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22 October 2021
Project: (210607)

PLW Planning and Environmental Consulting
c/o Leigh Whyte
240 Jarvis Street
Fort Erie, ON L2A 2S5

Dear Mr. Whyte:

RE: TRAFFIC BRIEF ADDENDUM
7 CENTRAL AVENUE, TOWN OF FORT ERIE

In July 2020[1], Paradigm Transportation Solutions Limited prepared a Traffic Brief for the above noted development proposal. Since then, the development proposal has been modified, such that the new proposal may alter the conclusions of the July 2020 Traffic Brief.

We have prepared this addendum letter to review the changes the site plan, recalculate the trip generation for the new development proposal, and provide an assessment of changes to the conclusions and recommendations of the July 2020 Traffic Brief. This addendum letter should be read in conjunction with the July 2020 Traffic Brief.

Development Proposal

The July 2020 Traffic Brief assumed a development proposal comprising two building pads with the following land uses:

- a three-storey, 15-unit condominium building; and
- a twelve storey 217-unit condominium building with 7,100 ft^2 (660 m^2) of ground floor commercial uses, specifically:
  - a 752 ft^2 (70 m^2) convenience store;
  - a 1,043 ft^2 (97 m^2) sandwich shop;
  - a 3,121 ft^2 (290 m^2) business centre; and
  - a 2,184 ft^2 (203 m^2) tap haus/restaurant.

[1] Traffic Brief, Residential Development, 7 Central Avenue, Fort Erie, ON. Prepared by Paradigm Transportation Solutions Limited. July 2020.

Access to the site was proposed via the current driveway connection to Central Avenue, approximately 115 metres north of Garrison Road/Veteran's Way. A secondary access was proposed to Douglas Street/Queensbury Road, north of Garrison Road at the northerly bend. Both connections were planned to operate with one inbound lane and one outbound lane. The connection to Douglas Street was intended to service the 15 residential units within the three-storey building pad and to facilitate a secondary emergency access connection between the two building pads.

The revised site plan does not include the 15-unit condominium building and includes the following land uses:

- A twelve storey 230-unit condominium building with approximately 6,943 ft^2 (645 m^2) of ground floor commercial uses, specifically:
  - A 958 ft^2 (89 m^2) convenience store;
  - an 818 ft^2 (76 m^2) sandwich shop;
  - an 872 ft^2 (81 m^2) general retail shop;
  - an 1,841 ft^2 (171 m^2) business centre; and
  - a 2,454 ft^2 (228 m^2) tap haus/restaurant.

Access to the site is proposed via the current driveway connection to Central Avenue, approximately 115 metres north of Garrison Road/Veteran's Way. The connection to Douglas Street is no longer part of the development proposal. **Figure 1 (attached)** illustrates the updated site plan.

Estimated Trip Generation

Table 1 summarizes the trip generation calculations from the July 2020 Traffic Brief. The trip generation of the site was estimated using the Institute of Transportation Engineer's (ITE) *Trip Generation Manual (10th Edition)*[2] and the following land use codes (LUC) in a general urban/suburban setting:

- 221 (Multifamily Housing – Mid Rise);
- 222 (Multifamily Housing – High Rise);
- 851 (Convenience Store)
- 920 (Copy, Print, and Express Ship Store)
- 930 (Fast Casual Restaurant) and
- 932 (High-Turnover (Sit-Down) Restaurant)

Since regression equations are not provided for LUC 851, 920, 930 and 832, the average rates were used. For LUC 222, the regression equations were used. The baseline trip generation for the site was estimated at 159 trips in the AM peak hour and 185 trips in the PM peak hour. Adjusted to account for internal trips between land uses, the site was estimated to generate 137 trips in the AM peak hour and 119 trips in the PM peak hour.

[2] ITE. *Trip Generation Manual (10th Edition)*. Washington, D.C. September 2017.

TABLE 1: PREVIOUS TRIP GENERATION ESTIMATES (JULY 2020)

Land Use Code	Units	GFA		Trip Type	AM Peak Hour				PM Peak Hour			
		ft^2	m^2		Rate	In	Out	Total	Rate	In	Out	Total
222	217	-	-	New	Eqn.	18	56	74	Eqn.	50	32	82
				Internal		0	0	0		8	8	16
				Pass-by	0%	0	0	0	0%	0	0	0
				Net		18	56	74		42	24	66
221	15	-	-	New	Eqn.	1	4	5	Eqn.	4	3	7
				Internal		0	0	0		0	0	0
				Pass-by	0%	0	0	0	0%	0	0	0
				Net		1	4	5		4	3	7
851	-	753	70	New	62.54	24	23	47	49.11	19	18	37
				Internal		3	3	6		10	10	20
				Pass-by	0%	0	0	0	51%	4	4	8
				Net		21	20	41		5	4	9
920	-	3122	290	New	2.78	7	2	9	7.42	10	13	23
				Internal		1	1	2		1	1	2
				Pass-by	0%	0	0	0	0%	0	0	0
				Net		6	1	7		9	12	21
930	-	1044	97	New	2.07	1	1	2	14.13	8	7	15
				Internal		1	1	2		3	3	6
				Pass-by	0%	0	0	0	0%	0	0	0
				Net		0	0	0		5	4	9
932	-	2185	203	New	9.94	12	10	22	9.77	13	8	21
				Internal		6	6	12		5	5	10
				Pass-by	0%	0	0	0	43%	2	2	4
				Net		6	4	10		6	1	7
Total Trip Generation				**New**		**63**	**96**	**159**		**104**	**81**	**185**
				Internal		**11**	**11**	**22**		**27**	**27**	**54**
				Pass-by		**0**	**0**	**0**		**6**	**6**	**12**
				Net		**52**	**85**	**137**		**71**	**48**	**119**

Pass-by rates not available for LUC 920 and LUC 930
PM peak hour pass-by rate for LUC 851: 51%, AM peak hour rate not provided
PM peak hour pass-by rate for LUC 932: 43%, AM peak hour rate not provided

Error! Not a valid bookmark self-reference. summarizes the updated trip generation calculations for the updated site plan. The updated calculations include LUC 820 (Shopping Centre) and omit LUC 221. Trip generation estimates for LUC 820 are based on the average rates in a general urban/suburban setting. The baseline trip generation for the site is estimated at 169 trips in the AM peak hour and 187 in the PM peak hour. Adjusted to account for internal trips between land uses, the site is estimated to generate 147 trips in the AM peak hour and 103 trips in the PM peak hour. **Appendix A** contains the updated internal capture worksheets.

The changes in land use on the site results in a net increase of 10 trips in the AM peak hour and a net decrease of 16 trips in the PM peak hour.

The site traffic was assigned to the road network based on the same methodology as documented in the July 2020 Traffic Brief. **Figure 2 (attached)** illustrates the site generated traffic volumes.

TABLE 2: UPDATED TRIP GENERATION ESTIMATES

Land Use Code	Units	GFA		Trip Type	AM Peak Hour				PM Peak Hour			
		ft^2	m^2		Rate	In	Out	Total	Rate	In	Out	Total
222	230	-	-	New	Eqn.	18	59	77	Eqn.	53	34	87
				Internal		0	4	4		10	7	17
				Pass-by	0%	0	0	0	0%	0	0	0
				Net		18	55	73		43	27	70
820	-	872	81	New	0.94	1	0	1	3.81	1	2	3
				Internal		1	0	1		0	0	0
				Pass-by	0%	0	0	0	34%	1	1	2
				Net		0	0	0		0	1	1
851	-	958	89	New	62.54	30	30	60	49.11	24	23	47
				Internal		2	4	6		11	14	25
				Pass-by	0%	0	0	0	51%	6	6	12
				Net		28	26	54		7	3	10
920	-	1841	171	New	2.78	4	1	5	7.42	6	8	14
				Internal		1	0	1		2	2	4
				Pass-by	0%	0	0	0	0%	0	0	0
				Net		3	1	4		4	6	10
930	-	818	76	New	2.07	1	1	2	14.13	7	5	12
				Internal		3	1	4		4	4	8
				Pass-by	0%	0	0	0	0%	0	0	0
				Net		-2	0	-2		3	1	4
932	-	2454	228	New	9.94	13	11	24	9.77	15	9	24
				Internal		4	2	6		5	5	10
				Pass-by	0%	0	0	0	43%	3	3	6
				Net		9	9	18		7	1	8
Total Trip Generation				**New**		**67**	**102**	**169**		**106**	**81**	**187**
				Internal		**11**	**11**	**17**		**32**	**32**	**64**
				Pass-by		**0**	**0**	**0**		**10**	**10**	**17**
				Net		**56**	**91**	**147**		**64**	**39**	**103**

Pass-by rates not available for LUC 920 and LUC 930
PM peak hour pass-by rate for LUC 820: 34%, AM peak hour rate not provided
PM peak hour pass-by rate for LUC 851: 51%, AM peak hour rate not provided
PM peak hour pass-by rate for LUC 932: 43%, AM peak hour rate not provided

Future Traffic Volumes

The future total traffic volumes anticipated to occur will include the future background traffic and full build-out of the site generated traffic. The future background traffic can be found in the July 2020 Traffic Brief. **Figure 3 (attached)** illustrates the future total traffic volumes.

Traffic Operations

Error! Not a valid bookmark self-reference. and **Table 4** summarize the future total level of service conditions and indicate the study area intersections are forecast to operate similar to existing and background conditions as noted in the July 2020 Traffic Brief. No critical movements are forecast during either peak hour. The development of the subject site is forecast to have a negligible impact on traffic operations in the study area, and the driveway connection to Central Avenue is forecast to operate at LOS B. **Appendix B** contains the detailed Synchro reports.

TABLE 3: FUTURE TOTAL TRAFFIC OPERATIONS – AM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	1 - Central Avenue & QEW WB Off-Ramp/Queen Street	TWSC	LOS	<	B	>	**B**	C	B	>	**B**	<	A	A	**A**	<	A	>	**A**	
			Delay	<	12	>	**12**	15	15	>	**15**	<	5	0	**2**	<	1	>	**0**	
			V/C	<	0.06	>		0.09	0.10	>		<	0.07	0.07		<	0.09	>		
			Q	<	2	>		2	3	>		<	2	0		<	0	>		
			Ex	<	-	>		30	-	>		<	-	-		<	-	>		
			Avail.	<	-	>		28	-	>		<	-	-		<	-	>		
	2 - Central Avenue & QEW EB OffiRamp	TCS	LOS	D		D	**D**						A		**A**		A		**A**	**B**
			Delay	36		36	**36**						1		**1**		7		**7**	**12**
			V/C	0.41		0.42							0.09				0.14			**0.18**
			Q	30		28							1				20			
			Ex	-		-							-				-			
			Avail.	-		-							-				-			
	3 - Central Avenue & Bridge to USA	TCS	LOS									D	A	>	**A**		A		**A**	**A**
			Delay									45	4	>	**10**		6		**6**	**8**
			V/C									0.51	0.13	>			0.18			**0.18**
			Q									20	14	>			15			
			Ex									-	-	>			-			
			Avail.									-	-	>			-			
	4 - Central Avenue & Parking Lot/NEXUS	TWSC	LOS	<	B	>	**B**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	13	>	**13**	<	11	>	**11**	<	3	>	**1**	<	1	>	**0**	
			V/C	<	0.20	>		<	0.03	>		<	0.08	>		<	0.11	>		
			Q	<	6	>		<	1	>		<	1	>		<	1	>		
			Ex	<	-	>		<	-	>		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	>		<	-	>		<	-	>		
	5 - Central Avenue & Garrison Road/Veteran's Way	TCS	LOS	C	C	C	**C**	<	C	>	**C**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	26	26	22	**25**	<	30	>	**30**	<	8	>	**8**	<	9	>	**9**	**16**
			V/C	0.55	0.55	0.04		<	0.03	>		<	0.07	>		<	0.18	>		**0.23**
			Q	36	37	2		<	2	>		<	8	>		<	15	>		
			Ex	65	-	-		<	-	>		<	-	>		<	-	>		
			Avail.	29	-	-		<	-	>		<	-	>		<	-	>		
	6 - Central Avenue & Lakeshore Road	TWSC	LOS	A	A		**A**		A	A	**A**					A		A	**A**	
			Delay	6	0		**4**		0	0	**0**					10		9	**9**	
			V/C	0.04	0.02				0.01	0.02						0.03		0.03		
			Q	1	0				0	0						1		1		
			Ex	-	-				-							-		-		
			Avail.	-	-				-							-		-		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

<- Shared Left/Through Lane
>- Shared Right/Through Lane

TABLE 4: FUTURE TOTAL TRAFFIC OPERATIONS – PM PEAK HOUR

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	1 - Central Avenue & QEW WB Off-Ramp/Queen Street	TWSC	LOS	<	B	>	**B**	C	C	>	**C**	<	A	A	**A**	<	A	>	**A**	
			Delay	<	14	>	**14**	17	16	>	**16**	<	3	0	**1**	<	0	>	**0**	
			V/C	<	0.20	>		0.19	0.24	>		<	0.09	0.05		<	0.11	>		
			Q	<	6	>		6	7	>		<	1	0		<	0	>		
			Ex	<	-	>		30	-	>		<	-	-		<	-	>		
			Avail.	<	-	>		24	-	>		<	-	-		<	-	>		
	2 - Central Avenue & QEW EB OffiRamp	TCS	LOS	D		D	**D**						A		**A**		A		**A**	**A**
			Delay	38		38	**38**						1		**1**		5		**5**	**9**
			V/C	0.33		0.42							0.08				0.17			**0.20**
			Q	22		25							1				25			
			Ex	-		-							-				-			
			Avail.	-		-							-				-			
	3 - Central Avenue & Bridge to USA	TCS	LOS									D	A	>	**A**		A		**A**	**A**
			Delay									48	3	>	**7**		3		**3**	**5**
			V/C									0.46	0.12	>			0.21			**0.19**
			Q									13	13	>			12			
			Ex									-	-	>			-			
			Avail.									-	-	>			-			
	4 - Central Avenue & Parking Lot/NEXUS	TWSC	LOS	<	B	>	**B**	<	B	>	**B**	<	A	>	**A**	<	A	>	**A**	
			Delay	<	12	>	**12**	<	12	>	**12**	<	4	>	**1**	<	0	>	**0**	
			V/C	<	0.12	>		<	0.04	>		<	0.08	>		<	0.14	>		
			Q	<	3	>		<	1	>		<	1	>		<	0	>		
			Ex	<	-	>		<	-	>		<	-	>		<	-	>		
			Avail.	<	-	>		<	-	>		<	-	>		<	-	>		
	5 - Central Avenue & Garrison Road/Veteran's Way	TCS	LOS	C	C	C	**C**	<	C	>	**C**	<	A	>	**A**	<	A	>	**A**	**B**
			Delay	25	25	21	**24**	<	30	>	**30**	<	9	>	**9**	<	9	>	**9**	**16**
			V/C	0.55	0.55	0.08		<	0.04	>		<	0.09	>		<	0.17	>		**0.27**
			Q	37	37	12		<	4	>		<	9	>		<	10	>		
			Ex	65	-	-		<	-	>		<	-	>		<	-	>		
			Avail.	28	-	-		<	-	>		<	-	>		<	-	>		
	6 - Central Avenue & Lakeshore Road	TWSC	LOS	A	A		**A**		A	A	**A**					B		A	**A**	
			Delay	6	0		**4**		0	0	**0**					10		9	**9**	
			V/C	0.05	0.03				0.00	0.02						0.05		0.05		
			Q	1	0				0	0						1		1		
			Ex	-	-				-							-		-		
			Avail.	-	-				-							-		-		

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)
Ex. - Existing Available Storage (m)
Avail. - Available Storage (m)

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

<- Shared Left/Through Lane
>- Shared Right/Through Lane

Conclusions

Based on the analyses contained herein, it is concluded that

- The revised site plan is estimated to generate 147 trips in the AM peak hour and 103 trips in the PM peak hour resulting in an increase of 10 trips in the AM peak hour and a decrease of 16 trips in the PM peak hour as compared to the July 2020 Traffic Brief;
- Under the new development proposal, the study area intersections are forecast to operate at acceptable levels of service. The site driveway connection to Central Avenue is forecast to operate at LOS B, as concluded in the July 2020 Traffic Brief; and

Based on the marginal increase in trips generated by the proposed development as well as the analysis noted above, the conclusions and recommendations found in the July 2020 study are still relevant for the proposed development.

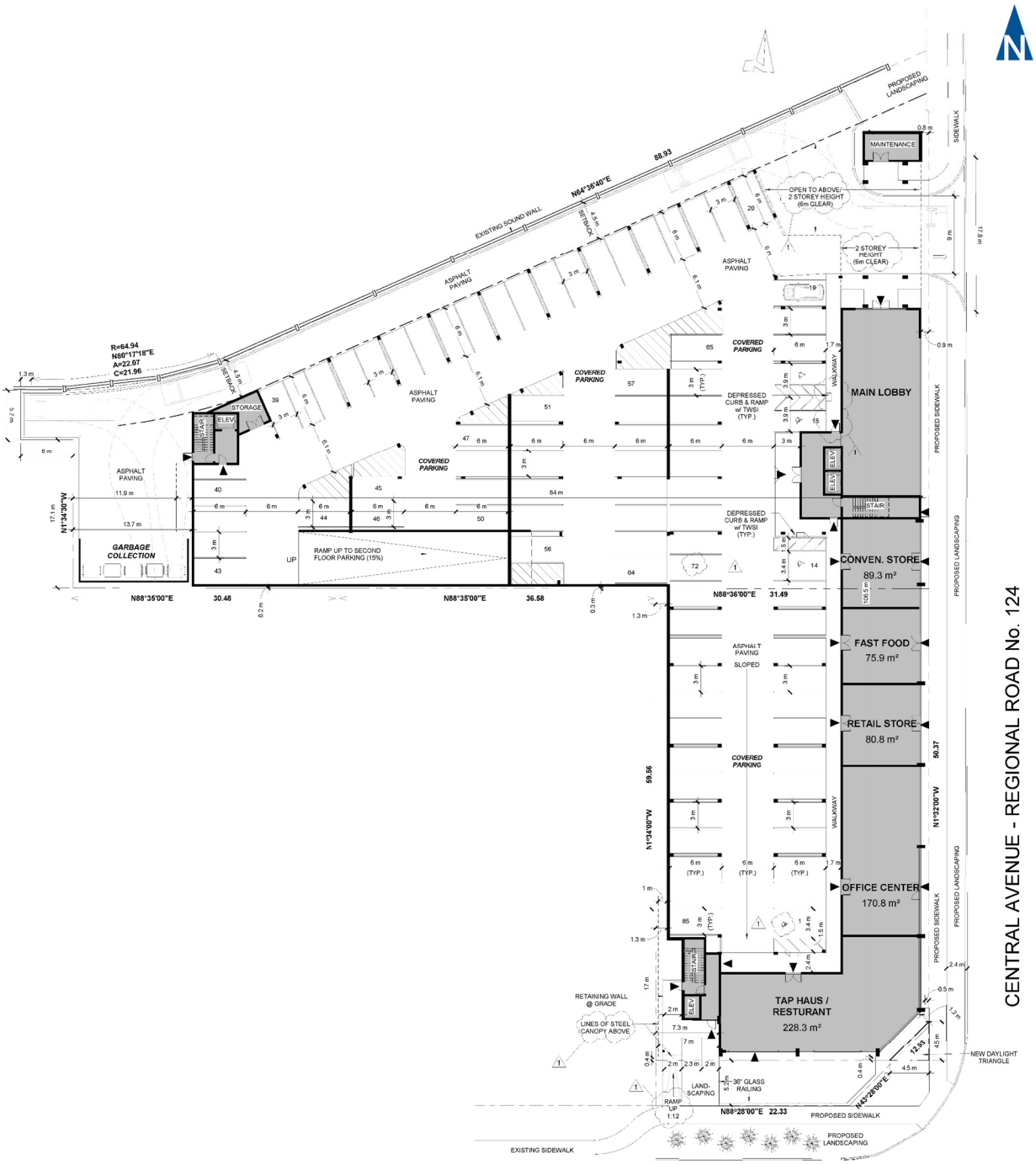
Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

Andrew Steinsky
P.Eng., PTP
Transportation Engineer

Adam J. Makarewicz
Dipl.T., C.E.T.
Senior Project Manager

Attachments



1 SITE & GROUND FLOOR PLAN
1 : 250

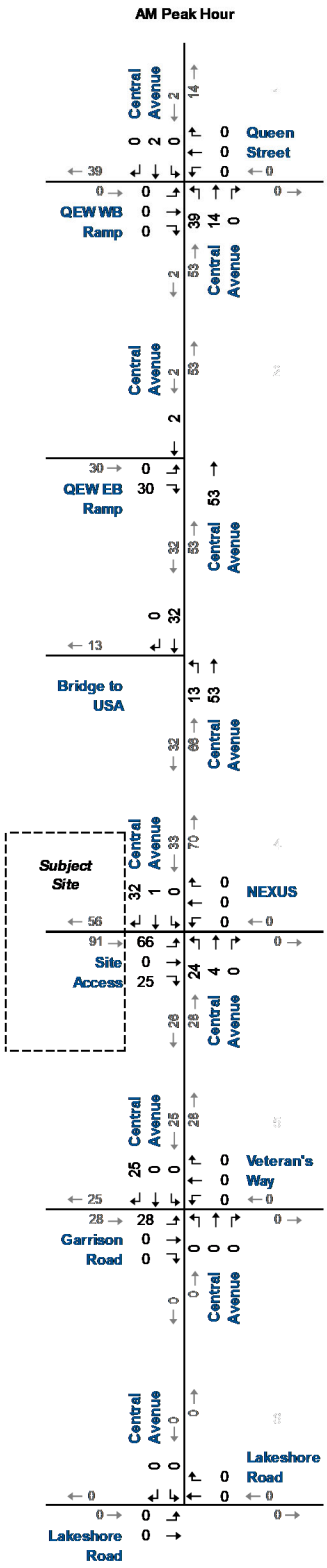
Not to Scale

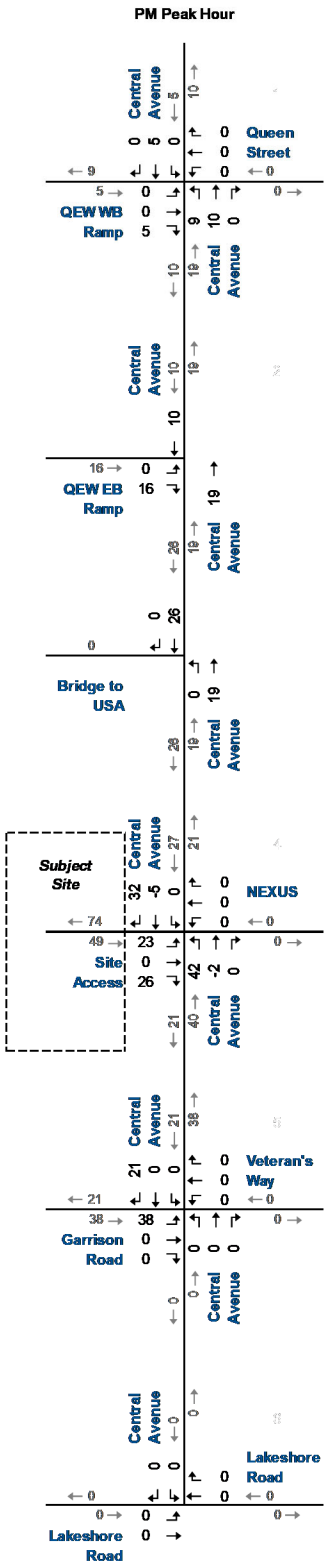
paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Plan

7 Central Traffic Brief Addendum
210607

Figure 1





Not to Scale

paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Generated Traffic Volumes

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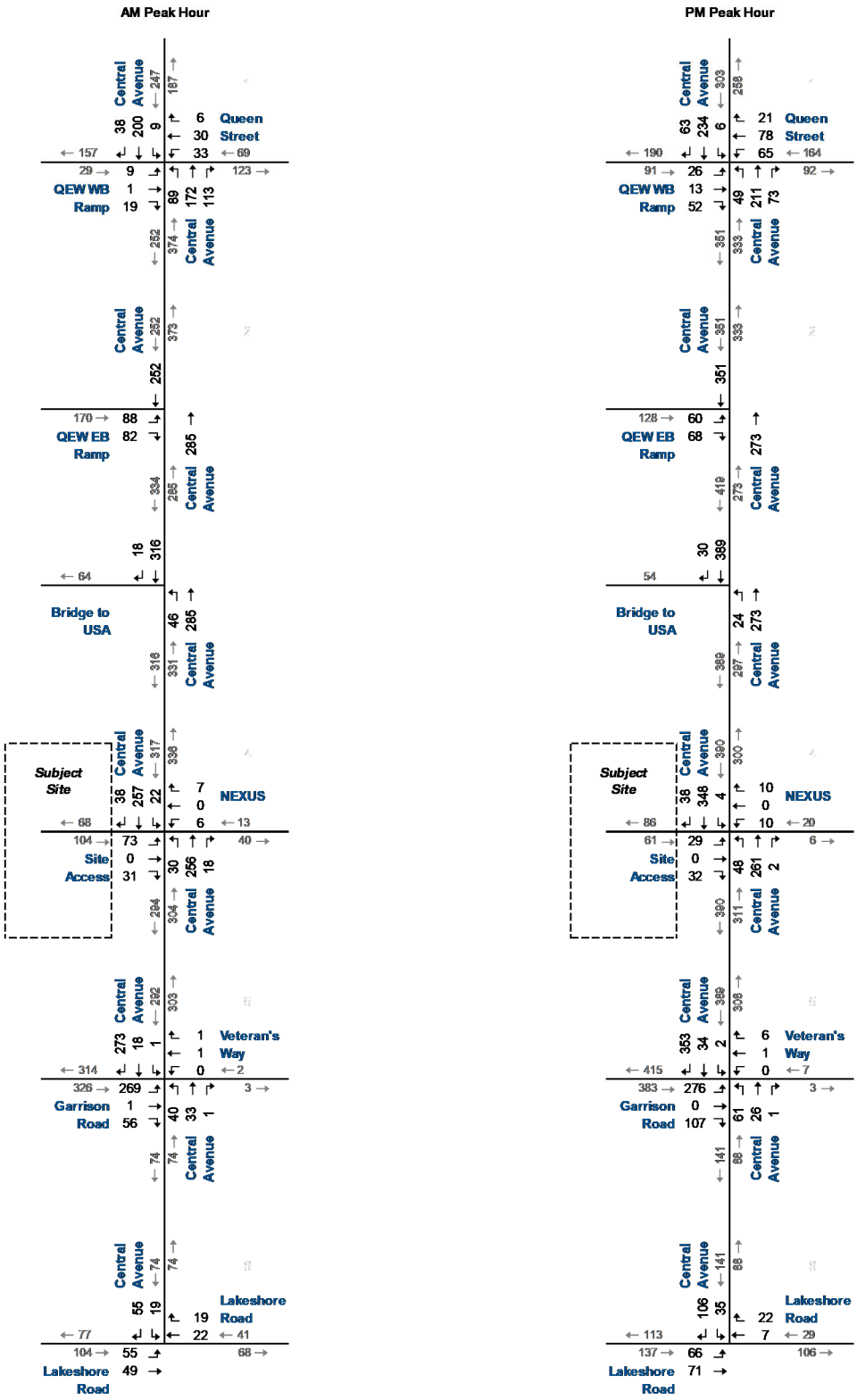
Figure 2



Not to Scale

Future Total Traffic Volumes

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Figure 3

Appendix A

Internal Capture Worksheet

NCHRP 8-51 Internal Trip Capture Estimation Tool				
Project Name:	7 Central Avenue TIA		**Organization:**	PTSL
Project Location:	Fort Erie, ON		**Performed By:**	PTSL
Scenario Description:			**Date:**	October 2021
Analysis Year:	N/A		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**		**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	920	1,841	sq. ft. GFA	5	4	1
Retail	820, 851	1,830	sq. ft. GFA	61	31	30
Restaurant	930, 932	3,272	sq. ft. GFA	26	14	12
Cinema/Entertainment				0		
Residential	222	230	Units	77	18	59
Hotel				0		
All Other Land Uses[2]				0		
Total				169	67	102

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		4	0	0	0
Restaurant	1	2		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	3	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	169	67	102
Internal Capture Percentage	13%	16%	11%
External Vehicle-Trips[3]	147	56	91
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	25%	0%
Retail	10%	13%
Restaurant	50%	25%
Cinema/Entertainment	N/A	N/A
Residential	0%	7%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	7 Central Avenue TIA
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	4	4	1.00	1	1
Retail	1.00	31	31	1.00	30	30
Restaurant	1.00	14	14	1.00	12	12
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	18	18	1.00	59	59
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	1	0	0	0
Retail	9		4	0	4	0
Restaurant	4	2		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	12	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		10	3	0	0	0
Retail	0		7	0	0	0
Restaurant	1	2		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	5	3	0		0
Hotel	0	1	1	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	1	3	4	3	0	0
Retail	3	28	31	28	0	0
Restaurant	7	7	14	7	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	18	18	18	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	1	1	1	0	0
Retail	4	26	30	26	0	0
Restaurant	3	9	12	9	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	4	55	59	55	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool				
Project Name:	7 Central Avenue TIA		**Organization:**	PTSL
Project Location:	Fort Erie, ON		**Performed By:**	PTSL
Scenario Description:			**Date:**	October 2021
Analysis Year:	N/A		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**		**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	920	1,841	sq. ft. GFA	14	6	8
Retail	820, 851	1,830	sq. ft. GFA	50	25	25
Restaurant	930, 932	3,272	sq. ft. GFA	36	22	14
Cinema/Entertainment				0		
Residential	222	230	Units	87	53	34
Hotel				0		
All Other Land Uses[2]				0		
Total				187	106	81

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	0	0	0	0
Retail	1		6	0	7	0
Restaurant	0	6		0	3	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	3	3	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	187	106	81
Internal Capture Percentage	34%	30%	40%
External Vehicle-Trips[3]	123	74	49
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	33%	25%
Retail	44%	56%
Restaurant	41%	64%
Cinema/Entertainment	N/A	N/A
Residential	19%	21%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	7 Central Avenue TIA
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	6	6	1.00	8	8
Retail	1.00	25	25	1.00	25	25
Restaurant	1.00	22	22	1.00	14	14
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	53	53	1.00	34	34
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	0	0	0	0
Retail	1		7	1	7	1
Restaurant	0	6		1	3	1
Cinema/Entertainment	0	0	0		0	0
Residential	1	14	7	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	0	0	2	0
Retail	2		6	0	24	0
Restaurant	2	13		0	8	0
Cinema/Entertainment	0	1	1		2	0
Residential	3	3	3	0		0
Hotel	0	1	1	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	2	4	6	4	0	0
Retail	11	14	25	14	0	0
Restaurant	9	13	22	13	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	10	43	53	43	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	2	6	8	6	0	0
Retail	14	11	25	11	0	0
Restaurant	9	5	14	5	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	7	27	34	27	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Appendix B

Traffic Operations Reports

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1	19	33	30	6	89	172	113	9	200	38
Future Volume (vph)	9	1	19	33	30	6	89	172	113	9	200	38
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.911			0.974				0.850		0.977	
Flt Protected		0.985		0.950				0.983			0.998	
Satd. Flow (prot)	0	1454	0	1662	1704	0	0	3226	1473	0	3096	0
Flt Permitted		0.985		0.950				0.983			0.998	
Satd. Flow (perm)	0	1454	0	1662	1704	0	0	3226	1473	0	3096	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		148.0			236.5			198.4			122.2	
Travel Time (s)		10.7			17.0			14.3			8.8	
Confl. Peds. (#/hr)							5		1	1		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	13%	0%	6%	0%	0%	0%	0%	2%	1%	0%	3%	15%
Adj. Flow (vph)	10	1	21	36	33	7	97	187	123	10	217	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	36	40	0	0	284	123	0	268	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)		3.6			3.6			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 35.2%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1	19	33	30	6	89	172	113	9	200	38
Future Volume (Veh/h)	9	1	19	33	30	6	89	172	113	9	200	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	1	21	36	33	7	97	187	123	10	217	41
Pedestrians		5			1							
Lane Width (m)		3.6			3.6							
Walking Speed (m/s)		1.2			1.2							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								198				
pX, platoon unblocked												
vC, conflicting volume	574	644	134	532	624	94	222			188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	574	644	134	532	624	94	222			188		
tC, single (s)	7.8	6.5	7.0	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	98	91	91	99	93			99		
cM capacity (veh/h)	328	361	874	396	371	949	1353			1397		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	32	36	40	159	125	123	118	150
Volume Left	10	36	0	97	0	0	10	0
Volume Right	21	0	7	0	0	123	0	41
cSH	558	396	415	1353	1700	1700	1397	1700
Volume to Capacity	0.06	0.09	0.10	0.07	0.07	0.07	0.01	0.09
Queue Length 95th (m)	1.5	2.4	2.5	1.9	0.0	0.0	0.2	0.0
Control Delay (s)	11.8	15.0	14.6	5.0	0.0	0.0	0.7	0.0
Lane LOS	B	B	B	A			A	
Approach Delay (s)	11.8	14.8		2.0			0.3	
Approach LOS	B	B						

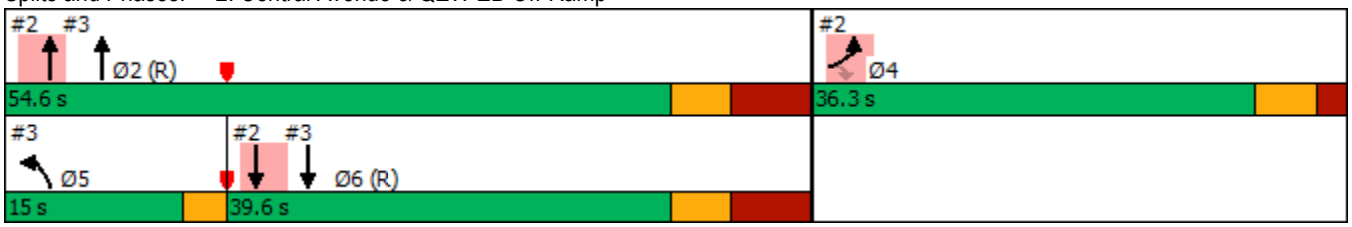
Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø5
Lane Configurations							
Traffic Volume (vph)	88	82	0	285	252	0	
Future Volume (vph)	88	82	0	285	252	0	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Lane Util. Factor	1.00	1.00	1.00	0.91	0.95	1.00	
Frt		0.850					
Flt Protected	0.950						
Satd. Flow (prot)	1630	1458	0	4730	3197	0	
Flt Permitted	0.950						
Satd. Flow (perm)	1630	1458	0	4730	3197	0	
Right Turn on Red		No				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	291.2			44.9	198.4		
Travel Time (s)	21.0			3.2	14.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	2%	0%	1%	4%	0%	
Adj. Flow (vph)	96	89	0	310	274	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	96	89	0	310	274	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.6			0.0	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	4.8			4.8	4.8		
Two way Left Turn Lane							
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	
Turning Speed (k/h)	25	15	25			15	
Number of Detectors	1	1		2	2		
Detector Template	Left	Right		Thru	Thru		
Leading Detector (m)	2.0	2.0		10.0	10.0		
Trailing Detector (m)	0.0	0.0		0.0	0.0		
Detector 1 Position(m)	0.0	0.0		0.0	0.0		
Detector 1 Size(m)	2.0	2.0		0.6	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		
Detector 2 Position(m)				9.4	9.4		
Detector 2 Size(m)				0.6	0.6		
Detector 2 Type				Cl+Ex	Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)				0.0	0.0		
Turn Type	Prot	Perm		NA	NA		
Protected Phases	4			2	6		5
Permitted Phases		4					
Detector Phase	4	4		2	6		
Switch Phase							

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø5
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0
Minimum Split (s)	14.3	14.3		28.6	28.6		9.0
Total Split (s)	36.3	36.3		54.6	39.6		15.0
Total Split (%)	39.9%	39.9%		60.1%	43.6%		17%
Maximum Green (s)	30.0	30.0		45.0	30.0		12.0
Yellow Time (s)	4.1	4.1		4.1	4.1		3.0
All-Red Time (s)	2.2	2.2		5.5	5.5		0.0
Lost Time Adjust (s)	-2.3	-2.3		-1.4	-1.4		
Total Lost Time (s)	4.0	4.0		8.2	8.2		
Lead/Lag					Lag		Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	2.5	2.5		5.0	5.0		2.5
Recall Mode	None	None		C-Min	C-Min		None
Walk Time (s)				8.0	8.0		
Flash Dont Walk (s)				5.9	5.9		
Pedestrian Calls (#/hr)				0	0		
Act Effct Green (s)	13.2	13.2		65.5	58.3		
Actuated g/C Ratio	0.15	0.15		0.72	0.64		
v/c Ratio	0.41	0.42		0.09	0.13		
Control Delay	39.8	40.8		0.9	8.2		
Queue Delay	0.0	0.0		0.3	0.0		
Total Delay	39.8	40.8		1.3	8.2		
LOS	D	D		A	A		
Approach Delay	40.3			1.3	8.2		
Approach LOS	D			A	A		

Intersection Summary	
Area Type: Other	
Cycle Length: 90.9	
Actuated Cycle Length: 90.9	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 24.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Central Avenue & QEW EB Off-Ramp



2: Central Avenue & QEW EB Off-Ramp

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	96	89	310	274
v/c Ratio	0.41	0.42	0.09	0.13
Control Delay	39.8	40.8	0.9	8.2
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	39.8	40.8	1.3	8.2
Queue Length 50th (m)	16.4	15.2	0.8	10.3
Queue Length 95th (m)	29.8	28.4	1.1	20.0
Internal Link Dist (m)	267.2		20.9	174.4
Turn Bay Length (m)				
Base Capacity (vph)	579	518	3408	2050
Starvation Cap Reductn	0	0	2536	0
Spillback Cap Reductn	0	0	0	9
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.17	0.36	0.13

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	88	82	0	285	252	0
Future Volume (vph)	88	82	0	285	252	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		8.2	8.2	
Lane Util. Factor	1.00	1.00		0.91	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1630	1458		4730	3197	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1630	1458		4730	3197	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	96	89	0	310	274	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	96	89	0	310	274	0
Heavy Vehicles (%)	2%	2%	0%	1%	4%	0%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	10.9	10.9		64.1	55.7	
Effective Green, g (s)	13.2	13.2		65.5	57.1	
Actuated g/C Ratio	0.15	0.15		0.72	0.63	
Clearance Time (s)	6.3	6.3		9.6	9.6	
Vehicle Extension (s)	2.5	2.5		5.0	5.0	
Lane Grp Cap (vph)	236	211		3408	2008	
v/s Ratio Prot	0.06			c0.07	c0.09	
v/s Ratio Perm		c0.06				
v/c Ratio	0.41	0.42		0.09	0.14	
Uniform Delay, d1	35.3	35.4		3.8	6.9	
Progression Factor	1.00	1.00		0.21	1.00	
Incremental Delay, d2	0.8	1.0		0.1	0.1	
Delay (s)	36.1	36.4		0.9	7.0	
Level of Service	D	D		A	A	
Approach Delay (s)	36.2			0.9	7.0	
Approach LOS	D			A	A	

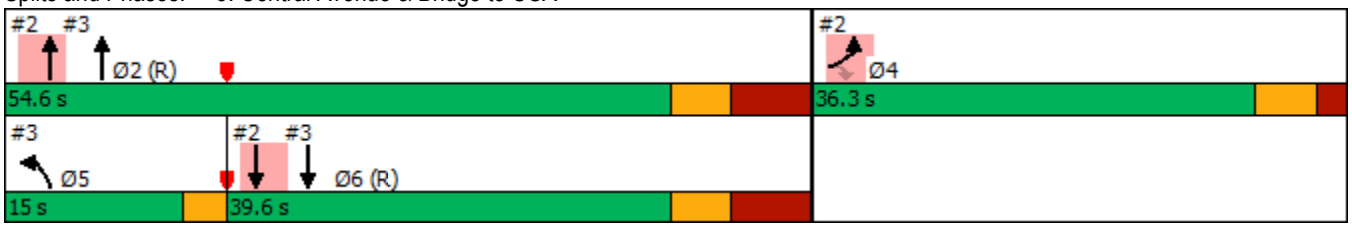
Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	15.2
Intersection Capacity Utilization	24.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø4
Lane Configurations							
Traffic Volume (vph)	0	0	46	285	316	18	
Future Volume (vph)	0	0	46	285	316	18	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	
Ped Bike Factor			0.99		1.00		
Frt					0.992		
Flt Protected			0.950				
Satd. Flow (prot)	0	0	1662	3292	3172	0	
Flt Permitted			0.950				
Satd. Flow (perm)	0	0	1646	3292	3172	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	259.9			95.0	44.9		
Travel Time (s)	18.7			6.8	3.2		
Confl. Peds. (#/hr)			5			5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	0%	1%	4%	0%	
Adj. Flow (vph)	0	0	50	310	343	20	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	0	50	310	363	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	0.0			3.6	3.6		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	4.8			4.8	4.8		
Two way Left Turn Lane							
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	
Turning Speed (k/h)	25	15	25			15	
Number of Detectors			1	2	2		
Detector Template			Left	Thru	Thru		
Leading Detector (m)			2.0	10.0	10.0		
Trailing Detector (m)			0.0	0.0	0.0		
Detector 1 Position(m)			0.0	0.0	0.0		
Detector 1 Size(m)			2.0	0.6	0.6		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0		
Detector 2 Position(m)				9.4	9.4		
Detector 2 Size(m)				0.6	0.6		
Detector 2 Type				Cl+Ex	Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)				0.0	0.0		
Turn Type			Prot	NA	NA		
Protected Phases			5	2	6		4
Permitted Phases							

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø4
Detector Phase			5	2	6		
Switch Phase							
Minimum Initial (s)			6.0	8.0	8.0		8.0
Minimum Split (s)			9.0	28.6	28.6		14.3
Total Split (s)			15.0	54.6	39.6		36.3
Total Split (%)			16.5%	60.1%	43.6%		40%
Maximum Green (s)			12.0	45.0	30.0		30.0
Yellow Time (s)			3.0	4.1	4.1		4.1
All-Red Time (s)			0.0	5.5	5.5		2.2
Lost Time Adjust (s)			0.0	-1.4	-1.4		
Total Lost Time (s)			3.0	8.2	8.2		
Lead/Lag			Lead		Lag		
Lead-Lag Optimize?							
Vehicle Extension (s)			2.5	5.0	5.0		2.5
Recall Mode			None	C-Min	C-Min		None
Walk Time (s)				8.0	8.0		
Flash Dont Walk (s)				5.9	5.9		
Pedestrian Calls (#/hr)				0	0		
Act Effct Green (s)			7.9	65.5	58.3		
Actuated g/C Ratio			0.09	0.72	0.64		
v/c Ratio			0.35	0.13	0.18		
Control Delay			45.2	4.4	6.5		
Queue Delay			0.0	0.0	0.4		
Total Delay			45.2	4.4	6.9		
LOS			D	A	A		
Approach Delay				10.1	6.9		
Approach LOS				B	A		

Intersection Summary	
Area Type: Other	
Cycle Length: 90.9	
Actuated Cycle Length: 90.9	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 8.5	Intersection LOS: A
Intersection Capacity Utilization 26.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Central Avenue & Bridge to USA



3: Central Avenue & Bridge to USA

Lane Group	NBL	NBT	SBT
Lane Group Flow (vph)	50	310	363
v/c Ratio	0.35	0.13	0.18
Control Delay	45.2	4.4	6.5
Queue Delay	0.0	0.0	0.4
Total Delay	45.2	4.4	6.9
Queue Length 50th (m)	8.9	7.5	10.5
Queue Length 95th (m)	19.7	14.2	14.5
Internal Link Dist (m)		71.0	20.9
Turn Bay Length (m)			
Base Capacity (vph)	219	2372	2034
Starvation Cap Reductn	0	0	1191
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.23	0.13	0.43

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	46	285	316	18
Future Volume (vph)	0	0	46	285	316	18
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)			3.0	8.2	8.2	
Lane Util. Factor			1.00	0.95	0.95	
Frpb, ped/bikes			1.00	1.00	1.00	
Flpb, ped/bikes			1.00	1.00	1.00	
Frt			1.00	1.00	0.99	
Flt Protected			0.95	1.00	1.00	
Satd. Flow (prot)			1662	3292	3171	
Flt Permitted			0.95	1.00	1.00	
Satd. Flow (perm)			1662	3292	3171	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	50	310	343	20
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	50	310	363	0
Confl. Peds. (#/hr)			5			5
Heavy Vehicles (%)	0%	0%	0%	1%	4%	0%
Turn Type			Prot	NA	NA	
Protected Phases			5	2	6	
Permitted Phases						
Actuated Green, G (s)			5.4	64.1	55.7	
Effective Green, g (s)			5.4	65.5	57.1	
Actuated g/C Ratio			0.06	0.72	0.63	
Clearance Time (s)			3.0	9.6	9.6	
Vehicle Extension (s)			2.5	5.0	5.0	
Lane Grp Cap (vph)			98	2372	1991	
v/s Ratio Prot			c0.03	0.09	c0.11	
v/s Ratio Perm						
v/c Ratio			0.51	0.13	0.18	
Uniform Delay, d1			41.5	3.9	7.1	
Progression Factor			1.00	1.00	0.77	
Incremental Delay, d2			3.3	0.1	0.2	
Delay (s)			44.8	4.0	5.7	
Level of Service			D	A	A	
Approach Delay (s)	0.0			9.7	5.7	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	17.5
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	0	31	6	0	7	30	256	18	22	257	38
Future Volume (vph)	73	0	31	6	0	7	30	256	18	22	257	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	0.91	0.91	0.91	0.95	0.95	0.95
Frt		0.959			0.928			0.991			0.982	
Flt Protected		0.966			0.977			0.995			0.997	
Satd. Flow (prot)	0	1621	0	0	1587	0	0	4711	0	0	3255	0
Flt Permitted		0.966			0.977			0.995			0.997	
Satd. Flow (perm)	0	1621	0	0	1587	0	0	4711	0	0	3255	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		76.9			114.0			112.9			95.0	
Travel Time (s)		5.5			8.2			8.1			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	79	0	34	7	0	8	33	278	20	24	279	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	113	0	0	15	0	0	331	0	0	344	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 36.1%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	0	31	6	0	7	30	256	18	22	257	38
Future Volume (Veh/h)	73	0	31	6	0	7	30	256	18	22	257	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	79	0	34	7	0	8	33	278	20	24	279	41
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								113			95	
pX, platoon unblocked	0.97	0.97	0.97	0.97	0.97		0.97					
vC, conflicting volume	514	712	160	576	722	103	320			298		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441	645	77	505	655	103	242			298		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	100	96	98	100	99	97			98		
cM capacity (veh/h)	470	366	947	412	361	939	1299			1275		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	113	15	102	139	90	164	180
Volume Left	79	7	33	0	0	24	0
Volume Right	34	8	0	0	20	0	41
cSH	554	588	1299	1700	1700	1275	1700
Volume to Capacity	0.20	0.03	0.03	0.08	0.05	0.02	0.11
Queue Length 95th (m)	6.1	0.6	0.6	0.0	0.0	0.5	0.0
Control Delay (s)	13.2	11.3	2.7	0.0	0.0	1.3	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	13.2	11.3	0.8			0.6	
Approach LOS	B	B					

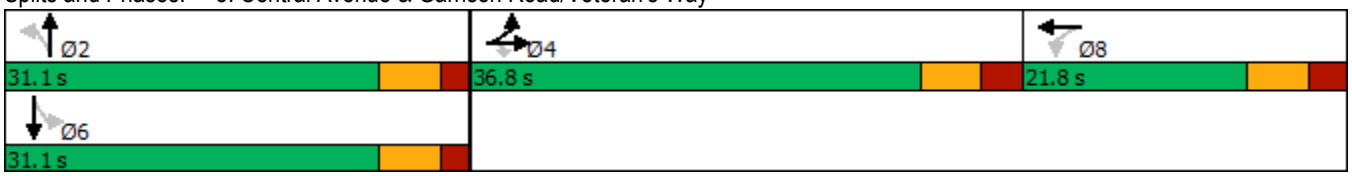
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	269	1	56	0	1	1	40	33	1	1	18	273
Future Volume (vph)	269	1	56	0	1	1	40	33	1	1	18	273
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	65.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	1.00	1.00	0.98		0.99			1.00			1.00	
Frt			0.850		0.932			0.998			0.860	
Flt Protected	0.950	0.953						0.974				
Satd. Flow (prot)	1564	1569	1403	0	1618	0	0	3125	0	0	2770	0
Flt Permitted	0.950	0.953						0.765			0.955	
Satd. Flow (perm)	1560	1565	1382	0	1618	0	0	2454	0	0	2645	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		1			1			297	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		262.1			318.9			187.1			112.9	
Travel Time (s)		18.9			23.0			13.5			8.1	
Confl. Peds. (#/hr)	2		3	3		2			1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	6%	0%	0%	0%	3%	4%	0%	0%	7%	3%
Adj. Flow (vph)	292	1	61	0	1	1	43	36	1	1	20	297
Shared Lane Traffic (%)	50%											
Lane Group Flow (vph)	146	147	61	0	2	0	0	80	0	0	318	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)		3.6			3.6			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
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)	2.0	10.0	2.0	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	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)	2.0	0.6	2.0	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	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)		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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA	Perm		NA		Perm	NA		Perm	NA	
Protected Phases	4	4			8			2			6	
Permitted Phases			4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	31.0	31.0	31.0	14.8	14.8		35.0	35.0		35.0	35.0	
Total Split (s)	36.8	36.8	36.8	21.8	21.8		31.1	31.1		31.1	31.1	
Total Split (%)	41.0%	41.0%	41.0%	24.3%	24.3%		34.7%	34.7%		34.7%	34.7%	
Maximum Green (s)	30.0	30.0	30.0	15.0	15.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		4.1	4.1		4.1	4.1	
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0			0.0			0.0	
Total Lost Time (s)	6.8	6.8	6.8		6.8			6.1			6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Recall Mode	None	None	None	None	None		Max	Max		Max	Max	
Walk Time (s)	11.0	11.0	11.0				13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	13.2	13.2	13.2				15.9	15.9		15.9	15.9	
Pedestrian Calls (#/hr)	0	0	0				0	0		0	0	
Act Effct Green (s)	10.6	10.6	10.6		8.1			30.5			30.5	
Actuated g/C Ratio	0.19	0.19	0.19		0.14			0.54			0.54	
v/c Ratio	0.50	0.50	0.17		0.01			0.06			0.20	
Control Delay	27.4	27.4	1.8		22.5			8.9			2.4	
Queue Delay	0.0	0.0	0.0		0.0			0.0			0.0	
Total Delay	27.4	27.4	1.8		22.5			8.9			2.4	
LOS	C	C	A		C			A			A	
Approach Delay		23.0			22.5			8.9			2.4	
Approach LOS		C			C			A			A	

Intersection Summary	
Area Type:	Other
Cycle Length: 89.7	
Actuated Cycle Length: 56.6	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 12.8	Intersection LOS: B
Intersection Capacity Utilization 63.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Central Avenue & Garrison Road/Veteran's Way



5: Central Avenue & Garrison Road/Veteran's Way

Lane Group	EBL	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	146	147	61	2	80	318
v/c Ratio	0.50	0.50	0.17	0.01	0.06	0.20
Control Delay	27.4	27.4	1.8	22.5	8.9	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	27.4	1.8	22.5	8.9	2.4
Queue Length 50th (m)	13.4	13.5	0.0	0.1	1.5	0.4
Queue Length 95th (m)	36.4	36.5	1.8	2.0	7.7	8.3
Internal Link Dist (m)		238.1		294.9	163.1	88.9
Turn Bay Length (m)	65.0					
Base Capacity (vph)	844	847	801	437	1324	1564
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	0.17	0.17	0.08	0.00	0.06	0.20

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	269	1	56	0	1	1	40	33	1	1	18	273
Future Volume (vph)	269	1	56	0	1	1	40	33	1	1	18	273
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	6.8	6.8	6.8		6.8			6.1			6.1	
Lane Util. Factor	0.95	0.95	1.00		1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00	0.99		0.98			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00			1.00			1.00	
Frt	1.00	1.00	0.85		0.93			1.00			0.86	
Flt Protected	0.95	0.95	1.00		1.00			0.97			1.00	
Satd. Flow (prot)	1564	1568	1383		1597			3124			2769	
Flt Permitted	0.95	0.95	1.00		1.00			0.77			0.95	
Satd. Flow (perm)	1564	1568	1383		1597			2455			2644	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	292	1	61	0	1	1	43	36	1	1	20	297
RTOR Reduction (vph)	0	0	51	0	1	0	0	1	0	0	151	0
Lane Group Flow (vph)	146	147	10	0	1	0	0	79	0	0	167	0
Confl. Peds. (#/hr)	2		3	3		2			1	1		
Heavy Vehicles (%)	1%	0%	6%	0%	0%	0%	3%	4%	0%	0%	7%	3%
Turn Type	Split	NA	Perm		NA		Perm	NA		Perm	NA	
Protected Phases	4	4			8			2			6	
Permitted Phases			4	8			2			6		
Actuated Green, G (s)	10.6	10.6	10.6		1.2			30.5			30.5	
Effective Green, g (s)	10.6	10.6	10.6		1.2			30.5			30.5	
Actuated g/C Ratio	0.17	0.17	0.17		0.02			0.49			0.49	
Clearance Time (s)	6.8	6.8	6.8		6.8			6.1			6.1	
Vehicle Extension (s)	2.8	2.8	2.8		2.8			2.8			2.8	
Lane Grp Cap (vph)	267	268	236		30			1207			1300	
v/s Ratio Prot	0.09	c0.09			c0.00							
v/s Ratio Perm			0.01					0.03			c0.06	
v/c Ratio	0.55	0.55	0.04		0.03			0.07			0.13	
Uniform Delay, d1	23.5	23.5	21.5		29.8			8.3			8.5	
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2	2.1	2.1	0.1		0.4			0.1			0.2	
Delay (s)	25.6	25.6	21.5		30.2			8.4			8.7	
Level of Service	C	C	C		C			A			A	
Approach Delay (s)		24.9			30.2			8.4			8.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	19.7
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	55	49	22	19	19	55
Future Volume (vph)	55	49	22	19	19	55
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	0.88
Frt			0.930			0.850
Flt Protected		0.974			0.950	
Satd. Flow (prot)	0	3175	3032	0	1630	2567
Flt Permitted		0.974			0.950	
Satd. Flow (perm)	0	3175	3032	0	1630	2567
Link Speed (k/h)		50	50		50	
Link Distance (m)		95.8	117.5		187.1	
Travel Time (s)		6.9	8.5		13.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	53	24	21	21	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	113	45	0	21	60
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	55	49	22	19	19	55
Future Volume (Veh/h)	55	49	22	19	19	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	53	24	21	21	60
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	45				181	22
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	45				181	22
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				97	94
cM capacity (veh/h)	1561				761	1049

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2	SB 3
Volume Total	78	35	16	29	21	30	30
Volume Left	60	0	0	0	21	0	0
Volume Right	0	0	0	21	0	30	30
cSH	1561	1700	1700	1700	761	1049	1049
Volume to Capacity	0.04	0.02	0.01	0.02	0.03	0.03	0.03
Queue Length 95th (m)	1.0	0.0	0.0	0.0	0.7	0.7	0.7
Control Delay (s)	5.8	0.0	0.0	0.0	9.9	8.5	8.5
Lane LOS	A				A	A	A
Approach Delay (s)	4.0		0.0		8.9		
Approach LOS					A		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	20.0%	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)	26	13	52	65	78	21	49	211	73	6	234	63
Future Volume (vph)	26	13	52	65	78	21	49	211	73	6	234	63
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0		0.0	30.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.922			0.968				0.850		0.969	
Flt Protected		0.986		0.950				0.991			0.999	
Satd. Flow (prot)	0	1513	0	1630	1694	0	0	3250	1488	0	3170	0
Flt Permitted		0.986		0.950				0.991			0.999	
Satd. Flow (perm)	0	1513	0	1630	1694	0	0	3250	1488	0	3170	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		148.0			236.5			198.4			122.2	
Travel Time (s)		10.7			17.0			14.3			8.8	
Confl. Peds. (#/hr)			1	1			1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	0%	7%	2%	0%	0%	3%	1%	0%	0%	2%	0%
Adj. Flow (vph)	28	14	57	71	85	23	53	229	79	7	254	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	99	0	71	108	0	0	282	79	0	329	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)		3.6			3.6			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 40.1%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	13	52	65	78	21	49	211	73	6	234	63
Future Volume (Veh/h)	26	13	52	65	78	21	49	211	73	6	234	63
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	14	57	71	85	23	53	229	79	7	254	68
Pedestrians		1			1			1				
Lane Width (m)		3.6			3.6			3.6				
Walking Speed (m/s)		1.2			1.2			1.2				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								198				
pX, platoon unblocked												
vC, conflicting volume	589	639	163	542	605	116	255			230		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	589	639	163	542	605	116	255			230		
tC, single (s)	7.6	6.5	7.0	7.5	6.5	6.9	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	96	93	81	78	98	96			99		
cM capacity (veh/h)	304	378	836	369	395	921	1299			1349		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	99	71	108	129	153	79	134	195
Volume Left	28	71	0	53	0	0	7	0
Volume Right	57	0	23	0	0	79	0	68
cSH	502	369	450	1299	1700	1700	1349	1700
Volume to Capacity	0.20	0.19	0.24	0.04	0.09	0.05	0.01	0.11
Queue Length 95th (m)	5.8	5.6	7.4	1.0	0.0	0.0	0.1	0.0
Control Delay (s)	13.9	17.1	15.5	3.4	0.0	0.0	0.4	0.0
Lane LOS	B	C	C	A			A	
Approach Delay (s)	13.9	16.1		1.2			0.2	
Approach LOS	B	C						

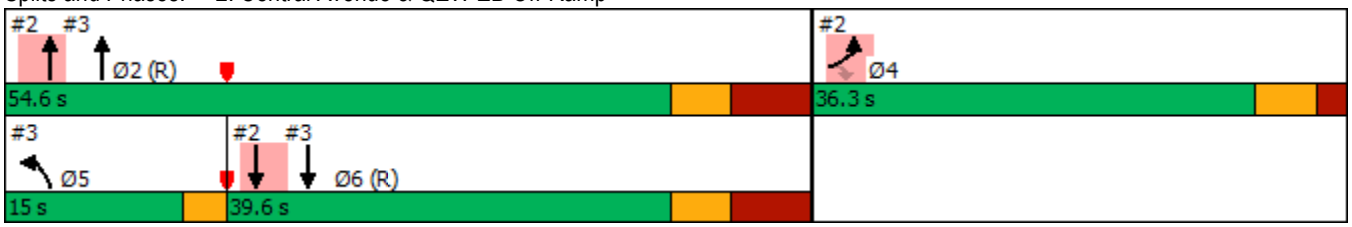
Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø5
Lane Configurations							
Traffic Volume (vph)	60	68	0	273	351	0	
Future Volume (vph)	60	68	0	273	351	0	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Lane Util. Factor	1.00	1.00	1.00	0.91	0.95	1.00	
Frt		0.850					
Flt Protected	0.950						
Satd. Flow (prot)	1662	1488	0	4777	3292	0	
Flt Permitted	0.950						
Satd. Flow (perm)	1662	1488	0	4777	3292	0	
Right Turn on Red		No				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	291.2			44.9	198.4		
Travel Time (s)	21.0			3.2	14.3		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	
Adj. Flow (vph)	65	74	0	297	382	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	65	74	0	297	382	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.6			0.0	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	4.8			4.8	4.8		
Two way Left Turn Lane							
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	
Turning Speed (k/h)	25	15	25			15	
Number of Detectors	1	1		2	2		
Detector Template	Left	Right		Thru	Thru		
Leading Detector (m)	2.0	2.0		10.0	10.0		
Trailing Detector (m)	0.0	0.0		0.0	0.0		
Detector 1 Position(m)	0.0	0.0		0.0	0.0		
Detector 1 Size(m)	2.0	2.0		0.6	0.6		
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		
Detector 2 Position(m)				9.4	9.4		
Detector 2 Size(m)				0.6	0.6		
Detector 2 Type				Cl+Ex	Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)				0.0	0.0		
Turn Type	Prot	Perm		NA	NA		
Protected Phases	4			2	6		5
Permitted Phases		4					
Detector Phase	4	4		2	6		
Switch Phase							

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø5
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0
Minimum Split (s)	14.3	14.3		28.6	28.6		9.0
Total Split (s)	36.3	36.3		54.6	39.6		15.0
Total Split (%)	39.9%	39.9%		60.1%	43.6%		17%
Maximum Green (s)	30.0	30.0		45.0	30.0		12.0
Yellow Time (s)	4.1	4.1		4.1	4.1		3.0
All-Red Time (s)	2.2	2.2		5.5	5.5		0.0
Lost Time Adjust (s)	-2.3	-2.3		-1.4	-1.4		
Total Lost Time (s)	4.0	4.0		8.2	8.2		
Lead/Lag					Lag		Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	2.5	2.5		5.0	5.0		2.5
Recall Mode	None	None		C-Min	C-Min		None
Walk Time (s)				8.0	8.0		
Flash Dont Walk (s)				5.9	5.9		
Pedestrian Calls (#/hr)				0	0		
Act Effct Green (s)	12.3	12.3		70.9	66.5		
Actuated g/C Ratio	0.14	0.14		0.78	0.73		
v/c Ratio	0.29	0.37		0.08	0.16		
Control Delay	38.0	40.4		0.8	6.2		
Queue Delay	0.0	0.0		0.2	0.0		
Total Delay	38.0	40.4		1.0	6.2		
LOS	D	D		A	A		
Approach Delay	39.3			1.0	6.2		
Approach LOS	D			A	A		

Intersection Summary	
Area Type: Other	
Cycle Length: 90.9	
Actuated Cycle Length: 90.9	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.37	
Intersection Signal Delay: 9.9	Intersection LOS: A
Intersection Capacity Utilization 27.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Central Avenue & QEW EB Off-Ramp



2: Central Avenue & QEW EB Off-Ramp

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	65	74	297	382
v/c Ratio	0.29	0.37	0.08	0.16
Control Delay	38.0	40.4	0.8	6.2
Queue Delay	0.0	0.0	0.2	0.0
Total Delay	38.0	40.4	1.0	6.2
Queue Length 50th (m)	11.0	12.7	0.7	9.0
Queue Length 95th (m)	22.2	25.0	1.1	24.6
Internal Link Dist (m)	267.2		20.9	174.4
Turn Bay Length (m)				
Base Capacity (vph)	590	528	3725	2409
Starvation Cap Reductn	0	0	2657	0
Spillback Cap Reductn	0	0	0	2
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.11	0.14	0.28	0.16

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	60	68	0	273	351	0
Future Volume (vph)	60	68	0	273	351	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		8.2	8.2	
Lane Util. Factor	1.00	1.00		0.91	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1662	1488		4778	3292	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1662	1488		4778	3292	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	74	0	297	382	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	65	74	0	297	382	0
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	8.4	8.4		66.6	60.5	
Effective Green, g (s)	10.7	10.7		68.0	61.9	
Actuated g/C Ratio	0.12	0.12		0.75	0.68	
Clearance Time (s)	6.3	6.3		9.6	9.6	
Vehicle Extension (s)	2.5	2.5		5.0	5.0	
Lane Grp Cap (vph)	195	175		3574	2241	
v/s Ratio Prot	0.04			c0.06	c0.12	
v/s Ratio Perm		c0.05				
v/c Ratio	0.33	0.42		0.08	0.17	
Uniform Delay, d1	36.8	37.2		3.1	5.2	
Progression Factor	1.00	1.00		0.22	1.00	
Incremental Delay, d2	0.7	1.2		0.0	0.2	
Delay (s)	37.6	38.4		0.7	5.4	
Level of Service	D	D		A	A	
Approach Delay (s)	38.0			0.7	5.4	
Approach LOS	D			A	A	

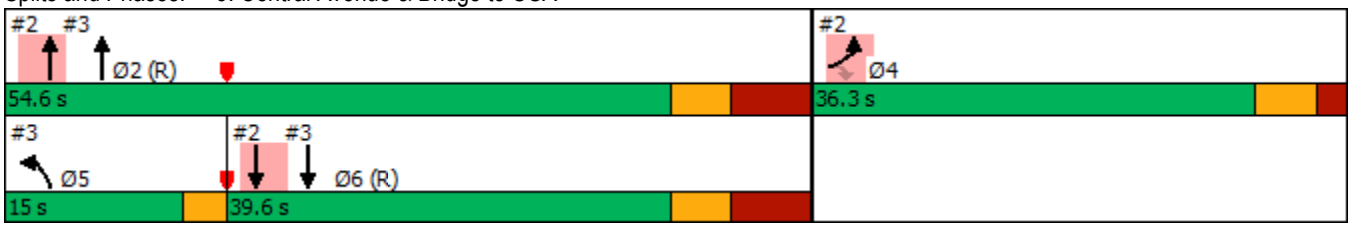
Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	15.2
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø4
Lane Configurations							
Traffic Volume (vph)	0	0	24	273	389	30	
Future Volume (vph)	0	0	24	273	389	30	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	
Ped Bike Factor			0.99		1.00		
Frt					0.989		
Flt Protected			0.950				
Satd. Flow (prot)	0	0	1662	3325	3249	0	
Flt Permitted			0.950				
Satd. Flow (perm)	0	0	1645	3325	3249	0	
Right Turn on Red		Yes				No	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	259.9			95.0	44.9		
Travel Time (s)	18.7			6.8	3.2		
Confl. Peds. (#/hr)			6			6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	
Adj. Flow (vph)	0	0	26	297	423	33	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	0	26	297	456	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	0.0			3.6	3.6		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	4.8			4.8	4.8		
Two way Left Turn Lane							
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	
Turning Speed (k/h)	25	15	25			15	
Number of Detectors			1	2	2		
Detector Template			Left	Thru	Thru		
Leading Detector (m)			2.0	10.0	10.0		
Trailing Detector (m)			0.0	0.0	0.0		
Detector 1 Position(m)			0.0	0.0	0.0		
Detector 1 Size(m)			2.0	0.6	0.6		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0		
Detector 2 Position(m)				9.4	9.4		
Detector 2 Size(m)				0.6	0.6		
Detector 2 Type				Cl+Ex	Cl+Ex		
Detector 2 Channel							
Detector 2 Extend (s)				0.0	0.0		
Turn Type			Prot	NA	NA		
Protected Phases			5	2	6		4
Permitted Phases							

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø4
Detector Phase			5	2	6		
Switch Phase							
Minimum Initial (s)			6.0	8.0	8.0		8.0
Minimum Split (s)			9.0	28.6	28.6		14.3
Total Split (s)			15.0	54.6	39.6		36.3
Total Split (%)			16.5%	60.1%	43.6%		40%
Maximum Green (s)			12.0	45.0	30.0		30.0
Yellow Time (s)			3.0	4.1	4.1		4.1
All-Red Time (s)			0.0	5.5	5.5		2.2
Lost Time Adjust (s)			0.0	-1.4	-1.4		
Total Lost Time (s)			3.0	8.2	8.2		
Lead/Lag			Lead		Lag		
Lead-Lag Optimize?							
Vehicle Extension (s)			2.5	5.0	5.0		2.5
Recall Mode			None	C-Min	C-Min		None
Walk Time (s)				8.0	8.0		
Flash Dont Walk (s)				5.9	5.9		
Pedestrian Calls (#/hr)				0	0		
Act Effct Green (s)			6.8	70.9	66.5		
Actuated g/C Ratio			0.07	0.78	0.73		
v/c Ratio			0.21	0.11	0.19		
Control Delay			43.2	3.7	3.6		
Queue Delay			0.0	0.0	0.4		
Total Delay			43.2	3.7	4.0		
LOS			D	A	A		
Approach Delay				6.9	4.0		
Approach LOS				A	A		

Intersection Summary	
Area Type: Other	
Cycle Length: 90.9	
Actuated Cycle Length: 90.9	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.37	
Intersection Signal Delay: 5.2	Intersection LOS: A
Intersection Capacity Utilization 27.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Central Avenue & Bridge to USA



3: Central Avenue & Bridge to USA

Lane Group	NBL	NBT	SBT
Lane Group Flow (vph)	26	297	456
v/c Ratio	0.21	0.11	0.19
Control Delay	43.2	3.7	3.6
Queue Delay	0.0	0.0	0.4
Total Delay	43.2	3.7	4.0
Queue Length 50th (m)	4.6	6.8	9.1
Queue Length 95th (m)	12.6	12.6	12.4
Internal Link Dist (m)		71.0	20.9
Turn Bay Length (m)			
Base Capacity (vph)	219	2592	2378
Starvation Cap Reductn	0	0	1347
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.12	0.11	0.44

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	24	273	389	30
Future Volume (vph)	0	0	24	273	389	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)			3.0	8.2	8.2	
Lane Util. Factor			1.00	0.95	0.95	
Frpb, ped/bikes			1.00	1.00	1.00	
Flpb, ped/bikes			1.00	1.00	1.00	
Frt			1.00	1.00	0.99	
Flt Protected			0.95	1.00	1.00	
Satd. Flow (prot)			1662	3325	3249	
Flt Permitted			0.95	1.00	1.00	
Satd. Flow (perm)			1662	3325	3249	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	26	297	423	33
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	26	297	456	0
Confl. Peds. (#/hr)			6			6
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%
Turn Type			Prot	NA	NA	
Protected Phases			5	2	6	
Permitted Phases						
Actuated Green, G (s)			3.1	66.6	60.5	
Effective Green, g (s)			3.1	68.0	61.9	
Actuated g/C Ratio			0.03	0.75	0.68	
Clearance Time (s)			3.0	9.6	9.6	
Vehicle Extension (s)			2.5	5.0	5.0	
Lane Grp Cap (vph)			56	2487	2212	
v/s Ratio Prot			c0.02	0.09	c0.14	
v/s Ratio Perm						
v/c Ratio			0.46	0.12	0.21	
Uniform Delay, d1			43.1	3.2	5.4	
Progression Factor			1.00	1.00	0.56	
Incremental Delay, d2			4.4	0.1	0.2	
Delay (s)			47.5	3.3	3.2	
Level of Service			D	A	A	
Approach Delay (s)	0.0			6.8	3.2	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	17.5
Intersection Capacity Utilization	27.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	0	32	10	0	10	48	261	2	4	348	38
Future Volume (vph)	29	0	32	10	0	10	48	261	2	4	348	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	0.91	0.91	0.91	0.95	0.95	0.95
Frt		0.929			0.932			0.999			0.985	
Flt Protected		0.977			0.976			0.992				
Satd. Flow (prot)	0	1588	0	0	1592	0	0	4735	0	0	3275	0
Flt Permitted		0.977			0.976			0.992				
Satd. Flow (perm)	0	1588	0	0	1592	0	0	4735	0	0	3275	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		76.9			114.0			112.9			95.0	
Travel Time (s)		5.5			8.2			8.1			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	32	0	35	11	0	11	52	284	2	4	378	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	0	0	22	0	0	338	0	0	423	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 33.2%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	0	32	10	0	10	48	261	2	4	348	38
Future Volume (Veh/h)	29	0	32	10	0	10	48	261	2	4	348	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	35	11	0	11	52	284	2	4	378	41
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								113			95	
pX, platoon unblocked	0.97	0.97	0.97	0.97	0.97		0.97					
vC, conflicting volume	616	796	210	621	816	96	419			286		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	532	719	112	537	739	96	328			286		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	96	97	100	99	96			100		
cM capacity (veh/h)	400	329	895	386	320	949	1200			1288		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	67	22	123	142	73	193	230
Volume Left	32	11	52	0	0	4	0
Volume Right	35	11	0	0	2	0	41
cSH	563	549	1200	1700	1700	1288	1700
Volume to Capacity	0.12	0.04	0.04	0.08	0.04	0.00	0.14
Queue Length 95th (m)	3.2	1.0	1.1	0.0	0.0	0.1	0.0
Control Delay (s)	12.3	11.8	3.7	0.0	0.0	0.2	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	12.3	11.8	1.3			0.1	
Approach LOS	B	B					

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

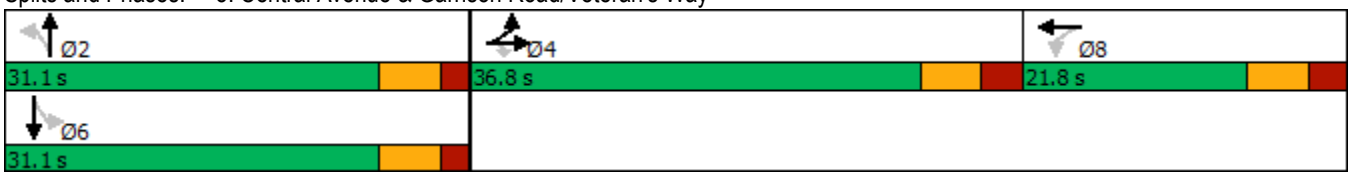
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	276	0	107	0	1	6	61	26	1	2	34	353
Future Volume (vph)	276	0	107	0	1	6	61	26	1	2	34	353
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (m)	65.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	1.00	1.00			0.99			1.00			0.98	
Frt			0.850		0.882			0.998			0.864	
Flt Protected	0.950	0.950						0.966				
Satd. Flow (prot)	1579	1579	1473	0	1525	0	0	3167	0	0	2791	0
Flt Permitted	0.950	0.950						0.681			0.954	
Satd. Flow (perm)	1578	1578	1473	0	1525	0	0	2232	0	0	2663	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		7			1			384	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		262.1			318.9			178.1			112.9	
Travel Time (s)		18.9			23.0			12.8			8.1	
Confl. Peds. (#/hr)	1					1	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%	0%	4%	0%	0%	0%	1%
Adj. Flow (vph)	300	0	116	0	1	7	66	28	1	2	37	384
Shared Lane Traffic (%)	50%											
Lane Group Flow (vph)	150	150	116	0	8	0	0	95	0	0	423	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)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25		15	25		15	25		15	25		15
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)	2.0	10.0	2.0	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	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)	2.0	0.6	2.0	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	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)		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	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Split	NA	Perm		NA		Perm	NA		Perm	NA	
Protected Phases	4	4			8			2			6	
Permitted Phases			4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	31.0	31.0	31.0	14.8	14.8		35.0	35.0		35.0	35.0	
Total Split (s)	36.8	36.8	36.8	21.8	21.8		31.1	31.1		31.1	31.1	
Total Split (%)	41.0%	41.0%	41.0%	24.3%	24.3%		34.7%	34.7%		34.7%	34.7%	
Maximum Green (s)	30.0	30.0	30.0	15.0	15.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		4.1	4.1		4.1	4.1	
All-Red Time (s)	2.7	2.7	2.7	2.7	2.7		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0			0.0			0.0	
Total Lost Time (s)	6.8	6.8	6.8		6.8			6.1			6.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.8	2.8	2.8	2.8	2.8		2.8	2.8		2.8	2.8	
Recall Mode	None	None	None	None	None		Max	Max		Max	Max	
Walk Time (s)	11.0	11.0	11.0				13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	13.2	13.2	13.2				15.9	15.9		15.9	15.9	
Pedestrian Calls (#/hr)	0	0	0				0	0		0	0	
Act Effct Green (s)	10.6	10.6	10.6		8.2			29.5			29.5	
Actuated g/C Ratio	0.19	0.19	0.19		0.15			0.53			0.53	
v/c Ratio	0.50	0.50	0.31		0.03			0.08			0.27	
Control Delay	27.1	27.1	7.3		17.3			9.0			2.5	
Queue Delay	0.0	0.0	0.0		0.0			0.0			0.0	
Total Delay	27.1	27.1	7.3		17.3			9.0			2.5	
LOS	C	C	A		B			A			A	
Approach Delay		21.6			17.3			9.0			2.5	
Approach LOS		C			B			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 89.7
Actuated Cycle Length: 55.6
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 11.7 Intersection LOS: B
Intersection Capacity Utilization 79.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 5: Central Avenue & Garrison Road/Veteran's Way



5: Central Avenue & Garrison Road/Veteran's Way

Lane Group	EBL	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	150	150	116	8	95	423
v/c Ratio	0.50	0.50	0.31	0.03	0.08	0.27
Control Delay	27.1	27.1	7.3	17.3	9.0	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	27.1	7.3	17.3	9.0	2.5
Queue Length 50th (m)	13.8	13.8	0.0	0.1	1.9	0.7
Queue Length 95th (m)	37.3	37.3	11.7	4.0	9.0	10.2
Internal Link Dist (m)		238.1		294.9	154.1	88.9
Turn Bay Length (m)	65.0					
Base Capacity (vph)	870	870	865	425	1185	1593
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	0.17	0.17	0.13	0.02	0.08	0.27

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	276	0	107	0	1	6	61	26	1	2	34	353
Future Volume (vph)	276	0	107	0	1	6	61	26	1	2	34	353
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	6.8	6.8	6.8		6.8			6.1			6.1	
Lane Util. Factor	0.95	0.95	1.00		1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00	1.00		0.98			1.00			0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00			1.00			1.00	
Frt	1.00	1.00	0.85		0.88			1.00			0.86	
Flt Protected	0.95	0.95	1.00		1.00			0.97			1.00	
Satd. Flow (prot)	1579	1579	1473		1507			3169			2791	
Flt Permitted	0.95	0.95	1.00		1.00			0.68			0.95	
Satd. Flow (perm)	1579	1579	1473		1507			2234			2664	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	300	0	116	0	1	7	66	28	1	2	37	384
RTOR Reduction (vph)	0	0	96	0	7	0	0	1	0	0	198	0
Lane Group Flow (vph)	150	150	20	0	1	0	0	94	0	0	225	0
Confl. Peds. (#/hr)	1					1	1		2	2		1
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%	0%	4%	0%	0%	0%	1%
Turn Type	Split	NA	Perm		NA		Perm	NA		Perm	NA	
Protected Phases	4	4			8			2			6	
Permitted Phases			4	8			2			6		
Actuated Green, G (s)	10.6	10.6	10.6		1.2			29.5			29.5	
Effective Green, g (s)	10.6	10.6	10.6		1.2			29.5			29.5	
Actuated g/C Ratio	0.17	0.17	0.17		0.02			0.48			0.48	
Clearance Time (s)	6.8	6.8	6.8		6.8			6.1			6.1	
Vehicle Extension (s)	2.8	2.8	2.8		2.8			2.8			2.8	
Lane Grp Cap (vph)	274	274	255		29			1080			1288	
v/s Ratio Prot	c0.09	0.09			c0.00							
v/s Ratio Perm			0.01					0.04			c0.08	
v/c Ratio	0.55	0.55	0.08		0.04			0.09			0.17	
Uniform Delay, d1	23.0	23.0	21.1		29.3			8.5			8.9	
Progression Factor	1.00	1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2	2.0	2.0	0.1		0.5			0.2			0.3	
Delay (s)	25.1	25.1	21.2		29.8			8.7			9.2	
Level of Service	C	C	C		C			A			A	
Approach Delay (s)		24.0			29.8			8.7			9.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	19.7
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	66	71	7	22	35	106
Future Volume (vph)	66	71	7	22	35	106
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (m)	0.0			0.0	25.0	0.0
Storage Lanes	0			0	1	2
Taper Length (m)	7.5				7.5	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	0.88
Frt			0.887			0.850
Flt Protected		0.976			0.950	
Satd. Flow (prot)	0	3182	2891	0	1630	2567
Flt Permitted		0.976			0.950	
Satd. Flow (perm)	0	3182	2891	0	1630	2567
Link Speed (k/h)		50	50		50	
Link Distance (m)		125.1	145.8		178.1	
Travel Time (s)		9.0	10.5		12.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	77	8	24	38	115
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	149	32	0	38	115
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 20.6%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	71	7	22	35	106
Future Volume (Veh/h)	66	71	7	22	35	106
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	77	8	24	38	115
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	32				202	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32				202	16
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				95	89
cM capacity (veh/h)	1579				732	1059

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2	SB 3
Volume Total	98	51	5	27	38	58	58
Volume Left	72	0	0	0	38	0	0
Volume Right	0	0	0	24	0	58	58
cSH	1579	1700	1700	1700	732	1059	1059
Volume to Capacity	0.05	0.03	0.00	0.02	0.05	0.05	0.05
Queue Length 95th (m)	1.1	0.0	0.0	0.0	1.3	1.4	1.4
Control Delay (s)	5.5	0.0	0.0	0.0	10.2	8.6	8.6
Lane LOS	A				B	A	A
Approach Delay (s)	3.6		0.0		9.0		
Approach LOS					A		

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		