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To:	**City of Edmonton**	Date:	**November 12, 2020**
Attention:	**Greg Ablett P.Eng., Kirk Kwan, E.I.T.**	Project No.:	**15755**
Cc:			
Reference:	**Holyrood Gardens Rezoning Traffic Impact Assessment (Draft)**		
From:	**Dan Zeggelaar, P.Eng., PTOE, Jackie Prior, E.I.T.**		

1.0 Background

The City of Edmonton accepted the Traffic Impact Assessment (TIA) in June 2018 for the current zoning of the Holyrood Gardens site, known herein as "2018 TIA". Regency is proposing a rezoning to increase the units from 440 to 890, north of 93 Avenue, with no changes south of 93 Avenue and no changes to the site plan. The following memo outlines the results of assessing the traffic impacts due to the increase in the number of units as well as provides an updated overview of the current state of transportation in the area due to new/updated plans completed by the City of Edmonton, since the 2018 TIA.

1.1 Study Scope

The following memo outlines the traffic impacts due to the increase in number of units using updated information from the 2018 TIA. This is summarized as follows.

Table 1.1: Comparison of 2018 TIA and Current TIA

Subject Area	2018 TIA	Current TIA	Discussion
Updated Background Traffic	2047 traffic model	2050 traffic model	2050 traffic model includes recently approved rezoning of Holyrood Gardens (1,200 units) and other rezoning in the area (e.g. Bonnie Doon and Strathern Heights). Requires update to background traffic (Exhibit 2.3) of the 2018 TIA.
Updated Land Use Schedule	1,200 dwelling units + non-residential uses.	Increase of 1,200 to 1,650 dwelling units.	Requires an update to land use (Table 3.1) of the 2018 TIA reflecting an increase in the number of units. No change in non-residential uses.
Updated Site Generated Traffic		Increase of 450 residential units.	Requires update to previous net trip generation table (Table 4.1) and site generated traffic volumes (Exhibit 4.1) of the 2018 TIA.
Updated Total Traffic			Requires update to Exhibit 4.2 (total traffic volumes), combining the updated background traffic volumes (Exhibit 2.3) with updated site generated traffic volumes (Exhibit 4.1) of the 2018 TIA.
Updated Traffic Analysis			Requires updates to section 5.0 of the 2018 TIA, including traffic operation analysis tables 5.2 to 5.26, daily volume analysis and pedestrian and cyclist facilities.

The study also needs to reflect on changes in the City policies and plans impacting the growth of the Holyrood neighbourhood, including reduced neighbourhood speed limits from 50 km/h to 40 km/h, bus network redesign, parking bylaw changes (open option parking), "City Plan" and draft "Bike Plan".

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No changes in the overall site layout are proposed with the current rezoning, including (but not limited to) the location of the access points, layout of the buildings, amenity areas, location of retail, connectivity provided by public shared use paths or other changes.

1.2 Study Outline

The outline of this study is as follows:

- **Section 2.0 – Future Traffic Conditions:** Describes the City's traffic model, compares the 2047 and 2050 horizon traffic models. Describes how the 2050 traffic was used to estimate 2050 background traffic volumes for this TIA.
- **Section 3.0 – Proposed Rezoning Summary:** Updated summary of site uses, outlining the proposed rezoning compared to the current zoning.
- **Section 4.0 – Site Generated Traffic:** Updated table 4.1 (2018 TIA), outlining the net trip generation for the proposed rezoning compared to the current zoning. Updated exhibit 4.1 and 4.2 of the 2018 TIA, outlining the site generated traffic volume exhibit and total traffic volume.
- **Section 5.0 – Transportation Assessment:** Daily volume and intersection operational analysis, including a review of the Valley Line Light Rail Transit (LRT) impacts on the traffic signals.
- **Section 6.0 – Other Considerations:** Discussion of the reduced neighbourhood speed limits and bus network redesign parking bylaw changes (open option parking), "City Plan" and draft "Bike Plan" in the context of the Holyrood neighbourhood.
- **Section 6.0 – Conclusions and Recommendations:** Study synopsis, conclusions and recommendations.

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2.0 Future Traffic Conditions

The following describes the City's traffic model, compares the 2047 and 2050 traffic models, and describes how the 2050 traffic was used to estimate background traffic volumes for this TIA.

2.1 Traffic Model Definition

The following described the City's traffic model (excerpt from the City of Edmonton, Traffic Impact Assessment Guidelines)

- "The City actively maintains a regional travel model ("Traffic Model") in EMME (traffic modelling software) to forecast longer term traffic demand. The model is updated regularly to incorporate land uses approved within the City and incorporate changes at the regional level on an as needed basis. This model presents a high-level overview of anticipated traffic volumes along key roadway links throughout the City."

The traffic model provides the forecast long-term traffic demand on roadways within the Holyrood areas.

2.2 Comparison of 2047 and 2050 Traffic Model Horizon

The 2018 TIA for the current zoning used the forecast traffic demand from the 2047 traffic model, but since this TIA was complete, the City has updated their traffic model and created a 2050 model. Major differences between the two models is that the 2050 model includes recently approved rezoning, including the existing Holyrood Gardens zoning and recent rezoning of the Bonnie Doon Mall and Strathern Heights. The 2047 model did not have these recently approved rezoning included.

The City traffic model update is part of their regular and ongoing maintenance of the traffic model and is based on the best information available at the time of its creation

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2.3 2050 Background Traffic Volume (Unadjusted)

The City provided 2050 AM and PM design volumes representing background traffic conditions at the intersections for the surrounding roadway network, extracted from their 2050 traffic model. These volumes were adjusted to better represent the population assumptions and Holyrood Gardens site plan, and this is described in the following sections. The unadjusted 2050 traffic volumes are provided in Appendix A.

2.4 2050 Background Traffic Volume Adjustment (Population)

Within the Holyrood neighbourhood, the 2047 traffic model shows a population of 4,990, and the 2050 model shows a population of 4,480. The decrease in population between models may be due to various modelling inputs that have changed since the 2047 model was complete. Since the 2019 population within the Holyrood neighbourhood was 3,294 (2019 municipal census) and the current zoning adds 1,200 dwelling units, ISL determined that increasing the 2050 traffic model volumes to reflect the higher population in the 2047 model was necessary. This required an 11% increase to the 2050 traffic model volumes within the Holyrood neighbourhood, which is the difference between the 2050 and 2047 population in the traffic models. Adjusted volumes are shown in Appendix A, in red, next to the unadjusted volumes.

2.5 2050 Background Traffic Volume Adjustment (Select Link Analysis)

The City of Edmonton provided a select link analysis from the 2050 traffic representing the current Holyrood Gardens zoning, which includes the 1,200 dwelling units and retail land uses approved in the previous rezoning. The select link analysis provides the traffic volume and routes to and from the Holyrood Gardens site. The select link analysis provided to ISL includes four diagram maps representing the AM and PM peak inbound and outbound

traffic volumes generated due to the Holyrood Gardens site and routing of traffic volumes along all roadways within the network shown. The select link analysis diagrams are provided in Appendix B.

The allocation of units, north and south of 93 Avenue in the select link analysis is not consistent with the current plan, which has 1,200 units split with 440 units (36%), north of 93 Avenue and 760 (63%), south of 93 Avenue. These required adjustment for the appropriate allocation, and this is shown in the following table.

Table 2.1: Adjustment of Select Link Volumes

Direction	Select Link	Adjusted Volumes	
		North of 93 Avenue	South of 93 Avenue
AM Inbound	87	31	56
AM Outbound	229	84	145
PM Inbound	149	55	94
PM Outbound	127	47	80

The adjusted volumes were reassigned to the site accesses to be consistent with the site plan, including an all direction access to the north and south of 93 Avenue, a two-way access located at the south and a one-way exit at the north. Further adjustments to the volumes to account for the access were required, which included:

- **North of 93 Avenue:** A portion of the outbound volumes, destined to the northeast (95 Avenue eastbound) were applied to the north exit only, as this exit is conveniently located near 95 Avenue, providing good access to this direction.
- **South of 93 Avenue:** A portion of the outbound volumes, destined to the southeast (90 Avenue eastbound, 79 southbound) were applied to the south exit, as this is conveniently located near 91 Avenue, providing good access to this direction.
- **South of 93 Avenue:** A portion of the outbound volumes, destined to the southwest (90 Avenue westbound, 85 Street southbound) were applied to the south exit, as this is conveniently connected to the right out on 90 Avenue (east of 85 Street).
- **South of 93 Avenue:** No inbound traffic was applied to the right in on 90 Avenue (east of 85 Street) due to the high levels of congestion on 90 Avenue westbound.

The select link volumes adjusted to the site accesses are provided in Appendix B.

2.6 2050 Background Traffic Volume Adjustments (Alley, 83 Street and 91 Avenue)

The 2050 traffic model does not provide all volumes for the network. Background traffic volumes for the north/south alley adjacent to the Holyrood Gardens site were reused from the 2018 TIA. In addition, 2050 traffic volumes on 83 Street and 91 Avenue were extracted from the AM and PM link volumes.

2.7 Summary of 2050 Background Traffic Volume

In summary, the 2050 background volumes were increased by 11% to correlate with the 2047 Holyrood neighbourhood population, adjusted to conform to the site access (using the select link analysis) and adjusted to account for the right in, right out on 90 Avenue. Further, volumes for the north/south alley, 83 Street and 91 Avenue were extracted from other sources as needed. The revised 2050 background volumes are provided on Exhibit 2.1.

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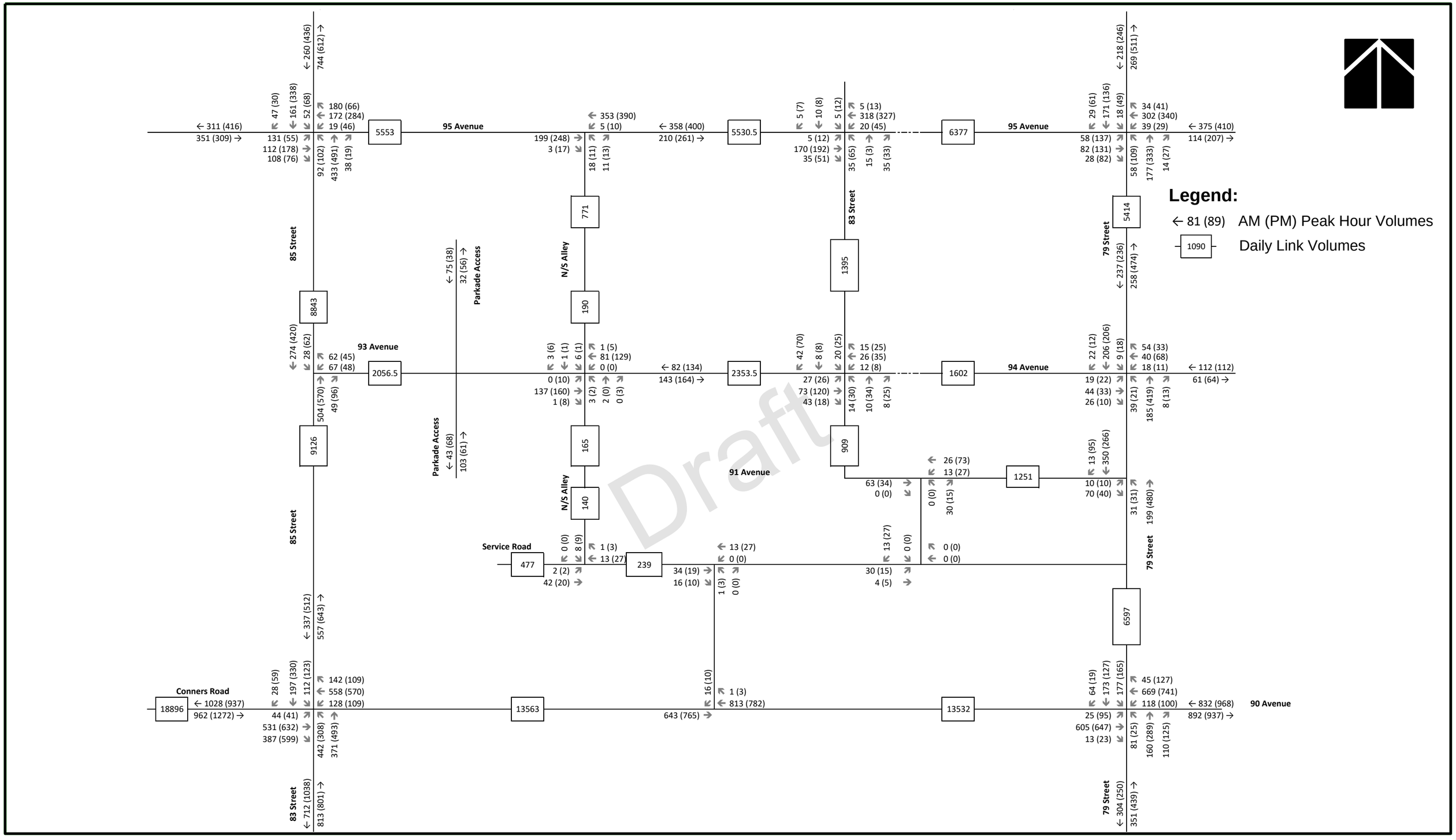

EXHIBIT 2.1

2050 Background Traffic Volumes

September, 2020

3.0 Proposed Rezoning Summary

The proposed rezoning is to increase the dwelling units from 440 to 890, north of 93 Avenue, with no changes south of 93 Avenue and no changes to the site plan. No changes to the site plan, including building location, access locations, size of non-residential component and any others are proposed. Only an increase to the number of dwelling units to the area of the site north of 93 Avenue is proposed, with 750 dwelling units located south of 93 Avenue for a total of 1,650 dwelling units (previous 1,200 dwelling units). The increase in dwelling units will be accommodated by increasing the height of certain buildings within the allowable height of the current zoning. The site plan is provided in Appendix C.

Table 3.1: Assumed Land Use Schedule

Category	Land Use	Size
Current Zoning (Table 3.1 of June 2018 TIA)		
Residential	Apartment Units	1,200 dwellings
Non-Residential	Restaurant	3,000 ft^2
	Coffee Shop	2,000 ft^2
	Medical/Dental	5,000 ft^2
	Convenience Store	3,000 ft^2
	Total:	**1,200 dwellings/13,000 ft^2**
Proposed Rezoning		
Residential	Apartment Units	1,650 dwellings (+ 450)
Non-Residential	No change	
	Total:	**1,650 dwellings/13,000 ft^2**

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4.0 Site Generated Traffic

Site generated traffic is shown in the following table for the current zoning and the proposed rezoning based on the estimates from the trip generation rates and the select link volumes from the 2050 traffic model.

Table 4.1: Net Trip Generation

Methodology	Trip Type	AM		PM		Daily	
		In	Out	In	Out	In	Out
	Current Zoning (Table 4.1 of June 2018 TIA)						
Trip Generation Rates	**Residential**						
	Total	69	339	302	178	3,486	3,486
	Transit and Active Modes	23	133	117	65	1,326	1,340
	Net Vehicle Trips	**46**	**206**	**185**	**113**	**2,160**	**2,146**
	Non-Residential						
	Total	148	137	92	95	1,413	1,413
	Transit and Active Modes	104	96	64	67	989	989
	Non-primary	16	16	8	8	148	148
	Net Vehicle Trips	**28**	**25**	**20**	**20**	**276**	**276**
	Total Net Vehicle Trips (Residential and Non-Residential)						
	Total	**74**	**231**	**205**	**133**	**2,436**	**2,422**
Select Link (2050 Traffic Model)	**Total**	**87**	**229**	**149**	**127**	**2,061***	**2,369***
Trip Generation Rates	**Proposed Rezoning (Additional trips)**						
	Residential						
	Total	26	127	113	67	1307	1307
	Transit and Active Modes	9	50	44	24	497	503
	Net Vehicle Trips	**17**	**77**	**69**	**42**	**810**	**805**
Select Link (37.5% of 2050 model)	**Residential**	**33**	**86**	**56**	**48**	**773**	**888**

*Estimated based on trip generated rate (AM + PM compared to daily)

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New trips for the proposed rezoning are assigned to the roadway network proportionally (37.5%) to the select link analysis for 1,200 units (450 of 1,200), using the traffic routes defined in the select link analysis with adjustment for the access/exit points in the site plan. This is shown in Exhibit 4.1. The total traffic volumes, combining Exhibit 2.1 and 4.1 are shown in Exhibit 4.2.

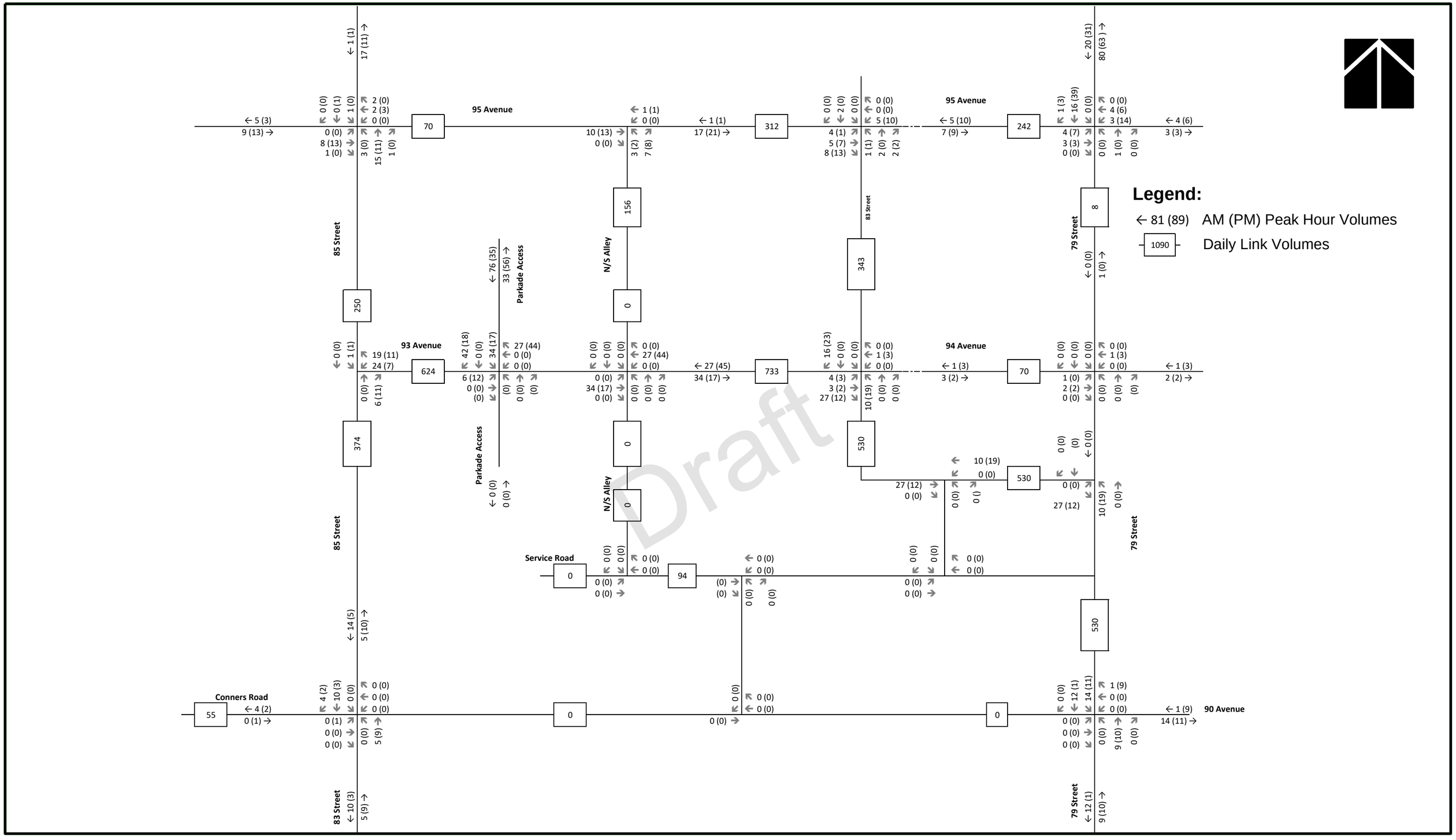

EXHIBIT 4.1

2050 Site Generated Traffic

September, 2020

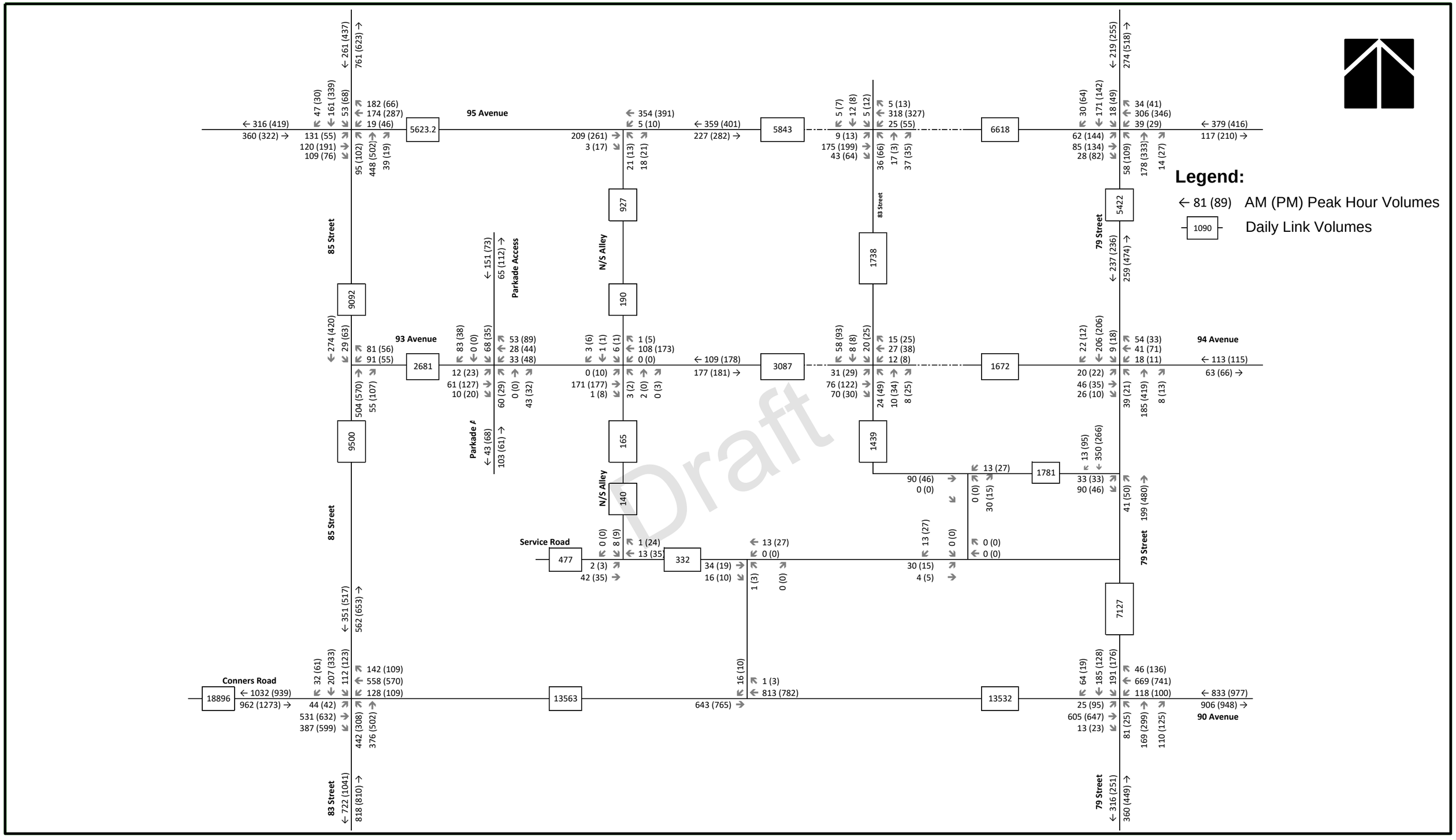

EXHIBIT 4.2

2050 Total Traffic

September, 2020

5.0 Transportation Assessment

5.1 Daily Volume Review Criteria

The City of Edmonton's TIA Guidelines (table 3.2) describes the daily volume threshold for a two-lane collector as 5,000 vehicles per day and 10,000 vehicles per day, with mitigation. Mitigation measures provided in the TIA guidelines include parking restrictions, limitation and/or removal of front drive access, intersection spacing and access control to improve traffic flow. As these measures may not be suitable in all communities, careful consideration and additional community consultation should be made in reviewing any mitigation measures on roadways implicated. This is discussed as follows, within the context of this TIA and the Holyrood neighbourhood.

5.2 Daily Volume Review

The existing 2018 daily traffic volumes adopted from the 2018 TIA, 2047 background and total (extracted from the 2018 TIA), 2050 background and total volumes are summarized in the following table. The 2047 total volumes from the 2018 TIA include the 1,200 units for the current Holyrood Gardens. Daily volumes for background traffic conditions are estimated by factoring the AM plus PM volumes by a value of 4.5. Daily volumes for site generated traffic are calculated based on the trip generation rate. Daily volumes on the alley and service road are estimated based on the comparison of the peak hour and daily volumes in the 2018 TIA.

Table 5.1: Daily Traffic Volumes

Location		Sourced from 2018 TIA			Current TIA	
		Existing	2047 BG	2047 Total	2050 BG	2050 Total
95 Avenue	East of 85 Street	2,485	3,775	3,830	5,553	5,623
	West of 83 Street	n/a	n/a	n/a	5,504	5,816
	West of 79 Street	2,792	4,118	4,581	6,377	6,618
93 Avenue	East of 85 Street	1,120	900	3,034	2,054	2,681
	West of 83 Street	940	900	2,567	2,354	3,087
	West of 79 Street	846	810	2,477	1,602	1,672
91 Avenue	West of 79 Street	n/a	n/a	1,090	1,251	1,781
83 Street	South of 90 Avenue	n/a	n/a	n/a	1395	1,738
	South of 93 Avenue	n/a	n/a	n/a	909	1,439
79 Street	South of 95 Avenue	3,614	4,395	5,417	5,414	5,422
	North of 90 Avenue	4,815	4,837	5,360	6,597	7,127
North/South Alley	South of 95 Avenue	340	690	1,211	771	927
	North of 93 Avenue	190	190	503	190	190
	South of 93 Avenue	165	165	402	165	165
	North of 91 Avenue	140	140	377	140	140
Service Road	West of 83 Street	45	45	745	477	477

n/a – not available (not included in the 2018 TIA)

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Overall, 95 Avenue and 79 Street traffic volumes exceed the City's design thresholds for a two-lane collector of 5,000 daily traffic volumes, where daily volumes beyond 5,000 are allowed with mitigation measures. 79 Street is the only road that may be a candidate for considering mitigation measures in the short term, as the existing daily volumes are close to 5,000 vehicles per day threshold, north of 90 Avenue. 95 Avenue will need consideration for mitigation measures in the long term. Mitigation measures could include parking restrictions and access controls to improve traffic flow. However, since increasing traffic volumes on 95 Avenue and 79 Street may be due to congestion on surrounding arterial roadways 85 Street, 75 Street, 90 Avenue and 98 Avenue, traffic calming measures, including curb extensions, raised crosswalks and speed humps that restrict, slow and reduce traffic flow may be considered.

At this time, the City should consider monitoring the volumes on 95 Avenue and 79 Street to determine which type of mitigation measure is needed, including parking restrictions and access control to enhance traffic flow and accommodate the higher volumes or traffic calming measures to calm traffic flow and reduce volumes to below their thresholds. Any mitigation measures should be determined in consultation with the community. A tertiary measure may be that the surrounding roadway network is improved to reduce congestion and promote flow roadways outside of the neighbourhood, including on 90 Avenue, 85 Street, 75 Street and 98 Avenue. Another measure is that new or improved active transportation facilities, including additional transit routes and bike lanes are provided as a means of reducing traffic in the neighbourhood. Congestion on the surrounding arterials is studied in the next section. The City is planning many active transportation improvements, and these are discussed in Section 6.0.

The previous recommendations from the 2018 based on the daily volume review are provided as follows and reviewed based on this TIA.

- **2018 TIA Recommendation (north/south alley):** The full north-south alley right-of-way width should be paved between the east-west drive aisle and 95 Avenue (adjacent to Area 1) to provide additional passing opportunities. Where existing grades and utilities make it challenging to widen the pavement to the full right-of-way width, a passing layby could be developed by widening into Area 1.
  - No changes are needed to this recommendation as the volumes in the north/south alley are comparable to the 2018 TIA volumes.
- **2018 TIA Recommendation (93 Avenue):** Three travel lanes should be provided along 93 Avenue between 85 Street and the alley. If on-street parking is desired through this section, laybys could be constructed.
  - No changes are recommended to this recommendation as the volumes along 93 Avenue are lower, but still relatively similar to the 2018 TIA volumes.
- **2018 TIA Recommendation (85 Street Service Road):** No parking signs should be installed along the remaining portion of the 85 Street East Service Road between the south parkade access and the 90 Avenue right in/right out access.
  - No changes are needed to this recommendation as the volumes along service road are relatively similar to the 2018 TIA volumes.

5.3 Surrounding Network Congestion Comparisons (2047, 2050 Traffic Models)

- To understand the differences in the traffic volumes between the 2047 and 2050 models, and potential reason for higher volumes on 95 Avenue and 79 Street, the levels of congestion on the surrounding roadway network are reviewed using congestion information provided by the City.
- **2047:** 2047 horizon congestion is extracted from the 2018 TIA, representing conditions with the current zoning (1,200 units) based on the 2047 model volume to capacity diagrams provided by the City, with congestion levels increased to account for the additional traffic generated due to the previous Holyrood Gardens rezoning, which was not included in the 2047 background model horizon.

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- **2050:** 2050 horizon congestion is extracted from the 2050 traffic model, based on level of service diagrams provided by the City, which includes the current zoning (1,200 units).
- For reference – The volume to capacity diagram shows the calculation of the volume to the capacity, where for example a value of 0.9 indicates the roadway is 90% at capacity, where the City's threshold is 95%. A level of service diagram indicates the level of delay based on a number system from A to F, where LOS E is the City's threshold and equivalent to approximately 50 – 80 seconds of delay.
- Congestion levels are quantified from lowest to highest and indicated as lower, moderate or high, based on the levels of congestion documented in the table as well as reviewing the congestion diagrams.
- The 2047 background horizon volume to capacity diagram and 2050 background level of service diagrams are provided in the Appendix D.

Table 5.2: Maximum Congestion (Northbound/Southbound or Eastbound/Westbound)

Horizon	85 Street		75 Street		90 Avenue		98 Avenue	
	AM	PM	AM	PM	AM	PM	AM	PM
2047	**0.67/0.75**	**0.78/0.44**	**0.61/0.82**	**0.62/0.75**	**0.51/0.94**	**0.91/0.76**	**0.82/1.01**	**0.92/0.89**
Congestion	**Lower**	**Moderate**	**Moderate**	**Lower**	**Higher**	**Higher**	**Higher**	**Higher**
2050	**F/E**	**F/F**	**C/F**	**C/F**	**F/F**	**E/F**	**F/F**	**F/F**
Congestion	**Higher**	**Higher**	**Moderate**	**Moderate**	**Higher**	**Higher**	**Higher**	**Higher**

The following observations are made based on comparing the daily volumes:

- In the 2047 model, the surrounding arterial network has low to higher levels of congestion.
- In the 2050 model, the surrounding arterial network has moderate to higher levels of congestion.
- Both models have higher levels of congestion on 90 Avenue and 98 Avenue, which may be causing higher volumes of traffic to use 95 Avenue. In comparison, the 2050 background model horizon appears to have higher levels of congestion, which may be causing higher volumes on 95 Avenue in the 2050 model, compared to the 2047 model.
- Improving the surrounding road network, to reduce congestion may reduce the volume of short cutting traffic in the neighbourhood.

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5.4 Intersection Operational Analysis

Operational analyses were performed using Synchro 9.1. This software uses techniques provided in the Highway Capacity Manual (HCM) to provided measures of effectiveness for intersection operations. The three main measures of effective that indicate intersection performance are described herein.

Level of service (LOS) is based on estimated average delay per vehicle entering the intersection. The LOS scale is letter graded, from A to F, where A indicates the lowest amount of delay, LOS E indicates congested conditions nearing capacity and LOS F indicates a delay of 80 seconds or greater for signalized intersections and 50 seconds for unsignalized intersections.

Volume to capacity (v/c) ratio indicates the remaining capacity of a movement or whether a movement is over capacity. A v/c ratio of 1.0 represents an intersection or movement at full capacity with no ability to accommodate additional traffic. A v/c ratio above 0.9 indicates that the movement is near capacity and may experience some congestion.

Finally, Synchro also calculates the 95th percentile vehicle queue length for each intersection movement. This allows the determination of left and right turn storage requirements. Use of the 95th percentile vehicle queue length criterion is accepted practice for normal peak hour operation; it means that the queue length is exceeded 5% of the time.

The City of Edmonton's TIA guidelines identify thresholds for peak hour LOS and v/c ratio. For short term traffic studies, up to a 15-year horizon, LOS D and v/c ratio of 0.85 is provided and for long term traffic studies LOS E and a v/c ratio of 0.95 is provided.

The 2018 TIA included a discussion regarding LOS and v/c ratio thresholds in mature neigbourhoods and operational impacts due to the future LRT signals. This TIA supplement reflects the previous discussion points, in which incremental changes to traffic operations at the LRT intersections are the focus. Other analysis assumptions, including Synchro default parameters, reduction of the saturation flow rate by 25% for all movements crossing the LRT tracks and analysis of unsignalized intersections using HCM2010 methodology are carried over from the 2018 TIA.

The following intersections are included in this study:

- 90 Avenue and 79 Street;
- 90 Avenue/Connors Road/83 Street/85 Street;
- 93 Avenue and 85 Street;
- 95 Avenue and 85 Street;
- 90 Avenue right in/right out;
- 85 Street East Service Road and the North-South Alley;
- 93 Avenue and the North-South Alley;
- 93 Avenue and 83 Street;
- 95 Avenue and the North-South Alley;
- 93 Avenue Parkade Access;
- 94 Avenue and 79 Street;
- 95 Avenue and 79 Street; and
- 95 Avenue and 83 Street.

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The analysis was conducted using the exact traffic model as the 2018 TIA for relative comparison. This includes no changes to traffic signal timing, intersection geometry, signal phasing, timing parameters or lane configuration. The 2018 TIA analysis tables are provided in the Appendix C for reference, due to size requirements to fit them into this memo. Synchro reports for this TIA are provided in Appendix E.

90 Avenue and 79 Street

The results of the traffic analysis are provided in Table 5.3 and 5.4.

Table 5.3: 90 Avenue and 79 Street (AM Peak)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2050 Background Actuated (75s cycle)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	25	605	13	118	669	45	81	160	110	177	173	64
v/c	0.34			0.52			0.38	0.62		0.93	0.56	
Delay (s)	1.7			10.3			28	27.2		78.6	26.9	
LOS	A			B			C	C		E	C	
95th Queue (m)	m0.0			46			21	49.5		#57.0	45.5	
Intersection Delay:						**17.7**				Intersection LOS:		**B**
2050 Total – Actuated (75s cycle)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	25	605	13	118	669	46	81	169	110	191	185	64
v/c	0.35			0.53			0.36	0.62		0.95	0.55	
Delay (s)	8.6			10.8			27.5	26.8		82.5	26.7	
LOS	A			B			C	C		F	C	
95” Queue (m)	30.6			46.1			21.1	51.8		#62.6	48.1	
Intersection Delay:						**20.5**				Intersection LOS:		**C**

Table 5.4: 90 Avenue and 79 Street (PM Peak)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2050 Background Actuated (75s cycle)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	95	647	23	100	741	127	25	289	125	165	127	19
v/c	0.53			0.62			0.08	0.88		1.42	0.31	
Delay (s)	13			12.1			21.2	47		260.3	22.3	
LOS	B			B			C	D		F	C	
95th Queue (m)	m2.6			55.9			8.1	#101.3		#66.6	29.5	
Intersection Delay:						**35.3**				Intersection LOS:		**D**
2050 Total – Actuated (75s cycle)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	95	647	23	100	741	136	25	299	125	176	128	19
v/c	0.53			0.63			0.08	0.9		1.61	0.31	
Delay (s)	11.2			12.1			21.2	50.1		340.3	22.4	
LOS	B			B			C	D		F	C	
95” Queue (m)	42.7			56.5			8.1	#105.1		#71.8	29.6	
Intersection Delay:						**37.8**				Intersection LOS:		**D**

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As shown in the tables, the intersection performance with the rezoning is insignificantly changed, as the increased trips did not significantly change the traffic volumes at this intersection. Northbound and southbound traffic on 79 Street will experience longer delays and congestion due to increased background traffic demand from the 2050 horizon traffic model, which indicates a major increase in traffic volumes compared to the 2047 horizon traffic model. Adding a left turn phase results the congestion and this is summarized in the following table.

Table 5.5: 90 Avenue and 79 Street (Southbound Left Turn, AM and PM)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2050 AM Total – Actuated (75s cycle, SBLT Signal Phase Added)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	25	605	13	118	669	46	81	169	110	191	185	64
v/c	0.4			0.63			0.39	0.78		0.7	0.42	
Delay (s)	13.7			17.7			31.9	41.2		33.4	19	
LOS	B			B			C	D		C	B	
95th Queue (m)	44.6			68.1			21.7	56.9		#35.2	40	
Intersection Delay:						**21.4**				Intersection LOS:		**C**
2050 PM Total – Actuated (80s cycle, SBLT Signal Phase Added)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	95	647	23	100	741	136	25	299	125	176	128	19
v/c	0.78			0.88			0.08	0.92		0.72	0.2	
Delay (s)	26			31.6			22.1	53.9		33.1	14	
LOS	C			C			C	D		C	B	
95” Queue (m)	#70.8			#103.4			8.4	#108.5		#34.8	23.5	
Intersection Delay:						**32.6**				Intersection LOS:		**C**

As shown, adding a southbound left turn phase at this intersection improves traffic operations for the southbound left turn, will only marginal increases in delay for the northbound through. Southbound queueing reduces from approximately 71 m to 35 m. Currently, the southbound left turn lane provides 20 m of storage and this should be extended to 35 m of storage.

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Connors Road and 85 Street

The results of the traffic analysis are provided in Table 5.6 and 5.7

Table 5.6: Connors Road and 85 Street (AM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T
2050 Background – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	44	531	387	128	558	142	442	371	112	197	28
v/c	0.2	1.2	0.23	0.32	0.71	0.42	1.19	0.74	1.44	0.47	0.06
Delay (s)	56.3	161.8	0.3	40.2	47.5	43.2	165.9	58.2	289.4	50.5	1.6
LOS	E	F	A	D	D	D	F	E	F	D	A
95th Queue (m)	31	#174.2	0	62.4	113	70.1	#112.5	138.1	#109.6	81.8	2.8
Intersection Delay:						**89.7**			Intersection LOS:		**F**
2050 Total – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	44	531	387	128	558	142	442	376	112	207	32
v/c	0.2	1.2	0.23	0.32	0.71	0.45	1.19	0.75	1.44	0.49	0.07
Delay (s)	56.3	161.8	0.3	43.2	52.2	47.8	165.9	58.8	289.5	50.7	1.7
LOS	E	F	A	D	D	D	F	E	F	D	A
95th Queue (m)	31	#174.2	0	64.4	125.8	74.8	#112.5	140.4	#109.8	85.9	3.1
Intersection Delay:						**90.7**			Intersection LOS:		**F**

Table 5.7: Connors Road and 85 Street (PM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T
2050 Background – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	41	632	599	106	568	109	308	493	123	333	61
v/c	0.19	1.43	0.35	0.27	0.72	0.33	0.83	0.98	1.58	0.79	0.13
Delay (s)	56	249.2	0.6	41.1	49.2	42.7	84.8	87.8	344.3	61	4.5
LOS	E	F	A	D	D	D	F	F	F	E	A
95th Queue (m)	30	#218.2	0	55.6	115.2	57.6	#67.5	#217.9	#122.8	#139.7	9.6
Intersection Delay:						**97.7**			Intersection LOS:		**F**
2050 Total – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	42	632	599	109	570	109	308	502	123	333	61
v/c	0.13	0.97	0.35	0.39	1.01	0.46	1.66	0.93	2.05	0.63	0.12
Delay (s)	45.1	84.4	0.6	55.1	98.3	58.3	361.8	75.9	550.4	49.8	7.1
LOS	D	F	A	E	F	E	F	E	F	D	A
95" Queue (m)	27.3	#175.4	0	63	#166.1	64.8	#96.0	#213.4	#130.6	132.3	12
Intersection Delay:						**105.7**			Intersection LOS:		**F**

As with the 2018 TIA results, this intersection operates under congested conditions, where there is only a small incremental increase in congestion between the background traffic and total traffic scenarios. AM intersection delay increases by ~10%, while PM intersection delay decreases by ~33%, due to changes in the background traffic patterns in the 2050 horizon traffic model, compared to the 2047 horizon traffic model. As with the 2018 TIA, in the westbound direction, the queuing is expected to extend past the right in/right out during the AM and PM peak hours. Drivers exiting at the right out will have to wait for another driver on 90 Avenue to let them in when traffic queues are present. Typically, courteous drivers will provide a gap when the queue is stopped, allowing another driver to enter.

As with the 2018 TIA, an alternative signal phasing was tested to reflect an LRT hold phase, representing 25% of the cycle length assumed to operate every cycle to allow LRT movements. Other phasing assumptions for the east-west and north-south traffic movements were carried over from the 2018 TIA Synchro model. The results are provided in Table 5.8 and 5.9.

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Table 5.8: Connors Road and 85 Street – Alternate Signal Phasing (AM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	L	T	R	L	T	R	L	T	L	T	R
AM Peak Hour – 2050 Total – Pre-timed (150s cycle, NB Prot L, Free EB R, Hold Phase)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	44	531	387	128	558	142	442	376	112	207	32
v/c	0.38	0.63	0.23	1.02	0.66	0.42	1.06	0.52	0.5	0.48	0.07
Delay (s)	59	54.6	0.3	141.7	55.6	52.5	122.7	35.8	43.8	39.1	0.5
LOS	50	D	A	F	E	D	F	D	D	D	A
95th Queue (m)	24.2	89.9	0	#82.8	94.8	57.5	#105.4	113.8	30.2	48.7	m0.1
Intersection Delay:						**57.1**			Intersection LOS:		**E**

Table 5.9: Connors Road and 85 Street – Alternate Signal Phasing (PM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	L	T	R	L	T	R	L	T	L	T	R
PM Peak Hour – 2050 Total – Pre-timed (150s cycle, NB Prot L, Free EB R, Hold Phase)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	42	632	599	109	570	109	308	502	123	333	61
v/c	0.33	0.69	0.35	0.99	0.62	0.3	1.66	0.73	0.72	0.65	0.12
Delay (s)	53.1	54.4	0.6	137.9	52.3	47	361.8	45.9	85.1	68.6	17.5
LOS	D	D	A	F	D	D	F	D	F	E	B
95th Queue (m)	22.7	105.9	0	#73.4	94.3	43.9	#96.0	169.9	m51.8	m128.9	m9.9
Intersection Delay:						**75.5**			Intersection LOS:		**E**

As with the 2018 TIA, this intersection will remain a bottleneck within the roadway network during the PM peak. Eastbound and westbound queueing drops by approximately 30 – 40% with the alternative signal phasing.

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93 Avenue and 85 Street

The results of the traffic analysis are provided in Table 5.10 and 5.11.

Table 5.10: 93 Avenue and 85 Street – AM Peak Hour

Direction	Westbound		Northbound		Southbound	
Movement	L	R	T	R	L	T
2050 Background – Actuated (150s cycle, Prot SB L)						
Geometry	L/R		T/R		L/T	
Volume (vph)	67	62	504	49	28	274
v/c	0.6	0.66	0.4	0.06	0.42	0.19
Delay (s)	87.3	96.1	4.3	3.4	69.8	10.3
LOS	F	F	A	A	E	B
95th Queue (m)	m45.6	m44.1	49.5	m7.0	m23.2	59.9
Intersection Delay:		**19.3**	Intersection LOS:		**B**	
2050 Total – Actuated (150s cycle, Prot SB L) – Revised Trip Assignment						
Geometry	L/R		T/R		L/T	
Volume (vph)	91	81	504	55	29	274
v/c	0.68	0.72	0.41	0.07	0.43	0.2
Delay (s)	89.6	97.4	5.1	4	67.9	11.8
LOS	F	F	A	A	E	B
95” Queue (m)	m58.0	m53.8	55.7	m8.5	m22.1	74.5
Intersection Delay:		**23.2**	Intersection LOS:		**C**	

Table 5.11: 93 Avenue and 85 Street – PM Peak Hour

Direction	Westbound		Northbound		Southbound	
Movement	L	R	T	R	L	T
2050 Background – Actuated (150s cycle, Prot SB L)						
Geometry	L/R		T/R		L/T	
Volume (vph)	48	45	570	96	62	420
v/c	0.53	0.58	0.46	0.13	0.63	0.29
Delay (s)	86.5	94.9	3.9	3	53.5	13.2
LOS	F	F	A	A	D	B
95th Queue (m)	m35.3	m33.7	m34.4	m8.5	m28.2	m99.6
Intersection Delay:		**16.0**	Intersection LOS:			**B**
2050 Total – Actuated (150s cycle, Prot SB L) – Revised Trip Assignment						
Geometry	L/R		T/R		L/T	
Volume (vph)	55	56	570	107	63	420
v/c	0.53	0.64	0.46	0.15	0.63	0.29
Delay (s)	82	95.1	3.4	2.9	72.3	9.5
LOS	F	F	A	A	E	A
95" Queue (m)	m39.0	m39.6	m26.4	m5.2	m29.3	m130.0
Intersection Delay		**16.2**	Intersection LOS:		**B**	

The 95th percentile queuing improved with the westbound queues estimated to range from 34 – 58 m compared to 30 – 51 m, in the 2018 TIA. There is approximately 50 m of queueing distance for westbound traffic waiting at the signal between 85 Street and the parkade accesses. The 2018 TIA recommends three lanes along 93 Avenue to accommodate both left and right turn lanes and this means a majority of time, queuing is not expected to impact the operation of the parkade accesses or 93 Avenue.

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95 Avenue and 85 Street

The results of the traffic analysis are provided in Table 5.12. and 5.13.

Table 5.12: 95 Avenue and 85 Street – AM Peak Hour

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T		L	T	R
2050 Background – Actuated (150s cycle, NB & SB Prot L, E/W Split)												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	131	112	108	19	172	180	92	433	38	52	161	47
v/c	0.94		0.29	0.06	1.1		0.85	0.59		0.63	0.57	
Delay (s)	99.8		10	44.4	127.4		122.3	37.8		100.5	50	
LOS	F		B	D	F		F	D		F	D	
95th Queue (m)	#163.6		15.9	15.4	#234.5		#82.0	77.8		#47.6	104	
Intersection Delay:						**74.9**				Intersection LOS:		**E**
2050 Total – Actuated (150s cycle, NB & SB Prot L, E/W Split) – Revised Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	131	120	109	19	174	182	95	448	39	53	161	47
v/c	0.95		0.29	0.06	1.13		0.88	0.61		0.65	0.57	
Delay (s)	102.8		10.2	44.4	135.5		125.9	39.4		101.8	50	
LOS	F		B	D	F		F	D		F	D	
95" Queue (m)	#170.8		16.2	15.4	#237.8		#83.6	82.2		#49.2	104	
Intersection Delay:						**77.9**				Intersection LOS:		**E**

Table 5.13: 95 Avenue and 85 Street – PM Peak Hour

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T		L	T	R
2050 Background – Actuated (150s cycle, NB & SB Prot L, E/W Split)												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	55	178	76	46	284	66	102	491	19	68	338	30
v/c	0.9		0.2	0.14	1.09		0.94	0.64		0.83	0.99	
Delay (s)	93.9		4	46	125.5		144.8	43.7		128.2	95.3	
LOS	F		A	D	F		F	D		F	F	
95th Queue (m)	#152.1		5.3	29.6	#242.0		#93.0	80.2		#65.6	#233.8	
Intersection Delay:						**85.0**	Intersection LOS:					**F**
2050 Total – Actuated (150s cycle, NB & SB Prot L, E/W Split)												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	55	191	76	46	287	66	102	502	19	68	339	30
v/c	0.95		0.20	0.14	1.11		0.94	0.65		0.83	0.99	
Delay (s)	99.1		4.0	46.1	133.2		139.0	53.2		128.2	95.9	
LOS	F		A	D	F		F	D		F	F	
95" Queue (m)	#164.4		5.3	29.6	#244.5		#91.6	94.4		#65.6	#234.6	
Intersection Delay:						**89.7**	Intersection LOS:					**F**

AM intersection delay increases by ~25% due to changes in the background traffic patterns in the 2050 horizon traffic model, compared to the 2047 horizon traffic model. The PM intersection delay remains approximately the same.

As with the 2018 TIA, an alternative signal phasing was tested to reflect an LRT hold phase, representing 25% of the cycle length assumed to operate every cycle to allow LRT movements. Other phasing assumptions for the east-west and north-south traffic movements were carried over from the 2018 TIA Synchro model. The results are provided in Table 5.14 and 5.15.

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Table 5.14: 95 Avenue and 85 Street – Alternate Signal Phasing (AM Peak)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T		L	T	R
2050 Total – Pre-timed (150s cycle, NB L Pm+Pt, Hold Phase) – Original Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	131	120	109	19	174	182	95	448	39	53	161	47
v/c	0.94		0.18	0.06	0.69		0.42	0.54		0.33	0.47	
Delay (s)	82		9.4	36.2	48		57.4	55.6		51.8	48.2	
LOS	F		A	D	D		E	E		D	D	
95th Queue (m)	#101.6		16.9	10.4	119.5		49	94.1		26.7	75.3	
Intersection Delay:						**53.7**	Intersection LOS:					**D**

Table 5.15: 95 Avenue and 85 Street – Alternate Signal Phasing (PM Peak)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T		L	T	R
2050 Total – Pre-timed (150s cycle, NB L Pm+Pt, Hold Phase)												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	55	191	76	46	287	66	102	502	19	68	339	30
v/c	1.34		0.17	0.25	0.83		0.35	0.37		0.32	0.82	
Delay (s)	226.2		3.4	49.7	69.8		40.1	38.6		49.5	67.1	
LOS	F		A	D	E		D	D		D	E	
95th Queue (m)	#149.7		5	23.4	#147.6		m30.8	67		31.4	#151.2	
Intersection Delay:						**75.9**	Intersection LOS:					**E**

As with the 2018 TIA, this intersection will remain a bottleneck within the roadway network during the PM peak. The 2018 TIA reported that a 5% shift in volumes away from this intersection would result in this intersection operating below capacity during the PM peak.

90 Avenue and Right In/Right Out

The results of the traffic analysis are provided in Table 5.16 and 5.17.

Table 5.16: 90 Avenue Right In/Right Out (AM Peak Hour)

Direction	Eastbound		Westbound		Southbound
Movement	T		T	R	R
AM Peak Hour – 2050 Background – Unsignalized (SB Stop)					
Geometry	T/T		T/TR		R
Volume (vph)	643		813	1	16
v/c					0.03
Delay (s)					11.6
LOS					B
95th Queue (m)					0.5
Intersection Delay:		**0.1**	Intersection LOS:		**A**
AM Peak Hour – 2050 Total – Unsignalized (SB Stop)					
Geometry	T/T		T/TR		R
Volume (vph)	643		813	1	16
v/c					0.03
Delay (s)					11.6
LOS					B
95th Queue (m)					0.5
Intersection Delay:		**0.1**	Intersection LOS:		**A**

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Table 5.17: 90 Avenue Right In/Right Out (PM Peak Hour)

Direction	Eastbound		Westbound		Southbound	
Movement	T		T	R	R	
PM Peak Hour – 2050 Background – Unsignalized (SB Stop)						
Geometry	T/T		T/TR		R	
Volume (vph)	765		783	3	10	
v/c					0.02	
Delay (s)					11.4	
LOS					B	
95th Queue (m)					0.5	
Intersection Delay:		**0.1**	Intersection LOS:		**A**	
PM Peak Hour – 2050 Total – Unsignalized (SB Stop)						
Geometry	T/T		T/TR		R	
Volume (vph)	765		783	3	10	
v/c					0.02	
Delay (s)					11.4	
LOS					B	
95th Queue (m)					0.5	
Intersection Delay:		**0.1**	Intersection LOS:		**A**	

This intersection improves due to a reduction in traffic volumes on 90 Avenue in the 2050 horizon traffic model, compared to the 2047 horizon traffic model. Similar to the 2018 TIA westbound movement may be affected by westbound queues along 90 Avenue from the 85 Street intersection. This is due to traffic queuing back from 85 Street blocking this right in/right out and drivers exiting at the right out will have to wait for another driver on 90 Avenue to let them in when traffic queues are present. Typically, courteous drivers will provide a gap when the queue is stopped, allowing another driver to enter.

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85 Street East Service Road and North-South Alley

The results of the traffic analysis are provided in Table 5.18 and 5.19.

Table 5.18: 85 Street East Service Road and the North-South Alley (AM Peak Hour)

Direction	Eastbound		Westbound		Southbound	
Movement	T		T	R	R	
AM Peak Hour – 2050 Background – Unsignalized (SB Stop)						
Geometry	LT		TR		LR	
Volume (vph)	2	42	13	1	8	0
v/c	7.3				0.01	
Delay (s)	0.0				9.0	
LOS	A				A	
95th Queue (m)	0.0				0.0	
Intersection Delay:		**1.3**		Intersection LOS:	**A**	
AM Peak Hour – 2050 Total – Unsignalized (SB Stop)						
Geometry	LT		TR		LR	
Volume (vph)	2	42	13	1	8	0
v/c	7.3				0.01	
Delay (s)	0.0				9.0	
LOS	A				A	
95th Queue (m)	0.0				0.0	
Intersection Delay:		**1.3**		Intersection LOS:	**A**	

Table 5.19: 85 Street East Service Road and the North-South Alley (PM Peak Hour)

Direction	Eastbound		Westbound		Southbound	
Movement	T		T	R	R	
PM Peak Hour – 2050 Background – Unsignalized (SB Stop)						
Geometry	LT		TR		LR	
Volume (vph)	2	20	27	3	9	0
v/c	0.00				0.01	
Delay (s)	7.3				9.0	
LOS	A				A	
95th Queue (m)	0				0	
Intersection Delay:	**1.6**		Intersection LOS:		**A**	
PM Peak Hour – 2050 Total – Unsignalized (SB Stop)						
Geometry	LT		TR		LR	
Volume (vph)	3	35	35	24	9	0
v/c	0.00				0.01	
Delay (s)	7.4				9.2	
LOS	A				A	
95th Queue (m)	0				0	
Intersection Delay:	**0.3**		Intersection LOS:		**A**	

This intersection performs well with all movements operating at LOS A.

93 Avenue and North-South Alley

The results of the traffic analysis are provided in Table 5.20 and 5.21.

Table 5.20: 93 Avenue and the North-South Alley (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L			T			R			L		
AM Peak Hour – 2050 Background – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	0	137	1	0	81	1	3	2	0	6	1	3
v/c	0.00			0.00			0.01			0.01		
Delay (s)	0.0			0.0			10.4			9.9		
LOS	A			A			B			A		
95th Queue (m)	0.0			0			0			0		
Intersection Delay:						**0.6**			Intersection LOS:			**A**
AM Peak Hour – 2050 Total – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	0	171	1	0	108	1	3	2	0	6	1	3
v/c	0.00			0.00			0.02			0.01		
Delay (s)	0.0			0.0			10.6			10.3		
LOS	A			A			B			B		
95th Queue (m)	0			0			0			0.0		
Intersection Delay:						**0.5**			Intersection LOS:			**A**

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Table 5.21: 93 Avenue and the North-South Alley (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**			**T**			**R**			**L**		
PM Peak Hour – 2050 Background – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	10	160	8	0	129	5	2	0	3	1	1	6
v/c	0.01			0.00			0.01			0.01		
Delay (s)	7.5			0.0			10.0			9.7		
LOS	A			A			B			A		
95th Queue (m)	0.0			0			0.1			0.0		
Intersection Delay:						**0.6**				Intersection LOS:		**A**
PM Peak Hour – 2050 Total – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	10	177	8	0	173	5	2	0	3	1	1	6
v/c	0.01			0.00			0.01			0.01		
Delay (s)	7.6			0.0			10.3			10		
LOS	A			A			B			B		
95th Queue (m)	0			0			0			0		
Intersection Delay:						**0.5**	Intersection LOS:					**A**

Traffic volumes increased with the revised trip assignment, but the intersection still performs well with all movements operating at LOS B or better.

95 Avenue and North-South Alley

The results of the traffic analysis are provided in Table 5.22 and 5.23.

Table 5.22: 95 Avenue and the North-South Alley (AM Peak Hour)

Direction	Eastbound		Westbound		Northbound	
Movement	**T**	**R**	**L**	**T**	**L**	**R**
AM Peak Hour – 2050 Total – Unsignalized (NB Stop)						
Geometry	TR		LT		LR	
Volume (vph)	199	3	5	353	18	11
v/c			0.00		0.05	
Delay (s)			7.7		12	
LOS			A		B	
95th Queue (m)			0		1.0	
Intersection Delay:		**0.6**	Intersection LOS:		**A**	
AM Peak Hour – 2050 Total – Unsignalized (NB Stop)						
Geometry	TR		LT		LR	
Volume (vph)	209	3	5	354	21	18
v/c			0.01		0.1	
Delay (s)			7.7		11.8	
LOS			A		B	
95th Queue (m)			0.0		1.0	
Intersection Delay:		**0.8**	Intersection LOS:		**A**	

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Table 5.23: 95 Avenue and the North-South Alley (PM Peak Hour)

Direction	Eastbound		Westbound		Northbound	
Movement	**T**	**R**	**L**	**T**	**L**	**R**
PM Peak Hour – 2050 Total – Unsignalized (NB Stop)						
Geometry	TR		LT		LR	
Volume (vph)	248	17	10	390	8	7
v/c			0.01		0.03	
Delay (s)			7.9		12.2	
LOS			A		B	
95th Queue (m)			0		0.5	
Intersection Delay:		**0.4**	Intersection LOS:		**A**	
PM Peak Hour – 2050 Total – Unsignalized (NB Stop)						
Geometry	TR		LT		LR	
Volume (vph)	261	17	10	391	10	15
v/c			0.01		0.05	
Delay (s)			7.9		11.9	
LOS			A		B	
95th Queue (m)			0.0		0.5	
Intersection Delay:		**0.5**	Intersection LOS:		**A**	

This intersection performs similar to the original trip assignment assumptions with all movements operating at LOS B or better.

93 Avenue and Parkade Access

The results of the traffic analysis are provided in Table 5.24 and 5.25.

Table 5.24: 93 Avenue Parkade Access (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
AM Peak Hour – 2050 Background – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	6	61	10	33	28	26	60	0	43	34	0	41
v/c	0.00			0.02			0.14			0.09		
Delay (s)	7.4			7.5			10.2			9.9		
LOS	A			A			B			A		
95th Queue (m)	0.0			0.5			1.0			1.5		
Intersection Delay:						**6.2**				Intersection LOS:		**A**
AM Peak Hour – 2050 Total – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	12	62	10	33	28	53	60	0	43	68	0	83
v/c	0.01			0.01			0.1			0.19		
Delay (s)	7.4			7.4			11.0			10.7		
LOS	A			A			B			B		
95th Queue (m)	0.0			0.5			1.0			3.5		
Intersection Delay:						**6.9**				Intersection LOS:		**A**

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Table 5.25: 93 Avenue Parkade Access (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
PM Peak Hour – 2050 Background – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	11	127	20	48	44	45	29	0	32	18	0	20
v/c	0.01			0.03			0.09			0.05		
Delay (s)	7.4			7.6			10.7			10.4		
LOS	A			A			B			B		
95th Queue (m)	0.0			0.5			1.5			1.0		
Intersection Delay:						**3.8**				Intersection LOS:		**A**
PM Peak Hour – 2050 Total – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	23	127	20	48	44	89	29	0	32	35	0	38
v/c	0.02			0.03			0.1			0.11		
Delay (s)	7.6			7.6			11.2			11.1		
LOS	A			A			B			B		
95th Queue (m)	1.5			0.5			1.5			2.0		
Intersection Delay:						**4.2**				Intersection LOS:		**A**

The changes in traffic volumes for the rezoning did not significantly impact the performance of this intersection, compared to the previous trip assignment assumptions. The LOS is B or better for all turning movements.

95 Avenue and 79 Street

The results of the traffic analysis are provided in Table 5.26 and 5.27.

Table 5.26: 95 Avenue and 79 Street (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2050 Background - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	58	82	28	39	302	34	58	177	14	18	171	29
v/c	0.282			0.585			0.413			0.362		
Delay (s)	11.4			16.3			13.1			12.3		
LOS	B			C			B			B		
95th Queue (m)	5.5			19			10			8		
Intersection Delay:						**12.2**				Intersection LOS:		**B**
2050 Total - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	62	85	28	39	306	34	58	178	14	18	171	30
v/c	0.30			0.60			0.42			0.37		
Delay (s)	11.6			18.7			13.3			12.5		
LOS	B			B			C			B		
95th Queue (m)	6			19.5			10.0			8.5		
Intersection Delay:						**14.2**				Intersection LOS:		**B**

Draft

Table 5.27: 95 Avenue and 79 Street (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
2050 Background - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	137	131	82	29	340	41	109	333	27	49	136	61
v/c	0.83			0.95			1.05			0.62		
Delay (s)	39.1			55.3			90.8			24.8		
LOS	E			F			F			C		
95th Queue (m)	36			51			76			18.5		
Intersection Delay:						**57.7**				Intersection LOS:		**F**
2050 Total - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	144	134	82	29	346	41	109	333	27	49	142	64
v/c	0.89			1			1.10			0.66		
Delay (s)	45.0			62.9			101.7			27.3		
LOS	E			F			F			D		
95th Queue (m)	40.5			55			80.5			21		
Intersection Delay:						**64.1**				Intersection LOS:		**F**

This intersection with increased congestion compared to the 2018 TIA, due to increased 2050 horizon traffic volumes, where 95 Avenue volumes increased by approximately 40% at this intersection. Delay is not an issue in the AM peak but will exceed LOS E in the PM peak. Since traffic volumes on 95 Avenue and 79 Avenue are forecast to exceed the City's 5,000 vpd threshold by the 2050 horizon, mitigating options that reduce volumes could be considered, including potential traffic calming measures and/or improvements to other arterial roadways in the area, including 75 Street. Alternatively, intersection improvement options to reduce delay and improve traffic flow could be considered, including installing traffic signals or a roundabout. The following table provides a summary of the intersection improvements with the installation of a traffic signal and roundabout. Both improvement options are discussed further, following the results table. The detailed Sidra roundabout analysis report is in Appendix F.

Draft

Table 5.28: 95 Avenue and 79 Street (PM Peak Hour) – Traffic Signal and Roundabout

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
2050 Total – Traffic Signal (60 s cycle length)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	144	134	82	29	346	41	109	333	27	49	142	64
v/c	0.95			0.71			0.66			0.36		
Delay (s)	54.3			22.6			19.6			11.6		
LOS	D			C			B			B		
95th Queue (m)	#74.9			57.9			#85.2			31.8		
Intersection Delay:						**27.4**				Intersection LOS:		**C**
2050 Total – Roundabout												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	144	134	82	29	346	41	109	333	27	49	142	64
v/c	0.316			0.505			0.449			0.289		
Delay (s)	5.2			6.8			4.5			5.0		
LOS	A			A			A			A		
95th Queue (m)	29.5			14.8			22.8			13.5		
Intersection Delay:						**5.2**				Intersection LOS:		**A**

94 Avenue and 79 Street

Table 5.29: 94 Avenue and 79 Street (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
2050 Background - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	19	44	26	18	40	54	39	185	8	9	206	22
v/c	0.18			0.2			0.02			0.01		
Delay (s)	13.9			12.9			7.7			7.6		
LOS	B			B			A			A		
95th Queue (m)	3.0			3.5			0.5			0		
Intersection Delay:						**4.6**	Intersection LOS:					**A**
2050 Total - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	20	46	26	18	41	54	39	185	8	9	206	22
v/c	0.18			0.2			0.02			0.01		
Delay (s)	14.0			13.0			7.7			7.6		
LOS	B			B			A			A		
95th Queue (m)	3.5			3.5			0.5			0		
Intersection Delay:						**4.6**	Intersection LOS:					**A**

Table 5.30: 94 Avenue and 79 Street (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
2050 Background - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	22	33	10	11	68	33	21	419	13	18	206	12
v/c	0.20			0.3			0.29			0.02		
Delay (s)	18.6			18.0			7.7			8.2		
LOS	C			C			A			A		
95th Queue (m)	3.5			6.0			0			0		
Intersection Delay:						**4.1**	Intersection LOS:					**A**
2050 Total - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	22	35	10	11	71	33	21	419	13	18	206	12
v/c	0.20			0.30			0.02			0.02		
Delay (s)	18.8			18.3			7.7			8.2		
LOS	C			C			A			A		
95th Queue (m)	4.0			6.0			0			0		
Intersection Delay:						**4.2**	Intersection LOS:					**A**

Overall, the intersection operates at LOS B or better under background traffic conditions. With the additional development traffic added to this intersection, the LOS for all movements is C or better.

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95 Avenue and 83 Street

The results of the traffic analysis are provided in Table 5.31 and 5.32.

Table 5.31: 95 Avenue and 83 Street (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
AM Peak Hour – 2050 Background – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	5	170	35	20	318	5	35	15	35	5	10	5
v/c	0.00	0.00		0.01	0.01		0.16			0.04		
Delay (s)	0.0	0.2		0.1	0.6		13.1			13.3		
LOS	A	A		A	A		B			B		
95th Queue (m)	0.1	0.1		0.3	0.3		4.3			1.0		
Intersection Delay:						**2.5**					Intersection LOS:	**A**
AM Peak Hour – 2050 Total – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	9	175	43	25	318	5	36	17	37	5	12	5
v/c	0.1	0,01		0,02	0,02		0,18			0.05		
Delay (s)	0.1	0.4		0.2	0.7		13.6			13.8		
LOS	A	A		A	A		B			B		
95th Queue (m)	0.2	0.2		0.4	0.4		4.8			1.2		
Intersection Delay:						**2.7**					Intersection LOS:	**A**

Table 5.32: 95 Avenue and 83 Street (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
PM Peak Hour – 2050 Background – Unsignalized (N/S Yield)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	12	192	51	45	327	13	65	3	33	12	8	7
v/c	0.01	0.01		0.03	0.03		0.24			0.07		
Delay (s)	0.1	0.5		0.3	1.2		16.0			14.9		
LOS	A	A		A	A		C			B		
95th Queue (m)	0.2	0.2		0.8	0.8		6.9			1.7		
Intersection Delay:						**3.4**					Intersection LOS:	**A**
PM Peak Hour – 2050 Total – Unsignalized (N/S Yield)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	13	199	64	55	327	13	66	3	35	12	8	7
v/c	0.01	0,01		0,04	0,04		0,26			0,07		
Delay (s)	0.1	0.5		0,4	1,5		16.9			15.6		
LOS	A	A		A	A		C			C		
95th Queue (m)	0.2	0.2		1.0	1.0		7.6			1.8		
Intersection Delay:						**3.6**					Intersection LOS:	**A**

The intersection of 85 Street and 95 Avenue will function well in both scenarios.

93 Avenue and 83 Street

The results of the traffic analysis are provided in Table 5.33 and 5.34.

Draft

Table 5.33: 93 Avenue and 83 Street (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
AM Peak Hour – 2050 Background – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	27	73	43	12	26	15	14	10	8	20	8	42
v/c	0.17			0.07			0.01	0.01		0.01	0.01	
Delay (s)	10.2			9.9			0.1	3.2		0.1	2.1	
LOS	B			A			A	A		A	A	
95th Queue (m)	4.7			1.6			0.2	0.2		0.3	0.3	
Intersection Delay:						**7.5**	Intersection LOS:					**A**
AM Peak Hour – 2050 Total – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	31	76	70	12	27	15	34	10	8	20	8	58
v/c	0.21			0.07			0.02	0.02		0.01	0.01	
Delay (s)	10.5			10.2			0.1	4.3		0.1	1.8	
LOS	B			B								
95th Queue (m)	6.1			1.8								
Intersection Delay:						**7.6**	Intersection LOS:					**A**

Table 5.34: 93 Avenue and 83 Street (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
PM Peak Hour – 2050 Background – Unsignalized (N/S Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	26	120	18	8	35	25	30	34	25	25	8	70
v/c	0.24			0.09			0.02	0.02		0.02	0.02	
Delay (s)	11.9			10.4			0.2	2.6		0.1	1.9	
LOS	B			B			A	A		A	A	
95th Queue (m)	7.1			2.3			0.5	0.5		0.4	0.4	
Intersection Delay:						**7.3**	Intersection LOS:					**A**
PM Peak Hour – 2050 Total – Unsignalized (E/W Yield)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	29	122	30	8	38	25	49	34	25	25	8	93
v/c	0.28			0.11			0.03	0.03		0.03	0.03	
Delay (s)	12.7			11.0			0.3	3.5		0,1	1.6	
LOS	B			B			A	A		A	A	
95th Queue (m)	8.6			2.7			0.8	0.8		0.4	0.4	
Intersection Delay:						**7.5**	Intersection LOS:					**A**

The intersection of 85 Street and 93 Avenue will function well in both scenarios.

Draft

6.0 Other Considerations

6.1 Reduced Neighbourhood Speeds

In June 2020, The City Council passed Bylaw 19282, which under the Alberta Traffic Safety Act, indicates the City's wish to implement a city-wide default residential speed limit of 40 km/h. This applies to all roadways within the Holyrood neighbourhood, except for designated playground zones that have a speed limit of 30 km/h. The change effectively means that 40 km/h speeds will be enforced compared to the current default of 50 km/h. Lower speeds will improve overall traffic safety in the neighbourhood by reducing vehicle stopping distance, providing additional time for drivers to observe other road users (cyclists, pedestrians, vehicles etc.) and reducing collision severity in the event of a collision. Reduced speeds will also function as a supporting mitigating measure for reducing the noise impacts of increased traffic volumes in the neighbourhood.

6.2 Bus Network Redesign

Since the 2018 TIA has been completed, the City has finalized changes to the bus network that are worth noting. The bus network redesign provides local and community transit routes within the Holyrood neighbourhood. Local bus routes are defined as those connecting seniors' residences with nearby services and a local bus route is planned on 93 Avenue/94 Avenue between 79 Street and 85 Street. A community route is defined as the one connecting neighbourhoods to local destinations and other transit routes, and a neighbourhood route is planned on 90 Avenue, 95 Avenue and 79 Street. These bus connections will complement the Valley Line LRT system that has a stop located at the intersection of 93 Avenue and 85 Street. The bus network redesign is illustrated in the below figure.

Draft

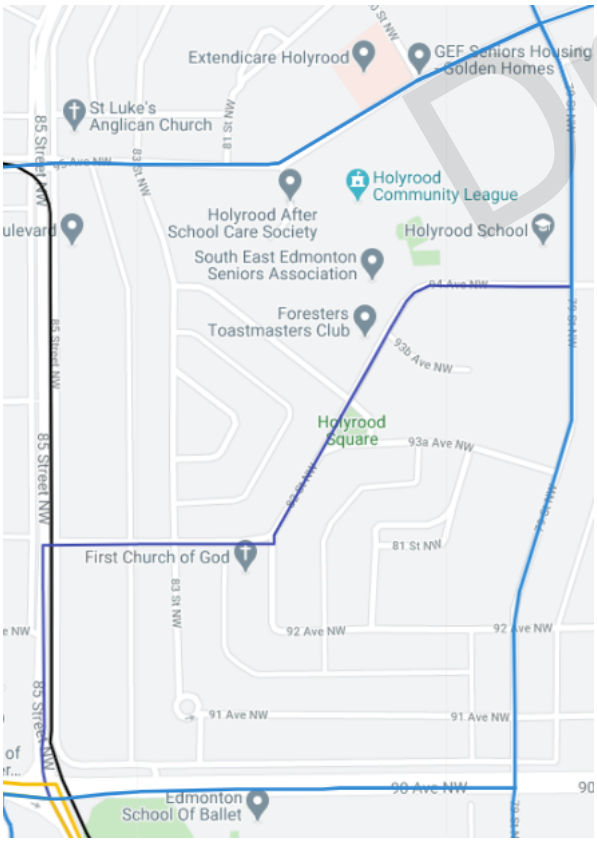

Figure 6.1: Bus Network Redesign

6.3 City Plan

In September 2020, the City passed second reading of the new “City Plan” which sets the strategic direction for the way Edmonton grows its land use, mobility systems, open spaces, employment and social networks, generally touching on most aspects of life in Edmonton. The City Plan is a combined transportation and land use plan, replacing the current Municipal Development Plan and Transportation Master Plan as a combined document. Although no changes to the assumed 38% transit and active transportation mode share are required in this TIA, the report notes the City Plan target is that 50% of trips are taken by transit and active transportation modes by a City population of 2 million. The report notes that this can be done by increasing funding for transit expansion, integrating transit with land use, and implementing strategic transit pricing mechanisms.

Currently, 25% of residents in the Holyrood neighbourhood travel by active transportation modes based on the 2016 City municipal census, and this is expected to increase with opening of Holyrood LRT station. For comparison, other neighbourhoods with LRT stations, including Blue Quill (Century Park), Ermineskin (Century Park) and Malmo Plains (Southgate) have a 32 – 33 % active transportation mode share. The Holyrood Gardens site has an assumed mode share of 38%, which is reasonable as it has direct access to the Holyrood LRT station.

Over time, as the City implements additional measures targeted towards a greater active transportation mode share by implementing measures that make transit and active transportation the first choice of mode for more residents, there is an expected reduction in traffic volumes. The Holyrood Gardens development is ideally planned for integrating land use with transit and aligns with the City Plan to achieve a 50% active transportation mode share.

6.4 Bike Network

The City is currently updating the bike network plan, and the draft plan shows an existing connector bike route on 79 Street and a future neighbourhood bike route on 95 Avenue and 85 Street. This is illustrated in the figure below.

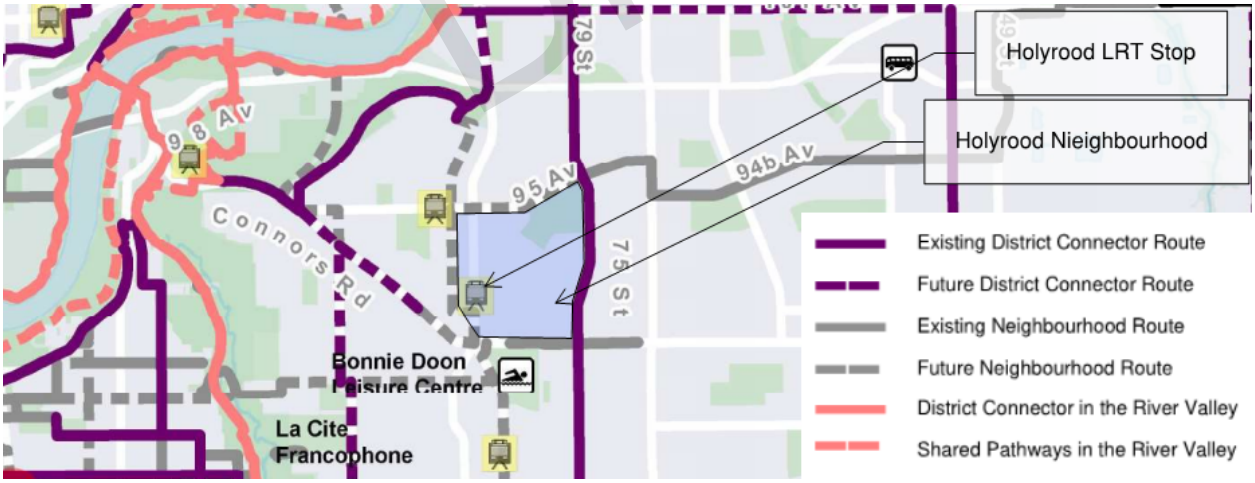

Figure 6.1: 2020 Bike Network Map (Draft)

To promote the use of bicycles as a primary mode of transportation, the rezoning includes the following policies that will be enforced and applied to the development of the Holyrood Gardens buildings:

- **Holyrood Gardens DC2 (6.3.e.):** 50% of the Bicycle Parking spaces on Site shall be provided in a safe and secure location in the Underground Parkade and/or in another secure location on the first Storey of the building that is easily accessible to cyclists via access ramps or a route through the building which facilitates easy and efficient transportation of bicycles, to the satisfaction of the Development Officer.

To further promote cycling, it is recommended that 93 Avenue be designated as a cycling route, providing more convenient and direct access between residents in the Holyrood neighbourhood and the Holyrood LRT station. Providing this connection is recommended between the LRT station and 79 Street and will improve overall connectivity in the network. It also provides cyclists an alternate connection between 79 Street and the LRT station, allowing them to avoid congested arterial corridors on 90 Avenue and 85 Street. The type of cycling corridor needed is at the discretion of the City as they are currently updating their plans.

6.5 Site Plan Features

Pedestrian Connectivity

The site design includes a transit plaza with wide sidewalks along 93 Avenue and includes additional connections for pedestrians connecting between the neighbourhood and 85 Street, including:

- Two 3.0 m connections provided as wide public shared use paths;
- Three 1.5 m connections provided as public walkways. One of the three 1.5 m walkways around the centre of the development splits into two paths, providing two separate accesses points to the north/south alley.

These connections are available for public use, connecting to/from a public walkway that wraps around the site. These connections improve pedestrian connectivity in the area as there are currently no other existing public connections through the subject site, between 85 Street and the neighbourhood, other than at 93 Avenue. Adding these connections provides more direct and convenient access through the Holyrood Gardens site and removes this site as a barrier for active transportation, compared to other similar sites that often have perimeter fences, which eliminate through access.

Draft

Parking

The proposed rezoning includes updating the parking requirements to match the City's recently passed parking bylaw changes, which allows the proponent to decide the amount of parking needed, up to the maximums allowed for transit-oriented developments, as follows:

- Maximum 1 vehicle parking spaces per studio dwelling;
- Maximum 1 vehicle parking spaces per 1 bedroom dwelling or residential-related unit;
- Maximum 1.5 vehicle parking spaces per 2 bedroom dwelling; and
- Maximum 1.75 vehicle parking spaces per 3 or more bedroom dwelling or multi-unit housing in the form of row housing.

It should be noted the site zoning stipulates that other than visitor parking and loading spaces located in the rear alley, all parking will be located underground.

93 Avenue Access Ramps and Pedestrian Realm

The site plan ensures the ramps to the underground parking garages are designed to limit impacts on the pedestrian realm as follows:

Holyrood Gardens DC2 (6.3.d.): The slope for vehicular access ramps to the underground Parking Garages from 93 Avenue NW shall not start for a minimum distance of 10.0 m from the Lot line abutting 93 Avenue NW, with the first 7.0 m of this distance having unobstructed views of the pedestrian Walkways.

The setback benefits pedestrians by making them more visible to drivers exiting the ramps.

Crime Prevention Through Environment Design

The site plan promotes positive environmental design elements that improve natural crime prevention, and this is as follows.

Holyrood Gardens DC2 (8.3): Site and building layouts shall include design elements that take the principles of Crime Prevention Through Environmental Design (CPTED) into consideration, particularly for commercial, industrial, multi-unit residential Uses and Vehicle Parking Uses. These elements may include but are not limited to: elements that allow for natural surveillance, increase sightlines and activity; and high-quality interior and exterior lighting. The physical layout and landscaping shall reduce the vulnerability of pedestrians by avoiding areas of concealment or entrapment such as: long public corridor spaces, stairwells, or other movement predictors); avoiding landscaping hazards such as: unpruned trees, rocks that can be thrown, or blind corners; and by locating Vehicle Parking areas close to building access points and by using wayfinding mechanisms. The development officer may require a Crime Prevention Through Environmental Design assessment prepared by a qualified security consultant, or similar professional, and may apply conditions to the approval of the Development Permit based on the recommendations of the CPTED.

6.6 Other

Through the previous zoning, the City council motioned the following:

- That administration analyze options for enhancing public realm and pedestrian safety near the site located at 8310 and 8311 - 93 Avenue NW using features such as parklets/woonerfs on 93 Avenue NW (between 83 Street NW and the Lane between 83 Street NW and 85 Street NW) only until it can be assessed at time of second Traffic Impact Assessment required by the DC2 Provision or the Community Traffic Management Plan process.

As a suggestion to the City administration for addressing the motion, several options could be considered that enhance the public realm, understanding that decisions for enhancing the public realm are at the discretion of the City and/or in collaboration with stakeholders and residents in the Holyrood community. These are as follows:

- Street and corridor lighting to improve visibility between pedestrians and other modes of transportation.
- Traffic calming measures that reduce vehicle speed through the area and positively improve the public realm including reducing stopping sight distance for vehicles, improving visibility between pedestrian and vehicles and reducing vehicle speed.
- Gateway features that promote messaging to drivers that they are entering a residential neighbourhood.
- Streetscaping features that promote the pedestrian aspects of the area, including landscaping, trees, shrubs, benches, parklets and others.

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7.0 Conclusions and Recommendations

7.1 Study Synopsis

This TIA memo was completed to assess the traffic impacts for the proposed rezoning of the Holyrood Gardens DC2, increasing the number of dwelling units from 1,200 to 1,650.

The 2018 TIA for the current zoning used the forecast traffic demand from the 2047 traffic model, but since this TIA was complete, the City has updated their traffic model and created a 2050 model. This TIA updates the 2050 traffic model volumes to the 2047 population for the Holyrood neighbourhood (11% increase) and applies the trips generated, traffic routes and patterns for the Holyrood Gardens site as per the 2050 model, based on the site plan access/egress points. The transportation assessment includes review of daily volume and intersection operational analysis and surrounding roadway congestion with and without the impacts of additional traffic volumes generated due to the proposed rezoning. In addition, several City plans ongoing or completed since the 2018 TIA was complete are discussed along with site plan features that align with the City plans.

7.2 Conclusions

The following conclusions are made based on this study:

- There are minimal impacts from traffic volumes generated due to the development of the Holyrood Gardens site, with the current zoning and proposed zoning to increase the number of dwelling units from 1,200 to 1,650.
- The daily traffic volumes on Holyrood neighbourhood collectors are summarized in Table 5.1 for the existing, future background (without Holyrood Gardens) and future total (with Holyrood Gardens) scenarios. Other than 79 Street and 95 Avenue, all roadways are below or well below the 5,000 vehicles per threshold for collectors. Daily traffic volumes on 79 Street and 95 Avenue are above the 5,000 vehicle per day threshold, however the proportion of daily volumes which are due to the Holyrood Gardens site is small and without the Holyrood Gardens traffic, the volumes are still above the threshold. Higher daily traffic volumes on 79 Street and 95 Avenue may be due to congestion on the surrounding roadway network, which is causing more traffic to use roadways within the Holyrood neighbourhood.
- Intersection operations on the surrounding road network is studied in Section 5.4. The outcome of intersection analysis is that future improvements are needed at the intersection of 95 Avenue and 79 Street and at the intersection of 90 Avenue and 79 Street, with and without traffic generated due to the Holyrood Gardens. As with previous TIAs, intersections along 85 Street operate with high levels of congestion, due to the LRT signaling requirements. Adding the Holyrood Gardens development traffic results in a small increase in the already congested 85 Street corridor.
- The current transit and active transportation mode share within the Holyrood neighbourhood is 25%, based on the 2016 neighbourhood profiles in the municipal census and this is expected to increase with opening of the Holyrood LRT station. For comparison, other neighbourhoods with LRT stations, including Blue Quill (Century Park), Ermineskin (Century Park) and Malmo Plains (Southgate) have a 32 – 33 % transit and active transportation mode share. The Holyrood Gardens site has an assumed mode share of 38%, which is reasonable as it has direct access to the Holyrood LRT station.
- The new City Plan, which passed second reading in September 2020, sets the strategic direction for the way Edmonton grows its land use, mobility systems, open spaces, employment and social networks, generally touching on most aspects of life in Edmonton. The City Plan targets a transit and active transportation mode share of 50% by a population of 2 million, through increased funding for transit and integration of transit with land use. Over time, as the City implements additional measures targeted towards a greater transit and active transportation mode share by implementing measures that make transit and active transportation the first choice

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of mode for more residents, this is expected to result in reduced traffic volumes. The Holyrood Gardens development is ideally planned for integrating land use with transit and aligns with the City Plan to achieve a 50% active transportation mode share.

- To further promote active transportation, the Holyrood Gardens DC2 zoning includes a policy that stipulates that 50% of bike parking will be provided as secure, indoor bicycle parking. This will encourage more residents to adopt travel by bicycle as their first choice of transportation model. In addition, the City is updating their bike network and the draft plan includes 85 Street, 90 Avenue, 95 Avenue and 79 Street as part of the bike network. Through review of the plan, it is suggested an additional link be considered by the City, which connects between the Holyrood LRT station and 79 Street, along 93 Avenue.
- Traffic on Holyrood neighbourhood roads will be subject to the new reduced speed limit (40 km/h) that is being implemented in 2021. The change effectively means that 40 km/h speeds will be enforced compared to the current default of 50 km/h. Lower speeds will improve overall traffic safety in the neighbourhood by reducing vehicle stopping distance, providing additional time for drivers to observe other road users (cyclists, pedestrians, vehicles etc.) and reducing collision severity in the event of a collision. Reduced speeds will also function as a supporting mitigating measure for reducing the noise impacts of increased traffic volumes in the neighbourhood.
- Other features of the site plan that promote accessibility and align with active transportation plans, include plans for five walkways connecting through the development. Adding these connections provides more direct and convenient access through the Holyrood Gardens site and removes this site as a barrier for active transportation, compared to other similar sites that often have perimeter fences, which eliminate through access. In addition, the access ramps to the underground parkades will be set back a minimum of 10 m from 93 Avenue, as to not interfere with the 93 Avenue public realm.

7.3 Recommendations

The recommendations from the 2018 TIA that are moved forward and apply to this additional analysis scenario are as follows:

- A cross-walk should be considered for the west side of the 93 Avenue/north-south alley intersection with a more direct tie-in between the on-site north-south walkways and the southwest and northwest corners of this intersection.
- The full north-south alley right-of-way width should be paved between the east-west drive aisle and 95 Avenue (adjacent to Area 1) to provide additional passing opportunities. Where existing grades and utilities make it challenging to widen the pavement to the full right-of-way width, a passing layby could be developed by widening into Area 1.
- Three travel lanes should be provided along 93 Avenue between 85 Street and the alley. If on-street parking is desired through this section, laybys could be constructed.
- No parking signs should be installed along the remaining portion of the 85 Street East service road between the south parkade access and the 90 Avenue right in/right out access.

The following recommendations are provided in addition to those provided in the 2018 TIA.

- Improvements are required at the intersection of 95 Avenue and 79 Street at the 2050 horizon. It is recommended that the City conducts regular monitoring of this intersection and updates the analysis as needed. The results of this study indicated that a traffic signal or a roundabout will improve traffic flow at this intersection. At the time that improvements are triggered, the type of improvement needed (traffic signal or roundabout) should be confirmed, including assessing the comparable operational improvements, safety benefits, land requirements, costs and other factors deemed necessary along with stakeholder and public input.
- A future southbound left turn phase is needed at 79 Street and 90 Avenue.

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- The City should consider adding 93 Avenue between the Holyrood LRT station and 79 Street to the bike network plans that are currently underway.

7.4 Areas of Further Study

At this time, the City should consider monitoring the volumes on 95 Avenue and 79 Street to determine which type of mitigation measure is needed, including parking restrictions and access control to enhance traffic flow and accommodate the higher volumes or traffic calming measures to calm traffic flow and reduce volumes to below their thresholds. Any mitigation measures should be determined in consultation with the community. A tertiary measure may be that the surrounding roadway network is improved to reduce congestion and promote flow roadways outside of the neighbourhood, including on 90 Avenue, 85 Street, 75 Street and 98 Avenue. Another measure is that new or improved active transportation facilities, including additional transit routes and bike lanes are provided as a means of providing an alternative mode of transportation and reducing traffic in the neighbourhood.

As a suggestion to the City administration for addressing the motion for enhancing the public realm (discussed in Section 6.6), several options could be considered, understanding that decisions for enhancing the public realm are at the discretion of the City and/or in collaboration with stakeholders and residents in the Holyrood community. These are as follows:

- Street and corridor lighting to improve visibility between pedestrians and other modes of transportation.
- Traffic calming measures that reduce vehicle speed through the area and positively improve the public realm including reducing stopping sight distance for vehicles, improving visibility between pedestrian and vehicles and reducing vehicle speed.
- Gateway features that promote messaging to drivers that they are entering a residential neighbourhood.
- Streetscaping features that promote the pedestrian aspects of the area, including landscaping, trees, shrubs, benches, parklets and others.

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Appendix A – AM and PM Design Volumes

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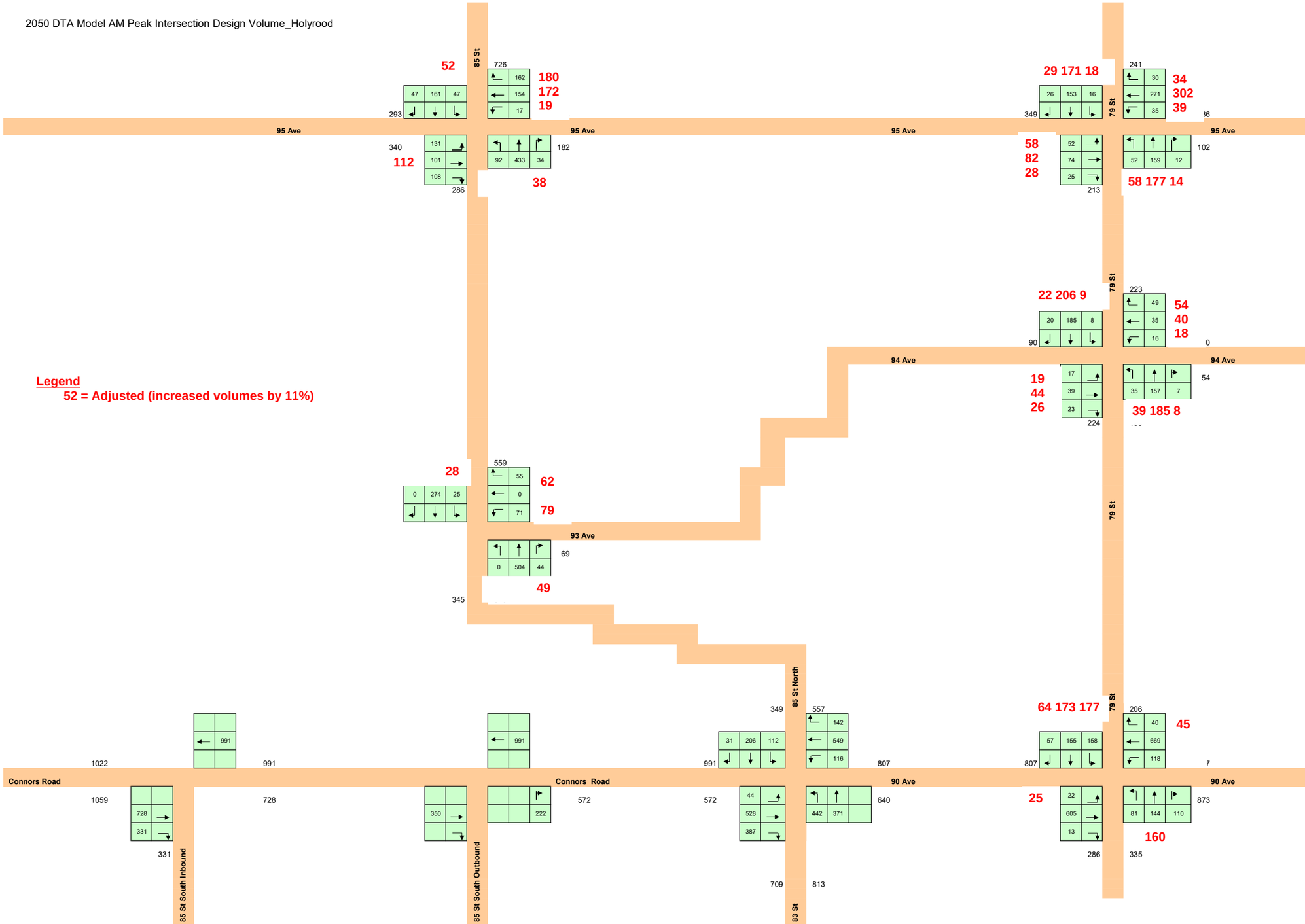
2050 DTA Model AM Peak Intersection Design Volume_Holyrood



Legend

52 = Adjusted (increased volumes by 11%)

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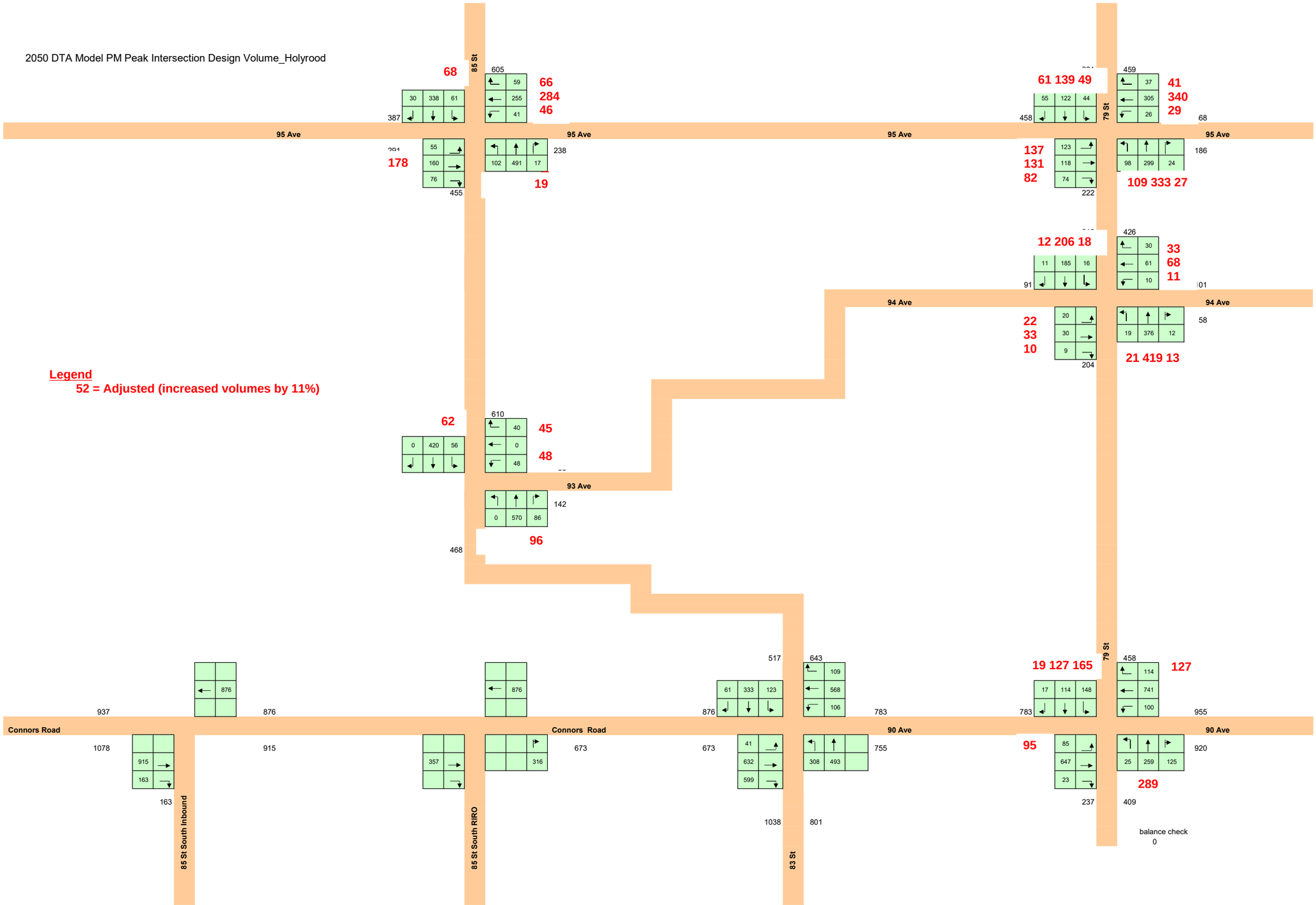
2050 DTA Model PM Peak Intersection Design Volume_Holyrood



Legend

52 = Adjusted (increased volumes by 11%)

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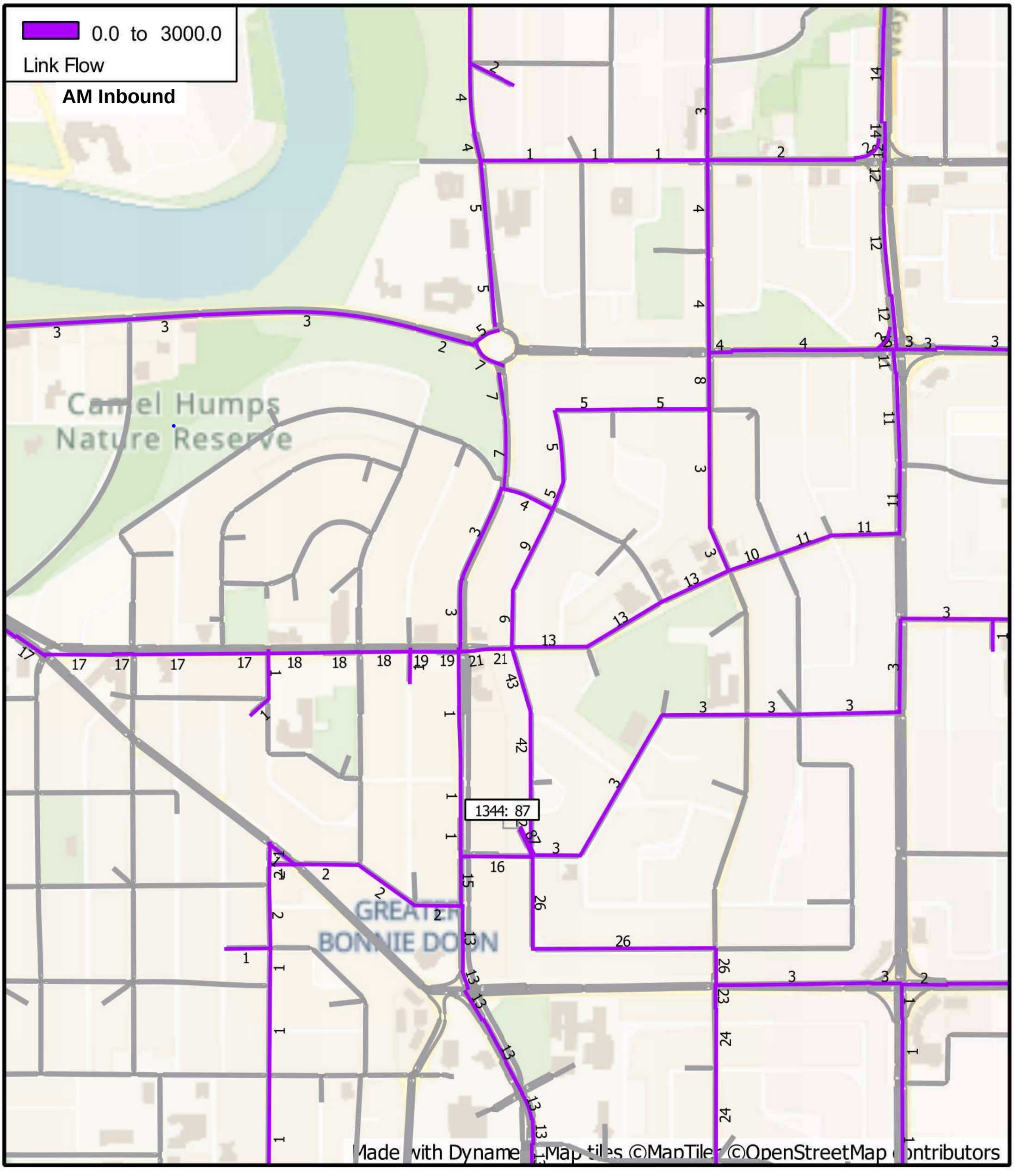
Appendix B – Select Link Analysis

2050 DTA AM Model Select Link Analysis_Zone1344_IBD



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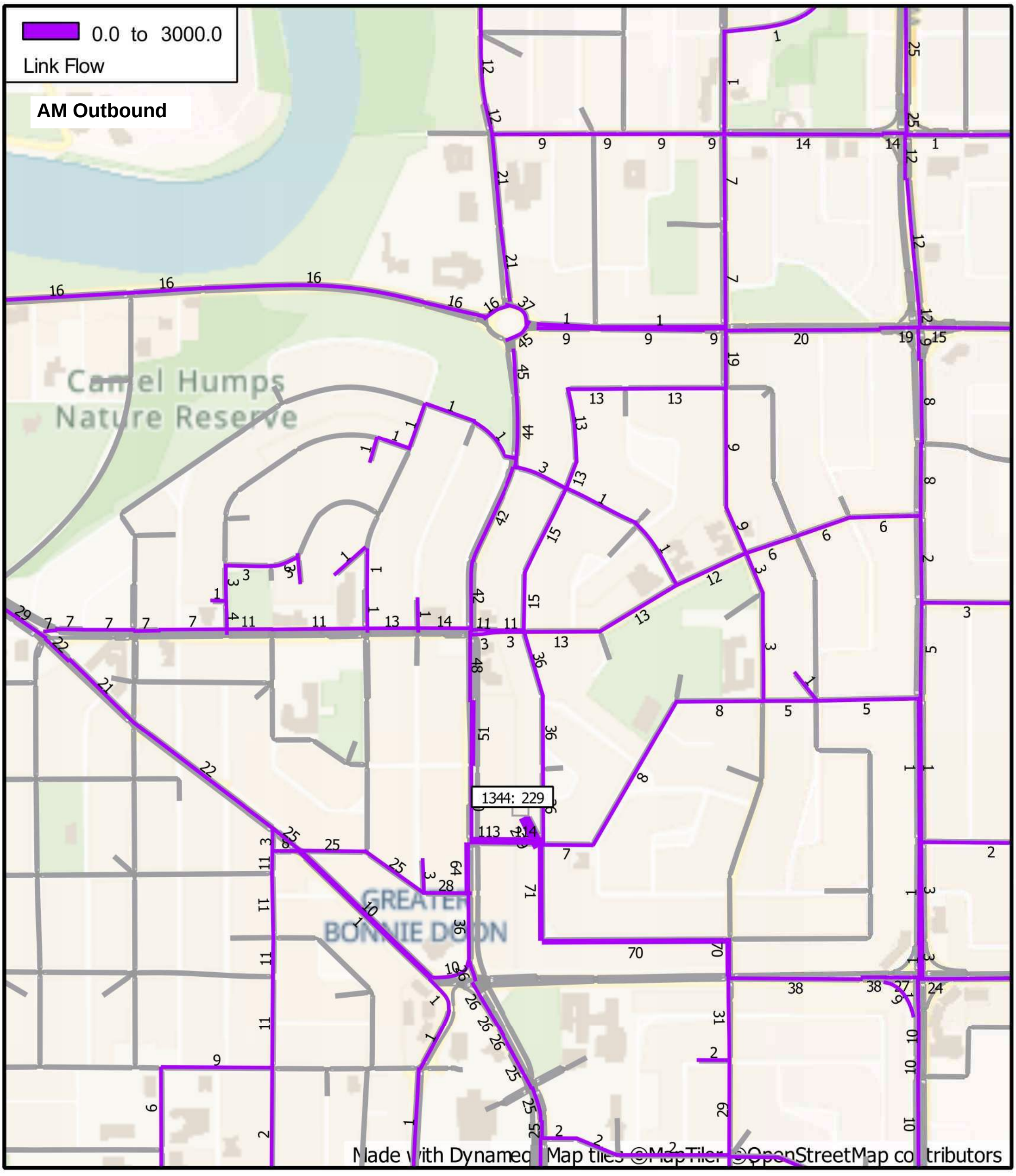
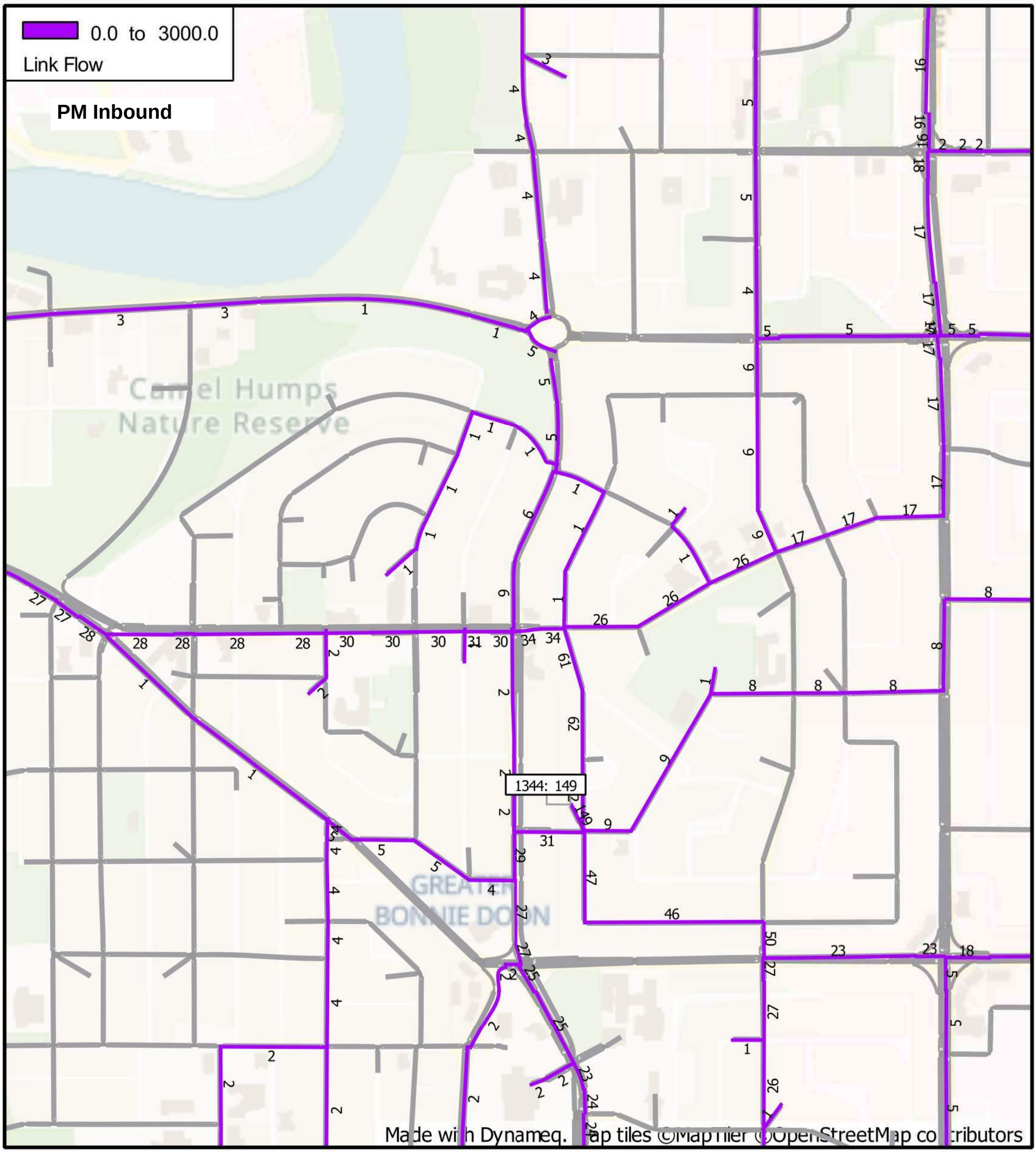

0.0 to 3000.0
Link Flow
AM Outbound
Camel Humps
Nature Reserve
1344: 229
Made with Dynameq | Map tiles ©MapTiler ©OpenStreetMap contributors

2050 DTA PM Model Select Link Analysis_Zone1344_IBD



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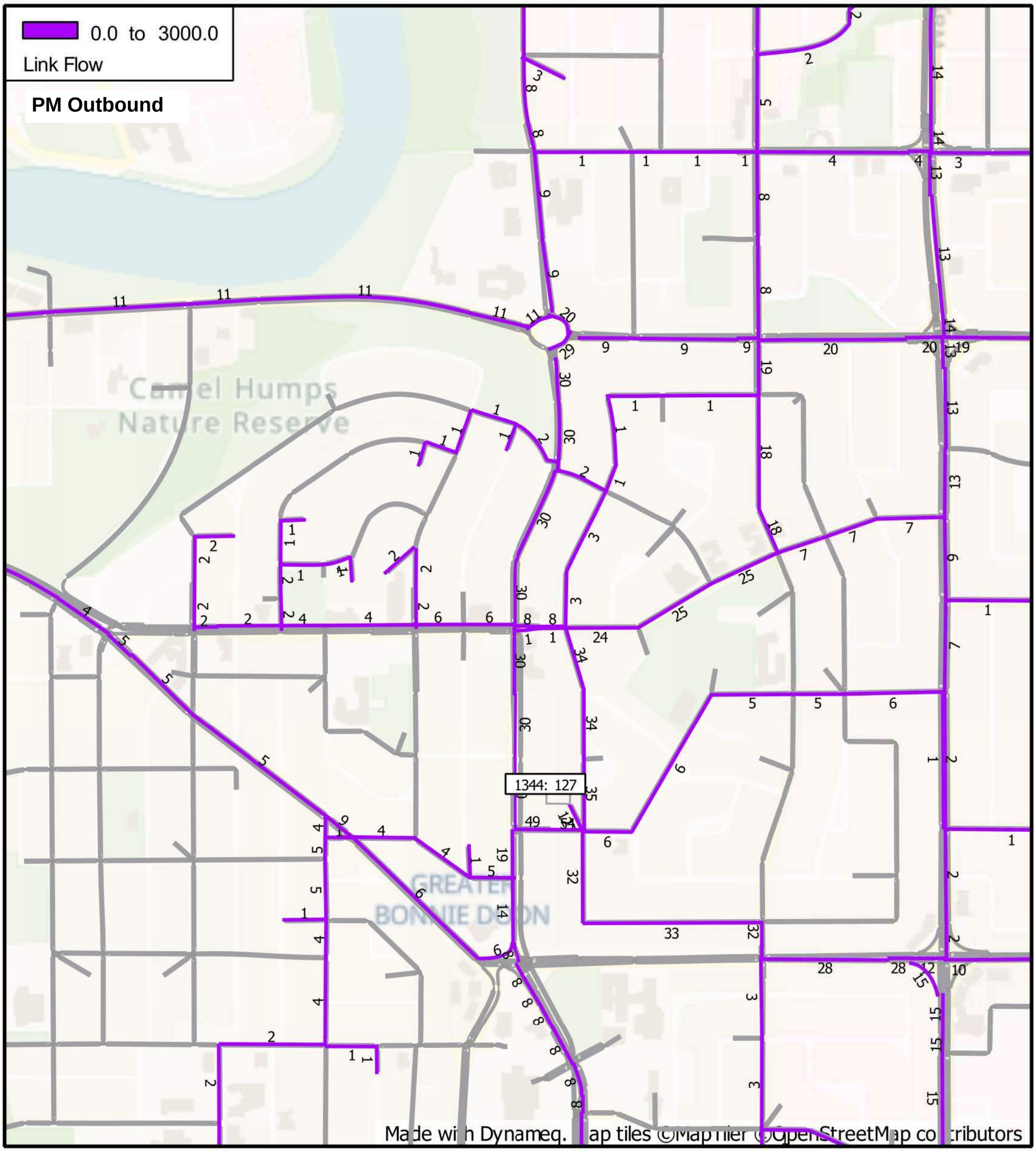
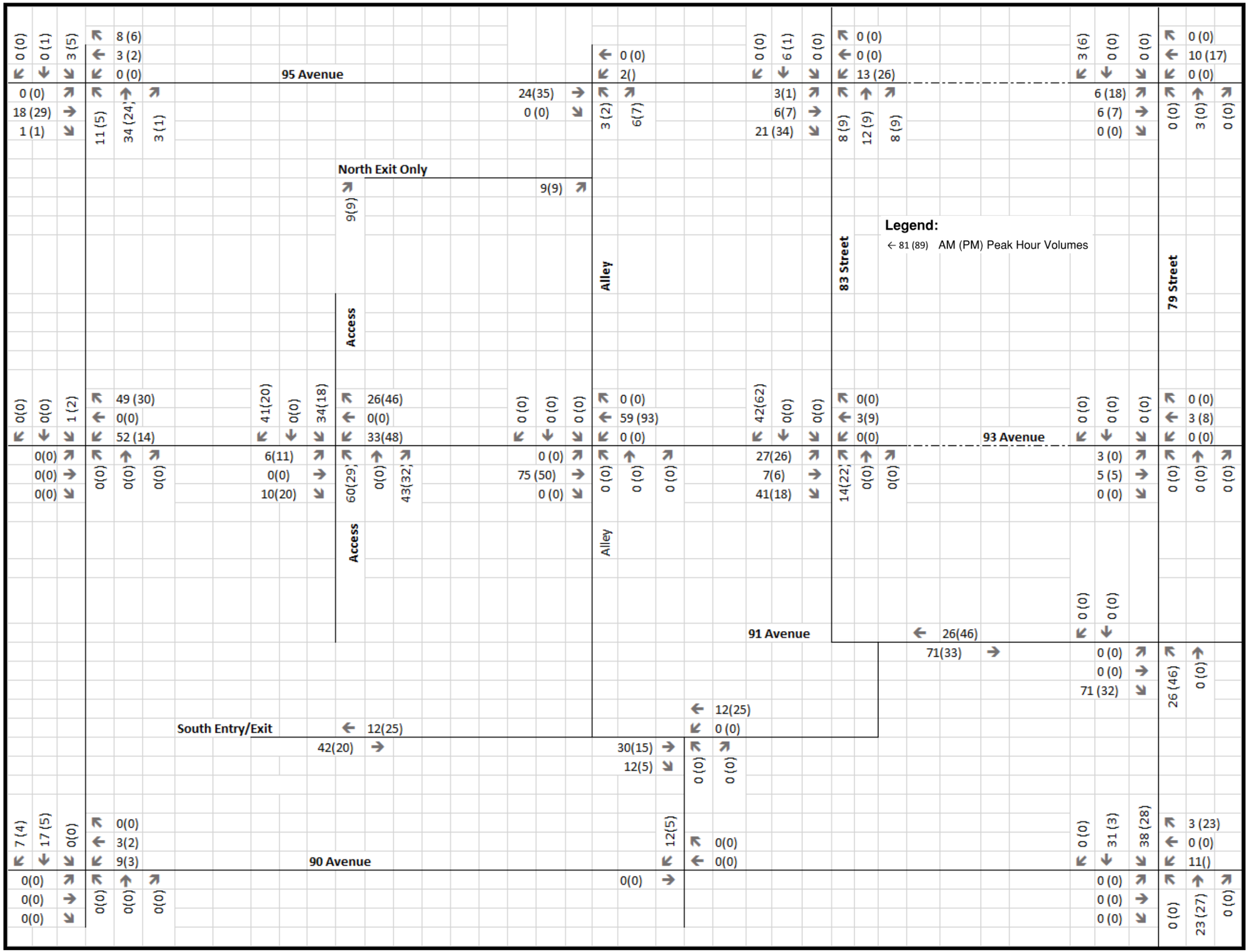

0.0 to 3000.0
Link Flow
PM Outbound
Camel Humps
Nature Reserve
GREATER
BONNIE DOON
1344: 127
Made with Dynameq. Map tiles ©MapTiler ©OpenStreetMap contributors

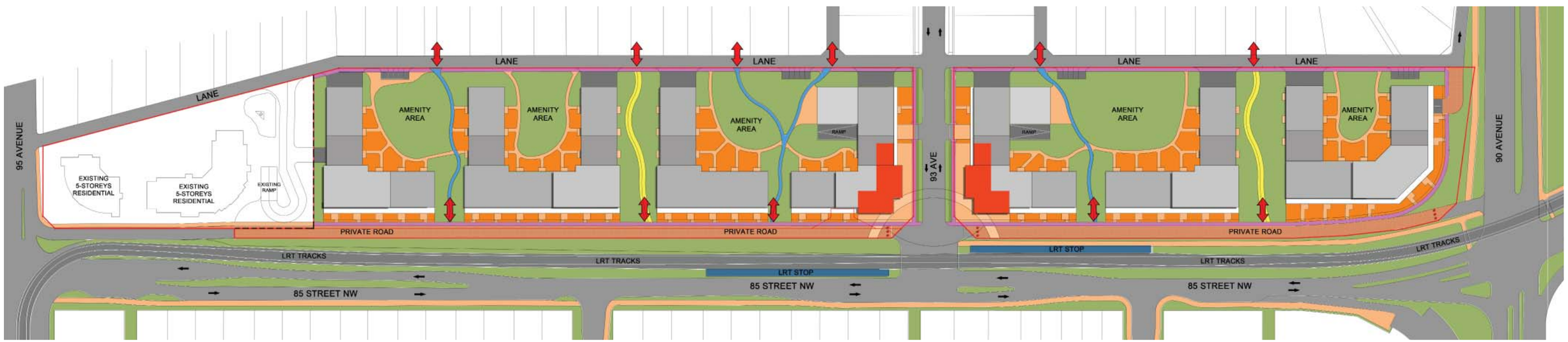


Select Zone Analysis Applied to Site Accesses

Appendix C – Site Plan and 2018 TIA Operational Analysis Results

LEGEND

- RETAIL
- INTERNAL PUBLIC WALKWAY (MIN 1.5M)
- EXTERIOR PUBLIC WALKWAY (MIN 1.8M)
- PRIVATE YARD SPACE FOR GROUND UNITS
- PUBLIC SHARED USE PATHWAY (MIN 3.0M)
- THRU ACCESS FOR COMMUNITY



ISL Engineering and Land Services

Exhibit 5.1 - Walkways

May, 2018

Table 5.2: 90 Avenue and 79 Street (AM Peak)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
2047 Background Actuated (75s cycle)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	30	460	30	90	1075	60	60	90	80	80	160	90
v/c	0.27			0.63			0.41	0.47		0.38	0.71	
Delay (s)	1.1			10.1			33.3	20.6		30.0	34.7	
LOS	A			B			C	C		C	C	
95th Queue (m)	m0			77			17	28		20	47	
Intersection Delay: **12.8**										Intersection LOS: **B**		
2047 Total – Actuated (75s cycle) – Original Trip Assignment												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	30	471	30	90	1083	68	60	91	80	111	161	90
v/c	0.28			0.64			0.41	0.47		0.53	0.71	
Delay (s)	1.3			10.3			33.3	20.8		35.4	34.8	
LOS	A			B			C	C		D	C	
95” Queue (m)	m0			79			17	28		27	47	
Intersection Delay: **13.4**										Intersection LOS: **B**		
2047 Total – Actuated (75s cycle) – Revised Trip Assignment												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	30	471	30	90	1081	76	60	92	80	118	162	90
v/c	0.28			0.64			0.41	0.48		0.57	0.72	
Delay (s)	1.4			10.4			33.4	21.0		38.9	34.9	
LOS	A			B			C	C		D	C	
95” Queue (m)	m0			79			17	28		30	47	
Intersection Delay: **13.6**										Intersection LOS: **B**		

Table 5.3: 90 Avenue and 79 Street (PM Peak)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
2047 Background Actuated (75s cycle)												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	95	805	40	45	840	115	35	175	65	80	65	35
v/c	0.55			0.51			0.15	0.70		0.52	0.29	
Delay (s)	21.9			8.2			24.4	35.4		38	18.5	
LOS	C			A			C	D		D	B	
95th Queue (m)	m51			54			10	46		21	18	
Intersection Delay: **18.0**										Intersection LOS: **B**		
2047 Total – Actuated (75s cycle) – Original Trip Assignment												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	95	812	40	45	873	133	36	176	65	98	66	35
v/c	0.57			0.54			0.15	0.70		0.64	0.29	
Delay (s)	22.3			8.5			24.4	35.5		45.7	18.5	
LOS	C			A			C	D		D	B	
95” Queue (m)	m51			58			11	46		26	18	
Intersection Delay: **18.5**										Intersection LOS: **B**		
2047 Total – Actuated (75s cycle) – Revised Trip Assignment												
Geometry	LT/TR			LT/TR			L/TR			L/TR		
Volume (vph)	95	812	40	45	863	145	36	178	65	103	67	35
v/c	0.57			0.54			0.15	0.70		0.67	0.29	
Delay (s)	22.3			8.5			24.4	35.7		48.4	18.6	
LOS	C			A			C	D		D	B	
95” Queue (m)	m51			58			11	47		27	18	
Intersection Delay: **18.7**										Intersection LOS: **B**		

As shown in the tables, the intersection performance with the revised trip assignment is insignificantly changed, as the updated trip assignment did not significantly changes the traffic volumes at this intersection. Overall, the intersection performs well under both traffic scenarios.

5.3.4 Connors Road and 85 Street

The results of the traffic analysis are provided in Table 5.4 and 5.5.

Table 5.4: Connors Road and 85 Street (AM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**
2047 Background – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	30	470	300	80	830	330	400	183	50	374	180
v/c	0.14	1.06	0.18	0.20	1.05	0.99	1.08	0.36	0.64	0.89	0.39
Delay (s)	54.9	118.4	0.2	40.0	90.6	89.6	130.9	44.8	90.2	70.8	12.9
LOS	D	F	A	D	F	F	F	D	F	E	B
95th Queue	24	#148	0	m42	#228	#212	#99	66	#46	#167	39
Intersection Delay: **80.3**								Intersection LOS: **F**			
2047 Total – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R) – Original Trip											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	34	470	300	97	835	335	400	199	61	419	193
v/c	0.15	1.06	0.18	0.25	1.06	1.00	1.08	0.40	0.78	0.99	0.42
Delay (s)	55.3	118.4	0.2	40.8	92.5	93.3	130.9	45.6	115.7	89.1	12.0
LOS	E	F	A	D	F	F	F	D	F	F	B
95” Queue (m)	26	#148	0	m51	#231	#218	#99	72	#59	#198	32
Intersection Delay: **83.2**								Intersection LOS: **F**			
2047 Total – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R) – Revised Trip											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	32	470	300	97	835	335	400	192	61	398	187
v/c	0.14	1.06	0.18	0.25	1.06	1.00	1.08	0.38	0.78	0.94	0.41
Delay (s)	55.1	118.4	0.2	40.8	92.5	93.3	130.9	45.3	113.6	79.1	11.8
LOS	E	F	A	D	F	F	F	D	F	E	B
95” Queue (m)	25	#148	0	m51	#231	#218	#99	69	#59	#184	35
Intersection Delay: **82.1**								Intersection LOS: **F**			

Table 5.5: Connors Road and 85 Street (PM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**
2047 Background – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R)											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	10	860	350	50	720	140	100	596	80	278	20
v/c	0.03	1.32	0.20	0.18	1.28	0.59	0.54	1.11	1.33	0.53	0.04
Delay (s)	43.1	199.1	0.3	44.4	180.2	56.6	80.5	119.5	266.5	46.2	2.0
LOS	D	F	A	D	F	E	F	F	F	D	A
95th Queue (m)	10	#272	0	27	#228	69	25	#275	#87	111	2
Intersection Delay: **132.7**								Intersection LOS: **F**			
2047 Total – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R) – Original Trip											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	24	860	350	59	722	143	100	651	87	301	26
v/c	0.07	1.32	0.20	0.21	1.28	0.60	0.54	1.21	1.45	0.57	0.05
Delay (s)	44.0	199.1	0.3	45.5	181.6	57.6	80.5	155.6	307.8	47.4	2.7
LOS	D	F	A	D	F	E	F	F	F	D	A
95” Queue (m)	18	#272	0	31	#229	73	25	#310	#93	121	4
Intersection Delay: **139.9**								Intersection LOS: **F**			
2047 Total – Pre-timed (150s cycle, NB & SB Prot L, E/W Split Phasing, Free EB R) – Revised Trip											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	20	860	350	59	722	143	100	634	87	291	23
v/c	0.06	1.32	0.20	0.21	1.28	0.60	0.54	1.18	1.45	0.55	0.05
Delay (s)	43.7	199.1	0.3	45.5	181.6	57.6	80.5	143.9	308.1	47.0	2.4
LOS	D	F	A	D	F	E	F	F	F	D	A
95” Queue (m)	16	#272	0	31	#229	73	25	#299	#94	117	3
Intersection Delay: **138.1**								Intersection LOS: **F**			

The revised trip assignment reduces the volumes slightly at this intersection, resulting in a small reduction in intersection delays. As with the previous TIA results, this intersection operates under congested conditions, where there is only a small incremental increase in congestion between the background 2047 traffic and total traffic scenarios. In particular, queueing along 90 Avenue will exceed 120 m (eastbound) and 230 (westbound) during the AM Peak and 270 m (eastbound) and 229 m (westbound) during the PM peak. In the westbound direction, the queuing is expected to extend past the right in/right out during the AM and PM peak hours. Drivers exiting at the right out will have to wait for another driver on 90 Avenue to let them in when traffic queues are present. Typically, courteous drivers will provide a gap when the queue is stopped, allowing another driver to enter.

As with the previous TIA, an alternative signal phasing was tested to reflect an LRT hold phase, representing 25% of the cycle length assumed to operate every cycle to allow LRT movements. Other phasing assumptions for the east-west and north-south traffic movements were carried over from the previous TIA Synchro model. The results are provided in Table 5.6.

Table 5.6: Connors Road and 85 Street – Alternate Signal Phasing (AM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**L**	**T**	**R**
AM Peak Hour – 2047 Total – Pre-timed (150s cycle, NB Prot L, Free EB R, Hold Phase) – Original											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	34	470	300	97	835	335	400	199	61	419	193
v/c	0.74	0.56	0.18	0.66	0.99	0.99	0.96	0.28	0.23	0.97	0.44
Delay (s)	124.9	52.6	0.2	65.3	76.7	93.9	100.3	30.2	39.8	77.4	16.1
LOS	F	D	A	E	E	F	F	C	D	E	B
95th Queue	#31	79	0	m#49	#164	#163	#92	58	24	#188	32
Intersection Delay: **64.3**								Intersection LOS: **E**			
AM Peak Hour – 2047 Total – Pre-timed (150s cycle, NB Prot L, Free EB R, Hold Phase) – Revised											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	32	470	300	97	835	335	400	192	61	398	187
v/c	0.70	0.56	0.18	0.66	0.99	0.99	0.96	0.27	0.23	0.92	0.43
Delay (s)	116.8	52.6	0.2	65.3	76.7	93.9	100.3	30.0	39.1	68.2	14.8
LOS	F	D	A	E	E	F	F	C	D	E	B
95th Queue	#29	79	0	m#49	#164	#163	#92	56	22	#174	26
Intersection Delay: **63.1**								Intersection LOS: **E**			

Table 5.7: Connors Road and 85 Street – Alternate Signal Phasing (PM Peak)

Direction	Eastbound			Westbound			Northbound		Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**L**	**T**	**R**
PM Peak Hour – 2047 Total – Pre-timed (150s cycle, NB Prot L, Free EB R, Hold Phase) – Original											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	24	860	350	59	722	143	100	651	87	301	26
v/c	0.29	0.94	0.20	1.28	0.79	0.39	0.54	0.95	1.24	0.59	0.05
Delay (s)	55.6	72.6	0.3	265.9	64.6	54.2	80.5	67.2	232.7	56.4	2.8
LOS	E	E	A	F	E	D	F	E	F	E	A
95th Queue	15	#163	0	#53	131	63	25	#263	#70	124	4
Intersection Delay: **67.1**								Intersection LOS: **E**			
PM Peak Hour – 2047 Total – Pre-timed (150s cycle, NB Prot L, Free EB R, Hold Phase) – Revised											
Geometry	L/T/T/R			L/T/T/R			L/L/T		L/T/R		
Volume (vph)	20	860	350	59	722	143	100	634	87	291	23
v/c	0.24	0.94	0.20	1.28	0.79	0.39	0.54	0.92	1.06	0.57	0.05
Delay (s)	52.9	72.6	0.3	265.9	64.6	54.2	80.5	63.1	171.5	56.2	2.6
LOS	D	E	A	F	E	D	F	E	F	E	A
95th Queue	13	#163	0	#53	131	63	25	#252	#66	120	4
Intersection Delay: **64.8**								Intersection LOS: **E**			

As shown, the intersection operates below capacity in the AM Peak with the original trip assignment assumption and is slightly improved with the updated trip assignment assumptions. As with the previous TIA, this intersection will remain a bottleneck within the roadway network during the PM peak. Eastbound and westbound queueing drops by approximately 30 – 40% with the alternative signal phasing.

5.3.5 93 Avenue and 85 Street

The results of the traffic analysis are provided in Table 5.8 and 5.9.

Table 5.8: 93 Avenue and 85 Street – AM Peak Hour

Direction	Westbound		Northbound		Southbound	
Movement	**L**	**R**	**T**	**R**	**L**	**T**
2047 Background – Actuated (150s cycle, Prot SB L)						
Geometry	L/R		T/R		L/T	
Volume (vph)	26	28	521	28	9	578
v/c	0.36	0.46	0.39	0.04	0.18	0.39
Delay (s)	80.6	90.5	3.1	1.4	72.1	7.8
LOS	F	F	A	A	E	A
95th Queue (m)	23	25	m62	m2	m8	108
Intersection Delay:	**9.6**		Intersection LOS:		**A**	
2047 Total – Actuated (150s cycle, Prot SB L) – Original Trip Assignment						
Geometry	L/R		T/R		L/T	
Volume (vph)	103	88	519	55	43	570
v/c	0.73	0.73	0.43	0.08	0.54	0.41
Delay (s)	90.8	95.4	9.5	5.8	81.3	12.7
LOS	F	F	A	A	F	B
95” Queue (m)	65	58	m111	m13	m28	143
Intersection Delay:	**24.5**		Intersection LOS:		**C**	
2047 Total – Actuated (150s cycle, Prot SB L) – Revised Trip Assignment						
Geometry		L/R	T/R		L/T	
Volume (vph)	76	67	519	47	32	570
v/c	0.66	0.68	0.42	0.06	0.46	0.40
Delay (s)	89.8	96.3	7.2	4.0	80.0	10.8
LOS	F	F	A	A	F	B
95” Queue (m)	51	47	m112	m9	m24	137
Intersection Delay:	**19.8**		Intersection LOS:		**B**	

Table 5.9: 93 Avenue and 85 Street – PM Peak Hour

Direction	Westbound		Northbound		Southbound	
Movement	**L**	**R**	**T**	**R**	**L**	**T**
2047 Background – Actuated (150s cycle, Prot SB L)						
Geometry	L/R		T/R		L/T	
Volume (vph)	21	9	698	48	17	357
v/c	0.35	0.18	0.52	0.06	0.30	0.24
Delay (s)	83.7	75.0	5.0	0.4	85.8	3.2
LOS	F	E	A	A	F	A
95th Queue (m)	20	12	m3	m0	m10	m34
Intersection Delay:	**7.4**		Intersection LOS:		**A**	
2047 Total – Actuated (150s cycle, Prot SB L) – Original Trip Assignment						
Geometry	L/R		T/R		L/T	
Volume (vph)	59	49	696	122	75	355
v/c	0.61	0.60	0.57	0.17	0.68	0.25
Delay (s)	91.2	93.9	6.9	1.2	77.2	5.3
LOS	F	F	A	A	E	A
95” Queue (m)	43	37	m11	m2	m31	m50
Intersection Delay	**16.7**		Intersection LOS:		**B**	
2047 Total – Actuated (150s cycle, Prot SB L) – Revised Trip Assignment						
Geometry	L/R		T/R		L/T	
Volume (vph)	47	36	696	101	58	355
v/c	0.56	0.50	0.55	0.13	0.61	0.24
Delay (s)	91.0	89.5	6.1	0.9	80.7	4.5
LOS	F	F	A	A	F	A
95” Queue (m)	36	30	m5	m1	m25	m45
Intersection Delay	**14.0**		Intersection LOS:		**B**	

Overall, the performance of this intersection showed the most improvements compared to the previous TIA as the updated trip assignment reduced traffic volumes at this intersection more significantly than other intersections. The LOS remained unchanged but the total intersection delay reduced. The 95th percentile queuing improved with the westbound queues estimated to range from 30 – 51 m, compared to 37 – 65 m with the original trip assignment assumptions. There is approximately 50 m of queueing distance for westbound traffic waiting at the signal between 85 Street and the parkade accesses. As a result of the findings, the majority of time, queuing is not expected to impact the operation of the parkade accesses with this traffic scenario.

5.3.6 95 Avenue and 85 Street

The results of the traffic analysis are provided in Table 5.10 and 5.11.

Table 5.10: 95 Avenue and 85 Street – AM Peak Hour

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**		**L**	**T**	**R**
2047 Background – Actuated (150s cycle, NB & SB Prot L, E/W Split)												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	147	81	163	35	162	114	80	388	21	11	199	79
v/c	0.90		0.44	0.12	0.93		0.6	0.51		0.10	0.76	
Delay (s)	94.4		22.1	45.6	88.0		68.	32.2		68.8	60.8	
LOS	F		C	D	F		E	C		E	E	
95th Queue (m)	#150		36	24	#169		#66	78		13	#148	
Intersection Delay: **59.0** Intersection LOS: **E**												
2047 Total – Actuated (150s cycle, NB & SB Prot L, E/W Split) – Original Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	147	81	174	35	162	119	92	434	21	11	214	79
v/c	0.90		0.46	0.11	0.94		0.7	0.57		0.10	0.80	
Delay (s)	94.4		22.8	45.5	89.2		86.	32.2		69.0	64.5	
LOS	F		C	D	F		F	C		E	E	
95” Queue (m)	#150		38	24	#173		#79	87		13	#165	
Intersection Delay: **60.2** Intersection LOS: **E**												
2047 Total – Actuated (150s cycle, NB & SB Prot L, E/W Split) – Revised Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	147	81	170	35	162	119	88	418	21	11	208	79
v/c	0.90		0.46	0.11	0.94		0.6	0.55		0.10	0.78	
Delay (s)	94.4		22.8	45.5	89.2		80.	32.4		69.0	62.7	
LOS	F		C	D	F		F	C		E	E	
95” Queue (m)	#150		38	24	#173		#76	85		13	#159	
Intersection Delay: **59.9** Intersection LOS: **E**												

Table 5.11: 95 Avenue and 85 Street – PM Peak Hour

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**		**L**	**T**	**R**
2047 Background – Actuated (150s cycle, NB & SB Prot L, E/W Split)												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	154	182	140	22	91	22	244	309	44	29	257	166
v/c	1.15		0.32	0.24	1.22		1.10	0.30		0.35	0.95	
Delay (s)	149.8		7.0	73.0	214.0		153.7	12.5		79.8	76.2	
LOS	F		A	E	F		F	B		E	E	
95th Queue	#238		14	21	#107		#188	41		26	#247	
Intersection Delay: **92.5** Intersection LOS: **F**												
2047 Total – Actuated (150s cycle, NB & SB Prot L, E/W Split) – Original Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	154	182	150	22	91	25	253	338	44	29	303	166
v/c	1.15		0.34	0.24	1.23		1.14	0.32		0.35	1.05	
Delay (s)	149.8		8.4	73.0	219.1		163.0	14.7		79.8	101.5	
LOS	F		A	E	F		F	B		E	F	
95” Queue (m)	#238		17	21	#110		#194	47		26	#290	
Intersection Delay: **99.8** Intersection LOS: **F**												
2047 Total – Actuated (150s cycle, NB & SB Prot L, E/W Split) – Revised Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	154	182	147	22	91	25	250	328	44	29	289	166
v/c	1.15		0.33	0.24	1.23		1.13	0.32		0.35	1.02	
Delay (s)	149.8		8.0	73.0	219.1		159.8	13.8		79.8	93.3	
LOS	F		A	E	F		F	B		E	F	
95” Queue (m)	#238		17	21	#110		#193	45		26	#276	
Intersection Delay: **97.5** Intersection LOS: **F**												

The revised trip assignment reduced the volumes slightly at this intersection and resulted in a small reduction in intersection delays.

As with the previous TIA, an alternative signal phasing was tested to reflect an LRT hold phase, representing 25% of the cycle length assumed to operate every cycle to allow LRT movements. Other phasing assumptions for the east-west and north-south traffic movements were carried over from the previous TIA Synchro model. The results are provided in Table 5.12.

Table 5.12: 95 Avenue and 85 Street – Alternate Signal Phasing (PM Peak)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T		L	T	R
2047 Total – Pre-timed (150s cycle, NB L Pm+Pt, Hold Phase) – Original Trip Assignment – Original Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	154	182	150	22	91	25	253	338	44	29	303	166
v/c	1.01		0.34	0.19	0.27		1.12	0.27		0.12	1.07	
Delay (s)	107.3		16.7	49.5	43.8		147.7	36.7		43.9	111.8	
LOS	F		B	D	D		F	D		D	F	
95th Queue (m)	#166		29	14	44		#126	39		15	#219	
Intersection Delay: **85.3** Intersection LOS: **F**												
2047 Total – Pre-timed (150s cycle, NB L Pm+Pt, Hold Phase) – Revised Trip Assignment												
Geometry	LT/R			L/TR			L/T/TR			L/TR		
Volume (vph)	154	182	147	22	91	25	250	328	44	29	289	166
v/c	1.01		0.34	0.19	0.27		1.09	0.27		0.12	1.04	
Delay (s)	107.3		16.1	49.5	43.8		138.6	36.5		43.8	103.3	
LOS	F		B	D	D		F	D		D	F	
95th Queue (m)	#166		28	14	44		#121	42		15	#209	
Intersection Delay: **81.7** Intersection LOS: **F**												

As shown in Table 5.12, the intersection operations are further improved with the reduction in traffic volumes due to the updated traffic assignment assumptions. As with the previous TIA, this intersection will remain a bottleneck within the roadway network during the PM peak. The previous TIA reported that a 5% shift in volumes away from this intersection would result in this intersection operating below capacity during the PM peak. A slightly smaller reduction is needed with the updated traffic assignment.

5.3.7 90 Avenue and Right In/Right Out

The results of the traffic analysis are provided in Table 5.13 and 5.14.

Table 5.13: 90 Avenue Right In/Right Out (AM Peak Hour)

Direction	Eastbound	Westbound		Southbound
Movement	T	T	R	R
AM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Original Trip Assignment				
Geometry	T/T	T/TR		R
Volume (vph)	531	1220	13	47
v/c				0.11
Delay (s)				14.9
LOS				B
95th Queue (m)				3
Intersection Delay: **0.4** Intersection LOS: **A**				
AM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Revised Trip Assignment				
Geometry	T/T	T/TR		R
Volume (vph)	531	1220	11	34
v/c				0.08

Direction	Eastbound	Westbound		Southbound
Movement	**T**	**T**	**R**	**R**
Delay (s)				14.5
LOS				B
95th Queue (m)				2
Intersection Delay: **0.4**		Intersection LOS: **A**		

Table 5.14: 90 Avenue Right In/Right Out (PM Peak Hour)

Direction	Eastbound	Westbound		Southbound
Movement	**T**	**T**	**R**	**R**
AM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Original Trip Assignment				
Geometry	T/T	T/TR		R
Volume (vph)	947	890	54	34
v/c				0.07
Delay (s)				12.5
LOS				B
95th Queue (m)				2
Intersection Delay: **0.2**		Intersection LOS: **A**		
AM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Revised Trip Assignment				
Geometry	T/T	T/TR		R
Volume (vph)	947	890	44	27
v/c				0.05
Delay (s)				12.4
LOS				B
95th Queue (m)				2
Intersection Delay: **0.2**		Intersection LOS: **A**		

This intersection performs similar to the original trip assignment assumptions with all movements operating at LOS B or better, but may be affected by westbound queues along 90 Avenue from the 85 Street intersection. This is noted in Section 5.3.4, where traffic queuing back from 85 Street will block this right in/right out and drivers exiting at the right out will have to wait for another driver on 90 Avenue to let them in when traffic queues are present. Typically, courteous drivers will provide a gap when the queue is stopped, allowing another driver to enter.

5.3.8 85 Street East Service Road and North-South Alley

The results of the traffic analysis are provided in Table 5.15 and 5.16.

Table 5.15: 85 Street East Service Road and the North-South Alley (AM Peak Hour)

Direction	Eastbound		Westbound		Southbound	
Movement	**T**		**T**	**R**	**R**	
AM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Original Trip Assignment						
Geometry	LT		TR		LR	
Volume (vph)	2	45	7	3	9	0
v/c	0.00				0.01	
Delay (s)	7.3				9.0	
LOS	A				A	
95th Queue (m)	0				0	
Intersection Delay: **1.4**			Intersection LOS: **A**			
AM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Revised Trip Assignment						
Geometry	LT		TR		LR	
Volume (vph)	2	45	7	5	9	0
v/c	0.00				0.01	
Delay (s)	7.3				9.0	
LOS	A				A	
95th Queue (m)	0				0	
Intersection Delay: **1.4**			Intersection LOS: **A**			

Table 5.16: 85 Street East Service Road and the North-South Alley (PM Peak Hour)

Direction	Eastbound		Westbound		Southbound	
Movement	**T**		**T**	**R**	**R**	
PM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Original Trip Assignment						
Geometry	LT		TR		LR	
Volume (vph)	4	24	25	17	8	0
v/c	0.00				0.01	
Delay (s)	7.3				9.1	
LOS	A				A	
95th Queue (m)	0				0	
Intersection Delay: **1.3**			Intersection LOS: **A**			
PM Peak Hour – 2047 Total – Unsignalized (SB Stop) – Revised Trip Assignment						
Geometry	LT		TR		LR	
Volume (vph)	4	24	25	24	8	0
v/c	0.00				0.01	
Delay (s)	7.4				9.1	
LOS	A				A	
95th Queue (m)	0				0	
Intersection Delay: **1.2**			Intersection LOS: **A**			

This intersection performs similar to the original trip assignment assumptions with all movements operating at LOS A or better.

5.3.9 93 Avenue and North-South Alley

The results of the traffic analysis are provided in Table 5.17 and 5.18.

Table 5.17: 93 Avenue and the North-South Alley (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L			T			R			L		
AM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Original Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	4	75	1	0	65	1	5	3	2	6	1	6
v/c	0.00			0.00			0.01			0.02		
Delay (s)	7.4			0.0			9.7			9.4		
LOS	A			A			A			A		
95th Queue (m)	0			0			0			0		
Intersection Delay: **1.5**										Intersection LOS: **A**		
AM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Revised Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	8	118	1	0	80	1	7	3	2	6	1	9
v/c	0.01			0.00			0.02			0.02		
Delay (s)	7.4			0.0			10.2			9.6		
LOS	A			A			B			A		
95th Queue (m)	0			0			1			0		
Intersection Delay: **1.4**										Intersection LOS: **A**		

Table 5.18: 93 Avenue and the North-South Alley (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L			T			R			L		
PM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Original Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	13	70	8	0	59	5	13	0	3	1	1	15
v/c	0.01			0.00			0.02			0.02		
Delay (s)	7.4			0.0			9.8			9.0		
LOS	A			A			A			A		
95th Queue (m)	0			0			1			1		
Intersection Delay: **2.2**										Intersection LOS: **A**		
PM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Revised Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	16	93	8	0	84	5	20	0	3	1	1	21
v/c	0.01			0.00			0.03			0.03		
Delay (s)	7.5			0.0			10.4			9.1		
LOS	A			A			B			A		
95th Queue (m)	0			0			1			1		
Intersection Delay: **2.2**								Intersection LOS: **A**				

Traffic volumes increased with the revised trip assignment, but the intersection still performs well with all movements operating at LOS B or better.

5.3.10 95 Avenue and North-South Alley

The results of the traffic analysis are provided in Table 5.19 and 5.20

Table 5.19: 95 Avenue and the North-South Alley (AM Peak Hour)

Direction	Eastbound		Westbound		Northbound	
Movement	T	R	L	T	L	R
AM Peak Hour – 2047 Total – Unsignalized (NB Stop) – Original Trip Assignment						
Geometry	TR		LT		LR	
Volume (vph)	110	3	8	293	23	29
v/c			0.01		0.07	
Delay (s)			7.5		10.5	
LOS			A		B	
95th Queue (m)			0		1	
Intersection Delay: **1.3**			Intersection LOS: **A**			
AM Peak Hour – 2047 Total – Unsignalized (NB Stop) – Revised Trip Assignment						
Geometry	TR		LT		LR	
Volume (vph)	110	3	11	293	23	33
v/c			0.01		0.08	
Delay (s)			7.5		10.5	
LOS			A		B	
95th Queue (m)			0		2	
Intersection Delay: **1.4**			Intersection LOS: **A**			

Table 5.20: 95 Avenue and the North-South Alley (PM Peak Hour)

Direction	Eastbound		Westbound		Northbound	
Movement	T	R	L	T	L	R
PM Peak Hour – 2047 Total – Unsignalized (NB Stop) – Original Trip Assignment						
Geometry	TR		LT		LR	
Volume (vph)	238	17	19	127	11	17
v/c			0.02		0.04	
Delay (s)			7.8		10.7	
LOS			A		B	
95th Queue (m)			0		1	
Intersection Delay: **1.0**			Intersection LOS: **A**			
PM Peak Hour – 2047 Total – Unsignalized (NB Stop) – Revised Trip Assignment						
Geometry	TR		LT		LR	
Volume (vph)	238	17	25	127	11	20
v/c			0.02		0.05	
Delay (s)			7.9		10.7	
LOS			A		B	
95th Queue (m)			1		1	
Intersection Delay: **1.2**			Intersection LOS: **A**			

This intersection performs similar to the original trip assignment assumptions with all movements operating at LOS B or better.

5.3.11 93 Avenue and Parkade Access

The results of the traffic analysis are provided in Table 5.21 and 5.22.

Table 5.21: 93 Avenue Parkade Access (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
AM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Original Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	37	37	24	6	53	17	36	0	16	27	0	102
v/c	0.03			0.00			0.08			0.15		
Delay (s)	7.5			7.4			10.8			9.8		
LOS	A			A			B			A		
95th Queue (m)	1			0			2			4		
Intersection Delay: **6.0** Intersection LOS: **A**												
AM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Revised Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	27	37	15	15	53	27	26	0	26	65	0	65
v/c	0.02			0.01			0.07			0.16		
Delay (s)	7.5			7.4			10.0			10.4		
LOS	A			A			B			B		
95th Queue (m)	1			0			2			5		
Intersection Delay: **6.1** Intersection LOS: **A**												

Table 5.22: 93 Avenue Parkade Access (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
PM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Original Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	80	64	53	9	30	48	22	0	11	16	0	56
v/c	0.05			0.01			0.06			0.09		
Delay (s)	7.5			7.5			11.3			9.7		
LOS	A			A			B			A		
95th Queue (m)	2			0			2			2		
Intersection Delay: **4.5** Intersection LOS: **A**												
PM Peak Hour – 2047 Total 0 Unsignalized (N/S Stop) – Revised Trip Assignment												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	64	64	31	31	30	64	17	0	17	36	0	36
v/c	0.04			0.02			0.05			0.10		
Delay (s)	7.6			7.5			10.6			10.8		
LOS	A			A			B			B		
95th Queue (m)	1			1			2			2		
Intersection Delay: **4.8** Intersection LOS: **A**												

The changes in traffic volumes with the updated trip assignment assumptions did not significantly impact the performance of this intersection, compared to the previous trip assignment assumptions. The LOS is B or better for all turning movements.

5.3.12 95 Avenue and 79 Street

The results of the traffic analysis are provided in Table 5.23 and 5.24.

Table 5.23: 95 Avenue and 79 Street (AM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2047 Background - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	33	49	39	40	182	51	52	122	8	30	245	63
v/c	0.19			0.42			0.29			0.50		
Delay (s)	10.1			12.4			10.9			13.4		
LOS	B			B			B			B		
95th Queue (m)	5			15			9			21		
Intersection Delay: **12.2**										Intersection LOS: **B**		
2047 Total - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	49	55	39	43	184	51	52	167	33	30	261	67
v/c	0.25			0.46			0.41			0.56		
Delay (s)	11.2			13.7			12.8			15.4		
LOS	B			B			B			C		
95th Queue (m)	8			17			15			26		
Intersection Delay: **13.7**										Intersection LOS: **B**		

Table 5.24: 95 Avenue and 79 Street (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2047 Background - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	53	120	70	11	30	15	77	296	29	30	103	30
v/c	0.37			0.09			0.57			0.28		
Delay (s)	11.6			9.4			14.5			10.4		
LOS	B			A			B			B		
95th Queue (m)	13			2			27			8		
Intersection Delay: **12.5**										Intersection LOS: **B**		
2047 Total - Unsignalized (4 Way Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	64	136	70	22	45	15	77	319	38	30	134	30
v/c	0.43			0.14			0.64			0.30		
Delay (s)	12.9			10.2			17.2			11.1		
LOS	B			B			C			B		
95th Queue (m)	16			4			35			10		
Intersection Delay: **14.2**										Intersection LOS: **B**		

This intersection operates well with the LOS B or better for all movement under both background traffic volumes and total traffic volumes.

5.3.13 94 Avenue and 79 Street

Table 5.25: 94 Avenue and 79 Street (AM Peak Hour)

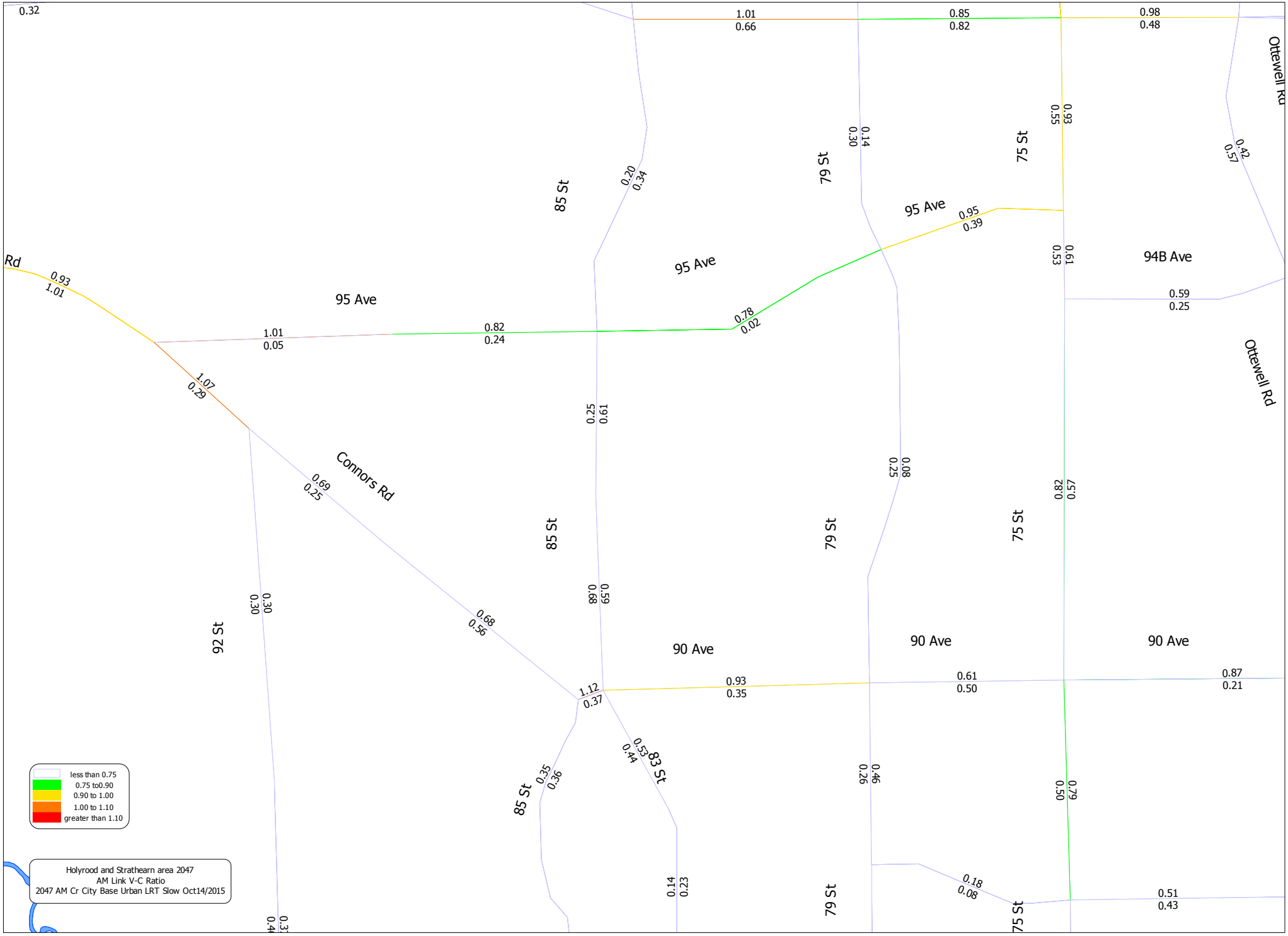
Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2047 Background - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	14	17	11	18	6	33	27	135	17	8	301	16
v/c	0.09			0.09			0.02			0.01		
Delay (s)	13.2			11.4			8.0			7.5		
LOS	B			B			A			A		
95th Queue (m)	2			2			1			0		
Intersection Delay: **2.5**										Intersection LOS: **A**		
2047 Total - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	64	22	40	19	8	33	44	155	19	8	304	29
v/c	0.28			0.11			0.04			0.01		
Delay (s)	16.2			12.6			8.0			7.6		
LOS	C			B			A			A		
95th Queue (m)	8			3			1			0		
Intersection Delay: **4.3**										Intersection LOS: **A**		

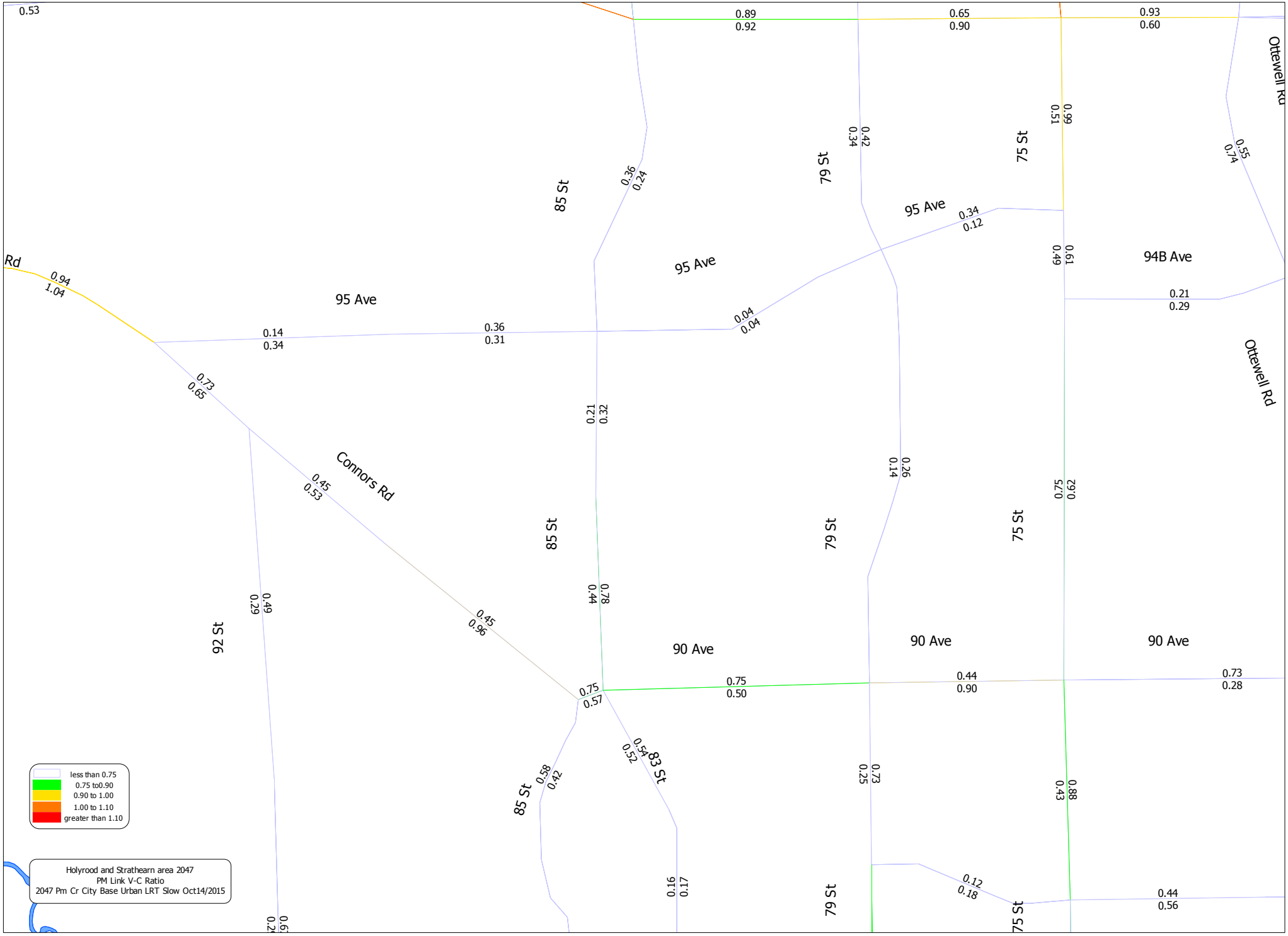
Table 5.26: 94 Avenue and 79 Street (PM Peak Hour)

Direction	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
2047 Background - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	30	11	9	11	9	18	7	355	23	13	161	11
v/c	0.11			0.08			0.01			0.01		
Delay (s)	14.1			12.7			7.6			8.1		
LOS	B			B			A			A		
95th Queue (m)	3			2			0			0		
Intersection Delay: **2.0**										Intersection LOS: **A**		
2047 Total - Unsignalized (E/W Stop)												
Geometry	LTR			LTR			LTR			LTR		
Volume (vph)	52	18	28	12	14	18	39	365	24	13	174	36
v/c	0.24			0.11			0.03			0.01		
Delay (s)	16.8			14.5			7.7			8.1		
LOS	C			B			A			A		
95th Queue (m)	7			2			1			0		
Intersection Delay: **3.4**										Intersection LOS: **A**		

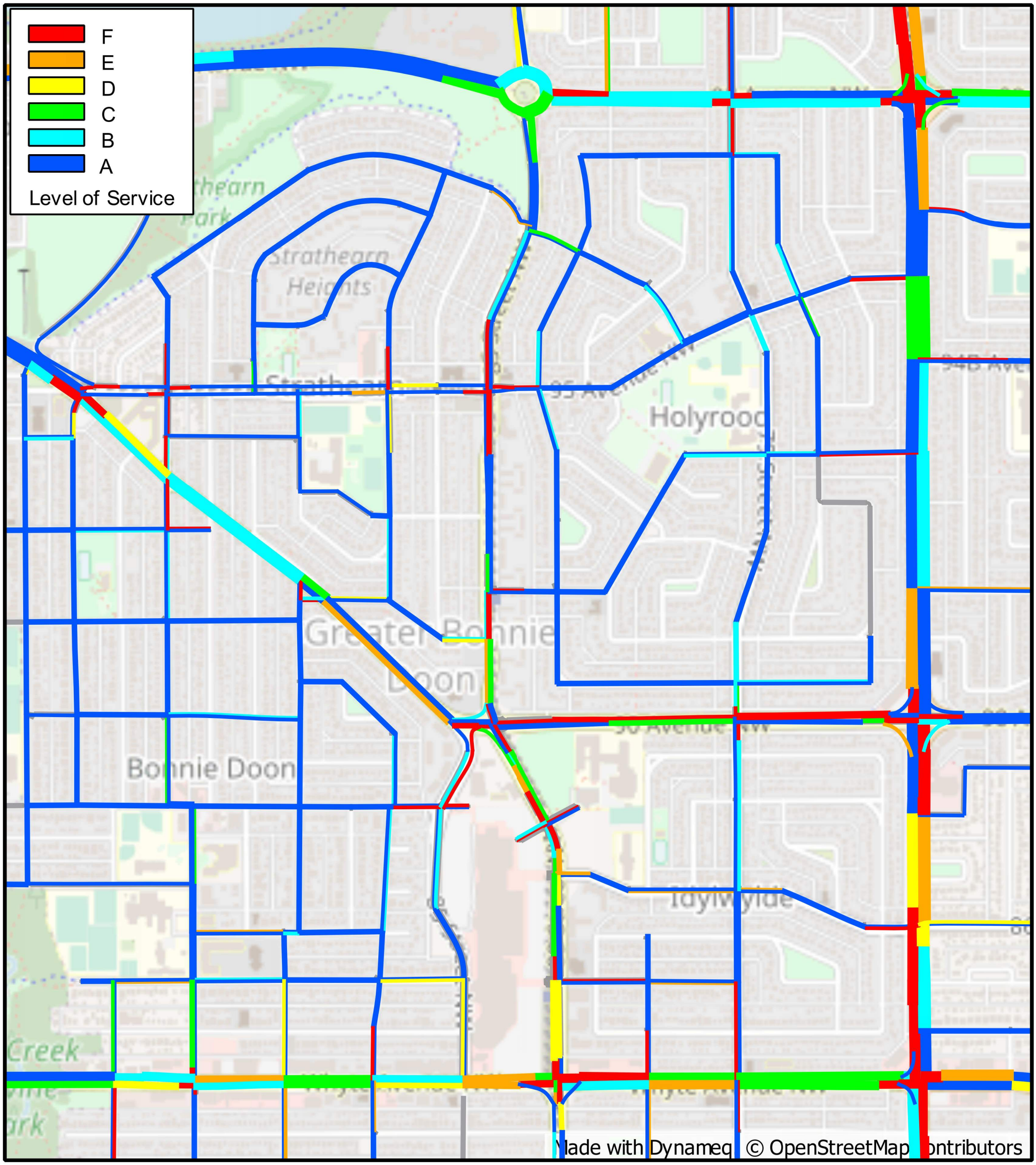
Overall, the intersection operates at LOS B or better under background traffic conditions. With the additional development traffic added to this intersection, the LOS for all movements is C or better.

Appendix D – 2047 and 2050 Congestion Plots


Holyrood and Strathearn area 2047
AM Link V-C Ratio
2047 AM Cr City Base Urban LRT Slow Oct14/2015
less than 0.75
0.75 to0.90
0.90 to 1.00
1.00 to 1.10
greater than 1.10
95 Ave
94B Ave
90 Ave
Connors Rd
Ottewell Rd
Rd
92 St
85 St
83 St
79 St
75 St
0.32
1.01
0.66
0.85
0.82
0.98
0.48
0.93
1.01
1.01
0.05
0.82
0.24
0.78
0.02
0.95
0.39
1.07
0.29
0.69
0.25
0.68
0.56
1.12
0.37
0.93
0.35
0.61
0.50
0.87
0.21
0.59
0.25
0.51
0.43
0.42
0.57
0.93
0.55
0.61
0.53
0.82
0.57
0.79
0.50
0.20
0.34
0.25
0.61
0.59
0.68
0.53
0.44
0.35
0.36
0.14
0.23
0.30
0.30
0.14
0.30
0.08
0.25
0.46
0.26
0.18
0.08

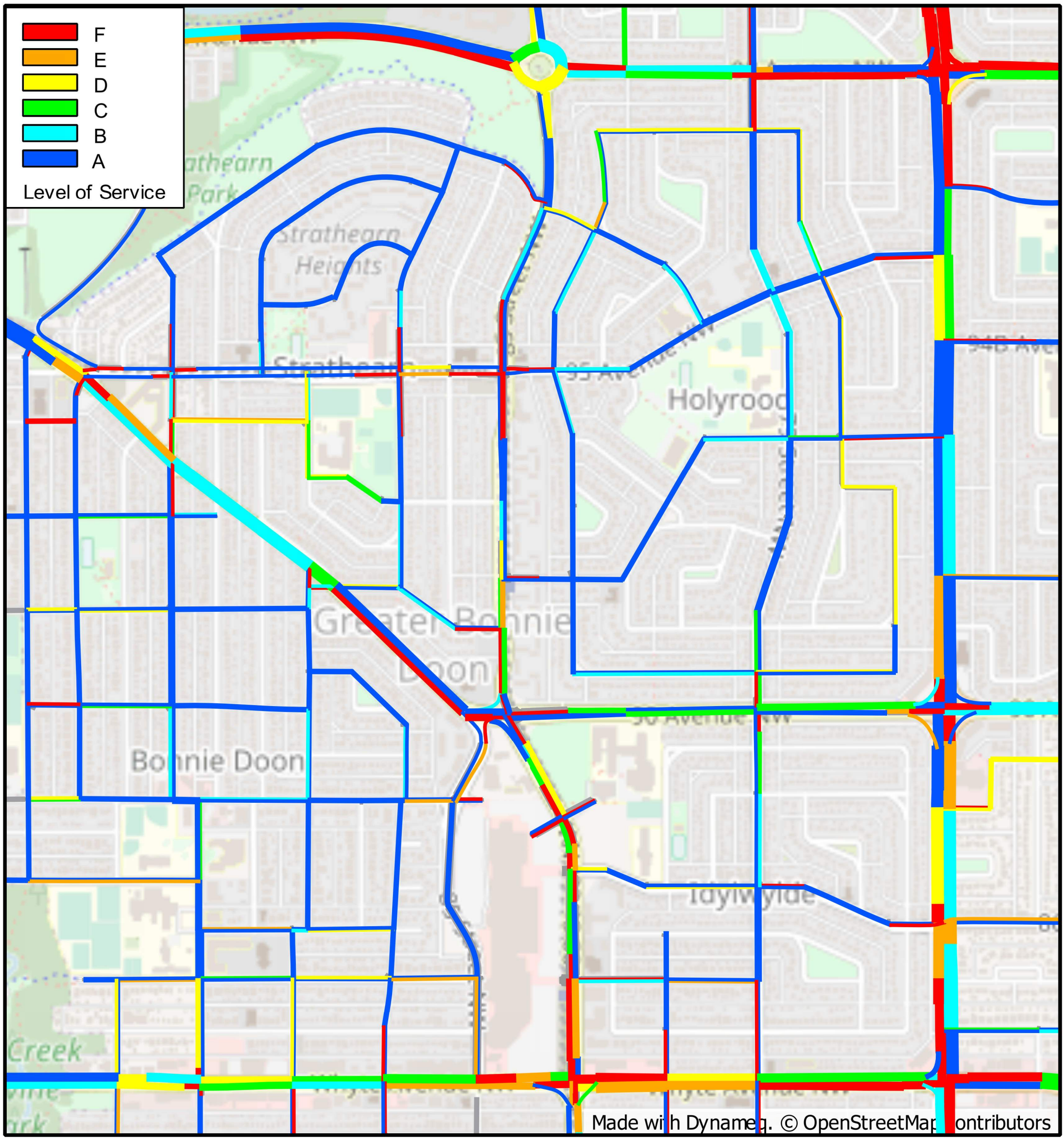

Holyrood and Strathearn area 2047
PM Link V-C Ratio
2047 Pm Cr City Base Urban LRT Slow Oct14/2015
less than 0.75
0.75 to0.90
0.90 to 1.00
1.00 to 1.10
greater than 1.10
Connors Rd
Ottewell Rd
95 Ave
94B Ave
90 Ave
85 St
83 St
79 St
75 St
92 St
0.53
0.89
0.92
0.65
0.90
0.93
0.60
0.99
0.51
0.42
0.34
0.55
0.74
0.36
0.24
0.34
0.12
0.61
0.49
0.21
0.29
0.94
1.04
0.14
0.34
0.36
0.31
0.04
0.04
0.73
0.65
0.21
0.32
0.26
0.14
0.45
0.53
0.75
0.62
0.78
0.44
0.49
0.29
0.45
0.96
0.75
0.57
0.75
0.50
0.44
0.90
0.73
0.28
0.54
0.52
0.58
0.42
0.73
0.25
0.88
0.43
0.16
0.17
0.12
0.18
0.44
0.56

2050 DTA Model AM Peak Link LOS Plot_Holyrood



DISCLAIMER: All information and content contained in this package were developed based on the best possible data set and assumptions available at the time of preparation. The City of Edmonton is sharing this package with good faith. Under no circumstances shall the City of Edmonton provides any warranty, or have any liability arising from any incorrect, incomplete or misleading information or its improper use.

2050 DTA Model PM Peak Link LOS Plot_Holyrood



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Appendix E – Synchro Reports

AM 2050 Background Synchro Results

Lanes, Volumes, Timings
2: 79 Street & 90 Avenue

10-29-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	605	13	118	669	45	81	160	110	177	173	64
Future Volume (vph)	25	605	13	118	669	45	81	160	110	177	173	64
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00		0.99	0.99		0.99	0.99	
Frt		0.997			0.992			0.939			0.959	
Flt Protected		0.998			0.993		0.950			0.950		
Satd. Flow (prot)	0	3449	0	0	3410	0	1648	1614	0	1648	1654	0
Flt Permitted		0.910			0.765		0.510			0.450		
Satd. Flow (perm)	0	3144	0	0	2624	0	878	1614	0	775	1654	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			14			45			24	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		424.2			411.5			72.8			22.9	
Travel Time (s)		30.5			29.6			5.2			1.6	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	605	13	118	669	45	81	160	110	177	173	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	643	0	0	832	0	81	270	0	177	237	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	39.0	39.0		39.0	39.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	44.0	44.0		44.0	44.0		15.0	15.0		15.0	15.0	
Total Split (s)	49.0	49.0		49.0	49.0		26.0	26.0		26.0	26.0	
Total Split (%)	65.3%	65.3%		65.3%	65.3%		34.7%	34.7%		34.7%	34.7%	
Maximum Green (s)	44.0	44.0		44.0	44.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.5			0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		45.5			45.5		18.5	18.5		18.5	18.5	
Actuated g/C Ratio		0.61			0.61		0.25	0.25		0.25	0.25	
v/c Ratio		0.34			0.52		0.38	0.62		0.93	0.56	
Control Delay		1.7			10.3		28.0	27.2		78.6	26.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		1.7			10.3		28.0	27.2		78.6	26.9	
LOS		A			B		C	C		E	C	
Approach Delay		1.7			10.3			27.4			49.0	
Approach LOS		A			B			C			D	
Queue Length 50th (m)		0.0			32.1		9.1	27.0		23.5	25.1	
Queue Length 95th (m)		m0.0			46.0		21.0	49.5		#57.0	45.5	
Internal Link Dist (m)		400.2			387.5			48.8			0.1	
Turn Bay Length (m)												
Base Capacity (vph)		1907			1595		239	473		211	469	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.34			0.52		0.34	0.57		0.84	0.51	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 67 (89%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 17.7 Intersection LOS: B
Intersection Capacity Utilization 111.0% ICU Level of Service H
Analysis Period (min) 15
* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 2: 79 Street & 90 Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt												
Flt Protected												
Satd. Flow (prot)	0	1735	0	0	1735	0	0	1735	0	0	1735	0
Flt Permitted												
Satd. Flow (perm)	0	1735	0	0	1735	0	0	1735	0	0	1735	0
Link Speed (k/h)		20			20			50			50	
Link Distance (m)		423.6			65.9			22.9			159.6	
Travel Time (s)		76.2			11.9			1.6			11.5	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 19.8%	ICU Level of Service A
Analysis Period (min) 15	

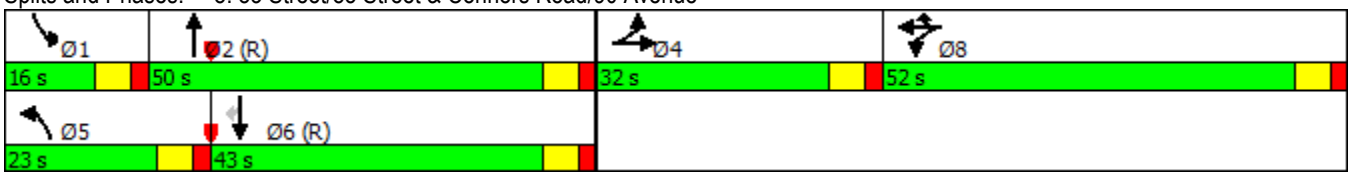
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	531	387	128	558	142	442	371	0	112	197	28
Future Volume (vph)	44	531	387	128	558	142	442	371	0	112	197	28
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	50.0		50.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		1	1		1	2		0	1		1
Taper Length (m)	2.5			7.6			2.5			7.6		
Lane Util. Factor	*0.75	*0.75	*1.00	*0.75	*0.75	*0.75	*1.00	1.00	*1.00	*0.75	1.00	1.00
Ped Bike Factor	0.98		0.99	0.99			0.97			0.99		0.96
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	1301	2602	1735	1301	2602	1106	3469	1735	0	1301	1735	1475
Flt Permitted												
Satd. Flow (perm)	1276	2602	1709	1286	2602	1106	3360	1735	0	1282	1735	1421
Right Turn on Red			Yes			No			No			Yes
Satd. Flow (RTOR)			199									153
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		55.6			124.4			243.2			270.7	
Travel Time (s)		3.3			7.5			14.6			19.5	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	531	387	128	558	142	442	371	0	112	197	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	531	387	128	558	142	442	371	0	112	197	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			4.9			1.6			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Split	NA	Free	Split	NA	Prot	Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8	8	5	2		1	6	
Permitted Phases			Free									6
Minimum Split (s)	24.0	24.0		24.0	24.0	24.0	11.0	24.0		11.0	24.0	24.0
Total Split (s)	32.0	32.0		52.0	52.0	52.0	23.0	50.0		16.0	43.0	43.0
Total Split (%)	21.3%	21.3%		34.7%	34.7%	34.7%	15.3%	33.3%		10.7%	28.7%	28.7%
Maximum Green (s)	26.0	26.0		46.0	46.0	46.0	17.0	44.0		10.0	37.0	37.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.5	0.5		0.5	0.5	0.5	1.0	0.5		1.0	0.5	0.5
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.0	6.5		7.0	6.5	6.5
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	0
Act Effct Green (s)	25.5	25.5	150.0	45.5	45.5	45.5	16.0	43.5		9.0	36.5	36.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.17	0.17	1.00	0.30	0.30	0.30	0.11	0.29		0.06	0.24	0.24
v/c Ratio	0.20	1.20	0.23	0.32	0.71	0.42	1.19	0.74		1.44	0.47	0.06
Control Delay	56.3	161.8	0.3	40.2	47.5	43.2	165.9	58.2		289.4	50.5	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	56.3	161.8	0.3	40.2	47.5	43.2	165.9	58.2		289.4	50.5	1.6
LOS	E	F	A	D	D	D	F	E		F	D	A
Approach Delay		92.0			45.6			116.8			125.8	
Approach LOS		F			D			F			F	
Queue Length 50th (m)	15.2	~127.4	0.0	35.3	86.9	41.8	~79.2	100.1		~61.6	55.8	0.0
Queue Length 95th (m)	31.0	#174.2	0.0	62.4	113.0	70.1	#112.5	138.1		#109.6	81.8	2.8
Internal Link Dist (m)		31.6			100.4			219.2			246.7	
Turn Bay Length (m)	50.0		50.0	50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	221	442	1709	394	789	335	370	503		78	422	461
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.20	1.20	0.23	0.32	0.71	0.42	1.19	0.74		1.44	0.47	0.06

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 1.44
Intersection Signal Delay: 89.7 Intersection LOS: F
Intersection Capacity Utilization 74.4% ICU Level of Service D
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: 83 Street/85 Street & Connors Road/90 Avenue



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	643	813	1	0	16
Future Volume (vph)	0	643	813	1	0	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	3296	3296	0	0	1501
Flt Permitted						
Satd. Flow (perm)	0	3296	3296	0	0	1501
Link Speed (k/h)		50	50		20	
Link Distance (m)		124.4	424.2		22.9	
Travel Time (s)		9.0	30.5		4.1	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	643	813	1	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	643	814	0	0	16
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 38.1%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	42	13	1	8	0
Future Volume (vph)	2	42	13	1	8	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.990			
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	1731	1717	0	1648	0
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	1731	1717	0	1648	0
Link Speed (k/h)		20	20		20	
Link Distance (m)		26.2	33.6		250.6	
Travel Time (s)		4.7	6.0		45.1	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	42	13	1	8	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	44	14	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.8%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	137	1	0	81	1	3	2	0	6	1	3
Future Volume (vph)	0	137	1	0	81	1	3	2	0	6	1	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999			0.998						0.959	
Flt Protected								0.971			0.971	
Satd. Flow (prot)	0	1733	0	0	1731	0	0	1684	0	0	1615	0
Flt Permitted								0.971			0.971	
Satd. Flow (perm)	0	1733	0	0	1731	0	0	1684	0	0	1615	0
Link Speed (k/h)		50			50			20			20	
Link Distance (m)		18.2			73.5			250.6			293.8	
Travel Time (s)		1.3			5.3			45.1			52.9	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	137	1	0	81	1	3	2	0	6	1	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	138	0	0	82	0	0	5	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 23.1%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	61	10	33	28	26	60	0	43	34	0	41
Future Volume (vph)	6	61	10	33	28	26	60	0	43	34	0	41
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.982			0.960			0.944			0.926	
Flt Protected		0.996			0.981			0.972			0.978	
Satd. Flow (prot)	0	1697	0	0	1634	0	0	1592	0	0	1571	0
Flt Permitted		0.996			0.981			0.972			0.978	
Satd. Flow (perm)	0	1697	0	0	1634	0	0	1592	0	0	1571	0
Link Speed (k/h)		50			50			20			20	
Link Distance (m)		72.6			18.2			24.4			26.2	
Travel Time (s)		5.2			1.3			4.4			4.7	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	6	61	10	33	28	26	60	0	43	34	0	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	77	0	0	87	0	0	103	0	0	75	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 30.7%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	62	504	49	28	274
Future Volume (vph)	67	62	504	49	28	274
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	30.0		30.0	30.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.6				7.6	
Lane Util. Factor	*0.75	*0.75	1.00	*0.75	*0.75	1.00
Ped Bike Factor	0.96			0.94	0.98	
Frt		0.850		0.850		
Flt Protected						
Satd. Flow (prot)	1301	1106	1735	1106	1301	1735
Flt Permitted						
Satd. Flow (perm)	1247	1106	1735	1039	1274	1735
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (k/h)	50		50			50
Link Distance (m)	72.6		270.7			456.2
Travel Time (s)	5.2		19.5			32.8
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	62	504	49	28	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	67	62	504	49	28	274
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	6.1	6.1	30.5	6.1	6.1	30.5
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	6.1	1.8	6.1	6.1	1.8
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)			28.7			28.7
Detector 2 Size(m)			1.8			1.8
Detector 2 Type			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot	Prot	NA	Perm	Prot	NA

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Protected Phases	8	8	2		1	6
Permitted Phases				2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	11.0	24.0
Total Split (s)	38.0	38.0	89.0	89.0	23.0	112.0
Total Split (%)	25.3%	25.3%	59.3%	59.3%	15.3%	74.7%
Maximum Green (s)	32.0	32.0	83.0	83.0	17.0	106.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.0	1.0	0.5	0.5	1.0	0.5
Total Lost Time (s)	7.0	7.0	6.5	6.5	7.0	6.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Min	Min	C-Max	C-Max	Min	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	12.8	12.8	108.9	108.9	7.7	123.7
Actuated g/C Ratio	0.09	0.09	0.73	0.73	0.05	0.82
v/c Ratio	0.60	0.66	0.40	0.06	0.42	0.19
Control Delay	87.3	96.1	4.3	3.4	69.8	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.3	96.1	4.3	3.4	69.8	10.3
LOS	F	F	A	A	E	B
Approach Delay	91.5		4.2			15.9
Approach LOS	F		A			B
Queue Length 50th (m)	26.1	24.5	32.3	2.5	11.0	39.5
Queue Length 95th (m)	m45.6	m44.1	49.5	m7.0	m23.2	59.9
Internal Link Dist (m)	48.6		246.7			432.2
Turn Bay Length (m)		30.0		30.0	30.0	
Base Capacity (vph)	268	228	1259	754	138	1430
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.27	0.40	0.06	0.20	0.19

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 134 (89%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 19.2 Intersection LOS: B
Intersection Capacity Utilization 48.0% ICU Level of Service A

Analysis Period (min) 15

* User Entered Value

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

Splits and Phases: 16: 85 Street & 93 Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	112	108	19	172	180	92	433	38	52	161	47
Future Volume (vph)	131	112	108	19	172	180	92	433	38	52	161	47
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		30.0	0.0		0.0	50.0		30.0	0.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*0.75	*0.75	1.00	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75
Ped Bike Factor		1.00	0.96	0.98	0.99		0.98	1.00		0.99	0.99	
Frt			0.850		0.923			0.988			0.966	
Flt Protected		0.974										
Satd. Flow (prot)	0	1267	1475	1301	1186	0	1301	2562	0	1301	1245	0
Flt Permitted		0.974										
Satd. Flow (perm)	0	1262	1414	1281	1186	0	1280	2562	0	1287	1245	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			109		33						10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		160.3			29.3			456.2			113.4	
Travel Time (s)		11.5			2.1			32.8			8.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	131	112	108	19	172	180	92	433	38	52	161	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	243	108	19	352	0	92	471	0	52	208	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	38.0	38.0	38.0	43.0	43.0		19.0	53.0		16.0	50.0	
Total Split (%)	25.3%	25.3%	25.3%	28.7%	28.7%		12.7%	35.3%		10.7%	33.3%	
Maximum Green (s)	32.0	32.0	32.0	37.0	37.0		13.0	47.0		10.0	44.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		6.5	6.5	6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	Min	Min	Min	Min	Min		Max	C-Max		Max	Max	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0		19.0	19.0		19.0	19.0	
Flash Dont Walk (s)	25.0	25.0	25.0	25.0	25.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)		30.7	30.7	37.3	37.3		12.5	46.5		9.5	43.5	
Actuated g/C Ratio		0.20	0.20	0.25	0.25		0.08	0.31		0.06	0.29	
v/c Ratio		0.94	0.29	0.06	1.10		0.85	0.59		0.63	0.57	
Control Delay		99.8	10.0	44.4	127.4		122.3	37.8		100.5	50.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		99.8	10.0	44.4	127.4		122.3	37.8		100.5	50.0	
LOS		F	B	D	F		F	D		F	D	
Approach Delay		72.2			123.2			51.6			60.1	
Approach LOS		E			F			D			E	
Queue Length 50th (m)		95.2	0.0	5.8	~150.4		37.6	51.3		20.5	67.0	
Queue Length 95th (m)		#163.6	15.9	15.4	#234.5		#82.0	77.8		#47.6	104.0	
Internal Link Dist (m)		136.3			5.3			432.2			89.4	
Turn Bay Length (m)			30.0				50.0					
Base Capacity (vph)		266	383	323	319		108	794		82	368	
Starvation Cap Reductn		0	0	0	0		0	0		0	0	
Spillback Cap Reductn		0	0	0	0		0	0		0	0	
Storage Cap Reductn		0	0	0	0		0	0		0	0	
Reduced v/c Ratio		0.91	0.28	0.06	1.10		0.85	0.59		0.63	0.57	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 25 (17%), Referenced to phase 2:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 74.9 Intersection LOS: E
Intersection Capacity Utilization 101.9% ICU Level of Service G

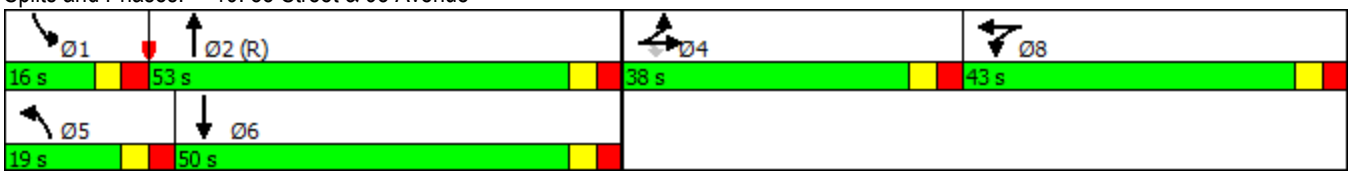
Analysis Period (min) 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 19: 85 Street & 95 Avenue



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	199	3	5	353	18	11
Future Volume (vph)	199	3	5	353	18	11
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.998				0.949	
Flt Protected				0.999	0.970	
Satd. Flow (prot)	1731	0	0	1733	1597	0
Flt Permitted				0.999	0.970	
Satd. Flow (perm)	1731	0	0	1733	1597	0
Link Speed (k/h)	50			50	20	
Link Distance (m)	24.4			92.1	166.6	
Travel Time (s)	1.8			6.6	30.0	
Confl. Peds. (#/hr)		10	10		10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	199	3	5	353	18	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	202	0	0	358	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 38.2%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	82	28	39	302	34	58	177	14	18	171	29
Future Volume (vph)	58	82	28	39	302	34	58	177	14	18	171	29
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.988			0.992			0.982	
Flt Protected		0.983			0.995			0.988			0.996	
Satd. Flow (prot)	0	1666	0	0	1705	0	0	1700	0	0	1697	0
Flt Permitted		0.983			0.995			0.988			0.996	
Satd. Flow (perm)	0	1666	0	0	1705	0	0	1700	0	0	1697	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		348.9			78.8			113.9			52.6	
Travel Time (s)		25.1			5.7			8.2			3.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	58	82	28	39	302	34	58	177	14	18	171	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	168	0	0	375	0	0	249	0	0	218	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 60.7%	ICU Level of Service B
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	44	26	18	40	54	39	185	8	9	206	22
Future Volume (vph)	19	44	26	18	40	54	39	185	8	9	206	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.961			0.935			0.995			0.987	
Flt Protected		0.989			0.992			0.992			0.998	
Satd. Flow (prot)	0	1649	0	0	1609	0	0	1712	0	0	1709	0
Flt Permitted		0.989			0.992			0.992			0.998	
Satd. Flow (perm)	0	1649	0	0	1609	0	0	1712	0	0	1709	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		233.6			101.9			87.6			319.4	
Travel Time (s)		16.8			7.3			6.3			23.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	19	44	26	18	40	54	39	185	8	9	206	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	89	0	0	112	0	0	232	0	0	237	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 45.7%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	170	35	20	318	5	35	15	35	5	10	5
Future Volume (vph)	5	170	35	20	318	5	35	15	35	5	10	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977			0.998			0.944			0.966	
Flt Protected		0.999			0.997			0.980			0.988	
Satd. Flow (prot)	0	1693	0	0	1726	0	0	1605	0	0	1656	0
Flt Permitted		0.999			0.997			0.980			0.988	
Satd. Flow (perm)	0	1693	0	0	1726	0	0	1605	0	0	1656	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		92.1			133.6			159.1			115.1	
Travel Time (s)		6.6			9.6			11.5			8.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	170	35	20	318	5	35	15	35	5	10	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	210	0	0	343	0	0	85	0	0	20	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 45.5%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	73	43	12	26	15	14	10	8	20	8	42
Future Volume (vph)	27	73	43	12	26	15	14	10	8	20	8	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.959			0.962			0.966			0.919	
Flt Protected		0.991			0.989			0.979			0.986	
Satd. Flow (prot)	0	1649	0	0	1650	0	0	1641	0	0	1572	0
Flt Permitted		0.991			0.989			0.979			0.986	
Satd. Flow (perm)	0	1649	0	0	1650	0	0	1641	0	0	1572	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.5			114.0			202.7			295.6	
Travel Time (s)		5.3			8.2			14.6			21.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	27	73	43	12	26	15	14	10	8	20	8	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	143	0	0	53	0	0	32	0	0	70	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Yield			Yield			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 23.5%	ICU Level of Service A
Analysis Period (min) 15	

PM 2050 Background Synchro Results

AM 2050 Total Synchro Results

Lanes, Volumes, Timings
2: 79 Street & 90 Avenue

10-29-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	605	13	118	669	46	81	169	110	191	185	64
Future Volume (vph)	25	605	13	118	669	46	81	169	110	191	185	64
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00		0.99	0.99		0.99	0.99	
Frt		0.997			0.992			0.941			0.961	
Flt Protected		0.998			0.993		0.950			0.950		
Satd. Flow (prot)	0	3449	0	0	3410	0	1648	1618	0	1648	1657	0
Flt Permitted		0.909			0.764		0.500			0.448		
Satd. Flow (perm)	0	3141	0	0	2621	0	861	1618	0	772	1657	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			14			43			23	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		228.7			411.5			72.8			26.5	
Travel Time (s)		16.5			29.6			5.2			1.9	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	605	13	118	669	46	81	169	110	191	185	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	643	0	0	833	0	81	279	0	191	249	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	39.0	39.0		39.0	39.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	44.0	44.0		44.0	44.0		15.0	15.0		15.0	15.0	
Total Split (s)	49.0	49.0		49.0	49.0		26.0	26.0		26.0	26.0	
Total Split (%)	65.3%	65.3%		65.3%	65.3%		34.7%	34.7%		34.7%	34.7%	
Maximum Green (s)	44.0	44.0		44.0	44.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.5			0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		44.4			44.4		19.6	19.6		19.6	19.6	
Actuated g/C Ratio		0.59			0.59		0.26	0.26		0.26	0.26	
v/c Ratio		0.35			0.53		0.36	0.62		0.95	0.55	
Control Delay		8.6			10.8		27.5	26.8		82.5	26.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		8.6			10.8		27.5	26.8		82.5	26.7	
LOS		A			B		C	C		F	C	
Approach Delay		8.6			10.8			27.0			50.9	
Approach LOS		A			B			C			D	
Queue Length 50th (m)		21.6			32.2		9.2	28.6		26.0	26.9	
Queue Length 95th (m)		30.6			46.1		21.1	51.8		#62.6	48.1	
Internal Link Dist (m)		204.7			387.5			48.8			2.5	
Turn Bay Length (m)										25.0		
Base Capacity (vph)		1862			1559		235	473		211	469	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.35			0.53		0.34	0.59		0.91	0.53	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 67 (89%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 20.5 Intersection LOS: C
Intersection Capacity Utilization 112.2% ICU Level of Service H

Analysis Period (min) 15

* User Entered Value

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

Splits and Phases: 2: 79 Street & 90 Avenue

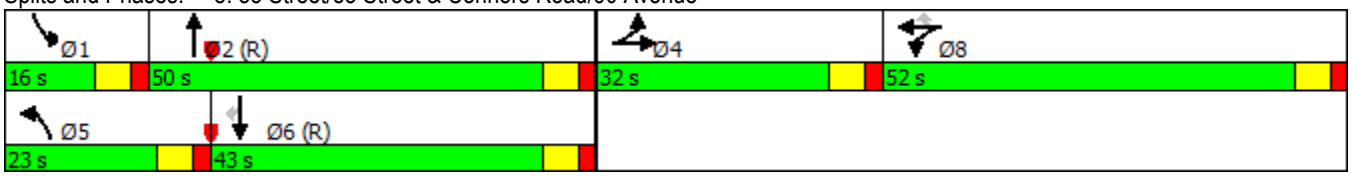
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Future Volume (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	50.0		50.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		1	1		1	2		0	1		1
Taper Length (m)	2.5			7.6			2.5			7.6		
Lane Util. Factor	*0.75	*0.75	*1.00	*0.75	*0.75	*0.75	*1.00	1.00	*1.00	*0.75	1.00	1.00
Ped Bike Factor	0.98		0.99	0.99		0.94	0.97			0.99		0.96
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	1301	2602	1735	1301	2602	1106	3469	1735	0	1301	1735	1475
Flt Permitted												
Satd. Flow (perm)	1276	2602	1709	1286	2602	1039	3361	1735	0	1282	1735	1421
Right Turn on Red			Yes			No			No			Yes
Satd. Flow (RTOR)			199									153
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		55.6			124.4			243.2			270.7	
Travel Time (s)		3.3			7.5			14.6			19.5	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			4.9			1.6			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Split	NA	Free	Split	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			Free			8						6
Minimum Split (s)	24.0	24.0		24.0	24.0	24.0	11.0	24.0		11.0	24.0	24.0
Total Split (s)	32.0	32.0		52.0	52.0	52.0	23.0	50.0		16.0	43.0	43.0
Total Split (%)	21.3%	21.3%		34.7%	34.7%	34.7%	15.3%	33.3%		10.7%	28.7%	28.7%
Maximum Green (s)	26.0	26.0		46.0	46.0	46.0	17.0	44.0		10.0	37.0	37.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.5	0.5		0.5	0.5	0.5	1.0	0.5		1.0	0.5	0.5
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.0	6.5		7.0	6.5	6.5
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	0
Act Effct Green (s)	25.5	25.5	150.0	45.5	45.5	45.5	16.0	43.5		9.0	36.5	36.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.17	0.17	1.00	0.30	0.30	0.30	0.11	0.29		0.06	0.24	0.24
v/c Ratio	0.20	1.20	0.23	0.32	0.71	0.45	1.19	0.75		1.44	0.49	0.07
Control Delay	56.3	161.8	0.3	43.2	52.2	47.8	165.9	58.8		289.5	50.7	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	56.3	161.8	0.3	43.2	52.2	47.8	165.9	58.8		289.5	50.7	1.7
LOS	E	F	A	D	D	D	F	E		F	D	A
Approach Delay		92.0			50.0			116.7			122.4	
Approach LOS		F			D			F			F	
Queue Length 50th (m)	15.2	~127.4	0.0	39.3	98.5	45.6	~79.2	101.9		~61.7	59.3	0.0
Queue Length 95th (m)	31.0	#174.2	0.0	64.4	125.8	74.8	#112.5	140.4		#109.8	85.9	3.1
Internal Link Dist (m)		31.6			100.4			219.2			246.7	
Turn Bay Length (m)	50.0		50.0	50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	221	442	1709	394	789	315	370	503		78	422	461
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.20	1.20	0.23	0.32	0.71	0.45	1.19	0.75		1.44	0.49	0.07

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 1.44
Intersection Signal Delay: 90.7 Intersection LOS: F
Intersection Capacity Utilization 74.4% ICU Level of Service D
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: 83 Street/85 Street & Connors Road/90 Avenue



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	643	813	1	0	16
Future Volume (vph)	0	643	813	1	0	16
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	3296	3296	0	0	1501
Flt Permitted						
Satd. Flow (perm)	0	3296	3296	0	0	1501
Link Speed (k/h)		50	50		20	
Link Distance (m)		124.4	195.5		22.9	
Travel Time (s)		9.0	14.1		4.1	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	643	813	1	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	643	814	0	0	16
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.1%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	42	13	1	8	0
Future Volume (vph)	2	42	13	1	8	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.990			
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	1731	1717	0	1648	0
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	1731	1717	0	1648	0
Link Speed (k/h)		20	20		20	
Link Distance (m)		26.2	33.6		250.6	
Travel Time (s)		4.7	6.0		45.1	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	42	13	1	8	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	44	14	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 19.8%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	171	1	0	108	1	3	2	0	6	1	3
Future Volume (vph)	0	171	1	0	108	1	3	2	0	6	1	3
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999			0.999						0.959	
Flt Protected								0.971			0.971	
Satd. Flow (prot)	0	1733	0	0	1733	0	0	1684	0	0	1615	0
Flt Permitted								0.971			0.971	
Satd. Flow (perm)	0	1733	0	0	1733	0	0	1684	0	0	1615	0
Link Speed (k/h)		50			50			20			20	
Link Distance (m)		18.2			62.1			250.6			293.8	
Travel Time (s)		1.3			4.5			45.1			52.9	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	171	1	0	108	1	3	2	0	6	1	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	172	0	0	109	0	0	5	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 24.5%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	61	10	33	28	53	60	0	43	68	0	83
Future Volume (vph)	12	61	10	33	28	53	60	0	43	68	0	83
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.984			0.937			0.944			0.926	
Flt Protected		0.993			0.986			0.972			0.978	
Satd. Flow (prot)	0	1695	0	0	1603	0	0	1592	0	0	1571	0
Flt Permitted		0.993			0.986			0.972			0.978	
Satd. Flow (perm)	0	1695	0	0	1603	0	0	1592	0	0	1571	0
Link Speed (k/h)		50			50			20			20	
Link Distance (m)		72.6			18.2			24.4			26.2	
Travel Time (s)		5.2			1.3			4.4			4.7	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	12	61	10	33	28	53	60	0	43	68	0	83
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	83	0	0	114	0	0	103	0	0	151	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 32.7%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	91	81	504	55	29	274
Future Volume (vph)	91	81	504	55	29	274
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	30.0		30.0	30.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.6				7.6	
Lane Util. Factor	*0.75	*0.75	1.00	*0.75	*0.75	1.00
Ped Bike Factor	0.96			0.94	0.98	
Frt		0.850		0.850		
Flt Protected						
Satd. Flow (prot)	1301	1106	1735	1106	1301	1735
Flt Permitted						
Satd. Flow (perm)	1247	1106	1735	1039	1274	1735
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (k/h)	50		50			50
Link Distance (m)	72.6		270.7			456.2
Travel Time (s)	5.2		19.5			32.8
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	91	81	504	55	29	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	91	81	504	55	29	274
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	6.1	6.1	30.5	6.1	6.1	30.5
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	6.1	1.8	6.1	6.1	1.8
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)			28.7			28.7
Detector 2 Size(m)			1.8			1.8
Detector 2 Type			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot	Prot	NA	Perm	Prot	NA

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Protected Phases	8	8	2		1	6
Permitted Phases				2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	11.0	24.0
Total Split (s)	38.0	38.0	89.0	89.0	23.0	112.0
Total Split (%)	25.3%	25.3%	59.3%	59.3%	15.3%	74.7%
Maximum Green (s)	32.0	32.0	83.0	83.0	17.0	106.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.0	1.0	0.5	0.5	1.0	0.5
Total Lost Time (s)	7.0	7.0	6.5	6.5	7.0	6.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Min	Min	C-Max	C-Max	Min	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	15.4	15.4	106.3	106.3	7.8	121.1
Actuated g/C Ratio	0.10	0.10	0.71	0.71	0.05	0.81
v/c Ratio	0.68	0.72	0.41	0.07	0.43	0.20
Control Delay	89.6	97.4	5.1	4.0	67.9	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.6	97.4	5.1	4.0	67.9	11.8
LOS	F	F	A	A	E	B
Approach Delay	93.3		5.0			17.2
Approach LOS	F		A			B
Queue Length 50th (m)	35.4	31.6	36.0	3.4	11.2	41.0
Queue Length 95th (m)	m58.0	m53.8	55.7	m8.5	m22.1	74.5
Internal Link Dist (m)	48.6		246.7			432.2
Turn Bay Length (m)		30.0		30.0	30.0	
Base Capacity (vph)	268	228	1229	736	138	1400
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.36	0.41	0.07	0.21	0.20

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 134 (89%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 23.2 Intersection LOS: C
Intersection Capacity Utilization 48.9% ICU Level of Service A

Analysis Period (min) 15

* User Entered Value

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

Splits and Phases: 16: 85 Street & 93 Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	120	109	19	174	182	95	448	39	53	161	47
Future Volume (vph)	131	120	109	19	174	182	95	448	39	53	161	47
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		30.0	0.0		0.0	50.0		30.0	0.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*0.75	*0.75	1.00	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75
Ped Bike Factor		1.00	0.96	0.98	0.99		0.98	1.00		0.99	0.99	
Frt			0.850		0.923			0.988			0.966	
Flt Protected		0.975										
Satd. Flow (prot)	0	1269	1475	1301	1186	0	1301	2562	0	1301	1245	0
Flt Permitted		0.975										
Satd. Flow (perm)	0	1263	1414	1281	1186	0	1280	2562	0	1287	1245	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			109		33						10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		160.3			29.3			456.2			113.4	
Travel Time (s)		11.5			2.1			32.8			8.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	131	120	109	19	174	182	95	448	39	53	161	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	251	109	19	356	0	95	487	0	53	208	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	38.0	38.0	38.0	43.0	43.0		19.0	53.0		16.0	50.0	
Total Split (%)	25.3%	25.3%	25.3%	28.7%	28.7%		12.7%	35.3%		10.7%	33.3%	
Maximum Green (s)	32.0	32.0	32.0	37.0	37.0		13.0	47.0		10.0	44.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		6.5	6.5	6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?								Yes		Yes		
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	Min	Min	Min	Min	Min		Max	C-Max		Max	Max	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0		19.0	19.0		19.0	19.0	
Flash Dont Walk (s)	25.0	25.0	25.0	25.0	25.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)		31.2	31.2	36.8	36.8		12.5	46.5		9.5	43.5	
Actuated g/C Ratio		0.21	0.21	0.25	0.25		0.08	0.31		0.06	0.29	
v/c Ratio		0.95	0.29	0.06	1.13		0.88	0.61		0.65	0.57	
Control Delay		102.8	10.2	44.4	135.5		125.9	39.4		101.8	50.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		102.8	10.2	44.4	135.5		125.9	39.4		101.8	50.0	
LOS		F	B	D	F		F	D		F	D	
Approach Delay		74.7			130.9			53.5			60.5	
Approach LOS		E			F			D			E	
Queue Length 50th (m)		99.0	0.0	5.8	~153.7		39.7	55.2		20.9	67.0	
Queue Length 95th (m)		#170.8	16.2	15.4	#237.8		#83.6	82.2		#49.2	104.0	
Internal Link Dist (m)		136.3			5.3			432.2			89.4	
Turn Bay Length (m)			30.0				50.0					
Base Capacity (vph)		266	383	319	315		108	794		82	368	
Starvation Cap Reductn		0	0	0	0		0	0		0	0	
Spillback Cap Reductn		0	0	0	0		0	0		0	0	
Storage Cap Reductn		0	0	0	0		0	0		0	0	
Reduced v/c Ratio		0.94	0.28	0.06	1.13		0.88	0.61		0.65	0.57	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 25 (17%), Referenced to phase 2:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 77.9 Intersection LOS: E
Intersection Capacity Utilization 102.4% ICU Level of Service G

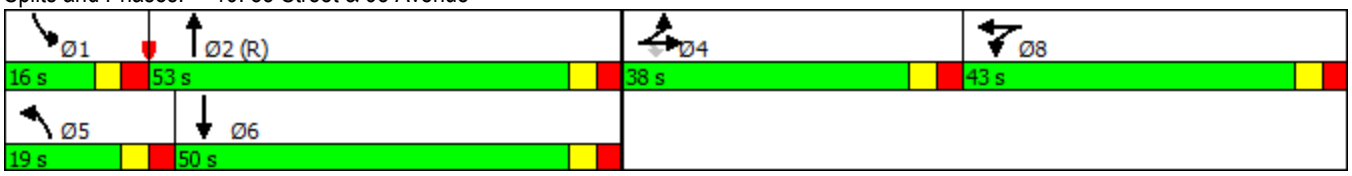
Analysis Period (min) 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 19: 85 Street & 95 Avenue



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	209	3	5	354	21	18
Future Volume (vph)	209	3	5	354	21	18
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.998				0.938	
Flt Protected				0.999	0.974	
Satd. Flow (prot)	1731	0	0	1733	1585	0
Flt Permitted				0.999	0.974	
Satd. Flow (perm)	1731	0	0	1733	1585	0
Link Speed (k/h)	50			50	20	
Link Distance (m)	24.4			70.2	166.6	
Travel Time (s)	1.8			5.1	30.0	
Confl. Peds. (#/hr)		10	10		10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	209	3	5	354	21	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	212	0	0	359	39	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 38.2%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	85	28	39	306	34	58	178	14	18	171	30
Future Volume (vph)	62	85	28	39	306	34	58	178	14	18	171	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.988			0.992			0.982	
Flt Protected		0.983			0.995			0.989			0.996	
Satd. Flow (prot)	0	1668	0	0	1705	0	0	1702	0	0	1697	0
Flt Permitted		0.983			0.995			0.989			0.996	
Satd. Flow (perm)	0	1668	0	0	1705	0	0	1702	0	0	1697	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		109.1			70.4			303.7			62.9	
Travel Time (s)		7.9			5.1			21.9			4.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	62	85	28	39	306	34	58	178	14	18	171	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	175	0	0	379	0	0	250	0	0	219	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 62.4%	ICU Level of Service B
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	46	26	18	41	54	39	185	8	9	206	22
Future Volume (vph)	20	46	26	18	41	54	39	185	8	9	206	22
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.962			0.935			0.995			0.987	
Flt Protected		0.989			0.992			0.992			0.998	
Satd. Flow (prot)	0	1650	0	0	1609	0	0	1712	0	0	1709	0
Flt Permitted		0.989			0.992			0.992			0.998	
Satd. Flow (perm)	0	1650	0	0	1609	0	0	1712	0	0	1709	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		107.9			110.0			291.8			303.7	
Travel Time (s)		7.8			7.9			21.0			21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	46	26	18	41	54	39	185	8	9	206	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	92	0	0	113	0	0	232	0	0	237	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 45.7%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	175	43	25	318	5	36	17	37	5	12	5
Future Volume (vph)	9	175	43	25	318	5	36	17	37	5	12	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.974			0.998			0.944			0.969	
Flt Protected		0.998			0.996			0.980			0.989	
Satd. Flow (prot)	0	1686	0	0	1724	0	0	1605	0	0	1662	0
Flt Permitted		0.998			0.996			0.980			0.989	
Satd. Flow (perm)	0	1686	0	0	1724	0	0	1605	0	0	1662	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		70.2			135.2			155.0			105.7	
Travel Time (s)		5.1			9.7			11.2			7.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	9	175	43	25	318	5	36	17	37	5	12	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	227	0	0	348	0	0	90	0	0	22	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 46.3%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	3296	3296	0	0	1735
Flt Permitted						
Satd. Flow (perm)	0	3296	3296	0	0	1735
Link Speed (k/h)		50	50		50	
Link Distance (m)		195.5	228.7		22.9	
Travel Time (s)		14.1	16.5		1.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 0.0%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	76	70	12	27	15	24	10	8	20	8	58
Future Volume (vph)	31	76	70	12	27	15	24	10	8	20	8	58
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.947			0.962			0.974			0.909	
Flt Protected		0.991			0.989			0.972			0.989	
Satd. Flow (prot)	0	1628	0	0	1650	0	0	1642	0	0	1560	0
Flt Permitted		0.991			0.989			0.972			0.989	
Satd. Flow (perm)	0	1628	0	0	1650	0	0	1642	0	0	1560	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		62.1			203.0			155.9			304.3	
Travel Time (s)		4.5			14.6			11.2			21.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	31	76	70	12	27	15	24	10	8	20	8	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	177	0	0	54	0	0	42	0	0	86	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Yield			Yield			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 26.7%	ICU Level of Service A
Analysis Period (min) 15	

PM 2050 Total Synchro Results

Lanes, Volumes, Timings
2: 79 Street & 90 Avenue

10-29-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	647	23	100	741	136	25	299	125	176	128	19
Future Volume (vph)	95	647	23	100	741	136	25	299	125	176	128	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99		0.99	0.99		1.00	1.00	
Frt		0.995			0.979			0.956			0.981	
Flt Protected		0.994			0.995		0.950			0.950		
Satd. Flow (prot)	0	3427	0	0	3361	0	1648	1647	0	1648	1697	0
Flt Permitted		0.719			0.785		0.663			0.231		
Satd. Flow (perm)	0	2478	0	0	2650	0	1140	1647	0	399	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			44			28			10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		219.1			411.5			72.8			23.8	
Travel Time (s)		15.8			29.6			5.2			1.7	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	95	647	23	100	741	136	25	299	125	176	128	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	765	0	0	977	0	25	424	0	176	147	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	39.0	39.0		39.0	39.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	44.0	44.0		44.0	44.0		15.0	15.0		15.0	15.0	
Total Split (s)	49.0	49.0		49.0	49.0		26.0	26.0		26.0	26.0	
Total Split (%)	65.3%	65.3%		65.3%	65.3%		34.7%	34.7%		34.7%	34.7%	
Maximum Green (s)	44.0	44.0		44.0	44.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.5			0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		5.5			5.5		5.5	5.5		5.5	5.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		43.5			43.5		20.5	20.5		20.5	20.5	
Actuated g/C Ratio		0.58			0.58		0.27	0.27		0.27	0.27	
v/c Ratio		0.53			0.63		0.08	0.90		1.61	0.31	
Control Delay		11.2			12.1		21.2	50.1		340.3	22.4	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		11.2			12.1		21.2	50.1		340.3	22.4	
LOS		B			B		C	D		F	C	
Approach Delay		11.2			12.1			48.5			195.6	
Approach LOS		B			B			D			F	
Queue Length 50th (m)		29.4			39.3		2.6	54.1		~36.5	15.3	
Queue Length 95th (m)		42.7			56.5		8.1	#105.1		#71.8	29.6	
Internal Link Dist (m)		195.1			387.5			48.8			0.1	
Turn Bay Length (m)										25.0		
Base Capacity (vph)		1440			1555		311	470		109	471	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.53			0.63		0.08	0.90		1.61	0.31	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 67 (89%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.61
Intersection Signal Delay: 41.9 Intersection LOS: D
Intersection Capacity Utilization 119.6% ICU Level of Service H

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	3296	3296	0	1735	0
Flt Permitted						
Satd. Flow (perm)	0	3296	3296	0	1735	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		205.1	219.1		12.6	
Travel Time (s)		14.8	15.8		0.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 0.0%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	199	64	55	327	13	66	3	35	12	8	7
Future Volume (vph)	13	199	64	55	327	13	66	3	35	12	8	7
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969			0.996			0.955			0.965	
Flt Protected		0.998			0.993			0.969			0.978	
Satd. Flow (prot)	0	1678	0	0	1716	0	0	1605	0	0	1637	0
Flt Permitted		0.998			0.993			0.969			0.978	
Satd. Flow (perm)	0	1678	0	0	1716	0	0	1605	0	0	1637	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		90.2			115.2			158.9			108.0	
Travel Time (s)		6.5			8.3			11.4			7.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	199	64	55	327	13	66	3	35	12	8	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	276	0	0	395	0	0	104	0	0	27	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 59.5%	ICU Level of Service B
Analysis Period (min) 15	

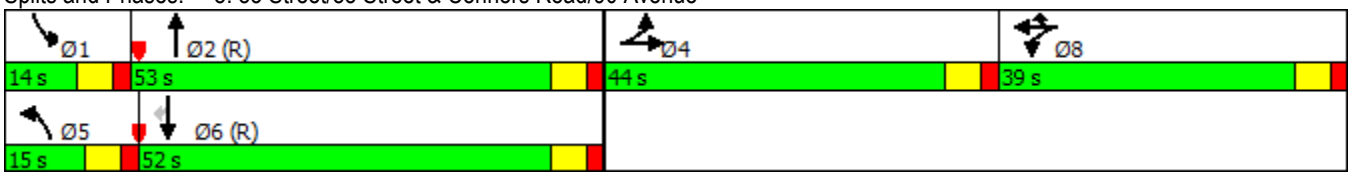
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Future Volume (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	50.0		50.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		1	1		1	2		0	1		1
Taper Length (m)	2.5			7.6			2.5			7.6		
Lane Util. Factor	*0.75	*0.75	*1.00	*0.75	*0.75	*0.75	*1.00	1.00	*1.00	*0.75	1.00	1.00
Ped Bike Factor	0.98		0.99	0.99			0.97			0.99		0.96
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	1301	2602	1735	1301	2602	1106	3469	1735	0	1301	1735	1475
Flt Permitted												
Satd. Flow (perm)	1276	2602	1709	1288	2602	1106	3378	1735	0	1285	1735	1421
Right Turn on Red			Yes			No			No			Yes
Satd. Flow (RTOR)			259									109
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		55.6			124.4			243.2			270.7	
Travel Time (s)		3.3			7.5			14.6			19.5	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			4.9			1.6			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Split	NA	Free	Split	NA	Prot	Prot	NA		Prot	NA	Perm
Protected Phases	4	4		8	8	8	5	2		1	6	
Permitted Phases			Free									6
Minimum Split (s)	24.0	24.0		24.0	24.0	24.0	13.0	24.0		13.0	24.0	24.0
Total Split (s)	44.0	44.0		39.0	39.0	39.0	15.0	53.0		14.0	52.0	52.0
Total Split (%)	29.3%	29.3%		26.0%	26.0%	26.0%	10.0%	35.3%		9.3%	34.7%	34.7%
Maximum Green (s)	38.0	38.0		33.0	33.0	33.0	9.0	47.0		8.0	46.0	46.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.5	0.5		0.5	0.5	0.5	1.0	0.5		1.0	0.5	0.5
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.0	6.5		7.0	6.5	6.5
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	0
Act Effct Green (s)	37.5	37.5	150.0	32.5	32.5	32.5	8.0	46.5		7.0	45.5	45.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.25	0.25	1.00	0.22	0.22	0.22	0.05	0.31		0.05	0.30	0.30
v/c Ratio	0.13	0.97	0.35	0.39	1.01	0.46	1.66	0.93		2.05	0.63	0.12
Control Delay	45.1	84.4	0.6	55.1	98.3	58.3	361.8	75.9		550.4	49.8	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	45.1	84.4	0.6	55.1	98.3	58.3	361.8	75.9		550.4	49.8	7.1
LOS	D	F	A	E	F	E	F	E		F	D	A
Approach Delay		43.6			86.8			184.6			163.8	
Approach LOS		D			F			F			F	
Queue Length 50th (m)	13.0	125.1	0.0	37.3	~116.2	38.0	~66.4	145.5		~77.6	99.7	4.7
Queue Length 95th (m)	27.3	#175.4	0.0	63.0	#166.1	64.8	#96.0	#213.4		#130.6	132.3	12.0
Internal Link Dist (m)		31.6			100.4			219.2			246.7	
Turn Bay Length (m)	50.0		50.0	50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	325	650	1709	281	563	239	185	537		60	526	506
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.13	0.97	0.35	0.39	1.01	0.46	1.66	0.93		2.05	0.63	0.12

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 145
Control Type: Pretimed
Maximum v/c Ratio: 2.05
Intersection Signal Delay: 105.7 Intersection LOS: F
Intersection Capacity Utilization 83.7% ICU Level of Service E
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: 83 Street/85 Street & Connors Road/90 Avenue



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	765	782	3	0	10
Future Volume (vph)	0	765	782	3	0	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.999			0.865
Flt Protected						
Satd. Flow (prot)	0	3296	3293	0	0	1501
Flt Permitted						
Satd. Flow (perm)	0	3296	3293	0	0	1501
Link Speed (k/h)		50	50		20	
Link Distance (m)		124.4	205.1		22.9	
Travel Time (s)		9.0	14.8		4.1	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	765	782	3	0	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	765	785	0	0	10
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.7	3.7		0.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 37.2%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	3	35	35	24	9	0
Future Volume (vph)	3	35	35	24	9	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.945			
Flt Protected		0.996			0.950	
Satd. Flow (prot)	0	1728	1639	0	1648	0
Flt Permitted		0.996			0.950	
Satd. Flow (perm)	0	1728	1639	0	1648	0
Link Speed (k/h)		20	20		20	
Link Distance (m)		26.2	33.6		250.6	
Travel Time (s)		4.7	6.0		45.1	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3	35	35	24	9	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	38	59	0	9	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.7	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.3%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	177	8	0	173	5	2	0	3	1	1	6
Future Volume (vph)	10	177	8	0	173	5	2	0	3	1	1	6
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.994			0.996			0.919			0.899	
Flt Protected		0.997						0.980			0.994	
Satd. Flow (prot)	0	1719	0	0	1728	0	0	1562	0	0	1550	0
Flt Permitted		0.997						0.980			0.994	
Satd. Flow (perm)	0	1719	0	0	1728	0	0	1562	0	0	1550	0
Link Speed (k/h)		50			50			20			20	
Link Distance (m)		18.2			88.1			250.6			293.8	
Travel Time (s)		1.3			6.3			45.1			52.9	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	177	8	0	173	5	2	0	3	1	1	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	195	0	0	178	0	0	5	0	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 33.3%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	127	20	48	44	89	29	0	32	35	0	38
Future Volume (vph)	23	127	20	48	44	89	29	0	32	35	0	38
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.984			0.934			0.929			0.930	
Flt Protected		0.993			0.987			0.977			0.977	
Satd. Flow (prot)	0	1695	0	0	1599	0	0	1575	0	0	1576	0
Flt Permitted		0.993			0.987			0.977			0.977	
Satd. Flow (perm)	0	1695	0	0	1599	0	0	1575	0	0	1576	0
Link Speed (k/h)		50			50			20			20	
Link Distance (m)		72.6			18.2			24.4			26.2	
Travel Time (s)		5.2			1.3			4.4			4.7	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	23	127	20	48	44	89	29	0	32	35	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	170	0	0	181	0	0	61	0	0	73	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 36.4%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	55	56	570	107	63	420
Future Volume (vph)	55	56	570	107	63	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0	30.0		30.0	30.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.6				7.6	
Lane Util. Factor	*0.75	*0.75	1.00	*0.75	*0.75	1.00
Ped Bike Factor	0.96			0.94	0.98	
Frt		0.850		0.850		
Flt Protected						
Satd. Flow (prot)	1301	1106	1735	1106	1301	1735
Flt Permitted						
Satd. Flow (perm)	1247	1106	1735	1039	1276	1735
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (k/h)	50		50			50
Link Distance (m)	72.6		270.7			456.2
Travel Time (s)	5.2		19.5			32.8
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	56	570	107	63	420
Shared Lane Traffic (%)						
Lane Group Flow (vph)	55	56	570	107	63	420
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.9		4.9			4.9
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24	14		14	24	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	6.1	6.1	30.5	6.1	6.1	30.5
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	6.1	6.1	1.8	6.1	6.1	1.8
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)			28.7			28.7
Detector 2 Size(m)			1.8			1.8
Detector 2 Type			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot	Prot	NA	Perm	Prot	NA

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Protected Phases	8	8	2		1	6
Permitted Phases				2		
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	11.0	24.0
Total Split (s)	38.0	38.0	89.0	89.0	23.0	112.0
Total Split (%)	25.3%	25.3%	59.3%	59.3%	15.3%	74.7%
Maximum Green (s)	32.0	32.0	83.0	83.0	17.0	106.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.0	1.0	0.5	0.5	1.0	0.5
Total Lost Time (s)	7.0	7.0	6.5	6.5	7.0	6.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Min	Min	C-Max	C-Max	Min	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	11.9	11.9	106.0	106.0	11.6	124.6
Actuated g/C Ratio	0.08	0.08	0.71	0.71	0.08	0.83
v/c Ratio	0.53	0.64	0.46	0.15	0.63	0.29
Control Delay	82.0	95.1	3.4	2.9	72.3	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.0	95.1	3.4	2.9	72.3	9.5
LOS	F	F	A	A	E	A
Approach Delay	88.6		3.3			17.7
Approach LOS	F		A			B
Queue Length 50th (m)	21.4	22.1	13.0	3.2	21.0	83.1
Queue Length 95th (m)	m39.0	m39.6	m26.4	m5.2	m29.3	m130.0
Internal Link Dist (m)	48.6		246.7			432.2
Turn Bay Length (m)		30.0		30.0	30.0	
Base Capacity (vph)	268	228	1226	734	140	1441
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.25	0.46	0.15	0.45	0.29

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 134 (89%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 16.2 Intersection LOS: B
Intersection Capacity Utilization 61.1% ICU Level of Service B

Analysis Period (min) 15

* User Entered Value

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

Splits and Phases: 16: 85 Street & 93 Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	191	76	46	287	66	102	502	19	68	339	30
Future Volume (vph)	55	191	76	46	287	66	102	502	19	68	339	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		30.0	0.0		0.0	50.0		30.0	0.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*0.75	*0.75	1.00	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75	*0.75
Ped Bike Factor		1.00	0.96	0.98	1.00		0.99	1.00		0.99	1.00	
Frt			0.850		0.972			0.995			0.988	
Flt Protected		0.989										
Satd. Flow (prot)	0	1287	1475	1301	1259	0	1301	2585	0	1301	1281	0
Flt Permitted		0.989										
Satd. Flow (perm)	0	1284	1414	1281	1259	0	1284	2585	0	1288	1281	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			153		6						3	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		160.3			29.3			456.2			113.4	
Travel Time (s)		11.5			2.1			32.8			8.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	191	76	46	287	66	102	502	19	68	339	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	246	76	46	353	0	102	521	0	68	369	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4									
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	41.0	41.0	41.0	17.0	17.0		32.0	76.0		16.0	60.0	
Total Split (%)	27.3%	27.3%	27.3%	11.3%	11.3%		21.3%	50.7%		10.7%	40.0%	
Maximum Green (s)	35.0	35.0	35.0	11.0	11.0		26.0	70.0		10.0	54.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		6.5	6.5	6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	Min	Min	Min	Min	Min		Max	C-Max		Max	Max	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0		19.0	19.0		19.0	19.0	
Flash Dont Walk (s)	25.0	25.0	25.0	25.0	25.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)		32.1	32.1	12.9	12.9		25.5	69.5		9.5	53.5	
Actuated g/C Ratio		0.21	0.21	0.09	0.09		0.17	0.46		0.06	0.36	
v/c Ratio		0.89	0.18	0.41	3.12		0.46	0.44		0.83	0.81	
Control Delay		89.5	0.9	78.7	995.8		77.5	15.5		128.2	58.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		89.5	0.9	78.7	995.8		77.5	15.5		128.2	58.1	
LOS		F	A	E	F		E	B		F	E	
Approach Delay		68.6			890.1			25.7			69.0	
Approach LOS		E			F			C			E	
Queue Length 50th (m)		93.7	0.0	17.8	~252.2		42.1	35.7		27.2	130.9	
Queue Length 95th (m)		#153.7	0.0	36.8	#336.4		68.9	49.0		#65.6	#198.8	
Internal Link Dist (m)		136.3			5.3			432.2			89.4	
Turn Bay Length (m)			30.0				50.0					
Base Capacity (vph)		296	443	112	113		221	1197		82	458	
Starvation Cap Reductn		0	0	0	0		0	0		0	0	
Spillback Cap Reductn		0	0	0	0		0	0		0	0	
Storage Cap Reductn		0	0	0	0		0	0		0	0	
Reduced v/c Ratio		0.83	0.17	0.41	3.12		0.46	0.44		0.83	0.81	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 25 (17%), Referenced to phase 2:NBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 3.12
Intersection Signal Delay: 237.7 Intersection LOS: F
Intersection Capacity Utilization 100.9% ICU Level of Service G

Analysis Period (min) 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Splits and Phases: 19: 85 Street & 95 Avenue

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	261	17	10	391	10	15
Future Volume (vph)	261	17	10	391	10	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.992				0.919	
Flt Protected				0.999	0.980	
Satd. Flow (prot)	1721	0	0	1733	1562	0
Flt Permitted				0.999	0.980	
Satd. Flow (perm)	1721	0	0	1733	1562	0
Link Speed (k/h)	50			50	20	
Link Distance (m)	24.4			90.2	166.6	
Travel Time (s)	1.8			6.5	30.0	
Confl. Peds. (#/hr)		10	10		10	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	261	17	10	391	10	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	278	0	0	401	25	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.9			4.9	4.9	
Two way Left Turn Lane						
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 44.7%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	134	82	29	346	41	109	333	27	49	142	64
Future Volume (vph)	144	134	82	29	346	41	109	333	27	49	142	64
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969			0.987			0.992			0.966	
Flt Protected		0.980			0.997			0.989			0.990	
Satd. Flow (prot)	0	1647	0	0	1707	0	0	1702	0	0	1659	0
Flt Permitted		0.980			0.997			0.989			0.990	
Satd. Flow (perm)	0	1647	0	0	1707	0	0	1702	0	0	1659	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		212.6			132.4			328.5			41.1	
Travel Time (s)		15.3			9.5			23.7			3.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	144	134	82	29	346	41	109	333	27	49	142	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	360	0	0	416	0	0	469	0	0	255	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 96.4%	ICU Level of Service F
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	35	10	11	71	33	21	419	13	18	206	12
Future Volume (vph)	22	35	10	11	71	33	21	419	13	18	206	12
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.961			0.996			0.993	
Flt Protected		0.984			0.995			0.998			0.996	
Satd. Flow (prot)	0	1673	0	0	1659	0	0	1724	0	0	1716	0
Flt Permitted		0.984			0.995			0.998			0.996	
Satd. Flow (perm)	0	1673	0	0	1659	0	0	1724	0	0	1716	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		172.0			155.0			250.5			328.5	
Travel Time (s)		12.4			11.2			18.0			23.7	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	22	35	10	11	71	33	21	419	13	18	206	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	0	0	115	0	0	453	0	0	236	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 47.7%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	122	30	8	38	25	49	34	25	25	8	93
Future Volume (vph)	29	122	30	8	38	25	49	34	25	25	8	93
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.952			0.969			0.900	
Flt Protected		0.992			0.994			0.978			0.990	
Satd. Flow (prot)	0	1683	0	0	1642	0	0	1644	0	0	1546	0
Flt Permitted		0.992			0.994			0.978			0.990	
Satd. Flow (perm)	0	1683	0	0	1642	0	0	1644	0	0	1546	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		88.1			88.1			89.8			300.2	
Travel Time (s)		6.3			6.3			6.5			21.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	29	122	30	8	38	25	49	34	25	25	8	93
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	181	0	0	71	0	0	108	0	0	126	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Yield			Yield			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 36.7%	ICU Level of Service A
Analysis Period (min) 15	

AM 2050 Total Hold Phase Synchro Results

Lanes, Volumes, Timings
8: 83 Street/85 Street & Connors Road/90 Avenue

10-29-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Future Volume (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	50.0		50.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		1	1		1	2		0	1		1
Taper Length (m)	2.5			7.6			2.5			7.6		
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00	1.00
Ped Bike Factor	0.99		0.99	0.99		0.94	0.97			0.99		0.96
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	1735	3469	1735	1735	3469	1475	3469	1735	0	1735	1735	1475
Flt Permitted	0.277			0.299						0.538		
Satd. Flow (perm)	475	3469	1709	515	3469	1385	3361	1735	0	919	1735	1421
Right Turn on Red			Yes			No			No			Yes
Satd. Flow (RTOR)			265									109
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		55.6			124.4			243.2			726.9	
Travel Time (s)		3.3			7.5			14.6			52.3	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	531	387	128	558	142	442	376	0	112	207	32
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			4.9			1.6			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Free	Perm	NA	Perm	Prot	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		Free	8		8				6		6
Minimum Split (s)	24.0	24.0		24.0	24.0	24.0	11.0	24.0		24.0	24.0	24.0
Total Split (s)	43.0	43.0		43.0	43.0	43.0	25.0	69.0		44.0	44.0	44.0
Total Split (%)	28.7%	28.7%		28.7%	28.7%	28.7%	16.7%	46.0%		29.3%	29.3%	29.3%
Maximum Green (s)	37.0	37.0		37.0	37.0	37.0	19.0	63.0		38.0	38.0	38.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.5	0.5		0.5	0.5	0.5	1.0	0.5		1.0	0.5	0.5
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.0	6.5		7.0	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0		0		0	0	0
Act Effct Green (s)	36.5	36.5	150.0	36.5	36.5	36.5	18.0	62.5		37.0	37.5	37.5

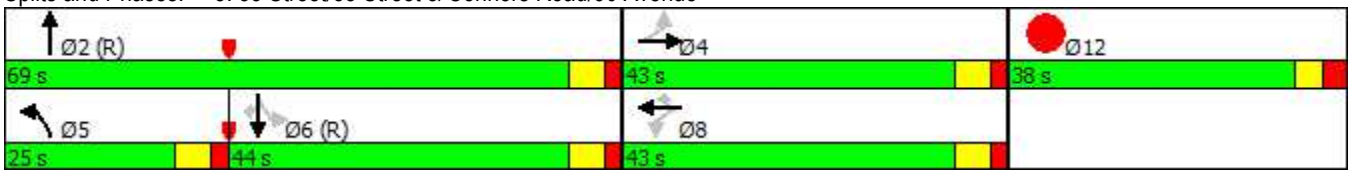
Lane Group	Ø12
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	12
Permitted Phases	
Minimum Split (s)	38.0
Total Split (s)	38.0
Total Split (%)	25%
Maximum Green (s)	32.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.24	0.24	1.00	0.24	0.24	0.24	0.12	0.42		0.25	0.25	0.25
v/c Ratio	0.38	0.63	0.23	1.02	0.66	0.42	1.06	0.52		0.50	0.48	0.07
Control Delay	59.0	54.6	0.3	141.7	55.6	52.5	122.7	35.8		43.8	39.1	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	59.0	54.6	0.3	141.7	55.6	52.5	122.7	35.8		43.8	39.1	0.5
LOS	E	D	A	F	E	D	F	D		D	D	A
Approach Delay		33.0			68.4			82.8			37.1	
Approach LOS		C			E			F			D	
Queue Length 50th (m)	11.0	71.1	0.0	~40.3	75.5	35.9	~72.1	82.7		18.0	33.5	0.1
Queue Length 95th (m)	24.2	89.9	0.0	#82.8	94.8	57.5	#105.4	113.8		30.2	48.7	m0.1
Internal Link Dist (m)		31.6			100.4			219.2			702.9	
Turn Bay Length (m)	50.0		50.0	50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	115	844	1709	125	844	337	416	722		226	433	437
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.38	0.63	0.23	1.02	0.66	0.42	1.06	0.52		0.50	0.48	0.07

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 110
Control Type: Pretimed
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 57.1 Intersection LOS: E
Intersection Capacity Utilization 74.4% ICU Level of Service D
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: 83 Street/85 Street & Connors Road/90 Avenue



Lane Group	Ø12
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	120	109	19	174	182	95	448	39	53	161	47
Future Volume (vph)	131	120	109	19	174	182	95	448	39	53	161	47
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		30.0	0.0		0.0	50.0		30.0	0.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00
Ped Bike Factor		1.00	0.96	0.98	0.99		0.99	1.00		0.99	0.99	
Frt			0.850		0.923			0.988			0.966	
Flt Protected		0.975										
Satd. Flow (prot)	0	1691	1475	1735	1581	0	1735	3417	0	1735	1660	0
Flt Permitted		0.344		0.603			0.501			0.353		
Satd. Flow (perm)	0	595	1414	1030	1581	0	857	3417	0	607	1660	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			85		36						10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		160.3			29.3			726.9			113.4	
Travel Time (s)		11.5			2.1			52.3			8.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	131	120	109	19	174	182	95	448	39	53	161	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	251	109	19	356	0	95	487	0	53	208	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5	6.1	6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	

Lane Group	Ø12
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	7	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	11.0	16.0	16.0	16.0	16.0		16.0	16.0		16.0	16.0	
Total Split (s)	15.0	66.0	66.0	51.0	51.0		46.0	46.0		46.0	46.0	
Total Split (%)	10.0%	44.0%	44.0%	34.0%	34.0%		30.7%	30.7%		30.7%	30.7%	
Maximum Green (s)	9.0	60.0	60.0	45.0	45.0		40.0	40.0		40.0	40.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		6.5	6.5	6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	Min	Min	Min	Min	Min		C-Max	C-Max		Min	Min	
Walk Time (s)		10.0	10.0	10.0	10.0		19.0	19.0		19.0	19.0	
Flash Dont Walk (s)		25.0	25.0	25.0	25.0		16.0	16.0		16.0	16.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0		0	0	
Act Effct Green (s)		58.3	58.3	46.8	46.8		39.5	39.5		39.5	39.5	
Actuated g/C Ratio		0.39	0.39	0.31	0.31		0.26	0.26		0.26	0.26	
v/c Ratio		0.94	0.18	0.06	0.69		0.42	0.54		0.33	0.47	
Control Delay		82.0	9.4	36.2	48.0		57.4	55.6		51.8	48.2	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		82.0	9.4	36.2	48.0		57.4	55.6		51.8	48.2	
LOS		F	A	D	D		E	E		D	D	
Approach Delay		60.0			47.4			55.9			48.9	
Approach LOS		E			D			E			D	
Queue Length 50th (m)		52.6	4.4	3.9	83.2		29.1	75.7		12.8	49.8	
Queue Length 95th (m)		#101.6	16.9	10.4	119.5		49.0	94.1		26.7	75.3	
Internal Link Dist (m)		136.3			5.3			702.9			89.4	
Turn Bay Length (m)			30.0				50.0					
Base Capacity (vph)		272	612	324	523		225	899		159	444	
Starvation Cap Reductn		0	0	0	0		0	0		0	0	
Spillback Cap Reductn		0	0	0	0		0	0		0	0	
Storage Cap Reductn		0	0	0	0		0	0		0	0	
Reduced v/c Ratio		0.92	0.18	0.06	0.68		0.42	0.54		0.33	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 110 (73%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 53.7 Intersection LOS: D
Intersection Capacity Utilization 102.4% ICU Level of Service G

Lane Group	Ø12
Protected Phases	12
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	32.0
Minimum Split (s)	38.0
Total Split (s)	38.0
Total Split (%)	25%
Maximum Green (s)	32.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Walk Time (s)	7.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

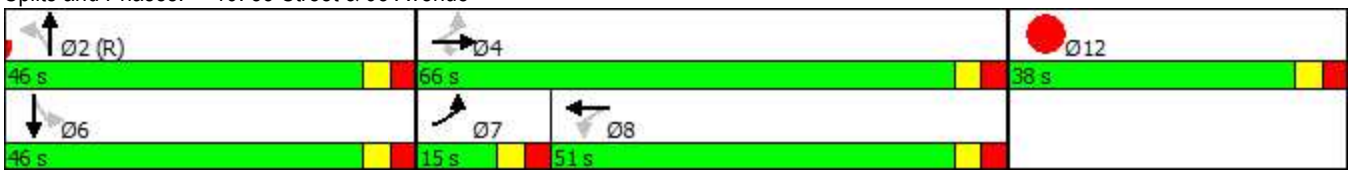
Intersection Summary

Analysis Period (min) 15

* User Entered Value

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

Splits and Phases: 19: 85 Street & 95 Avenue



PM 2050 Hold Phase Synchro Results

Lanes, Volumes, Timings
8: 83 Street/85 Street & Connors Road/90 Avenue

10-29-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Future Volume (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	50.0		50.0	50.0		50.0	100.0		0.0	30.0		30.0
Storage Lanes	1		1	1		1	2		0	1		1
Taper Length (m)	2.5			7.6			2.5			7.6		
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	1.00	*1.00	*1.00	1.00	1.00
Ped Bike Factor	0.99		0.99	0.99		0.94	0.97			0.99		0.96
Frt						0.850						0.850
Flt Protected												
Satd. Flow (prot)	1735	3469	1735	1735	3469	1475	3469	1735	0	1735	1735	1475
Flt Permitted	0.287			0.242						0.334		
Satd. Flow (perm)	492	3469	1709	418	3469	1385	3378	1735	0	575	1735	1421
Right Turn on Red			Yes			No			No			Yes
Satd. Flow (RTOR)			345									109
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		55.6			124.4			243.2			726.9	
Travel Time (s)		3.3			7.5			14.6			52.3	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	632	599	109	570	109	308	502	0	123	333	61
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			7.4			7.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			4.9			1.6			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Free	Perm	NA	Perm	Prot	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		Free	8		8				6		6
Minimum Split (s)	24.0	24.0		24.0	24.0	24.0	11.0	24.0		24.0	24.0	24.0
Total Split (s)	46.0	46.0		46.0	46.0	46.0	15.0	66.0		51.0	51.0	51.0
Total Split (%)	30.7%	30.7%		30.7%	30.7%	30.7%	10.0%	44.0%		34.0%	34.0%	34.0%
Maximum Green (s)	40.0	40.0		40.0	40.0	40.0	9.0	60.0		45.0	45.0	45.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.5	0.5		0.5	0.5	0.5	1.0	0.5		0.5	0.5	0.5
Total Lost Time (s)	6.5	6.5		6.5	6.5	6.5	7.0	6.5		6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0		0		0	0	0
Act Effct Green (s)	39.5	39.5	150.0	39.5	39.5	39.5	8.0	59.5		44.5	44.5	44.5

Lane Group	Ø12
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	12
Permitted Phases	
Minimum Split (s)	38.0
Total Split (s)	38.0
Total Split (%)	25%
Maximum Green (s)	32.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	

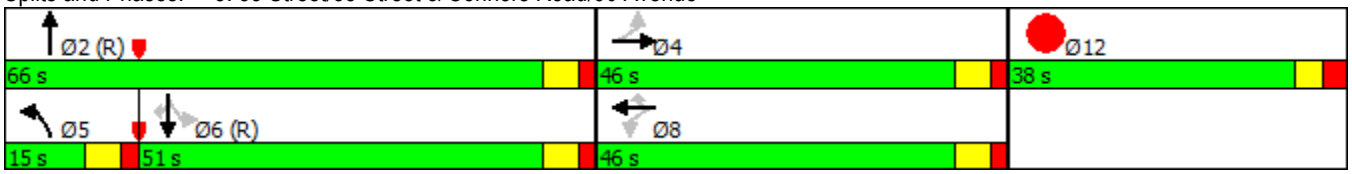
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.26	0.26	1.00	0.26	0.26	0.26	0.05	0.40		0.30	0.30	0.30
v/c Ratio	0.33	0.69	0.35	0.99	0.62	0.30	1.66	0.73		0.72	0.65	0.12
Control Delay	53.1	54.4	0.6	137.9	52.3	47.0	361.8	45.9		85.1	68.6	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	53.1	54.4	0.6	137.9	52.3	47.0	361.8	45.9		85.1	68.6	17.5
LOS	D	D	A	F	D	D	F	D		F	E	B
Approach Delay		29.0			63.4			166.0			66.5	
Approach LOS		C			E			F			E	
Queue Length 50th (m)	10.1	85.3	0.0	32.5	75.2	26.1	~66.4	126.1		37.7	101.6	5.1
Queue Length 95th (m)	22.7	105.9	0.0	#73.4	94.3	43.9	#96.0	169.9		m51.8	m128.9	m9.9
Internal Link Dist (m)		31.6			100.4			219.2			702.9	
Turn Bay Length (m)	50.0		50.0	50.0		50.0	100.0			30.0		30.0
Base Capacity (vph)	129	913	1709	110	913	364	185	688		170	514	498
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.33	0.69	0.35	0.99	0.62	0.30	1.66	0.73		0.72	0.65	0.12

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 120
Control Type: Pretimed
Maximum v/c Ratio: 1.66
Intersection Signal Delay: 75.5 Intersection LOS: E
Intersection Capacity Utilization 83.3% ICU Level of Service E
Analysis Period (min) 15

* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: 83 Street/85 Street & Connors Road/90 Avenue



Lane Group	Ø12
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	191	76	46	287	66	102	502	19	68	339	30
Future Volume (vph)	55	191	76	46	287	66	102	502	19	68	339	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		30.0	0.0		0.0	50.0		30.0	0.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*1.00	*1.00	1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00
Ped Bike Factor		1.00	0.96	0.99	1.00		0.99	1.00		0.99	1.00	
Frt			0.850		0.972			0.995			0.988	
Flt Protected		0.989										
Satd. Flow (prot)	0	1716	1475	1735	1678	0	1735	3447	0	1735	1708	0
Flt Permitted		0.426		0.423			0.206			0.471		
Satd. Flow (perm)	0	738	1414	724	1678	0	355	3447	0	809	1708	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)			109		7						3	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		160.3			29.3			726.9			113.4	
Travel Time (s)		11.5			2.1			52.3			8.2	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	55	191	76	46	287	66	102	502	19	68	339	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	246	76	46	353	0	102	521	0	68	369	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0		11.0	16.0		16.0	16.0	
Total Split (s)	44.0	44.0	44.0	44.0	44.0		22.0	68.0		46.0	46.0	
Total Split (%)	29.3%	29.3%	29.3%	29.3%	29.3%		14.7%	45.3%		30.7%	30.7%	
Maximum Green (s)	38.0	38.0	38.0	38.0	38.0		16.0	62.0		40.0	40.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		6.5	6.5	6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Walk Time (s)	10.0	10.0	10.0	10.0	10.0			19.0		19.0	19.0	
Flash Dont Walk (s)	25.0	25.0	25.0	25.0	25.0			16.0		16.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		37.5	37.5	37.5	37.5		61.5	61.5		39.5	39.5	

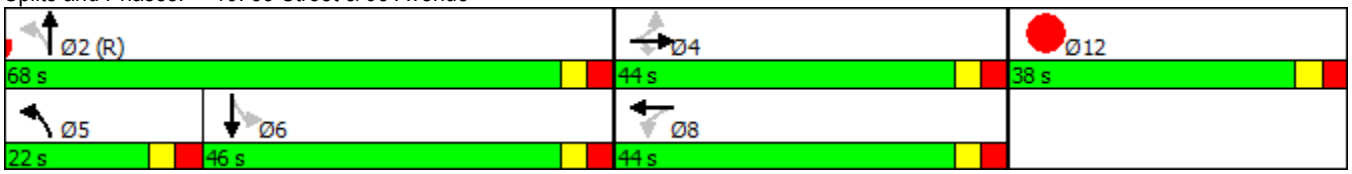
Lane Group	Ø12
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (m)	
Storage Lanes	
Taper Length (m)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (k/h)	
Turn Type	
Protected Phases	12
Permitted Phases	
Minimum Split (s)	38.0
Total Split (s)	38.0
Total Split (%)	25%
Maximum Green (s)	32.0
Yellow Time (s)	3.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Walk Time (s)	7.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio		0.25	0.25	0.25	0.25		0.41	0.41		0.26	0.26	
v/c Ratio		1.34	0.17	0.25	0.83		0.35	0.37		0.32	0.82	
Control Delay		226.2	3.4	49.7	69.8		40.1	38.6		49.5	67.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		226.2	3.4	49.7	69.8		40.1	38.6		49.5	67.1	
LOS		F	A	D	E		D	D		D	E	
Approach Delay		173.6			67.5			38.8			64.4	
Approach LOS		F			E			D			E	
Queue Length 50th (m)		~94.8	0.0	11.0	98.4		18.6	47.3		16.4	103.0	
Queue Length 95th (m)		#149.7	5.0	23.4	#147.6		m30.8	67.0		31.4	#151.2	
Internal Link Dist (m)		136.3			5.3			702.9			89.4	
Turn Bay Length (m)			30.0				50.0					
Base Capacity (vph)		184	435	181	424		288	1413		213	451	
Starvation Cap Reductn		0	0	0	0		0	0		0	0	
Spillback Cap Reductn		0	0	0	0		0	0		0	0	
Storage Cap Reductn		0	0	0	0		0	0		0	0	
Reduced v/c Ratio		1.34	0.17	0.25	0.83		0.35	0.37		0.32	0.82	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle: 115
Control Type: Pretimed
Maximum v/c Ratio: 1.34
Intersection Signal Delay: 75.9 Intersection LOS: E
Intersection Capacity Utilization 116.5% ICU Level of Service H
Analysis Period (min) 15
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 19: 85 Street & 95 Avenue



Lane Group	Ø12
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

AM 2050 Total Improvements Synchro Results

Lanes, Volumes, Timings
2: 79 Street & 90 Avenue

10-29-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	605	13	118	669	46	81	169	110	191	185	64
Future Volume (vph)	25	605	13	118	669	46	81	169	110	191	185	64
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00		0.99	0.99		0.99	0.99	
Frt		0.997			0.992			0.941			0.961	
Flt Protected		0.998			0.993		0.950			0.950		
Satd. Flow (prot)	0	3449	0	0	3410	0	1648	1617	0	1648	1657	0
Flt Permitted		0.907			0.746		0.605			0.275		
Satd. Flow (perm)	0	3134	0	0	2559	0	1041	1617	0	474	1657	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			10			39			26	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		228.7			411.5			72.8			26.5	
Travel Time (s)		16.5			29.6			5.2			1.9	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	605	13	118	669	46	81	169	110	191	185	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	643	0	0	833	0	81	279	0	191	249	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		10.0	10.0		7.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		26.0	26.0		11.5	26.0	
Total Split (s)	42.0	42.0		42.0	42.0		26.0	26.0		12.0	38.0	
Total Split (%)	52.5%	52.5%		52.5%	52.5%		32.5%	32.5%		15.0%	47.5%	
Maximum Green (s)	37.0	37.0		37.0	37.0		21.0	21.0		7.5	33.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.5	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.5			0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Min	Min		None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		14.0	14.0			14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0	
Act Effct Green (s)		40.9			40.9		16.1	16.1		28.6	28.1	
Actuated g/C Ratio		0.51			0.51		0.20	0.20		0.36	0.35	
v/c Ratio		0.40			0.63		0.39	0.78		0.70	0.42	
Control Delay		13.7			17.7		31.9	41.2		33.4	19.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		13.7			17.7		31.9	41.2		33.4	19.0	
LOS		B			B		C	D		C	B	
Approach Delay		13.7			17.7			39.1			25.2	
Approach LOS		B			B			D			C	
Queue Length 50th (m)		28.7			43.5		10.6	34.5		20.4	24.7	
Queue Length 95th (m)		44.6			68.1		21.7	56.9		#35.2	40.0	
Internal Link Dist (m)		204.7			387.5			48.8			2.5	
Turn Bay Length (m)										25.0		
Base Capacity (vph)		1604			1313		266	443		272	688	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.40			0.63		0.30	0.63		0.70	0.36	

Intersection Summary

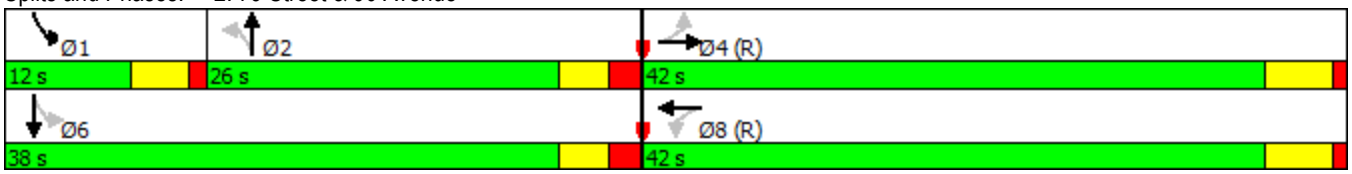
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 91.7% ICU Level of Service F

Analysis Period (min) 15

* User Entered Value

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

Splits and Phases: 2: 79 Street & 90 Avenue



PM 2050 Improvements
Synchro Results

Lanes, Volumes, Timings
2: 79 Street & 90 Avenue

10-29-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	647	23	100	741	136	25	299	125	176	128	19
Future Volume (vph)	95	647	23	100	741	136	25	299	125	176	128	19
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	*1.00	*1.00	*1.00	*1.00	*1.00	*1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99		0.99	0.99		1.00	1.00	
Frt		0.995			0.979			0.956			0.981	
Flt Protected		0.994			0.995		0.950			0.950		
Satd. Flow (prot)	0	3427	0	0	3360	0	1648	1647	0	1648	1697	0
Flt Permitted		0.645			0.730		0.663			0.176		
Satd. Flow (perm)	0	2223	0	0	2464	0	1139	1647	0	304	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			30			26			12	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		219.1			411.5			72.8			23.8	
Travel Time (s)		15.8			29.6			5.2			1.7	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	95	647	23	100	741	136	25	299	125	176	128	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	765	0	0	977	0	25	424	0	176	147	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		28.7			28.7			28.7			28.7	
Detector 2 Size(m)		1.8			1.8			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		10.0	10.0		7.0	10.0	
Minimum Split (s)	23.0	23.0		23.0	23.0		26.0	26.0		11.5	26.0	
Total Split (s)	40.0	40.0		40.0	40.0		28.0	28.0		12.0	40.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		35.0%	35.0%		15.0%	50.0%	
Maximum Green (s)	35.0	35.0		35.0	35.0		23.0	23.0		7.5	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	3.0		3.5	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		2.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.5			0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)		5.5			5.5		5.5	5.5		5.0	5.5	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Min	Min		None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		14.0	14.0			14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0			0	
Act Effct Green (s)		35.4			35.4		21.6	21.6		34.1	33.6	
Actuated g/C Ratio		0.44			0.44		0.27	0.27		0.43	0.42	
v/c Ratio		0.78			0.88		0.08	0.92		0.72	0.20	
Control Delay		26.0			31.6		22.1	53.9		33.1	14.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		26.0			31.6		22.1	53.9		33.1	14.0	
LOS		C			C		C	D		C	B	
Approach Delay		26.0			31.6			52.1			24.4	
Approach LOS		C			C			D			C	
Queue Length 50th (m)		48.3			65.1		2.8	57.9		16.2	12.3	
Queue Length 95th (m)		#70.8			#103.4		8.4	#108.5		#34.8	23.5	
Internal Link Dist (m)		195.1			387.5			48.8			0.1	
Turn Bay Length (m)										25.0		
Base Capacity (vph)		987			1108		320	481		246	738	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.78			0.88		0.08	0.88		0.72	0.20	

Intersection Summary

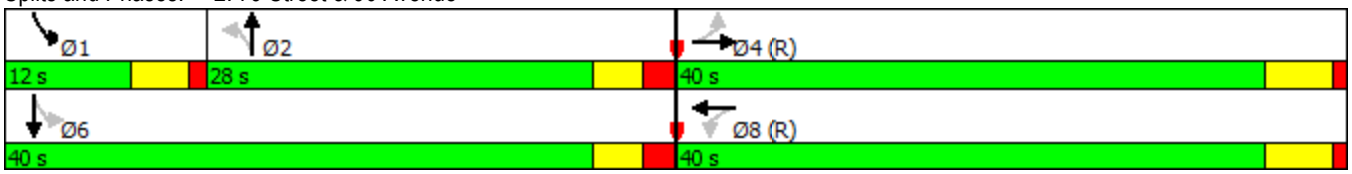
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 32.6 Intersection LOS: C
Intersection Capacity Utilization 107.6% ICU Level of Service G

Analysis Period (min) 15

* User Entered Value

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

Splits and Phases: 2: 79 Street & 90 Avenue



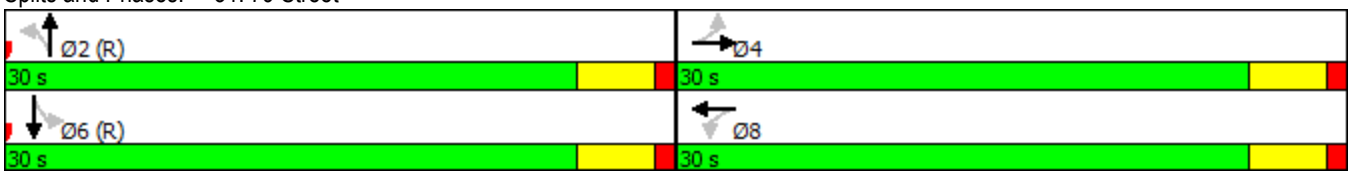
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	134	82	29	346	41	109	333	27	49	142	64
Future Volume (vph)	144	134	82	29	346	41	109	333	27	49	142	64
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969			0.987			0.992			0.966	
Flt Protected		0.980			0.997			0.989			0.990	
Satd. Flow (prot)	0	1647	0	0	1707	0	0	1702	0	0	1659	0
Flt Permitted		0.602			0.958			0.862			0.867	
Satd. Flow (perm)	0	1012	0	0	1640	0	0	1483	0	0	1453	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		30			11			6			34	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		212.6			132.4			328.5			41.1	
Travel Time (s)		15.3			9.5			23.7			3.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	144	134	82	29	346	41	109	333	27	49	142	64
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	360	0	0	416	0	0	469	0	0	255	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	26.5	26.5		26.5	26.5		26.5	26.5		26.5	26.5	
Total Split (s)	30.0	30.0		30.0	30.0		30.0	30.0		30.0	30.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	25.5	25.5		25.5	25.5		25.5	25.5		25.5	25.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.5			0.5			0.5			0.5	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		21.3			21.3			28.7			28.7	
Actuated g/C Ratio		0.36			0.36			0.48			0.48	
v/c Ratio		0.95			0.71			0.66			0.36	
Control Delay		54.3			22.6			19.6			11.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		54.3			22.6			19.6			11.6	
LOS		D			C			B			B	
Approach Delay		54.3			22.6			19.6			11.6	
Approach LOS		D			C			B			B	
Queue Length 50th (m)		32.4			34.8			39.1			15.2	
Queue Length 95th (m)		#74.9			57.9			#85.2			31.8	
Internal Link Dist (m)		188.6			108.4			304.5			17.1	
Turn Bay Length (m)												
Base Capacity (vph)		439			689			712			712	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.82			0.60			0.66			0.36	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 27.4 Intersection LOS: C
Intersection Capacity Utilization 97.7% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 31: 79 Street



Appendix F – Sidra Results

MOVEMENT SUMMARY

Site: 79 Street and 95 Avenue

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: 79 Street											
1	L2	109	2.0	0.449	7.7	LOS A	3.2	22.8	0.63	0.55	39.2
2	T1	333	2.0	0.449	3.5	LOS A	3.2	22.8	0.63	0.55	38.9
3	R2	27	2.0	0.449	3.9	LOS A	3.2	22.8	0.63	0.55	38.1
Approach		469	2.0	0.449	4.5	LOS A	3.2	22.8	0.63	0.55	38.9
East: 95 Avenue											
4	L2	29	2.0	0.505	10.7	LOS B	4.1	29.5	0.82	0.84	38.8
5	T1	346	2.0	0.505	6.4	LOS A	4.1	29.5	0.82	0.84	38.4
6	R2	41	2.0	0.505	6.9	LOS A	4.1	29.5	0.82	0.84	37.6
Approach		416	2.0	0.505	6.8	LOS A	4.1	29.5	0.82	0.84	38.3
North: 79 Street											
7	L2	49	2.0	0.289	8.4	LOS A	1.9	13.5	0.69	0.63	39.2
8	T1	142	2.0	0.289	4.1	LOS A	1.9	13.5	0.69	0.63	38.8
9	R2	64	2.0	0.289	4.5	LOS A	1.9	13.5	0.69	0.63	38.0
Approach		255	2.0	0.289	5.0	LOS A	1.9	13.5	0.69	0.63	38.7
West: 95 Avenue											
10	L2	144	0.0	0.316	6.7	LOS A	2.1	14.8	0.49	0.49	39.4
11	T1	138	0.0	0.316	2.5	LOS A	2.1	14.8	0.49	0.49	39.0
12	R2	82	0.0	0.316	2.9	LOS A	2.1	14.8	0.49	0.49	38.2
Approach		364	0.0	0.316	4.3	LOS A	2.1	14.8	0.49	0.49	39.0
All Vehicles		1504	1.5	0.505	5.2	LOS A	4.1	29.5	0.66	0.63	38.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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