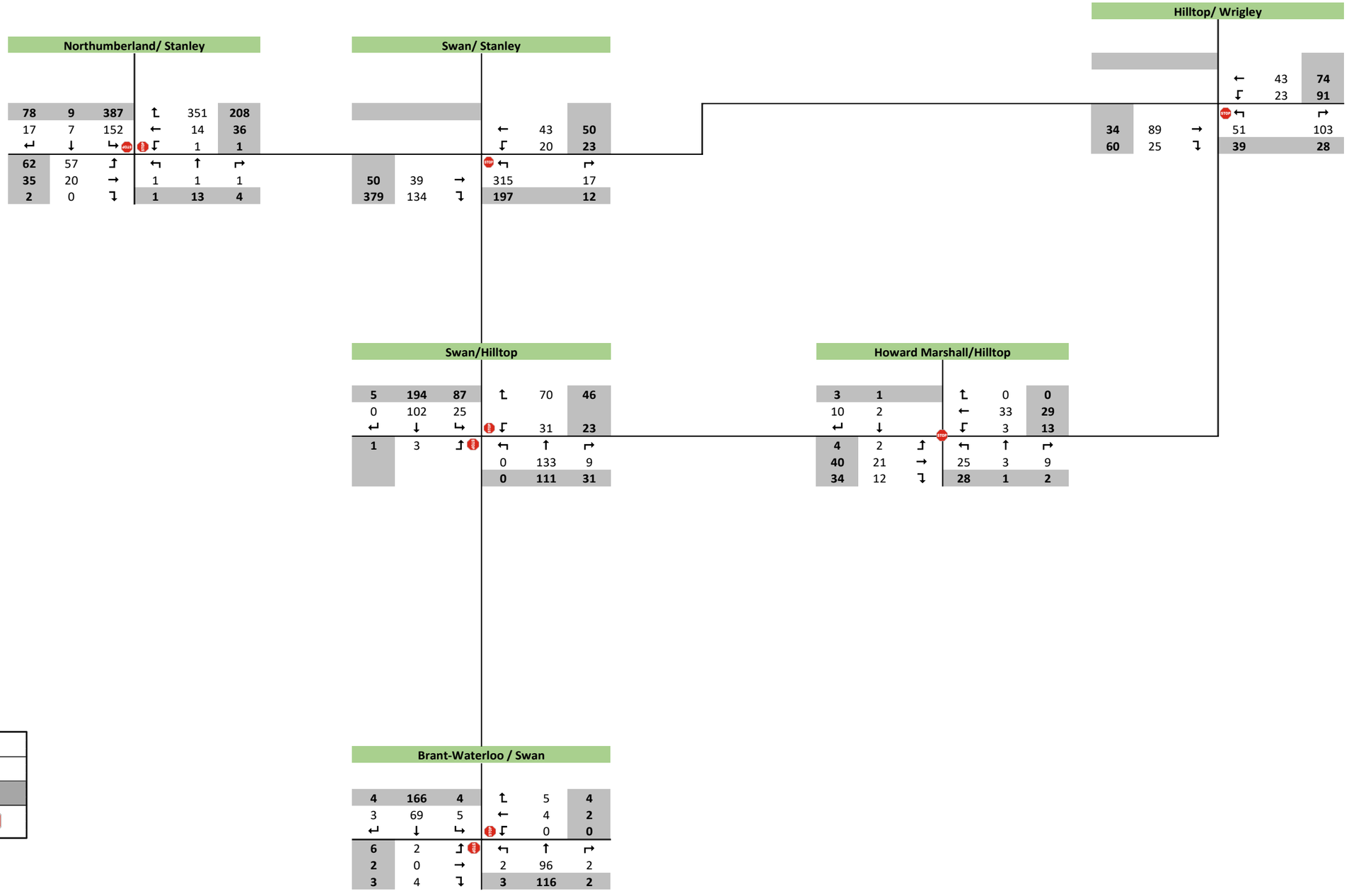
It is worth noting that although the non-auto mode choices such as walking and cycling add up to 7%, no reductions are considered necessary for Institute of Transportation Engineers (ITE) trip generation rates used in the analysis for the subject site. ITE trip generation rates are developed in locations with little to no transit service or Travel Demand Management programs, which are in line with the existing modal share for the subject site.

2.5 Existing Traffic Volumes

Turning movement counts were performed on behalf of HDR by Traffic Survey Analysis Inc. for the weekday AM and PM peak periods (7:00 AM to 9:00 AM, and 4:00 PM to 6:00 PM) at all existing intersections in the study area excepting Brant Waterloo Road and Swan Street. These hours represent peak traffic generation time for residential developments as well as the peak period of adjacent street traffic. The counts were performed on Thursday, January 18th, 2018.

Following the data collection, the existing intersection of Brant Waterloo Road with Swan Street was included in the scope of the study (after receiving comments from the Township). The present year (2018) traffic volumes at this intersection were based on 2013 turning movement counts presented in the Hilltop TIS and a growth rate of 1.5% per annum for the study area traffic. Detailed discussions of the growth rate are presented in **Section 3.2**.

Existing traffic volumes are shown in **Exhibit 3** and detailed data is provided in **Appendix A**.



LEGEND	
AM	X
PM	X
Stop Sign	STOP

Exhibit 3 Existing Traffic Volumes

2.6 Existing Traffic Operations

The existing traffic operations were assessed based on the existing traffic counts and supplementary data from Hilltop TIS as shown **Exhibit 3**.This included heavy vehicle percentages derived from the available traffic counts.

The existing road network and intersection controls depicted in **Exhibit 2** were modeled in the Synchro network. It is noted that HCM methodologies do not allow the assessment of the unusual intersection control at the Northumberland Street and Stanley Street/Private Drive. This intersection has a stop control on the southbound and westbound approaches, with the eastbound approach free flowing.

To address this issue, the intersection was modeled as a two-way stop-controlled intersection. Stop control was assumed on the southbound approach, as per existing conditions, and on the northbound approach since it's a private driveway fronting a regional road at the subject intersection.

This analysis method may overestimate the delays for the north and south approaches, and especially so for the heavy southbound volumes because westbound traffic will be considered free-flowing; consequently it may underestimate delays for the westbound traffic, which would otherwise be required to make full stops at the intersection for minor street movements. However, the westbound right turn is modeled as a channelized right-turn stop control as per field conditions, and considering that the westbound through volumes are low, the delays to southbound left turns may be considered to be within reason in the proxy intersection control configuration.

In the Synchro model the respective link speeds within the road network were coded, along with default lane widths of 3.5m at the intersection approaches as per the Region of Waterloo's Capacity Analysis Requirements[4]. The Capacity Analysis requirements also provide values for parameters including the Peak Hour Factor (PHF of 0.9 for all movements), and saturation flow values specified for different lane configurations. All other inputs for the models were kept at the Synchro default values.

Intersection operations are summarized in **Table 1**. Detailed Synchro reports are provided in **Appendix B**.

Table 1: 2018 Existing Traffic Operations

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th Q	LOS	Delays (s)	v/c	95th Q
Swan @ Hilltop									
EB	Left/Through/Right	B	12	0.01	<1	B	15	0	<1
WB	Left/Through/Right	B	10	0.14	4	B	11	0.12	3
NB	Left/Through/Right		0	0	0		0	0	0
SB	Left/Through/Right	A	2	0.02	<1	A	3	0.07	2
Howard Marshall @ Hilltop									
EB	Left/Through/Right	A	7	0.04	-	A	7	0.09	-
WB	Left/Through/Right	A	7	0.05	-	A	7	0.05	-

[4] *Transportation Impact Studies (TIS) Requirements for Capacity Analysis, Roundabouts, Signal Warrants.* Region of Waterloo.

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th Q	LOS	Delays (s)	v/c	95th Q
NB	Left/Through/Right	A	7	0.05	-	A	8	0.04	-
SB	Left/Through/Right	A	7	0.01	-	A	7	0	-
Northumberland @ Stanley									
EB	Left/Through/Right	A	6	0.04	<1	A	5	0.04	1
WB	Left/Through	A	0	0	0	A	0	0	0
WB	Right	-	0	0.23	0	-	0	0.14	0
NB	Left/Through/Right	A	10	0	<1	B	10	0.03	<1
SB	Left/Through/Right	B	11	0.25	8	C	23	0.74	51
Hilltop @ Wrigley									
EB	Through	-	0	0.07	0	-	0	0.06	0
WB	Left	A	8	0.02	<1	A	8	0.07	2
WB	Through	-	0	0.03	0	-	0	0.05	0
NB	Left/Right	B	10	0.2	6	B	11	0.1	3
Swan @ Stanley									
EB	Through/Right	-	0	0.11	0	-	0	0.28	0
WB	Left/Through	A	3	0.02	<1	A	3	0.02	<1
NB	Left/Right	B	14	0.48	20	B	14	0.38	13
Swan @ Brant-Waterloo									
EB	Left/Through/Right	A	9	0.01	<1	B	11	0.02	<1
WB	Left/Through/Right	A	9	0.01	<1	A	10	0.01	<1
NB	Left/Through/Right	A	0	0	0	A	0	0	0
SB	Left/Through/Right	A	1	0	<1	A	0	0	<1

LOS – Level of Service v/c – Volume to Capacity Ratio 95th Q – 95th percentile queue length in metres

Under existing conditions all movements at all study intersections are operating well with LOS C or better and with volume to capacity ratios of 0.74 or lower indicating that the intersections are operating well and with residual capacity.

The existing intersections within the study area generally do not feature turning movement storage lanes. As such, all 95th percentile queues are accommodated in the shared lanes at intersection approaches. Synchro reports that the longest queues under existing conditions may occur at the southbound approach of Northumberland Street and Stanley Street. However, 95th percentile queue of 51 metres will not stretch to the nearest upstream intersection.

3 Future Background Conditions

3.1 Future Road Network

As described in **Section 2.3**, improvements are planned for the active transportation facilities within the study area, which are supportive of the Town of North Dumfries' "Downtown Ayr: Strategic Action Plan for Revitalization". No other public information is currently available on planned construction projects by the Region within the Town. However, during the development of the Hilltop TIS, the

Region provided the input regarding future improvements, which have been incorporated into the TIS for the subject site. These are listed as follows:

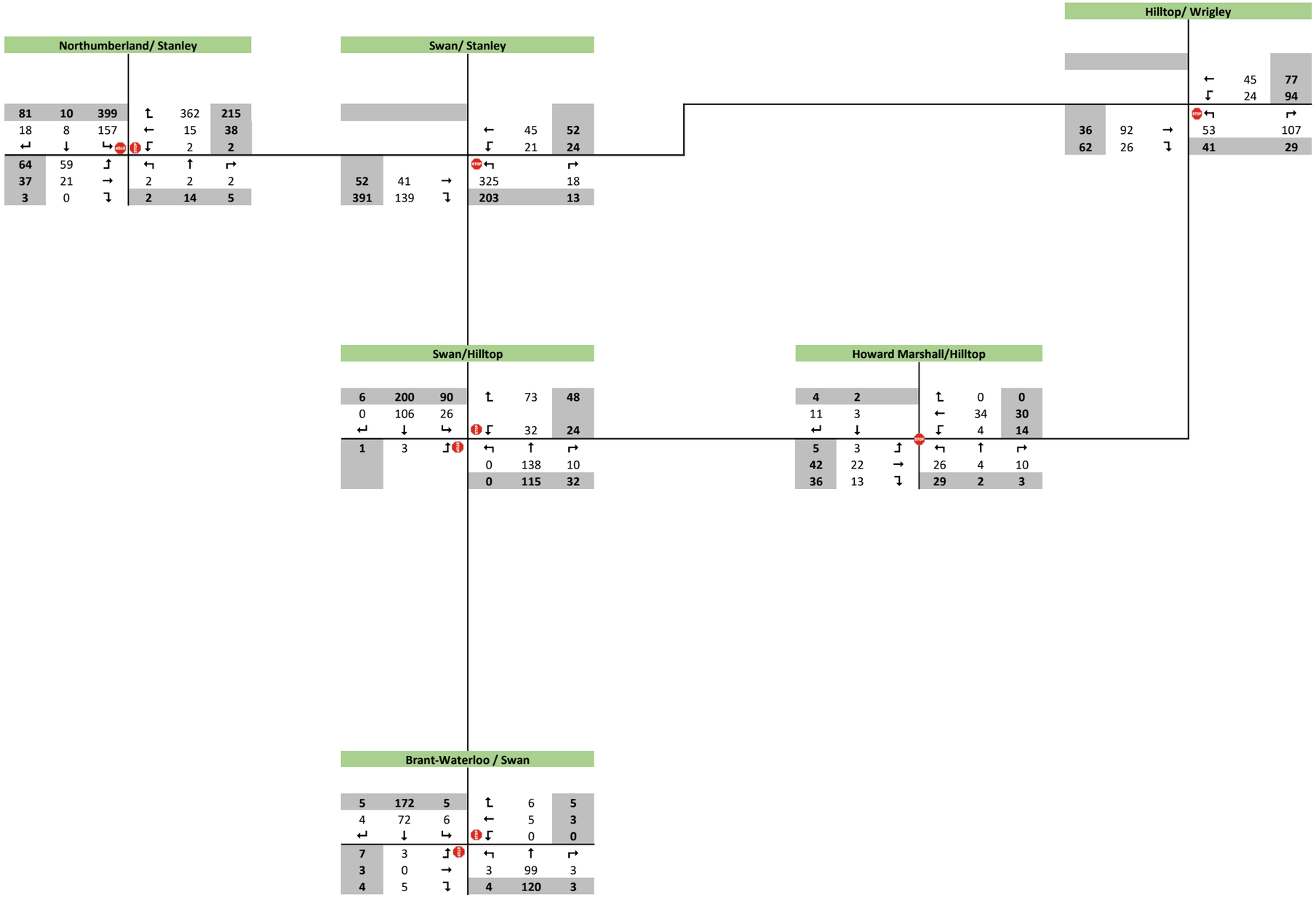
- According to the Region[5] a new southbound left-turn lane from Swan Street to Hilltop Drive is planned for construction within the near future. In addition, the Hilltop TIS also assumed an opposing northbound left-turn lane to serve the development to the west of Swan Street. As such, the existing road network was modified with the above planned improvements for analysis in both the 2020 and 2031 future planning horizons.
- Hilltop TIS also proposed for an all-way stop control at the intersection of Northumberland Street and Stanley Street by the 2027 as a mitigation measure for the study area background growth and additional site traffic generated by the Hilltop Estates Subdivision. Therefore, the 2031 study area road network for the current 869 Brant-Waterloo Road study includes the implementation of an all-way stop control at the intersection of Northumberland Street and Stanley Street.

3.2 Background Traffic Growth

Background traffic growth for the study area was based on the assumptions made in the Hilltop TIS. Insufficient data historical data was available to confirm the assumed 1.5% per annum growth rate in the Hilltop TIS. However, since this growth rate was discussed with the Region staff during the pre-consultation meeting for the Hilltop TIS and considered to be applicable to all vehicle movements, the current study maintained consistent assumptions.

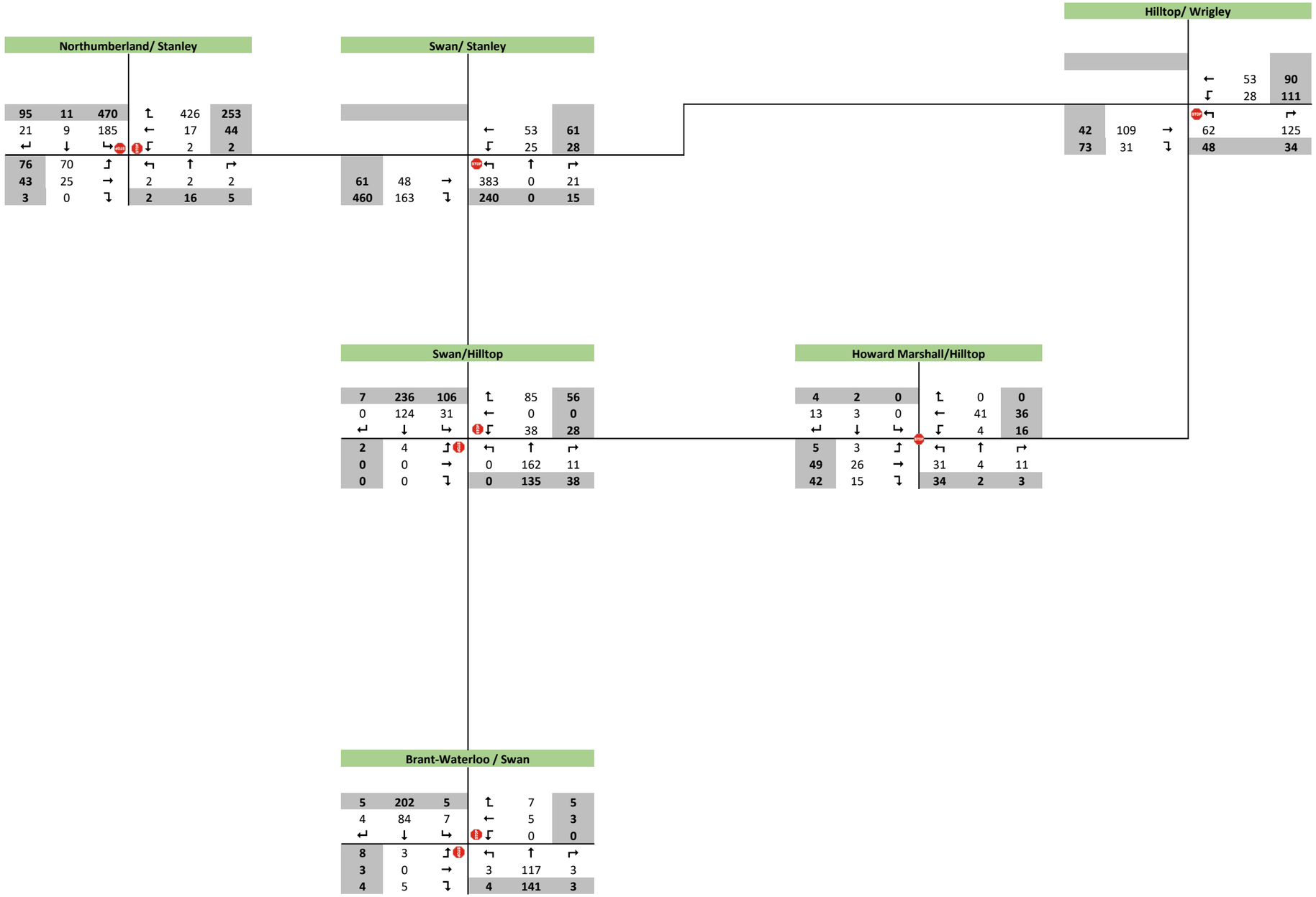
Future background growth for the 2020 and 2031 horizon years are shown in **Exhibit 4** and **Exhibit 5.**

[5] *Hilltop Estates Subdivision Stage 4, Ayr Traffic Impact Study*. Stantec. November 2013.



LEGEND	
AM	X
PM	X
Stop Sign	STOP

Exhibit 4 2020 Background Growth Traffic Volumes



LEGEND	
AM	X
PM	X
Stop Sign	STOP

Exhibit 5 2031 Background Growth Traffic Volumes

3.3 Background Developments

The Hilltop Estates Subdivision located to the west of the subject site is currently under development. As per Hilltop TIS, the proposed development will consist of 391 total residential units, occupying a total footprint of 22.93 hectares at full built-out. The detailed breakdown of the proposed residential types are listed below:

- 30 Residential Condominiums
- 78 Townhouses
- 34 Semi-Detached Homes
- 249 Single Family Detached Homes

3.3.1 2020 Horizon Year

The Hilltop Estates Subdivision is expected to be developed in phases with full-build out in 2022. Hilltop TIS considered 2021 as an interim year for analysis purposes. The site trips in the 2021 interim year were based on the completion of the first two phases by 2020, totaling 295 units. These interim year site trips were extracted for use in the current study as described below.

Latest information from the Hilltop developers indicates that Phase 1 of Hilltop is yet to commence and will likely occur in 2019. The extent of the Phase 1 development of Hilltop Estates Subdivision is shown in **Exhibit 6**. Phase 1 will include 108 to 120 units. Therefore, for the 2020 horizon year in the present study for 869 Brant-Waterloo Road, Phase 1 of the Hilltop Estates Subdivision is considered to be a background development. As a conservative approach, 120 units are assumed to be completed by 2020, representing 41% of the expected 2021 interim site trips (from 295 units) generated in the Hilltop TIS[6].

Exhibit 7 shows the site trips expected to be generated by Hilltop Estates Subdivision in 2020 based on 41% of the Hilltop TIS 2021 interim year site traffic volumes.

Exhibit 8 shows the total background traffic in 2020 for the 869 Brant-Waterloo Road site.

It should be noted that vehicular access to Phase 1 of the Hilltop Estates Subdivision is provided from the intersections of Robert Woolner Street and Howard Marshall Road, and Leslie Davis Street and Swan Street.

3.3.2 2031 Horizon Year

By the 2031 horizon year in the current study, Hilltop Estates Subdivision is assumed to be fully built and occupied, and contributing to the 2031 total background traffic. The Hilltop site traffic[7] was added to the 2031 background traffic growth in **Exhibit 5**.

Exhibit 9 shows the total background traffic in 2031 for the 869 Brant-Waterloo Road site.

---

[6] Figure 6. *Hilltop Estates Subdivision Stage 4, Ayr Traffic Impact Study*. Stantec. November 2013.

[7] Figure 7. *Hilltop Estates Subdivision Stage 4, Ayr Traffic Impact Study*. Stantec. November 2013.

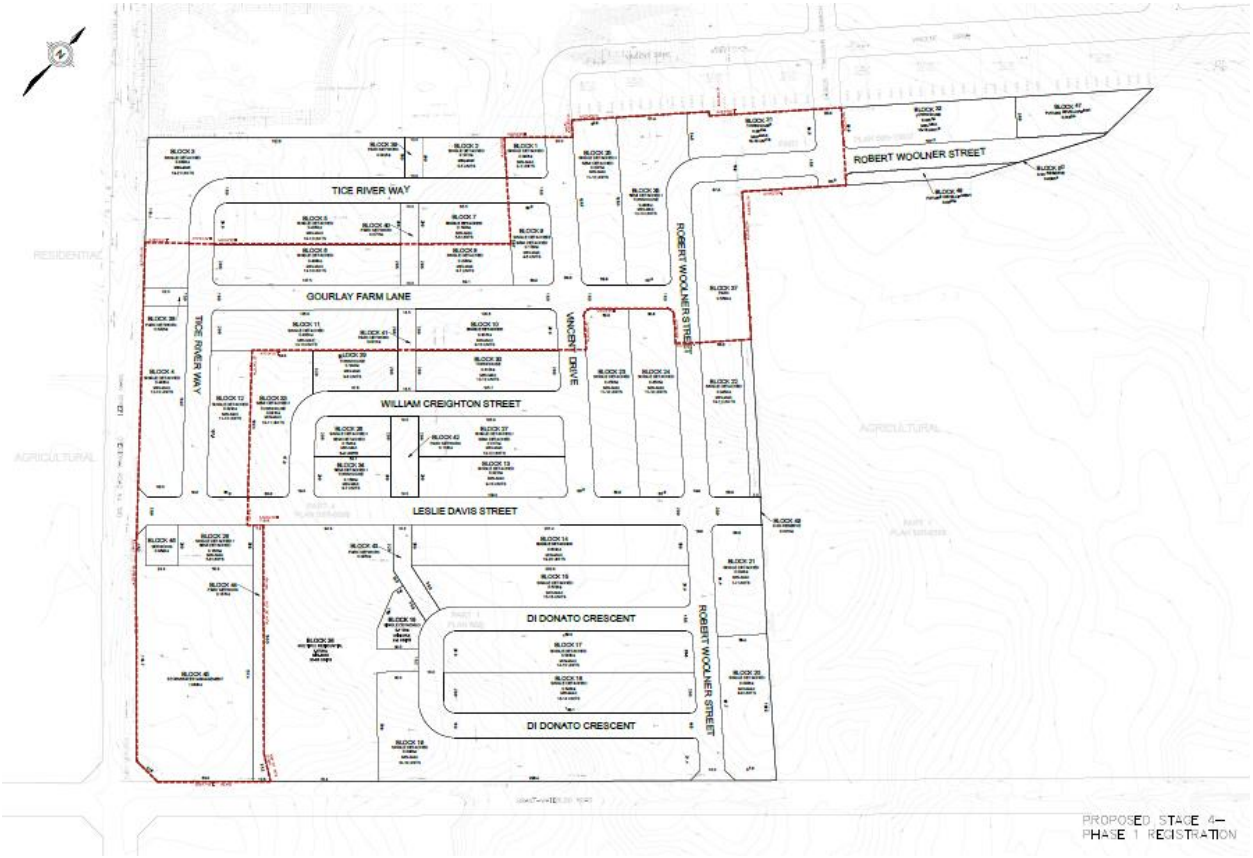
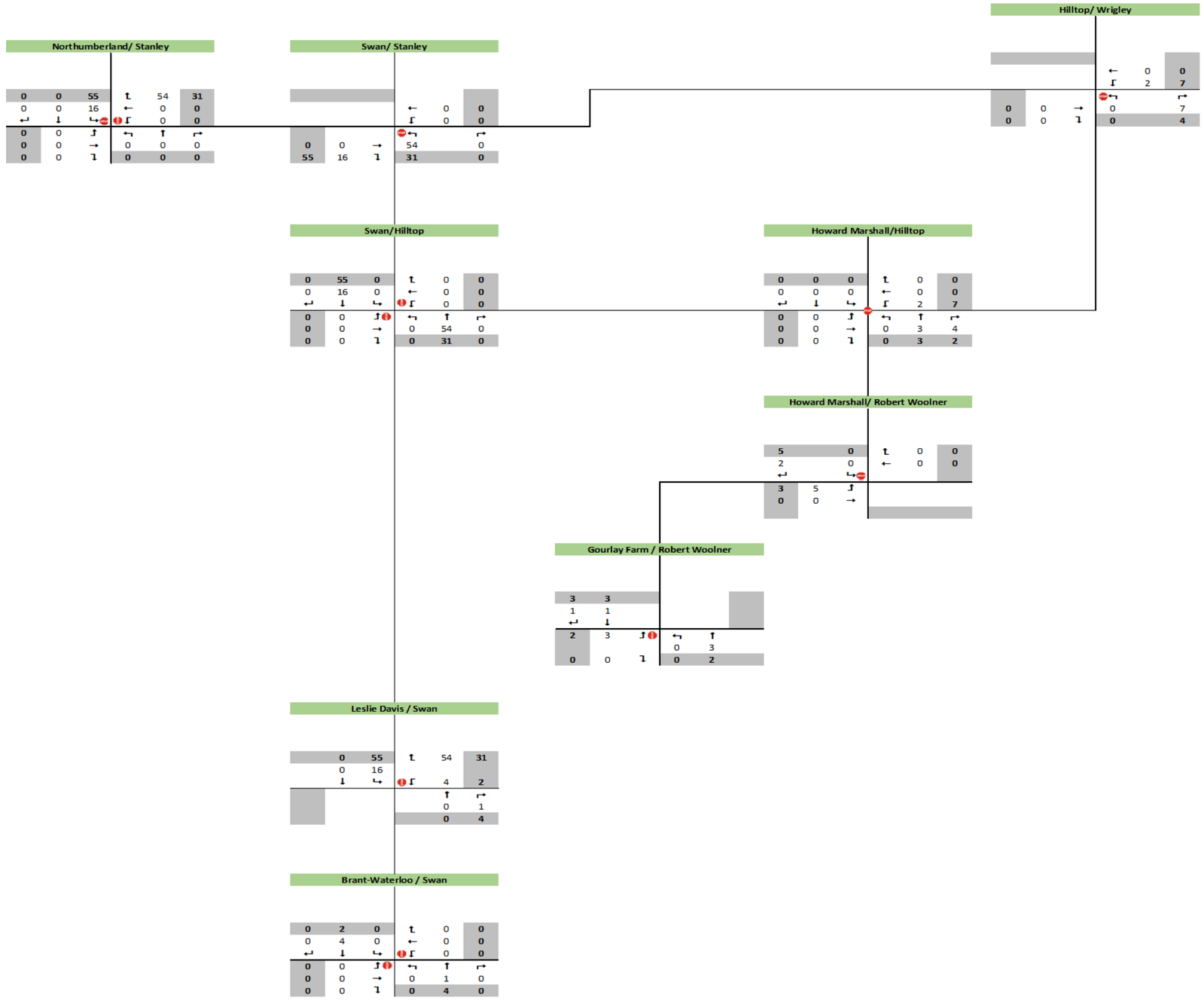
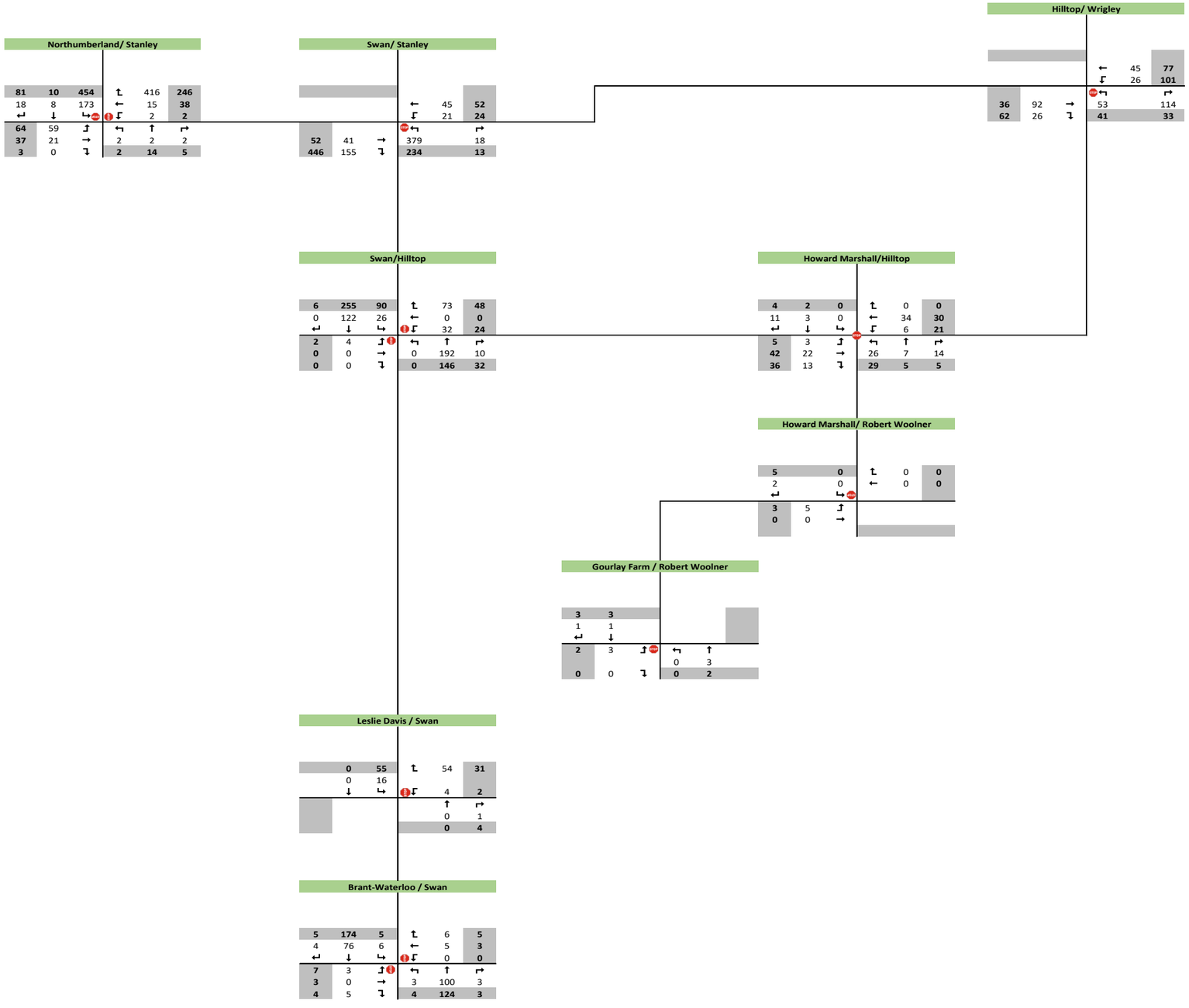


Exhibit 6 Hilltop Phase 1 Development Extent



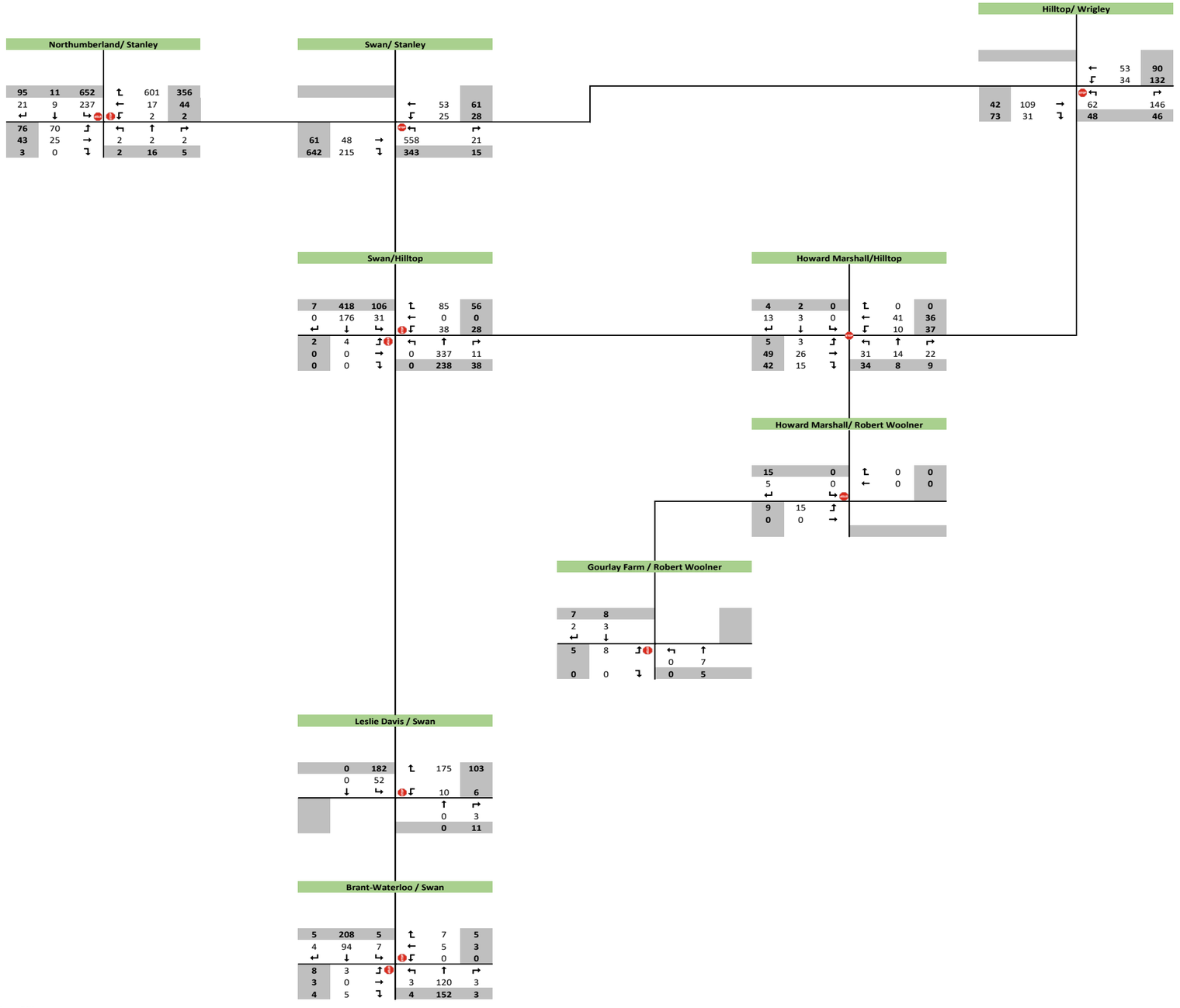
LEGEND	
AM	X
PM	X
Stop Sign	STOP

Exhibit 7 Hilltop Phase 1 Site Traffic



LEGEND	
AM	X
PM	X
Stop Sign	STOP

Exhibit 8 2020 Total Background Traffic



LEGEND	
AM	X
PM	X
Stop Sign	STOP

Exhibit 9 2031 Total Background Traffic

3.4 Future Background Traffic Operations

3.4.1 2020 Horizon

Traffic operations were assessed under future 2020 background traffic conditions based on the future road network discussed in **Section 3.1** Future Road Network and traffic volumes presented in **Exhibit 4**. Intersection operations are summarized in **Table 2**. Detailed Synchro reports are provided in **Appendix C**. Similar to existing conditions, the Region's Capacity Analysis requirements were maintained.

Table 2: Future 2020 Background Traffic Operations

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th Q	LOS	Delays (s)	v/c	95th Q
Swan @ Hilltop									
EB	Left/Through/Right	B	13	0.01	<1	C	17	0.01	<1
WB	Left/Through/Right	B	11	0.17	5	B	12	0.14	4
NB	Left	-	0	0	0	-	0	0	0
NB	Through/Right	-	0	0.13	0	-	0	0.12	0
SB	Left	A	8	0.02	<1	A	8	0.07	2
SB	Through/Right	-	0	0.08	0	-	0	0.17	0
Howard Marshall @ Hilltop									
EB	Left/Through/Right	A	7	0.05	-	A	7	0.1	-
WB	Left/Through/Right	A	7	0.05	-	A	8	0.06	-
NB	Left/Through/Right	A	7	0.06	-	A	8	0.05	-
SB	Left/Through/Right	A	7	0.02	-	A	7	0.01	-
Northumberland @ Stanley									
EB	Left/Through/Right	A	6	0.04	1	A	5	0.05	1
WB	Left/Through	A	1	0	0	A	0	0	0
WB	Right	-	0	0.27	0	-	0	0.16	0
NB	Left/Through/Right	A	10	0.01	<1	B	10	0.03	<1
SB	Left/Through/Right	B	12	0.29	9	E	36	0.88	82
Hilltop @ Wrigley									
EB	Through	-	0	0.08	0	-	0	0.06	0
WB	Left	A	8	0.02	<1	A	8	0.08	2
WB	Through	-	0	0.03	0	-	0	0.05	0
NB	Left/Right	B	10	0.21	6	B	11	0.12	3
Swan @ Stanley									
EB	Through/Right	-	0	0.13	0	-	0	0.33	0
WB	Left/Through	A	3	0.02	<1	A	3	0.03	<1
NB	Left/Right	C	16	0.59	29	C	17	0.47	19
Swan @ Brant-Waterloo									
EB	Left/Through/Right	A	9	0.01	<1	B	11	0.02	<1
WB	Left/Through/Right	A	10	0.02	<1	A	10	0.01	<1
NB	Left/Through/Right	A	0	0	0	A	0	0	<1

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th Q	LOS	Delays (s)	v/c	95th Q
SB	Left/Through/Right	A	1	0	<1	A	0	0	<1
Robert Woolner @ Howard Marshall									
EB	Left/Through	A	7	0	<1	A	7	0	0
WB	Through/Right	-	0	0	0	-	0	0	0
SB	Left/Right	A	8	0	0	A	8	0.01	<1
Swan @ Leslie Davis									
WB	Left/Right	A	9	0.06	1	A	9	0.03	<1
NB	Through/Right	-	0	0	0	-	0	0	0
SB	Left/Through	A	7	0.01	<1	A	7	0.04	<1
Robert Woolner @ Gourlay Farm									
EB	Left/Right	A	9	0	<1	A	9	0	0
NB	Left/Through	-	0	0	0	-	0	0	0
SB	Through/Right	-	0	0	0	-	0	0	0

LOS – Level of Service v/c – Volume to Capacity Ratio 95th Q – 95th percentile queue length in metres

Under future 2020 background conditions all movements at all study intersections will operate well with LOS C or better, excepting the southbound left turn movement from Northumberland Street to Stanley Street. The delays expected for this movement are expected to increase to over 35 seconds leading to a LOS E. The 95th percentile queue for this movement may extend 82 metres but will not block any upstream intersections. The highest volume to capacity ratio (0.88) is expected at this movement as well. However, all intersections will continue to operate well and with residual capacity.

3.4.2 2031 Horizon

Traffic operations were assessed under future 2031 background traffic conditions based on the future road network discussed in **Section 3.1** and traffic volumes presented in **Exhibit 5**. Intersection operations are summarized in **Table 3**. Detailed Synchro reports are provided in **Appendix C**. Similar to existing conditions, the Region's Capacity Analysis Requirements were followed.

Table 3: Future 2031 Background Traffic Operations

Intersections Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th	LOS	Delays (s)	v/c	95th
Swan @ Hilltop									
EB	Left/Through/Right	C	18	0.01	<1	D	25	0.01	<1
WB	Left/Through/Right	B	14	0.25	8	C	17	0.23	7
NB	Left	-	0	0	0		0	0	0
NB	Through/Right	-	0	0.23	0		0	0.18	0
SB	Left	A	8	0.03	<1	A	8	0.09	2
SB	Through/Right	-	0	0.12	0		0	0.28	0
Howard Marshall @ Hilltop									
EB	Left/Through/Right	A	7	0.06	-	A	7	0.12	-

Intersections Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th	LOS	Delays (s)	v/c	95th
WB	Left/Through/Right	A	8	0.07	-	A	8	0.1	-
NB	Left/Through/Right	A	8	0.08	-	A	8	0.07	-
SB	Left/Through/Right	A	7	0.02	-	A	7	0.01	-
Northumberland @ Stanley									
EB	Left/Through/Right	A	9	0.14	-	B	11	0.23	-
WB	Left/Through	B	8	0.03	-	A	10	0.09	-
WB	Right		11	0.59	-		8	0.35	-
NB	Left/Through/Right	A	7	0.01	-	A	9	0.04	-
SB	Left/Through/Right	A	10	0.36	-	F	77	**1.08**	-
Hilltop @ Wrigley									
EB	Through	-	0	0.09	0	-	0	0.08	0
WB	Left	A	8	0.03	<1	A	8	0.1	3
WB	Through	-	0	0.03	0	-	0	0.06	0
NB	Left/Right	B	11	0.28	9	B	12	0.16	4
Swan @ Stanley									
EB	Through/Right	-	0	0.17	0	-	0	0.46	0
WB	Left/Through	A	3	0.02	<1	A	3	0.04	<1
NB	Left/Right	E	44	0.93	97	E	40	0.83	62
Swan @ Brant-Waterloo									
EB	Left/Through/Right	A	9	0.01	<1	B	11	0.03	<1
WB	Left/Through/Right	A	10	0.02	<1	B	10	0.01	<1
NB	Left/Through/Right	A	0	0	0	A	0	0	<1
SB	Left/Through/Right	A	1	0.01	<1	A	0	0	<1
Robert Woolner @ Howard Marshall									
EB	Left/Through	A	7	0.01	<1	A	7	0.01	<1
WB	Through/Right	-	0	0	0		0	0	0
SB	Left/Right	A	8	0.01	<1	A	8	0.02	<1
Swan @ Leslie Davis									
WB	Left/Right	A	9	0.19	5	A	9	0.12	3
NB	Through/Right	-	0	0	0	-	0	0.01	0
SB	Left/Through	A	7	0.04	<1	A	8	0.13	3
Robert Woolner @ Gourlay Farm									
EB	Left/Right	A	9	0.01	<1	A	9	0.01	<1
NB	Left/Through	-	0	0	0	-	0	0	0
SB	Through/Right	-	0	0	0	-	0	0	0

LOS – Level of Service v/c – Volume to Capacity Ratio 95th Q – 95th percentile queue length in metres

Under future 2031 background conditions, the two intersections of Stanley Street with Northumberland Street and with Swan Street will deteriorate considerably. All movements at the other intersections remain in acceptable standing with LOS D or better, and with reserve capacity. At the intersection of Swan Street and Stanley Street, the northbound approach is expected to experience delays over 35 seconds in both AM and PM peak periods and operate with LOS E.

At the intersection of Northumberland Street and Stanley Street, the southbound approach is expected to experience very high delays exceeding 75 seconds in the PM Peak hour. The volumes expected at this approach, primarily due to left turning vehicles, will exceed the available capacity.

Hilltop TIS showed that the southbound approach at this intersection would operate with long delays (and LOS F) and at capacity by 2027, even with the proposed improvement of an all-way stop control. Therefore, it may be implied that any additional background growth following 2027 conditions would result in unacceptable conditions. A sensitivity analysis was completed assuming no background traffic growth from 2018 existing conditions to 2031, and by assuming a minimal background growth rate of 0.5%. Both cases show that the critical movement at this intersection will operate beyond capacity, at LOS F and with delays exceeding 120 seconds. Similar above capacity conditions will persist for the adjacent intersection of Stanley Street and Swan Street.

Based on the above analysis and sensitivity tests on background growth rates, any new site traffic from the subject site of 869 Brant-Waterloo Road is expected to exacerbate the situation. However, no alternative routes for traffic travelling to and from the north are available to the planned developments within in the Ayr Urban Area. As such, the following sections detail the expected operations in the study area road network with the additional traffic from the subject site of 869 Brant-Waterloo Road.

4 Site Characteristics

4.1 Site Plan and Access

Broos Properties Ltd. is proposing to construct 302 single family units, 108 townhouse units, and 75 townhouse units in medium density residential blocks within the subject site at 869 Brant-Waterloo Road. The proposed development is expected to be carried out in the following four phases:

- Phase 1 construction starts in 2018
- Phase 2 construction starts in 2020
- Phase 3 construction starts in 2022
- Phase 4 construction starts in 2024
- Full build-out and occupied by 2026

Sketch plans showing the subject site at 869 Brant-Waterloo Road at Phase 1 development and full-build are presented in **Exhibit 10.** The draft plan for the entire subdivision at 869 Brant-Waterloo Road is presented in **Exhibit 11.**

During Phase 1, access to the subject site will consist of connections to Howard Marshall Street and Freer Street via Robert Woolner Street and Street H, respectively. No connection is provided to Swan Street via Leslie Davis Street although the adjacent Hilltop Estates Subdivision considers the intersection of Leslie Davis Street and Swan Street to be complete by 2020. The new intersections and respective traffic control devices within the internal road network of the subject site are as listed below:

- Robert Woolner Drive & Howard Marshall Street – stop-control on southbound approach
- Robert Woolner Drive /Street F & Freer Street – stop-control on southbound approach
- Robert Woolner Drive & Gourlay Farm Lane – stop-control on eastbound approach

- Leslie Davis & Street A – traffic circle with yield-control at all approaches (see **Section 7** for further details)

At full build-out, new access to the subject site include:

- Robert Woolner Street & Leslie Davie Street
- Robert Woolner Street & Brant-Waterloo Road, and
- Brant Waterloo Road & Street A.

Additional intersections and their control types under full build-out are listed below:

- Robert Woolner Drive & Leslie Davis Street – traffic circle with yield-control at all approaches
- Brant-Waterloo Road & Robert Woolner Drive - stop-control on southbound approach
- Brant-Waterloo Road & Street A - stop-control on southbound approach

4.2 Site Vehicular Traffic Trip Generation

The trip generation for the residential development was based on information in the Trip Generation Manual, 9th Edition by the Institute of Transportation Engineers (“ITE”):

- The “Single-Family Detached Housing” land use code 210 was used to generate trips for the proposed detached houses.
- The “Residential Condominium/Townhouse” land use code 230 was used to generate trips for the proposed townhouse units.

The site trip generation was based on fitted curve equations for the respective land uses, using the fixed variable “dwelling units” and in/out percentage splits. The resulting vehicular traffic generation for the proposed residential units for the AM and PM peak hour is summarized in **Table 4**.

.

Table 4 Site Traffic Generation

Land Use	LUC #	Units	A.M. Peak Hour			P.M. Peak Hour		
			In	Out	Total	In	Out	Total
Phase 1 (2020)								
Single Family Detached	210	87	19	55	73	62	35	97
Townhouse	230	52	5	26	31	35	21	56
Total		**139**	**24**	**81**	**104**	**97**	**56**	**153**
Full Build-out (2026)								
Single Family Detached	210	302	59	166	224	189	107	296
Townhouse	230	183	15	70	85	64	37	101
Total		**485**	**74**	**236**	**309**	**253**	**144**	**397**

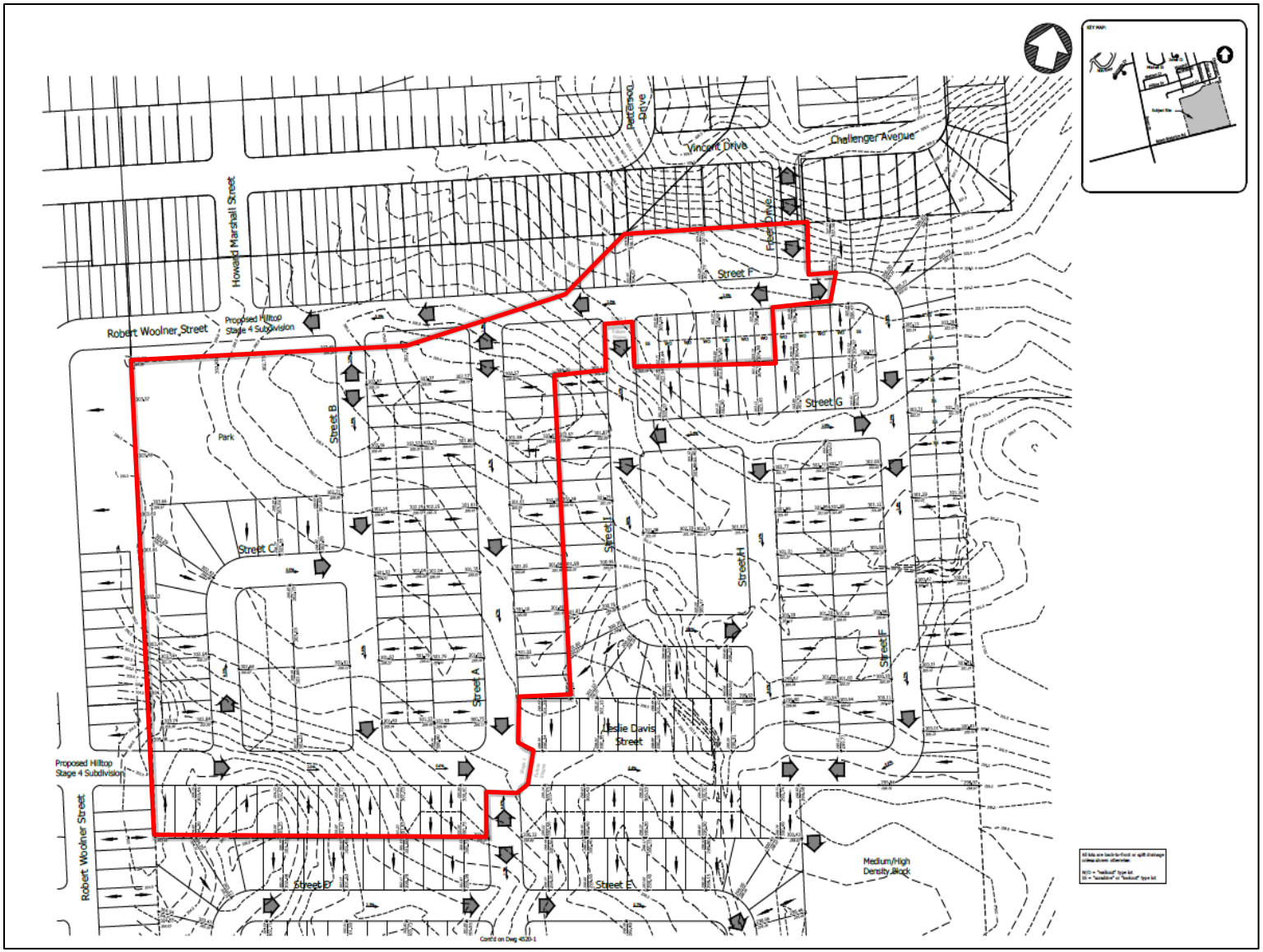


Exhibit 10 Proposed Development and Phasing

Exhibit 11 Draft Plan of Subdivision

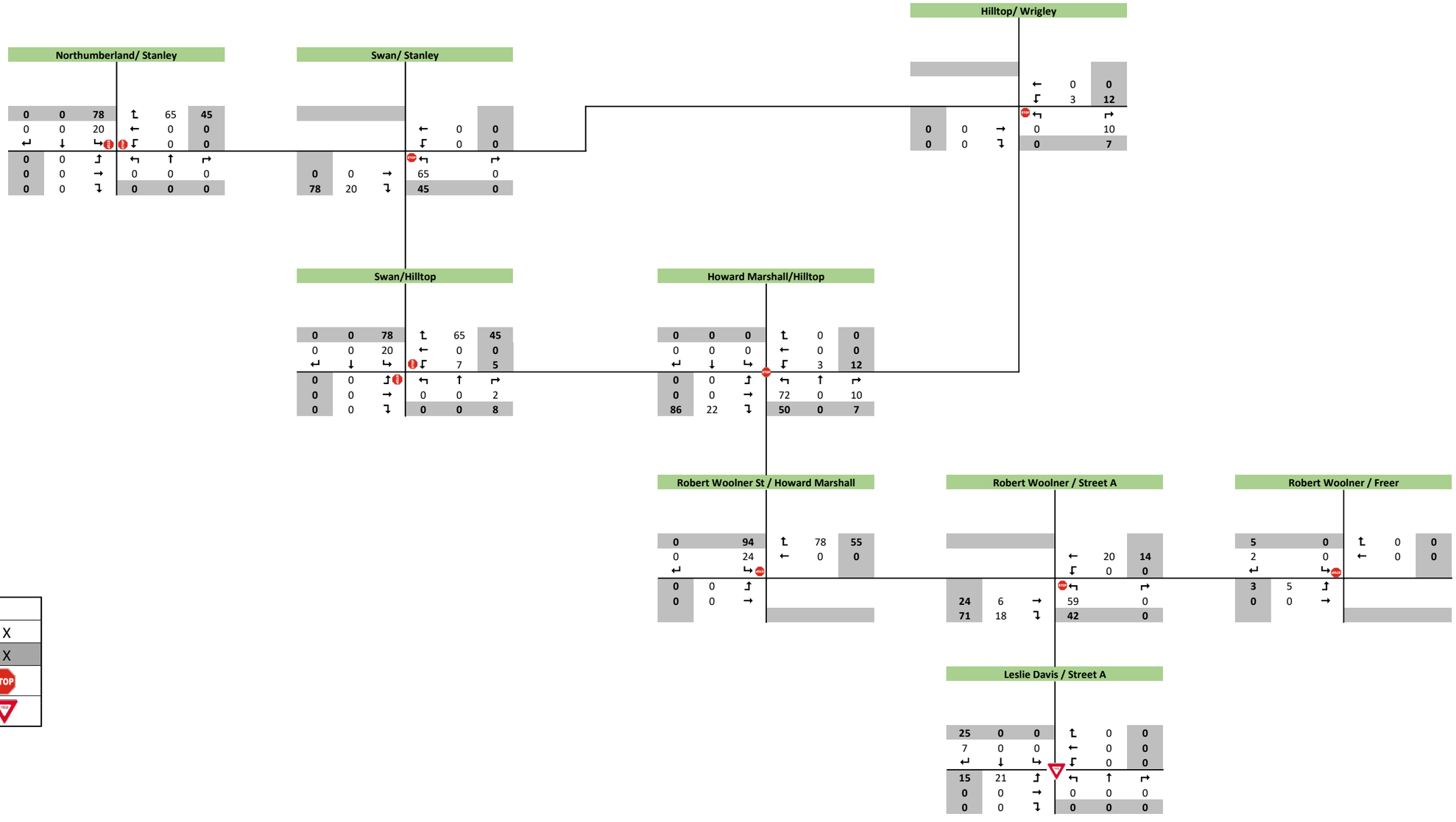
4.3 Site Traffic Distribution and Assignment

The distribution of site trips provided in the Hilltop TIS was reviewed against existing traffic patterns and 2011 TTS data. Minor changes in the trip distribution are suggested for the current study and is summarized in **Table 5**.

Table 5: Trip Distribution

To/From	Via	%
North	Hilltop Drive – Swan Street – Northumberland Street	80
South	Brant Waterloo Road – Swan Street	8
East	Howard Marshall Street – Hilltop Drive – Wrigley Road	12

The site traffic assignments in Phase 1 in 2020 and at full build-out in 2031 are shown in **Exhibit 12** and **Exhibit 13**. The total traffic volumes include background traffic and the site traffic generated by the proposed development. The resulting future total traffic volumes for 2020 and 2031 horizon years are shown in **Exhibit 14** and **Exhibit 15**.



LEGEND	
AM	X
PM	X
Stop Sign	STOP
Yield Sign	YIELD

Exhibit 12 Site Generated Traffic Volumes in Phase 1 (2020)

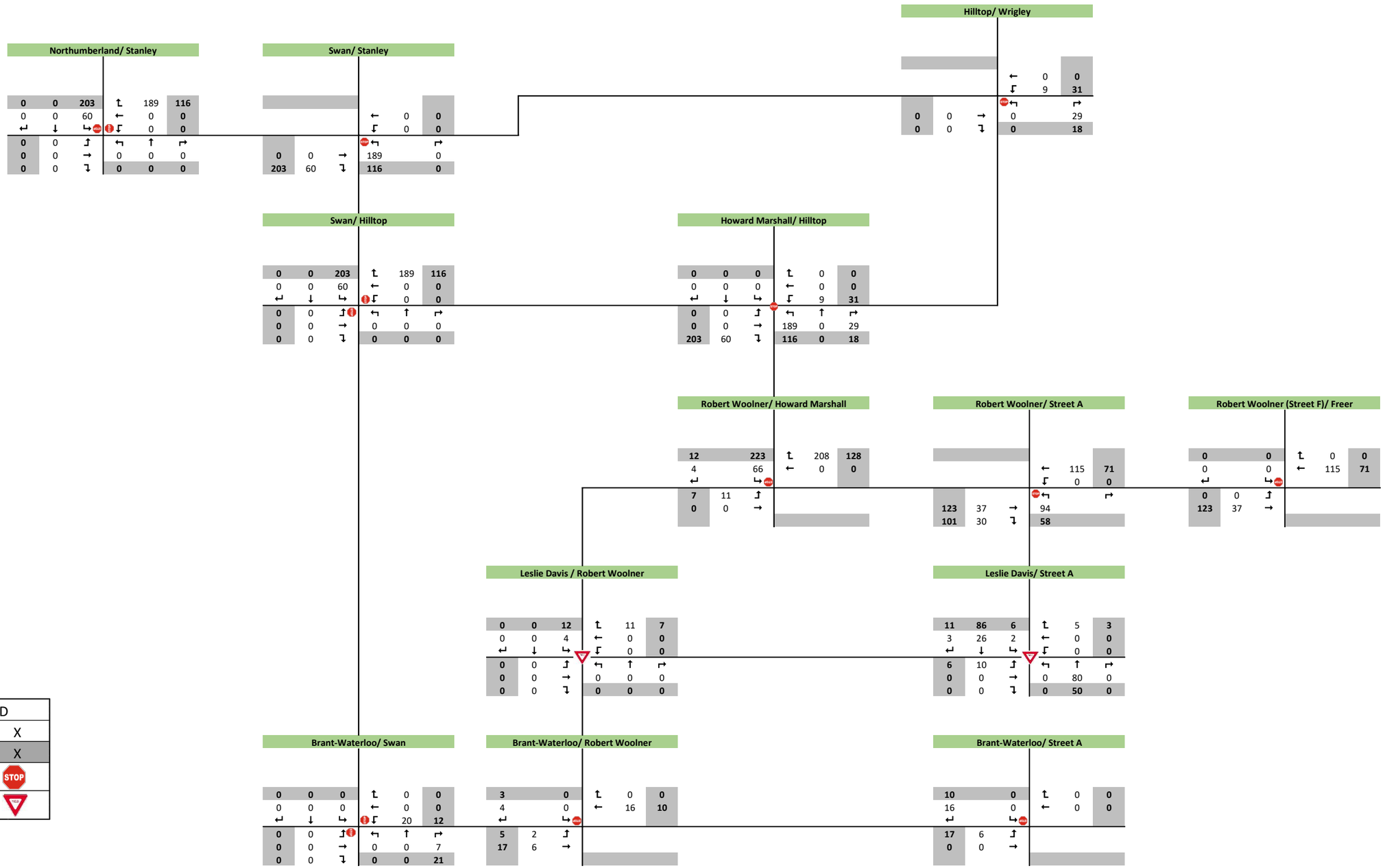
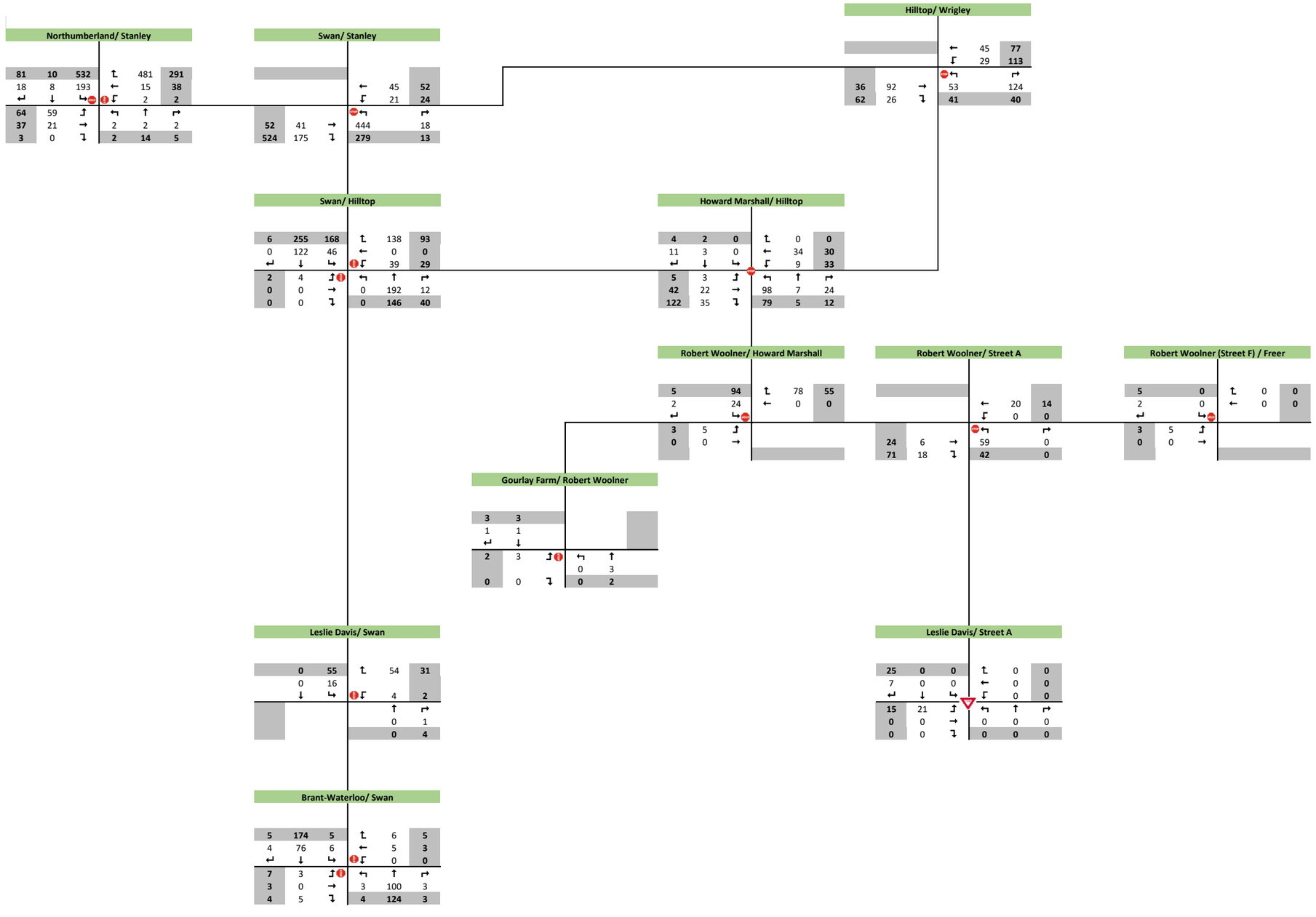
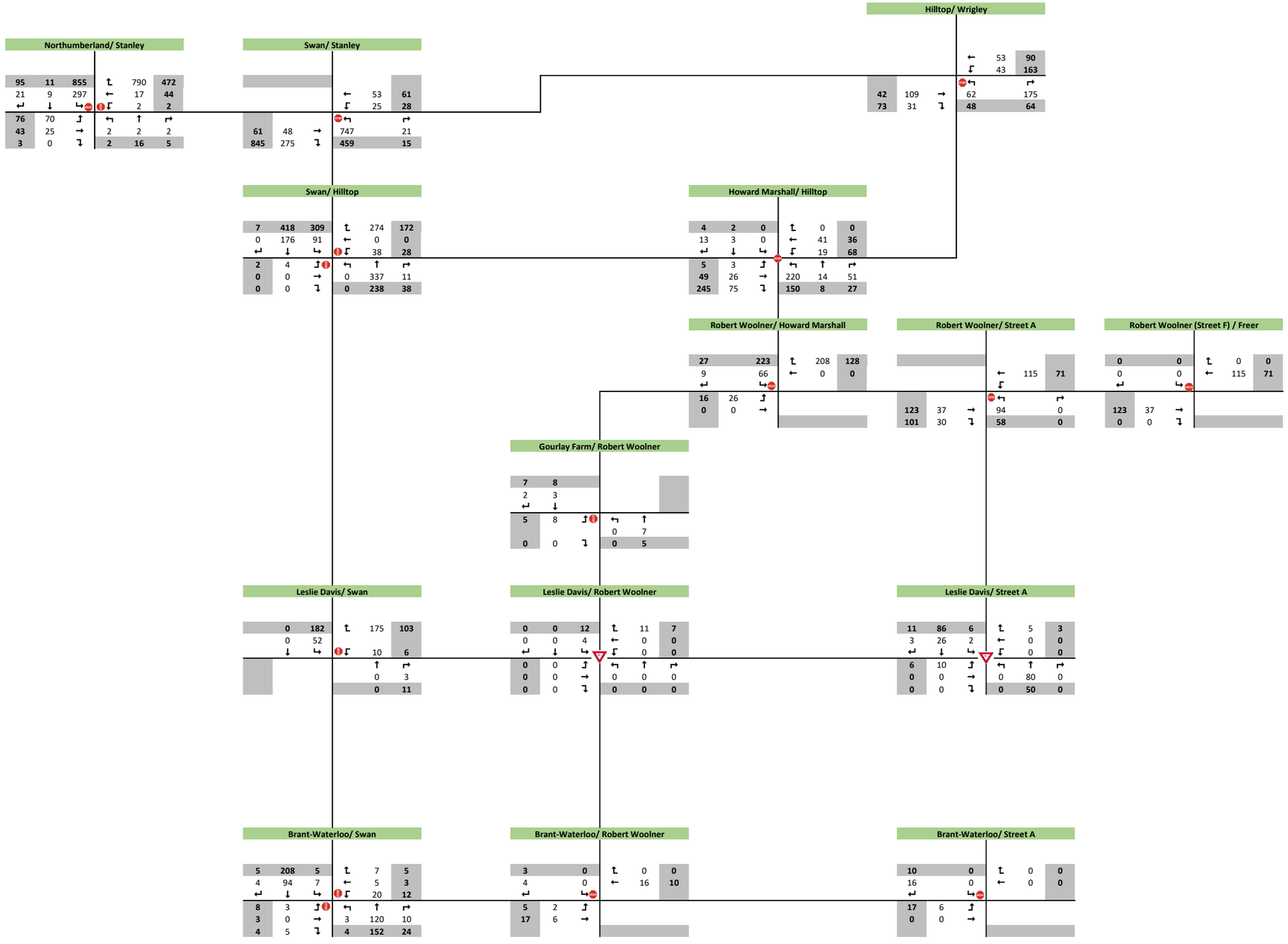


Exhibit 13 Site Generated Traffic Volumes at Full Build-out



LEGEND	
AM	X
PM	X
Stop Sign	STOP
Yield Sign	YIELD

Exhibit 14 2020 Total Traffic Volumes



LEGEND	
AM	X
PM	X
Stop Sign	STOP
Yield Sign	YIELD

Exhibit 15 2031 Total Traffic Volume

5 Future Traffic Operations

5.1.1 2020 Horizon

Traffic operations were assessed under future 2020 total traffic conditions, based on the traffic volumes shown in **Exhibit 3** and the existing road network with the described modifications presented in **Section 3.1**. Intersection operations are summarized in **Table 6**. Detailed Synchro reports are provided in **Appendix D**.

Table 6: Future 2020 Total Traffic Operations

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th	LOS	Delays (s)	v/c	95th
Swan @ Hilltop									
EB	Left/Through/Right	C	16	0.01	<1	C	23	0.01	<1
WB	Left/Through/Right	B	12	0.27	8	B	14	0.25	7
NB	Left	-	0	0	0	-	0	0	0
NB	Through/Right	-	0	0.13	0	-	0	0.12	0
SB	Left	A	8	0.04	<1	A	3	0.13	4
SB	Through/Right	-	0	0.08	0		0	0.17	0
Howard Marshall @ Hilltop									
EB	Left/Through/Right	A	7	0.07	-	A	8	0.2	-
WB	Left/Through/Right	A	8	0.06	-	A	8	0.09	-
NB	Left/Through/Right	A	8	0.17	-	A	8	0.14	-
SB	Left/Through/Right	A	7	0.02	-	A	7	0.01	-
Northumberland @ Stanley									
EB	Left/Through/Right	A	6	0.04	1	A	5	0.05	1
WB	Left/Through	A	1	0	0	A	0	0	0
WB	Right	-	0	0.31	0	-	0	0.19	0
NB	Left/Through/Right	A	10	0.01	<1	B	10	0.03	<1
SB	Left/Through/Right	B	12	0.32	11	F	63	**1.01**	127
Hilltop @ Wrigley									
EB	Through	-	0	0.08	0	-	0	0.06	0
WB	Left	A	8	0.02	<1	A	8	0.08	2
WB	Through	-	0	0.03	0	-	0	0.05	0
NB	Left/Right	B	10	0.23	7	B	11	0.13	3
Swan @ Stanley									
EB	Through/Right	-	0	0.14	0	-	0	0.38	0
WB	Left/Through	A	3	0.02	<1	A	3	0.03	<1
NB	Left/Right	C	20	0.69	43	C	21	0.59	29
Swan @ Brant-Waterloo									
EB	Left/Through/Right	A	9	0.01	<1	B	11	0.02	<1
WB	Left/Through/Right	A	10	0.02	<1	A	10	0.01	<1
NB	Left/Through/Right	A	0	0	0	A	0	0	<1

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th	LOS	Delays (s)	v/c	95th
SB	Left/Through/Right	A	1	0	<1	A	0	0	<1
Robert Woolner @ Howard Marshall									
EB	Left/Through	A	7	0	<1	A	7	0	0
WB	Through/Right	-	0	0.05	0	-	0	0.04	0
SB	Left/Right	A	9	0.03	<1	A	9	0.11	3
Swan @ Leslie Davis									
WB	Left/Right	A	9	0.06	1.4	A	9	0.03	<1
NB	Through/Right	-	0	0	0	-	0	0	0
SB	Left/Through	A	7	0.01	<1	A	7	0.04	<1
Robert Woolner @ Gourlay Farm									
EB	Left/Right	A	9	0	<1	A	9	0	0
NB	Left/Through	-	0	0	0	-	0	0	0
SB	Through/Right	-	0	0	0	-	0	0	0
Robert Woolner /Street F @ Freer									
EB	Left/Through	A	7	0	<1	A	7	0	0
WB	Through/Right	-	0	0	0	-	0	0	0
SB	Left/Right	A	8	0	0	A	8	0.01	<1
Robert Woolner @ Street A									
EB	Through/Right	-	0	0.02	0	-	0	0.06	0
WB	Left/Through	-	0	0	0	-	0	0	0
NB	Left/Right	A	9	0.07	2	A	9	0.05	1
Leslie Davis @ Street A									
EB	Left/Through/Right	A	7	0.03	-	A	7	0.02	-
WB	Left/Through/Right	A	7	0	-	A	7	0	-
NB	Left/Through/Right	A	7	0	-	A	7	0	-
SB	Left/Through/Right	A	6	0.01	-	A	7	0.03	-

LOS – Level of Service v/c – Volume to Capacity Ratio 95th – 95th percentile queue length in metres

Under future 2020 total conditions most movements at all study intersections will operate at LOS C or better and with volume to capacity ratios of 0.69 or lower, indicating that intersections will operate well and with residual capacity. Only the southbound approach at the intersection of Northumberland Street and Stanley Street will operate at LOS F and volume to capacity ratio 1.01, indicating high delays and at-capacity conditions for the movement. The 95th percentile queue for this movement will extend to 127 metres north of the intersection.

5.1.2 2031 Horizon

Traffic operations were assessed under future 2031 total traffic conditions, based on the traffic volumes shown in **Exhibit 13** and the future road network discussed in **Section 3.1**. Intersection operations are summarized in **Table 7**. Detailed Synchro reports are provided in **Appendix D**.

Table 7: Future 2031 Total Traffic Operations

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th	LOS	Delays (s)	v/c	95th
Swan @ Hilltop									
EB	Left/Through/Right	E	42	0.04	1	F	80	0.04	1
WB	Left/Through/Right	C	20	0.6	30	D	29	0.61	29
NB	Left	-	0	0	0	-	0	0	0
NB	Through/Right	-	0	0.23	0	-	0	0.18	0
SB	Left	A	8	0.09	2	A	9	0.27	8
SB	Through/Right	-	0	0.12	0	-	0	0.28	0
Howard Marshall @ Hilltop									
EB	Left/Through/Right	A	8	0.14	-	A	10	0.4	-
WB	Left/Through/Right	A	8	0.09	-	A	9	0.16	-
NB	Left/Through/Right	B	10	0.39	-	B	10	0.3	-
SB	Left/Through/Right	A	7	0.02	-	A	8	0.01	-
Northumberland @ Stanley									
EB	Left/Through/Right	A	9	0.15	-	B	11	0.23	-
WB	Left/Through	C	8	0.03	-	A	10	0.09	-
WB	Right		17	0.78	-		9	0.47	-
NB	Left/Through/Right	A	8	0.01	-	A	9	0.04	-
SB	Left/Through/Right	B	11	0.44	-	F	194	**1.4**	-
Hilltop @ Wrigley									
EB	Through	-	0	0.09	0	-	0	0.08	0
WB	Left	A	8	0.03	<1	A	8	0.12	3
WB	Through	-	0	0.03	0	-	0	0.06	0
NB	Left/Right	B	11	0.32	10	B	12	0.19	5
Swan @ Stanley									
EB	Through/Right	-	0	0.21	0	-	0	0.6	0
WB	Left/Through	A	3	0.02	<1	A	4	0.04	1
NB	Left/Right	F	163	**1.29**	256	F	177	**1.29**	178
Swan @ Brant-Waterloo									
EB	Left/Through/Right	A	9	0.01	<1	B	12	0.03	<1
WB	Left/Through/Right	B	10	0.05	1	B	11	0.04	<1
NB	Left/Through/Right	A	0	0	0	A	0	0	<1
SB	Left/Through/Right	A	1	0.01	<1	A	0	0	<1
Robert Woolner @ Howard Marshall									
EB	Left/Through	A	8	0.02	<1	A	8	0.01	0
WB	Through/Right	-	0	0.14	0	-	0	0.08	0
SB	Left/Right	A	10	0.1	3	B	11	0.31	10
Swan @ Leslie Davis									
WB	Left/Right	A	9	0.19	5	A	9	0.12	3
NB	Through/Right	-	0	0	0	-	0	0.01	0

Intersection Approach / Movement		Weekday A.M. Peak				Weekday P.M. Peak			
		LOS	Delays (s)	v/c	95th	LOS	Delays (s)	v/c	95th
SB	Left/Through	A	7	0.04	<1	A	8	0.13	3
Robert Woolner @ Gourlay Farm									
EB	Left/Right	A	9	0.01	<1	A	9	0.01	<1
NB	Left/Through	-	0	0	0	-	0	0	0
SB	Through/Right	-	-	0	0	-	-	0.01	0
Robert Woolner /Street F @ Freer									
EB	Left/Through	-	0	0	0	-	0	0	0
WB	Through/Right	-	0	0.08	0	-	0	0.05	0
SB	Left/Right	A	0	0	0	A	0	0	0
Robert Woolner @ Street A									
EB	Through/Right	-	0	0.04	0	-	0	0.15	0
WB	Left/Through	-	0	0	0	-	0	0	0
NB	Left/Right	B	10	0.13	3	B	11	0.09	2.2
Leslie Davis @ Street A									
EB	Left/Through/Right	A	8	0.01	-	A	8	0.01	-
WB	Left/Through/Right	A	7	0.01	-	A	7	0	-
NB	Left/Through/Right	A	7	0.1	-	A	7	0.06	-
SB	Left/Through/Right	A	7	0.04	-	A	8	0.13	-
Leslie Davis @ Robert Woolner									
EB	Left/Through/Right	A	7	0	-	A	7	0	-
WB	Left/Through/Right	A	6	0.01	-	A	6	0.01	-
NB	Left/Through/Right	A	7	0	-	A	7	0	-
SB	Left/Through/Right	A	7	0	-	A	7	0.01	-
Brant-Waterloo @ Robert Woolner									
EB	Left/Through	A	2	0	0	A	2	0	<1
WB	Through/Right	-	0	0.01	0	-	0	0.01	0
SB	Left/Right	A	8	0	<1	A	8	0	<1
Brant-Waterloo @ Street A									
EB	Left/Through	A	7	0	<1	A	7	0.01	<1
WB	Through/Right	-	0	0	0	-	0	0	0
SB	Left/Right	A	8	0.02	<1	A	8	0.01	<1

LOS – Level of Service v/c – Volume to Capacity Ratio 95th – 95th percentile queue length in metres

Under future 2031 total conditions, the two intersections identified as operating at unacceptable conditions under 2031 background conditions become worse:

- At the intersection of Northumberland Street and Stanley Street, the southbound left turn volumes are particularly high during the PM peak hour and are expected to experience delays of 194 seconds. The volume at the approach will exceed the available capacity.
- Long delays close to or exceeding 200 seconds will also be experienced by the northbound approach at the intersection of Stanley Street and Swan Street during both peak periods. In both peak periods, the northbound left turn is a critical movement at the intersection.

Other movements at the study area intersections are expected to continue to operate at LOS D or better and with volume to capacity ratios of 0.78 or lower, indicating that intersections will operate well and with residual capacity. Only the eastbound movement at the intersection of Swan Street and Hilltop Drive, representing vehicles exiting the private driveway (west leg) will experience long delays and LOS E or F in the peak periods due to limited gaps in the high north-south through movement to complete turning movements. However, the volumes are very low in both peak periods.

6 Road Network Improvements Analysis

6.1 Signal Warrant Analysis

The analysis of 2031 future total traffic conditions indicate that the southbound approach of the intersection of Northumberland Street and Stanley Street will not operate at desirable LOS and is subject to higher volumes than the available capacity. An all-way stop control is already warranted at this intersection in 2027 as per the recommendations in the Hilltop TIS.

In 2031, the adjacent intersection of Swan Street is also expected to experience operational constraints on the northbound approach. Based on the guidelines presented in the **Ontario Traffic Manual – Book 5, Regulatory Signs**, an all-way stop control may not be considered at the intersection of Swan Street and Stanley Street as well, since it is less than 250 metres east of the intersection of Northumberland Street and Stanley Street. Based on these findings and constraints a traffic signal warrant analysis was completed to evaluate the potential for installation of traffic signals at the intersection of Northumberland and Stanley Street.

Signal warrants for future 2031 total conditions for the existing intersection of Northumberland Street and Stanley Street was completed as per the most recent version of Section 4.10a of the **Ontario Traffic Manual - Book 12, Traffic Signals** (March 2012), based on the Region's Capacity Analysis Requirements. Although the preferred approach is using eight-hour volume projections and evaluation against Justification 1, 2 or 3, there was insufficient data to confirm the hourly variation in traffic during the off-peak period.

Justification 7 – Projected Volumes in OTM Book 12 provides a method to determine whether a traffic signal is justified for future developments using the Average Hourly Volume (AHV). The Average Hourly Volume is calculated using the AM and PM Peak hour volumes determined for the future planning horizon.

Justification 7 considers minimum vehicular volume and delay to cross traffic, similar to Justification 1 and 2, but requires 120 percent compliance for both cases for an existing intersection to warrant a traffic signal. Results for the intersections are summarized in **Table 8**.

Table 8: Signal Warrant - OTM Book 12 Justification 7

Justification	Description	Minimum Requirement 1 Lane Highways	Compliance		
			Sectional		Entire %
		Restricted Flow	Numerical	%	
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	720	715	99%	98%
	B. Vehicle volume, along minor streets (average hour)	170	166	98%	
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	548	76%	76%
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	295	393%	

For an existing intersection to warrant a traffic signal under future conditions, both Justification 1 and 2 must be satisfied by 120% compliance. Only Justification 2B compliance (393%) satisfies the 120% requirement while Justification 2A remains well below the requirement, confirming that Justification 2 Delay to Cross Traffic is not satisfied. Therefore, for the intersection of Northumberland Street and Stanley Street, since Justification 1 and 2 are not at or above 120%, the installation of a traffic signal is not warranted in 5 years after full build-out.

6.2 Other Improvements

Consideration was given to auxiliary lanes at the two intersections of Stanley Street with Northumberland Street and Swan Street, and determined that they did not provide operational benefits to either intersection during the peak hours. In addition, due to the built up surroundings of the intersections, property takes may be required to accommodate any potential auxiliary lanes. Hence, no auxiliary lane warrant analysis is included in this document.

An alternative that may be considered in place of a traffic signal at the intersection of Northumberland Street and Stanley Street is a single-lane roundabout. A roundabout may provide gateway characteristic to the downtown Ayr area and potential capacity improvements. However, a roundabout may require a large footprint and incur additional costs for construction. To consider a roundabout the Region requires an Intersection Control Study to evaluate the feasibility of implementing a roundabout at a particular location in comparison to other forms of traffic control. Prior to undertaking such a study, the Region also requires the completion of an Initial Screening Form.

7 Traffic Calming

In 2014, BA Group conducted a Traffic Calming Study using the expected daily traffic volumes generated from the Hilltop Estates Subdivision and the subject site of the current study at 869 Brant-Waterloo Road. The study reviewed the potential for higher vehicle speeds on internal roadways

within the Hilltop Estates Subdivision and based on an evaluation of potential traffic calming measures, recommended traffic circles with mountable islands as the preferred alternative at the following internal intersections:

- Leslie Davis Street and Robert Woolner Street
- Vincent Drive and Gourlay Farm Lane

The recommended traffic circles are expected to reduce vehicle speeds, but ensure less of an impact on emergency service response times. The BA study assumes that Leslie Davis Street provides Hilltop Estates Subdivision with connections to Swan Street as well as to the subject site at 869 Brant-Waterloo Road, thereby carrying the highest volumes of traffic in the internal road network. Implementation of the traffic circle at the intersection of Leslie Davis Street and Robert Woolner Street will reduce long straight sections of Leslie Davis Street, and reduce the potential for high speeds for the expected traffic on this road.

In the current study for the subject site at 869 Brant-Waterloo Road, a traffic circle is also recommended at the intersection of Leslie Davis Street and Street A, located east of Robert Woolner Street. Although the analysis presented in this study indicates that a direct connection to Swan Street through the Hilltop Estates Division is not necessary to support the site generated trips, traffic calming benefits of a traffic circle can be still recognized on Leslie Davis Street since long straight sections of the roadway will be reduced.

As such, the traffic analysis completed in the current study includes a traffic circle with yield control on all approaches at the intersection of Leslie Davis Street and Robert Woolner Street. The functional design for the proposed traffic circle has been completed, replicating the design provided in the BA Study, and is shown in **Exhibit 16**. The proposed traffic circle includes the following:

- 7m Inscribed Circle Diameter for the traffic circle
- 7m of pavement around the circle
- Sidewalk on the west side of Street A and pedestrian crossings on the eastbound and northbound approaches

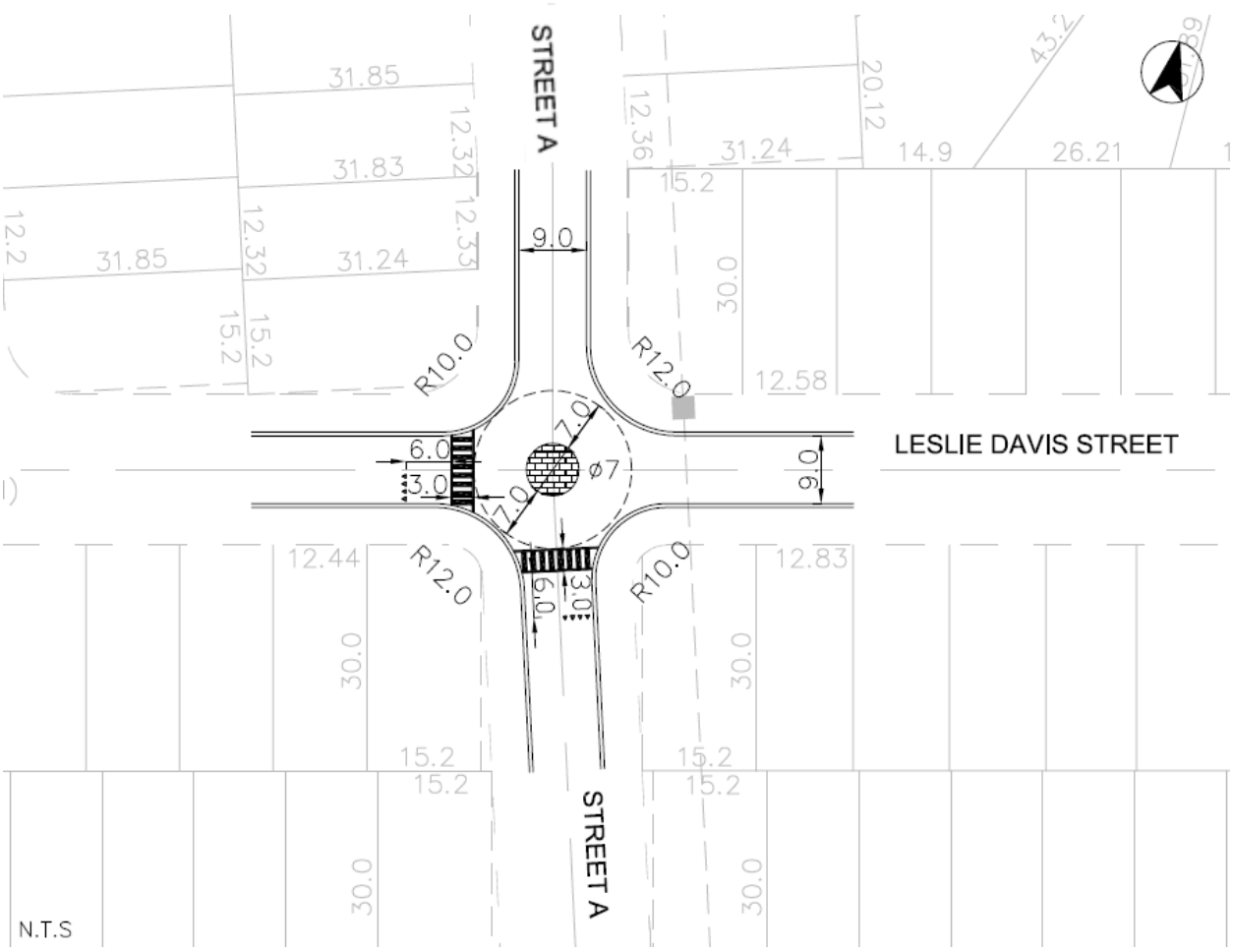


Exhibit 16 Functional Design of Traffic Circle at Leslie Davis Drive and Street A

8 Conclusions & Recommendations

The key findings of the study are summarized below:

- Under existing conditions all intersections and movements operate at acceptable levels.
- With the latent background traffic growth and addition of background developments, namely from Hilltop Estates Subdivision, the future road network is mostly able to accommodate traffic in the 2020 and 2027 horizon years. The only intersection that is expected to reach capacity conditions is the intersection of Northumberland and Stanley Street in the 2031 PM Peak hour, due to heavy southbound left turns. The intersection of Stanley Street and Swan Street will continue to operate with reserve capacity and the northbound approach will operate at LOS E.
- Traffic generated from the subject site at 869 Brant-Waterloo Road and distributed to the future road network in Phase 1 (2020) and at 5 years from full build-out (2031) will result in added volumes at the critical intersections of Northumberland Street and Stanley Street, and Stanley Street and Swan Street. As a result, the southbound approach at the intersection of Northumberland and Stanley Street will reach capacity conditions in 2020, and additionally, the northbound approach at the intersection of Swan Street and Stanley Street is expected to experience above capacity conditions by 2031. However, since the intersection of Northumberland Street and Stanley Street is expected to remain unchanged from the unusual existing configuration in 2020, the delays for southbound vehicles may be lower than indicated by the proxy analysis of a two-way stop controlled intersection (refer to Section for details). We believe the reported delays will be lower given the conservative analysis method.
- In year 2020, the proposed 869 Brant-Waterloo Road development will only add 9-13% to the southbound approach at the intersection of Northumberland and Stanley Street and 14-15% to the northbound approach at the intersection of Swan Street and Stanley Street, relative to existing and background traffic.
- A signal warrant analysis at the intersection of Northumberland Street and Stanley Street **is not warranted** under 2031 total traffic conditions based on Ontario Traffic Manual Book 12.
- The intersection of Stanley Street and Swan Street located 88 metres east of the intersection of Northumberland Street and Stanley Street, and therefore was not considered an ideal location for another all-way stop controlled intersection.
- All movements at the remaining intersections will continue to perform within LOS D or better and with reserve capacity under both 2020 and 2031 total traffic conditions.
- The proposed development traffic can be accommodated on the existing road network (using Howard Marshall and Hilltop Drive to access either Swan Street or Wrigley Road) for both Phase 1 and for the ultimate build-out in 2031. The analysis has demonstrated that the proposed development does not rely on a connection to Swan Street via Leslie Davis Street in Phase 1 or in 2031 (although the connection will be available). This is because the intersections of Hilltop drive and Swan Street, and Hilltop Drive and Howard Marshall Street are expected to operate within acceptable levels of service and with reserve capacity when subjected to all site traffic generated from the proposed development at 869 Brant-Waterloo

Road. The proposed development will also not have any major traffic volumes distributed to Brant-Waterloo Road.

- At full build-out of the proposed site, most internal intersections are expected to have stop control on the minor approach. The intersection of Leslie Davis Street and Street A is proposed to be a traffic circle and provide traffic calming for the internal road network of the proposed development.

Based on the findings above, Phase 1 of the proposed development will not require any physical external or internal road network improvements.

For the 2031 horizon year representing 5 years from full build-out of the proposed site, it is expected that the site traffic will add incremental delays at the critical intersections of Northumberland Street and Stanley Street and Stanley Street and Swan Street. However, there are no other alternative routes for trips to and from the north via Swan Street. Physical improvements such as the addition of auxiliary lanes at the critical intersections are not expected to mitigate the 2031 traffic operating conditions.

A traffic signal is not warranted at the intersection of Northumberland Street and Stanley Street under forecast 2031 conditions.

In year 2031, the proposed 869 Brant-Waterloo Road development will only add 18-21% to the southbound approach at the intersection of Northumberland and Stanley Street and 24-25% to the northbound approach at the intersection of Swan Street and Stanley Street, relative to existing and background traffic.

However, it is recommended that the future traffic volumes be monitored to confirm operating conditions and re-evaluate the necessity for signalization or any other road/intersection improvements. A full Intersection Control Study based on the Region’s guidelines may be required to address issues that arise as traffic continues to increase at the critical intersections due to background growth within the Ayr Urban Area.

Appendix A

Turning Movement Counts

Hilltop Drive & Howard Marshall Street

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Ayr
Site #: 0000000201
Intersection: Hilltop Drive & Howard Marshall Str
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hilltop Drive runs W/E

North Leg Total:	17
North Entering:	12
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	10	2	0	12
Totals	10	2	0	

Heavys	0
Trucks	0
Cars	5
Totals	5

East Leg Total:	66
East Entering:	36
East Peds:	0
Peds Cross:	⧖

Howard Marshall Street

Heavys	Trucks	Cars	Totals
0	2	66	68

Cars	Trucks	Heavys	Totals
0	0	0	0
32	1	0	33
3	0	0	3
35	1	0	

Hilltop Drive

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	2	2
1	1	19	21
1	0	11	12
2	1	32	

Hilltop Drive

Cars	Trucks	Heavys	Totals
27	1	2	30

Howard Marshall Street

Peds Cross:	⧖
West Peds:	5
West Entering:	35
West Leg Total:	103

Cars	16			
Trucks	0			
Heavys	1			
Totals	17			

Cars	24	3	8	35
Trucks	1	0	0	1
Heavys	0	0	1	1
Totals	25	3	9	

Peds Cross:	⋈
South Peds:	6
South Entering:	37
South Leg Total:	54

Comments

Hilltop Drive & Howard Marshall Street

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Ayr
Site #: 0000000201
Intersection: Hilltop Drive & Howard Marshall Str
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hilltop Drive runs W/E

North Leg Total:	9
North Entering:	4
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	3	1	0	4
Totals	3	1	0	

Heavys	0
Trucks	0
Cars	5
Totals	5

East Leg Total:	84
East Entering:	42
East Peds:	0
Peds Cross:	⧖

Howard Marshall Street

Heavys	Trucks	Cars	Totals
0	0	60	60

Cars	Trucks	Heavys	Totals
0	0	0	0
29	0	0	29
13	0	0	13
42	0	0	

Hilltop Drive

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	4	4
0	1	39	40
0	0	34	34
0	1	77	

Hilltop Drive

Cars	Trucks	Heavys	Totals
41	1	0	42

Howard Marshall Street

Peds Cross:	⧖
West Peds:	2
West Entering:	78
West Leg Total:	138

Cars	48			
Trucks	0			
Heavys	0			
Totals	48			

Cars	28	1	2	31
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	28	1	2	

Peds Cross:	⋈
South Peds:	3
South Entering:	31
South Leg Total:	79

Comments

Hilltop Drive & Howard Marshall Street

Total Count Diagram

Municipality: Ayr
Site #: 0000000201
Intersection: Hilltop Drive & Howard Marshall Str
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions: Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Hilltop Drive runs W/E

North Leg Total:	44
North Entering:	29
North Peds:	0
Peds Cross:	⋈

Heavys	1	0	0	1
Trucks	0	0	0	0
Cars	22	6	0	28
Totals	23	6	0	

Heavys	2
Trucks	0
Cars	13
Totals	15

East Leg Total:	258
East Entering:	134
East Peds:	1
Peds Cross:	⧖

Howard Marshall Street

Heavys	Trucks	Cars	Totals
2	5	219	226

Cars	Trucks	Heavys	Totals
0	0	0	0
105	3	1	109
25	0	0	25
130	3	1	

Hilltop Drive

N
W E
S

Heavys	Trucks	Cars	Totals
2	0	8	10
2	3	99	104
1	0	100	101
5	3	207	

Hilltop Drive

Cars	Trucks	Heavys	Totals
118	3	3	124

Howard Marshall Street

Peds Cross:	⧖
West Peds:	11
West Entering:	215
West Leg Total:	441

Cars	131			
Trucks	0			
Heavys	1			
Totals	132			

Cars	92	5	19	116
Trucks	2	0	0	2
Heavys	0	0	1	1
Totals	94	5	20	

Peds Cross:	⋈
South Peds:	45
South Entering:	119
South Leg Total:	251

Comments

Hilltop Drive & Howard Marshall Street
Traffic Count Summary

Intersection: Hilltop Drive & Howard Marshall St | **Count Date:** 18-Jan-2018 | **Municipality:** Ayr

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	2	8	10	0	43
9:00:00	0	3	6	9	0	43
16:00:00	0	0	0	0	0	0
17:00:00	0	1	6	7	0	26
18:00:00	0	0	3	3	0	36
Totals:	0	6	23	29	0	148

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	23	4	6	33	4
9:00:00	24	0	10	34	29
16:00:00	0	0	0	0	0
17:00:00	16	0	3	19	9
18:00:00	31	1	1	33	3
Totals:	94	5	20	119	45

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	3	33	0	36	0	68
9:00:00	0	19	0	19	0	51
16:00:00	0	0	0	0	0	0
17:00:00	10	33	0	43	1	113
18:00:00	12	24	0	36	0	117
Totals:	25	109	0	134	1	349

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	1	20	11	32	3
9:00:00	3	18	11	32	5
16:00:00	0	0	0	0	0
17:00:00	3	30	37	70	1
18:00:00	3	36	42	81	2
Totals:	10	104	101	215	11

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	17:00	18:00	18:00
Crossing Values:	0	30	32	0	19	55	34	54

Swan Street & Hilltop Drive

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Ayr
Site #: 0000000202
Intersection: Swan Street & Hilltop Drive
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Swan Street runs N/S

North Leg Total:	333			
North Entering:	127			
North Peds:	1			
Peds Cross:	⋈			

Heavys	0	3	2	5
Trucks	0	5	0	5
Cars	0	94	23	117
Totals	0	102	25	

Heavys	1	
Trucks	4	
Cars	201	
Totals	206	

East Leg Total:	135	
East Entering:	101	
East Peds:	1	
Peds Cross:	⧖	

Swan Street

Heavys	Trucks	Cars	Totals
0	0	0	0

Cars	Trucks	Heavys	Totals
68	1	1	70
0	0	0	0
30	1	0	31
98	2	1	

Driveway

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	3	3
0	0	0	0
0	0	0	0
0	0	3	

Hilltop Drive

Cars	Trucks	Heavys	Totals
31	0	3	34

Swan Street

Peds Cross:	⧖			
West Peds:	0			
West Entering:	3			
West Leg Total:	3			

Cars	124			
Trucks	6			
Heavys	3			
Totals	133			

Cars	0	130	8	138
Trucks	0	3	0	3
Heavys	0	0	1	1
Totals	0	133	9	

Peds Cross:	⋈	
South Peds:	7	
South Entering:	142	
South Leg Total:	275	

Comments

Swan Street & Hilltop Drive

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Ayr
Site #: 0000000202
Intersection: Swan Street & Hilltop Drive
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy

Person(s) who counted:

**** Non-Signalized Intersection ****

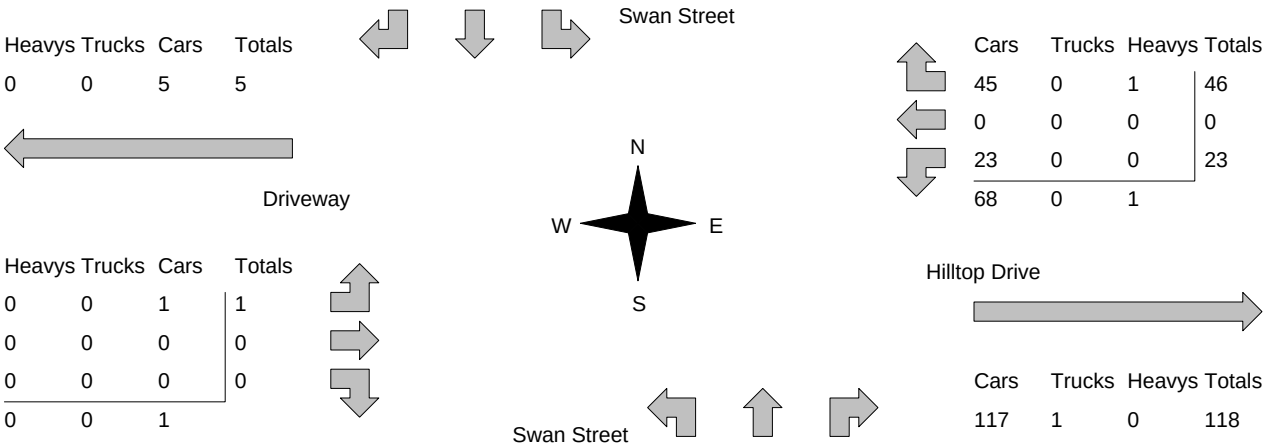
Major Road: Swan Street runs N/S

North Leg Total:	444
North Entering:	286
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	0	2	1	3
Cars	5	192	86	283
Totals	5	194	87	

Heavys	2
Trucks	0
Cars	156
Totals	158

East Leg Total:	187
East Entering:	69
East Peds:	1
Peds Cross:	⧖



Peds Cross:	⧖
West Peds:	0
West Entering:	1
West Leg Total:	6

Cars	215			
Trucks	2			
Heavys	0			
Totals	217			

Cars	0	110	31	141
Trucks	0	0	0	0
Heavys	0	1	0	1
Totals	0	111	31	

Peds Cross:	⋈
South Peds:	3
South Entering:	142
South Leg Total:	359

Comments

Swan Street & Hilltop Drive

Total Count Diagram

Municipality: Ayr
Site #: 0000000202
Intersection: Swan Street & Hilltop Drive
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Swan Street runs N/S

North Leg Total: 1437
North Entering: 773
North Peds: 3
Peds Cross: ⋈

Heavys	0	4	5	9
Trucks	0	12	2	14
Cars	8	534	208	750
Totals	8	550	215	

Heavys	7
Trucks	8
Cars	649
Totals	664

East Leg Total: 609
East Entering: 312
East Peds: 3
Peds Cross: ⧖

Swan Street

Heavys	Trucks	Cars	Totals
0	0	9	9

Cars	Trucks	Heavys	Totals
201	2	3	206
0	0	0	0
105	1	0	106
306	3	3	

Driveway

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	7	7
0	0	0	0
0	0	0	0
0	0	7	

Hilltop Drive

Cars	Trucks	Heavys	Totals
289	2	6	297

Swan Street

Peds Cross: ⧖
West Peds: 0
West Entering: 7
West Leg Total: 16

Cars	639			
Trucks	13			
Heavys	4			
Totals	656			

Cars	1	441	81	523
Trucks	0	6	0	6
Heavys	0	4	1	5
Totals	1	451	82	

Peds Cross: ⋈
South Peds: 11
South Entering: 534
South Leg Total: 1190

Comments

Swan Street & Hilltop Drive
Traffic Count Summary

Intersection: Swan Street & Hilltop Drive | **Count Date:** 18-Jan-2018 | **Municipality:** Ayr

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	24	90	0	114	1	252
9:00:00	32	99	0	131	0	253
16:00:00	0	0	0	0	0	0
17:00:00	77	180	3	260	0	383
18:00:00	82	181	5	268	2	419
Totals:	215	550	8	773	3	1307

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	130	8	138	7
9:00:00	1	108	13	122	0
16:00:00	0	0	0	0	0
17:00:00	0	101	22	123	2
18:00:00	0	112	39	151	2
	1	451	82	534	11

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	35	0	73	108	1	111
9:00:00	25	0	58	83	0	86
16:00:00	0	0	0	0	0	0
17:00:00	27	0	37	64	0	64
18:00:00	19	0	38	57	2	58
Totals:	106	0	206	312	3	319

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	3	0	0	3	0
9:00:00	3	0	0	3	0
16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0
18:00:00	1	0	0	1	0
	7	0	0	7	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	0:00	0:00	7:00	8:00	9:00	16:00	17:00	18:00
Crossing Values:	0	0	0	46	28	0	29	24

Wrigley Road & Hilltop Drive

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

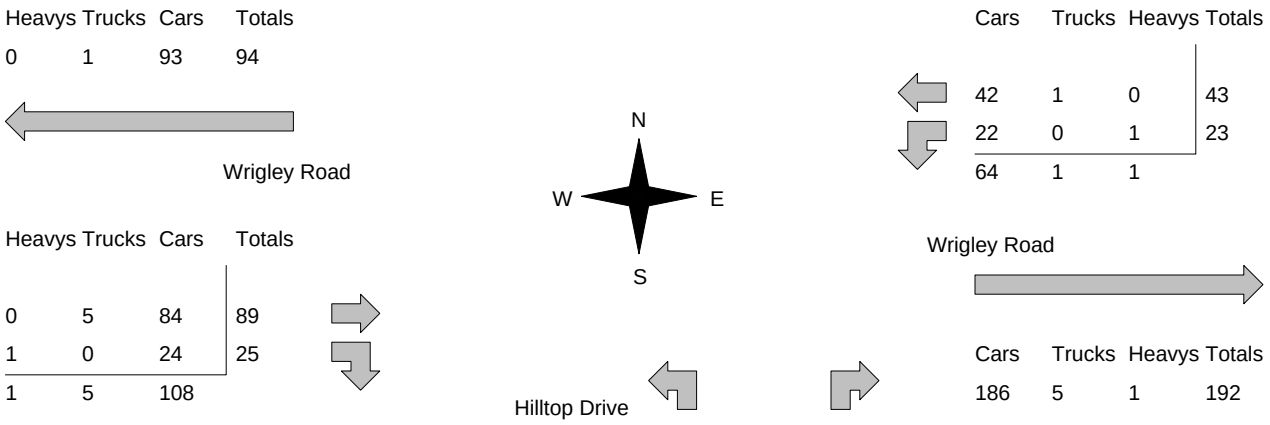
Municipality: Ayr
Site #: 0000000203
Intersection: Wrigley Road & Hilltop Drive
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Wrigley Road runs W/E

East Leg Total: 258
East Entering: 66
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 114
West Leg Total: 208

Cars 46
Trucks 0
Heavys 2
Totals 48

Cars 51 102 153
Trucks 0 0 0
Heavys 0 1 1
Totals 51 103

Peds Cross: ⋈
South Peds: 3
South Entering: 154
South Leg Total: 202

Comments

Wrigley Road & Hilltop Drive

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Ayr
Site #: 0000000203
Intersection: Wrigley Road & Hilltop Drive
TFR File #: 1
Count date: 18-Jan-2018

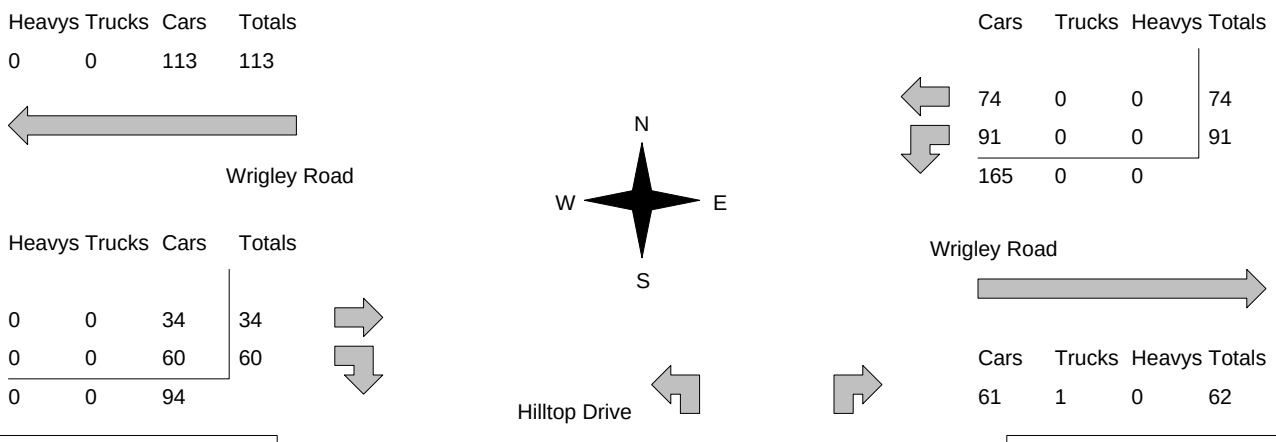
Weather conditions:
Cloudy

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Wrigley Road runs W/E

East Leg Total: 227
East Entering: 165
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 94
West Leg Total: 207

Cars 151
Trucks 0
Heavys 0
Totals 151

Cars 39 27 66
Trucks 0 1 1
Heavys 0 0 0
Totals 39 28

Peds Cross: ⋈
South Peds: 2
South Entering: 67
South Leg Total: 218

Comments

Wrigley Road & Hilltop Drive

Total Count Diagram

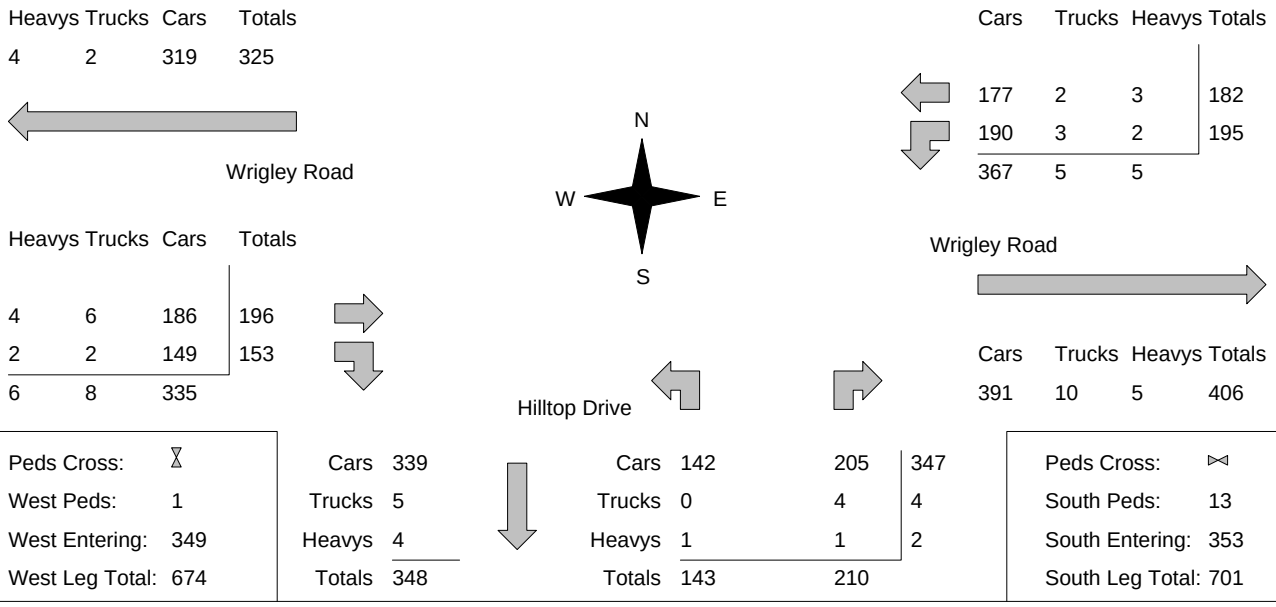
Municipality: Ayr
Site #: 0000000203
Intersection: Wrigley Road & Hilltop Drive
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Wrigley Road runs W/E

East Leg Total: 783
East Entering: 377
East Peds: 1
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 1
West Entering: 349
West Leg Total: 674

Cars 339
Trucks 5
Heavys 4
Totals 348

Cars 142 205 347
Trucks 0 4 4
Heavys 1 1 2
Totals 143 210

Peds Cross: ⋈
South Peds: 13
South Entering: 353
South Leg Total: 701

Comments

Wrigley Road & Hilltop Drive
Traffic Count Summary

Intersection: Wrigley Road & Hilltop Drive | **Count Date:** 18-Jan-2018 | **Municipality:** Ayr

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	0	0	0	0	142
9:00:00	0	0	0	0	0	100
16:00:00	0	0	0	0	0	0
17:00:00	0	0	0	0	0	66
18:00:00	0	0	0	0	0	45
Totals:	0	0	0	0	0	353

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	43	0	99	142	4
9:00:00	44	0	56	100	5
16:00:00	0	0	0	0	0
17:00:00	32	0	34	66	1
18:00:00	24	0	21	45	3
Totals:	143	0	210	353	13

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	15	36	0	51	0	137
9:00:00	26	32	0	58	1	142
16:00:00	0	0	0	0	0	0
17:00:00	70	62	0	132	0	220
18:00:00	84	52	0	136	0	227
Totals:	195	182	0	377	1	726

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	68	18	86	0
9:00:00	0	56	28	84	0
16:00:00	0	0	0	0	0
17:00:00	0	36	52	88	1
18:00:00	0	36	55	91	0
Totals:	0	196	153	349	1

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	17:00	18:00	18:00
Crossing Values:	0	43	45	0	133	33	24	139

Swan Street & Stanley Street

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

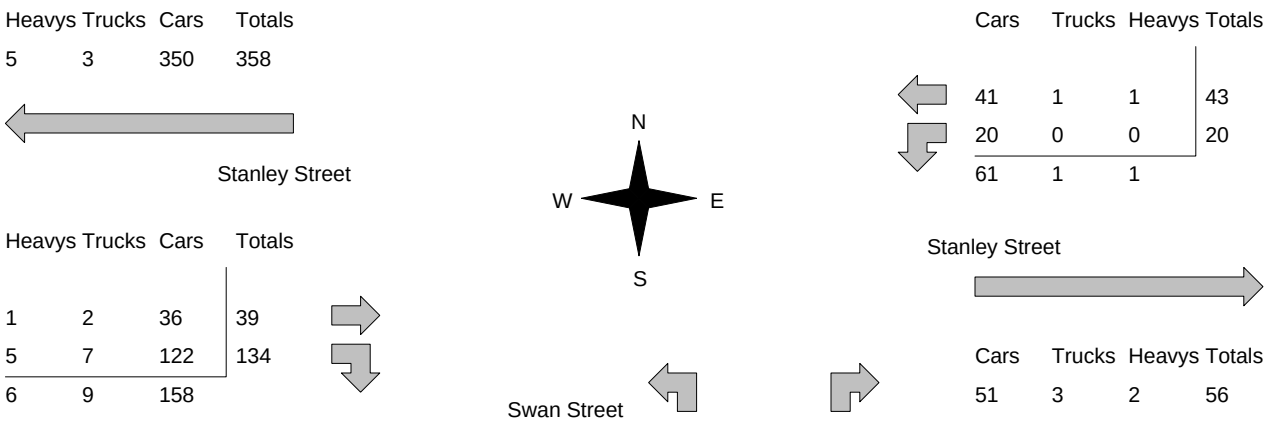
Municipality: Ayr
Site #: 0000000204
Intersection: Stanley Street & Swan Street
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Stanley Street runs W/E

East Leg Total: 119
East Entering: 63
East Peds: 0
Peds Cross:



Peds Cross:
West Peds: 1
West Entering: 173
West Leg Total: 531

Cars 142
Trucks 7
Heavys 5
Totals 154

Cars 309 15 324
Trucks 2 1 3
Heavys 4 1 5
Totals 315 17

Peds Cross:
South Peds: 4
South Entering: 332
South Leg Total: 486

Comments

Swan Street & Stanley Street

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Ayr
Site #: 0000000204
Intersection: Stanley Street & Swan Street
TFR File #: 1
Count date: 18-Jan-2018

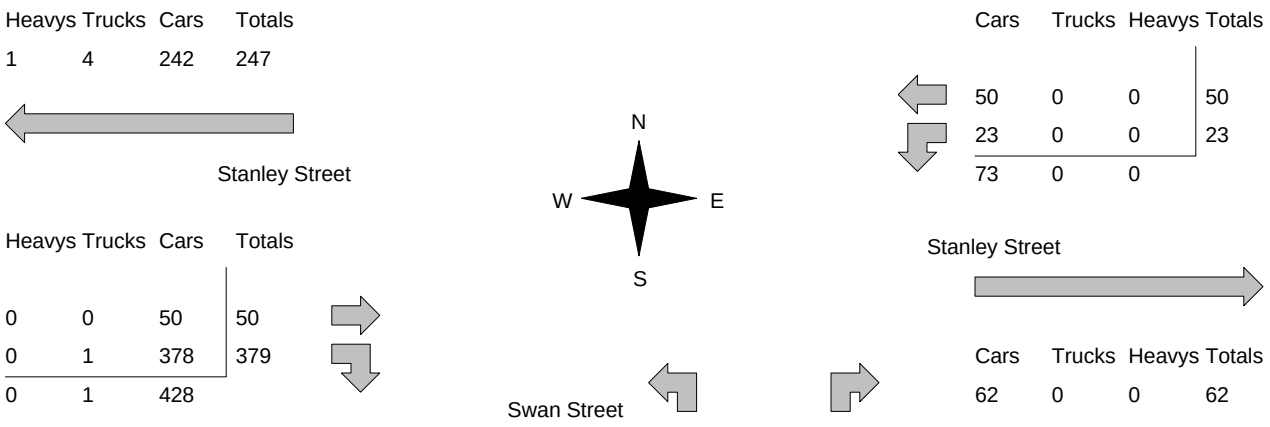
Weather conditions:
Cloudy

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Stanley Street runs W/E

East Leg Total: 135
East Entering: 73
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 1
West Entering: 429
West Leg Total: 676

Cars 401
Trucks 1
Heavys 0
Totals 402

Cars 192 12 204
Trucks 4 0 4
Heavys 1 0 1
Totals 197 12

Peds Cross: ⋈
South Peds: 1
South Entering: 209
South Leg Total: 611

Comments

Swan Street & Stanley Street

Total Count Diagram

Municipality: Ayr
Site #: 0000000204
Intersection: Stanley Street & Swan Street
TFR File #: 1
Count date: 18-Jan-2018

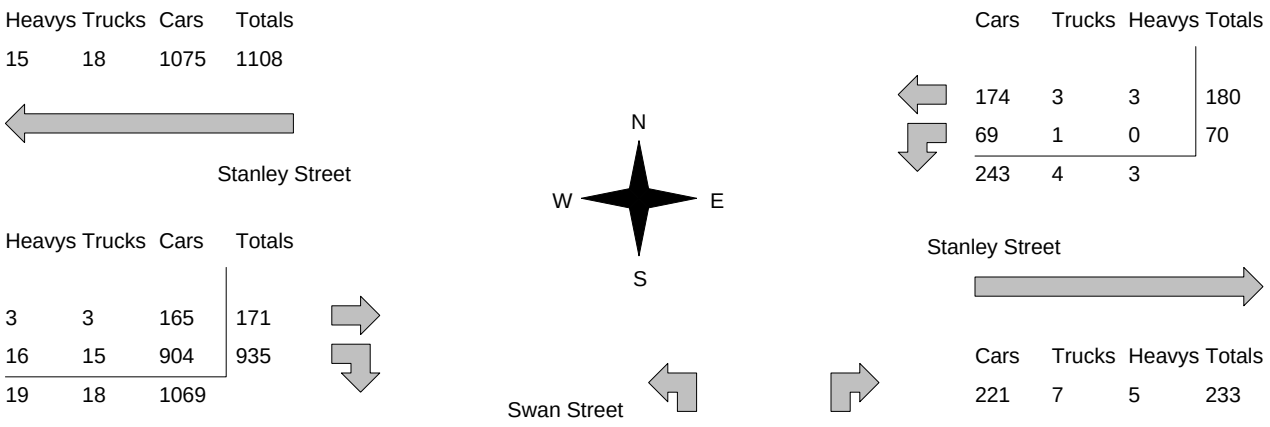
Weather conditions:
Cloudy

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Stanley Street runs W/E

East Leg Total: 483
East Entering: 250
East Peds: 3
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 6
West Entering: 1106
West Leg Total: 2214

Cars 973
Trucks 16
Heavys 16
Totals 1005

Cars 901 56 957
Trucks 15 4 19
Heavys 12 2 14
Totals 928 62

Peds Cross: ⋈
South Peds: 10
South Entering: 990
South Leg Total: 1995

Comments

Swan Street & Stanley Street
Traffic Count Summary

Intersection: Stanley Street & Swan Street | **Count Date:** 18-Jan-2018 | **Municipality:** Ayr

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	0	0	0	0	315
9:00:00	0	0	0	0	0	265
16:00:00	0	0	0	0	0	0
17:00:00	0	0	0	0	0	214
18:00:00	0	0	0	0	0	196
Totals:	0	0	0	0	0	990

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	298	0	17	315	2
9:00:00	247	0	18	265	4
16:00:00	0	0	0	0	0
17:00:00	199	0	15	214	3
18:00:00	184	0	12	196	1
Totals:	928	0	62	990	10

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	18	45	0	63	0	198
9:00:00	15	38	0	53	0	228
16:00:00	0	0	0	0	0	0
17:00:00	15	53	0	68	3	441
18:00:00	22	44	0	66	0	489
Totals:	70	180	0	250	3	1356

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	25	110	135	4
9:00:00	0	37	138	175	1
16:00:00	0	0	0	0	0
17:00:00	0	61	312	373	0
18:00:00	0	48	375	423	1
Totals:	0	171	935	1106	6

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	17:00	18:00	18:00
Crossing Values:	0	302	248	0	202	79	185	71

Stanley Street & Northumberland Street

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

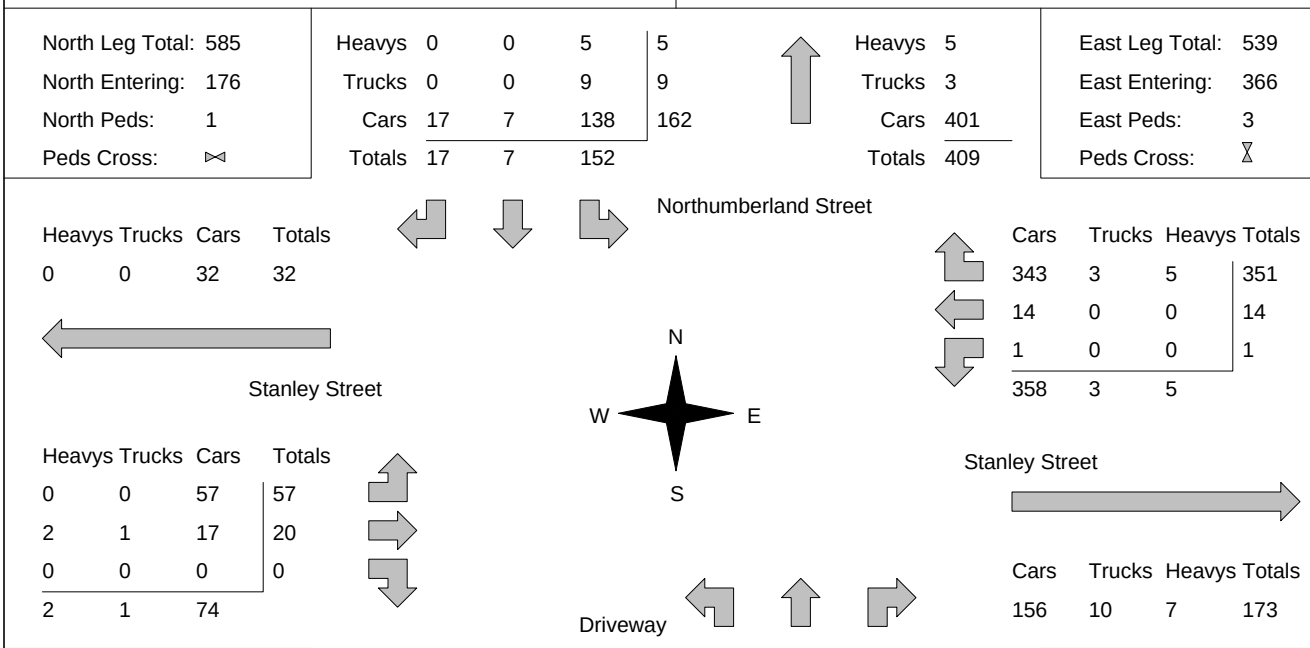
One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Ayr
Site #: 0000000205
Intersection: Stanley Street & Northumberland S
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Stanley Street runs W/E



Comments

Stanley Street & Northumberland Street

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Ayr
Site #: 0000000205
Intersection: Stanley Street & Northumberland S
TFR File #: 1
Count date: 18-Jan-2018

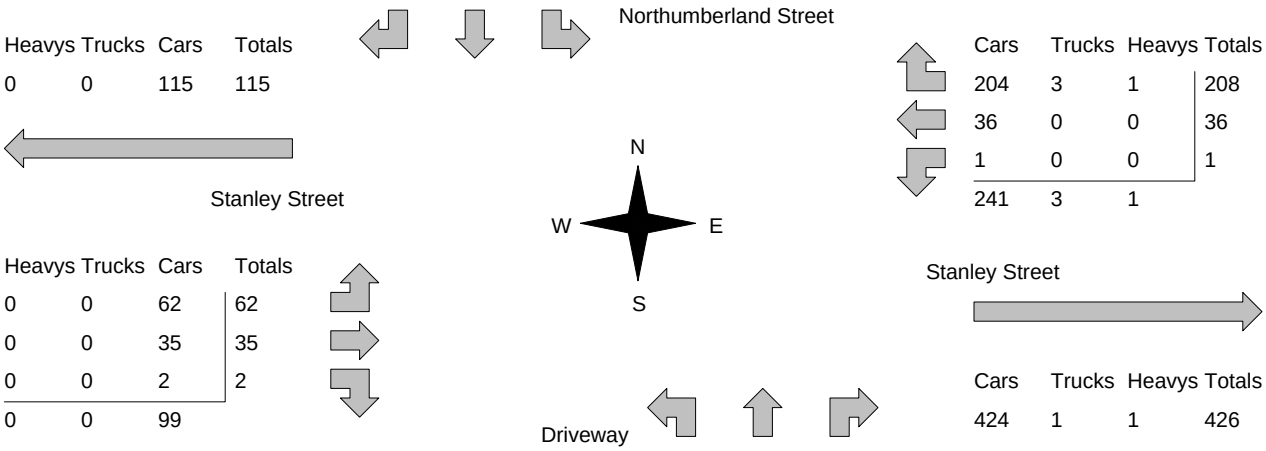
Weather conditions:
Cloudy

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Stanley Street runs W/E

North Leg Total:	757			
North Entering:	474			
North Peds:	5			
Peds Cross:	⋈			
Heavys	0	0	1	1
Trucks	0	0	1	1
Cars	78	9	385	472
Totals	78	9	387	
Heavys	1			
Trucks	3			
Cars	279			
Totals	283			
East Leg Total:	671			
East Entering:	245			
East Peds:	6			
Peds Cross:	⧖			



Peds Cross:	⧖				
West Peds:	1				
West Entering:	99				
West Leg Total:	214				
Cars	12				
Trucks	0				
Heavys	0				
Totals	12				
Cars	1	13	4	18	
Trucks	0	0	0	0	
Heavys	0	0	0	0	
Totals	1	13	4		
Peds Cross:	⋈				
South Peds:	2				
South Entering:	18				
South Leg Total:	30				

Comments

Stanley Street & Northumberland Street

Total Count Diagram

Municipality: Ayr
Site #: 0000000205
Intersection: Stanley Street & Northumberland S
TFR File #: 1
Count date: 18-Jan-2018

Weather conditions:
Cloudy
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Stanley Street runs W/E

North Leg Total:	2444			
North Entering:	1205			
North Peds:	17			
Peds Cross:	⋈			
Heavys	3	0	15	18
Trucks	0	0	17	17
Cars	169	37	964	1170
Totals	172	37	996	
Heavys	16			
Trucks	16			
Cars	1207			
Totals	1239			
East Leg Total:	2234			
East Entering:	1123			
East Peds:	24			
Peds Cross:	⧖			

Northumberland Street

Heavys	Trucks	Cars	Totals
4	1	263	268

Cars	Trucks	Heavys	Totals
991	16	14	1021
91	1	1	93
9	0	0	9
1091	17	15	

Stanley Street

N
W E
S

Heavys	Trucks	Cars	Totals
2	0	196	198
5	2	97	104
0	0	4	4
7	2	297	

Stanley Street

Cars	Trucks	Heavys	Totals
1072	19	20	1111

Driveway

Peds Cross:	⧖			
West Peds:	7			
West Entering:	306			
West Leg Total:	574			
Cars	50			
Trucks	0			
Heavys	0			
Totals	50			
Cars	3	20	11	34
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	3	20	11	
Peds Cross:	⋈			
South Peds:	16			
South Entering:	34			
South Leg Total:	84			

Comments

Stanley Street & Northumberland Street
Traffic Count Summary

Intersection: Stanley Street & Northumberland S | **Count Date:** 18-Jan-2018 | **Municipality:** Ayr

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	120	4	16	140	1	141
9:00:00	151	10	27	188	4	192
16:00:00	0	0	0	0	0	0
17:00:00	347	13	55	415	9	427
18:00:00	378	10	74	462	3	479
Totals:	996	37	172	1205	17	1239

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	0	1	0	1	3
9:00:00	1	0	3	4	7
16:00:00	0	0	0	0	0
17:00:00	1	6	5	12	4
18:00:00	1	13	3	17	2
Totals:	3	20	11	34	16

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	15	334	349	5	419
9:00:00	1	13	272	286	4	355
16:00:00	0	0	0	0	0	0
17:00:00	3	38	222	263	9	337
18:00:00	5	27	193	225	6	318
Totals:	9	93	1021	1123	24	1429

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	54	16	0	70	0
9:00:00	44	23	2	69	5
16:00:00	0	0	0	0	0
17:00:00	45	29	0	74	1
18:00:00	55	36	2	93	1
Totals:	198	104	4	306	7

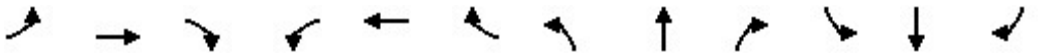
Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	16:00	17:00	17:00	18:00	18:00
Crossing Values:	0	129	171	0	371	99	399	101

Appendix B

Synchro Reports

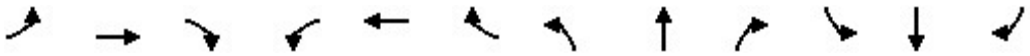
2018 Existing Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	0	0	31	0	70	0	133	9	25	102	0
Future Volume (Veh/h)	3	0	0	31	0	70	0	133	9	25	102	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	0	34	0	78	0	148	10	28	113	0
Pedestrians					1			7			1	
Lane Width (m)					3.5			3.5			3.5	
Walking Speed (m/s)					1.1			1.1			1.1	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	401	328	120	330	323	155	113			159		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	401	328	120	330	323	155	113			159		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	99	100	100	94	100	91	100			98		
cM capacity (veh/h)	505	581	931	613	585	892	1489			1383		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	3	112	158	141
Volume Left	3	34	0	28
Volume Right	0	78	10	0
cSH	505	783	1489	1383
Volume to Capacity	0.01	0.14	0.00	0.02
Queue Length 95th (m)	0.1	3.8	0.0	0.5
Control Delay (s)	12.2	10.4	0.0	1.7
Lane LOS	B	B		A
Approach Delay (s)	12.2	10.4	0.0	1.7
Approach LOS	B	B		

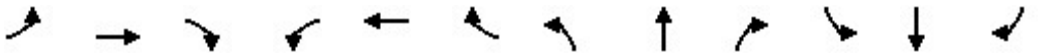
Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	34.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	21	12	3	33	0	25	3	9	0	2	10
Future Volume (vph)	2	21	12	3	33	0	25	3	9	0	2	10
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	23	13	3	37	0	28	3	10	0	2	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	38	40	41	13
Volume Left (vph)	2	3	28	0
Volume Right (vph)	13	0	10	11
Hadj (s)	-0.10	0.02	0.04	-0.51
Departure Headway (s)	4.0	4.1	4.1	3.6
Degree Utilization, x	0.04	0.05	0.05	0.01
Capacity (veh/h)	890	868	848	972
Control Delay (s)	7.1	7.3	7.3	6.6
Approach Delay (s)	7.1	7.3	7.3	6.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.2		
Level of Service	A		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	20	0	1	14	351	1	1	1	152	7	17
Future Volume (Veh/h)	57	20	0	1	14	351	1	1	1	152	7	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	63	22	0	1	16	390	1	1	1	169	8	19
Pedestrians		1			3			3			1	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	17			25			193	170	28	172	170	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	17			25			193	170	28	172	170	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	78	99	98
cM capacity (veh/h)	1612			1598			723	695	1047	759	695	1064

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	85	17	390	3	196
Volume Left	63	1	0	1	169
Volume Right	0	0	390	1	19
cSH	1612	1598	1700	795	778
Volume to Capacity	0.04	0.00	0.23	0.00	0.25
Queue Length 95th (m)	0.9	0.0	0.0	0.1	7.6
Control Delay (s)	5.5	0.4	0.0	9.5	11.2
Lane LOS	A	A		A	B
Approach Delay (s)	5.5	0.0		9.5	11.2
Approach LOS				A	B

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	43.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	89	25	23	43	51	103
Future Volume (Veh/h)	89	25	23	43	51	103
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	99	28	26	48	57	114
Pedestrians					3	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			130		216	116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			130		216	116
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		93	88
cM capacity (veh/h)			1439		761	936

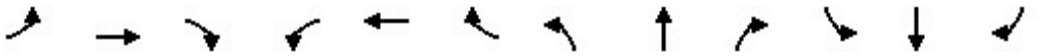
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	127	26	48	171
Volume Left	0	26	0	57
Volume Right	28	0	0	114
cSH	1700	1439	1700	869
Volume to Capacity	0.07	0.02	0.03	0.20
Queue Length 95th (m)	0.0	0.4	0.0	5.5
Control Delay (s)	0.0	7.5	0.0	10.2
Lane LOS		A		B
Approach Delay (s)	0.0	2.7		10.2
Approach LOS				B

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	24.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	39	134	20	43	315	17
Future Volume (Veh/h)	39	134	20	43	315	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	43	149	22	48	350	19
Pedestrians	1				4	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			196		214	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			196		214	122
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		54	98
cM capacity (veh/h)			1384		760	916

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	192	70	369
Volume Left	0	22	350
Volume Right	149	0	19
cSH	1700	1384	767
Volume to Capacity	0.11	0.02	0.48
Queue Length 95th (m)	0.0	0.4	20.1
Control Delay (s)	0.0	2.5	14.0
Lane LOS		A	B
Approach Delay (s)	0.0	2.5	14.0
Approach LOS			B

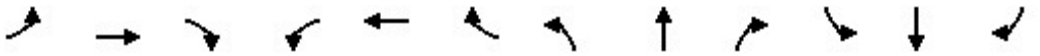
Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	4	0	4	5	2	96	2	5	69	3
Future Volume (Veh/h)	2	0	4	0	4	5	2	96	2	5	69	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	4	0	4	6	2	107	2	6	77	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	210	204	78	206	204	108	80			109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	210	204	78	206	204	108	80			109		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	99	99	100			100		
cM capacity (veh/h)	740	693	988	749	692	938	1531			1494		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	6	10	111	86
Volume Left	2	0	2	6
Volume Right	4	6	2	3
cSH	888	821	1531	1494
Volume to Capacity	0.01	0.01	0.00	0.00
Queue Length 95th (m)	0.2	0.3	0.0	0.1
Control Delay (s)	9.1	9.4	0.1	0.5
Lane LOS	A	A	A	A
Approach Delay (s)	9.1	9.4	0.1	0.5
Approach LOS	A	A		

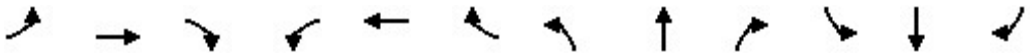
Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	17.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	0	23	0	46	0	111	31	87	194	5
Future Volume (Veh/h)	1	0	0	23	0	46	0	111	31	87	194	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	1	0	0	26	0	51	0	123	34	97	216	6
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	604	571	222	557	557	141	222			158		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	604	571	222	557	557	141	222			158		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	94	100	94	100			93		
cM capacity (veh/h)	370	404	820	419	411	906	1359			1433		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	77	157	319
Volume Left	1	26	0	97
Volume Right	0	51	34	6
cSH	370	651	1359	1433
Volume to Capacity	0.00	0.12	0.00	0.07
Queue Length 95th (m)	0.1	3.0	0.0	1.7
Control Delay (s)	14.8	11.3	0.0	2.8
Lane LOS	B	B		A
Approach Delay (s)	14.8	11.3	0.0	2.8
Approach LOS	B	B		

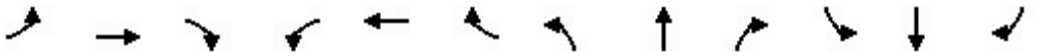
Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	40	34	13	29	0	28	1	2	0	1	3
Future Volume (vph)	4	40	34	13	29	0	28	1	2	0	1	3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	44	38	14	32	0	31	1	2	0	1	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	86	46	34	4
Volume Left (vph)	4	14	31	0
Volume Right (vph)	38	0	2	3
Hadj (s)	-0.26	0.06	0.15	-0.45
Departure Headway (s)	3.8	4.1	4.3	3.8
Degree Utilization, x	0.09	0.05	0.04	0.00
Capacity (veh/h)	936	858	799	920
Control Delay (s)	7.1	7.4	7.5	6.8
Approach Delay (s)	7.1	7.4	7.5	6.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.3			
Level of Service	A			
Intersection Capacity Utilization	23.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	35	2	1	36	208	1	13	4	387	9	78
Future Volume (Veh/h)	62	35	2	1	36	208	1	13	4	387	9	78
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	69	39	2	1	40	231	1	14	4	430	10	87
Pedestrians		1			6			2			5	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	45			43			315	227	48	242	228	46
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	45			43			315	227	48	242	228	46
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	98	100	36	98	92
cM capacity (veh/h)	1569			1576			556	642	1019	668	641	1024

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	110	41	231	19	527
Volume Left	69	1	0	1	430
Volume Right	2	0	231	4	87
cSH	1569	1576	1700	690	708
Volume to Capacity	0.04	0.00	0.14	0.03	0.74
Queue Length 95th (m)	1.0	0.0	0.0	0.6	51.1
Control Delay (s)	4.8	0.2	0.0	10.4	23.4
Lane LOS	A	A		B	C
Approach Delay (s)	4.8	0.0		10.4	23.4
Approach LOS				B	C

Intersection Summary				
Average Delay	14.0			
Intersection Capacity Utilization	59.3%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	34	60	91	74	39	28
Future Volume (Veh/h)	34	60	91	74	39	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	38	67	101	82	43	31
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			107		358	74
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			107		358	74
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		93	97
cM capacity (veh/h)			1494		600	992

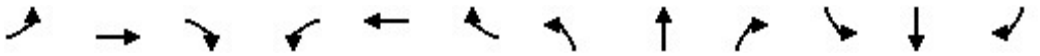
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	105	101	82	74
Volume Left	0	101	0	43
Volume Right	67	0	0	31
cSH	1700	1494	1700	719
Volume to Capacity	0.06	0.07	0.05	0.10
Queue Length 95th (m)	0.0	1.7	0.0	2.6
Control Delay (s)	0.0	7.6	0.0	10.6
Lane LOS		A		B
Approach Delay (s)	0.0	4.2		10.6
Approach LOS				B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	50	379	23	50	197	12
Future Volume (Veh/h)	50	379	23	50	197	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	56	421	26	56	219	13
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			478		376	268
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			478		376	268
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		64	98
cM capacity (veh/h)			1094		611	775

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	477	82	232
Volume Left	0	26	219
Volume Right	421	0	13
cSH	1700	1094	618
Volume to Capacity	0.28	0.02	0.38
Queue Length 95th (m)	0.0	0.6	13.2
Control Delay (s)	0.0	2.8	14.3
Lane LOS		A	B
Approach Delay (s)	0.0	2.8	14.3
Approach LOS			B

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	2	3	0	2	4	3	116	2	4	166	4
Future Volume (Veh/h)	6	2	3	0	2	4	3	116	2	4	166	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	2	3	0	2	4	3	129	2	4	184	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	335	331	186	334	332	130	188			131		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	335	331	186	334	332	130	188			131		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	100	100			100		
cM capacity (veh/h)	616	589	861	617	588	925	1398			1467		

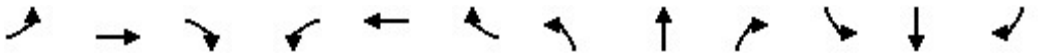
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	6	134	192
Volume Left	7	0	3	4
Volume Right	3	4	2	4
cSH	658	777	1398	1467
Volume to Capacity	0.02	0.01	0.00	0.00
Queue Length 95th (m)	0.4	0.2	0.0	0.1
Control Delay (s)	10.6	9.7	0.2	0.2
Lane LOS	B	A	A	A
Approach Delay (s)	10.6	9.7	0.2	0.2
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	27.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix C

Synchro Reports

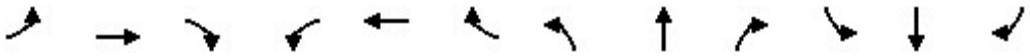
2020 and 2031 Future Background Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	0	32	0	73	0	192	10	26	122	0
Future Volume (Veh/h)	4	0	0	32	0	73	0	192	10	26	122	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	0	0	36	0	81	0	213	11	29	136	0
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	488	419	139	416	414	220	136			225		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	488	419	139	416	414	220	136			225		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	93	100	90	100			98		
cM capacity (veh/h)	437	517	912	539	520	822	1461			1354		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	117	0	224	29	136
Volume Left	4	36	0	0	29	0
Volume Right	0	81	0	11	0	0
cSH	437	708	1700	1700	1354	1700
Volume to Capacity	0.01	0.17	0.00	0.13	0.02	0.08
Queue Length 95th (m)	0.2	4.5	0.0	0.0	0.5	0.0
Control Delay (s)	13.3	11.1	0.0	0.0	7.7	0.0
Lane LOS	B	B			A	
Approach Delay (s)	13.3	11.1	0.0		1.4	
Approach LOS	B	B				

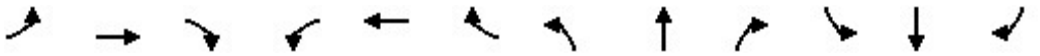
Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	33.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	22	13	6	34	0	26	7	14	0	3	11
Future Volume (vph)	3	22	13	6	34	0	26	7	14	0	3	11
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	24	14	7	38	0	29	8	16	0	3	12

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	41	45	53	15
Volume Left (vph)	3	7	29	0
Volume Right (vph)	14	0	16	12
Hadj (s)	-0.09	0.03	-0.02	-0.48
Departure Headway (s)	4.0	4.1	4.1	3.7
Degree Utilization, x	0.05	0.05	0.06	0.02
Capacity (veh/h)	879	855	853	954
Control Delay (s)	7.2	7.3	7.3	6.7
Approach Delay (s)	7.2	7.3	7.3	6.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.2			
Level of Service	A			
Intersection Capacity Utilization	19.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	21	0	2	15	416	2	2	2	173	8	18
Future Volume (Veh/h)	59	21	0	2	15	416	2	2	2	173	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	66	23	0	2	17	462	2	2	2	192	9	20
Pedestrians		1			6			2			5	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	22			25			204	183	31	190	183	23
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	22			25			204	183	31	190	183	23
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	74	99	98
cM capacity (veh/h)	1600			1600			708	680	1042	736	680	1054

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	89	19	462	6	221
Volume Left	66	2	0	2	192
Volume Right	0	0	462	2	20
cSH	1600	1600	1700	781	754
Volume to Capacity	0.04	0.00	0.27	0.01	0.29
Queue Length 95th (m)	1.0	0.0	0.0	0.2	9.3
Control Delay (s)	5.5	0.8	0.0	9.6	11.7
Lane LOS	A	A		A	B
Approach Delay (s)	5.5	0.0		9.6	11.7
Approach LOS				A	B

Intersection Summary				
Average Delay	4.0			
Intersection Capacity Utilization	49.5%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	92	26	26	45	53	114
Future Volume (Veh/h)	92	26	26	45	53	114
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	102	29	29	50	59	127
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			133		226	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			133		226	118
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		92	86
cM capacity (veh/h)			1437		749	934

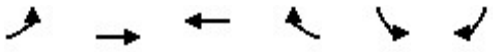
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	131	29	50	186
Volume Left	0	29	0	59
Volume Right	29	0	0	127
cSH	1700	1437	1700	866
Volume to Capacity	0.08	0.02	0.03	0.21
Queue Length 95th (m)	0.0	0.5	0.0	6.2
Control Delay (s)	0.0	7.6	0.0	10.3
Lane LOS		A		B
Approach Delay (s)	0.0	2.8		10.3
Approach LOS				B

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	41	155	21	45	379	18
Future Volume (Veh/h)	41	155	21	45	379	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	46	172	23	50	421	20
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			219		230	133
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			219		230	133
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		44	98
cM capacity (veh/h)			1361		746	905

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	218	73	441
Volume Left	0	23	421
Volume Right	172	0	20
cSH	1700	1361	752
Volume to Capacity	0.13	0.02	0.59
Queue Length 95th (m)	0.0	0.4	29.4
Control Delay (s)	0.0	2.5	16.3
Lane LOS		A	C
Approach Delay (s)	0.0	2.5	16.3
Approach LOS			C

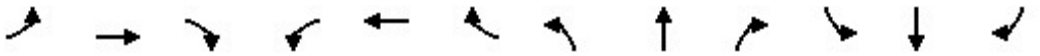
Intersection Summary			
Average Delay	10.1		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	0	0	0	2
Future Volume (Veh/h)	5	0	0	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	0	0	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				12	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				12	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1623				1004	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	6	0	2
Volume Left	6	0	0
Volume Right	0	0	2
cSH	1623	1700	1085
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	7.2	0.0	8.3
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.3
Approach LOS			A

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	0	5	0	5	6	3	100	3	6	76	4
Future Volume (Veh/h)	3	0	5	0	5	6	3	100	3	6	76	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	6	0	6	7	3	111	3	7	84	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	228	220	86	224	220	112	88			114		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	228	220	86	224	220	112	88			114		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	99	99	100			100		
cM capacity (veh/h)	717	677	978	727	677	946	1520			1488		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	13	117	95
Volume Left	3	0	3	7
Volume Right	6	7	3	4
cSH	872	799	1520	1488
Volume to Capacity	0.01	0.02	0.00	0.00
Queue Length 95th (m)	0.2	0.4	0.0	0.1
Control Delay (s)	9.2	9.6	0.2	0.6
Lane LOS	A	A	A	A
Approach Delay (s)	9.2	9.6	0.2	0.6
Approach LOS	A	A		

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	19.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	4	54	0	1	16	0
Future Volume (Veh/h)	4	54	0	1	16	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	60	0	1	18	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	36	0			1	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	36	0			1	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			99	
cM capacity (veh/h)	965	1084			1622	

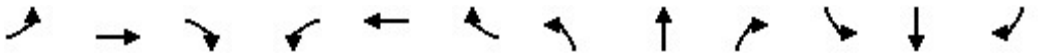
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	64	1	18
Volume Left	4	0	18
Volume Right	60	1	0
cSH	1076	1700	1622
Volume to Capacity	0.06	0.00	0.01
Queue Length 95th (m)	1.4	0.0	0.3
Control Delay (s)	8.6	0.0	7.2
Lane LOS	A		A
Approach Delay (s)	8.6	0.0	7.2
Approach LOS	A		

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	18.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	0	0	3	1	1
Future Volume (Veh/h)	3	0	0	3	1	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	0	3	1	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	4	2	2			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4	2	2			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1017	1083	1620			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	3	3	2
Volume Left	3	0	0
Volume Right	0	0	1
cSH	1017	1620	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	8.5	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.5	0.0	0.0
Approach LOS	A		

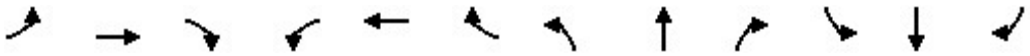
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	24	0	48	0	146	32	90	255	6
Future Volume (Veh/h)	2	0	0	24	0	48	0	146	32	90	255	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	0	27	0	53	0	162	36	100	283	7
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	702	686	290	667	671	181	290			199		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	702	686	290	667	671	181	290			199		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	92	100	94	100			93		
cM capacity (veh/h)	315	346	752	353	352	861	1283			1384		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	80	0	198	100	290
Volume Left	2	27	0	0	100	0
Volume Right	0	53	0	36	0	7
cSH	315	579	1700	1700	1384	1700
Volume to Capacity	0.01	0.14	0.00	0.12	0.07	0.17
Queue Length 95th (m)	0.1	3.6	0.0	0.0	1.8	0.0
Control Delay (s)	16.5	12.2	0.0	0.0	7.8	0.0
Lane LOS	C	B			A	
Approach Delay (s)	16.5	12.2	0.0		2.0	
Approach LOS	C	B				

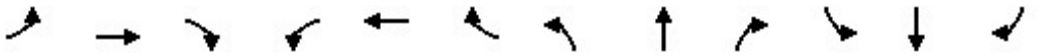
Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	35.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	42	36	21	30	0	29	5	5	0	2	4
Future Volume (vph)	5	42	36	21	30	0	29	5	5	0	2	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	47	40	23	33	0	32	6	6	0	2	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	56	44	6
Volume Left (vph)	6	23	32	0
Volume Right (vph)	40	0	6	4
Hadj (s)	-0.25	0.08	0.06	-0.40
Departure Headway (s)	3.8	4.2	4.3	3.9
Degree Utilization, x	0.10	0.06	0.05	0.01
Capacity (veh/h)	922	844	805	891
Control Delay (s)	7.2	7.5	7.5	6.9
Approach Delay (s)	7.2	7.5	7.5	6.9
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	37	3	2	38	246	2	14	5	454	10	81
Future Volume (Veh/h)	64	37	3	2	38	246	2	14	5	454	10	81
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	71	41	3	2	42	273	2	16	6	504	11	90
Pedestrians		1			6			2			5	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	47			46			329	238	50	256	239	48
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			46			329	238	50	256	239	48
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			100			100	97	99	23	98	91
cM capacity (veh/h)	1567			1572			541	632	1016	651	631	1021

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	115	44	273	24	605
Volume Left	71	2	0	2	504
Volume Right	3	0	273	6	90
cSH	1567	1572	1700	687	687
Volume to Capacity	0.05	0.00	0.16	0.03	0.88
Queue Length 95th (m)	1.1	0.0	0.0	0.8	81.9
Control Delay (s)	4.7	0.3	0.0	10.4	36.2
Lane LOS	A	A		B	E
Approach Delay (s)	4.7	0.0		10.4	36.2
Approach LOS				B	E

Intersection Summary				
Average Delay	21.4			
Intersection Capacity Utilization	64.5%	ICU Level of Service		C
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	36	62	101	77	41	33
Future Volume (Veh/h)	36	62	101	77	41	33
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	40	69	112	86	46	37
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			111		386	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			111		386	76
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		92	96
cM capacity (veh/h)			1489		573	988

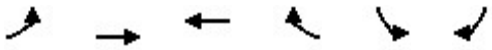
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	109	112	86	83
Volume Left	0	112	0	46
Volume Right	69	0	0	37
cSH	1700	1489	1700	705
Volume to Capacity	0.06	0.08	0.05	0.12
Queue Length 95th (m)	0.0	1.9	0.0	3.0
Control Delay (s)	0.0	7.6	0.0	10.8
Lane LOS		A		B
Approach Delay (s)	0.0	4.3		10.8
Approach LOS				B

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	52	446	24	52	234	13
Future Volume (Veh/h)	52	446	24	52	234	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	58	496	27	58	260	14
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			555		420	307
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			555		420	307
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		55	98
cM capacity (veh/h)			1025		575	737

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	554	85	274
Volume Left	0	27	260
Volume Right	496	0	14
cSH	1700	1025	582
Volume to Capacity	0.33	0.03	0.47
Queue Length 95th (m)	0.0	0.6	19.1
Control Delay (s)	0.0	2.9	16.6
Lane LOS		A	C
Approach Delay (s)	0.0	2.9	16.6
Approach LOS			C

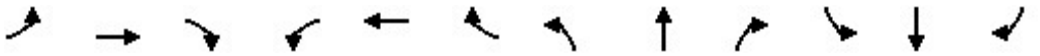
Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	0	0	0	0	5
Future Volume (Veh/h)	3	0	0	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	0	0	0	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				6	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				6	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1623				1014	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	3	0	6
Volume Left	3	0	0
Volume Right	0	0	6
cSH	1623	1700	1085
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	7.2	0.0	8.3
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.3
Approach LOS			A

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	3	4	0	3	5	4	124	3	5	174	5
Future Volume (Veh/h)	7	3	4	0	3	5	4	124	3	5	174	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	4	0	3	6	4	138	3	6	193	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	363	357	196	361	358	140	199			141		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	363	357	196	361	358	140	199			141		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	100	100	99	99	100			100		
cM capacity (veh/h)	587	568	850	590	567	914	1385			1455		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	15	9	145	205
Volume Left	8	0	4	6
Volume Right	4	6	3	6
cSH	635	759	1385	1455
Volume to Capacity	0.02	0.01	0.00	0.00
Queue Length 95th (m)	0.6	0.3	0.1	0.1
Control Delay (s)	10.8	9.8	0.2	0.3
Lane LOS	B	A	A	A
Approach Delay (s)	10.8	9.8	0.2	0.3
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	28.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	31	0	4	55	0
Future Volume (Veh/h)	2	31	0	4	55	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	34	0	4	61	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	124	2			4	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	124	2			4	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			96	
cM capacity (veh/h)	838	1082			1618	

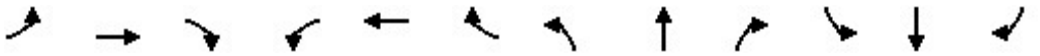
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	36	4	61
Volume Left	2	0	61
Volume Right	34	4	0
cSH	1065	1700	1618
Volume to Capacity	0.03	0.00	0.04
Queue Length 95th (m)	0.8	0.0	0.9
Control Delay (s)	8.5	0.0	7.3
Lane LOS	A		A
Approach Delay (s)	8.5	0.0	7.3
Approach LOS	A		

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	0	0	2	3	3
Future Volume (Veh/h)	2	0	0	2	3	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	0	2	3	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	6	4	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	6	4	6			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1015	1079	1615			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	2	2	6
Volume Left	2	0	0
Volume Right	0	0	3
cSH	1015	1615	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	8.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.6	0.0	0.0
Approach LOS	A		

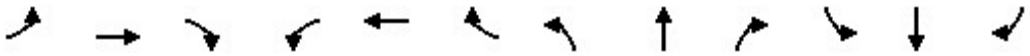
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	0	38	0	85	0	337	11	31	176	0
Future Volume (Veh/h)	4	0	0	38	0	85	0	337	11	31	176	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	0	0	42	0	94	0	374	12	34	196	0
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	732	651	199	648	645	381	196			387		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	732	651	199	648	645	381	196			387		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	89	100	86	100			97		
cM capacity (veh/h)	285	379	845	376	382	668	1389			1181		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	136	0	386	34	196
Volume Left	4	42	0	0	34	0
Volume Right	0	94	0	12	0	0
cSH	285	539	1700	1700	1181	1700
Volume to Capacity	0.01	0.25	0.00	0.23	0.03	0.12
Queue Length 95th (m)	0.3	7.5	0.0	0.0	0.7	0.0
Control Delay (s)	17.8	13.9	0.0	0.0	8.1	0.0
Lane LOS	C	B			A	
Approach Delay (s)	17.8	13.9	0.0		1.2	
Approach LOS	C	B				

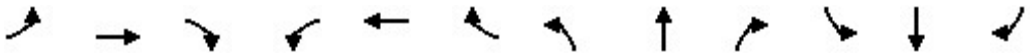
Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	44.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	26	15	10	41	0	31	14	22	0	3	13
Future Volume (vph)	3	26	15	10	41	0	31	14	22	0	3	13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	29	17	11	46	0	34	16	24	0	3	14

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	49	57	74	17
Volume Left (vph)	3	11	34	0
Volume Right (vph)	17	0	24	14
Hadj (s)	-0.10	0.04	-0.04	-0.49
Departure Headway (s)	4.1	4.2	4.1	3.7
Degree Utilization, x	0.06	0.07	0.08	0.02
Capacity (veh/h)	862	838	846	935
Control Delay (s)	7.3	7.5	7.5	6.8
Approach Delay (s)	7.3	7.5	7.5	6.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.4			
Level of Service	A			
Intersection Capacity Utilization	22.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	70	25	0	2	17	601	2	2	2	237	9	21
Future Volume (vph)	70	25	0	2	17	601	2	2	2	237	9	21
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	78	28	0	2	19	668	2	2	2	263	10	23

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	106	21	668	6	296
Volume Left (vph)	78	2	0	2	263
Volume Right (vph)	0	0	668	2	23
Hadj (s)	0.19	0.02	-0.58	-0.13	0.13
Departure Headway (s)	4.8	4.8	3.2	4.4	4.4
Degree Utilization, x	0.14	0.03	0.59	0.01	0.36
Capacity (veh/h)	697	695	1118	770	798
Control Delay (s)	8.6	7.9	10.8	7.4	9.8
Approach Delay (s)	8.6	10.7		7.4	9.8
Approach LOS	A	B		A	A

Intersection Summary				
Delay	10.2			
Level of Service	B			
Intersection Capacity Utilization	62.9%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	109	31	34	53	62	146
Future Volume (Veh/h)	109	31	34	53	62	146
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	121	34	38	59	69	162
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			157		275	140
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		275	140
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		90	82
cM capacity (veh/h)			1408		698	909

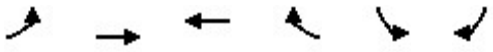
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	155	38	59	231
Volume Left	0	38	0	69
Volume Right	34	0	0	162
cSH	1700	1408	1700	834
Volume to Capacity	0.09	0.03	0.03	0.28
Queue Length 95th (m)	0.0	0.6	0.0	8.6
Control Delay (s)	0.0	7.6	0.0	11.0
Lane LOS		A		B
Approach Delay (s)	0.0	3.0		11.0
Approach LOS				B

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	48	215	25	53	558	21
Future Volume (Veh/h)	48	215	25	53	558	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	53	239	28	59	620	23
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			293		290	174
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			293		290	174
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		10	97
cM capacity (veh/h)			1279		687	859

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	292	87	643
Volume Left	0	28	620
Volume Right	239	0	23
cSH	1700	1279	692
Volume to Capacity	0.17	0.02	0.93
Queue Length 95th (m)	0.0	0.5	97.2
Control Delay (s)	0.0	2.7	43.7
Lane LOS		A	E
Approach Delay (s)	0.0	2.7	43.7
Approach LOS			E

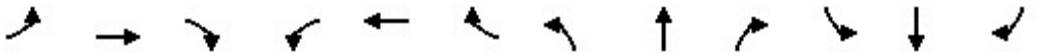
Intersection Summary			
Average Delay		27.7	
Intersection Capacity Utilization		67.7%	ICU Level of Service C
Analysis Period (min)		15	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	0	0	0	0	5
Future Volume (Veh/h)	15	0	0	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	0	0	0	0	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				34	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				34	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1623				969	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	17	0	6
Volume Left	17	0	0
Volume Right	0	0	6
cSH	1623	1700	1085
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.2	0.0	0.1
Control Delay (s)	7.2	0.0	8.3
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.3
Approach LOS			A

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	0	5	0	5	7	3	120	3	7	94	4
Future Volume (Veh/h)	3	0	5	0	5	7	3	120	3	7	94	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	6	0	6	8	3	133	3	8	104	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	274	264	106	268	264	134	108			136		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274	264	106	268	264	134	108			136		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	99	99	100			99		
cM capacity (veh/h)	668	640	954	680	639	920	1495			1461		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	14	139	116
Volume Left	3	0	3	8
Volume Right	6	8	3	4
cSH	835	774	1495	1461
Volume to Capacity	0.01	0.02	0.00	0.01
Queue Length 95th (m)	0.2	0.4	0.0	0.1
Control Delay (s)	9.4	9.7	0.2	0.6
Lane LOS	A	A	A	A
Approach Delay (s)	9.4	9.7	0.2	0.6
Approach LOS	A	A		

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	175	0	3	52	0
Future Volume (Veh/h)	10	175	0	3	52	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	194	0	3	58	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	118	2			3	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118	2			3	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	82			96	
cM capacity (veh/h)	847	1083			1619	

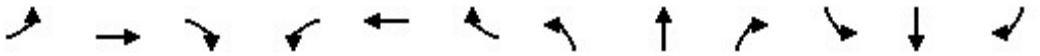
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	205	3	58
Volume Left	11	0	58
Volume Right	194	3	0
cSH	1067	1700	1619
Volume to Capacity	0.19	0.00	0.04
Queue Length 95th (m)	5.4	0.0	0.8
Control Delay (s)	9.2	0.0	7.3
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	7.3
Approach LOS	A		

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	0	0	7	3	2
Future Volume (Veh/h)	8	0	0	7	3	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	0	0	8	3	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12	4	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12	4	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	1008	1080	1616			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	9	8	5
Volume Left	9	0	0
Volume Right	0	0	2
cSH	1008	1616	1700
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	8.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.6	0.0	0.0
Approach LOS	A		

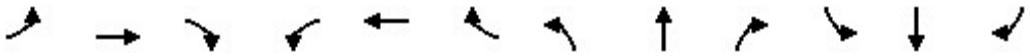
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	28	0	56	0	238	38	106	418	7
Future Volume (Veh/h)	2	0	0	28	0	56	0	238	38	106	418	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	0	31	0	62	0	264	42	118	464	8
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1030	1011	471	989	994	286	472			307		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1030	1011	471	989	994	286	472			307		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	85	100	92	100			91		
cM capacity (veh/h)	182	219	595	211	224	752	1100			1264		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	93	0	306	118	472
Volume Left	2	31	0	0	118	0
Volume Right	0	62	0	42	0	8
cSH	182	405	1700	1700	1264	1700
Volume to Capacity	0.01	0.23	0.00	0.18	0.09	0.28
Queue Length 95th (m)	0.3	6.6	0.0	0.0	2.3	0.0
Control Delay (s)	25.0	16.5	0.0	0.0	8.1	0.0
Lane LOS	D	C			A	
Approach Delay (s)	25.0	16.5	0.0		1.6	
Approach LOS	D	C				

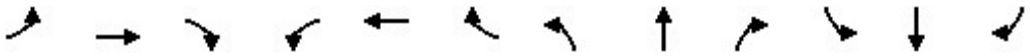
Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	46.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	49	42	37	36	0	34	8	9	0	2	4
Future Volume (vph)	5	49	42	37	36	0	34	8	9	0	2	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	54	47	41	40	0	38	9	10	0	2	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	107	81	57	6
Volume Left (vph)	6	41	38	0
Volume Right (vph)	47	0	10	4
Hadj (s)	-0.25	0.10	0.03	-0.40
Departure Headway (s)	3.9	4.2	4.3	4.0
Degree Utilization, x	0.12	0.10	0.07	0.01
Capacity (veh/h)	907	829	790	859
Control Delay (s)	7.4	7.7	7.6	7.0
Approach Delay (s)	7.4	7.7	7.6	7.0
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	26.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	76	43	3	2	44	356	2	16	5	652	11	95
Future Volume (vph)	76	43	3	2	44	356	2	16	5	652	11	95
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	84	48	3	2	49	396	2	18	6	724	12	106

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	135	51	396	26	842
Volume Left (vph)	84	2	0	2	724
Volume Right (vph)	3	0	396	6	106
Hadj (s)	0.11	0.01	-0.60	-0.12	0.10
Departure Headway (s)	6.0	6.1	3.2	5.3	4.6
Degree Utilization, x	0.23	0.09	0.35	0.04	1.08
Capacity (veh/h)	586	571	1114	652	773
Control Delay (s)	10.8	9.7	7.9	8.5	76.9
Approach Delay (s)	10.8	8.1		8.5	76.9
Approach LOS	B	A		A	F

Intersection Summary				
Delay	48.3			
Level of Service	E			
Intersection Capacity Utilization	80.3%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	42	73	132	90	48	46
Future Volume (Veh/h)	42	73	132	90	48	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	47	81	147	100	53	51
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			130		484	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			130		484	90
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		89	95
cM capacity (veh/h)			1465		490	972

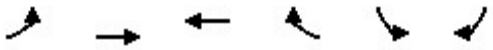
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	128	147	100	104
Volume Left	0	147	0	53
Volume Right	81	0	0	51
cSH	1700	1465	1700	648
Volume to Capacity	0.08	0.10	0.06	0.16
Queue Length 95th (m)	0.0	2.5	0.0	4.3
Control Delay (s)	0.0	7.7	0.0	11.6
Lane LOS		A		B
Approach Delay (s)	0.0	4.6		11.6
Approach LOS				B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	27.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	61	642	28	61	343	15
Future Volume (Veh/h)	61	642	28	61	343	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	713	31	68	381	17
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			782		556	426
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			782		556	426
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		20	97
cM capacity (veh/h)			844		475	633

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	781	99	398
Volume Left	0	31	381
Volume Right	713	0	17
cSH	1700	844	480
Volume to Capacity	0.46	0.04	0.83
Queue Length 95th (m)	0.0	0.9	61.8
Control Delay (s)	0.0	3.2	39.6
Lane LOS		A	E
Approach Delay (s)	0.0	3.2	39.6
Approach LOS			E

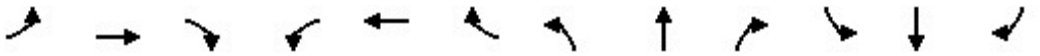
Intersection Summary			
Average Delay	12.6		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	0	0	0	0	15
Future Volume (Veh/h)	9	0	0	0	0	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	10	0	0	0	0	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				20	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				20	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	98
cM capacity (veh/h)	1623				991	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	10	0	17
Volume Left	10	0	0
Volume Right	0	0	17
cSH	1623	1700	1085
Volume to Capacity	0.01	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.4
Control Delay (s)	7.2	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	3	4	0	3	5	4	152	3	5	208	5
Future Volume (Veh/h)	8	3	4	0	3	5	4	152	3	5	208	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	3	4	0	3	6	4	169	3	6	231	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	432	426	234	430	428	170	237			172		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	432	426	234	430	428	170	237			172		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	100	100	99	99	100			100		
cM capacity (veh/h)	528	520	810	531	519	879	1342			1417		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	9	176	243
Volume Left	9	0	4	6
Volume Right	4	6	3	6
cSH	577	714	1342	1417
Volume to Capacity	0.03	0.01	0.00	0.00
Queue Length 95th (m)	0.6	0.3	0.1	0.1
Control Delay (s)	11.4	10.1	0.2	0.2
Lane LOS	B	B	A	A
Approach Delay (s)	11.4	10.1	0.2	0.2
Approach LOS	B	B		

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	103	0	11	182	0
Future Volume (Veh/h)	6	103	0	11	182	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	114	0	12	202	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	410	6			12	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410	6			12	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	89			87	
cM capacity (veh/h)	523	1077			1607	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	121	12	202
Volume Left	7	0	202
Volume Right	114	12	0
cSH	1015	1700	1607
Volume to Capacity	0.12	0.01	0.13
Queue Length 95th (m)	3.1	0.0	3.3
Control Delay (s)	9.0	0.0	7.6
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	7.6
Approach LOS	A		

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	0	5	8	7
Future Volume (Veh/h)	5	0	0	5	8	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	0	0	6	9	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	19	13	17			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	19	13	17			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	998	1067	1600			

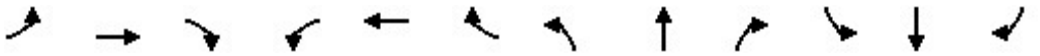
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	6	6	17
Volume Left	6	0	0
Volume Right	0	0	8
cSH	998	1600	1700
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	8.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D

Synchro Reports

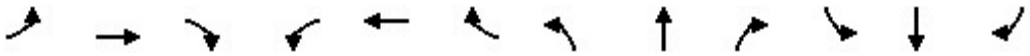
2020 and 2031 Future Total Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	0	39	0	138	0	192	12	46	122	0
Future Volume (Veh/h)	4	0	0	39	0	138	0	192	12	46	122	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	0	0	43	0	153	0	213	13	51	136	0
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	604	465	139	462	458	220	136			227		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	604	465	139	462	458	220	136			227		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	91	100	81	100			96		
cM capacity (veh/h)	326	479	912	497	483	821	1461			1352		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	196	0	226	51	136
Volume Left	4	43	0	0	51	0
Volume Right	0	153	0	13	0	0
cSH	326	718	1700	1700	1352	1700
Volume to Capacity	0.01	0.27	0.00	0.13	0.04	0.08
Queue Length 95th (m)	0.3	8.4	0.0	0.0	0.9	0.0
Control Delay (s)	16.2	11.9	0.0	0.0	7.8	0.0
Lane LOS	C	B			A	
Approach Delay (s)	16.2	11.9	0.0		2.1	
Approach LOS	C	B				

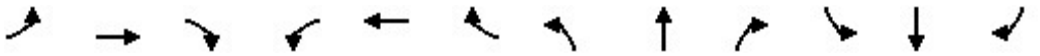
Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	38.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	22	35	9	34	0	98	7	24	0	3	11
Future Volume (vph)	3	22	35	9	34	0	98	7	24	0	3	11
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	24	39	10	38	0	109	8	27	0	3	12

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	66	48	144	15
Volume Left (vph)	3	10	109	0
Volume Right (vph)	39	0	27	12
Hadj (s)	-0.23	0.04	0.07	-0.48
Departure Headway (s)	4.1	4.4	4.2	3.8
Degree Utilization, x	0.07	0.06	0.17	0.02
Capacity (veh/h)	845	790	821	901
Control Delay (s)	7.4	7.6	8.1	6.9
Approach Delay (s)	7.4	7.6	8.1	6.9
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	25.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	21	0	2	15	481	2	2	2	193	8	18
Future Volume (Veh/h)	59	21	0	2	15	481	2	2	2	193	8	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	66	23	0	2	17	534	2	2	2	214	9	20
Pedestrians		1			6			2			5	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	22			25			204	183	31	190	183	23
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	22			25			204	183	31	190	183	23
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	71	99	98
cM capacity (veh/h)	1600			1600			708	680	1042	736	680	1054

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	89	19	534	6	243
Volume Left	66	2	0	2	214
Volume Right	0	0	534	2	20
cSH	1600	1600	1700	781	752
Volume to Capacity	0.04	0.00	0.31	0.01	0.32
Queue Length 95th (m)	1.0	0.0	0.0	0.2	10.7
Control Delay (s)	5.5	0.8	0.0	9.6	12.1
Lane LOS	A	A		A	B
Approach Delay (s)	5.5	0.0		9.6	12.1
Approach LOS				A	B

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	53.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	92	26	29	45	53	124
Future Volume (Veh/h)	92	26	29	45	53	124
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	102	29	32	50	59	138
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			133		232	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			133		232	118
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		92	85
cM capacity (veh/h)			1437		742	934

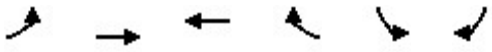
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	131	32	50	197
Volume Left	0	32	0	59
Volume Right	29	0	0	138
cSH	1700	1437	1700	867
Volume to Capacity	0.08	0.02	0.03	0.23
Queue Length 95th (m)	0.0	0.5	0.0	6.6
Control Delay (s)	0.0	7.6	0.0	10.4
Lane LOS		A		B
Approach Delay (s)	0.0	3.0		10.4
Approach LOS				B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	26.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	41	175	21	45	444	18
Future Volume (Veh/h)	41	175	21	45	444	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	46	194	23	50	493	20
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			241		241	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			241		241	144
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		33	98
cM capacity (veh/h)			1336		735	892

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	240	73	513
Volume Left	0	23	493
Volume Right	194	0	20
cSH	1700	1336	740
Volume to Capacity	0.14	0.02	0.69
Queue Length 95th (m)	0.0	0.4	42.9
Control Delay (s)	0.0	2.5	20.1
Lane LOS		A	C
Approach Delay (s)	0.0	2.5	20.1
Approach LOS			C

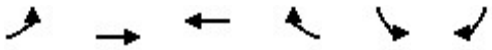
Intersection Summary			
Average Delay	12.7		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	0	78	24	2
Future Volume (Veh/h)	5	0	0	78	24	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	0	0	87	27	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	87				56	44
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	87				56	44
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	100
cM capacity (veh/h)	1509				948	1027

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	6	87	29
Volume Left	6	0	27
Volume Right	0	87	2
cSH	1509	1700	953
Volume to Capacity	0.00	0.05	0.03
Queue Length 95th (m)	0.1	0.0	0.7
Control Delay (s)	7.4	0.0	8.9
Lane LOS	A		A
Approach Delay (s)	7.4	0.0	8.9
Approach LOS			A

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	0	0	0	2
Future Volume (Veh/h)	5	0	0	0	0	2
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	0	0	0	0	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				12	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				12	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1623				1004	1085

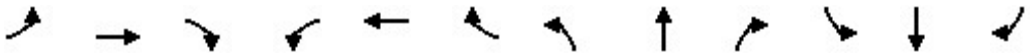
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	6	0	2
Volume Left	6	0	0
Volume Right	0	0	2
cSH	1623	1700	1085
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	7.2	0.0	8.3
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.3
Approach LOS			A

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	6	18	0	20	59	0
Future Volume (Veh/h)	6	18	0	20	59	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	20	0	22	66	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			27		39	17
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			27		39	17
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	100
cM capacity (veh/h)			1587		973	1062

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	27	22	66
Volume Left	0	0	66
Volume Right	20	0	0
cSH	1700	1587	973
Volume to Capacity	0.02	0.00	0.07
Queue Length 95th (m)	0.0	0.0	1.7
Control Delay (s)	0.0	0.0	9.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.0
Approach LOS			A

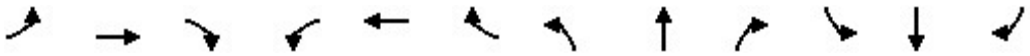
Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	21	0	0	0	0	0	0	0	0	0	0	7
Future Volume (vph)	21	0	0	0	0	0	0	0	0	0	0	7
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	23	0	0	0	0	0	0	0	0	0	0	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	23	0	0	8
Volume Left (vph)	23	0	0	0
Volume Right (vph)	0	0	0	8
Hadj (s)	0.23	0.00	0.00	-0.57
Departure Headway (s)	4.1	3.9	4.0	3.4
Degree Utilization, x	0.03	0.00	0.00	0.01
Capacity (veh/h)	860	900	900	1050
Control Delay (s)	7.3	6.9	7.0	6.4
Approach Delay (s)	7.3	0.0	0.0	6.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.0			
Level of Service	A			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	0	5	0	5	6	3	100	3	6	76	4
Future Volume (Veh/h)	3	0	5	0	5	6	3	100	3	6	76	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	6	0	6	7	3	111	3	7	84	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	228	220	86	224	220	112	88			114		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	228	220	86	224	220	112	88			114		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	99	99	100			100		
cM capacity (veh/h)	717	677	978	727	677	946	1520			1488		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	13	117	95
Volume Left	3	0	3	7
Volume Right	6	7	3	4
cSH	872	799	1520	1488
Volume to Capacity	0.01	0.02	0.00	0.00
Queue Length 95th (m)	0.2	0.4	0.0	0.1
Control Delay (s)	9.2	9.6	0.2	0.6
Lane LOS	A	A	A	A
Approach Delay (s)	9.2	9.6	0.2	0.6
Approach LOS	A	A		

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	19.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	4	54	0	1	16	0
Future Volume (Veh/h)	4	54	0	1	16	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	60	0	1	18	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	36	0			1	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	36	0			1	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			99	
cM capacity (veh/h)	965	1084			1622	

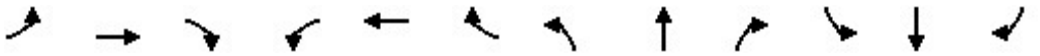
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	64	1	18
Volume Left	4	0	18
Volume Right	60	1	0
cSH	1076	1700	1622
Volume to Capacity	0.06	0.00	0.01
Queue Length 95th (m)	1.4	0.0	0.3
Control Delay (s)	8.6	0.0	7.2
Lane LOS	A		A
Approach Delay (s)	8.6	0.0	7.2
Approach LOS	A		

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	18.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	0	0	3	1	1
Future Volume (Veh/h)	3	0	0	3	1	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	0	3	1	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	4	2	2			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4	2	2			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1017	1083	1620			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	3	3	2
Volume Left	3	0	0
Volume Right	0	0	1
cSH	1017	1620	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	8.5	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.5	0.0	0.0
Approach LOS	A		

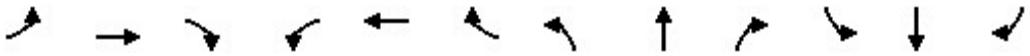
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	29	0	93	0	146	40	168	255	6
Future Volume (Veh/h)	2	0	0	29	0	93	0	146	40	168	255	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	0	32	0	103	0	162	44	187	283	7
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	926	868	290	845	849	185	290			207		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	926	868	290	845	849	185	290			207		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	87	100	88	100			86		
cM capacity (veh/h)	198	253	752	254	259	856	1283			1375		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	135	0	206	187	290
Volume Left	2	32	0	0	187	0
Volume Right	0	103	0	44	0	7
cSH	198	548	1700	1700	1375	1700
Volume to Capacity	0.01	0.25	0.00	0.12	0.14	0.17
Queue Length 95th (m)	0.2	7.3	0.0	0.0	3.6	0.0
Control Delay (s)	23.4	13.7	0.0	0.0	8.0	0.0
Lane LOS	C	B			A	
Approach Delay (s)	23.4	13.7	0.0		3.1	
Approach LOS	C	B				

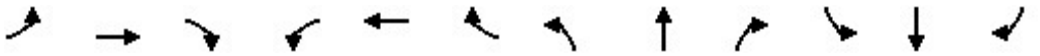
Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	42.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	42	122	33	30	0	79	5	12	0	2	4
Future Volume (vph)	5	42	122	33	30	0	79	5	12	0	2	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	47	136	37	33	0	88	6	13	0	2	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	189	70	107	6
Volume Left (vph)	6	37	88	0
Volume Right (vph)	136	0	13	4
Hadj (s)	-0.43	0.11	0.09	-0.40
Departure Headway (s)	3.8	4.5	4.5	4.2
Degree Utilization, x	0.20	0.09	0.14	0.01
Capacity (veh/h)	911	769	748	792
Control Delay (s)	7.8	7.9	8.3	7.2
Approach Delay (s)	7.8	7.9	8.3	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	35.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	37	3	2	38	291	2	14	5	532	10	81
Future Volume (Veh/h)	64	37	3	2	38	291	2	14	5	532	10	81
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	71	41	3	2	42	323	2	16	6	591	11	90
Pedestrians		1			6			2			5	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	47			46			329	238	50	256	239	48
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			46			329	238	50	256	239	48
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			100			100	97	99	9	98	91
cM capacity (veh/h)	1567			1572			541	632	1016	651	631	1021

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	115	44	323	24	692
Volume Left	71	2	0	2	591
Volume Right	3	0	323	6	90
cSH	1567	1572	1700	687	682
Volume to Capacity	0.05	0.00	0.19	0.03	1.01
Queue Length 95th (m)	1.1	0.0	0.0	0.8	127.1
Control Delay (s)	4.7	0.3	0.0	10.4	62.6
Lane LOS	A	A		B	F
Approach Delay (s)	4.7	0.0		10.4	62.6
Approach LOS				B	F

Intersection Summary				
Average Delay	36.8			
Intersection Capacity Utilization	69.8%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	36	62	113	77	41	40
Future Volume (Veh/h)	36	62	113	77	41	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	40	69	126	86	46	44
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			111		414	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			111		414	76
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		92	96
cM capacity (veh/h)			1489		547	988

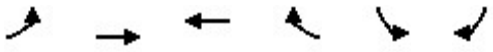
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	109	126	86	90
Volume Left	0	126	0	46
Volume Right	69	0	0	44
cSH	1700	1489	1700	699
Volume to Capacity	0.06	0.08	0.05	0.13
Queue Length 95th (m)	0.0	2.1	0.0	3.3
Control Delay (s)	0.0	7.6	0.0	10.9
Lane LOS		A		B
Approach Delay (s)	0.0	4.5		10.9
Approach LOS				B

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	52	524	24	52	279	13
Future Volume (Veh/h)	52	524	24	52	279	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	58	582	27	58	310	14
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			641		463	350
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			641		463	350
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		43	98
cM capacity (veh/h)			952		542	697

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	640	85	324
Volume Left	0	27	310
Volume Right	582	0	14
cSH	1700	952	547
Volume to Capacity	0.38	0.03	0.59
Queue Length 95th (m)	0.0	0.7	29.1
Control Delay (s)	0.0	3.0	20.7
Lane LOS		A	C
Approach Delay (s)	0.0	3.0	20.7
Approach LOS			C

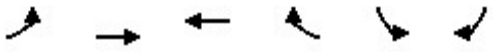
Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	0	0	55	94	5
Future Volume (Veh/h)	3	0	0	55	94	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	0	61	104	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	61				36	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	61				36	30
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				89	99
cM capacity (veh/h)	1542				974	1044

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	3	61	110
Volume Left	3	0	104
Volume Right	0	61	6
cSH	1542	1700	978
Volume to Capacity	0.00	0.04	0.11
Queue Length 95th (m)	0.0	0.0	2.9
Control Delay (s)	7.3	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	7.3	0.0	9.1
Approach LOS			A

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	16.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	0	0	0	0	5
Future Volume (Veh/h)	3	0	0	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	0	0	0	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				6	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				6	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1623				1014	1085

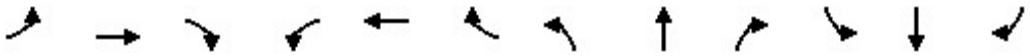
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	3	0	6
Volume Left	3	0	0
Volume Right	0	0	6
cSH	1623	1700	1085
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	7.2	0.0	8.3
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.3
Approach LOS			A

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	24	71	0	14	42	0
Future Volume (Veh/h)	24	71	0	14	42	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	27	79	0	16	47	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			106		82	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			106		82	66
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1485		919	997

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	106	16	47
Volume Left	0	0	47
Volume Right	79	0	0
cSH	1700	1485	919
Volume to Capacity	0.06	0.00	0.05
Queue Length 95th (m)	0.0	0.0	1.2
Control Delay (s)	0.0	0.0	9.1
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.1
Approach LOS			A

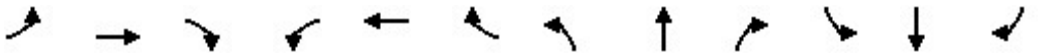
Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	16.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	15	0	0	0	0	0	0	0	0	0	0	25
Future Volume (vph)	15	0	0	0	0	0	0	0	0	0	0	25
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	17	0	0	0	0	0	0	0	0	0	0	28

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	17	0	0	28
Volume Left (vph)	17	0	0	0
Volume Right (vph)	0	0	0	28
Hadj (s)	0.23	0.00	0.00	-0.57
Departure Headway (s)	4.2	4.0	4.0	3.4
Degree Utilization, x	0.02	0.00	0.00	0.03
Capacity (veh/h)	848	900	900	1056
Control Delay (s)	7.3	7.0	7.0	6.5
Approach Delay (s)	7.3	0.0	0.0	6.5
Approach LOS	A	A	A	A

Intersection Summary				
Delay	6.8			
Level of Service	A			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	3	4	0	3	5	4	124	3	5	174	5
Future Volume (Veh/h)	7	3	4	0	3	5	4	124	3	5	174	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	8	3	4	0	3	6	4	138	3	6	193	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	363	357	196	361	358	140	199			141		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	363	357	196	361	358	140	199			141		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	100	100	99	99	100			100		
cM capacity (veh/h)	587	568	850	590	567	914	1385			1455		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	15	9	145	205
Volume Left	8	0	4	6
Volume Right	4	6	3	6
cSH	635	759	1385	1455
Volume to Capacity	0.02	0.01	0.00	0.00
Queue Length 95th (m)	0.6	0.3	0.1	0.1
Control Delay (s)	10.8	9.8	0.2	0.3
Lane LOS	B	A	A	A
Approach Delay (s)	10.8	9.8	0.2	0.3
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	28.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	31	0	4	55	0
Future Volume (Veh/h)	2	31	0	4	55	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	34	0	4	61	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	124	2			4	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	124	2			4	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			96	
cM capacity (veh/h)	838	1082			1618	

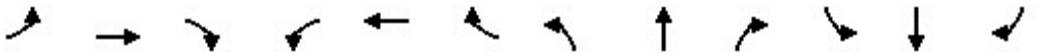
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	36	4	61
Volume Left	2	0	61
Volume Right	34	4	0
cSH	1065	1700	1618
Volume to Capacity	0.03	0.00	0.04
Queue Length 95th (m)	0.8	0.0	0.9
Control Delay (s)	8.5	0.0	7.3
Lane LOS	A		A
Approach Delay (s)	8.5	0.0	7.3
Approach LOS	A		

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	0	0	2	3	3
Future Volume (Veh/h)	2	0	0	2	3	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	0	2	3	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	6	4	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	6	4	6			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1015	1079	1615			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	2	2	6
Volume Left	2	0	0
Volume Right	0	0	3
cSH	1015	1615	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	8.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.6	0.0	0.0
Approach LOS	A		

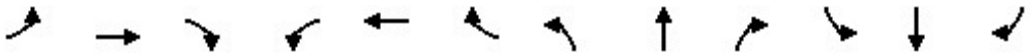
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	0	38	0	274	0	337	11	91	176	0
Future Volume (Veh/h)	4	0	0	38	0	274	0	337	11	91	176	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	0	0	42	0	304	0	374	12	101	196	0
Pedestrians					1			3				
Lane Width (m)					3.5			3.5				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1076	785	199	782	779	381	196			387		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1076	785	199	782	779	381	196			387		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	100	86	100	54	100			91		
cM capacity (veh/h)	101	299	845	292	301	668	1389			1181		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	346	0	386	101	196
Volume Left	4	42	0	0	101	0
Volume Right	0	304	0	12	0	0
cSH	101	578	1700	1700	1181	1700
Volume to Capacity	0.04	0.60	0.00	0.23	0.09	0.12
Queue Length 95th (m)	0.9	30.0	0.0	0.0	2.1	0.0
Control Delay (s)	42.1	20.1	0.0	0.0	8.3	0.0
Lane LOS	E	C			A	
Approach Delay (s)	42.1	20.1	0.0		2.8	
Approach LOS	E	C				

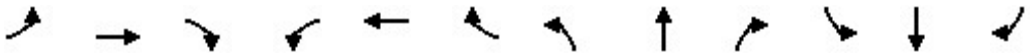
Intersection Summary				
Average Delay	7.7			
Intersection Capacity Utilization	60.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	26	75	19	41	0	220	14	51	0	3	13
Future Volume (vph)	3	26	75	19	41	0	220	14	51	0	3	13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	29	83	21	46	0	244	16	57	0	3	14

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	115	67	317	17
Volume Left (vph)	3	21	244	0
Volume Right (vph)	83	0	57	14
Hadj (s)	-0.31	0.06	0.08	-0.49
Departure Headway (s)	4.5	4.9	4.4	4.2
Degree Utilization, x	0.14	0.09	0.39	0.02
Capacity (veh/h)	741	677	785	789
Control Delay (s)	8.2	8.4	10.3	7.3
Approach Delay (s)	8.2	8.4	10.3	7.3
Approach LOS	A	A	B	A

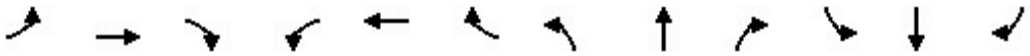
Intersection Summary				
Delay	9.5			
Level of Service	A			
Intersection Capacity Utilization	39.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	0	0	0	0	0	11	0	0	0	4	0	0
Future Volume (vph)	0	0	0	0	0	11	0	0	0	4	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	0	0	12	0	0	0	4	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	12	0	4
Volume Left (vph)	0	0	0	4
Volume Right (vph)	0	12	0	0
Hadj (s)	0.00	-0.57	0.00	0.23
Departure Headway (s)	3.9	3.3	3.9	4.2
Degree Utilization, x	0.00	0.01	0.00	0.00
Capacity (veh/h)	913	1069	910	859
Control Delay (s)	6.9	6.4	6.9	7.2
Approach Delay (s)	0.0	6.4	0.0	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	6.6			
Level of Service	A			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	70	25	0	2	17	790	2	2	2	297	9	21
Future Volume (vph)	70	25	0	2	17	790	2	2	2	297	9	21
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	78	28	0	2	19	878	2	2	2	330	10	23

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	106	21	878	6	363
Volume Left (vph)	78	2	0	2	330
Volume Right (vph)	0	0	878	2	23
Hadj (s)	0.19	0.02	-0.58	-0.13	0.14
Departure Headway (s)	5.0	4.9	3.2	4.5	4.4
Degree Utilization, x	0.15	0.03	0.78	0.01	0.44
Capacity (veh/h)	669	665	1121	753	796
Control Delay (s)	8.8	8.1	16.5	7.5	10.8
Approach Delay (s)	8.8	16.3		7.5	10.8
Approach LOS	A	C		A	B

Intersection Summary				
Delay	14.2			
Level of Service	B			
Intersection Capacity Utilization	75.6%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	109	31	43	53	62	175
Future Volume (Veh/h)	109	31	43	53	62	175
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	121	34	48	59	69	194
Pedestrians					2	
Lane Width (m)					3.5	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			157		295	140
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		295	140
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		90	79
cM capacity (veh/h)			1408		675	909

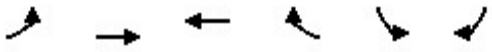
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	155	48	59	263
Volume Left	0	48	0	69
Volume Right	34	0	0	194
cSH	1700	1408	1700	833
Volume to Capacity	0.09	0.03	0.03	0.32
Queue Length 95th (m)	0.0	0.8	0.0	10.3
Control Delay (s)	0.0	7.6	0.0	11.3
Lane LOS		A		B
Approach Delay (s)	0.0	3.4		11.3
Approach LOS				B

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	48	275	25	53	747	21
Future Volume (Veh/h)	48	275	25	53	747	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	53	306	28	59	830	23
Pedestrians	1				1	
Lane Width (m)	3.5				3.5	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			360		323	207
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			360		323	207
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			98		0	97
cM capacity (veh/h)			1209		656	823

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	359	87	853
Volume Left	0	28	830
Volume Right	306	0	23
cSH	1700	1209	660
Volume to Capacity	0.21	0.02	1.29
Queue Length 95th (m)	0.0	0.5	255.8
Control Delay (s)	0.0	2.7	163.1
Lane LOS		A	F
Approach Delay (s)	0.0	2.7	163.1
Approach LOS			F

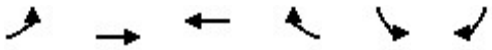
Intersection Summary			
Average Delay	107.3		
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	26	0	0	208	66	9
Future Volume (Veh/h)	26	0	0	208	66	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	0	0	231	73	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	231				174	116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	231				174	116
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				91	99
cM capacity (veh/h)	1337				799	937

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	29	231	83
Volume Left	29	0	73
Volume Right	0	231	10
cSH	1337	1700	813
Volume to Capacity	0.02	0.14	0.10
Queue Length 95th (m)	0.5	0.0	2.6
Control Delay (s)	7.8	0.0	9.9
Lane LOS	A		A
Approach Delay (s)	7.8	0.0	9.9
Approach LOS			A

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	37	115	0	0	0
Future Volume (Veh/h)	0	37	115	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	41	128	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	128				169	128
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	128				169	128
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1458				821	922

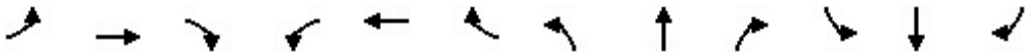
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	41	128	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1458	1700	1700
Volume to Capacity	0.00	0.08	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		10.3%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	37	30	0	115	94	0
Future Volume (Veh/h)	37	30	0	115	94	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	41	33	0	128	104	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			74		186	58
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			74		186	58
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		87	100
cM capacity (veh/h)			1526		804	1009

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	74	128	104
Volume Left	0	0	104
Volume Right	33	0	0
cSH	1700	1526	804
Volume to Capacity	0.04	0.00	0.13
Queue Length 95th (m)	0.0	0.0	3.4
Control Delay (s)	0.0	0.0	10.1
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.1
Approach LOS			B

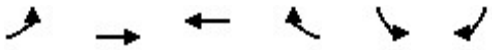
Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	10	0	0	0	0	5	0	80	0	2	26	3
Future Volume (vph)	10	0	0	0	0	5	0	80	0	2	26	3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	0	0	0	0	6	0	89	0	2	29	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	11	6	89	34
Volume Left (vph)	11	0	0	2
Volume Right (vph)	0	6	0	3
Hadj (s)	0.23	-0.57	0.03	-0.01
Departure Headway (s)	4.4	3.6	4.0	4.0
Degree Utilization, x	0.01	0.01	0.10	0.04
Capacity (veh/h)	791	960	883	885
Control Delay (s)	7.5	6.6	7.4	7.2
Approach Delay (s)	7.5	6.6	7.4	7.2
Approach LOS	A	A	A	A

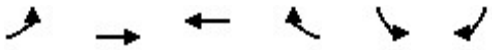
Intersection Summary				
Delay	7.3			
Level of Service	A			
Intersection Capacity Utilization	19.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	6	16	0	0	4
Future Volume (Veh/h)	2	6	16	0	0	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	7	18	0	0	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	18				29	18
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	18				29	18
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1599				984	1061

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	9	18	4
Volume Left	2	0	0
Volume Right	0	0	4
cSH	1599	1700	1061
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	1.6	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	1.6	0.0	8.4
Approach LOS			A

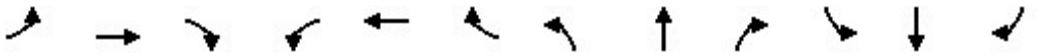
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	0	0	0	0	16
Future Volume (Veh/h)	6	0	0	0	0	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	0	0	0	0	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				14	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				14	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	1623				1001	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	7	0	18
Volume Left	7	0	0
Volume Right	0	0	18
cSH	1623	1700	1085
Volume to Capacity	0.00	0.00	0.02
Queue Length 95th (m)	0.1	0.0	0.4
Control Delay (s)	7.2	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	0	5	20	5	7	3	120	10	7	94	4
Future Volume (Veh/h)	3	0	5	20	5	7	3	120	10	7	94	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	0	6	22	6	8	3	133	11	8	104	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	278	272	106	272	268	138	108			144		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278	272	106	272	268	138	108			144		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	97	99	99	100			99		
cM capacity (veh/h)	664	633	954	676	636	915	1495			1451		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	36	147	116
Volume Left	3	22	3	8
Volume Right	6	8	11	4
cSH	833	710	1495	1451
Volume to Capacity	0.01	0.05	0.00	0.01
Queue Length 95th (m)	0.2	1.2	0.0	0.1
Control Delay (s)	9.4	10.3	0.2	0.6
Lane LOS	A	B	A	A
Approach Delay (s)	9.4	10.3	0.2	0.6
Approach LOS	A	B		

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	21.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	175	0	3	52	0
Future Volume (Veh/h)	10	175	0	3	52	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	194	0	3	58	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	118	2			3	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118	2			3	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	82			96	
cM capacity (veh/h)	847	1083			1619	

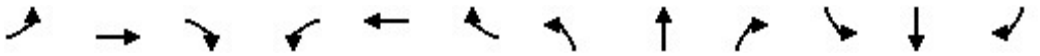
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	205	3	58
Volume Left	11	0	58
Volume Right	194	3	0
cSH	1067	1700	1619
Volume to Capacity	0.19	0.00	0.04
Queue Length 95th (m)	5.4	0.0	0.8
Control Delay (s)	9.2	0.0	7.3
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	7.3
Approach LOS	A		

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	0	0	7	3	2
Future Volume (Veh/h)	8	0	0	7	3	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	0	0	8	3	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	12	4	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	12	4	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	1008	1080	1616			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	9	8	5
Volume Left	9	0	0
Volume Right	0	0	2
cSH	1008	1616	1700
Volume to Capacity	0.01	0.00	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	8.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.6	0.0	0.0
Approach LOS	A		

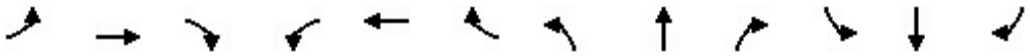
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	0	28	0	172	0	238	38	309	418	7
Future Volume (Veh/h)	2	0	0	28	0	172	0	238	38	309	418	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	0	0	31	0	191	0	264	42	343	464	8
Pedestrians					1			3				
Lane Width (m)					3.4			3.4				
Walking Speed (m/s)					1.1			1.1				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1609	1461	471	1439	1444	286	472			307		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1609	1461	471	1439	1444	286	472			307		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	100	65	100	75	100			73		
cM capacity (veh/h)	50	95	595	88	97	752	1100			1264		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	222	0	306	343	472
Volume Left	2	31	0	0	343	0
Volume Right	0	191	0	42	0	8
cSH	50	366	1700	1700	1264	1700
Volume to Capacity	0.04	0.61	0.00	0.18	0.27	0.28
Queue Length 95th (m)	0.9	29.0	0.0	0.0	8.4	0.0
Control Delay (s)	79.7	28.8	0.0	0.0	8.9	0.0
Lane LOS	F	D			A	
Approach Delay (s)	79.7	28.8	0.0		3.7	
Approach LOS	F	D				

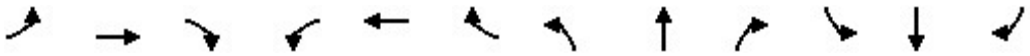
Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	63.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	49	245	68	36	0	150	8	27	0	2	4
Future Volume (vph)	5	49	245	68	36	0	150	8	27	0	2	4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	54	272	76	40	0	167	9	30	0	2	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	332	116	206	6
Volume Left (vph)	6	76	167	0
Volume Right (vph)	272	0	30	4
Hadj (s)	-0.49	0.13	0.07	-0.40
Departure Headway (s)	4.1	5.0	5.0	4.8
Degree Utilization, x	0.38	0.16	0.29	0.01
Capacity (veh/h)	837	680	675	653
Control Delay (s)	9.6	8.9	10.0	7.8
Approach Delay (s)	9.6	8.9	10.0	7.8
Approach LOS	A	A	A	A

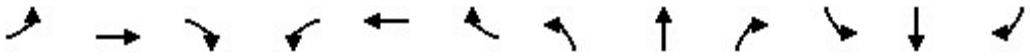
Intersection Summary				
Delay	9.6			
Level of Service	A			
Intersection Capacity Utilization	50.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	0	0	0	0	0	7	0	0	0	12	0	0
Future Volume (vph)	0	0	0	0	0	7	0	0	0	12	0	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	0	0	8	0	0	0	13	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	0	8	0	13
Volume Left (vph)	0	0	0	13
Volume Right (vph)	0	8	0	0
Hadj (s)	0.00	-0.57	0.00	0.23
Departure Headway (s)	3.9	3.4	3.9	4.1
Degree Utilization, x	0.00	0.01	0.00	0.01
Capacity (veh/h)	900	1060	911	861
Control Delay (s)	6.9	6.4	6.9	7.2
Approach Delay (s)	0.0	6.4	0.0	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	6.9			
Level of Service	A			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	76	43	3	2	44	472	2	16	5	855	11	95
Future Volume (vph)	76	43	3	2	44	472	2	16	5	855	11	95
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	84	48	3	2	49	524	2	18	6	950	12	106

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	135	51	524	26	1068
Volume Left (vph)	84	2	0	2	950
Volume Right (vph)	3	0	524	6	106
Hadj (s)	0.11	0.01	-0.60	-0.12	0.12
Departure Headway (s)	6.0	6.1	3.2	5.3	4.6
Degree Utilization, x	0.23	0.09	0.47	0.04	1.38
Capacity (veh/h)	586	571	1116	652	765
Control Delay (s)	10.8	9.7	9.0	8.5	193.8
Approach Delay (s)	10.8	9.0		8.5	193.8
Approach LOS	B	A		A	F

Intersection Summary				
Delay	118.5			
Level of Service	F			
Intersection Capacity Utilization	94.0%	ICU Level of Service		F
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	42	73	163	90	48	64
Future Volume (Veh/h)	42	73	163	90	48	64
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	47	81	181	100	53	71
Pedestrians					2	
Lane Width (m)					3.4	
Walking Speed (m/s)					1.1	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			130		552	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			130		552	90
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		88	93
cM capacity (veh/h)			1465		436	972

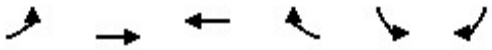
Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	128	181	100	124
Volume Left	0	181	0	53
Volume Right	81	0	0	71
cSH	1700	1465	1700	637
Volume to Capacity	0.08	0.12	0.06	0.19
Queue Length 95th (m)	0.0	3.2	0.0	5.4
Control Delay (s)	0.0	7.8	0.0	12.0
Lane LOS		A		B
Approach Delay (s)	0.0	5.0		12.0
Approach LOS				B

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	61	845	28	61	459	15
Future Volume (Veh/h)	61	845	28	61	459	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	939	31	68	510	17
Pedestrians	1				1	
Lane Width (m)	3.4				3.4	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			1008		670	538
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1008		670	538
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		0	97
cM capacity (veh/h)			695		404	546

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1007	99	527
Volume Left	0	31	510
Volume Right	939	0	17
cSH	1700	695	408
Volume to Capacity	0.59	0.04	1.29
Queue Length 95th (m)	0.0	1.1	177.5
Control Delay (s)	0.0	3.6	176.8
Lane LOS		A	F
Approach Delay (s)	0.0	3.6	176.8
Approach LOS			F

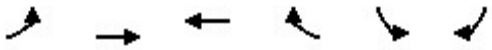
Intersection Summary			
Average Delay	57.3		
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	0	0	128	223	27
Future Volume (Veh/h)	16	0	0	128	223	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	18	0	0	142	248	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	142				107	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	142				107	71
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				72	97
cM capacity (veh/h)	1441				879	991

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	18	142	278
Volume Left	18	0	248
Volume Right	0	142	30
cSH	1441	1700	890
Volume to Capacity	0.01	0.08	0.31
Queue Length 95th (m)	0.3	0.0	10.2
Control Delay (s)	7.5	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	7.5	0.0	10.9
Approach LOS			B

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	123	71	0	0	0
Future Volume (Veh/h)	0	123	71	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	137	79	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	79				216	79
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	79				216	79
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1519				772	981

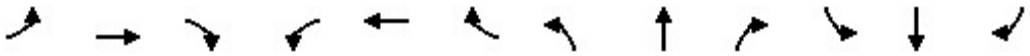
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	137	79	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1519	1700	1700
Volume to Capacity	0.00	0.05	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization		10.8%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	123	101	0	71	58	0
Future Volume (Veh/h)	123	101	0	71	58	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	137	112	0	79	64	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			249		272	193
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			249		272	193
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	100
cM capacity (veh/h)			1317		717	849

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	249	79	64
Volume Left	0	0	64
Volume Right	112	0	0
cSH	1700	1317	717
Volume to Capacity	0.15	0.00	0.09
Queue Length 95th (m)	0.0	0.0	2.2
Control Delay (s)	0.0	0.0	10.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.5
Approach LOS			B

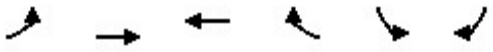
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	6	0	0	0	0	3	0	50	0	6	86	11
Future Volume (vph)	6	0	0	0	0	3	0	50	0	6	86	11
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	0	0	0	0	3	0	56	0	7	96	12

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	7	3	56	115
Volume Left (vph)	7	0	0	7
Volume Right (vph)	0	3	0	12
Hadj (s)	0.23	-0.57	0.03	-0.02
Departure Headway (s)	4.5	3.7	4.1	4.0
Degree Utilization, x	0.01	0.00	0.06	0.13
Capacity (veh/h)	766	924	868	901
Control Delay (s)	7.5	6.7	7.3	7.5
Approach Delay (s)	7.5	6.7	7.3	7.5
Approach LOS	A	A	A	A

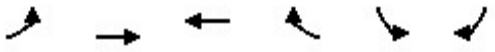
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	25.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	17	10	0	0	3
Future Volume (Veh/h)	5	17	10	0	0	3
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	19	11	0	0	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	11				42	11
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	11				42	11
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1608				965	1070

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	25	11	3
Volume Left	6	0	0
Volume Right	0	0	3
cSH	1608	1700	1070
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	1.8	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	1.8	0.0	8.4
Approach LOS			A

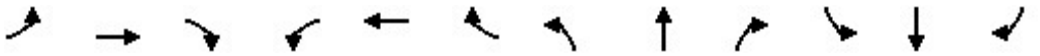
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	0	0	0	0	10
Future Volume (Veh/h)	17	0	0	0	0	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	19	0	0	0	0	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0				38	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				38	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	99
cM capacity (veh/h)	1623				963	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	19	0	11
Volume Left	19	0	0
Volume Right	0	0	11
cSH	1623	1700	1085
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.3	0.0	0.2
Control Delay (s)	7.2	0.0	8.4
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	8.4
Approach LOS			A

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	3	4	12	3	5	4	152	24	5	208	5
Future Volume (Veh/h)	8	3	4	12	3	5	4	152	24	5	208	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	9	3	4	13	3	6	4	169	27	6	231	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	444	450	234	442	440	182	237			196		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	444	450	234	442	440	182	237			196		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	100	98	99	99	100			100		
cM capacity (veh/h)	519	504	810	521	511	865	1342			1389		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	22	200	243
Volume Left	9	13	4	6
Volume Right	4	6	27	6
cSH	566	583	1342	1389
Volume to Capacity	0.03	0.04	0.00	0.00
Queue Length 95th (m)	0.7	0.9	0.1	0.1
Control Delay (s)	11.5	11.4	0.2	0.2
Lane LOS	B	B	A	A
Approach Delay (s)	11.5	11.4	0.2	0.2
Approach LOS	B	B		

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	26.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	103	0	11	182	0
Future Volume (Veh/h)	6	103	0	11	182	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	114	0	12	202	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	410	6			12	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410	6			12	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	89			87	
cM capacity (veh/h)	523	1077			1607	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	121	12	202
Volume Left	7	0	202
Volume Right	114	12	0
cSH	1015	1700	1607
Volume to Capacity	0.12	0.01	0.13
Queue Length 95th (m)	3.1	0.0	3.3
Control Delay (s)	9.0	0.0	7.6
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	7.6
Approach LOS	A		

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	0	5	8	7
Future Volume (Veh/h)	5	0	0	5	8	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	0	0	6	9	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	19	13	17			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	19	13	17			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	998	1067	1600			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	6	6	17
Volume Left	6	0	0
Volume Right	0	0	8
cSH	998	1600	1700
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	8.6	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.6	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		