

# TECHNICAL MEMORANDUM

**To:** St. Mark and Dementia Coptic Orthodox Church

**From:** Matthew Di Maria, C.E.T., RSP<sub>1</sub>, CAPM  
Nick Palomba, P.Eng.

**Date:** February 17, 2023

**Subject:** Ninth Line Coptic Church TIS – Addendum Memorandum

**RVA:** 215810



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## 1.0 Introduction

RVA is pleased to provide the following Addendum Memorandum to the previously completed Ninth Line Coptic Church Traffic Impact Study (TIS) dated January 31<sup>st</sup>, 2022.

The purpose of the Addendum Memorandum is to address comments received from Halton Region and the Ministry of Transportation (MTO) via letter dated September 15<sup>th</sup>, 2022. The specific comments addressed as part of this memo are as follows:

### Halton Region

*Comment 1: As previously noted in the Region's first submission comment letter, only one access should be planned for the development site. Therefore, the shared configuration for the existing northerly access into the Access Storage Facility will not be supported.*

*Comment 2: The proposed left-in/right-in/right-out at the southerly limits of the property is supported. A southbound left-turn lane is warranted, which has been shown on the contextual plans. The access must also be equipped with a northbound right-turn lane with the appropriate storage and taper lengths, and all relevant plans will need to be subsequently updated to reflect this.*

## MTO

*Comment 1: Section 2.4: Please specify the peak hours for analysis. For example, it is not very clear whether the weekday p.m. peak hour assessed is between 7-9pm as per 2021 TMC or 3-6pm as per 2019 TMC.*

*Comment 2: Section 7.4: The ministry's latest general guidelines (Feb 2021) states that: "At signalized intersections, movements with v/c ratio greater than 0.85 are deemed to be critical in terms of operations. Movements that experience a v/c ratio of 0.85 or greater shall be evaluated for possible operational improvements. For ramps, a v/c ratio for terminal ramp approaches with a value greater than 0.75 would be deemed critical and shall be evaluated for possible operational improvements." Please include a discussion on potential operational improvements to the ramp terminal*

## **2.0 Responses to Halton Region Comments**

Based on the Region's comments regarding the shared north access with the existing storage facility, a sensitivity analysis was performed to evaluate the traffic impacts of assigning all site generated traffic to the proposed south access of the development. In order to assess the impacts, the following tasks have been undertaken:

- Reassign all site generated traffic volumes to the south site access for both Phase 1 and Phase 2 of the proposed development;
- Perform intersection operational analysis for the south site access under the following horizon years:
  - › 2028 for the opening year of Phase 1;
  - › 2030 for the opening year of Phase 2 (full development build-out);
  - › 2035 for 5 years post full build-out; and
  - › 2040 for 10 years post full build-out.
- Identify any critical movements or capacity issues at the south site access and recommended any mitigation measures.

### **Site Traffic Redistribution**

The site generated traffic volumes for Phase 1 and 2 of the development are previously presented in Table 1 of the January 2022 TIS. For the purpose of this memorandum, all of the site trips were assigned to the south access based on trip distribution percentages

identified in Table 2 of the same report and the permitted movements at the access, which include left-in, right-in, and right-out movements.

Figure 2.1 and Figure 2.2 present the redistributed site generated traffic volumes for the weekday p.m. and Saturday p.m. and Sunday a.m. peak hours at the south access for Phase 1 and 2 of the proposed development respectively.

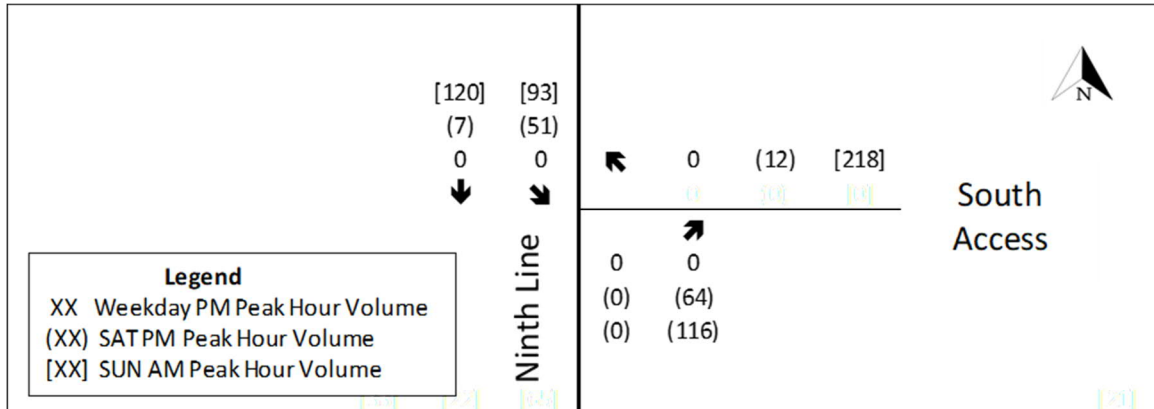


Figure 2.1 – Phase 1 Redistributed Site Trips

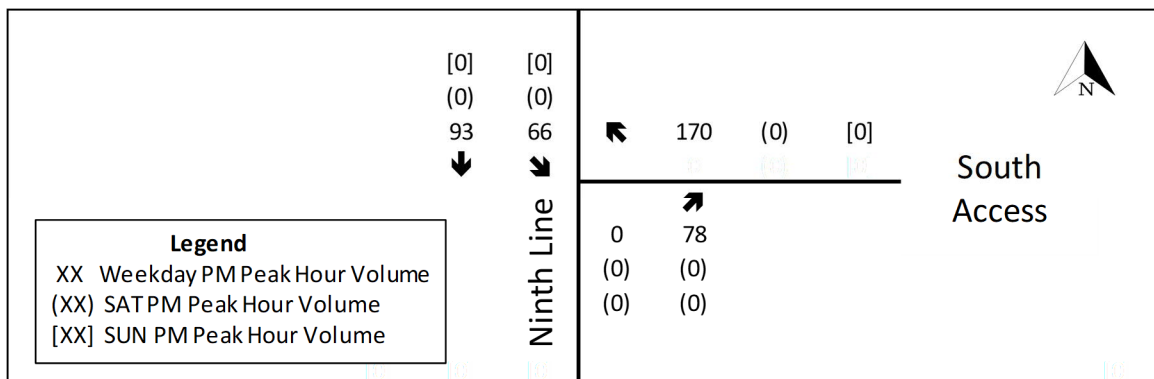


Figure 2.2 – Phase 2 Redistributed Site Trips

## 2.1 Future Total Traffic Conditions

### 2.3.1. Future Total Traffic Volumes

The future total traffic volumes for the south site access were derived by combining the future background 2028, 2030, 2035 and 2040 traffic volumes shown in Figures 10 through 13 of the January 2022 TIS report with the site traffic volumes presented in Figure 2.1 and Figure 2.2 of this memorandum.

The resulting future total 2028, 2030, 2035 and 2040 traffic volumes for the weekday p.m. and Saturday p.m., and Sunday a.m. peak hours are presented in Figure 2.3, Figure 2.4, Figure 2.5, and Figure 2.6 respectively.

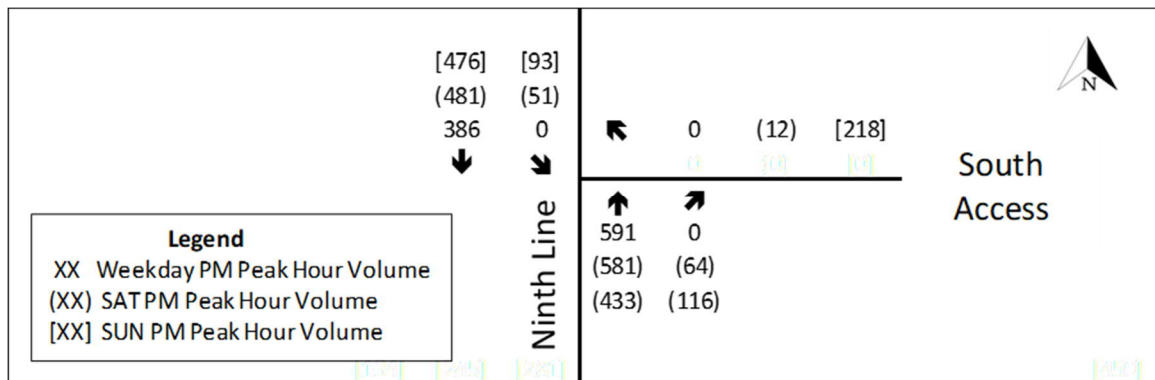


Figure 2.3 – Future Total (2028) Traffic Volumes

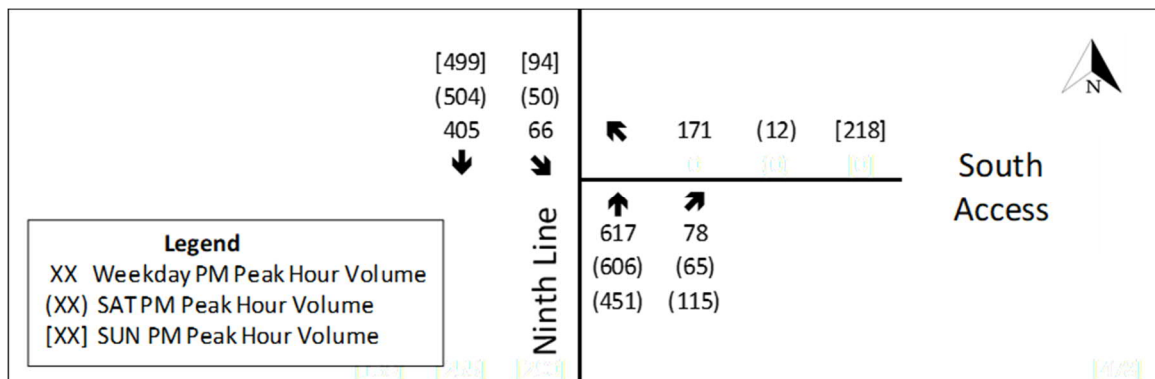


Figure 2.4 – Future Total (2030) Traffic Volumes

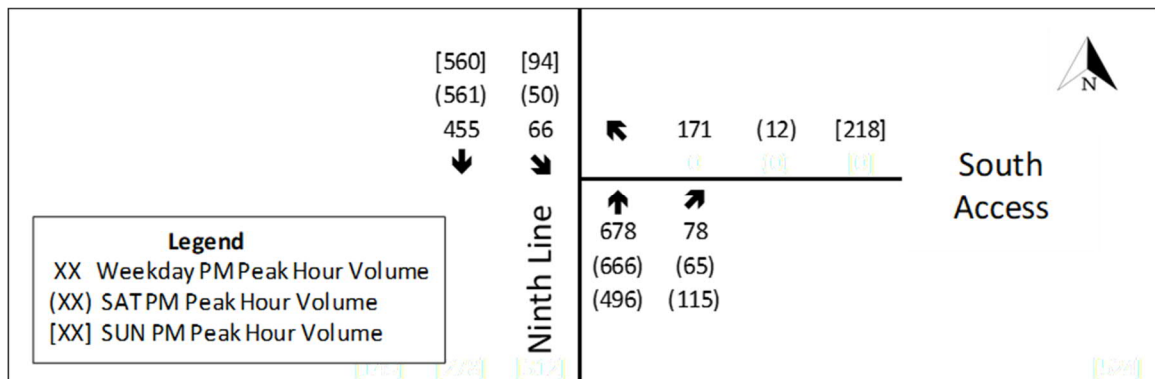


Figure 2.5 – Future Total (2035) Traffic Volumes

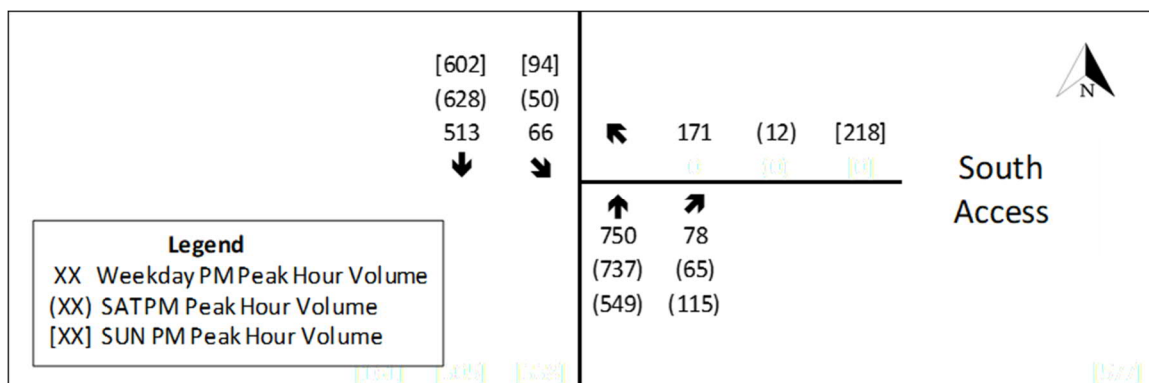


Figure 2.6 – Future Total (2040) Traffic Volumes

## 2.2 Intersection Operational Analysis

**Table 2.1** presents the result of the intersection operational analysis completed under future total 2028, 2030, 2035 and 2040 traffic conditions for Ninth Line and the proposed south site access. All Synchro HCM analysis outputs are provided in **Appendix A**.

It is to be noted that this analysis was completed with a dedicated southbound left-turn lane and dedicated northbound right-turn lane at the access as highlighted by the Region in Comment 2 under Section 1 of this memo. Initially, 15 metres storage length was assumed for both the southbound and northbound turning lanes.

Table 2.1 – Intersection Operational Analysis – Ninth Line & Proposed South Access

Scenario	Movement	Peak Hour												Existing Storage Length (m)
		Weekday PM				Saturday PM				Sunday AM				
		V/C	LOS	Delay (s)	95% <sup>tile</sup> Queue (m)	V/C	LOS	Delay (s)	95% <sup>tile</sup> Queue (m)	V/C	LOS	Delay (s)	95% <sup>tile</sup> Queue (m)	
Future Total 2028 (Phase 1)	WBR	0.28	A	0	0	0.02	B	10	0	0.28	B	11	9	-
	NBR	0.07	A	0	0	0.04	A	0	0	0.07	A	0	0	-
	SBL	0.00	A	0	0	0.05	A	9	1	0.09	A	9	2	-
Future Total 2030 (Phase 1+2)	WBR	0.25	B	12	8	0.02	B	10	0	0.28	B	11	9	-
	NBR	0.05	A	0	0	0.04	A	0	0	0.07	A	0	0	-
	SBL	0.07	A	9	2	0.05	A	9	1	0.09	A	9	3	-
Future Total 2035 (Phase 1+2)	WBR	0.26	B	12	8	0.02	B	11	0	0.29	B	12	10	-
	NBR	0.05	A	0	0	0.04	A	0	0	0.07	A	0	0	-
	SBL	0.08	A	2	10	0.06	A	9	2	0.10	A	9	3	-
Future Total 2040 (Phase 1+2)	WBR	0.27	B	13	9	0.02	B	11	0	0.30	B	12	10	-
	NBR	0.05	A	0	0	0.04	A	0	0	0.07	A	0	0	-
	SBL	0.08	A	10	2	0.06	A	10	2	0.10	A	9	3	-

As presented in **Table 2.1**, all turn movements at the proposed south access are forecast to operate well under all future total traffic scenarios during all peak hours analyzed. Delays are forecast to be minor, and movements are forecast to operate at levels of service “B” or better. Movement capacities do not exceed 0.30 and queues do not extend beyond 10 metres or 1 vehicle.

Based on the results of the operational analysis completed, the proposed south access to the development is forecast to operate well as a left-in/right-in/right-out access intersections and can accommodate both phases of the development to the ultimate 2040 horizon year analyzed.

### **2.3.2. Storage Lengths**

As illustrated in **Table 2.1**, looking out to the ultimate 2040 horizon year, there is no queue forecast for the northbound right turn movement into the south site access based on the 95<sup>th</sup> percentile queue length results.

Based on these results and the Region’s requirement for providing a dedicated right-turn lane, it is recommended that the proposed right-turn lane have a minimum storage length of 15 metres as per the Transportation Association of Canada’s (TAC) Geometric Design Guide manual.

Similarly, a 15-metre storage length for the southbound left-turn movement at the south site access would be required as 95<sup>th</sup> percentile queue lengths for this movement are forecast to only reach 10 metres by the ultimate 2040 horizon year analyzed.

A conceptual drawing of the access showing the auxiliary lane storage requirements is presented in **Appendix B**.

## **3.0 Responses to MTO Comments**

### **Response to Comment 1**

In response to comment 1 from the MTO, below are the specific peak hours analyzed for the study area intersections:

- Weekday PM Peak Hour: 5:00 p.m. to 6:00 p.m.
- Saturday Evening: 7:00 p.m. to 8:00 p.m.
- Sunday AM: 10:30 a.m. to 11:30 a.m.

### **Response to Comment 2**

As presented in Table 7 of the January 2022 TIS, the results of the intersection operational analysis for the northbound Highway 403 off-ramp with Dundas Street show that the intersection is forecast to operate with no v/c ratios exceeding the Ministry’s thresholds forecasting out to the ultimate study horizon year of 2040.

At the southbound Highway 403 Off-ramp with Dundas Street as presented in Table 6 of the TIS report, the southbound right-turn movement is currently operating above the Ministry's capacity threshold under existing and future background 2028 conditions, without the addition of site generated traffic to the intersection. With the addition site generated traffic under Phase 1 of the development in 2028, the southbound right-turn v/c ratio has only increased slightly from future 2028 background traffic conditions during all three peak hours analyzed.

Similarly, the addition of Phase 2 site trips to the intersection in 2030 has once again had only a minor impact to the southbound right-turn movement v/c ratios as compared with future background 2030 traffic conditions.

Although the southbound movement is currently operating or forecast to operate above the Ministry's v/c capacity thresholds, there is still reserve capacity available for the movement based on the future forecast 2040 traffic conditions, which takes into account both the forecasted site trips for the full development plus 2% background traffic growth for 19 years into the future. In addition, the level of service for this movement is forecast to be "D" or better (between 35 to 55 seconds of delay) and the greatest 95<sup>th</sup> percentile queue length is forecast to be only 182 metres, which can be accommodated within the existing off-ramp length which is over 500 metres in length.

Based on these results, no geometric improvements are recommended for the intersection as a result of site generated traffic volumes.

## 4.0 Conclusions

The results of the operational analysis completed for the south site access as a left-in/right-in/right-out access indicates that the intersection will operate well under this configuration with the addition of all site generated traffic volumes to the access.

Based on 95<sup>th</sup> percentile queues under future total 2040 traffic conditions, the dedicated southbound left-turn lane and dedicated northbound right-turn lanes into the site would require storage lengths of 15 metres each. In addition to the storage lengths, taper lengths are to be provided based on the design speed requirements.

The southbound right-turn movement at southbound Highway 403 Off-ramp with Dundas Street is currently operating or forecast to operate above the Ministry's v/c capacity thresholds. However, based on intersection operational analysis under future forecast 2040 traffic conditions, there is still reserve capacity available for the movement, level of service is forecast to be "D" or better (35 to 55 seconds of delay) and 95<sup>th</sup> percentile queue lengths can be accommodated within the existing off-ramp length.

**APPENDIX 1**














Synchro HCM Analysis Reports


















Ninth Line Coptic Church TIS  
3: Southern Site Access & Ninth Line

Future Total (2028) Traffic Conditions (PH 1)  
Weekday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	0	591	0	0	386	
Future Volume (Veh/h)	0	0	591	0	0	386	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	0	591	0	0	386	
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	784	296			591		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	784	296			591		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	100			100		
cM capacity (veh/h)	330	701			981		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	0	296	296	0	0	193	193
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.28	0.17	0.17	0.07	0.00	0.11	0.11
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A						
Approach Delay (s)	0.0	0.0			0.0		
Approach LOS	A						
Intersection Summary							
Average Delay			0.0				
Intersection Capacity Utilization			19.7%		ICU Level of Service		A
Analysis Period (min)			15				















Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2028) Traffic Conditions (PH 1)  
 Saturday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	12	581	64	51	481	
Future Volume (Veh/h)	0	12	581	64	51	481	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	12	581	64	51	481	
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	924	290			645		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	924	290			645		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	98			95		
cM capacity (veh/h)	254	706			936		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	12	290	290	64	51	240	240
Volume Left	0	0	0	0	51	0	0
Volume Right	12	0	0	64	0	0	0
cSH	706	1700	1700	1700	936	1700	1700
Volume to Capacity	0.02	0.17	0.17	0.04	0.05	0.14	0.14
Queue Length 95th (m)	0.4	0.0	0.0	0.0	1.4	0.0	0.0
Control Delay (s)	10.2	0.0	0.0	0.0	9.1	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	10.2	0.0			0.9		
Approach LOS	B						
Intersection Summary							
Average Delay			0.5				
Intersection Capacity Utilization			26.1%		ICU Level of Service		A
Analysis Period (min)			15				
















Ninth Line Coptic Church TIS  
3: Southern Site Access & Ninth Line

Future Total (2028) Traffic Conditions (PH 1)  
Sunday AM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	218	433	116	93	476	
Future Volume (Veh/h)	0	218	433	116	93	476	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	218	433	116	93	476	
Pedestrians			72				
Lane Width (m)			3.6				
Walking Speed (m/s)			1.2				
Percent Blockage			6				
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	929	216			549		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	929	216			549		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	72			91		
cM capacity (veh/h)	228	788			1017		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	218	216	216	116	93	238	238
Volume Left	0	0	0	0	93	0	0
Volume Right	218	0	0	116	0	0	0
cSH	788	1700	1700	1700	1017	1700	1700
Volume to Capacity	0.28	0.13	0.13	0.07	0.09	0.14	0.14
Queue Length 95th (m)	9.0	0.0	0.0	0.0	2.4	0.0	0.0
Control Delay (s)	11.3	0.0	0.0	0.0	8.9	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	11.3	0.0			1.5		
Approach LOS	B						
Intersection Summary							
Average Delay			2.5				
Intersection Capacity Utilization			32.1%		ICU Level of Service		A
Analysis Period (min)			15				














Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2030) Traffic Conditions (PH 1 & 2)  
 Weekday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 		 	 	
Traffic Volume (veh/h)	0	171	617	78	66	405	
Future Volume (Veh/h)	0	171	617	78	66	405	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	171	617	78	66	405	
<b>Pedestrians</b>							
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	952	308			695		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	952	308			695		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	75			93		
cM capacity (veh/h)	239	687			897		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	171	308	308	78	66	202	202
Volume Left	0	0	0	0	66	0	0
Volume Right	171	0	0	78	0	0	0
cSH	687	1700	1700	1700	897	1700	1700
Volume to Capacity	0.25	0.18	0.18	0.05	0.07	0.12	0.12
Queue Length 95th (m)	7.8	0.0	0.0	0.0	1.9	0.0	0.0
Control Delay (s)	12.0	0.0	0.0	0.0	9.3	0.0	0.0
Lane LOS	B			A			
Approach Delay (s)	12.0	0.0			1.3		
Approach LOS	B						
<b>Intersection Summary</b>							
Average Delay			2.0				
Intersection Capacity Utilization			34.3%	ICU Level of Service	A		
Analysis Period (min)			15				


















Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2030) Traffic Conditions (PH 1 & 2)  
 Saturday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	12	606	65	50	504	
Future Volume (Veh/h)	0	12	606	65	50	504	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	12	606	65	50	504	
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	958	303			671		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	958	303			671		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	98			95		
cM capacity (veh/h)	241	693			915		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	12	303	303	65	50	252	252
Volume Left	0	0	0	0	50	0	0
Volume Right	12	0	0	65	0	0	0
cSH	693	1700	1700	1700	915	1700	1700
Volume to Capacity	0.02	0.18	0.18	0.04	0.05	0.15	0.15
Queue Length 95th (m)	0.4	0.0	0.0	0.0	1.4	0.0	0.0
Control Delay (s)	10.3	0.0	0.0	0.0	9.2	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	10.3	0.0			0.8		
Approach LOS	B						
Intersection Summary							
Average Delay			0.5				
Intersection Capacity Utilization			26.8%		ICU Level of Service		A
Analysis Period (min)			15				












Ninth Line Coptic Church TIS  
3: Southern Site Access & Ninth Line

Future Total (2030) Traffic Conditions (PH 1 & 2)  
Sunday AM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 		 	 	 
Traffic Volume (veh/h)	0	218	451	115	94	499	
Future Volume (Veh/h)	0	218	451	115	94	499	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	218	451	115	94	499	
Pedestrians			72				
Lane Width (m)			3.6				
Walking Speed (m/s)			1.2				
Percent Blockage			6				
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	960	226			566		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	960	226			566		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	72			91		
cM capacity (veh/h)	217	778			1002		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	218	226	226	115	94	250	250
Volume Left	0	0	0	0	94	0	0
Volume Right	218	0	0	115	0	0	0
cSH	778	1700	1700	1700	1002	1700	1700
Volume to Capacity	0.28	0.13	0.13	0.07	0.09	0.15	0.15
Queue Length 95th (m)	9.2	0.0	0.0	0.0	2.5	0.0	0.0
Control Delay (s)	11.4	0.0	0.0	0.0	9.0	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	11.4	0.0			1.4		
Approach LOS	B						
Intersection Summary							
Average Delay			2.4				
Intersection Capacity Utilization			32.6%		ICU Level of Service		A
Analysis Period (min)			15				
















Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2035) Traffic Conditions (PH 1 & 2)  
 Weekday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	0	171	678	78	66	455	
Future Volume (Veh/h)	0	171	678	78	66	455	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	171	678	78	66	455	
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	1038	339			756		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1038	339			756		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	74			92		
cM capacity (veh/h)	209	657			851		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	171	339	339	78	66	228	228
Volume Left	0	0	0	0	66	0	0
Volume Right	171	0	0	78	0	0	0
cSH	657	1700	1700	1700	851	1700	1700
Volume to Capacity	0.26	0.20	0.20	0.05	0.08	0.13	0.13
Queue Length 95th (m)	8.3	0.0	0.0	0.0	2.0	0.0	0.0
Control Delay (s)	12.4	0.0	0.0	0.0	9.6	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	12.4	0.0			1.2		
Approach LOS	B						
Intersection Summary							
Average Delay			1.9				
Intersection Capacity Utilization			36.0%		ICU Level of Service		A
Analysis Period (min)			15				

Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line















Future Total (2035) Traffic Conditions (PH 1 & 2)  
 Saturday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 		 	 	
Traffic Volume (veh/h)	0	12	666	65	50	561	
Future Volume (Veh/h)	0	12	666	65	50	561	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	12	666	65	50	561	
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	1046	333			731		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1046	333			731		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	98			94		
cM capacity (veh/h)	211	663			869		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	12	333	333	65	50	280	280
Volume Left	0	0	0	0	50	0	0
Volume Right	12	0	0	65	0	0	0
cSH	663	1700	1700	1700	869	1700	1700
Volume to Capacity	0.02	0.20	0.20	0.04	0.06	0.17	0.17
Queue Length 95th (m)	0.4	0.0	0.0	0.0	1.5	0.0	0.0
Control Delay (s)	10.5	0.0	0.0	0.0	9.4	0.0	0.0
Lane LOS	B			A			
Approach Delay (s)	10.5	0.0			0.8		
Approach LOS	B						
Intersection Summary							
Average Delay			0.4				
Intersection Capacity Utilization			28.4%	ICU Level of Service		A	
Analysis Period (min)			15				

















Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2035) Traffic Conditions (PH 1 & 2)  
 Sunday AM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	218	496	115	94	560	
Future Volume (Veh/h)	0	218	496	115	94	560	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	218	496	115	94	560	
Pedestrians			72				
Lane Width (m)			3.6				
Walking Speed (m/s)			1.2				
Percent Blockage			6				
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1036	248			611		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1036	248			611		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	71			90		
cM capacity (veh/h)	193	752			964		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	218	248	248	115	94	280	280
Volume Left	0	0	0	0	94	0	0
Volume Right	218	0	0	115	0	0	0
cSH	752	1700	1700	1700	964	1700	1700
Volume to Capacity	0.29	0.15	0.15	0.07	0.10	0.16	0.16
Queue Length 95th (m)	9.6	0.0	0.0	0.0	2.6	0.0	0.0
Control Delay (s)	11.7	0.0	0.0	0.0	9.1	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	11.7	0.0			1.3		
Approach LOS	B						
Intersection Summary							
Average Delay			2.3				
Intersection Capacity Utilization			33.9%		ICU Level of Service		A
Analysis Period (min)			15				















Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2040) Traffic Conditions (PH 1 & 2)  
 Weekday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 		 	 	
Traffic Volume (veh/h)	0	171	750	78	66	513	
Future Volume (Veh/h)	0	171	750	78	66	513	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	171	750	78	66	513	
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	1138	375			828		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1138	375			828		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	73			92		
cM capacity (veh/h)	179	623			799		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	171	375	375	78	66	256	256
Volume Left	0	0	0	0	66	0	0
Volume Right	171	0	0	78	0	0	0
cSH	623	1700	1700	1700	799	1700	1700
Volume to Capacity	0.27	0.22	0.22	0.05	0.08	0.15	0.15
Queue Length 95th (m)	8.9	0.0	0.0	0.0	2.2	0.0	0.0
Control Delay (s)	13.0	0.0	0.0	0.0	9.9	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	13.0	0.0			1.1		
Approach LOS	B						
Intersection Summary							
Average Delay			1.8				
Intersection Capacity Utilization			38.0%		ICU Level of Service		A
Analysis Period (min)			15				















Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2040) Traffic Conditions (PH 1 & 2)  
 Saturday PM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 		 	 	
Traffic Volume (veh/h)	0	12	737	65	50	628	
Future Volume (Veh/h)	0	12	737	65	50	628	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	12	737	65	50	628	
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	1151	368			802		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1151	368			802		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	98			94		
cM capacity (veh/h)	180	629			817		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	12	368	368	65	50	314	314
Volume Left	0	0	0	0	50	0	0
Volume Right	12	0	0	65	0	0	0
cSH	629	1700	1700	1700	817	1700	1700
Volume to Capacity	0.02	0.22	0.22	0.04	0.06	0.18	0.18
Queue Length 95th (m)	0.5	0.0	0.0	0.0	1.6	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0	9.7	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	10.8	0.0			0.7		
Approach LOS	B						
Intersection Summary							
Average Delay			0.4				
Intersection Capacity Utilization			30.4%		ICU Level of Service		A
Analysis Period (min)			15				

Ninth Line Coptic Church TIS  
 3: Southern Site Access & Ninth Line

Future Total (2040) Traffic Conditions (PH 1 & 2)  
 Sunday AM Peak Hour

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations			 			 	
Traffic Volume (veh/h)	0	218	549	115	94	602	
Future Volume (Veh/h)	0	218	549	115	94	602	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	218	549	115	94	602	
Pedestrians			72				
Lane Width (m)			3.6				
Walking Speed (m/s)			1.2				
Percent Blockage			6				
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	1110	274			664		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1110	274			664		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	70			90		
cM capacity (veh/h)	172	723			921		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	218	274	274	115	94	301	301
Volume Left	0	0	0	0	94	0	0
Volume Right	218	0	0	115	0	0	0
cSH	723	1700	1700	1700	921	1700	1700
Volume to Capacity	0.30	0.16	0.16	0.07	0.10	0.18	0.18
Queue Length 95th (m)	10.2	0.0	0.0	0.0	2.7	0.0	0.0
Control Delay (s)	12.1	0.0	0.0	0.0	9.4	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	12.1	0.0			1.3		
Approach LOS	B						
Intersection Summary							
Average Delay			2.2				
Intersection Capacity Utilization			35.3%		ICU Level of Service		A
Analysis Period (min)			15				

## **APPENDIX 2**

### Conceptual Site Access Drawing





**R.V. ANDERSON ASSOCIATES LIMITED**  
Innovative solutions for complex challenges

***YOUSSEF-COPTIC CHURCH***  
***ACCESS CONCEPT 1***