



Memorandum

To: Department of Transportation, Traffic & Parking, City of New Haven, CT

From: Kwesi Brown, PE, PTOE – SLR International Corporation (SLR)

Date: August 9, 2022

Subject: South Frontage Road Bike Lane Feasibility, New Haven, CT

SLR was tasked by the City of New Haven to evaluate the feasibility of introducing a dedicated bike lane on the segment of South Frontage Road from Howard Avenue/Howe Street to College Street in New Haven, CT. South Frontage Road is a one-way eastbound road which is characterized by three through travel lanes and turn lanes at intersections. The potential bike lane would be introduced within the existing roadway width (no widening) on South Frontage Road which would require eliminating one through travel lane resulting in two through lanes within the corridor.

For our analysis, the following signalized intersections were evaluated:

- South Frontage Road at Howard Avenue/Howe Street
- South Frontage Road at Park Street
- South Frontage Road at York Street
- South Frontage Road at College Street

Year 2020 traffic volumes for the study intersections were obtained from the Traffic Study prepared by Fuss & O'Neill for the 101 College Street development project. The existing 2020 traffic volumes were projected to year 2040 utilizing an annual growth rate of 0.5% over 20 years and including future site traffic from the 101 College Street and the Yale New Haven Hospital RCP development projects. Additionally, the City of New Haven provided SLR with a memorandum prepared by VHB (dated April 1, 2022) which evaluated the feasibility of converting York Street between Martin Luther King Jr Boulevard and South Frontage Road to two-way. The future 2040 traffic volumes were revised to account for this two-way conversion on York Street. The 2020 and 2040 traffic volumes are presented in Figures 1 through 3.

A number of existing and future (2040) traffic scenarios with and without a bike lane on South Frontage Road were analyzed including:

- Existing Conditions without a Bike Lane
- Existing Conditions with a Bike Lane
- 2040 Conditions with York Street One -Way and without a Bike Lane

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- 2040 Conditions with York Street Two -Way without a Bike Lane
- 2040 Conditions with York Street Two - Way and a Bike Lane

The existing Synchro network of the study area previously prepared by Fuss & O'Neill was provided by the city and updated by SLR accordingly for this bike lane feasibility study. It should be noted that traffic signal timings were optimized for the future 2040 conditions and exclusive pedestrian phasing was utilized. The results of the capacity analyses are presented in Tables 1a through 4b. The 2040 peak hour conditions with York Street Two-Way and a bike lane on South Frontage Road was determined to be the most critical scenario in determining the feasibility of introducing a bike lane on South Frontage Road.

Based on the results of the analysis presented in Tables 1a through 4b, the following intersections would operate at a poor level of service (LOS F) and exceed capacity (Volume to Capacity Ratio >1) under future 2040 conditions with the introduction of a bike lane on South Frontage Road:

- South Frontage Road at Howard Avenue/Howe Street during the PM Peak hour
- South Frontage Road at York Street during both AM and PM peak hours
- South Frontage Road at College Street during both AM and PM peak hours

Conclusion

SLR has evaluated the feasibility of introducing a bike lane on the segment of South Frontage Road from Howard Avenue to College Street. Three of the four intersections that were evaluated are expected to exceed capacity and fail (LOS F) under future 2040 peak hour conditions with the bike lane in place. Based on these results, it is our opinion that a bike lane on the South Frontage Road segment between Howard Avenue/Howe Street and College Street would not be feasible under future 2040 peak hour conditions.

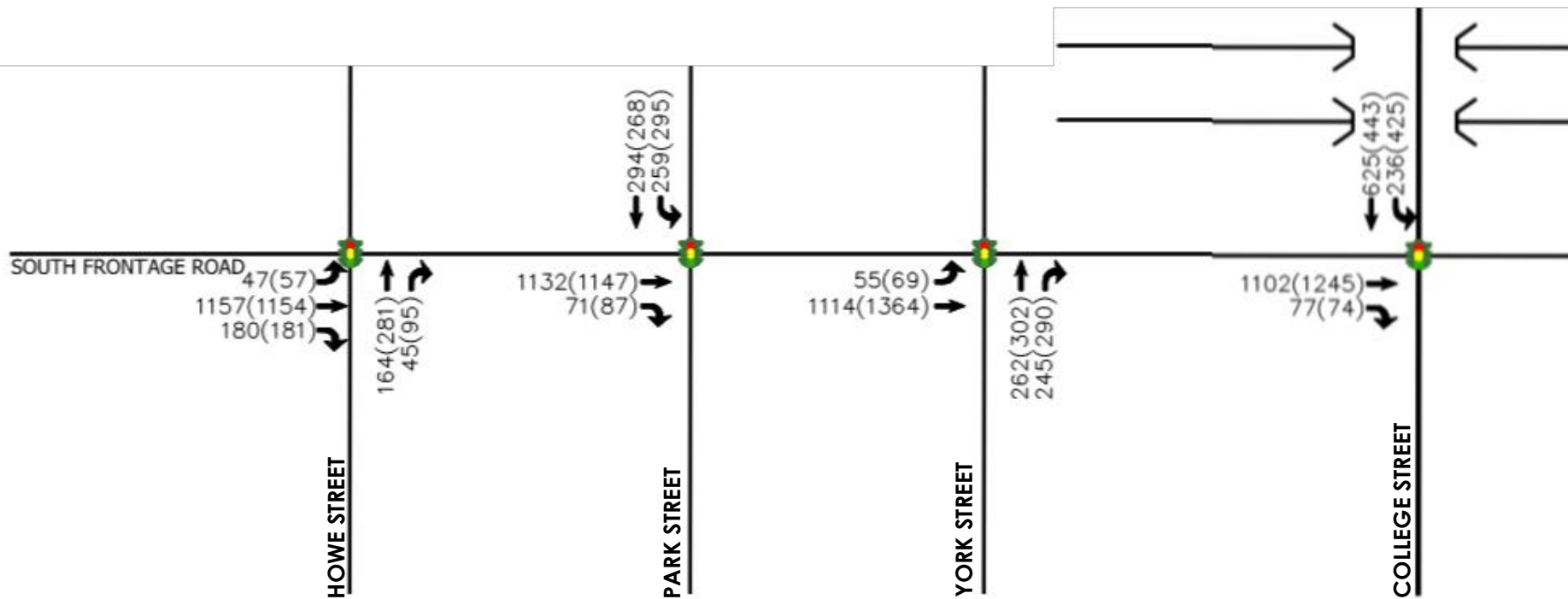
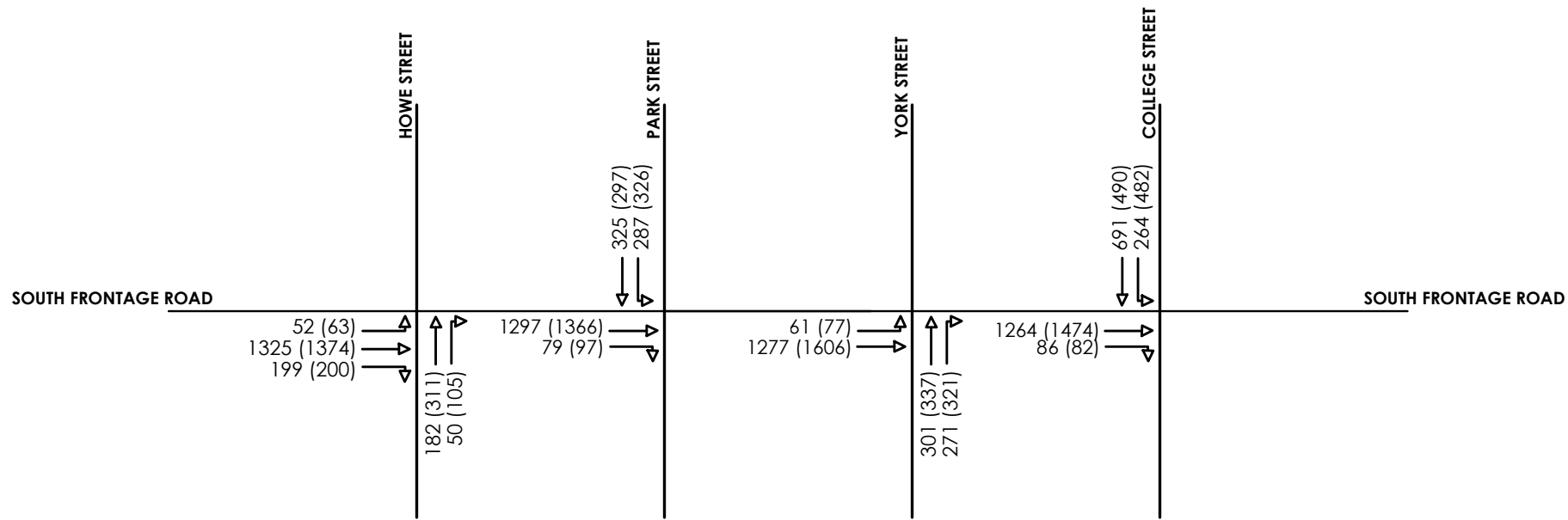


FIGURE 2: EXISTING 2020 VOLUMES
 PROJ. NO: 20140158.A40

EXISTING 2020 TRAFFIC VOLUMES

SOUTH FRONTAGE ROAD

FIG. 1



LEGEND:

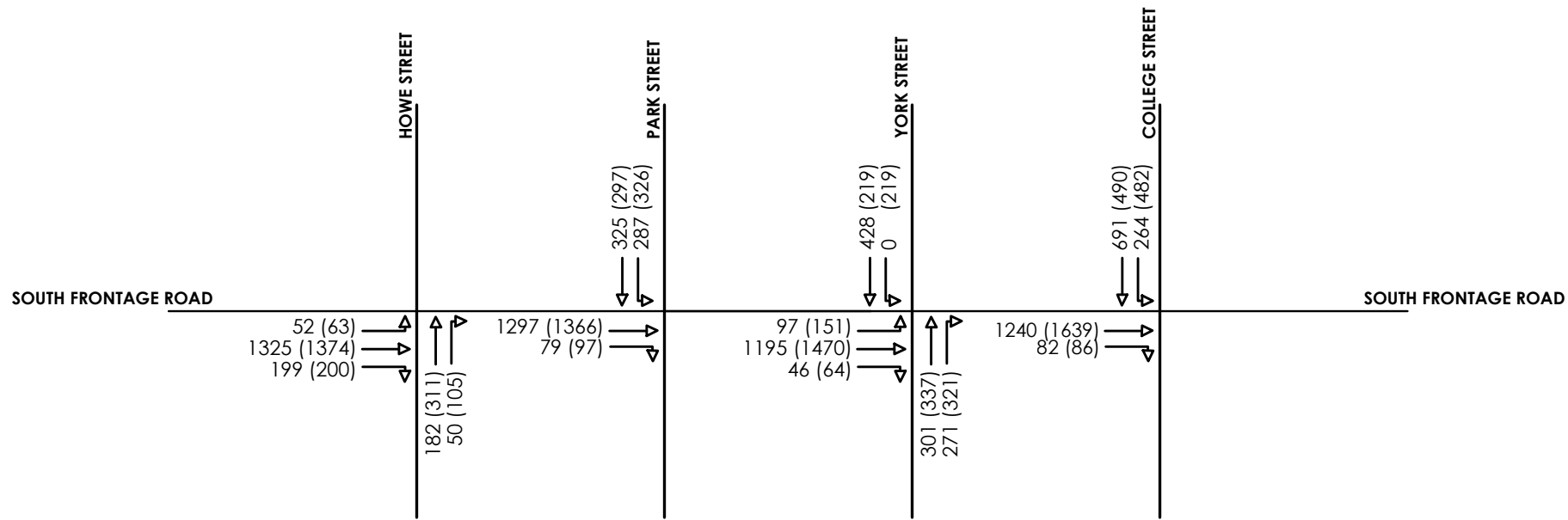
XX = WEEKDAY AM PEAK
 (XX) = WEEKDAY PM PEAK

NOT TO SCALE

2040 BACKGROUND TRAFFIC VOLUMES
 SOUTH FRONTAGE ROAD (ONE WAY YORK STREET) **

** SITE GENERATED TRAFFIC FROM THE 101 COLLEGE STREET AND YNHH RCP EXPANSION STUDIES ARE INCLUDED

FIG. 2



LEGEND:

XX = WEEKDAY AM PEAK
 (XX) = WEEKDAY PM PEAK

NOT TO SCALE

2040 BACKGROUND TRAFFIC VOLUMES
 SOUTH FRONTAGE ROAD (TWO WAY YORK STREET) **

** SITE GENERATED TRAFFIC FROM THE 101 COLLEGE STREET AND YNHH RCP EXPANSION STUDIES ARE INCLUDED

FIG. 3

Table 1a - South Frontage Road at Howard Avenue/Howe Street

Location/Approach	Weekday Morning (AM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	B	(15.4 sec.)	C	(22.4 sec.)	B	(16.8 sec.)	B	(16.8 sec.)	B	(16.8 sec.)	C	(29.7 sec.)
Northbound	C	(33.2 sec.)	C	(33.2 sec.)	C	(34.9 sec.)	C	(34.9 sec.)	C	(34.9 sec.)	D	(35.9 sec.)
Overall	B	(17.8 sec.)	C	(23.8 sec.)	B	(19.1 sec.)	B	(19.1 sec.)	B	(19.1 sec.)	C	(30.5 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	289'	12 vehs	597' *	24 vehs	350'	14 vehs	350'	14 vehs	350'	14 vehs	706'*	29 vehs
EB Storage	360'	14 vehs	360'	14 vehs	360'	14 vehs	360'	14 vehs	360'	14 vehs	360'	14 vehs
NB Queue	174'	7 vehs	174'	7 vehs	195'	8 vehs	195'	8 vehs	195'	8 vehs	201'	8 vehs
NB Storage	325'	13 vehs	325'	13 vehs	325'	13 vehs	325'	13 vehs	325'	13 vehs	325'	13 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.57		0.82		0.65		0.65		0.65		0.93	
Northbound	0.55		0.55		0.62		0.62		0.62		0.63	
Overall	0.48		0.63		0.55		0.55		0.55		0.72	

* = Queue may be longer than reported.

Table 1b - South Frontage Road at Howard Avenue/Howe Street

Location/Approach	Weekday Afternoon (PM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	B	(18.3 sec.)	C	(30.8 sec.)	C	(24.4 sec.)	C	(23.1 sec.)	C	(23.1 sec.)	F	(115.9 sec.)
Northbound	D	(54.5 sec.)	D	(54.5 sec.)	D	(47.3 sec.)	D	(54.2 sec.)	D	(54.2 sec.)	D	(42.8 sec.)
Overall	C	(26.0 sec.)	D	(35.9 sec.)	C	(29.0 sec.)	C	(29.4 sec.)	C	(29.4 sec.)	F	(101.1 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	305'	12 vehs	634'*	26 vehs	389'	16 vehs	465' *	19 vehs	465' *	19 vehs	783'*	32 vehs
EB Storage	360'	14 vehs	360'	14 vehs	360'	14 vehs	360'	14 vehs	360'	14 vehs	360'	14 vehs
NB Queue	409' *	17 vehs	409' *	17 vehs	470' *	19 vehs	422' *	17 vehs	422' *	17 vehs	495'*	20 vehs
NB Storage	325'	13 vehs	325'	13 vehs	325'	13 vehs	325'	13 vehs	325'	13 vehs	325'	13 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.63		0.92		0.80		0.78		0.78		1.19	
Northbound	0.90		0.90		0.88		0.92		0.92		0.85	
Overall	0.62		0.78		0.71		0.71		0.71		0.90	

Table 2a - South Frontage Road at Park Street												
Location/Approach	Weekday Morning (AM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	A	(6.6 sec.)	A	(8.7 sec.)	A	(8.2 sec.)	A	(0.8 sec.)	A	(1.8 sec.)	A	(6.2 sec.)
Southbound	E	(71.2 sec.)	E	(71.2 sec.)	E	(71.6 sec.)	D	(50.1 sec.)	C	(34.9 sec.)	C	(34.9 sec.)
Overall	C	(27.0 sec.)	C	(28.4 sec.)	C	(27.7 sec.)	B	(16.0 sec.)	B	(12.0 sec.)	B	(15.0 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	305'	13 vehs	471'	19 vehs	369'	15 vehs	6'	1 veh <	12'	1 veh	17'	1 veh
EB Storage	190'	7 vehs	190'	7 vehs	360'	14 vehs	360'	14 vehs	360'	14 vehs	190'	7 vehs
SB Queue	156'	7 vehs	156'	7 vehs	168'	7 vehs	165'	7 vehs	141'	6 vehs	141'	7 vehs
SB Storage	200'	8 vehs	200'	8 vehs	325'	13 vehs	325'	13 vehs	325'	13 vehs	200'	8 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.35		0.51		0.41		0.41		0.41		0.59	
Southbound	0.60		0.60		0.62		0.62		0.62		0.62	
Overall	0.42		0.55		0.48		0.48		0.48		0.63	

* = Queue may be longer than reported.

Table 2b - South Frontage Road at Park Street												
Location/Approach	Weekday Afternoon (PM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	A	(8.7 sec.)	B	(10.7 sec.)	B	(10.3 sec.)	A	(0.6 sec.)	A	(0.6 sec.)	A	(2.6 sec.)
Southbound	F	(80.3 sec.)	F	(81.2 sec.)	F	(83.3 sec.)	E	(57.3 sec.)	C	(34.2 sec.)	C	(34.2 sec.)
Overall	C	(31.1 sec.)	C	(32.8 sec.)	C	(32.1 sec.)	B	(17.5 sec.)	B	(10.6 sec.)	B	(12.0 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	323'	13 vehs	478'	17 vehs	397'	16 vehs	3'	1 veh <	3'	1 veh <	4'	1 veh <
EB Storage	190'	7 vehs	190'	7 vehs	190'	7 vehs	190'	7 vehs	190'	7 vehs	190'	7 vehs
SB Queue	163'	7 vehs	163'	7 vehs	178'	7 vehs	175'	7 vehs	153'	6 vehs	153'	6 vehs
SB Storage	200'	8 vehs	200'	8 vehs	200'	8 vehs	200'	8 vehs	200'	8 vehs	200'	8 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.38		0.54		0.46		0.46		0.46		0.66	
Southbound	0.60		0.62		0.63		0.63		0.63		0.63	
Overall	0.45		0.59		0.52		0.52		0.52		0.69	

Table 3a - South Frontage Road at York Street

Location/Approach	Weekday Morning (AM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	A	(7.1 sec.)	B	(10.7 sec.)	A	(6.6 sec.)	A	(7.4 sec.)	C	(33.4 sec.)	E	(72.2 sec.)
Northbound	C	(33.6 sec.)	C	(33.6 sec.)	D	(35.9 sec.)	D	(35.9 sec.)	C	(32.4 sec.)	C	(29.8 sec.)
Southbound	-		-		-		-		D	(49.7 sec.)	D	(41.6 sec.)
Overall	B	(15.1 sec.)	B	(17.6 sec.)	B	(15.4 sec.)	B	(15.9 sec.)	D	(36.2 sec.)	E	(56.2 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	55'	3 vehs	464' *	19 vehs	60'	3 vehs	83'	3 vehs	357' *	15 vehs	600' *	24 vehs
EB Storage	460'	18 vehs	460'	18 vehs	460'	18 vehs	460'	18 vehs	460'	18 vehs	460'	18 vehs
NB Queue	164'	7 vehs	164'	7 vehs	185' *	8 vehs	185' *	9 vehs	313' *	13 vehs	377' *	15 vehs
NB Storage	95'	4 vehs	95'	4 vehs	95'	4 vehs	95'	4 vehs	95'	4 vehs	95'	4 vehs
SB Queue	-		-		-		-		422' *	17 vehs	486' *	20 vehs
SB Storage	-		-		-		-		185'	7 vehs	185'	7 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.52		0.75		0.60		0.60		0.71		1.06	
Northbound	0.60		0.60		0.67		0.67		0.74		0.70	
Southbound	-		-		-		-		0.91		0.86	
Overall	0.46		0.59		0.52		0.52		0.66		0.81	

* = Queue may be longer than reported.

Table 3b - South Frontage Road at York Street

Location/Approach	Weekday Afternoon (PM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	A	(6.5 sec.)	B	(18.7 sec.)	A	(8.1 sec.)	B	(11.2 sec.)	F	(129.1 sec.)	F	(352.5 sec.)
Northbound	D	(40.2 sec.)	D	(40.2 sec.)	D	(45.3 sec.)	D	(45.3 sec.)	C	(21.0 sec.)	C	(21.8 sec.)
Southbound	-		-		-		-		F	(296.1 sec.)	F	(305.3 sec.)
Overall	B	(16.3 sec.)	C	(25.0 sec.)	B	(18.6 sec.)	C	(20.8 sec.)	F	(131.8 sec.)	F	(266.9 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	77'	3 vehs	646' *	26 vehs	429' *	19 vehs	453' *	18 vehs	520' *	21 vehs	912' *	37 vehs
EB Storage	460'	18 vehs	460'	18 vehs	460'	18 vehs	460'	18 vehs	460'	18 vehs	460'	18 vehs
NB Queue	232' *	10 vehs	232' *	10 vehs	269' *	10 vehs	269' *	9 vehs	385' *	16 vehs	391'	16 vehs
NB Storage	95'	4 vehs	95'	4 vehs	95'	4 vehs	95'	4 vehs	95'	4 vehs	95'	4 vehs
SB Queue	-		-		-		-		435' **	18 vehs **	437' **	18 vehs**
SB Storage	-		-		-		-		185'	7 vehs	185'	7 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.65		0.93		0.77		0.77		1.25		1.79	
Northbound	0.75		0.75		0.82		0.82		0.62		0.63	
Southbound	-		-		-		-		1.57		1.59	
Overall	0.57		0.74		0.66		0.66		1.20		1.40	

Table 4a - South Frontage Road at College Street

Location/Approach	Weekday Morning (AM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	B	(16.9 sec.)	E	(57.3 sec.)	C	(25.9 sec.)	C	(30.3 sec.)	B	(15.0 sec.)	F	(168.1 sec.)
Southbound	D	(38.8 sec.)	D	(36.8 sec.)	D	(36.1 sec.)	C	(31.5 sec.)	D	(35.1 sec.)	C	(29.7 sec.)
Overall	C	(25.9 sec.)	D	(48.9 sec.)	C	(30.0 sec.)	C	(30.8 sec.)	C	(23.2 sec.)	F	(111.6 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	378' *	16 vehs	686' *	28 vehs	469' *	19 vehs	448' *	18 vehs	400' *	16 vehs	588' *	24 vehs
EB Storage	810'	32 vehs	810'	32 vehs	810'	32 vehs	810'	32 vehs	810'	32 vehs	810'	32 vehs
SB Queue	186'	7 vehs	186'	7 vehs	217'	9 vehs	262' *	13 vehs	213' *	9 vehs	237' *	10 vehs
SB Storage	185'	7 vehs	185'	7 vehs	185'	7 vehs	185'	7 vehs	185'	7 vehs	185'	7 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.74		1.06		0.91		0.93		0.90		1.34	
Southbound	0.91		0.91		0.91		0.88		0.89		0.85	
Overall	0.67		0.84		0.76		0.76		0.75		0.93	

* = Queue may be longer than reported.

Table 4b - South Frontage Road at College Street

Location/Approach	Weekday Afternoon (PM) Peak Hour											
	2020 Conditions Existing Volumes		2020 Conditions Existing Volumes with Bike Lane		Background Condition 2040 with Site Traffic		Background Condition 2040 with Site Traffic (Optimized)		2040 Conditions Two-Way on York St (Optimized)		2040 Conditions Two-Way on York St & Bike Lane (Optimized)	
	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)	LOS	(Delay)
Eastbound	B	(10.8 sec.)	D	(43.8 sec.)	B	(16.1 sec.)	B	(12.9 sec.)	A	(8.9 sec.)	F	(195.3 sec.)
Southbound	C	(34.4 sec.)	C	(33.4 sec.)	C	(34.7 sec.)	C	(33.3 sec.)	D	(38.7 sec.)	D	(36.2 sec.)
Overall	C	(20.9 sec.)	D	(39.4 sec.)	C	(23.8 sec.)	C	(21.4 sec.)	C	(20.5 sec.)	F	(133.3 sec.)
95th Percentile Queue Lengths - (feet)												
EB Queue	394' *	16 vehs	698' *	28 vehs	526' *	21 vehs	434' *	18 vehs	430' *	18 vehs	117' *	5 vehs
EB Storage	810'	32 vehs	810'	32 vehs	810'	32 vehs	810'	32 vehs	810'	32 vehs	810'	32 vehs
SB Queue	155'	6 vehs	151'	6 vehs	169'	7 vehs	174' *	7 vehs	249' *	10 vehs	268' *	9 vehs
SB Storage	185'	7 vehs	185'	7 vehs	185'	7 vehs	185'	7 vehs	185'	7 vehs	185'	7 vehs
Vehicle to Capacity (v/c) Ratio												
Eastbound	0.73		1.05		0.88		0.86		0.96		1.40	
Southbound	0.80		0.80		0.85		0.87		0.87		0.84	
Overall	0.63		0.80		0.72		0.72		0.77		0.99	