

# **Appendix C**

## **Traffic Analysis**

## 1. Introduction

As part of the North York Centre South Service Road Environmental Assessment (EA) Addendum, a traffic analysis was conducted for the intersections along the Doris Avenue/Tradewind Avenue corridor for the years 2023 and 2031.

Two traffic analysis scenarios were considered along the Doris Avenue/Tradewind Avenue corridor. The first scenario evaluated a signalized offset intersection as an interim measure for 2023 at the Doris and Sheppard Avenue intersection. The second scenario, for 2031, realigned Doris Avenue at Sheppard Avenue East to form a 4-legged intersection with Tradewind Avenue. Results of the traffic analysis for each scenario were used to develop geometric improvements in the study area.

### 1.1 Study Area

The study area extends southerly from the intersection of Sheppard Avenue East and Doris Avenue to Avondale Avenue and Tradewind Avenue. The northerly extent is Greenfield Avenue. A schematic plan for the interim year scenario is shown in Figure 1.1 and in Figure 1.2 for the ultimate year scenario.

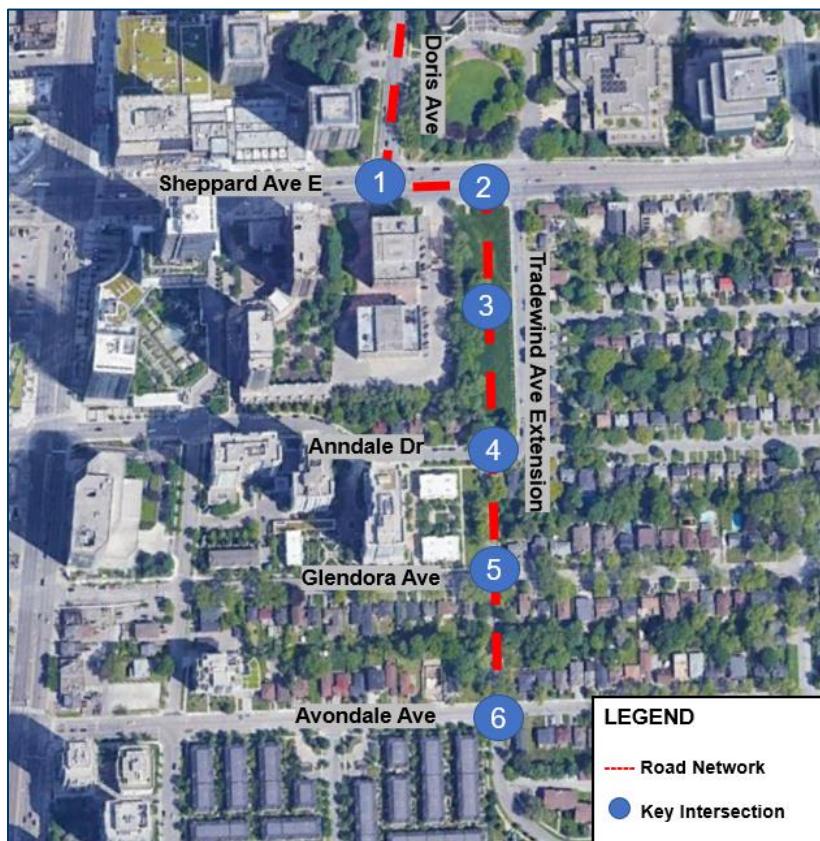
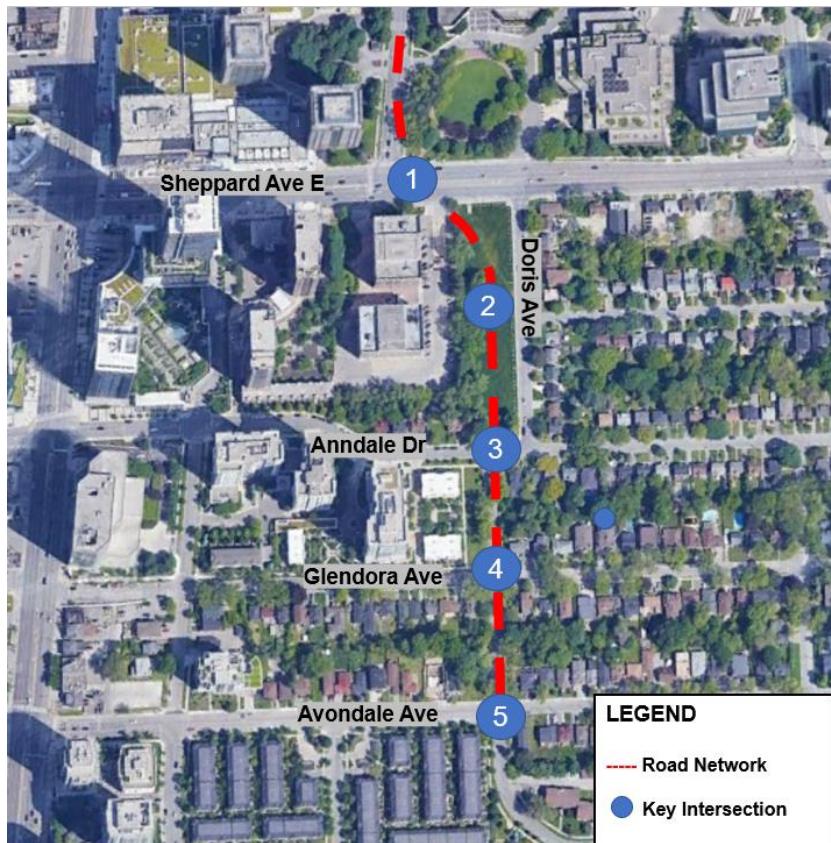


Figure 1.1 Interim Year 2023 Study Area



**Figure 1.2    Ultimate Year 2031 Study Area**

Table 1.1 lists the intersections assessed in the interim and ultimate scenario with the traffic control mode. In the ultimate scenario, the continuation of Doris Avenue to the south of Sheppard Avenue is labelled as Doris Avenue in our analysis.

**Table 1.1    Key Intersections in Study Area**

Scenario	No.	Intersection	Control Mode
Interim Scenario 2023	1	Sheppard Avenue East and Doris Avenue	Signalized (Offset)
	2	Sheppard Avenue East and Tradewind Avenue	Signalized (Offset)
	3	47-49 Sheppard Ave E, Parking Entry/Exit to/from Tradewind Avenue	Stop-Controlled
	4	Tradewind Avenue and Anndale Drive	Stop-Controlled
	5	Tradewind Avenue and Glendora Avenue	Stop-Controlled
	6	Tradewind Avenue and Avondale Avenue	Stop-Controlled
Ultimate Scenario 2031	1	Sheppard Avenue East and Doris Avenue	Signalized (4-Legged)
	2	47-49 Sheppard Ave E, Parking Entry/Exit to/from Doris Avenue	Stop-Controlled
	3	Doris Avenue and Anndale Drive	Stop-Controlled
	4	Doris Avenue and Glendora Avenue	Stop-Controlled
	5	Doris Avenue and Avondale Avenue	Stop-Controlled

## **2. Traffic Volumes – Interim Year 2023**

### **2.1 Base Traffic Volumes 2023**

Traffic analysis was conducted for the 2023 AM (8:00-9:00) and PM (3:00-4:00) peak hour scenarios. The 2031 REimagining Yonge Street Modelling Report was used as a basis for obtaining volumes for 2023. The 2031 volumes, as outlined in the REimagining Yonge staff report, were adjusted to 2023 using a reduction factor of 0.5% annually for the AM peak and 1% annually for PM peak volumes. These reduction factors were the annual growth rates used in the Doris Avenue Extension Traffic Analysis Report, which was previously conducted for the Doris Avenue corridor. (available in Attachment 1 of Staff's report to City Council: <https://www.toronto.ca/legdocs/mmis/2020/ie/bgrd/backgroundfile-158590.pdf>)

### **2.2 Total Traffic Volumes 2023**

To compute the total traffic volumes for 2023, peak hour volumes generated from a parking garage located at 45-47 Sheppard Avenue East were also considered as part of the traffic analysis. Parking survey data was used to estimate peak hour volumes for entering and exiting trips from the parking area, and these trips were assigned to the study area road network. Traffic volumes generated by the parking garage were added to base traffic volumes to obtain total traffic volume for 2023, as shown in Figure 2.1.

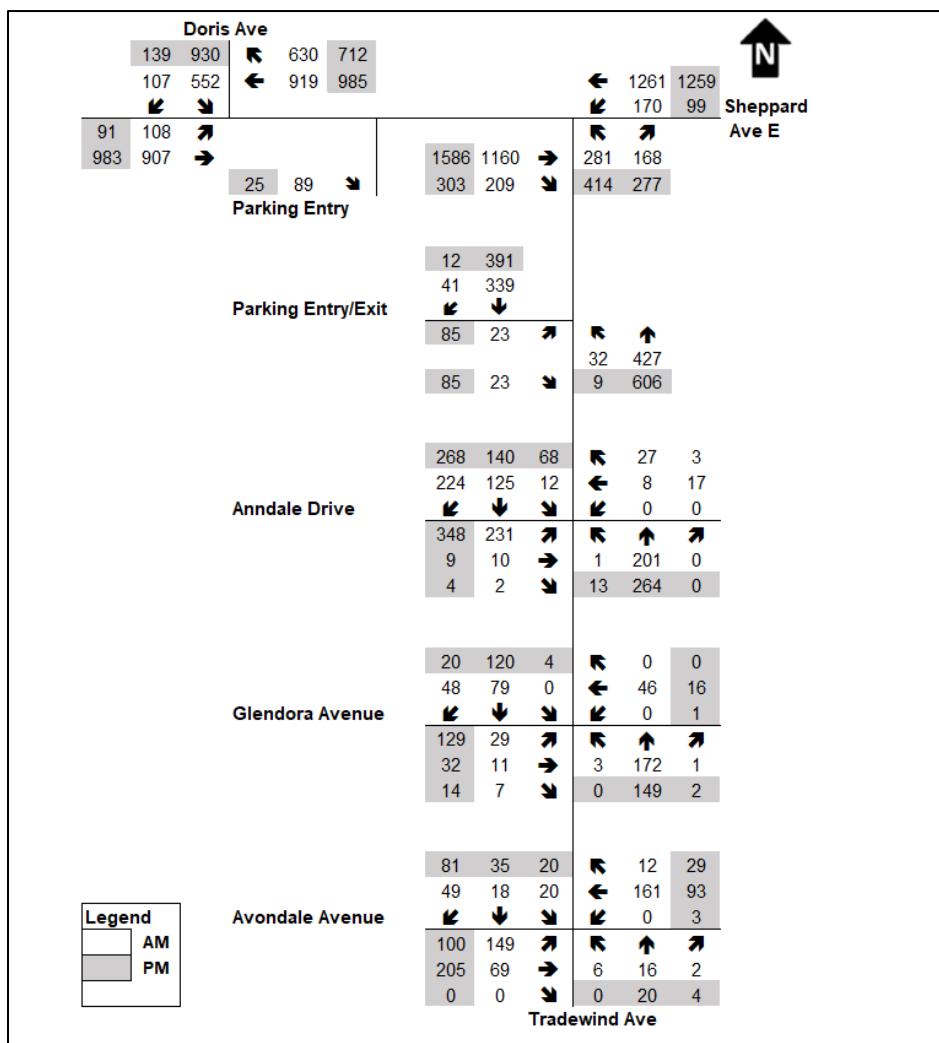


Figure 2.1 Total Traffic Volumes 2023

### 3. Traffic Volumes – Ultimate Year 2031

#### 3.1 Base Traffic Volumes 2031

Traffic analysis was conducted for the 2031 AM and PM peak hour scenarios. The 2031 REimagining Yonge Street Modelling Report was used to obtain traffic volumes for 2031.

#### 3.2 Total Traffic Volumes 2031

To compute the total traffic volumes for 2031, peak hour volumes generated from the parking garage located on 45-47 Sheppard Avenue East were also considered as part of the traffic analysis. Parking survey data was used to estimate peak hour volumes for entering and exiting trips, which were assigned to the study area road network. Traffic volumes generated by the parking garage were added to base traffic volumes to obtain total traffic volume for 2031, as shown in Figure 3.1.

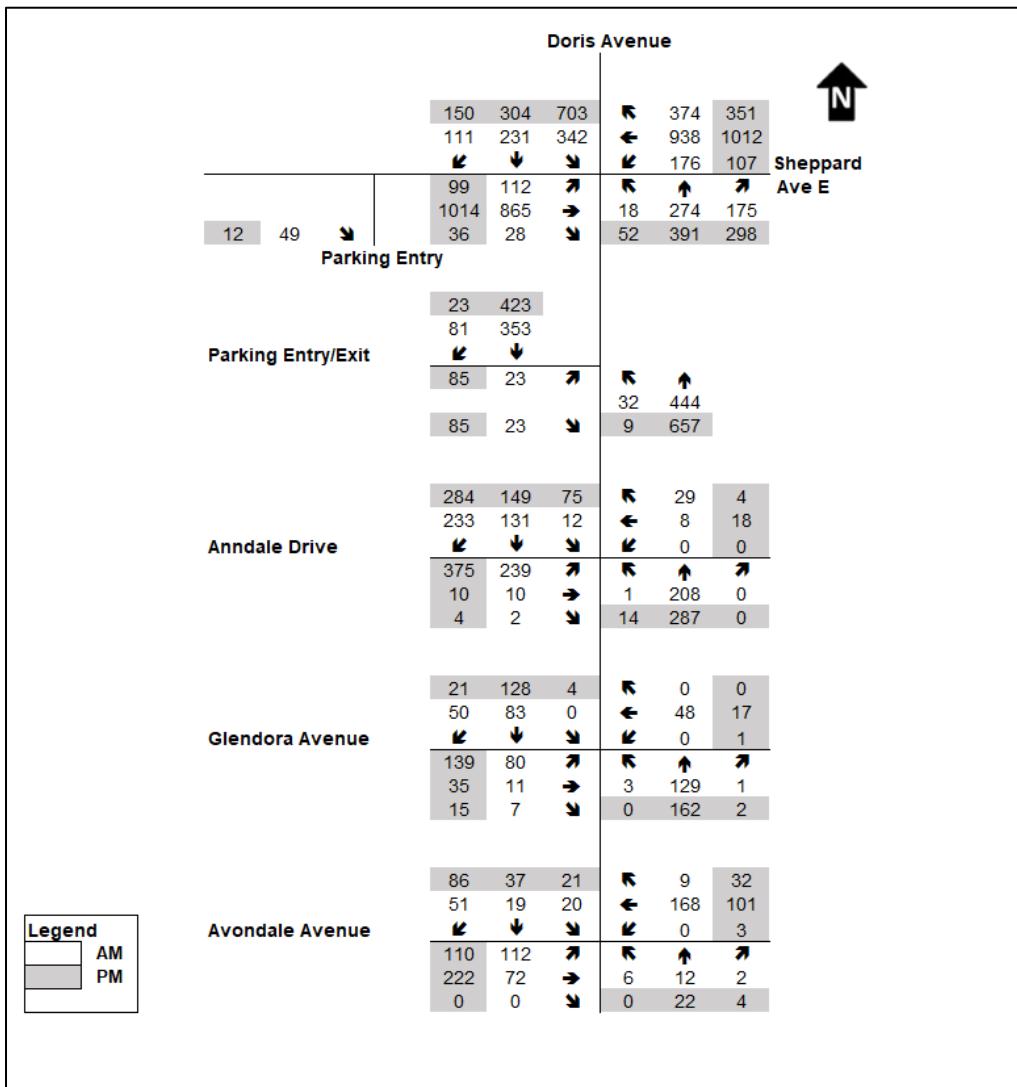


Figure 3.1 Total Traffic Volumes 2031

## 4. Intersection Lane Configuration

Intersection lane configurations and road cross-sections for the interim and ultimate year scenarios were proposed in line with the City of Toronto's goals and traffic volume demand. For both future scenarios, a 4-lane cross section was considered for the road segment between Sheppard Avenue and Anndale Drive, whereas a 2-lane cross section was considered south of Anndale Drive. Lane configurations for intersections in the interim and ultimate year are shown in Figure 4.1 and Figure 4.2 respectively. Two lane configuration alternatives were assessed for Doris Avenue and Sheppard Avenue's north approach in the ultimate scenario, as shown in Figure 4.2.

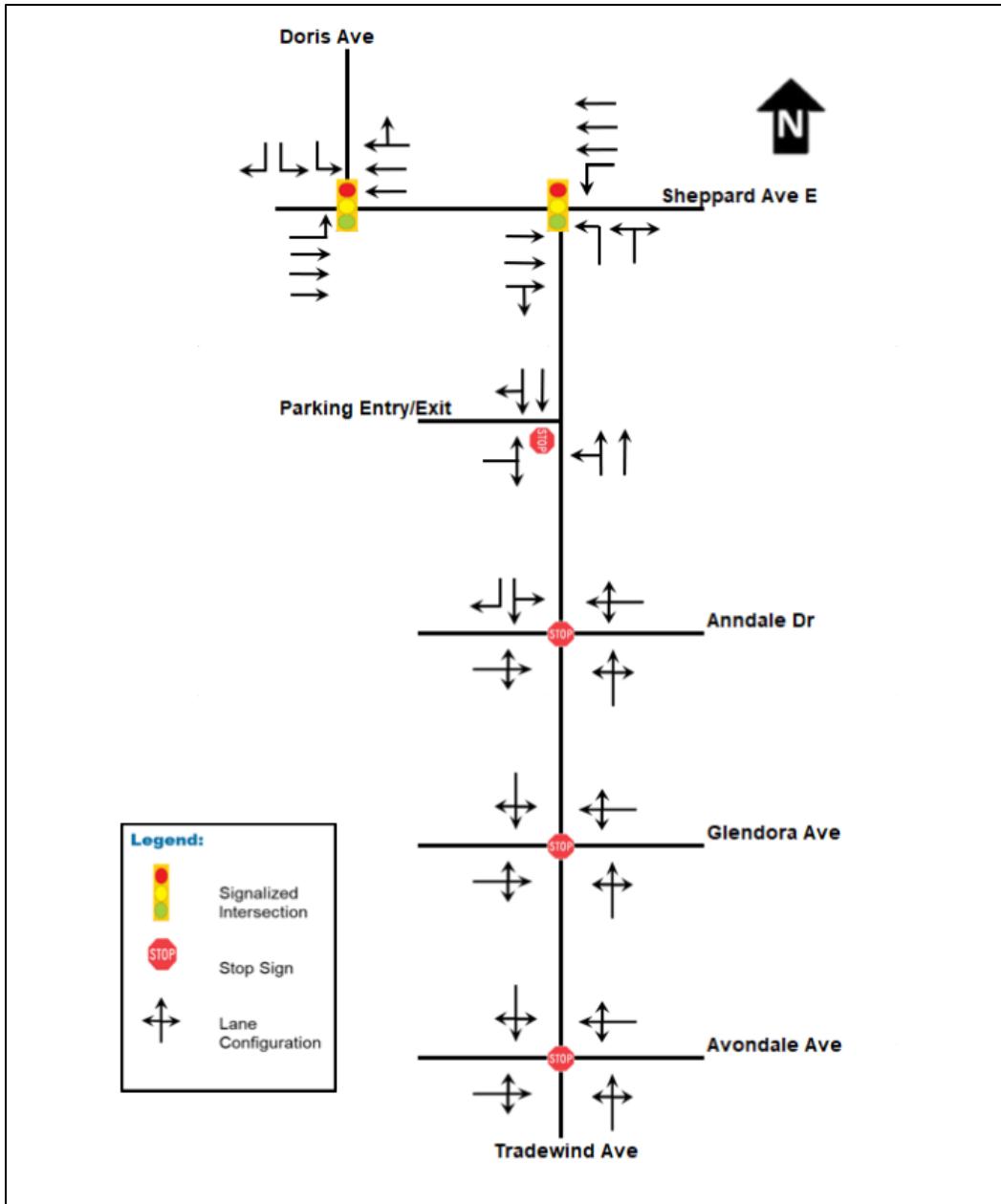


Figure 4.1 Intersection Configurations – Interim Year 2023

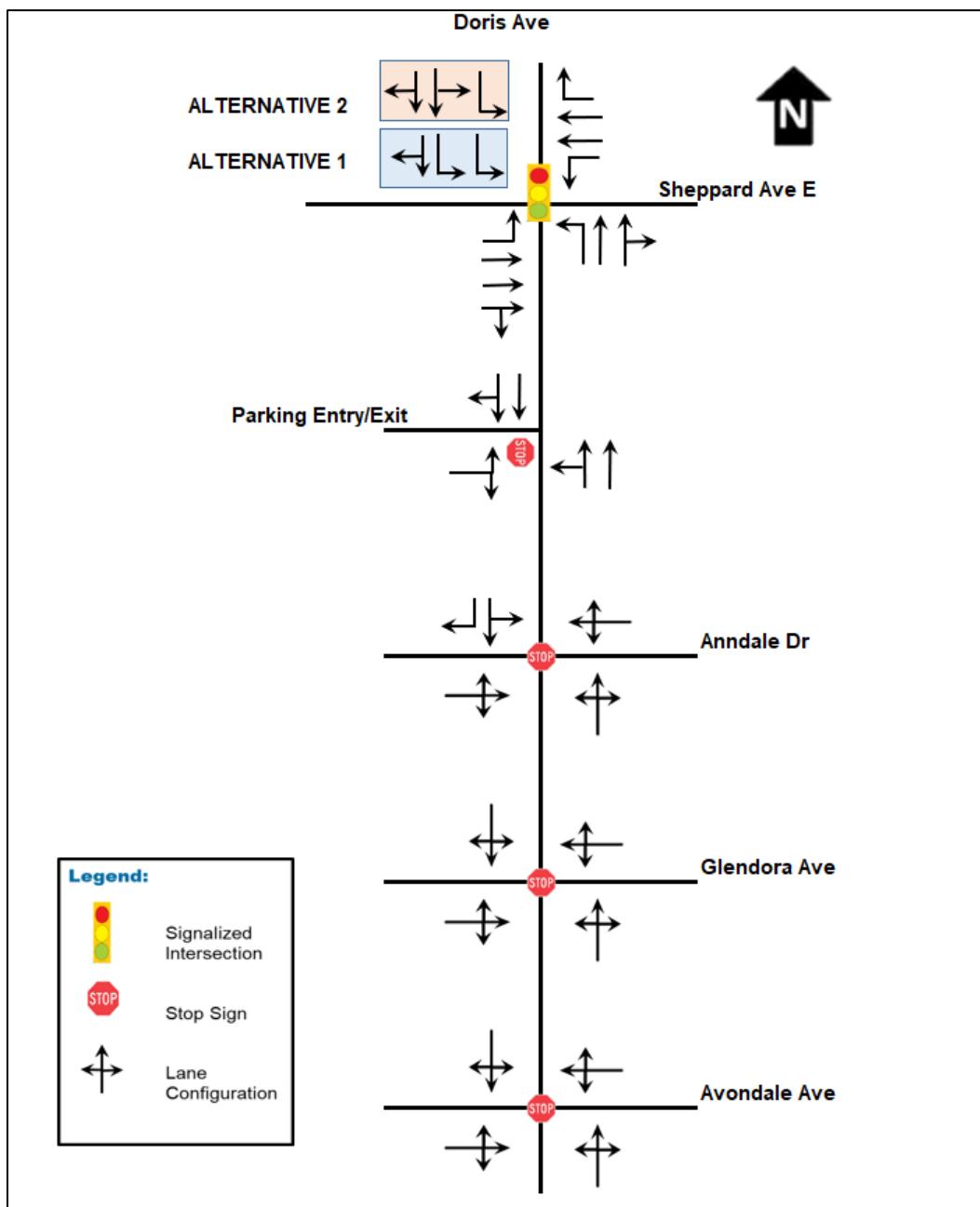


Figure 4.2 Intersection Configurations – Ultimate Year 2031

## 5. Signal Timing/Phasing Considerations

Signal timing plans for future scenarios were developed in accordance with City of Toronto Synchro Guidelines (January 15, 2021). The existing signal timing for the Sheppard Avenue East and Doris Avenue intersection was included as part of the 49 Sheppard Avenue East Traffic Impact Study report, which was provided by the City of Toronto. Timing parameters such as cycle length were maintained for future scenario peak hours based on existing cycle lengths, to maintain coordination with adjacent intersections. Should updated signal timing

guidelines be produced by the City before detailed design is complete, the traffic analysis should be reviewed with consideration of any new guidelines.

## 5.1 Offset Intersection – Interim Year 2023

The interim offset intersection at Sheppard/Tradewind Avenue and Sheppard/Doris Avenue is planned to function as a single intersection with integrated traffic signal phasing as required in the City's Traffic Signal Operations Policies and Strategies document (May 2015) for intersections spaced less than 100 metres apart. Traffic signal phasing was coordinated at the offset intersection to optimize the flow of traffic and prevent excessive queuing which could result in spillback at the intersections. The signal phasing at the intersection is displayed in Figure 5.1.

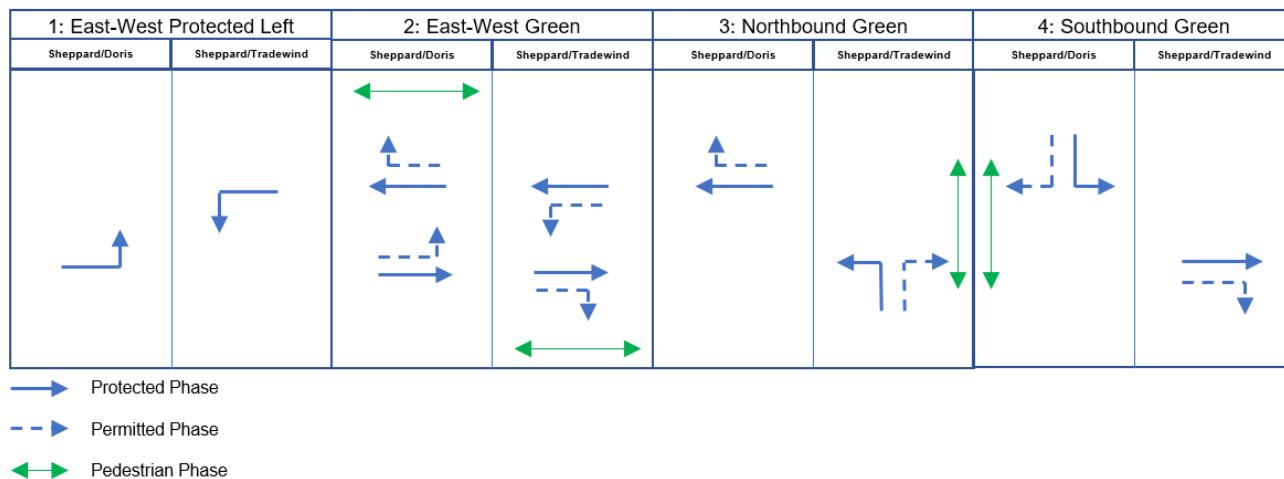


Figure 5.1 Offset Intersection Phasing Diagram – Interim Year 2023

Since the proposed cycle length for the offset intersection was kept the same as the existing cycle length for the Doris/Sheppard intersection, and minimum pedestrian walk intervals to cross the major approaches were also considered, it resulted in the green time for the major approaches to be limited to 25-30% of total cycle length. Due to this limited green time for the major approaches, coordination along Sheppard Avenue East may be impacted as a result of the offset intersection phasing. Signal timing plans for the interim scenario are attached in Appendix C-1.

## 5.2 4-Legged Intersection – Ultimate Year 2031

Since the intersection is proposed to function as a 4-legged intersection for the ultimate year, a more conventional approach to signal phasing was used. Signal timing plans for the ultimate scenario are attached in Appendix C-1. The signal timing for alternative 2 lane configuration, as shown in Figure 4.2, includes split phasing, which is currently not an acceptable phasing for the City; however, it is the only way to allow a southbound shared left-through lane. Therefore, although this option was assessed, it will need to be screened out.

# 6. Traffic Operations Assessment

The traffic modelling software Synchro was used to assess the traffic operations for the intersections in the study area. All input parameters and analysis were as per the City of Toronto's Synchro Guidelines. The measures of effectiveness used to assess the operations at the intersections in this study are the Level of

Service (LOS), the volume to capacity (v/c) ratio, and 95<sup>th</sup> percentile queues. LOS is defined in terms of average control delay per vehicle according to the criteria of the Highway Capacity Manual, sixth edition (HCM 6) and is used to describe the quality of service of a transportation facility. There are six levels defined, ranging from LOS 'A' to LOS 'F'. LOS 'A' represents the best operating conditions from the traveller's perspective and LOS 'F' represents the worst. The LOS and the corresponding delay, as defined by HCM 6 for signalized and unsignalized intersections are shown in Table 6.1.

*Table 6.1 Level of Service Criteria for Intersections*

Level of Service	Control Delay – Signalized (s)	Control Delay – Unsignalized (s)	Description
A	≤ 10	≤ 10	Free flow
B	> 10 - 20	> 10 – 15	Stable flow (slight delays)
C	> 20 - 35	> 15 – 25	Stable flow (acceptable delays)
D	> 35 – 55	> 25 – 35	Approaching unstable flow (tolerable delays)
E	> 55 – 80	> 35 – 50	Unstable flow (intolerable delays)
F	> 80 or v/c >1.0	> 50 or v/c >1.0	Forced flow (jammed)

The volume to capacity ratio represents the sufficiency of an intersection to accommodate vehicular demand. A description of typical v/c ratio thresholds at intersections is presented in Table 6.2.

*Table 6.2 V/C Ratio Threshold Description*

V/C Ratio	Description
< 0.85	Intersection is operating under capacity. Excessive delays are not experienced.
0.85-0.95	Intersection is operating near its capacity. Higher delays may be expected, but continuously increasing queues should not occur.
0.95-1.0	Unstable flow results in a wide range of delay. Intersection improvements will be required soon to avoid excessive delays.
>1.0	The demand exceeds the available capacity of the intersection. Excessive delays and queueing are anticipated.

The peak hour factors (PHF) and heavy vehicle percentage inputs for intersections were based on data from the 49 Sheppard Traffic Impact Study provided by the City of Toronto. In the case of any unknown PHF, a value of 0.9 was assumed for AM and PM peak based on the City of Toronto Synchro Guidelines.

## 6.1 Traffic Assessment Results 2023

Results of the traffic assessment for the interim year 2023 are outlined in Table 6.3. Critical values for LOS, delay, and v/c ratios have been highlighted. A critical movement was defined as greater than a LOS 'E' or v/c greater than 0.9. Detailed capacity analysis results are attached in Appendix C-2.

*Table 6.3 Traffic Operational Assessment Results 2023*

Intersection	Movement	AM			PM		
		Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue	Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue (m)
	SBL	38.1s (D)	0.60	75m	96.8s (F)	1.08	175m

Intersection	Movement	AM			PM		
		Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue	Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue (m)
Sheppard Avenue East and Doris Avenue	SBR	14.4s (B)	0.23	20m	25.7s (C)	0.32	35m
	EBL	42.6s (D)	0.61	20m	37.7s (D)	0.56	25m
	EBT	49.6s (D)	0.84	90m	43.6s (D)	0.75	100m
	WBTR	54.0s (D)	0.61	20m	53.3s (D)	0.64	25m
	Overall	48.4s (D)			59.9s (E)		
Sheppard Avenue East and Tradewind Avenue	NBLR	26.8s (C)	0.47	50m	40.6s (D)	0.76	90m
	EBTR	7.6s (A)	0.57	25m	6.2s (A)	0.76	0m
	WBL	<b>78.0s (E)</b>	<b>0.91</b>	65m	37.7s (D)	0.56	30m
	WBT	<b>116.4s (F)</b>	<b>1.14</b>	155m	105.3s (F)	<b>1.01</b>	150m
	Overall	56.1s (E)			44.7s (D)		
Parking Entry/Exit on Tradewind Avenue	NBL	8.2s (A)	0.03	0m	8.2s (A)	0.01	0m
	NBT	0.2s (A)	-	0m	0.1s (A)	-	0m
	SBTR	0s (A)	-	0m	0s (A)	-	0m
	EBLR	13.1s (B)	0.10	5m	18.3s (C)	0.41	15m
	Overall	1.1s (A)			2.7s (A)		
Tradewind Avenue and Anndale Drive	NBLTR	11.3s (B)	0.34		16.1s (C)	0.53	
	SBLT	10.3s (B)	0.24		14.2s (B)	0.43	
	SBR	10.4s (B)	0.35		13.6s (B)	0.48	
	EBLTR	12.8s (B)	0.42		22.4s (C)	0.69	
	WBLTR	8.9s (A)	0.06		10.9s (B)	0.05	
	Overall	12.5s (B)			17.1s (D)		
Tradewind Avenue and Glendora Avenue	NBLTR	8.6s (A)	0.23		8.9s (A)	0.21	
	SBLTR	7.9s (A)	0.16		8.7s (A)	0.20	
	EBLTR	8.1s (A)	0.07		9.5s (A)	0.26	
	WBLTR	8.1s (A)	0.07		8.1s (A)	0.03	
	Overall	8.3s (A)			9.0s (A)		
Tradewind Avenue and Avondale Avenue	NBLTR	8.2s (A)	0.04		8.4s (A)	0.04	
	SBLTR	8.3s (A)	0.13		8.9s (A)	0.20	
	EBLTR	9.6s (A)	0.31		11.0s (B)	0.43	
	WBLTR	8.8s (A)	0.24		8.6s (A)	0.18	
	Overall	9.0s (A)			9.9s (A)		

Results of the 2023 interim conditions analysis suggest that the offset intersection formed at Sheppard Avenue and Doris/Trauwind will operate at an overall LOS of 'D' for the AM and LOS of 'E' for the PM peak hour. The westbound through movement at Sheppard Avenue and Tradewind Avenue, shows capacity and delay concerns in the AM and PM peak hour as it operates at LOS 'F'. Cycle lengths for the offset intersection were maintained as the existing cycle length for the Doris/Sheppard intersection, and minimum pedestrian walk

intervals to cross the major approaches were also considered when timing the signal. Due to this, the green time for the major approaches, including the westbound movement, is limited. The limited green time for the westbound approach results in a deteriorating LOS and delays. Furthermore, the southbound left movement at Sheppard Avenue and Doris Avenue operates at LOS 'F' in the PM peak. The remaining intersections along the Tradewind Avenue corridor generally operate at an acceptable LOS with no capacity or queuing concerns.

## 6.2 Traffic Assessment Results 2031

Results of the traffic assessment for the ultimate year 2031 are outlined in Table 6.4. This includes the assessment of both intersection configuration alternatives for Doris Avenue and Sheppard Avenue, as shown in Figure 4.2. Critical values for LOS, delay, and v/c ratios have been highlighted. A critical movement was defined as greater than a LOS 'E' or v/c greater than 0.9. Detailed capacity analysis results are attached in Appendix C-2.

*Table 6.4 Traffic Operational Assessment Results 2031*

Intersection	Movement	AM			PM		
		Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue	Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue (m)
Sheppard Avenue East and Doris Avenue – Alternative 1	NBL	35.7s (D)	0.07	10m	35.6s (D)	0.19	20m
	NBT	42.2s (D)	0.65	50m	52.5s (D)	0.82	95m
	NBR	43.3s (D)	0.67	-	54.7s (D)	0.83	-
	SBL	53.7s (D)	0.78	55m	75.2s (E)	<b>0.98</b>	130m
	SBTR	27.9s (C)	0.54	80m	20.7s (C)	0.53	95m
	EBL	21.1s (C)	0.46	25m	35.8s (D)	0.59	30m
	EBT	25.3s (C)	0.46	80m	38.8s (D)	0.67	100m
	EBR	26.2s (C)	0.46	-	41.7s (D)	0.67	-
	WBL	18.2s (B)	0.49	35m	29.1s (C)	0.49	30m
	WBT	27.1s (C)	0.65	130m	54.4s (D)	<b>0.93</b>	170m
	WBR	27.5s (C)	0.58	20m	44.6s (D)	0.72	35m
	Overall	30.7s (C)			48.7s (D)		
Sheppard Avenue East and Doris Avenue – Alternative 2	NBL	35.4s (D)	0.05	10m	34.9s (D)	0.12	20m
	NBT	42.3s (D)	0.65	50m	55.1s (E)	0.84	95m
	NBR	43.3s (D)	0.67	-	57.6s (E)	0.85	-
	SBL	40.0s (D)	0.60	75m	50.1s (D)	0.85	175m
	SBTLR	41.7s (D)	0.65	60m	65.9s (E)	<b>0.91</b>	140m
	EBL	31.5s (C)	0.58	30m	40.5s (D)	0.63	30m
	EBT	33.1s (C)	0.57	95m	46.6s (D)	0.78	110m
	EBR	34.9s (C)	0.57	-	51.7s (D)	0.78	-
	WBL	32.5s (C)	0.66	65m	34.6s (E)	0.55	35m
	WBT	42.3s (D)	0.84	185m	96.8s (F)	<b>1.08</b>	190m
	WBR	43.1s (D)	0.76	40m	57.6s (E)	0.83	40m

Intersection	Movement	AM			PM		
		Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue	Delay (LOS)	Movement V/C	95 <sup>th</sup> Percentile Queue (m)
	Overall	39.3s (D)			62.3s (E)		
Parking Entry/Exit on Doris Avenue	NBL	8.4s (A)	0.03	0m	8.4s (A)	0.01	0m
	NBT	0.2s (A)	-	0m	0.1s (A)	-	0m
	SBTR	0s (A)	-	0m	0s (A)	-	0m
	EBLR	13.7s (B)	0.11	5m	20.3s (C)	0.45	20m
	Overall	1.1s (A)			2.8s (A)		
Doris Avenue and Anndale Drive	NBLTR	11.6 (B)	0.36		19.1s (C)	0.61	
	SBLT	10.6s (B)	0.26		16.0s (C)	0.48	
	SBR	10.7s (B)	0.36		15.5s (C)	0.53	
	EBLTR	13.3s (B)	0.44		29.2s (D)	0.77	
	WBLTR	9.0s (A)	0.06		11.0s (B)	0.05	
	Overall	11.6s (B)			20.8s (C)		
Doris Avenue and Glendora Avenue	NBLTR	8.5s (A)	0.18		9.2s (A)	0.24	
	SBLTR	8.1s (A)	0.17		8.9s (A)	0.22	
	EBLTR	8.6s (A)	0.14		9.8s (A)	0.28	
	WBLTR	8.1s (A)	0.07		8.2s (A)	0.03	
	Overall	8.3s (A)			9.3s (A)		
Doris Avenue and Avondale Avenue	NBLTR	8.1s (A)	0.03		8.5s (A)	0.04	
	SBLTR	8.2s (A)	0.13		9.2s (A)	0.22	
	EBLTR	9.1s (A)	0.26		11.7s (B)	0.47	
	WBLTR	8.8s (A)	0.24		8.8s (A)	0.20	
	Overall	8.8s (A)			10.4s (B)		

Results of the 2031 ultimate conditions analysis suggest that the Doris Avenue corridor will operate with an overall acceptable LOS, with no capacity or queuing concerns if alternative 1 configuration is implemented at the Doris/Sheppard intersection. However, using the alternative 2 configuration results in an overall LOS of 'E' in the PM peak, and results in capacity concerns for the westbound movements as the westbound through operates at an LOS of 'F' and with a v/c of 1.08. This is because under alternative 2, the intersection configuration requires split phasing to operate. By using split phasing, as well as ensuring minimum pedestrian walk intervals during minor approach movement phases, longer delays are experienced for the major approaches including the westbound through movement. The alternative 2 lane configuration is not a viable alternative from both a traffic signal phasing perspective, due to the split phasing and the poor traffic operations. The remaining intersections along the Doris Avenue/Tradewind Avenue corridor also operate at an acceptable LOS in the ultimate year scenario.

## 7. Conclusion

Traffic operational assessment was performed for the interim and ultimate year options to assist the long-term geometric development of the Doris Avenue corridor. Traffic assessment results for the interim year scenario shows that the implementation of an offset intersection provides a sufficient overall LOS with an LOS of 'D' during the AM peak and LOS of 'E' for the PM peak hour. However, some movements at the intersection, including the westbound through and southbound left movement may experience heavier delays. This is due to timing constraints based on maintaining existing cycle length, as well as meeting pedestrian walk interval times during the other signal phases. However, generally the intersection provides adequate LOS and can work as an interim measure until the 2031 ultimate year scenario. The remaining intersections along the Doris Avenue/Tradewind Avenue corridor also operate at an acceptable LOS in the interim year scenario.

Results of the traffic assessment for the ultimate year scenario shows that a continuous 4-legged intersection formed by realigning Doris Avenue and Tradewind Avenue at Sheppard works well operationally. In terms of the intersection lane configuration, alternative 1 which implements two southbound left-turn lanes and one southbound through-right turn lane is a better option. Implementation of this option in the ultimate year does not show any LOS, delay, or capacity concerns for the AM or PM peak. The remaining intersections along the Doris Avenue/Tradewind Avenue corridor also operate at an acceptable LOS in the ultimate year scenario.

Regards

**Vanessa Skelton**  
Project Manager, Transportation  
613-288-1727  
[vanessa.skelton@ghd.com](mailto:vanessa.skelton@ghd.com)

# Appendices

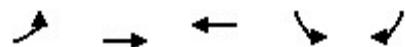
# **Appendix C-1**

## **Signal Timing Plans**

## Timings

## 2: Sheppard Ave E &amp; Doris Ave

06/04/2021



Lane Group	EBL	EBT	WBT	SBL	SBR	Ø3	Ø5	Ø6
Lane Configurations	↑	↑↑↑	↑↑↑	↑↑	↑			
Traffic Volume (vph)	108	907	919	552	107			
Future Volume (vph)	108	907	919	552	107			
Turn Type	pm+pt	NA	NA	Prot	Perm			
Protected Phases	1!	2	6 3!	4		3	5	6
Permitted Phases	2				4			
Detector Phase	1	2	6 3	4	4			
Switch Phase								
Minimum Initial (s)	6.0	12.0		12.0	12.0	6.0	12.0	
Minimum Split (s)	10.0	29.5		36.0	36.0	36.0	10.0	29.5
Total Split (s)	10.0	30.0		36.0	36.0	36.0	10.0	30.0
Total Split (%)	8.9%	26.8%		32.1%	32.1%	32%	9%	27%
Yellow Time (s)	2.0	4.0		3.0	3.0	3.0	2.0	4.0
All-Red Time (s)	2.0	2.0		3.0	3.0	3.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			
Total Lost Time (s)	3.0	5.0		5.0	5.0			
Lead/Lag	Lead	Lag		Lag	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max		None	None	None	None	C-Max

## Intersection Summary

Cycle Length: 112

Actuated Cycle Length: 112

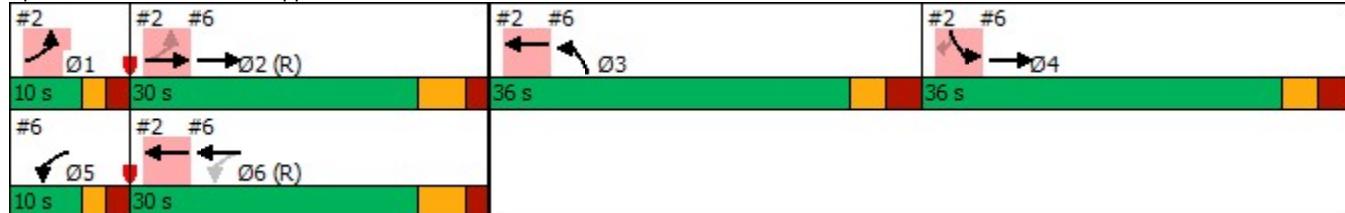
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

! Phase conflict between lane groups.

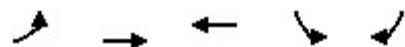
## Splits and Phases: 2: Sheppard Ave E &amp; Doris Ave



## Timings

## 2: Sheppard Ave E &amp; Doris Ave

06/04/2021



Lane Group	EBL	EBT	WBT	SBL	SBR	Ø3	Ø5	Ø6
Lane Configurations	↑ ↗	↑↑↑ ↗	↑↑↑ ↘	↖ ↗	↗			
Traffic Volume (vph)	91	983	985	930	139			
Future Volume (vph)	91	983	985	930	139			
Turn Type	pm+pt	NA	NA	Prot	Perm			
Protected Phases	1!	2	6 3!	4		3	5	6
Permitted Phases	2				4			
Detector Phase	1	2	6 3	4	4			
Switch Phase								
Minimum Initial (s)	6.0	12.0		12.0	12.0	6.0	6.0	12.0
Minimum Split (s)	10.0	29.5		36.0	36.0	36.0	12.0	29.5
Total Split (s)	10.0	38.0		36.0	36.0	36.0	12.0	36.0
Total Split (%)	8.3%	31.7%		30.0%	30.0%	30%	10%	30%
Yellow Time (s)	2.0	4.0		3.0	3.0	3.0	2.0	4.0
All-Red Time (s)	2.0	2.0		3.0	3.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			
Total Lost Time (s)	3.0	5.0		5.0	5.0			
Lead/Lag	Lead	Lag		Lag	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes				Yes	Yes	
Recall Mode	None	C-Max		None	None	None	None	C-Max

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

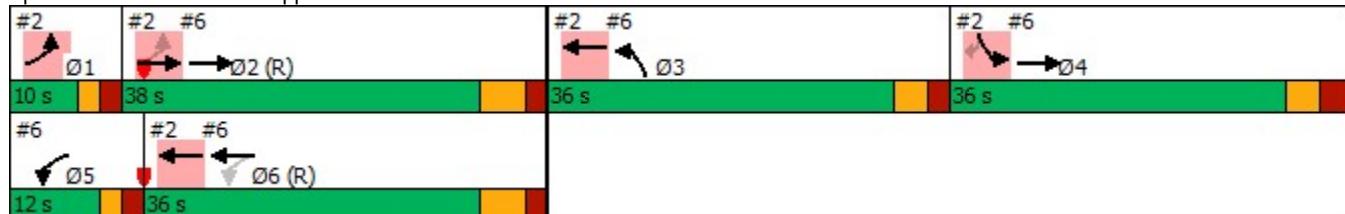
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 125

Control Type: Actuated-Coordinated

! Phase conflict between lane groups.

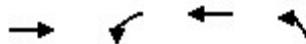
Splits and Phases: 2: Sheppard Ave E &amp; Doris Ave



## Timings

## 6: Tradewind Ave &amp; Sheppard Ave E

06/04/2021



Lane Group	EBT	WBL	WBT	NBL	Ø1	Ø2	Ø4
Lane Configurations	↑↑↑	↑	↑↑↑	↑↑↑			
Traffic Volume (vph)	1160	170	1261	281			
Future Volume (vph)	1160	170	1261	281			
Turn Type	NA	pm+pt	NA	Prot			
Protected Phases	2 4!	5!	6	3	1	2	4
Permitted Phases		6					
Detector Phase	2 4	5	6	3			
Switch Phase							
Minimum Initial (s)		6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)		10.0	29.5	36.0	10.0	29.5	36.0
Total Split (s)		10.0	30.0	36.0	10.0	30.0	36.0
Total Split (%)		8.9%	26.8%	32.1%	9%	27%	32%
Yellow Time (s)		2.0	4.0	3.0	2.0	4.0	3.0
All-Red Time (s)		2.0	2.0	3.0	2.0	2.0	3.0
Lost Time Adjust (s)		-1.0	-1.0	-1.0			
Total Lost Time (s)		3.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max	None	

## Intersection Summary

Cycle Length: 112

Actuated Cycle Length: 112

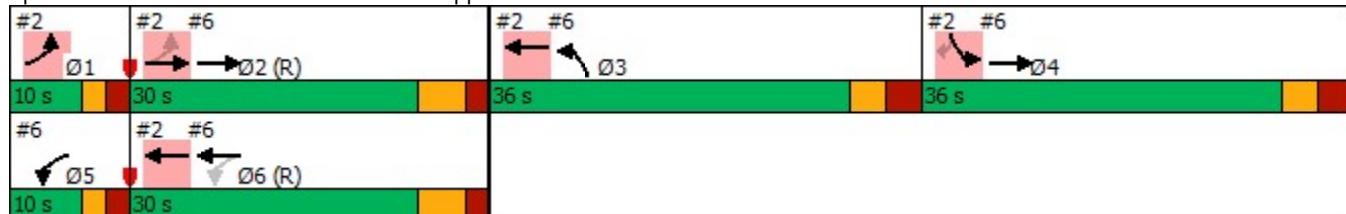
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

! Phase conflict between lane groups.

## Splits and Phases: 6: Tradewind Ave &amp; Sheppard Ave E



## Timings

## 6: Tradewind Ave &amp; Sheppard Ave E

06/04/2021



Lane Group	EBT	WBL	WBT	NBL	Ø1	Ø2	Ø4
Lane Configurations	↑↑↓	↑	↑↑↑	↑↓			
Traffic Volume (vph)	1586	99	1259	414			
Future Volume (vph)	1586	99	1259	414			
Turn Type	NA	pm+pt	NA	Prot			
Protected Phases	2 4!	5!	6	3	1	2	4
Permitted Phases		6					
Detector Phase	2 4	5	6	3			
Switch Phase							
Minimum Initial (s)		6.0	12.0	6.0	6.0	12.0	12.0
Minimum Split (s)		12.0	29.5	36.0	10.0	29.5	36.0
Total Split (s)		12.0	36.0	36.0	10.0	38.0	36.0
Total Split (%)		10.0%	30.0%	30.0%	8%	32%	30%
Yellow Time (s)		2.0	4.0	3.0	2.0	4.0	3.0
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0			
Total Lost Time (s)		4.0	6.0	5.0			
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		
Recall Mode	None	C-Max	None	None	C-Max	None	

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

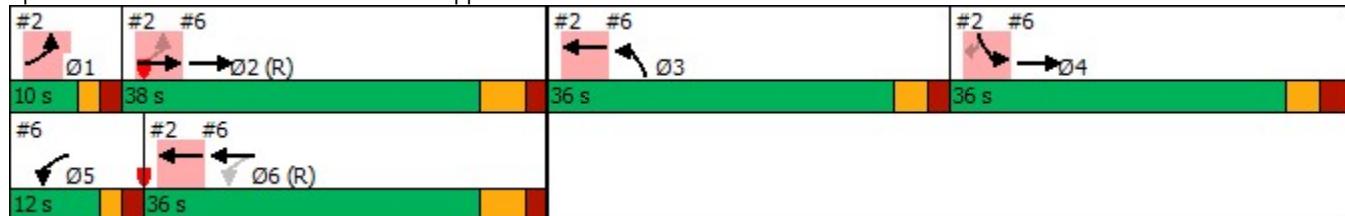
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 125

Control Type: Actuated-Coordinated

! Phase conflict between lane groups.

## Splits and Phases: 6: Tradewind Ave &amp; Sheppard Ave E



## Timings

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 1

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↑ ↗ ↘ ↗ ↘	↑ ↗ ↘ ↗ ↘	↑ ↗ ↘	↑ ↗ ↘	↑ ↗ ↘	↑ ↗ ↘	↑ ↗ ↘	↑ ↗ ↘	↑ ↗ ↘
Traffic Volume (vph)	112	865	176	938	374	18	274	342	231
Future Volume (vph)	112	865	176	938	374	18	274	342	231
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Prot	NA
Protected Phases	5	2	1	6			4	3	8
Permitted Phases					6	4			
Detector Phase	5	2	1	6	6	4	4	3	8
Switch Phase									
Minimum Initial (s)	6.0	12.0	6.0	12.0	12.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	29.5	11.0	29.5	29.5	36.0	36.0	11.0	36.0
Total Split (s)	12.0	37.0	18.0	43.0	43.0	36.0	36.0	21.0	57.0
Total Split (%)	10.7%	33.0%	16.1%	38.4%	38.4%	32.1%	32.1%	18.8%	50.9%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	5.0	5.0	4.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None

## Intersection Summary

Cycle Length: 112

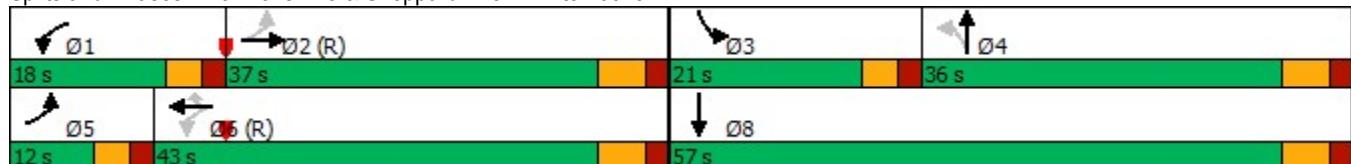
Actuated Cycle Length: 112

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

## Splits and Phases: 3: Doris Ave &amp; Sheppard Ave E - Alternative 1



## Timings

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 1

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↑ ↗ ↘ ↗ ↘	↑↑↑ ↗ ↘ ↗ ↘	↑ ↗	↑↑ ↗	↑ ↗	↑ ↗	↑↑ ↗ ↘	↑ ↗ ↘	↗
Traffic Volume (vph)	99	1014	107	1012	351	52	391	703	304
Future Volume (vph)	99	1014	107	1012	351	52	391	703	304
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Prot	NA
Protected Phases	5	2	1	6			4	3	8
Permitted Phases					6	4			
Detector Phase	5	2	1	6	6	4	4	3	8
Switch Phase									
Minimum Initial (s)	6.0	12.0	6.0	12.0	12.0	7.0	7.0	6.0	7.0
Minimum Split (s)	11.0	29.5	11.0	29.5	29.5	36.0	36.0	11.0	36.0
Total Split (s)	11.0	42.0	11.0	42.0	42.0	37.0	37.0	30.0	67.0
Total Split (%)	9.2%	35.0%	9.2%	35.0%	35.0%	30.8%	30.8%	25.0%	55.8%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	5.0	5.0	4.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max	None	Max	Max	None	None	None	None

## Intersection Summary

Cycle Length: 120

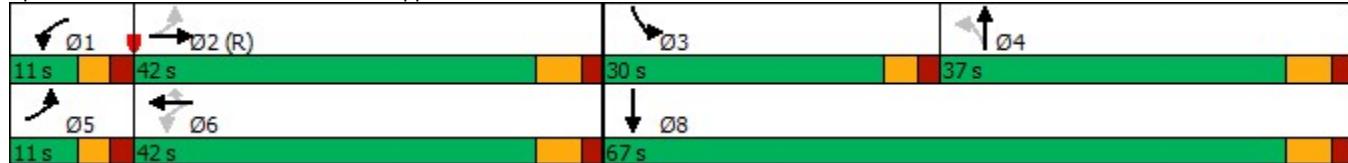
Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

## Splits and Phases: 3: Doris Ave &amp; Sheppard Ave E - Alternative 1



## Timings

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 2

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↑ ↗ ↘ ↗ ↘	↑↑↑ ↗ ↘ ↗ ↘	↑ ↗	↑↑ ↗	↗ ↗	↑ ↗	↑↑ ↗ ↘	↑ ↗	↖ ↗ ↘
Traffic Volume (vph)	112	865	176	938	374	18	274	342	231
Future Volume (vph)	112	865	176	938	374	18	274	342	231
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Split	NA	Split	NA
Protected Phases	5	2	1	6		4	4	8	8
Permitted Phases					6				
Detector Phase	5	2	1	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	6.0	12.0	6.0	12.0	12.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	29.5	11.0	29.5	29.5	36.0	36.0	36.0	36.0
Total Split (s)	11.0	29.5	11.0	29.5	29.5	36.0	36.0	36.0	36.0
Total Split (%)	9.8%	26.2%	9.8%	26.2%	26.2%	32.0%	32.0%	32.0%	32.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None

## Intersection Summary

Cycle Length: 112.5

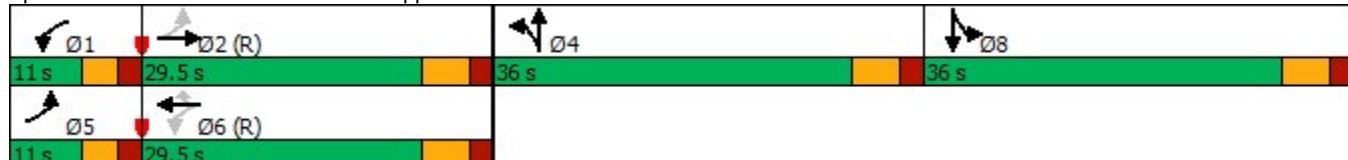
Actuated Cycle Length: 112.5

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

Natural Cycle: 115

Control Type: Actuated-Coordinated

## Splits and Phases: 3: Doris Ave &amp; Sheppard Ave E - Alternative 2



## Timings

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 2

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↑ ↗ ↘ ↗ ↘	↑↑↑ ↗ ↘ ↗ ↘	↑ ↗ ↘	↑↑ ↗ ↘	↑ ↗ ↘	↑ ↗ ↘	↑↑↑ ↗ ↘	↑ ↗ ↘	↑↑ ↗ ↘
Traffic Volume (vph)	99	1014	107	1012	351	52	391	703	304
Future Volume (vph)	99	1014	107	1012	351	52	391	703	304
Turn Type	pm+pt	NA	pm+pt	NA	Perm	Split	NA	Split	NA
Protected Phases	5	2	1	6		4	4	8	8
Permitted Phases					6				
Detector Phase	5	2	1	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	6.0	12.0	6.0	12.0	12.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.0	29.5	11.0	29.5	29.5	36.0	36.0	36.0	36.0
Total Split (s)	11.0	37.0	11.0	37.0	37.0	36.0	36.0	36.0	36.0
Total Split (%)	9.2%	30.8%	9.2%	30.8%	30.8%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	Max	Max	None	None	None	None

## Intersection Summary

Cycle Length: 120

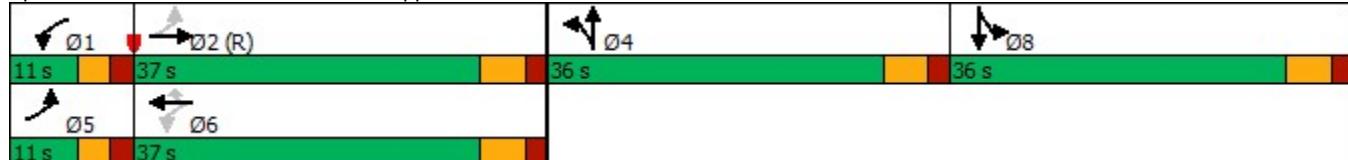
Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL, Start of Green

Natural Cycle: 125

Control Type: Actuated-Coordinated

## Splits and Phases: 3: Doris Ave &amp; Sheppard Ave E - Alternative 2



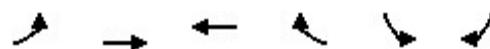
# **Appendix C-2**

## **Capacity Analysis Reports**

## Queues

## 2: Sheppard Ave E &amp; Doris Ave

06/04/2021



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3	Ø5	Ø6
Lane Configurations	↑	↑↑↑	↑↑↑		↑↑	↑			
Traffic Volume (vph)	108	907	919	630	552	107			
Future Volume (vph)	108	907	919	630	552	107			
Satd. Flow (prot)	1785	5092	4896	0	3541	1633			
Flt Permitted	0.158				0.950				
Satd. Flow (perm)	297	5092	4896	0	3541	1633			
Satd. Flow (RTOR)			243			72			
Lane Group Flow (vph)	115	965	1665	0	587	114			
Turn Type	pm+pt	NA	NA		Prot	Perm			
Protected Phases	1!	2	6 3!		4		3	5	6
Permitted Phases	2					4			
Total Split (s)	10.0	30.0			36.0	36.0	36.0	10.0	30.0
Total Lost Time (s)	3.0	5.0			5.0	5.0			
Act Effct Green (s)	34.5	25.3	60.4		31.1	31.1			
Actuated g/C Ratio	0.31	0.23	0.54		0.28	0.28			
v/c Ratio	0.61	0.84	0.61		0.60	0.23			
Control Delay	42.6	49.3	5.3		38.1	14.4			
Queue Delay	0.0	0.4	48.7		0.0	0.0			
Total Delay	42.6	49.6	54.0		38.1	14.4			
LOS	D	D	D		D	B			
Approach Delay		48.9	54.0		34.2				
Approach LOS		D	D		C				
Stops (vph)	77	835	441		466	35			
Fuel Used(l)	7	65	23		29	3			
CO Emissions (g/hr)	125	1212	435		538	53			
NOx Emissions (g/hr)	24	234	84		104	10			
VOC Emissions (g/hr)	29	280	100		124	12			
Dilemma Vehicles (#)	0	0	0		0	0			
Queue Length 50th (m)	17.9	74.5	38.2		57.4	6.8			
Queue Length 95th (m)	#34.4	91.0	m18.7		75.3	20.7			
Internal Link Dist (m)		116.0	24.8		80.2				
Turn Bay Length (m)	65.0				25.0				
Base Capacity (vph)	187	1149	2777		983	505			
Starvation Cap Reductn	0	0	1402		0	0			
Spillback Cap Reductn	0	22	0		0	0			
Storage Cap Reductn	0	0	0		0	0			
Reduced v/c Ratio	0.61	0.86	1.21		0.60	0.23			

## Intersection Summary

Cycle Length: 112

Actuated Cycle Length: 112

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

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.14

Intersection Signal Delay: 48.4

Intersection LOS: D

Intersection Capacity Utilization 65.3%

ICU Level of Service C

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

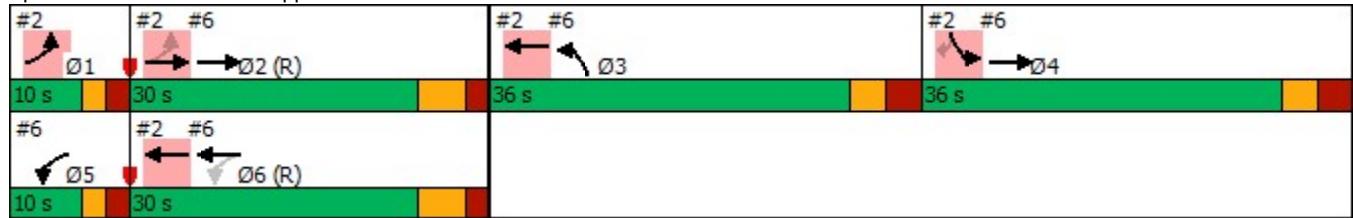
## Queues

## 2: Sheppard Ave E & Doris Ave

06/04/2021

- m Volume for 95th percentile queue is metered by upstream signal.
  - ! Phase conflict between lane groups.

## Splits and Phases: 2: Sheppard Ave E & Doris Ave



## Queues

## 6: Tradewind Ave &amp; Sheppard Ave E

06/04/2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø1	Ø2	Ø4
Lane Configurations	↑↑↓		↑	↑↑↑	↑↑↓				
Traffic Volume (vph)	1160	209	170	1261	281	168			
Future Volume (vph)	1160	209	170	1261	281	168			
Satd. Flow (prot)	4997	0	1825	5193	3413	0			
Flt Permitted				0.160		0.970			
Satd. Flow (perm)	4997	0	307	5193	3413	0			
Satd. Flow (RTOR)		46				117			
Lane Group Flow (vph)	1441	0	179	1327	473	0			
Turn Type	NA		pm+pt	NA	Prot				
Protected Phases	2 4!		5!	6	3		1	2	4
Permitted Phases			6						
Total Split (s)			10.0	30.0	36.0		10.0	30.0	36.0
Total Lost Time (s)			3.0	5.0	5.0				
Act Effct Green (s)	56.4		34.5	25.0	30.4				
Actuated g/C Ratio	0.50		0.31	0.22	0.27				
v/c Ratio	0.57		0.91	1.14	0.47				
Control Delay	6.8		78.0	115.6	26.8				
Queue Delay	0.8		0.0	0.7	0.1				
Total Delay	7.6		78.0	116.4	26.8				
LOS	A		E	F	C				
Approach Delay	7.6			111.8	26.8				
Approach LOS	A			F	C				
Stops (vph)	239		113	1080	274				
Fuel Used(l)	19		15	151	18				
CO Emissions (g/hr)	350		274	2816	330				
NOx Emissions (g/hr)	68		53	543	64				
VOC Emissions (g/hr)	81		63	649	76				
Dilemma Vehicles (#)	0		0	0	0				
Queue Length 50th (m)	11.9		28.9	~124.9	32.8				
Queue Length 95th (m)	24.1		#64.4	#153.8	47.8				
Internal Link Dist (m)	24.8			100.8	72.2				
Turn Bay Length (m)									
Base Capacity (vph)	2538		196	1159	1029				
Starvation Cap Reductn	705		0	0	0				
Spillback Cap Reductn	0		0	169	54				
Storage Cap Reductn	0		0	0	0				
Reduced v/c Ratio	0.79		0.91	1.34	0.49				

## Intersection Summary

Cycle Length: 112

Actuated Cycle Length: 112

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

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.14

Intersection Signal Delay: 56.1

Intersection LOS: E

Intersection Capacity Utilization 61.5%

ICU Level of Service B

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

## Queues

### 6: Tradewind Ave & Sheppard Ave E

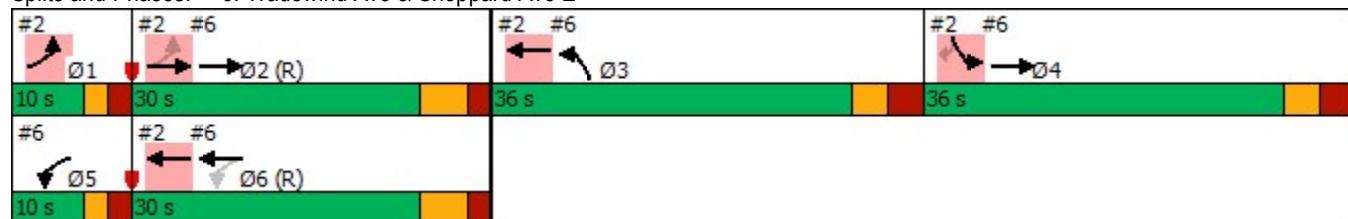
06/04/2021

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

! Phase conflict between lane groups.

Splits and Phases: 6: Tradewind Ave & Sheppard Ave E



**Intersection**

Int Delay, s/veh 1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑↑	↑↑	
Traffic Vol, veh/h	23	23	32	427	339	41
Future Vol, veh/h	23	23	32	427	339	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	26	26	36	474	377	46

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	709	212	423	0	-	0
Stage 1	400	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	373	800	1147	-	-	-
Stage 1	652	-	-	-	-	-
Stage 2	724	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	357	800	1147	-	-	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	724	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1147	-	494	-	-
HCM Lane V/C Ratio	0.031	-	0.103	-	-
HCM Control Delay (s)	8.2	0.2	13.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

**Intersection**

Intersection Delay, s/veh 11.2

Intersection LOS B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	231	10	2	0	8	27	1	201	0	12	125	224
Future Vol, veh/h	231	10	2	0	8	27	1	201	0	12	125	224
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	257	11	2	0	9	30	1	223	0	13	139	249
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1
Approach	EB			WB			NB			SB		
Opposing Approach	WB				EB		SB			NB		
Opposing Lanes	1				1		2			1		
Conflicting Approach Left	SB				NB		EB			WB		
Conflicting Lanes Left	2				1		1			1		
Conflicting Approach Right	NB				SB		WB			EB		
Conflicting Lanes Right	1				2		1			1		
HCM Control Delay	12.8				8.9		11.3			10.4		
HCM LOS	B				A		B			B		

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	95%	0%	9%	0%
Vol Thru, %	100%	4%	23%	91%	0%
Vol Right, %	0%	1%	77%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	202	243	35	137	224
LT Vol	1	231	0	12	0
Through Vol	201	10	8	125	0
RT Vol	0	2	27	0	224
Lane Flow Rate	224	270	39	152	249
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.339	0.425	0.059	0.243	0.346
Departure Headway (Hd)	5.443	5.662	5.493	5.756	5.003
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	660	637	651	624	719
Service Time	3.476	3.692	3.537	3.486	2.733
HCM Lane V/C Ratio	0.339	0.424	0.06	0.244	0.346
HCM Control Delay	11.3	12.8	8.9	10.3	10.4
HCM Lane LOS	B	B	A	B	B
HCM 95th-tile Q	1.5	2.1	0.2	0.9	1.5

Intersection

Intersection Delay, s/veh 8.3

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖			↖			↖			↖	
Traffic Vol, veh/h	29	11	7	0	46	0	3	172	1	0	79	48
Future Vol, veh/h	29	11	7	0	46	0	3	172	1	0	79	48
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	32	12	8	0	51	0	3	191	1	0	88	53
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB				EB		SB			NB		
Opposing Lanes	1				1		1			1		
Conflicting Approach Left	SB				NB		EB			WB		
Conflicting Lanes Left	1				1		1			1		
Conflicting Approach Right	NB				SB		WB			EB		
Conflicting Lanes Right	1				1		1			1		
HCM Control Delay	8.1				8.1		8.6			7.9		
HCM LOS	A				A		A			A		

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	62%	0%	0%
Vol Thru, %	98%	23%	100%	62%
Vol Right, %	1%	15%	0%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	176	47	46	127
LT Vol	3	29	0	0
Through Vol	172	11	46	79
RT Vol	1	7	0	48
Lane Flow Rate	196	52	51	141
Geometry Grp	1	1	1	1
Degree of Util (X)	0.233	0.069	0.067	0.162
Departure Headway (Hd)	4.292	4.729	4.696	4.127
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	839	758	764	871
Service Time	2.309	2.752	2.72	2.144
HCM Lane V/C Ratio	0.234	0.069	0.067	0.162
HCM Control Delay	8.6	8.1	8.1	7.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0.2	0.2	0.6

**Intersection**

Intersection Delay, s/veh

9

Intersection LOS

A

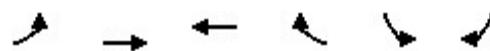
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
<b>Lane Configurations</b>												
Traffic Vol, veh/h	149	69	0	0	161	12	6	16	2	20	18	49
Future Vol, veh/h	149	69	0	0	161	12	6	16	2	20	18	49
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	166	77	0	0	179	13	7	18	2	22	20	54
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
<b>Approach</b>												
Opposing Approach	WB				WB		NB			SB		
Opposing Lanes	1				1		1			1		
Conflicting Approach Left	SB				NB		EB			WB		
Conflicting Lanes Left	1				1		1			1		
Conflicting Approach Right	NB				SB		WB			EB		
Conflicting Lanes Right	1				1		1			1		
HCM Control Delay	9.6				8.8		8.2			8.3		
HCM LOS	A				A		A			A		

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	68%	0%	23%
Vol Thru, %	67%	32%	93%	21%
Vol Right, %	8%	0%	7%	56%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	24	218	173	87
LT Vol	6	149	0	20
Through Vol	16	69	161	18
RT Vol	2	0	12	49
Lane Flow Rate	27	242	192	97
Geometry Grp	1	1	1	1
Degree of Util (X)	0.037	0.305	0.236	0.124
Departure Headway (Hd)	5.012	4.538	4.42	4.625
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	713	792	813	774
Service Time	3.052	2.564	2.447	2.658
HCM Lane V/C Ratio	0.038	0.306	0.236	0.125
HCM Control Delay	8.2	9.6	8.8	8.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	1.3	0.9	0.4

## Queues

## 2: Sheppard Ave E &amp; Doris Ave

06/04/2021



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3	Ø5	Ø6
Lane Configurations	↑	↑↑↑	↑↑↑		↑↑	↑			
Traffic Volume (vph)	91	983	985	712	930	139			
Future Volume (vph)	91	983	985	712	930	139			
Satd. Flow (prot)	1825	5092	4886	0	3541	1633			
Flt Permitted	0.121				0.950				
Satd. Flow (perm)	232	5092	4886	0	3541	1633			
Satd. Flow (RTOR)			247			50			
Lane Group Flow (vph)	97	1046	1825	0	989	148			
Turn Type	pm+pt	NA	NA		Prot	Perm			
Protected Phases	1!	2	6 3!		4		3	5	6
Permitted Phases	2					4			
Total Split (s)	10.0	38.0			36.0	36.0	36.0	12.0	36.0
Total Lost Time (s)	3.0	5.0			5.0	5.0			
Act Effct Green (s)	42.0	33.0	67.2		31.0	31.0			
Actuated g/C Ratio	0.35	0.28	0.56		0.26	0.26			
v/c Ratio	0.56	0.75	0.64		1.08	0.32			
Control Delay	37.7	43.6	5.2		96.8	25.7			
Queue Delay	0.0	0.0	48.2		0.0	0.0			
Total Delay	37.7	43.6	53.3		96.8	25.7			
LOS	D	D	D		F	C			
Approach Delay		43.1	53.3		87.5				
Approach LOS		D	D		F				
Stops (vph)	59	874	411		813	73			
Fuel Used(l)	5	66	24		89	5			
CO Emissions (g/hr)	96	1221	446		1663	94			
NOx Emissions (g/hr)	19	236	86		321	18			
VOC Emissions (g/hr)	22	282	103		384	22			
Dilemma Vehicles (#)	0	0	0		0	0			
Queue Length 50th (m)	15.0	82.4	33.4		~134.2	18.3			
Queue Length 95th (m)	26.8	98.7	m27.1		#173.6	36.4			
Internal Link Dist (m)		116.0	25.7		62.2				
Turn Bay Length (m)	65.0				25.0				
Base Capacity (vph)	174	1400	2846		914	458			
Starvation Cap Reductn	0	0	1269		0	0			
Spillback Cap Reductn	0	0	0		0	0			
Storage Cap Reductn	0	0	0		0	0			
Reduced v/c Ratio	0.56	0.75	1.16		1.08	0.32			

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 60.0

Intersection LOS: E

Intersection Capacity Utilization 78.2%

ICU Level of Service D

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

## Queues

### 2: Sheppard Ave E & Doris Ave

06/04/2021

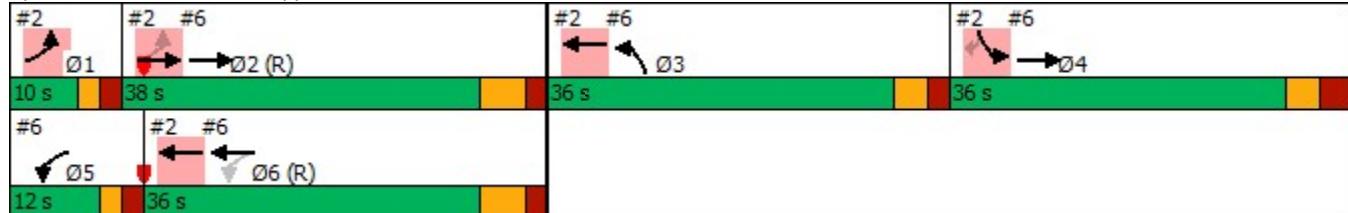
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

! Phase conflict between lane groups.

Splits and Phases: 2: Sheppard Ave E & Doris Ave



## Queues

## 6: Tradewind Ave &amp; Sheppard Ave E

06/04/2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø1	Ø2	Ø4
Lane Configurations	↑↑↑		↑	↑↑↑	↑↑↑				
Traffic Volume (vph)	1586	303	99	1259	414	277			
Future Volume (vph)	1586	303	99	1259	414	277			
Satd. Flow (prot)	4993	0	1825	5193	3402	0			
Flt Permitted				0.132		0.971			
Satd. Flow (perm)	4993	0	254	5193	3402	0			
Satd. Flow (RTOR)		48				111			
Lane Group Flow (vph)	1988	0	104	1325	728	0			
Turn Type	NA		pm+pt	NA		Prot			
Protected Phases	2 4!		5!	6	3		1	2	4
Permitted Phases				6					
Total Split (s)			12.0	36.0	36.0		10.0	38.0	36.0
Total Lost Time (s)			4.0	6.0	5.0				
Act Effct Green (s)	62.0		40.0	30.2	31.0				
Actuated g/C Ratio	0.52		0.33	0.25	0.26				
v/c Ratio	0.76		0.56	1.01	0.76				
Control Delay	4.2		37.7	72.7	40.4				
Queue Delay	2.1		0.0	32.6	0.2				
Total Delay	6.2		37.7	105.3	40.6				
LOS	A		D	F	D				
Approach Delay	6.2			100.4	40.6				
Approach LOS	A			F	D				
Stops (vph)	252		67	1133	541				
Fuel Used(l)	21		6	111	36				
CO Emissions (g/hr)	383		103	2060	677				
NOx Emissions (g/hr)	74		20	398	131				
VOC Emissions (g/hr)	88		24	475	156				
Dilemma Vehicles (#)	0		0	0	0				
Queue Length 50th (m)	11.9		16.3	~121.3	70.0				
Queue Length 95th (m)	m0.0		28.8	#150.5	91.7				
Internal Link Dist (m)	25.7			100.8	73.0				
Turn Bay Length (m)									
Base Capacity (vph)	2602		189	1308	961				
Starvation Cap Reductn	444		0	0	0				
Spillback Cap Reductn	0		0	132	22				
Storage Cap Reductn	0		0	0	0				
Reduced v/c Ratio	0.92		0.55	1.13	0.78				

## Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 44.7

Intersection LOS: D

Intersection Capacity Utilization 75.9%

ICU Level of Service D

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

## Queues

### 6: Tradewind Ave & Sheppard Ave E

06/04/2021

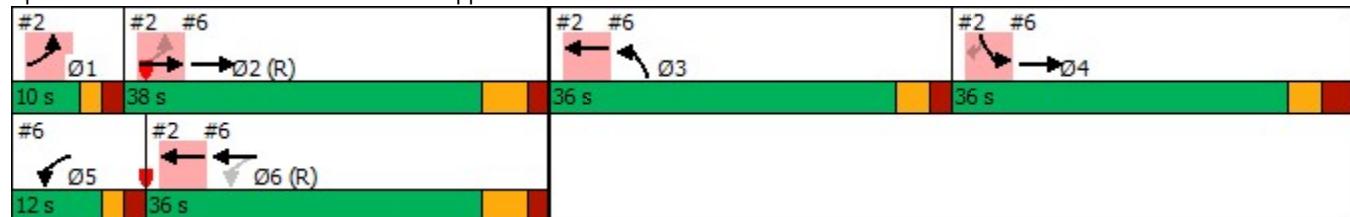
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

! Phase conflict between lane groups.

Splits and Phases: 6: Tradewind Ave & Sheppard Ave E



**Intersection**

Int Delay, s/veh 2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑↑	↑↑	
Traffic Vol, veh/h	85	85	9	606	391	12
Future Vol, veh/h	85	85	9	606	391	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	94	94	10	673	434	13

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	798	224	447	0	-	0
Stage 1	441	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	328	786	1124	-	-	-
Stage 1	622	-	-	-	-	-
Stage 2	685	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	323	786	1124	-	-	-
Mov Cap-2 Maneuver	323	-	-	-	-	-
Stage 1	613	-	-	-	-	-
Stage 2	685	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.3	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1124	-	458	-	-
HCM Lane V/C Ratio	0.009	-	0.412	-	-
HCM Control Delay (s)	8.2	0.1	18.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	2	-	-

Intersection

Intersection Delay, s/veh 17.1

Intersection LOS C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	348	9	4	0	17	3	13	264	0	68	140	269
Future Vol, veh/h	348	9	4	0	17	3	13	264	0	68	140	269
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	387	10	4	0	19	3	14	293	0	76	156	299
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1
Approach												
Opposing Approach	WB			EB			NB			SB		
Opposing Lanes	1			1			2			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	2			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			2			1			1		
HCM Control Delay	22.4			10.5			16.1			13.9		
HCM LOS	C			B			C			B		

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	5%	96%	0%	33%	0%
Vol Thru, %	95%	2%	85%	67%	0%
Vol Right, %	0%	1%	15%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	277	361	20	208	269
LT Vol	13	348	0	68	0
Through Vol	264	9	17	140	0
RT Vol	0	4	3	0	269
Lane Flow Rate	308	401	22	231	299
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.529	0.694	0.044	0.423	0.474
Departure Headway (Hd)	6.185	6.23	7.147	6.591	5.711
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	579	578	504	543	625
Service Time	4.271	4.301	5.147	4.376	3.495
HCM Lane V/C Ratio	0.532	0.694	0.044	0.425	0.478
HCM Control Delay	16.1	22.4	10.5	14.2	13.6
HCM Lane LOS	C	C	B	B	B
HCM 95th-tile Q	3.1	5.4	0.1	2.1	2.5

**Intersection**

Intersection Delay, s/veh

9

Intersection LOS

A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
<b>Lane Configurations</b>												
Traffic Vol, veh/h	129	32	14	1	16	0	0	149	2	4	120	20
Future Vol, veh/h	129	32	14	1	16	0	0	149	2	4	120	20
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	143	36	16	1	18	0	0	166	2	4	133	22
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
<b>Approach</b>												
Opposing Approach	WB			WB			NB		SB			
Opposing Lanes	1			1			1		1			
Conflicting Approach Left	SB			NB			EB		WB			
Conflicting Lanes Left	1			1			1		1			
Conflicting Approach Right	NB			SB			WB		EB			
Conflicting Lanes Right	1			1			1		1			
HCM Control Delay	9.5			8.1			8.9		8.7			
HCM LOS	A			A			A		A			

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	74%	6%	3%
Vol Thru, %	99%	18%	94%	83%
Vol Right, %	1%	8%	0%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	151	175	17	144
LT Vol	0	129	1	4
Through Vol	149	32	16	120
RT Vol	2	14	0	20
Lane Flow Rate	168	194	19	160
Geometry Grp	1	1	1	1
Degree of Util (X)	0.215	0.258	0.026	0.202
Departure Headway (Hd)	4.603	4.776	4.921	4.545
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	778	751	724	789
Service Time	2.639	2.815	2.972	2.581
HCM Lane V/C Ratio	0.216	0.258	0.026	0.203
HCM Control Delay	8.9	9.5	8.1	8.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.8	1	0.1	0.8

**Intersection**

Intersection Delay, s/veh 9.9

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	100	205	0	3	93	29	0	20	4	20	35	81
Future Vol, veh/h	100	205	0	3	93	29	0	20	4	20	35	81
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	111	228	0	3	103	32	0	22	4	22	39	90
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB		SB			
Opposing Approach	WB			EB			SB		NB			
Opposing Lanes	1			1			1		1			
Conflicting Approach Left	SB			NB			EB		WB			
Conflicting Lanes Left	1			1			1		1			
Conflicting Approach Right	NB			SB			WB		EB			
Conflicting Lanes Right	1			1			1		1			
HCM Control Delay	11			8.6			8.4		8.9			
HCM LOS	B			A			A		A			

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	2%	15%
Vol Thru, %	83%	67%	74%	26%
Vol Right, %	17%	0%	23%	60%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	24	305	125	136
LT Vol	0	100	3	20
Through Vol	20	205	93	35
RT Vol	4	0	29	81
Lane Flow Rate	27	339	139	151
Geometry Grp	1	1	1	1
Degree of Util (X)	0.038	0.428	0.177	0.197
Departure Headway (Hd)	5.103	4.55	4.577	4.7
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	698	790	781	760
Service Time	3.163	2.588	2.623	2.746
HCM Lane V/C Ratio	0.039	0.429	0.178	0.199
HCM Control Delay	8.4	11	8.6	8.9
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.1	2.2	0.6	0.7

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 1

06/10/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑	↑	↑	↑↑		↑↑	↑	
Traffic Volume (veh/h)	112	865	28	176	938	374	18	274	175	342	231	111
Future Volume (veh/h)	112	865	28	176	938	374	18	274	175	342	231	111
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No		No		No	
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1900	1826	1900	1900	1885	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	120	930	30	187	998	402	19	291	186	368	248	119
Peak Hour Factor	0.93	0.93	0.93	0.94	0.94	0.93	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	0	5	0	0	1	0	0	0	0	0	0	0
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	262	2025	65	383	1548	696	281	449	279	469	461	221
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.06	0.41	0.40	0.09	0.43	0.43	0.21	0.21	0.20	0.13	0.38	0.37
Unsig. Movement Delay												
Ln Grp Delay, s/veh	21.1	25.3	26.2	18.2	27.1	27.5	35.7	42.2	43.3	53.7	0.0	27.9
Ln Grp LOS	C	C	C	B	C	C	D	D	D	D	A	C
Approach Vol, veh/h	1080			1587			496			735		
Approach Delay, s/veh	25.1			26.2			42.5			40.8		
Approach LOS	C			C			D			D		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6			8			
Case No	1.1	4.0	2.0	6.3	1.1	3.0			4.0			
Phs Duration (G+Y+Rc), s	13.8	50.7	19.0	28.5	11.1	53.4			47.5			
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0			6.0			
Max Green (Gmax), s	13.0	31.0	16.0	30.0	7.0	37.0			51.0			
Max Allow Headway (MAH), s	5.2	8.9	5.4	9.4	5.2	7.9			9.5			
Max Q Clear (g_c+l1), s	8.4	17.3	13.4	16.5	6.2	26.6			19.9			
Green Ext Time (g_e), s	0.4	10.0	0.6	6.1	0.0	9.0			7.8			
Prob of Phs Call (p_c)	1.00	1.00	1.00	1.00	0.98	1.00			1.00			
Prob of Max Out (p_x)	1.00	0.00	1.00	0.72	1.00	0.00			0.10			
Left-Turn Movement Data												
Assigned Mvmt	1		3	7	5							
Mvmt Sat Flow, veh/h	1810		3510	1031	1810							
Through Movement Data												
Assigned Mvmt	2		4		6		8					
Mvmt Sat Flow, veh/h	4960		2137		3582		1213					
Right-Turn Movement Data												
Assigned Mvmt	12		14		16		18					
Mvmt Sat Flow, veh/h	160		1328		1610		582					
Left Lane Group Data												
Assigned Mvmt	1	0	3	7	5	0	0	0				
Lane Assignment	L (Pr/Pm)		L (Prot)	LL (Pr/Pm)								

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 1

06/10/2021

Lanes in Grp	1	0	2	1	1	0	0	0
Grp Vol (v), veh/h	187	0	368	19	120	0	0	0
Grp Sat Flow (s), veh/h/ln	1810	0	1755	1031	1810	0	0	0
Q Serve Time (g_s), s	6.4	0.0	11.4	1.7	4.2	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	6.4	0.0	11.4	1.7	4.2	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	594	0	0	1031	391	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	46.4	0.0	0.0	23.5	45.7	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	30.4	0.0	0.0	23.5	23.8	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	7.3	0.0	0.0	1.7	9.7	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	383	0	469	281	262	0	0	0
V/C Ratio (X)	0.49	0.00	0.78	0.07	0.46	0.00	0.00	0.00
Avail Cap (c_a), veh/h	452	0	533	350	277	0	0	0
Upstream Filter (l)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	17.2	0.0	47.0	35.6	19.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	6.7	0.1	1.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	18.2	0.0	53.7	35.7	21.1	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.0	0.0	3.6	0.3	0.7	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.4	0.0	0.1	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.1	0.0	4.1	0.3	0.8	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	6.14	0.00	15.47	2.57	4.56	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### Middle Lane Group Data

Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		
Lanes in Grp	0	2	0	1	0	2	0	0
Grp Vol (v), veh/h	0	623	0	244	0	998	0	0
Grp Sat Flow (s), veh/h/ln	0	1662	0	1805	0	1791	0	0
Q Serve Time (g_s), s	0.0	15.3	0.0	13.9	0.0	24.6	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	15.3	0.0	13.9	0.0	24.6	0.0	0.0
Lane Grp Cap (c), veh/h	0	1357	0	379	0	1548	0	0
V/C Ratio (X)	0.00	0.46	0.00	0.64	0.00	0.64	0.00	0.00
Avail Cap (c_a), veh/h	0	1357	0	500	0	1548	0	0
Upstream Filter (l)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	24.1	0.0	40.4	0.0	25.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.1	0.0	1.8	0.0	2.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	25.3	0.0	42.2	0.0	27.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.0	0.0	4.3	0.0	4.9	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.2	0.0	0.4	0.0	0.0

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 1

06/10/2021

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	3.2	0.0	4.5	0.0	5.4	0.0
%ile Storage Ratio (RQ%)	0.00	9.40	0.00	16.35	0.00	15.82	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Right Lane Group Data</b>							
Assigned Mvmt	0	12	0	14	0	16	0
Lane Assignment		T+R		T+R		R	T+R
Lanes in Grp	0	1	0	1	0	1	0
Grp Vol (v), veh/h	0	337	0	233	0	402	0
Grp Sat Flow (s), veh/h/ln	0	1797	0	1661	0	1610	0
Q Serve Time (g_s), s	0.0	15.3	0.0	14.5	0.0	21.2	0.0
Cycle Q Clear Time (g_c), s	0.0	15.3	0.0	14.5	0.0	21.2	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.09	0.00	0.80	0.00	1.00	0.00
Lane Grp Cap (c), veh/h	0	734	0	349	0	696	0
V/C Ratio (X)	0.00	0.46	0.00	0.67	0.00	0.58	0.00
Avail Cap (c_a), veh/h	0	734	0	460	0	696	0
Upstream Filter (l)	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d1), s/veh	0.0	24.2	0.0	41.0	0.0	24.1	0.0
Incr Delay (d2), s/veh	0.0	2.1	0.0	2.3	0.0	3.5	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	26.2	0.0	43.3	0.0	27.5	0.0
1st-Term Q (Q1), veh/ln	0.0	3.3	0.0	4.2	0.0	3.8	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.4	0.0	0.2	0.0	0.7	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	3.7	0.0	4.4	0.0	4.5	0.0
%ile Storage Ratio (RQ%)	0.00	10.80	0.00	15.92	0.00	13.09	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### Intersection Summary

HCM 6th Ctrl Delay 30.7

HCM 6th LOS C

### Notes

User approved pedestrian interval to be less than phase max green.

## Queues

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 1

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	960	187	998	402	19	477	368	367
v/c Ratio	0.39	0.46	0.49	0.63	0.43	0.11	0.70	0.72	0.56
Control Delay	16.7	26.2	17.2	28.4	4.1	38.4	37.1	54.6	29.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.7	26.2	17.2	28.4	4.1	38.4	37.1	54.6	29.9
Stops (vph)	56	635	85	725	31	16	305	320	245
Fuel Used(l)	4	40	6	45	5	1	21	22	14
CO Emissions (g/hr)	69	747	107	834	95	17	398	405	263
NOx Emissions (g/hr)	13	144	21	161	18	3	77	78	51
VOC Emissions (g/hr)	16	172	25	192	22	4	92	94	61
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0	0
Queue Length 50th (m)	11.7	54.9	18.9	88.6	0.0	3.6	38.2	39.7	58.5
Queue Length 95th (m)	23.3	80.3	34.9	129.2	19.9	9.7	52.1	55.3	79.4
Internal Link Dist (m)		69.8		67.0			61.3		49.0
Turn Bay Length (m)	40.0		40.0			25.0			
Base Capacity (vph)	307	2069	416	1579	939	288	1043	537	863
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.46	0.45	0.63	0.43	0.07	0.46	0.69	0.43
Intersection Summary									

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 2

06/10/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑		↑	↑↑	↑	↑	↑↑		↑	↑↑	
Traffic Volume (veh/h)	112	865	28	176	938	374	18	274	175	342	231	111
Future Volume (veh/h)	112	865	28	176	938	374	18	274	175	342	231	111
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No		No		No	
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1900	1826	1900	1900	1885	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	120	930	30	187	998	402	19	291	186	245	420	119
Peak Hour Factor	0.93	0.93	0.93	0.94	0.94	0.93	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	0	5	0	0	1	0	0	0	0	0	0	0
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	205	1638	53	281	1182	532	380	449	279	412	650	182
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.06	0.33	0.32	0.06	0.33	0.33	0.21	0.21	0.20	0.23	0.23	0.22
Unsig. Movement Delay												
Ln Grp Delay, s/veh	31.5	33.1	34.9	32.5	42.3	43.1	35.4	42.3	43.3	40.0	41.1	41.7
Ln Grp LOS	C	C	C	C	D	D	D	D	D	D	D	D
Approach Vol, veh/h	1080			1587			496			784		
Approach Delay, s/veh	33.5			41.4			42.5			41.0		
Approach LOS	C			D			D			D		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	8	4	5	6						
Case No	1.1	4.0	10.0	10.0	1.1	3.0						
Phs Duration (G+Y+Rc), s	11.0	42.0	30.5	28.5	11.0	42.0						
Change Period (Y+Rc), s	5.0	6.0	6.0	6.0	5.0	6.0						
Max Green (Gmax), s	6.0	23.5	30.0	30.0	6.0	23.5						
Max Allow Headway (MAH), s	5.2	8.9	8.2	9.4	5.2	7.9						
Max Q Clear (g_c+l1), s	9.0	19.3	17.1	16.5	6.8	31.0						
Green Ext Time (g_e), s	0.0	3.4	7.4	6.1	0.0	0.0						
Prob of Phs Call (p_c)	1.00	1.00	1.00	1.00	0.98	1.00						
Prob of Max Out (p_x)	1.00	0.00	0.77	0.72	1.00	0.00						
Left-Turn Movement Data												
Assigned Mvmt	1		3	7	5							
Mvmt Sat Flow, veh/h	1810		1810	1810	1810							
Through Movement Data												
Assigned Mvmt	2	8	4		6							
Mvmt Sat Flow, veh/h	4960	2855	2137		3582							
Right-Turn Movement Data												
Assigned Mvmt	12	18	14		16							
Mvmt Sat Flow, veh/h	160	801	1328		1610							
Left Lane Group Data												
Assigned Mvmt	1	0	3	7	5	0	0	0				
Lane Assignment	L (Pr/Pm)		L	LL (Pr/Pm)								

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 2

06/10/2021

Lanes in Grp	1	0	1	1	1	0	0	0
Grp Vol (v), veh/h	187	0	245	19	120	0	0	0
Grp Sat Flow (s), veh/h/ln	1810	0	1810	1810	1810	0	0	0
Q Serve Time (g_s), s	7.0	0.0	13.5	0.9	4.8	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	7.0	0.0	13.5	0.9	4.8	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	594	0	1810	1810	391	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	37.0	0.0	0.0	0.0	37.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	19.6	0.0	0.0	0.0	8.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	11.3	0.0	0.0	0.0	8.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	281	0	412	380	205	0	0	0
V/C Ratio (X)	0.66	0.00	0.59	0.05	0.58	0.00	0.00	0.00
Avail Cap (c_a), veh/h	281	0	501	501	205	0	0	0
Upstream Filter (l)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	26.7	0.0	38.6	35.3	27.3	0.0	0.0	0.0
Incr Delay (d2), s/veh	5.8	0.0	1.4	0.1	4.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	32.5	0.0	40.0	35.4	31.5	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.7	0.0	4.2	0.3	1.1	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.5	0.0	0.2	0.0	0.2	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	2.2	0.0	4.3	0.3	1.3	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	11.84	0.00	16.48	2.53	7.09	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### Middle Lane Group Data

Assigned Mvmt	0	2	8	4	0	6	0	0
Lane Assignment		T	T	T		T		
Lanes in Grp	0	2	1	1	0	2	0	0
Grp Vol (v), veh/h	0	623	278	244	0	998	0	0
Grp Sat Flow (s), veh/h/ln	0	1662	1900	1805	0	1791	0	0
Q Serve Time (g_s), s	0.0	17.3	14.8	13.9	0.0	29.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	17.3	14.8	13.9	0.0	29.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1097	433	379	0	1182	0	0
V/C Ratio (X)	0.00	0.57	0.64	0.64	0.00	0.84	0.00	0.00
Avail Cap (c_a), veh/h	0	1097	526	500	0	1182	0	0
Upstream Filter (l)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	30.9	39.1	40.4	0.0	34.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	2.1	1.9	1.8	0.0	7.4	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	33.1	41.1	42.3	0.0	42.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	3.9	4.8	4.3	0.0	7.1	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.2	0.2	0.0	1.2	0.0	0.0

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 2

06/10/2021

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	4.3	5.0	4.5	0.0	8.3	0.0
%ile Storage Ratio (RQ%)	0.00	12.02	19.14	16.36	0.00	23.65	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Right Lane Group Data</b>							
Assigned Mvmt	0	12	18	14	0	16	0
Lane Assignment		T+R	T+R	T+R		R	
Lanes in Grp	0	1	1	1	0	1	0
Grp Vol (v), veh/h	0	337	261	233	0	402	0
Grp Sat Flow (s), veh/h/ln	0	1797	1756	1661	0	1610	0
Q Serve Time (g_s), s	0.0	17.3	15.1	14.5	0.0	25.0	0.0
Cycle Q Clear Time (g_c), s	0.0	17.3	15.1	14.5	0.0	25.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.09	0.46	0.80	0.00	1.00	0.00
Lane Grp Cap (c), veh/h	0	593	400	349	0	532	0
V/C Ratio (X)	0.00	0.57	0.65	0.67	0.00	0.76	0.00
Avail Cap (c_a), veh/h	0	593	486	460	0	532	0
Upstream Filter (I)	0.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d1), s/veh	0.0	31.0	39.4	41.0	0.0	33.5	0.0
Incr Delay (d2), s/veh	0.0	3.9	2.3	2.3	0.0	9.7	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	34.9	41.7	43.3	0.0	43.1	0.0
1st-Term Q (Q1), veh/ln	0.0	4.3	4.5	4.2	0.0	5.5	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.6	0.3	0.2	0.0	1.4	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	4.9	4.8	4.4	0.0	6.9	0.0
%ile Storage Ratio (RQ%)	0.00	13.88	18.24	15.92	0.00	19.51	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### Intersection Summary

HCM 6th Ctrl Delay 39.3

HCM 6th LOS D

### Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

## Queues

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 2

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	960	187	998	402	19	477	247	488
v/c Ratio	0.52	0.64	0.55	0.80	0.51	0.06	0.70	0.65	0.62
Control Delay	28.9	38.0	28.8	41.2	9.1	37.2	37.4	46.9	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	38.0	28.8	41.2	9.1	37.2	37.4	46.9	39.0
Stops (vph)	71	740	97	702	67	16	305	201	365
Fuel Used(l)	5	51	8	54	7	1	21	13	23
CO Emissions (g/hr)	94	942	141	996	137	17	400	243	420
NOx Emissions (g/hr)	18	182	27	192	26	3	77	47	81
VOC Emissions (g/hr)	22	217	33	230	32	4	92	56	97
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0	0
Queue Length 50th (m)	14.3	67.8	23.1	104.7	8.5	3.5	38.5	54.5	49.6
Queue Length 95th (m)	32.4	#97.1	#64.7	#185.6	41.0	9.6	52.4	75.0	60.3
Internal Link Dist (m)		69.8		67.0			61.3		49.0
Turn Bay Length (m)	40.0		40.0			25.0			
Base Capacity (vph)	231	1506	341	1254	792	502	1038	468	963
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.64	0.55	0.80	0.51	0.04	0.46	0.53	0.51

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑↑	↑↑	
Traffic Vol, veh/h	23	23	32	444	353	81
Future Vol, veh/h	23	23	32	444	353	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	26	26	36	493	392	90
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	756	241	482	0	-	0
Stage 1	437	-	-	-	-	-
Stage 2	319	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	348	766	1091	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	332	766	1091	-	-	-
Mov Cap-2 Maneuver	332	-	-	-	-	-
Stage 1	596	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	13.7	0.8	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1091	-	463	-	-	
HCM Lane V/C Ratio	0.033	-	0.11	-	-	
HCM Control Delay (s)	8.4	0.2	13.7	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-	

**Intersection**

Intersection Delay, s/veh 11.6

Intersection LOS B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖ ↗			↖ ↗			↖ ↗		↖ ↗	↖ ↗	↖ ↗
Traffic Vol, veh/h	239	10	2	0	8	29	1	208	0	12	131	233
Future Vol, veh/h	239	10	2	0	8	29	1	208	0	12	131	233
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	266	11	2	0	9	32	1	231	0	13	146	259
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1
Approach	EB			WB			NB			SB		
Opposing Approach	WB				EB		SB			NB		
Opposing Lanes	1				1		2			1		
Conflicting Approach Left	SB				NB		EB			WB		
Conflicting Lanes Left	2				1		1			1		
Conflicting Approach Right	NB				SB		WB			EB		
Conflicting Lanes Right	1				2		1			1		
HCM Control Delay	13.3				9		11.6			10.7		
HCM LOS	B				A		B			B		

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	95%	0%	8%	0%
Vol Thru, %	100%	4%	22%	92%	0%
Vol Right, %	0%	1%	78%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	209	251	37	143	233
LT Vol	1	239	0	12	0
Through Vol	208	10	8	131	0
RT Vol	0	2	29	0	233
Lane Flow Rate	232	279	41	159	259
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.356	0.444	0.064	0.257	0.364
Departure Headway (Hd)	5.516	5.732	5.584	5.817	5.065
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	653	628	639	618	709
Service Time	3.553	3.767	3.636	3.551	2.799
HCM Lane V/C Ratio	0.355	0.444	0.064	0.257	0.365
HCM Control Delay	11.6	13.3	9	10.6	10.7
HCM Lane LOS	B	B	A	B	B
HCM 95th-tile Q	1.6	2.3	0.2	1	1.7

Intersection

Intersection Delay, s/veh 8.3

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	11	7	0	48	0	3	129	1	0	83	50
Future Vol, veh/h	80	11	7	0	48	0	3	129	1	0	83	50
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	89	12	8	0	53	0	3	143	1	0	92	56
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach												
Opposing Approach	WB				WB		NB			SB		
Opposing Lanes	1				1		1			1		
Conflicting Approach Left	SB				NB		EB			WB		
Conflicting Lanes Left	1				1		1			1		
Conflicting Approach Right	NB				SB		WB			EB		
Conflicting Lanes Right	1				1		1			1		
HCM Control Delay	8.6				8.1		8.5			8.1		
HCM LOS	A				A		A			A		

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	82%	0%	0%
Vol Thru, %	97%	11%	100%	62%
Vol Right, %	1%	7%	0%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	133	98	48	133
LT Vol	3	80	0	0
Through Vol	129	11	48	83
RT Vol	1	7	0	50
Lane Flow Rate	148	109	53	148
Geometry Grp	1	1	1	1
Degree of Util (X)	0.183	0.143	0.069	0.174
Departure Headway (Hd)	4.451	4.741	4.691	4.232
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	807	757	763	848
Service Time	2.471	2.769	2.723	2.253
HCM Lane V/C Ratio	0.183	0.144	0.069	0.175
HCM Control Delay	8.5	8.6	8.1	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.5	0.2	0.6

Intersection													
Intersection Delay, s/veh		8.8											
Intersection LOS		A											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖ ↗			↖ ↗			↖ ↗			↖ ↗	
Traffic Vol, veh/h	112	72	0	0	168	9	6	12	2	20	19	51
Future Vol, veh/h	112	72	0	0	168	9	6	12	2	20	19	51
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	124	80	0	0	187	10	7	13	2	22	21	57
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			1			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			1			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			1		
HCM Control Delay	9.1			8.8			8.1			8.2		
HCM LOS	A			A			A			A		

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	30%	61%	0%	22%
Vol Thru, %	60%	39%	95%	21%
Vol Right, %	10%	0%	5%	57%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	20	184	177	90
LT Vol	6	112	0	20
Through Vol	12	72	168	19
RT Vol	2	0	9	51
Lane Flow Rate	22	204	197	100
Geometry Grp	1	1	1	1
Degree of Util (X)	0.03	0.257	0.239	0.126
Departure Headway (Hd)	4.934	4.519	4.381	4.537
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	725	795	820	790
Service Time	2.969	2.542	2.405	2.565
HCM Lane V/C Ratio	0.03	0.257	0.24	0.127
HCM Control Delay	8.1	9.1	8.8	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	1	0.9	0.4

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 1

06/10/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑	↑	↑	↑↑		↑↑	↑	
Traffic Volume (veh/h)	99	1014	36	107	1012	351	52	391	298	703	304	150
Future Volume (veh/h)	99	1014	36	107	1012	351	52	391	298	703	304	150
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1900	1856	1900	1900	1885	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	105	1079	38	113	1065	369	55	412	314	748	323	160
Peak Hour Factor	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	0	3	0	0	1	0	0	0	0	0	0	0
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	177	1601	56	233	1141	513	298	502	379	761	607	301
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.06	0.32	0.31	0.06	0.32	0.32	0.26	0.26	0.25	0.22	0.51	0.50
Unsig. Movement Delay												
Ln Grp Delay, s/veh	35.8	38.8	41.7	29.1	54.4	44.6	35.6	52.5	54.7	75.2	0.0	20.7
Ln Grp LOS	D	D	D	C	D	D	D	D	D	E	A	C
Approach Vol, veh/h	1222				1547			781			1231	
Approach Delay, s/veh	39.5				50.2			52.3			53.8	
Approach LOS	D				D			D			D	
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6			8			
Case No	1.1	4.0	2.0	6.3	1.1	3.0			4.0			
Phs Duration (G+Y+Rc), s	11.0	43.2	30.0	35.8	11.0	43.2			65.8			
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0			6.0			
Max Green (Gmax), s	6.0	36.0	25.0	31.0	6.0	36.0			61.0			
Max Allow Headway (MAH), s	5.2	8.9	5.4	9.3	5.2	8.0			9.5			
Max Q Clear (g_c+l1), s	7.0	24.4	27.5	26.1	6.6	36.6			23.9			
Green Ext Time (g_e), s	0.0	9.5	0.0	3.7	0.0	0.0			11.7			
Prob of Phs Call (p_c)	0.98	1.00	1.00	1.00	0.97	1.00			1.00			
Prob of Max Out (p_x)	1.00	0.00	1.00	1.00	1.00	0.00			0.13			
<b>Left-Turn Movement Data</b>												
Assigned Mvmt	1		3	7	5							
Mvmt Sat Flow, veh/h	1810		3510	927	1810							
<b>Through Movement Data</b>												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		5024		1958		3582		1199				
<b>Right-Turn Movement Data</b>												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		177		1480		1610		594				
<b>Left Lane Group Data</b>												
Assigned Mvmt	1	0	3	7	5	0	0	0				
Lane Assignment	L (Pr/Pm)		L (Prot)		LL (Pr/Pm)							

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 1

06/10/2021

Lanes in Grp	1	0	2	1	1	0	0	0
Grp Vol (v), veh/h	113	0	748	55	105	0	0	0
Grp Sat Flow (s), veh/h/ln	1810	0	1755	927	1810	0	0	0
Q Serve Time (g_s), s	5.0	0.0	25.5	5.6	4.6	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	5.0	0.0	25.5	5.6	4.6	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	512	0	0	927	379	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	38.2	0.0	0.0	30.8	38.2	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	15.8	0.0	0.0	30.8	3.6	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	6.3	0.0	0.0	5.6	3.6	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	233	0	761	298	177	0	0	0
V/C Ratio (X)	0.48	0.00	0.98	0.18	0.59	0.00	0.00	0.00
Avail Cap (c_a), veh/h	233	0	761	307	177	0	0	0
Upstream Filter (l)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	27.5	0.0	46.8	35.3	30.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	1.6	0.0	28.4	0.3	5.2	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	29.1	0.0	75.2	35.6	35.8	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.2	0.0	8.0	0.9	1.1	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.1	0.0	3.0	0.0	0.3	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.3	0.0	11.0	0.9	1.4	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	7.19	0.00	44.01	7.87	7.54	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### Middle Lane Group Data

Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		
Lanes in Grp	0	2	0	1	0	2	0	0
Grp Vol (v), veh/h	0	725	0	379	0	1065	0	0
Grp Sat Flow (s), veh/h/ln	0	1689	0	1805	0	1791	0	0
Q Serve Time (g_s), s	0.0	22.4	0.0	23.8	0.0	34.6	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	22.4	0.0	23.8	0.0	34.6	0.0	0.0
Lane Grp Cap (c), veh/h	0	1076	0	463	0	1141	0	0
V/C Ratio (X)	0.00	0.67	0.00	0.82	0.00	0.93	0.00	0.00
Avail Cap (c_a), veh/h	0	1076	0	481	0	1141	0	0
Upstream Filter (l)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	35.5	0.0	42.0	0.0	39.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	3.4	0.0	10.5	0.0	14.8	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	38.8	0.0	52.5	0.0	54.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	5.6	0.0	7.5	0.0	9.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.5	0.0	1.3	0.0	2.3	0.0	0.0

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 1

06/10/2021

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	6.1	0.0	8.8	0.0	11.5	0.0
%ile Storage Ratio (RQ%)	0.00	20.40	0.00	28.75	0.00	20.53	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Right Lane Group Data</b>							
Assigned Mvmt	0	12	0	14	0	16	0
Lane Assignment		T+R		T+R		R	T+R
Lanes in Grp	0	1	0	1	0	1	0
Grp Vol (v), veh/h	0	392	0	347	0	369	0
Grp Sat Flow (s), veh/h/ln	0	1824	0	1634	0	1610	0
Q Serve Time (g_s), s	0.0	22.4	0.0	24.1	0.0	24.3	0.0
Cycle Q Clear Time (g_c), s	0.0	22.4	0.0	24.1	0.0	24.3	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.10	0.00	0.91	0.00	1.00	0.00
Lane Grp Cap (c), veh/h	0	581	0	419	0	513	0
V/C Ratio (X)	0.00	0.67	0.00	0.83	0.00	0.72	0.00
Avail Cap (c_a), veh/h	0	581	0	436	0	513	0
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d1), s/veh	0.0	35.5	0.0	42.6	0.0	36.1	0.0
Incr Delay (d2), s/veh	0.0	6.2	0.0	12.1	0.0	8.4	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	41.7	0.0	54.7	0.0	44.6	0.0
1st-Term Q (Q1), veh/ln	0.0	6.1	0.0	6.9	0.0	5.8	0.0
2nd-Term Q (Q2), veh/ln	0.0	1.0	0.0	1.4	0.0	1.2	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	7.1	0.0	8.3	0.0	7.0	0.0
%ile Storage Ratio (RQ%)	0.00	20.40	0.00	28.75	0.00	20.53	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Intersection Summary</b>							
HCM 6th Ctrl Delay			48.7				
HCM 6th LOS			D				

## Queues

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 1

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	1117	113	1065	369	55	726	748	483
v/c Ratio	0.57	0.68	0.56	0.90	0.50	0.24	0.80	0.98	0.53
Control Delay	34.8	37.9	33.8	50.9	8.6	38.4	43.5	73.9	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.8	37.9	33.8	50.9	8.6	38.4	43.5	73.9	21.5
Stops (vph)	60	885	66	892	57	40	549	634	280
Fuel Used(l)	5	60	5	68	7	3	38	55	15
CO Emissions (g/hr)	91	1112	97	1272	123	49	701	1018	280
NOx Emissions (g/hr)	18	215	19	246	24	9	135	197	54
VOC Emissions (g/hr)	21	257	22	293	28	11	162	235	65
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0	0
Queue Length 50th (m)	15.0	84.9	16.3	129.1	9.3	10.3	71.8	90.8	68.5
Queue Length 95th (m)	#29.4	101.2	#30.2	#171.7	34.8	21.6	92.8	#129.1	95.7
Internal Link Dist (m)		69.8		67.0			63.7		46.6
Turn Bay Length (m)	40.0		40.0			25.0			
Base Capacity (vph)	185	1650	201	1178	743	250	987	767	957
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.68	0.56	0.90	0.50	0.22	0.74	0.98	0.50

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 2

06/10/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↓		↑	↑↑	↑	↑	↑↑		↑	↑↓	
Traffic Volume (veh/h)	99	1014	36	107	1012	351	52	391	298	703	304	150
Future Volume (veh/h)	99	1014	36	107	1012	351	52	391	298	703	304	150
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1900	1856	1900	1900	1885	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	105	1079	38	113	1065	369	55	412	314	795	258	160
Peak Hour Factor	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	0	3	0	0	1	0	0	0	0	0	0	0
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	166	1382	49	205	985	443	454	491	371	932	283	175
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.06	0.27	0.27	0.06	0.27	0.27	0.25	0.25	0.24	0.26	0.26	0.25
Unsig. Movement Delay												
Ln Grp Delay, s/veh	40.5	46.6	51.7	34.6	96.8	57.6	34.9	55.1	57.6	50.1	0.0	65.9
Ln Grp LOS	D	D	D	C	F	E	C	E	E	D	A	E
Approach Vol, veh/h	1222				1547			781			1213	
Approach Delay, s/veh	47.7				82.9			54.8			55.5	
Approach LOS	D				F			D			E	
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	8	4	5	6						
Case No	1.1	4.0	10.0	10.0	1.1	3.0						
Phs Duration (G+Y+Rc), s	11.0	38.0	35.9	35.1	11.0	38.0						
Change Period (Y+Rc), s	5.0	6.0	6.0	6.0	5.0	6.0						
Max Green (Gmax), s	6.0	31.0	30.0	30.0	6.0	31.0						
Max Allow Headway (MAH), s	5.2	8.9	6.8	9.3	5.2	8.0						
Max Q Clear (g_c+l1), s	7.3	25.8	29.4	26.3	6.9	35.0						
Green Ext Time (g_e), s	0.0	4.5	0.5	2.8	0.0	0.0						
Prob of Phs Call (p_c)	0.98	1.00	1.00	1.00	0.97	1.00						
Prob of Max Out (p_x)	1.00	0.00	1.00	1.00	1.00	0.00						
<b>Left-Turn Movement Data</b>												
Assigned Mvmt	1		3	7	5							
Mvmt Sat Flow, veh/h	1810		3619	1810	1810							
<b>Through Movement Data</b>												
Assigned Mvmt		2	8	4		6						
Mvmt Sat Flow, veh/h		5024	1097	1958		3582						
<b>Right-Turn Movement Data</b>												
Assigned Mvmt		12	18	14		16						
Mvmt Sat Flow, veh/h		177	680	1480		1610						
<b>Left Lane Group Data</b>												
Assigned Mvmt	1	0	3	7	5	0	0	0				
Lane Assignment	L (Pr/Pm)		L	LL	(Pr/Pm)							

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 2

06/10/2021

Lanes in Grp	1	0	2	1	1	0	0	0
Grp Vol (v), veh/h	113	0	795	55	105	0	0	0
Grp Sat Flow (s), veh/h/ln	1810	0	1810	1810	1810	0	0	0
Q Serve Time (g_s), s	5.3	0.0	25.1	2.8	4.9	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	5.3	0.0	25.1	2.8	4.9	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	512	0	1810	1810	379	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	33.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	205	0	932	454	166	0	0	0
V/C Ratio (X)	0.55	0.00	0.85	0.12	0.63	0.00	0.00	0.00
Avail Cap (c_a), veh/h	205	0	935	467	166	0	0	0
Upstream Filter (l)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	31.5	0.0	42.4	34.7	32.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	3.2	0.0	7.7	0.1	7.7	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	34.6	0.0	50.1	34.9	40.5	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	1.4	0.0	7.9	0.9	1.3	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.2	0.0	1.0	0.0	0.4	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	1.6	0.0	8.9	0.9	1.6	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	8.58	0.00	35.46	7.65	8.95	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### Middle Lane Group Data

Assigned Mvmt	0	2	8	4	0	6	0	0
Lane Assignment		T		T		T		
Lanes in Grp	0	2	0	1	0	2	0	0
Grp Vol (v), veh/h	0	725	0	379	0	1065	0	0
Grp Sat Flow (s), veh/h/ln	0	1689	0	1805	0	1791	0	0
Q Serve Time (g_s), s	0.0	23.8	0.0	23.9	0.0	33.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	23.8	0.0	23.9	0.0	33.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	929	0	453	0	985	0	0
V/C Ratio (X)	0.00	0.78	0.00	0.84	0.00	1.08	0.00	0.00
Avail Cap (c_a), veh/h	0	929	0	466	0	985	0	0
Upstream Filter (l)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	40.2	0.0	42.6	0.0	43.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	6.5	0.0	12.5	0.0	53.3	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	46.6	0.0	55.1	0.0	96.8	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	6.3	0.0	7.5	0.0	9.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.8	0.0	1.6	0.0	7.3	0.0	0.0

# HCM 6th Signalized Intersection Capacity Analysis

## 3: Doris Ave & Sheppard Ave E - Alternative 2

06/10/2021

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	7.1	0.0	9.1	0.0	16.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	19.82	0.00	31.48	0.00	46.95	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0

### Right Lane Group Data

Assigned Mvmt	0	12	18	14	0	16	0	0
Lane Assignment		T+R	T+R	T+R		R		
Lanes in Grp	0	1	1	1	0	1	0	0
Grp Vol (v), veh/h	0	392	418	347	0	369	0	0
Grp Sat Flow (s), veh/h/ln	0	1824	1778	1634	0	1610	0	0
Q Serve Time (g_s), s	0.0	23.8	27.4	24.3	0.0	25.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	23.8	27.4	24.3	0.0	25.9	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.10	0.38	0.91	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	502	458	410	0	443	0	0
V/C Ratio (X)	0.00	0.78	0.91	0.85	0.00	0.83	0.00	0.00
Avail Cap (c_a), veh/h	0	502	459	422	0	443	0	0
Upstream Filter (l)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	40.2	43.4	43.2	0.0	40.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	11.5	22.5	14.4	0.0	16.6	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	51.7	65.9	57.6	0.0	57.6	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	6.8	8.5	7.0	0.0	6.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	1.6	2.9	1.6	0.0	2.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	8.4	11.4	8.6	0.0	8.6	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	23.35	45.45	29.84	0.00	24.11	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

### Intersection Summary

HCM 6th Ctrl Delay 62.3

HCM 6th LOS E

### Notes

User approved volume balancing among the lanes for turning movement.

## Queues

## 3: Doris Ave &amp; Sheppard Ave E - Alternative 2

06/10/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	1117	113	1065	369	55	726	411	820
v/c Ratio	0.60	0.80	0.64	1.07	0.56	0.13	0.81	0.92	0.90
Control Delay	41.3	45.9	44.2	92.7	11.8	35.5	44.2	70.0	55.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	45.9	44.2	92.7	11.8	35.5	44.2	70.0	55.3
Stops (vph)	67	951	70	866	75	38	549	332	672
Fuel Used(l)	6	68	6	100	8	2	38	29	49
CO Emissions (g/hr)	103	1260	114	1867	147	46	708	533	904
NOx Emissions (g/hr)	20	243	22	360	28	9	137	103	175
VOC Emissions (g/hr)	24	291	26	431	34	11	163	123	209
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0	0
Queue Length 50th (m)	16.5	90.4	17.8	~150.3	13.2	10.0	71.5	104.8	101.5
Queue Length 95th (m)	#30.6	107.7	#34.0	#191.1	42.1	20.5	93.6	#172.5	#141.4
Internal Link Dist (m)		69.8		67.0			63.7		46.6
Turn Bay Length (m)	40.0		40.0			25.0			
Base Capacity (vph)	174	1390	176	991	662	471	962	447	912
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.80	0.64	1.07	0.56	0.12	0.75	0.92	0.90

## Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

**Intersection**

Int Delay, s/veh 2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			↑↑	↑↑	
Traffic Vol, veh/h	85	85	9	657	423	23
Future Vol, veh/h	85	85	9	657	423	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	94	94	10	730	470	26

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	868	248	496	0	-	0
Stage 1	483	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	296	758	1078	-	-	-
Stage 1	592	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	291	758	1078	-	-	-
Mov Cap-2 Maneuver	291	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	663	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.3	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1078	-	421	-	-
HCM Lane V/C Ratio	0.009	-	0.449	-	-
HCM Control Delay (s)	8.4	0.1	20.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	2.3	-	-

**Intersection**

Intersection Delay, s/veh 20.8

Intersection LOS C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖ ↗			↖ ↗			↖ ↗		↖ ↗	↖ ↗	↖ ↗
Traffic Vol, veh/h	375	10	4	0	18	4	14	287	0	75	149	284
Future Vol, veh/h	375	10	4	0	18	4	14	287	0	75	149	284
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	417	11	4	0	20	4	16	319	0	83	166	316
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1
Approach	EB			WB			NB			SB		
Opposing Approach	WB				EB			SB			NB	
Opposing Lanes	1				1			2			1	
Conflicting Approach Left	SB				NB			EB			WB	
Conflicting Lanes Left	2					1		1			1	
Conflicting Approach Right	NB					SB		WB			EB	
Conflicting Lanes Right	1					2		1			1	
HCM Control Delay	29.2					11		19.1			15.7	
HCM LOS	D				B		C			C		

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	5%	96%	0%	33%	0%
Vol Thru, %	95%	3%	82%	67%	0%
Vol Right, %	0%	1%	18%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	301	389	22	224	284
LT Vol	14	375	0	75	0
Through Vol	287	10	18	149	0
RT Vol	0	4	4	0	284
Lane Flow Rate	334	432	24	249	316
Geometry Grp	5	2	2	7	7
Degree of Util (X)	0.606	0.784	0.051	0.48	0.531
Departure Headway (Hd)	6.521	6.528	7.535	6.946	6.059
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	552	558	474	518	593
Service Time	4.566	4.528	5.604	4.693	3.806
HCM Lane V/C Ratio	0.605	0.774	0.051	0.481	0.533
HCM Control Delay	19.1	29.2	11	16	15.5
HCM Lane LOS	C	D	B	C	C
HCM 95th-tile Q	4	7.3	0.2	2.6	3.1

Intersection

Intersection Delay, s/veh 9.3

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	139	35	15	1	17	0	0	162	2	4	126	21
Future Vol, veh/h	139	35	15	1	17	0	0	162	2	4	126	21
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	154	39	17	1	19	0	0	180	2	4	140	23
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB		SB			
Opposing Approach	WB			EB			SB		NB			
Opposing Lanes	1			1			1		1			
Conflicting Approach Left	SB			NB			EB		WB			
Conflicting Lanes Left	1			1			1		1			
Conflicting Approach Right	NB			SB			WB		EB			
Conflicting Lanes Right	1			1			1		1			
HCM Control Delay	9.8			8.2			9.2		8.9			
HCM LOS	A			A			A		A			

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	74%	6%	3%
Vol Thru, %	99%	19%	94%	83%
Vol Right, %	1%	8%	0%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	164	189	18	151
LT Vol	0	139	1	4
Through Vol	162	35	17	126
RT Vol	2	15	0	21
Lane Flow Rate	182	210	20	168
Geometry Grp	1	1	1	1
Degree of Util (X)	0.236	0.282	0.028	0.215
Departure Headway (Hd)	4.663	4.835	5.005	4.611
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	767	741	711	777
Service Time	2.704	2.879	3.064	2.654
HCM Lane V/C Ratio	0.237	0.283	0.028	0.216
HCM Control Delay	9.2	9.8	8.2	8.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	1.2	0.1	0.8

Intersection

Intersection Delay, s/veh 10.4

Intersection LOS B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖			↖			↖			↖	
Traffic Vol, veh/h	110	222	0	3	101	32	0	22	4	21	37	86
Future Vol, veh/h	110	222	0	3	101	32	0	22	4	21	37	86
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	122	247	0	3	112	36	0	24	4	23	41	96
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB		SB			
Opposing Approach	WB			EB			SB		NB			
Opposing Lanes	1			1			1		1			
Conflicting Approach Left	SB			NB			EB		WB			
Conflicting Lanes Left	1			1			1		1			
Conflicting Approach Right	NB			SB			WB		EB			
Conflicting Lanes Right	1			1			1		1			
HCM Control Delay	11.7			8.8			8.5		9.2			
HCM LOS	B			A			A		A			

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	33%	2%	15%
Vol Thru, %	85%	67%	74%	26%
Vol Right, %	15%	0%	24%	60%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	26	332	136	144
LT Vol	0	110	3	21
Through Vol	22	222	101	37
RT Vol	4	0	32	86
Lane Flow Rate	29	369	151	160
Geometry Grp	1	1	1	1
Degree of Util (X)	0.042	0.471	0.195	0.213
Departure Headway (Hd)	5.232	4.601	4.65	4.803
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	679	782	768	742
Service Time	3.306	2.646	2.704	2.86
HCM Lane V/C Ratio	0.043	0.472	0.197	0.216
HCM Control Delay	8.5	11.7	8.8	9.2
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.1	2.5	0.7	0.8