

FRANCIS / ASSEMBLY INTERSECTION CONTROL EVALUATION REPORT

ASSEMBLY STREET AND FRANCIS AVENUE IN SPOKANE, WASHINGTON

Prepared for:

City of Spokane
Washington State Department of Transportation

For Submittal to:

City of Spokane
Washington State Department of Transportation



CivTech Inc.

12720 East Nora Avenue, Suite D
Spokane Valley, Washington 99216

Office: 509.236.0800
info@civtech.com



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CIVTECH PROJECT NO. 22-1640

INTRODUCTION

CivTech has been retained to prepare an Intersection Control Evaluation (ICE) at the intersections of Assembly Street & Francis Avenue, Driscoll Boulevard & Assembly Avenue in Spokane, Washington. The intersection location and vicinity map are shown in **Figure 1**. The evaluation was conducted based on the guidelines set in Chapter 1300.05(3) Intersection Control Evaluation (ICE) Section of the Washington State Department of Transportation (WSDOT) Design Manual M 22-01.22 (October 2023).

Figure 1 – Vicinity Map



CivTech prepared this document using the 5-step ICE screening process that was coordinated with WSDOT to evaluate the alternatives and determine the best possible intersection type and design for this specified area.

BACKGROUND & PROJECT NEEDS

EXISTING ROADWAY NETWORK

The roadway classifications were obtained from the WSDOT Functional Classification Map.

Assembly Street is a north/south principal arterial roadway to the south and a minor arterial roadway to the north. The roadway begins south where it converts from Northwest Boulevard and continues north until it terminates at Woodside Avenue. The speed limit is 30 miles per hour (MPH) within the vicinity of the project.

Francis Avenue/Nine Mile Road is an east/west principal arterial roadway. Francis Avenue/Nine Mile Road is also classified as State Route 291, which is a WSDOT facility. The roadway begins to the east where it converts from Bigelow Gulch Road and continues west where it extends beyond the City limits as State Route 291. The speed limit is 35 MPH within the vicinity of the project.

Driscoll Boulevard is an east/west minor arterial roadway. The roadway begins to east where it converts from Cochran Street and continues west until it terminates at Assembly Street. The speed limit is 30 MPH within the vicinity of the project.

Nine Mile Road & Francis Avenue (1) is a three-legged unsignalized intersection with stop control in the northbound approach. The northbound approach consists of a through lane and a dedicated right-turn lane. The eastbound approach consists of a through lane and a dedicated right-turn lane. The westbound approach consists of a through lane.

Francis Avenue & N. Assembly St (2) is a four-legged unsignalized intersection with stop control in the northbound and southbound approaches. The northbound approach consists of a dedicated right-turn lane. The southbound approach consists of a shared left/through/right-turn lane. The eastbound approach consists of an exclusive left-turn lane, a through lane and a shared through/right-turn lane. The westbound approach consists of an exclusive left-turn lane, a through lane and a dedicated right-turn lane.

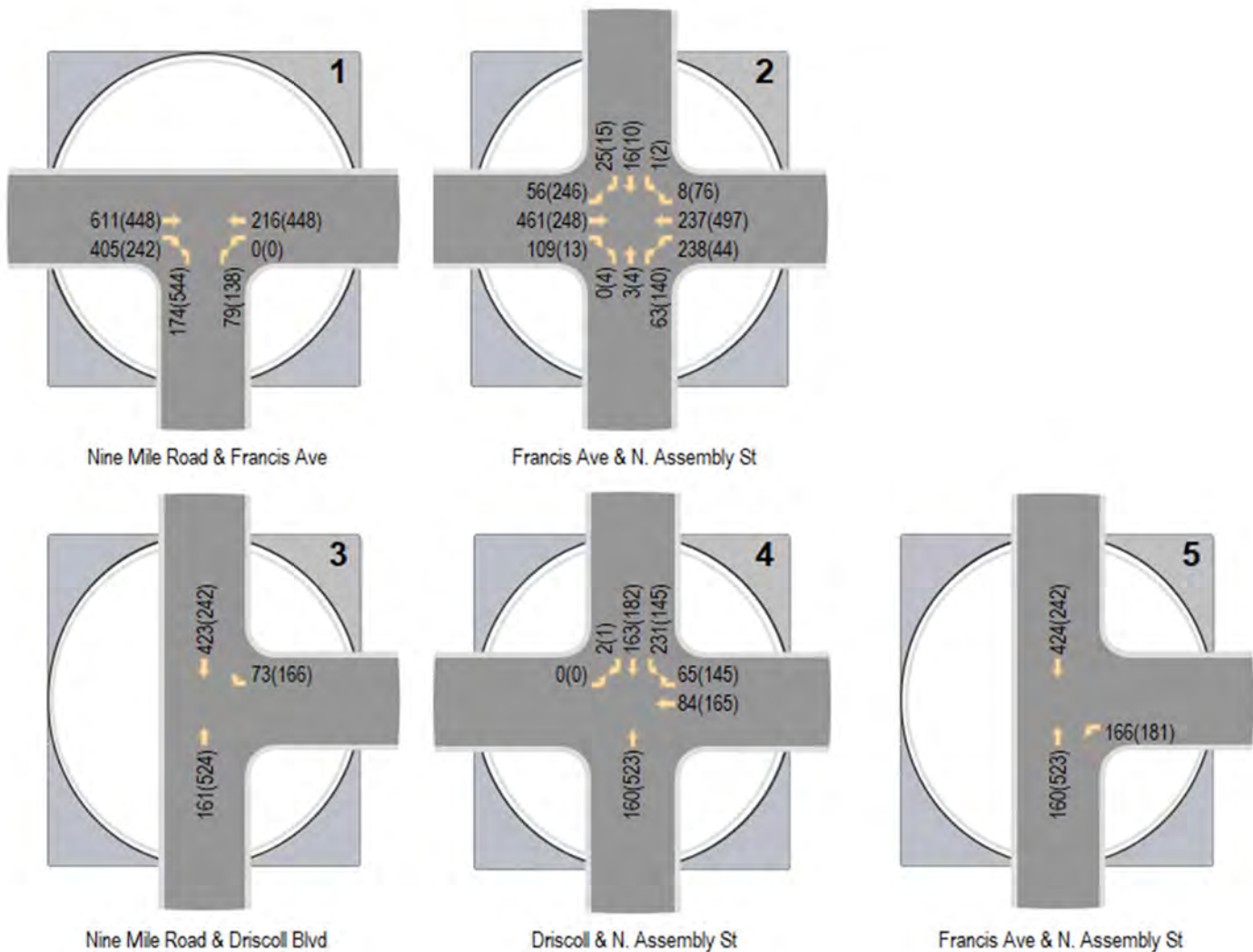
Nine Mile Road & Driscoll Boulevard (3) is a three-legged unsignalized intersection with stop control in the westbound approach. The northbound approach consists of two through lanes. The southbound approach consists of one through lane. The westbound approach consists of a dedicated right-turn lane.

Driscoll Boulevard & N. Assembly Street (4) is a three-legged unsignalized intersection with stop control in the southbound approach. The northbound approach consists of consists of a shared left/through/right-turn lane. The Southbound approach consists of a shared through/left-turn lane. The westbound approach consists of an exclusive left-turn lane and a through lane.

Nine Mile Road & N. Assembly Street (5) is a three-legged unsignalized intersection with stop control in the southbound approach. The southbound approach consists of one through lane. The northbound approach consists of one (1) through lane. The westbound approach consists of one exclusive left turn lane.

The existing peak hour volumes at these intersections are provided in **Figure 2**.

Figure 2 – Existing Peak Hour Volumes AM (PM)



PROJECT NEEDS

The evaluation spurred as the area is a funnel point for vehicles to get on and off from State Route 291 (Francis Avenue) and it currently experiences heavy delay during the peak hours due to the configuration among these three intersections, especially during the PM Peak Hour at the intersection of Nine Mile Road & Francis Avenue. This ICE document will review alternative options to help relieve the expected delay in the area.

INTERSECTION TRAFFIC CONTROL ALTERNATIVES

Alternative A – Assembly Street Connection.

Alternative A involves the connection of the Assembly Street roadway segment at Driscoll Boulevard. Assembly Street is re-aligned and connects with Assembly Street at Nine Mile/Francis Avenue. The Alternative A roadway network configuration is depicted in **Figure 3**.

Figure 3 – Alternative A Roadway Network



Alternative B – Two (2) signals on Francis, Driscoll Alignment Modification.

Alternative B includes the intersections of Assembly Street & Francis Avenue and Francis Avenue & Nine Mile Road to be signalized. This alternative will also remove the connector road from Assembly Street to Francis Avenue. The recommended roadway network configuration is depicted in **Figure 4**.

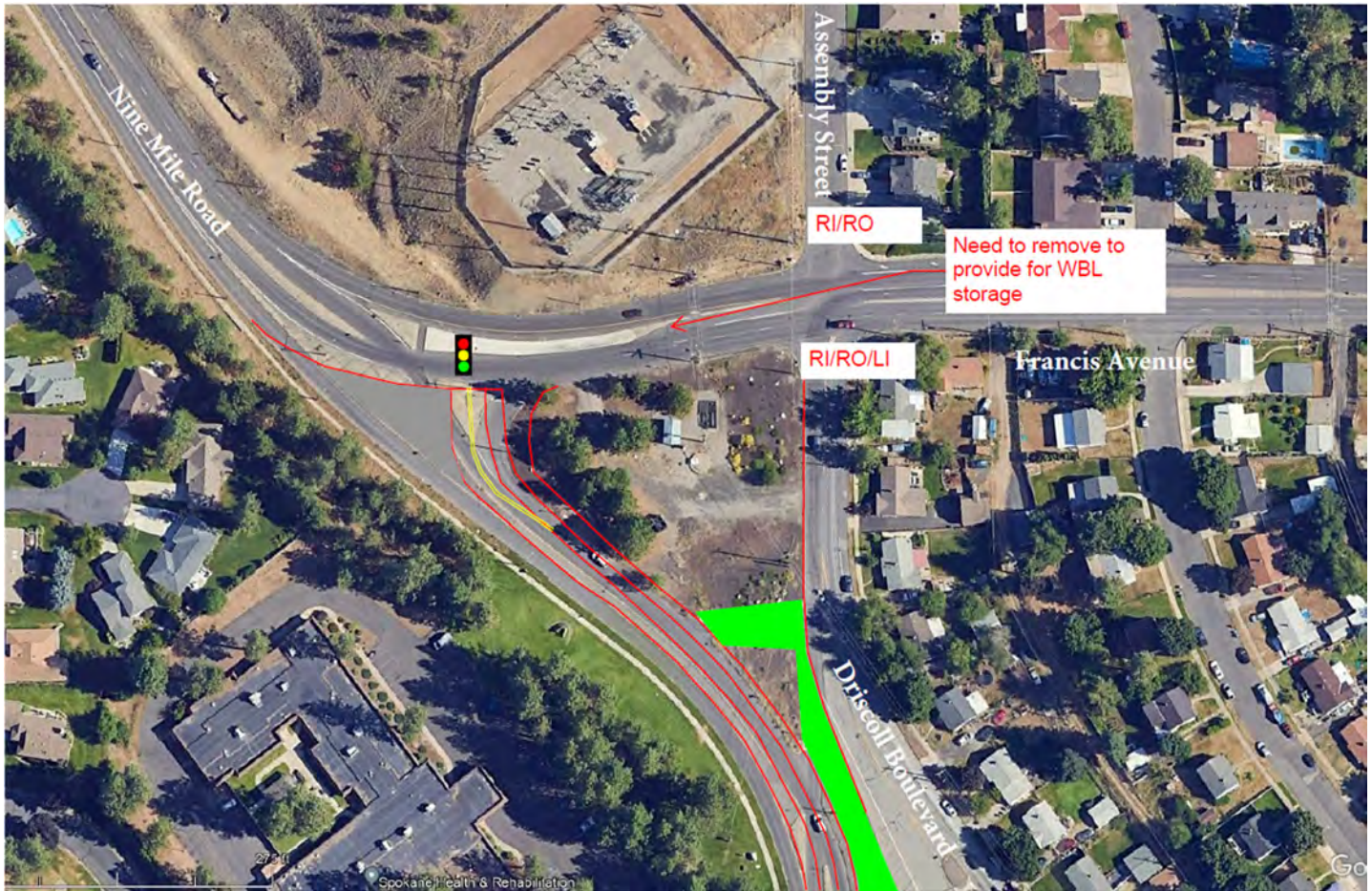
Figure 4 – Alternative B Roadway Network



Alternative C – 1 Signal on Francis, Driscoll modification with restrictions at Assembly.

Alternative C involves the intersection of Nine Mile Road & Francis Avenue to be signalized, the connector road from Assembly Street to Francis Avenue will be removed and the intersection of Assembly Street & Francis Avenue will have modifications to the northbound, southbound and eastbound approaches. The recommended roadway network configuration is depicted in **Figure 5**.

Figure 5 – Alternative C Roadway Network



Alternative D – Segment Termination (Assembly Street).

Alternative D involves the termination of the Assembly Street roadway segment before Driscoll Boulevard. Assembly Street south of Francis is then connected directly to Nine Mile Road. At the existing intersection of Assembly St and Francis Avenue, the northbound and southbound approach are to be restricted to right-in/right-out. The proposed intersection of Assembly Street and Nine Mile Road requires the modification of the median to provide a left turn lane. To support future regional growth, it is recommended that both Nine Mile Road and Assembly Street and Assembly Street and Driscoll Boulevard should be signalized. The recommended roadway network configuration is depicted in **Figure 6**.

Figure 6 – Alternative D Roadway Network



Alternative D – Roundabouts.

This alternative involves intersection 1 (Francis Ave & Nine Mile Road) and intersection 4 (Assembly Street & Driscoll Boulevard) being analyzed as roundabouts. The intersection of Francis Avenue & Assembly Street will remain as it is. The roundabout at Francis Avenue and Nine Mile Road includes dual circulating lanes for southbound and northbound, as well as a southbound slip lane and a westbound slip lane. These slip lanes are needed to accommodate the existing and projected traffic volumes and limits the ability for future capacity upgrades should development continue or increase at a faster rate than projected. The recommended roadway network configuration is depicted in **Figure 7**.

Figure 7 – Alternative Roundabout



FUTURE DEVELOPMENTS

Three (3) adjacent future developments PM Peak hour volumes were considered in the background analysis, Volkman, Seven Mile Addition, and Sundance Meadows. The location of each is shown in **Figure 8**. Volkman is proposed to include 825 single-family units and is anticipated to generate 660 total PM peak hour trips (416 in/244 out). Seven Mile Addition is a proposed 75-unit single family development anticipated to generate 79 total PM peak hour trips (49 in/30 out). Sundance Meadows is projected to include 475 single family units and is anticipated to generate 470 total PM peak hour trips (296 in/174 out). The trip generation summary for the developments is shown in **Table 1**.

Figure 8 – Background Developments

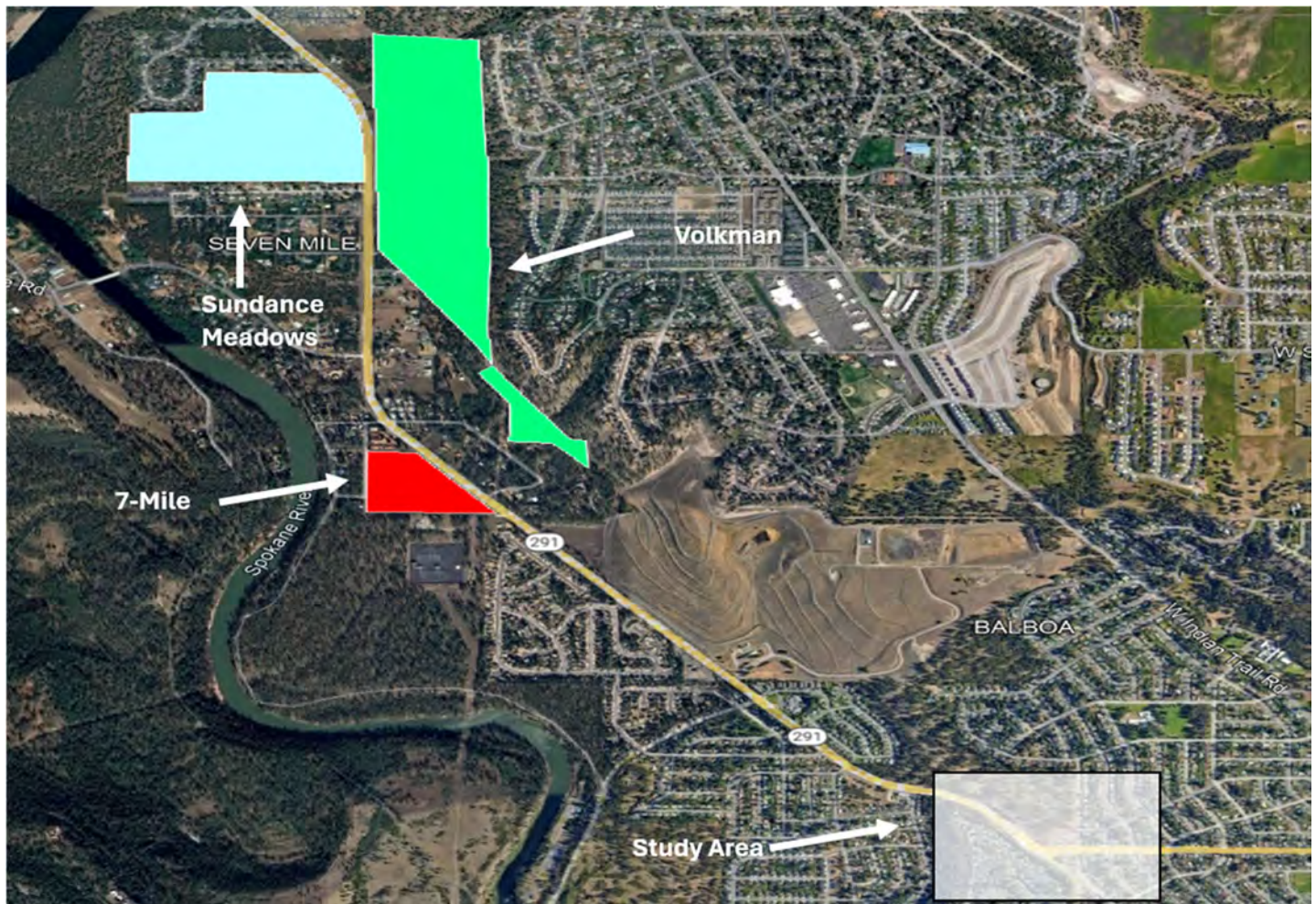


Table 1 – Trip Generation Summary

Land Use	ADT		AM Peak Hour				PM Peak Hour			
	Avg. Rate*	Total	Avg. Rate*	In	Out	Total	Avg. Rate*	In	Out	Total
Volkman [825 DU]	8.72	6,794	0.63	119	359	478	0.89	416	244	660
Seven Mile Addition [65 DU]	10.45	679	0.78	13	38	51	1.22	49	30	79
Sundance Meadows [475 DU]	11.55	5,486	0.74	88	264	352	0.99	296	174	470
Totals Trips		12,959		220	661	881		761	448	109

For all three (3) developments, 35 percent of traffic is anticipated to originate and terminate to the south of the intersection Nine Mile Road & Assembly Street, 15 percent of traffic is anticipated to originate and terminate to the southeast of the intersection Driscoll Boulevard & Francis Avenue, and 50 percent of traffic is anticipated to originate and terminate to the east of the intersection Assembly Street & Francis Avenue. The Background Volumes are presented in **Figure 9**. The trip distribution can be seen in **Figure 10**.

Figure 9 – Background Volumes

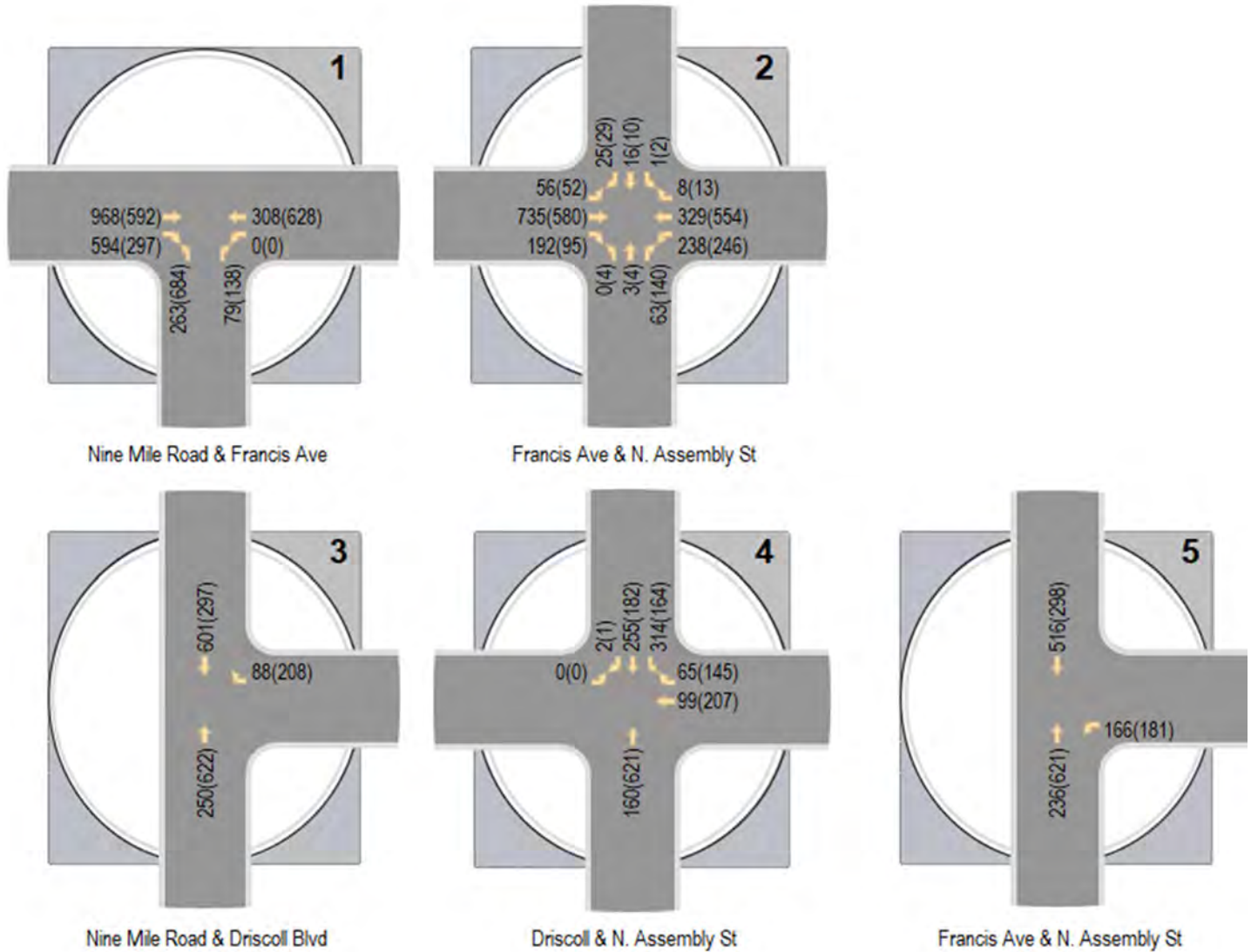


Figure 10 – Trip Distribution



OPERATIONAL & SAFETY PERFORMANCE ANALYSIS

As described previously, the operations of the intersections traffic controls were evaluated using the existing and background conditions. **Table 2** below shows the Levels of Service for the Existing Conditions scenario.

Table 2 – Existing Conditions LOS

ID	Intersection	Control [Cycle]	Approach/ Movement	Baseline AM(PM) Peak Hour Delays (sec/veh)
				Existing
1	Nine Mile Road & Francis Avenue	1-Way Stop (NB)	NB Left NB Right	42.2 E (280.0 F) 17.7 C (13.9 B)
2	Francis Avenue & N. Assembly St	2-Way Stop (NB/SB)	NB Right SB Shared EB Left WB Left	11.0 B (11.8 B) 51.4 F (38.7 E) 7.9 A (8.4 A) 10.1 B (10.0 A)
3	Nine Mil Road & Driscoll Boulevard	1-Way Stop (WB)	WB Right	10.2 B (15.4 C)
4	Driscoll Boulevard & N. Assembly Street	Yield (WB)	SB Left	8.3 A (8.4 A)
5	Nine Mile Road & N. Assembly Street	1-Way Stop (SB)	SB Thru	24.3 C (52.3 F)

The unsignalized intersection of **Nine Mile Road & Francis Avenue** in the existing scenario experiences a delay of 42.2 sec/veh (LOS E) and 280.0 sec/veh (LOS F) at the northbound left-turn movement during the AM and PM Peak Hour, respectively.

The unsignalized intersection of **Francis Avenue & N/ Assembly Street** in the existing scenario experiences a delay of 51.4 sec/veh (LOS F) and 38.7 sec/veh (LOS E) at the southbound shared movement during the AM and PM Peak Hour, respectively.

The unsignalized intersection of **Nine Mile Road & N. Assembly Street** in the existing scenario experiences a delay of 52.3 sec/veh (LOS F) at the southbound through movement during the PM Peak Hour. **Table 3** below shows the Background Scenario levels-of-service.

Table 3 – Background Scenario LOS

ID	Intersection	Control [Cycle]	Approach/ Movement	Baseline AM(PM) Peak Hour Delays (sec/veh)
				Background
1	Nine Mile Road & Francis Avenue	1-Way Stop (NB)	NB Left NB Right	490.2 F (717.7 F) 38.8 E (16.1 C)
2	Francis Avenue & N. Assembly St	2-Way Stop (NB/SB)	NB Right SB Shared EB Left WB Left	14.1 B (12.6 B) 13.6 B (94.8 F) 7.9 A (8.9 A) 10.8 B (10.7 B)
3	Nine Mil Road & Driscoll Boulevard	1-Way Stop (WB)	WB Right	13.4 B (20.4 C)
4	Driscoll Boulevard & N. Assembly Street	Yield (WB)	SB Left	8.7 A (8.6 A)
5	Nine Mile Road & N. Assembly Street	1-Way Stop (SB)	SB Thru	42.5 E (117.1 E)

With the inclusion of the surrounding development plus extrapolating the traffic volume to 2040, the unsignalized intersection of **Nine Mile Road & Francis Avenue** in the background scenario is expected to experience a delay of 490.2 F sec/veh (LOS E) and 717.7 sec/veh (LOS F) at the northbound left-turning movement, during the AM and PM Peak hour, respectively. The northbound right-turning movement is expected to experience a delay of 38.8 sec/veh (LOS E) during the AM Peak Hour.

The unsignalized intersection of **Francis Avenue & N. Assembly Street** in the background scenario is expected to experience a delay of 94.8 sec/veh (LOS F) at the southbound approach during the PM Peak Hour.

The unsignalized intersection of **Assembly Street & Driscoll Boulevard** is expected to experience a delay of 42.5 sec/veh (LOS E) and 117.1 sec/veh (LOS F) at the southbound through movement during the AM and PM Peak Hour, respectively.

TRAFFIC SIGNAL WARRANT ANALYSIS

CivTech utilized the 2024 Peak Hour traffic counts and ADT Volumes that were recorded by the City of Spokane in the signal warrant analysis below. The Peak Hour Traffic Counts were used to calculate a percentage to grow the City of Spokane 24-hour Traffic Counts.

As with the existing analysis, the traffic signal warrant analysis was accomplished in accordance with standard traffic signal warranting criteria found in the Manual on Uniform Traffic Control Devices, 2023 Edition (MUTCD). The MUTCD describes nine conditions under which a traffic signal might be warranted, designated Warrants 1 through 9. It indicates that, "The investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the nine traffic signal warrants and other factors related to existing operation and safety at the study location." It then cautions that, "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Warrant 1: Eight-Hour Vehicular Volume

The Eight-Hour Vehicular Volume Warrant is intended for locations where either of the following two conditions, or a combination of both, exist for each of any 8 hours of an average day and is, thus, the principle reason to consider the installation of a traffic signal: a large volume of intersecting traffic or traffic volumes so heavy on the major street that entering vehicles suffer extensive delay or conflict.

CONDITION A: MINIMUM VEHICULAR VOLUME

Condition A, the Minimum Vehicular Volume, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The need for a traffic control signal shall be considered if the vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 of the MUTCD (reproduced below) occur on the major-street and the higher-volume minor-street approaches, respectively, to the intersection for each of any 8 hours of an average day.

CONDITION B: INTERRUPTION OF CONTINUOUS TRAFFIC

Condition B, the Interruption of Continuous Traffic, is intended for application at locations where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street. The need for a traffic control signal shall be considered if the vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 of the MUTCD occur on the major-street and the higher-volume minor-street approaches, respectively, to the intersection for each of any 8 hours of an average day.

COMBINATION OF CONDITIONS A AND B

The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied *and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.* (Emphasis added. CivTech was not made aware by either agency of any specific operational concerns with this intersection; therefore, it will be assumed for purposes of this analysis that this “combination warrant” is not applicable.) The need for a traffic control signal shall be considered if the vehicles per hour given in both of the 80 percent columns of Conditions A and Condition B in Table 4C-1 of the MUTCD occur on the major-street and the higher-volume minor-street approaches, respectively, to the intersection for each of any 8 hours of an average day.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume									
Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
<u>Major Street</u>	<u>Minor Street</u>	<u>100%^a</u>	<u>80%^b</u>	<u>70%^c</u>	<u>56%^d</u>	<u>100%^a</u>	<u>80%^b</u>	<u>70%^c</u>	<u>56%^d</u>
1.....	1.....	500	400	350	280	150	120	105	84
2 or more...	1.....	600	480	420	336	150	120	105	84
2 or more...	2 or more ...	600	480	420	336	200	160	140	112
1.....	2 or more ...	500	400	350	280	200	160	140	112
Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
<u>Major Street</u>	<u>Minor Street</u>	<u>100%^a</u>	<u>80%^b</u>	<u>70%^c</u>	<u>56%^d</u>	<u>100%^a</u>	<u>80%^b</u>	<u>70%^c</u>	<u>56%^d</u>
1.....	1.....	750	600	525	420	75	60	53	42
2 or more...	1.....	900	720	630	504	75	60	53	42
2 or more...	2 or more ...	900	720	630	504	100	80	70	56
1.....	2 or more ...	750	600	525	420	100	80	70	56

^a Basic minimum hourly volume.

^b Used for combination of Conditions A and B after adequate trial of other remedial measures.

^c May be used when the major-street speed exceeds 70 km/h or exceeds 40 mph or in an isolated community with a population of less than 10,000.

^d May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 70 km/h or exceeds 40 mph or in an isolated community with a population of less than 10,000.

Excerpt from MUTCD page 438

For each of the above, if the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

Warrant 2: Four-Hour Vehicular Volume

The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 (this and all other referenced figures are attached) for the existing combination of approach lanes.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1. The posted speed limit on the roadways analyzed are below 40 mph; therefore, Figure 4C-1 was used for this analysis.

Warrant 3: Peak-Hour

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. It shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

- A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:
 - 1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and
 - 2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and
 - 3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.
- B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

(For this warrant, CivTech prefers the less data-intensive Category B.)

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to satisfy the criteria in the second category of the Standard. The posted speed limit on the roadways analyzed are below 40 mph; therefore, Figure 4C-3 was used for this analysis

Table 4 – Traffic Signal Analysis Summary Warrants 1 – 3

Intersection	Warrant 1				Warrant 2	Warrant 3
	Condition A	Condition B	Combination of A & B	Overall		
<i>Existing Year</i>						
Assembly Street & Driscoll Boulevard	No	No	No	No	No	No
Francis Avenue & Assembly Street	No	No	No	No	No	No
Francis Avenue & Nine Mile Road	Yes	Yes	Yes	Yes	Yes	Yes

Table 4 summarizes the volume-based warrant analysis results for the existing year volumes. The warranting criteria for Warrants 2 and 3 were automatically calculated using formulae, not determined by the plotting method described in the MUTCD. The formulae, which approximate the curves of the MUTCD, were published in the *2023 Indiana MUTCD Revisions 1 & 2 & 3*.

ANALYSIS

The results of the volumes-based traffic signal warrants indicate that the traffic volumes for the existing scenario for the intersections of **Assembly Street & Driscoll Boulevard** and **Francis Avenue & Assembly Street** do not meet the criteria to warrant for a traffic signal.

The results of the volumes-based traffic signal warrants indicate that the traffic volumes for the existing scenario for the intersections of **Francis Avenue & Nine Mile Road** does meet the criteria to warrant for a traffic signal.

Table 5 below shows the AM Peak Hour Background Scenario levels-of-service considering Alternatives A through D.

Table 5 – AM Peak Hour Background Alternatives A-D Level-of-Service

ID	Intersection	Control [Cycle]	Approach/ Movement	Alternative A	Alternative B	Alternative C	Alternative D
1	Nine Mile Road & Francis Avenue	1-Way Stop (NB)	NB Left NB Right	-	-	-	-
		Signal	NB Left NB Right NB Overall EB Thru WB Left WB Thru Overall	-	16.7 B 18.1 B 17.4 B 18.2 B 16.1 B 8.6 A 16.0 B	16.7 B 18.1 B 17.4 B 18.2 B 16.1 B 8.6 A 16.0 B	18.2 B 20.2 C 19.4 B 23.1 C 30.8 C 9.1 A 20.6 C
			NB SB WB Overall		6.9 A [0.246] 3.5 A [0.309] 1.4 A [0.206] 3.5 A [0.309]		
		Roundabout					
2	Francis Avenue & N. Assembly Street	2-Way Stop (NB/SB)	NB Right SB Right WB Left	-	-	-	12.2 B 16.1 C 10.2 B
		2-Way Stop (NB/SB)	NB Left NB Shared SB Right EB Left WB Left	-	-	247.3 F 9.3 A 9.5 A 7.9 A 8.6 A	-

Table 5 – AM Peak Hour Background Alternatives A-D Level-of-Service

ID	Intersection	Control [Cycle]	Approach/ Movement	Alternative A	Alternative B	Alternative C	Alternative D
		Signal [90 sec]	NB Left NB Right NB Overall SB Left SB Right SB Overall EB Left EB Thru EB Right EB Overall WB Left WB Thru WB Right WB Overall Overall	46.6 D 15.6 B 35.2 D 147.5 F 20.9 C 24.3 C 58.9 E 37.7 D 0.0 A 40.4 D 67.4 E 23.4 C 23.4 C 45.0 D 39.6 D	51.7 D 16.0 B 36.9 D 147.5 F 19.9 B 23.3 C 56.3 E 37.5 D 0.0 A 39.9 D 61.3 E 23.3 C 23.3 C 42.0 D 39.0 D	-	-
3	Nine Mile Road & Driscoll Boulevard	1-Way Stop (WB)	WB Right	-	-	-	8.9 A
4	Driscoll Boulevard & N. Assembly Street	1-Way Stop (WB)	SB Left WB Left WB Right	-	-	-	-
		Signal [90 sec]	NB Thru SB Left SB Thru SB Overall WB Left WB Right Overall	15.2 B 40.6 D 0.2 A 9.0 B 31.9 C 44.5 D 14.9 B	-	-	
		Signal [60 sec]	NB Thru NB Right NB Overall SB Left SB Thru SB Overall WB Left WB Right WB Overall Overall				9.2 A 0.0 A 9.2 A 15.6 B 3.4 A 6.6 A 50.4 D 0.0 A 50.4 D 8.9 A
		Roundabout	NB Shared SB Shared WB Shared Overall	6.3 A [0.25] 5.4 A [0.40] 6.1 A [0.3] 5.6 A [0.4]			
5	Nine Mile Road & N. Assembly Street	1-Way Stop (SB)	SB Thru	-	-	-	-

(1) Delay experienced by 10 assumed vehicles that do not currently exist

The signalized intersection of **Francis Avenue & N. Assembly Street** in the Alternative A scenario is expected to operate with a delay in the southbound, eastbound and westbound approach. The southbound left-turning movement experiences a delay of 147.5 sec/veh (LOS F) during the AM Peak Hour. The eastbound left-turning movement experiences a delay of 58.9 sec/veh (LOS E) during the AM Peak hour. The westbound left-turning movement experiences a delay of 67.4 sec/veh (LOS F) during the AM Peak Hour.

The signalized intersection of **Francis Avenue & N. Assembly Street** in the Alternative B scenario is expected to operate with a delay in the eastbound and westbound approach. The southbound left-turning movement experiences a delay of 147.5 sec/veh (LOS F) during the AM Peak Hour. The eastbound right-turning movement

experiences a delay of 56.3 sec/veh (LOS E) during the AM Peak hour. The westbound left-turning movement experiences a delay of 61.3 sec/veh (LOS E) during the AM Peak Hour.

The unsignalized intersection of **Francis Avenue & N. Assembly Street** in the Alternative C scenario is expected to operate with a delay in the northbound approach. The northbound left-turning movement is expected to operate with a delay of 247.3 sec/veh (LOS F) during the AM Peak Hour.

Table 6 below shows the PM Peak Hour Background Scenario levels-of-service considering Alternatives A through D.

Table 6 – PM Peak Hour Background Alternatives A-D Level-of-Service

ID	Intersection	Control [Cycle]	Approach / Movement	Alternative A	Alternative B	Alternative C	Alternative D
1	Nine Mile Road & Francis Avenue	1-Way Stop (NB)	NB Left NB Right	-	-	-	-
		Signal	NB Left NB Right NB Overall EB Thru WB Left WB Thru Overall	-	(29.8 C) (48.8 D) (39.4 D) (18.1 B) (12.8 B) (10.9 A) (23.7 C)	(29.8 C) (48.8 D) (39.4 D) (18.1 B) (12.8 B) (10.9 A) (23.7 C)	(25.0 C) (44.6 D) (34.9 D) (20.9 C) (35.4 D) (18.6 B) (27.3 C)
		Roundabout	NB SB WB Overall	(19.2 C [0.73]) (3.2 A [0.271]) (2.6 A [0.361]) (8.7 A [0.730])			
2	Francis Avenue & N. Assembly Street	2-Way Stop (NB/SB)	NB Right SB Right WB Left	-	-	-	12.1 B 28.7 C 10.1 A
		2-Way Stop (NB/SB)	NB Left NB Shared SB Right EB Left WB Left	-	-	(2,351.5 F) (10.6 B) (11.3 B) (9.2 A) (8.9 A)	-
		Signal [90 sec]	NB Left NB Right NB Overall SB Left SB Right SB Overall EB Left EB Thru EB Right EB Overall WB Left WB Thru WB Right WB Overall Overall	(43.5 D) (19.2 B) (37.0 D) (122.5 F) (35.9 D) (39.8 D) (38.1 D) (49.4 D) (0.0 A) (48.2 D) (61.0 E) (43.8 D) (43.4 D) (48.5 D) (43.3 D)	(52.5 D) (19.9 C) (42.3 C) (122.5 F) (30.5 C) (34.4 C) (38.4 D) (46.5 D) (0.0 A) (45.7 D) (58.8 E) (42.4 D) (42.1 D) (46.9 D) (44.5 D)	- <	

Table 6 – PM Peak Hour Background Alternatives A-D Level-of-Service

ID	Intersection	Control [Cycle]	Approach/ Movement	Alternative A	Alternative B	Alternative C	Alternative D
		Signal [90 sec]	NB Thru SB Left SB Thru SB Overall WB Left WB Right Overall	(24.0 C) (35.7 C) (0.2 A) (9.2 A) (22.7 C) (51.0 D) (23.6 C)	-	-	
		Signal [60 sec]	NB Thru NB Right NB Overall SB Left SB Thru SB Overall WB Left WB Right WB Overall Overall				(7.5 A) (0.0 A) (7.5 A) (6.3 A) (2.0 A) (3.1 A) (52.5 D) (0.0 A) (52.5 D) (5.7 A)
		Roundabout	NB Shared SB Shared WB Shared Overall	(9.1 A [0.75]) (5.5 A [0.30]) (20.8 C [0.82]) (10.1 B [0.82])			
5	Nine Mile Road & N. Assembly Street	1-Way Stop (SB)	SB Thru	-	-	-	-

(1) Delay experienced by 10 assumed vehicles that do not currently exist

The signalized intersection of **Francis Avenue & N. Assembly Street** in the Alternative A scenario is expected to operate with delays in the southbound and westbound approach. The southbound left-turning movement is expected to operate with a delay of 122.5 sec/veh (LOS F) during the PM Peak Hour. The westbound left-turning movement is expected to operate with a delay of 61.0 sec/veh (LOS E) during the PM Peak Hour.

The signalized intersection of **Francis Avenue & N. Assembly Street** in the Alternative B scenario is expected to operate with delays in the southbound and westbound approach. The southbound left-turning movement is expected to operate with a delay of 122.5 sec/veh (LOS F) during the PM Peak Hour. The westbound left-turning movement is expected to operate with a delay of 61.0 sec/veh (LOS E) during the PM Peak Hour.

The unsignalized intersection **Francis Avenue & N. Assembly Street** in the Alternative C scenario is expected to operate with a delay in the northbound left-turning movement of 2,351.5 sec/veh (LOS F) during the PM Peak Hour.

The signalized intersection **Nine Mile Road & Francis Avenue** in the Alternative D scenario is expected to operate with a delay in the northbound right-turning movement of 56.2 sec/veh (LOS F) during the PM Peak Hour.

The overall Levels of Service tables above show that Alternative D will provide the least amount of delay at the study intersections while providing the most access to existing (and future) residents. Based on LOS and operational characteristics, Alternative D will be used moving forward for the remainder of the analysis and ICE document.

FEASIBILITY

Alternative D was reviewed based on factors and other specific site issues in accordance with Chapter 1300 of the WSDOT Design Manual. **Table 7** will summarize the comparison of Alternative D when looking at a signal or roundabout configuration.

Table 7 – Alternative Feasibility Comparison

Factor	Traffic Signal System	Roundabout System
Least Right-of-way Impacts	Best	Good
Least Design Constraints	Best	Good
Best Multimodal Accommodation	Good	Best
Best Safety Benefit	Best	Good
Lowest Maintenance/Operations	Good	Best
Easiest Implementation/Constructability	Best	Good
Lowest Initial Cost	Good	Best

The term “Best” is given to the intersection type that performs better between the roundabout and the traffic signal system. For example, the traffic signal system will require less right-of-way, therefore it is labeled as “Best” while the roundabout system is labeled as “Good”. Similarly, the traffic signal system has the least design constraints, with regards to vertical and horizontal geometrics, when compared to the roundabout system. Another example is the maintenance and operations of the intersection type, in which the roundabout provides the “Best” overall performance when compared to the traffic signal, which was labeled as “Good”.

Both the traffic signal system and roundabout system are feasible alternatives at this location. Because the existing intersections are all stop controlled intersections, the roundabout system didn't have as favorable crash reduction as expected when compared to the traffic signal system. Overall, the traffic signal system shows slightly better results than the roundabout system.

IMPROVEMENT COSTS

The costs for installing the traffic signal system or the roundabout system of Alternative D are summarized in **Table 8**.

With the alternative scenarios that involve a traffic signal to be implemented, it is recommended that advanced warning signs/beacons be added to alert drivers of upcoming traffic signals and the traffic signal timing change, which would enhance roadway safety and help reduce the likelihood of accidents. The advanced warning signs/beacons are also recommended due to the vertical profile of Francis Avenue and the horizontal curve that is present at the intersection of Francis Avenue and Nine-Mile Road. These advanced warning signs/beacons would be tied to the traffic signal timing, via fiber, and will alert drivers of the upcoming need to stop at a red indicator.

TABLE 8– Project Costs using Alternative D

Severity	Traffic Signal System	Roundabout System
Preliminary Engineering	\$699,892	\$885,084
Construction	\$8,048,763	\$8,093,089
Total Intersection Cost	\$8,748,655	\$8,978,173
2025 engineers' estimate of probable costs		

The improvement costs noted in **Table 8** are for the total project costs, including improvements to the City of Spokane System and the WSDOT system. Further breakdown of costs by City versus WSDOT system are summarized in Table 9.

TABLE 9– Project Costs using Alternative D by Agency

Activity	Traffic Signal System		Roundabout System	
	City	WSDOT	City	WSDOT
Preliminary Engineering	\$307,467	\$392,425	\$304,510	\$580,574
Construction	\$3,535,867	\$4,512,896	\$2,751,807	\$5,341,282
Total Intersection Cost	\$3,843,334	\$4,905,321	\$3,056,317	\$5,921,856

2025 engineers' estimate of probable costs

SAFETY PERFORMANCE ANALYSIS

Crash Analysis

Crash data for the Study Area was obtained from the City of Spokane for the past six (6) years. In total, there have been 38 incidents within the Study Area since the beginning of 2018. The summary of intersection crash data is presented in **Table 10**.

TABLE 10 – 2018-2023 INTERSECTION CRASH DATA SUMMARY

ID	Intersection	Total Incidents	Incidents in each Category																
			2018	2019	2020	2021	2022	2023	Injury	Fatality	Single Vehicle	Left Turn	Rear End	Head On	Sideswipe	Angle	DUI	Pedestrian	Bicycle
1	Nine Mile Road & Francis Avenue	8	2	1	2	2	1	0	3	0	0	2	0	0	0	6	0	0	0
3	Francis Avenue & N. Assembly Street	26	3	6	6	5	5	1	14	0	4	1	0	0	0	21	0	0	0
4	Driscoll Boulevard & N. Assembly Street	4	0	0	1	1	1	1	4	0	0	3	0	0	0	1	0	0	0

Table 10 shows that the intersection that had the most accidents occurred at the **Francis Avenue & N. Assembly Street** intersection. This intersection is currently restricted on the northbound approach to allow right-outs only. This intersection had 26 crashes throughout six (6) years while 21 of the 26 crashes (80%) were angle related. There have been no fatalities in the study area.

Of the eight (8) crashes at the intersection of **Nine Mile Road & Francis Avenue**, five (5) crashes had been listed as 'No Apparent Injury', two (2) crashes had been listed as a 'Possible Injury' and one (1) crash had been listed as 'Suspected Serious Injury'.

Of the twenty-six (26) crashes at the intersection of **Francis Avenue & N. Assembly Street**, eleven (11) crashes had been listed as 'No Apparent Injury', eight (8) crashes had a 'Possible Injury' and seven (7) crashes had been listed as 'Suspected Minor Injury'.

Of the four (4) crashes at the intersection of **Driscoll Boulevard & N. Assembly Street**, all crashes had been listed as 'Possible Injury'.

When calculating the crash rate for each intersection listed above, the intersection crash rates for all three have a rate less than 1 crash per million entering vehicles. This signifies that there are no abnormal circumstances occurring within these intersections. **Table 11** indicates the existing intersection crash rate per million entering vehicles.

Table 11 – Existing Intersection Crash Rates

Factor	Crash Rate per Million Entering Vehicles
Francis Avenue & Nine Mile Road	0.177
Francis Avenue & N. Assembly Street	0.384
Assembly Street & Driscoll Boulevard	0.258

The modifications that are presented also provide us with further Crash Modification Factors (CMF) and Crash Reduction Factors (CRF). **Table 12** represents the CRF's and CMF's for the modifications that were considered in this analysis.

Table 12 – Crash Reduction/Modification Factors

Configuration Type	CMF (CRF) [ID #]
Install a Traffic Signal w/Lefts	0.541 (45.9%)[7966]
Intersection to Roundabout	0.623 (37.7%)[10082]
Install Right-in-Right-out operations at Stop-Controlled Intersections	0.55 (45%)[9821]

Applying the crash modification factors from **Table 12** to the intersections listed in **Table 11** generates the potential crash rate reductions, shown in **Table 13**, at each intersection based on the installation of a traffic signal or a roundabout system of traffic control devices.

Table 13 – Updated Intersection Crash Rates

Factor	Crash Rate per Million (Traffic Signal w/Lefts)	Crash Rate per Million (Roundabout)
Francis Avenue & Nine Mile Road	0.110	0.096
Francis Avenue & N. Assembly Street	0.211	-
Assembly Street & Driscoll Boulevard	0.161	0.139

Based on the crash data provided, we can estimate the number of crashes each intersection will approximately decrease with the updated configuration based on Alternative D. These are summarized in **Table 14**.

Table 14 – Estimated Decrease in Crashes by System

Severity	Traffic Signal System	Roundabout System
K – Fatal Injury	0	0
A – Suspected Serious Injury	0.46	0.38
B – Suspected Minor Injury	3.67	3.02
C – Possible Injury	6.43	5.28
O – No Apparent Injury	7.34	6.03
Decrease in crashes Rounded to nearest whole #	17.9	14.7

The Study Area will experience a total decrease in crashes of approximately 17 crashes with the configuration signalized system of Alternative D and 14 crashes with the roundabout configuration.

Focusing only on the WSDOT system (Francis Avenue), the estimated decrease in crashes by system is summarized in **Table 15**.

Table 15 – Estimated Decrease in Crashes by System – WSDOT Only

Severity	Traffic Signal System	Roundabout System
K – Fatal Injury	0	0
A – Suspected Serious Injury	0.46	0.38
B – Suspected Minor Injury	3.67	3.02
C – Possible Injury	4.59	3.77
O – No Apparent Injury	7.34	6.03
Decrease in crashes Rounded to nearest whole #	16.1	13.2

The WSDOT system (Francis Avenue) will experience a total decrease in crashes of approximately 16 crashes with the configuration signalized system of Alternative D and 13 crashes with the roundabout configuration.

Benefit Cost Evaluation

Estimating the cost of crashes will be done to justify if the configuration will positively impact in an economic way. The Federal Highway Administration Safety Program: *Crash Costs for Highway Safety Analysis* (January 2018) document provides a national unit cost for each severity of crash, which is presented in **Table 16**.

Table 16 – Comprehensive Unit Cost (2016 dollars)

Severity	Crash Unit Cost
K – Fatal Injury	\$11,295,400
A – Suspected Serious Injury	\$655,000
B – Suspected Minor Injury	\$198,500
C – Possible Injury	\$125,600
O – No Apparent Injury	\$11,900

Using the crash cost unit from the table above and the crash data from **Table 10**, the estimated cost that must be spent on intersection improvements can be calculated. Using the total estimated cost and our updated crash modification rates, the amount of money that will be saved from using the intersection configurations from Alternative D can be calculated. This information can be seen in **Table 17**.

Table 17 – Intersection Crash Cost per Severity & Cost Benefit

Severity	Traffic Signal System		Roundabout System	
	Crash Cost	Crash Benefit	Crash Cost	Crash Benefit
K – Fatal Injury	\$0	\$0	\$0	\$0
A – Suspected Serious Injury	\$655,000	\$300,645	\$655,000	\$245,935
B – Suspected Minor Injury	\$1,588,000	\$728,892	\$1,588,000	\$598,676
C – Possible Injury	\$1,758,400	\$807,106	\$1,758,400	\$662,917
O – No Apparent Injury	\$190,400	\$87,394	\$190,400	\$71,781
Totals	\$4,191,800	\$1,924,036	\$4,191,800	\$1,580,309

Alternative D (signalized system) will provide the study area with a benefit of reducing crashes equal to approximately \$1,924,036, based on historic crash trends, exceeding the crash benefit of the roundabout system. Calculation Worksheets for the cost benefit analysis can be found in **Attachment D**.

Alternative D (roundabout system) will provide the study area with a benefit of reducing crashes equal to approximately \$1,580,309, based on historic crash trends. Calculation Worksheets for the cost benefit analysis can be found in **Attachment D**.

Focusing on the WSDOT system (Francis Avenue only), the intersection crash costs and benefits are summarized in **Table 18**.

Table 18 – Intersection Crash Cost per Severity & Cost Benefit

Severity	Traffic Signal System		Roundabout System	
	Crash Cost	Crash Benefit	Crash Cost	Crash Benefit
K – Fatal Injury	\$0	\$0	\$0	\$0
A – Suspected Serious Injury	\$655,000	\$300,645	\$655,000	\$245,935
B – Suspected Minor Injury	\$1,588,000	\$728,892	\$1,588,000	\$598,676
C – Possible Injury	\$1,256,000	\$576,504	\$1,256,000	\$473,512
O – No Apparent Injury	\$190,400	\$87,394	\$190,400	\$71,781
Totals	\$3,689,400	\$1,693,435	\$3,689,400	\$1,390,904

Alternative D (signalized system) just along Francis Avenue will provide the study area with a benefit of reducing crashes equal to approximately \$1,693,435, based on historic crash trends, exceeding the crash benefit of the roundabout system. Calculation Worksheets for the cost benefit analysis can be found in **Attachment D**.

Alternative D (roundabout system) just along Francis Avenue will provide the study area with a benefit of reducing crashes equal to approximately \$1,390,904, based on historic crash trends. Calculation Worksheets for the cost benefit analysis can be found in **Attachment D**.

The project benefit to cost can then be calculated for each system, using FHWA guidance. The Benefit to Cost Ratio (BCR) for the traffic signal system and the roundabout system are summarized in **Table 19**.

Table 19 – Project Benefit to Cost Ratio

Severity	Traffic Signal System	Roundabout System
System Costs (C)	\$8,748,655	\$8,978,173
System Crash Benefits	\$1,924,036	\$1,580,309
Worth of Benefits (WB)	\$23,049,954	\$18,932,097
Net Benefits (WB – C)	\$14,301,298	\$9,953,924
Benefit to Cost Ratio (NB/C)	2.63	2.11

Worth of Benefits calculated using FHWA criteria

As noted in **Table 19**, the traffic signal system BCR is 2.63 while the roundabout system BCR is 2.11. The traffic signal system has a higher BCR, meaning that there is more benefit from the traffic signal system when compared to the roundabout system.

Focusing on the WSDOT system (Francis Avenue only), the BCR for the traffic signal system and the roundabout system are summarized in **Table 20**.

Table 20 – Project Benefit to Cost Ratio

Severity	Traffic Signal System	Roundabout System
System Costs (C)	\$4,905,322	\$5,921,856
System Crash Benefits	\$1,693,435	\$1,390,904
Worth of Benefits (WB)	\$20,287,347	\$16,663,028
Net Benefits (WB – C)	\$15,382,025	\$10,741,171
Benefit to Cost Ratio (NB/C)	4.14	2.81

Worth of Benefits calculated using FHWA criteria

As noted in **Table 20**, the traffic signal system along Francis Avenue only has a BCR of 4.14 while the roundabout system BCR is 2.81. The traffic signal system has a higher BCR, meaning that there is more benefit from the traffic signal system when compared to the roundabout system.

ALTERNATIVES EVALUATION

The roundabout layout will require additional right-of-way along Assembly Street, specifically at the southernmost roundabout, to install the functional system when compared to the traffic signal system. In addition, the roundabout system will require impacts to the Avista property to the north to install the needed westbound bypass lane and sidewalk, including the need for a wall to contain the steep property slope. Shifting Francis Avenue to the south is not possible without significant utility costs, therefore the layout as noted herein requires walls to be installed with the roundabout layout whereas the traffic signal layout does not require additional walls.

The roundabout option limits the availability to expand in the future. The current layout requires dual circulating lanes in addition to bypass lanes (westbound and southbound). There are currently no three-lane circulating laned roundabouts in Washington – therefore it can be assumed no additional circulating lanes will be added in the future. The only capacity increasing item that can be added to the roundabout intersection is an approach meter, in the southbound-to-eastbound direction. On the other hand, the traffic signal layout offers additional capacity by adding a separate northbound right-turn lane, and the traffic signal timing can be modified to allow overlap phasing on the northbound right-turn movement in the future.

The installation of a traffic signal on Francis Avenue will allow additional coordination of traffic volume on Francis Avenue, offering the ability to create gaps for side street and driveway access while keeping the Francis Avenue corridor in coordination – ensuring platoons of cars can traverse the corridor with limited stops. Similarly, the traffic signal system will allow for the same driveway and side street gaps on Assembly Street through implementation of a coordination traffic signal timing plan. The roundabout system will not create gaps, instead it will lessen available gaps as traffic is continuously moving through the roundabout, thereby spacing

Table 21 – Alternative D Feasibility Comparison

Factor	Pros	Cons
Roundabout	• Best multimodal accommodation – slower traffic through intersection and larger pathways provided • Lower overall maintenance costs	• More right-of-way impacts • More design constraints for speeds and vertical/horizontal deflection • Construction phasing and implementation challenges • Expandability in the future is limited (dual lanes recommended) • More expensive to construct than traffic signals
Traffic Signal	• Least right-of-way impacts • Least design constraints • Better safety benefits than roundabout (due to dual lane roundabout comparison) • Easiest to implement and construct • Can be expanded to accommodate additional development traffic in the future • Less expensive to construct than roundabouts	• Higher maintenance and operations costs (with ITS advanced warning) • Pedestrians have more conflict points than with a roundabout

In general, the construction costs are lower for the traffic signal option as the construction phasing will be less intensive due to the existing configuration. The roundabout option does require additional right-of-way and will require walls on the north side to accommodate pedestrian facilities.

The implementation of traffic signals also allows for the Francis Avenue corridor to be timed and synchronized to promote platooning through coordinated signal timing. This platooning will aid existing driveways and minor cross streets with access to and from Francis Avenue. Similarly, Assembly Street traffic signals can be coordinated allowing for gaps in the system for driveway and minor street access.

The signalized system identified within this analysis includes ITS devices along Francis Avenue for advanced warning of traffic signal timing changes. These devices are recommended due to the vertical curve just east of the subject site as well as the horizontal curve just west of the subject site. The intent of the devices is to alert drivers of changes about to happen and allow enough distance and time for driver reaction to the traffic signal phase changes. In addition, traffic count stations/loops can be added and provide real time information to the City and WSDOT through ITS connections into the regional system.

SELECTION

After carefully evaluating all available alternatives, CivTech recommends implementing **Alternative D with the traffic signals** for this Study Area. This configuration minimizes delays during the AM and PM Peak hour, offers safer vehicle routes and is expected to reduce crash incidents in the area, and can be expanded should development activities increase beyond what is projected.

Attachments (4)

- A. Synchro Reports
- B. Alternative D design
- C. Crash Data & Crash Rates Calculation Sheet
- D. Cost Benefit Calculation Sheets.

22-1640 Assembly & Francis & Nine Mile/Driscoll
Existing AM

1: Nine Mile Rd & Francis Ave
HCM 6th TWSC

Intersection						
Int Delay, s/veh	7.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	↑
Traffic Vol, veh/h	611	405	0	216	174	79
Future Vol, veh/h	611	405	0	216	174	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	-14	-	-	7	3	-
Peak Hour Factor	84	84	84	84	67	67
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	727	482	0	257	260	118

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 984 727
Stage 1	-	-	- 727 -
Stage 2	-	-	- 257 -
Critical Hdwy	-	-	- 7.01 6.51
Critical Hdwy Stg 1	-	-	- 6.01 -
Critical Hdwy Stg 2	-	-	- 6.01 -
Follow-up Hdwy	-	-	- 3.509 3.309
Pot Cap-1 Maneuver	-	0	- ~ 235 401
Stage 1	-	0	- 425 -
Stage 2	-	0	- 755 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- ~ 235 401
Mov Cap-2 Maneuver	-	-	- 342 -
Stage 1	-	-	- 425 -
Stage 2	-	-	- 755 -

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	34.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBT
Capacity (veh/h)	342	401	-	-	-
HCM Lane V/C Ratio	0.759	0.294	-	-	-
HCM Ctrl Dly (s/v)	42.2	17.7	-	-	-
HCM Lane LOS	E	C	-	-	-
HCM 95th %tile Q (veh)	6	1.2	-	-	-

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s
 +: Computation Not Defined *: All major volume in platoon

22-1640 Assembly & Francis & Nine Mile/Driscoll
Existing PM

1: Nine Mile Rd & Francis Ave
HCM 6th TWSC

Intersection						
Int Delay, s/veh	81.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	↑
Traffic Vol, veh/h	482	242	0	448	544	138
Future Vol, veh/h	482	242	0	448	544	138
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	-14	-	-	7	3	-
Peak Hour Factor	95	95	93	93	97	97
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	507	255	0	482	561	142

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 989 507
Stage 1	-	-	- 507 -
Stage 2	-	-	- 482 -
Critical Hdwy	-	-	- 7 6.5
Critical Hdwy Stg 1	-	-	- 6 -
Critical Hdwy Stg 2	-	-	- 6 -
Follow-up Hdwy	-	-	- 3.5 3.3
Pot Cap-1 Maneuver	-	0	- ~ 234 546
Stage 1	-	0	- ~ 560 -
Stage 2	-	0	- 577 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- ~ 234 546
Mov Cap-2 Maneuver	-	-	- ~ 366 -
Stage 1	-	-	- ~ 560 -
Stage 2	-	-	- 577 -

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	226.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBT
Capacity (veh/h)	366	546	-	-	-
HCM Lane V/C Ratio	1.532	0.261	-	-	-
HCM Ctrl Dly (s/v)	280	13.9	-	-	-
HCM Lane LOS	F	B	-	-	-
HCM 95th %tile Q (veh)	31.1	1	-	-	-

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s
 +: Computation Not Defined *: All major volume in platoon

22-1640 Assembly & Francis& Nine Mile/Driscoll
Existing AM

2: Assembly St & Francais Ave
HCM 6th TWSC

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱↱		↱	↱	↱			↱	↱↱		
Traffic Vol, veh/h	56	461	109	238	237	8	0	3	63	1	16	25
Future Vol, veh/h	56	461	109	238	237	8	0	3	63	1	16	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	0	-	100	-	-	0	-	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	1	-	-	1	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	94	94	94	90	90	90	76	76	76	56	56	56
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	60	490	116	264	263	9	0	4	83	2	29	45

Major/Minor	Major1	Major2	Minor1	Minor2								
Conflicting Flow All	272	0	0	606	0	0	-	1468	303	1158	1517	263
Stage 1	-	-	-	-	-	-	-	668	-	791	791	-
Stage 2	-	-	-	-	-	-	-	800	-	367	726	-
Critical Hdwy	4.1	-	-	4.115	-	-	-	6.9	7.1	8.3	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.9	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.9	-	7.5	6.5	-
Follow-up Hdwy	2.2	-	-	2.2095	-	-	-	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1303	-	-	976	-	-	0	109	687	119	79	753
Stage 1	-	-	-	-	-	-	0	427	-	310	324	-
Stage 2	-	-	-	-	-	-	0	366	-	569	354	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1303	-	-	976	-	-	-	76	687	79	55	753
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	155	-	146	66	-
Stage 1	-	-	-	-	-	-	-	407	-	296	237	-
Stage 2	-	-	-	-	-	-	-	267	-	473	338	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.7	5	11	51.4
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	687	1303	-	-	976	-	-	149
HCM Lane V/C Ratio	0.121	0.046	-	-	0.271	-	-	0.503
HCM Ctrl Dly (s/v)	11	7.9	-	-	10.1	-	-	51.4
HCM Lane LOS	B	A	-	-	B	-	-	F
HCM 95th %tile Q (veh)	0.4	0.1	-	-	1.1	-	-	2.4

22-1640 Assembly & Francis& Nine Mile/Driscoll
Existing PM

2: Assembly St & Francais Ave
HCM 6th TWSC

Intersection												
Int Delay, s/veh	4.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱↱		↱	↱	↱			↱	↱↱		
Traffic Vol, veh/h	44	497	76	246	428	13	4	4	140	2	10	15
Future Vol, veh/h	44	497	76	246	428	13	4	4	140	2	10	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	0	-	100	-	-	0	-	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	1	-	-	1	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	95	95	95	93	93	93	86	86	86	73	73	73
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	46	523	80	265	460	14	5	5	163	3	14	21

Major/Minor	Major1	Major2	Minor1	Minor2								
Conflicting Flow All	474	0	0	603	0	0	1670	1659	302	1346	1685	460
Stage 1	-	-	-	-	-	-	655	655	-	990	990	-
Stage 2	-	-	-	-	-	-	1015	1004	-	356	695	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.7	6.9	7.1	8.3	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.9	5.9	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.9	-	7.5	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1099	-	-	984	-	-	58	82	688	83	60	568
Stage 1	-	-	-	-	-	-	396	433	-	227	248	-
Stage 2	-	-	-	-	-	-	259	288	-	580	368	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1099	-	-	984	-	-	37	57	688	47	42	568
Mov Cap-2 Maneuver	-	-	-	-	-	-	96	128	-	103	70	-
Stage 1	-	-	-	-	-	-	379	415	-	217	181	-
Stage 2	-	-	-	-	-	-	169	211	-	419	353	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.6	3.6	11.8	38.7
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	688	1099	-	-	984	-	-	143
HCM Lane V/C Ratio	0.237	0.042	-	-	0.269	-	-	0.259
HCM Ctrl Dly (s/v)	11.8	8.4	-	-	10	-	-	38.7
HCM Lane LOS	B	A	-	-	A	-	-	E
HCM 95th %tile Q (veh)	0.9	0.1	-	-	1.1	-	-	1

22-1640 Assembly & Francis& Nine Mile/Driscoll 3: Assembly St/Nine Mile Rd & Driscoll Blvd
Existing AM HCM 6th TWSC

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑			↑
Traffic Vol, veh/h	0	73	161	0	0	423
Future Vol, veh/h	0	73	161	0	0	423
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, #	1	-	0	-	-	0
Grade, %	0	-	2	-	-	1
Peak Hour Factor	72	72	65	65	85	85
Heavy Vehicles, %	0	0	2	2	0	0
Mvmt Flow	0	101	248	0	0	498

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	248	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.2	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.3	-
Pot Cap-1 Maneuver	0	796	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	796	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	-	796
HCM Lane V/C Ratio	-	0.127
HCM Ctrl Dly (s/v)	-	10.2
HCM Lane LOS	-	B
HCM 95th %tile Q (veh)	-	0.4

22-1640 Assembly & Francis& Nine Mile/Driscoll 3: Assembly St/Nine Mile Rd & Driscoll Blvd
Existing PM HCM 6th TWSC

Intersection						
Int Delay, s/veh	2.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑			↑
Traffic Vol, veh/h	0	166	524	0	0	242
Future Vol, veh/h	0	166	524	0	0	242
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, #	1	-	0	-	-	0
Grade, %	0	-	2	-	-	1
Peak Hour Factor	90	90	93	93	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	184	563	0	0	299

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	563	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.2	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.3	-
Pot Cap-1 Maneuver	0	530	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	530	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	15.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	-	530
HCM Lane V/C Ratio	-	0.348
HCM Ctrl Dly (s/v)	-	15.4
HCM Lane LOS	-	C
HCM 95th %tile Q (veh)	-	1.5

22-1640 Assembly & Francis & Nine Mile/Driscoll
Existing AM

4: Assembly St & Driscoll Blvd
HCM 6th TWSC

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱			↱	↱					↱	↱	
Traffic Vol, veh/h	0	0	0	1	84	65	0	0	0	231	163	2
Future Vol, veh/h	0	0	0	1	84	65	0	0	0	231	163	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	1	-	-	1	-	-	4	-
Peak Hour Factor	92	92	92	77	77	77	25	25	25	80	80	80
Heavy Vehicles, %	0	0	2	0	0	0	2	2	2	0	0	0
Mvmt Flow	0	0	0	1	109	84	0	0	0	289	204	3

Major/Minor	Minor1	Major2		Major1	
Conflicting Flow All	937	-	-	207	0
Stage 1	784	-	-	-	-
Stage 2	153	-	-	-	-
Critical Hdwy	6.4	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	-	-	2.2	-
Pot Cap-1 Maneuver	296	0	0	1376	-
Stage 1	453	0	0	-	-
Stage 2	880	0	0	-	-
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	226	0	-	1376	-
Mov Cap-2 Maneuver	289	0	-	-	-
Stage 1	347	0	-	-	-
Stage 2	879	0	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0	0.1	4.8
HCM LOS	A		

Minor Lane/Major Mvmt	EBLn1	WBL	WBT	WBR	SBL	SBT	SBR
Capacity (veh/h)	-	1376	-	-	1392	-	-
HCM Lane V/C Ratio	-	0.001	-	-	0.207	-	-
HCM Ctrl Dly (s/v)	0	7.6	-	-	8.3	0	-
HCM Lane LOS	A	A	-	-	A	A	-
HCM 95th %tile Q (veh)	-	0	-	-	0.8	-	-

22-1640 Assembly & Francis & Nine Mile/Driscoll
Existing PM

4: Assembly St & Driscoll Blvd
HCM 6th TWSC

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱			↱	↱					↱	↱	
Traffic Vol, veh/h	0	0	0	0	165	145	0	0	0	145	182	1
Future Vol, veh/h	0	0	0	0	165	145	0	0	0	145	182	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	1	-	-	1	-	-	4	-
Peak Hour Factor	92	92	92	91	91	91	92	92	92	86	86	86
Heavy Vehicles, %	2	2	2	0	0	0	2	2	2	0	0	0
Mvmt Flow	0	0	0	0	181	159	0	0	0	169	212	1

Major/Minor	Minor1	Major2		Major1	
Conflicting Flow All	812	-	-	-	0
Stage 1	551	-	-	-	-
Stage 2	261	-	-	-	-
Critical Hdwy	6.42	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-
Pot Cap-1 Maneuver	348	0	0	-	-
Stage 1	577	0	0	-	-
Stage 2	783	0	0	-	-
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	294	0	-	-	-
Mov Cap-2 Maneuver	378	0	-	-	-
Stage 1	487	0	-	-	-
Stage 2	783	0	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	EBLn1	WBL	WBR	SBL	SBT	SBR
Capacity (veh/h)	-	-	-	1230	-	-
HCM Lane V/C Ratio	-	-	-	0.137	-	-
HCM Ctrl Dly (s/v)	0	-	-	8.4	0	-
HCM Lane LOS	A	-	-	A	A	-
HCM 95th %tile Q (veh)	-	-	-	0.5	-	-

22-1640 Assembly & Francis & Nine Mile/Driscoll
Existing AM

5: Assembly St & Nine Mile Rd
HCM 6th TWSC

Intersection						
Int Delay, s/veh	5.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↑		↑			↑
Traffic Vol, veh/h	166	0	160	0	0	424
Future Vol, veh/h	166	0	160	0	0	424
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, %	4	-	1	-	-	3
Peak Hour Factor	81	81	92	92	92	92
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	205	0	174	0	0	461

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	635	-	0
Stage 1	174	-	-
Stage 2	461	-	-
Critical Hdwy	7.2	-	-
Critical Hdwy Stg 1	6.2	-	-
Critical Hdwy Stg 2	6.2	-	-
Follow-up Hdwy	3.5	-	-
Pot Cap-1 Maneuver	387	0	-
Stage 1	829	0	-
Stage 2	577	0	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	387	-	-
Mov Cap-2 Maneuver	387	-	-
Stage 1	829	-	-
Stage 2	577	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	24.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	-	387
HCM Lane V/C Ratio	-	0.53
HCM Ctrl Dly (s/v)	-	24.3
HCM Lane LOS	-	C
HCM 95th %tile Q (veh)	-	3

22-1640 Assembly & Francis & Nine Mile/Driscoll
Existing PM

5: Assembly St & Nine Mile Rd
HCM 6th TWSC

Intersection						
Int Delay, s/veh	10.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↑		↑			↑
Traffic Vol, veh/h	181	0	523	0	0	242
Future Vol, veh/h	181	0	523	0	0	242
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, %	4	-	1	-	-	3
Peak Hour Factor	85	85	94	94	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	213	0	556	0	0	299

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	855	-	0
Stage 1	556	-	-
Stage 2	299	-	-
Critical Hdwy	7.2	-	-
Critical Hdwy Stg 1	6.2	-	-
Critical Hdwy Stg 2	6.2	-	-
Follow-up Hdwy	3.5	-	-
Pot Cap-1 Maneuver	274	0	-
Stage 1	511	0	-
Stage 2	708	0	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	274	-	-
Mov Cap-2 Maneuver	274	-	-
Stage 1	511	-	-
Stage 2	708	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	52.3	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	-	274
HCM Lane V/C Ratio	-	0.777
HCM Ctrl Dly (s/v)	-	52.3
HCM Lane LOS	-	F
HCM 95th %tile Q (veh)	-	5.9

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background AM

1: Nine Mile Rd & Francis Ave
HCM 6th TWSC

Intersection						
Int Delay, s/veh	72					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	↑
Traffic Vol, veh/h	968	594	0	308	263	79
Future Vol, veh/h	968	594	0	308	263	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	-14	-	-	7	3	-
Peak Hour Factor	84	84	84	84	67	67
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	1152	707	0	367	393	118

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 1519 1152
Stage 1	-	-	- 1152 -
Stage 2	-	-	- 367 -
Critical Hdwy	-	-	- 7.01 6.51
Critical Hdwy Stg 1	-	-	- 6.01 -
Critical Hdwy Stg 2	-	-	- 6.01 -
Follow-up Hdwy	-	-	- 3.509 3.309
Pot Cap-1 Maneuver	-	0	- ~ 102 220
Stage 1	-	0	- ~ 250 -
Stage 2	-	0	- 661 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- ~ 102 220
Mov Cap-2 Maneuver	-	-	- ~ 200 -
Stage 1	-	-	- ~ 250 -
Stage 2	-	-	- 661 -

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	\$ 385.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBT
Capacity (veh/h)	200	220	-	-	-
HCM Lane V/C Ratio	1.963	0.536	-	-	-
HCM Ctrl Dly (s/v)	\$ 490.2	38.8	-	-	-
HCM Lane LOS	F	E	-	-	-
HCM 95th %tile Q (veh)	29.1	2.8	-	-	-

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s
 +: Computation Not Defined *: All major volume in platoon

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background PM

1: Nine Mile Rd & Francis Ave
HCM 6th TWSC

Intersection						
Int Delay, s/veh	206.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	↑
Traffic Vol, veh/h	482	242	0	488	544	138
Future Vol, veh/h	589	299	0	628	684	138
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	0	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	-14	-	-	7	3	-
Peak Hour Factor	95	95	93	93	97	97
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	620	315	0	675	705	142

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 1295 620
Stage 1	-	-	- 620 -
Stage 2	-	-	- 675 -
Critical Hdwy	-	-	- 7 6.5
Critical Hdwy Stg 1	-	-	- 6 -
Critical Hdwy Stg 2	-	-	- 6 -
Follow-up Hdwy	-	-	- 3.5 3.3
Pot Cap-1 Maneuver	-	0	- ~ 146 467
Stage 1	-	0	- ~ 487 -
Stage 2	-	0	- ~ 455 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- ~ 146 467
Mov Cap-2 Maneuver	-	-	- ~ 281 -
Stage 1	-	-	- ~ 487 -
Stage 2	-	-	- ~ 455 -

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	\$ 599.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBT
Capacity (veh/h)	281	467	-	-	-
HCM Lane V/C Ratio	2.509	0.305	-	-	-
HCM Ctrl Dly (s/v)	\$ 717.7	16.1	-	-	-
HCM Lane LOS	F	C	-	-	-
HCM 95th %tile Q (veh)	57.6	1.3	-	-	-

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s
 +: Computation Not Defined *: All major volume in platoon

22-1640 Assembly & Francis& Nine Mile/Driscoll
Background AM

2: Assembly St & Francais Ave
HCM 6th TWSC

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱↱		↱	↱	↱			↱	↱↱		
Traffic Vol, veh/h	56	735	192	238	329	8	0	3	63	1	16	25
Future Vol, veh/h	56	735	275	238	329	8	0	3	63	1	16	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	0	-	100	-	-	0	-	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	1	-	-	1	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	94	94	94	90	90	90	76	76	76	56	56	56
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	60	782	293	264	366	9	0	4	83	2	29	45

Major/Minor	Major1	Major2	Minor1	Minor2								
Conflicting Flow All	375	0	0	1075	0	0	-	1952	538	1407	2089	366
Stage 1	-	-	-	-	-	-	-	1049	-	894	894	-
Stage 2	-	-	-	-	-	-	-	903	-	513	1195	-
Critical Hdwy	4.1	-	-	4.115	-	-	-	6.9	7.1	8.3	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.9	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.9	-	7.5	6.5	-
Follow-up Hdwy	2.2	-	-	2.2095	-	-	-	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1195	-	-	651	-	-	0	52	478	74	30	650
Stage 1	-	-	-	-	-	-	0	273	-	264	283	-
Stage 2	-	-	-	-	-	-	0	325	-	449	188	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1195	-	-	651	-	-	-	29	478	39	~ 17	650
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	92	-	69	-	-
Stage 1	-	-	-	-	-	-	-	259	-	251	168	-
Stage 2	-	-	-	-	-	-	-	193	-	347	179	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.4	5.9	14.1	13.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	478	1195	-	-	651	-	-	491
HCM Lane V/C Ratio	0.173	0.05	-	-	0.406	-	-	0.153
HCM Ctrl Dly (s/v)	14.1	8.2	-	-	14.3	-	-	13.6
HCM Lane LOS	B	A	-	-	B	-	-	B
HCM 95th %tile Q (veh)	0.6	0.2	-	-	2	-	-	0.5

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s
 *: Computation Not Defined *: All major volume in platoon

22-1640 Assembly & Francis& Nine Mile/Driscoll
Background PM

2: Assembly St & Francais Ave
HCM 6th TWSC

Intersection												
Int Delay, s/veh	4.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱↱		↱	↱	↱			↱	↱↱		
Traffic Vol, veh/h	44	497	76	246	428	13	4	4	140	2	10	15
Future Vol, veh/h	44	579	101	246	568	13	4	4	140	2	10	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	0	-	100	-	-	0	-	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	1	-	-	1	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	95	95	95	93	93	93	86	86	86	73	73	73
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	46	609	106	265	611	14	5	5	163	3	14	21

Major/Minor	Major1	Major2	Minor1	Minor2								
Conflicting Flow All	625	0	0	715	0	0	-	1920	1909	358	1540	1948
Stage 1	-	-	-	-	-	-	-	754	754	-	1141	1141
Stage 2	-	-	-	-	-	-	-	1166	1155	-	399	807
Critical Hdwy	4.1	-	-	4.1	-	-	-	7.7	6.9	7.1	8.3	7.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.9	5.9	-	7.1	6.5
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.5	5.9	-	7.5	6.5
Follow-up Hdwy	2.2	-	-	2.2	-	-	-	3.5	4	3.3	3.5	4
Pot Cap-1 Maneuver	966	-	-	895	-	-	37	56	632	57	38	457
Stage 1	-	-	-	-	-	-	342	386	-	179	202	-
Stage 2	-	-	-	-	-	-	209	241	-	540	317	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	966	-	-	895	-	-	18	38	632	30	25	457
Mov Cap-2 Maneuver	-	-	-	-	-	-	64	97	-	75	33	-
Stage 1	-	-	-	-	-	-	326	367	-	170	142	-
Stage 2	-	-	-	-	-	-	127	170	-	377	302	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.5	3.2	12.7	94.8
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	632	966	-	-	895	-	-	74
HCM Lane V/C Ratio	0.258	0.048	-	-	0.296	-	-	0.5
HCM Ctrl Dly (s/v)	12.7	8.9	-	-	10.7	-	-	94.8
HCM Lane LOS	B	A	-	-	B	-	-	F
HCM 95th %tile Q (veh)	1	0.2	-	-	1.2	-	-	2.1

22-1640 Assembly & Francis & Nine Mile/Driscoll 3: Assembly St/Nine Mile Rd & Driscoll Blvd
Background AM HCM 6th TWSC

Intersection						
Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑			↑
Traffic Vol, veh/h	0	88	250	0	0	601
Future Vol, veh/h	0	115	314	0	0	792
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, #	1	-	0	-	-	0
Grade, %	0	-	2	-	-	1
Peak Hour Factor	72	72	65	65	85	85
Heavy Vehicles, %	0	0	2	2	0	0
Mvmt Flow	0	160	483	0	0	932

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	483	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.2	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.3	-
Pot Cap-1 Maneuver	0	588	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	588	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	13.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	-	588
HCM Lane V/C Ratio	-	0.272
HCM Ctrl Dly (s/v)	-	13.4
HCM Lane LOS	-	B
HCM 95th %tile Q (veh)	-	1.1

22-1640 Assembly & Francis & Nine Mile/Driscoll 3: Assembly St/Nine Mile Rd & Driscoll Blvd
Background PM HCM 6th TWSC

Intersection						
Int Delay, s/veh	3.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑			↑
Traffic Vol, veh/h	0	166	524	0	0	242
Future Vol, veh/h	0	208	622	0	0	299
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, #	1	-	0	-	-	0
Grade, %	0	-	2	-	-	1
Peak Hour Factor	90	90	93	93	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	231	669	0	0	369

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	669	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.2	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.3	-
Pot Cap-1 Maneuver	0	461	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	461	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	20.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	-	461
HCM Lane V/C Ratio	-	0.501
HCM Ctrl Dly (s/v)	-	20.4
HCM Lane LOS	-	C
HCM 95th %tile Q (veh)	-	2.8

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background AM

4: Assembly St & Driscoll Blvd
HCM 6th TWSC

Intersection												
Int Delay, s/veh	3.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱				↱	↱				↱	↱	
Traffic Vol, veh/h	0	0	0	0	99	65	0	0	0	314	255	2
Future Vol, veh/h	0	0	0	0	99	65	0	0	0	314	255	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	1	-	-	1	-	-	4	-
Peak Hour Factor	92	92	92	77	77	77	25	25	25	80	80	80
Heavy Vehicles, %	0	0	2	0	0	0	2	2	2	0	0	0
Mvmt Flow	0	0	0	0	129	84	0	0	0	393	319	3

Major/Minor	Minor1	Major2				Major1		
Conflicting Flow All	1278	-	-	-	0	213	0	0
Stage 1	1107	-	-	-	-	-	-	-
Stage 2	171	-	-	-	-	-	-	-
Critical Hdwy	6.4	-	-	-	-	4.1	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	-	-	-	2.2	-	-
Pot Cap-1 Maneuver	185	0	0	0	-	1369	-	-
Stage 1	319	0	0	0	-	-	-	-
Stage 2	864	0	0	0	-	-	-	-
Platoon blocked, %		-	-	-	-	-	-	-
Mov Cap-1 Maneuver	120	0	-	-	-	1369	-	-
Mov Cap-2 Maneuver	173	0	-	-	-	-	-	-
Stage 1	207	0	-	-	-	-	-	-
Stage 2	864	0	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0	0	4.8
HCM LOS	A		

Minor Lane/Major Mvmt	EBLn1	WBT	WBR	SBL	SBT	SBR
Capacity (veh/h)	-	-	-	1369	-	-
HCM Lane V/C Ratio	-	-	-	0.287	-	-
HCM Ctrl Dly (s/v)	0	-	-	8.7	0	-
HCM Lane LOS	A	-	-	A	A	-
HCM 95th %tile Q (veh)	-	-	-	1.2	-	-

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background PM

4: Assembly St & Driscoll Blvd
HCM 6th TWSC

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱				↱	↱				↱	↱	
Traffic Vol, veh/h	0	0	0	0	165	145	0	0	0	145	182	1
Future Vol, veh/h	0	0	0	0	207	145	0	0	0	170	182	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	1	-	-	1	-	-	4	-
Peak Hour Factor	92	92	92	91	91	91	92	92	92	86	86	86
Heavy Vehicles, %	2	2	2	0	0	0	2	2	2	0	0	0
Mvmt Flow	0	0	0	0	227	159	0	0	0	198	212	1

Major/Minor	Minor1	Major2				Major1		
Conflicting Flow All	916	-	-	-	0	386	0	0
Stage 1	609	-	-	-	-	-	-	-
Stage 2	307	-	-	-	-	-	-	-
Critical Hdwy	6.42	-	-	-	-	4.1	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-	2.2	-	-
Pot Cap-1 Maneuver	302	0	0	0	-	1184	-	-
Stage 1	543	0	0	0	-	-	-	-
Stage 2	746	0	0	0	-	-	-	-
Platoon blocked, %		-	-	-	-	-	-	-
Mov Cap-1 Maneuver	245	0	-	-	-	1184	-	-
Mov Cap-2 Maneuver	332	0	-	-	-	-	-	-
Stage 1	440	0	-	-	-	-	-	-
Stage 2	746	0	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0	0	4.2
HCM LOS	A		

Minor Lane/Major Mvmt	EBLn1	WBT	WBR	SBL	SBT	SBR
Capacity (veh/h)	-	-	-	1184	-	-
HCM Lane V/C Ratio	-	-	-	0.167	-	-
HCM Ctrl Dly (s/v)	0	-	-	8.6	0	-
HCM Lane LOS	A	-	-	A	A	-
HCM 95th %tile Q (veh)	-	-	-	0.6	-	-

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background AM

5: Assembly St & Nine Mile Rd
HCM 6th TWSC

Intersection						
Int Delay, s/veh	8.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↱		↱			↱
Traffic Vol, veh/h	166	0	236	0	0	516
Future Vol, veh/h	166	0	236	0	0	516
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, %	4	-	1	-	-	3
Peak Hour Factor	81	81	92	92	92	92
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	205	0	257	0	0	561

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	818	-	0 - - -
Stage 1	257	-	- - - -
Stage 2	561	-	- - - -
Critical Hdwy	7.2	-	- - - -
Critical Hdwy Stg 1	6.2	-	- - - -
Critical Hdwy Stg 2	6.2	-	- - - -
Follow-up Hdwy	3.5	-	- - - -
Pot Cap-1 Maneuver	290	0	- 0 0 -
Stage 1	747	0	- 0 0 -
Stage 2	508	0	- 0 0 -
Platoon blocked, %		-	- - - -
Mov Cap-1 Maneuver	290	-	- - - -
Mov Cap-2 Maneuver	290	-	- - - -
Stage 1	747	-	- - - -
Stage 2	508	-	- - - -

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	42.5	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	- 290	-
HCM Lane V/C Ratio	- 0.707	-
HCM Ctrl Dly (s/v)	- 42.5	-
HCM Lane LOS	- E	-
HCM 95th %tile Q (veh)	- 4.9	-

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background PM

5: Assembly St & Nine Mile Rd
HCM 6th TWSC

Intersection						
Int Delay, s/veh	20.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↱		↱			↱
Traffic Vol, veh/h	181	0	523	0	0	243
Future Vol, veh/h	181	0	621	0	0	300
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, %	4	-	1	-	-	3
Peak Hour Factor	85	85	94	94	81	81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	213	0	661	0	0	370

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1031	-	0 - - -
Stage 1	661	-	- - - -
Stage 2	370	-	- - - -
Critical Hdwy	7.2	-	- - - -
Critical Hdwy Stg 1	6.2	-	- - - -
Critical Hdwy Stg 2	6.2	-	- - - -
Follow-up Hdwy	3.5	-	- - - -
Pot Cap-1 Maneuver	~ 207	0	- 0 0 -
Stage 1	447	0	- 0 0 -
Stage 2	648	0	- 0 0 -
Platoon blocked, %		-	- - - -
Mov Cap-1 Maneuver	~ 207	-	- - - -
Mov Cap-2 Maneuver	~ 207	-	- - - -
Stage 1	447	-	- - - -
Stage 2	648	-	- - - -

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	118.8	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBTWBLn1	SBT
Capacity (veh/h)	- 207	-
HCM Lane V/C Ratio	- 1.029	-
HCM Ctrl Dly (s/v)	- 118.8	-
HCM Lane LOS	- F	-
HCM 95th %tile Q (veh)	- 9.3	-

Notes
 -: Volume exceeds capacity \$: Delay exceeds 300s
 +: Computation Not Defined *: All major volume in platoon

22-1640 Assembly & Francis& Nine Mile/Driscoll
Option A AM

2: Assembly St & Francais Ave
Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰↱	↰	↰	↰↱	↰	↰	↰	↰
Traffic Volume (vph)	56	384	530	238	237	174	3	1	16
Future Volume (vph)	56	384	768	238	237	234	3	1	16
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	3	8		7	4	5	2	1	6
Permitted Phases			8						
Detector Phase	3	8	8	7	4	5	2	1	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	8.0	20.0	8.0	20.0
Total Split (s)	12.0	33.0	33.0	22.0	43.0	15.0	27.0	8.0	20.0
Total Split (%)	13.3%	36.7%	36.7%	24.4%	47.8%	16.7%	30.0%	8.9%	22.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max
Act Effct Green (s)	7.3	24.1	24.1	17.1	35.8	11.1	35.2	4.6	21.7
Actuated g/C Ratio	0.08	0.27	0.27	0.19	0.40	0.12	0.39	0.05	0.24
v/c Ratio	0.43	0.45	0.91	0.85	0.21	0.76	0.25	0.02	0.18
Control Delay (s/veh)	49.1	28.1	22.3	60.8	17.4	60.9	16.6	42.0	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.1	28.1	22.3	60.8	17.4	60.9	16.6	42.0	17.0
LOS	D	C	C	E	B	E	B	D	B
Approach Delay (s/veh)		25.4			38.8		44.7		17.7
Approach LOS		C			D		D		B

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay (s/veh): 32.1

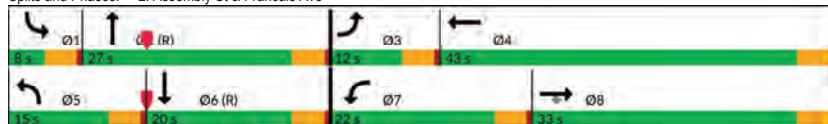
Intersection LOS: C

Intersection Capacity Utilization 61.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Assembly St & Francais Ave



22-1640 Assembly & Francis& Nine Mile/Driscoll
Option A PM

2: Assembly St & Francais Ave
Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰↱	↰	↰	↰↱	↰	↰	↰	↰
Traffic Volume (vph)	44	363	317	246	428	555	4	2	10
Future Volume (vph)	56	486	427	246	615	763	4	2	10
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	3	8		7	4	5	2	1	6
Permitted Phases			8						
Detector Phase	3	8	8	7	4	5	2	1	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	8.0	20.0	8.0	20.0
Total Split (s)	11.0	20.0	20.0	24.0	33.0	30.0	38.0	8.0	16.0
Total Split (%)	12.2%	22.2%	22.2%	26.7%	36.7%	33.3%	42.2%	8.9%	17.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max
Act Effct Green (s)	7.8	16.5	16.5	18.0	30.7	25.8	41.9	4.3	13.8
Actuated g/C Ratio	0.09	0.18	0.18	0.20	0.34	0.29	0.47	0.05	0.15
v/c Ratio	0.40	0.82	0.70	0.81	0.60	0.94	0.37	0.04	0.23
Control Delay (s/veh)	47.1	48.0	9.9	53.3	27.9	60.1	14.5	42.5	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	10.1	0.4	0.0	0.0
Total Delay (s/veh)	47.1	48.0	9.9	53.3	27.9	70.2	14.9	42.5	16.6
LOS	D	D	A	D	C	E	B	D	B
Approach Delay (s/veh)		31.2			35.1		55.4		17.7
Approach LOS		C			D		E		B

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay (s/veh): 41.1

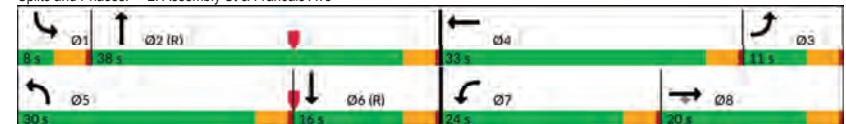
Intersection LOS: D

Intersection Capacity Utilization 58.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Assembly St & Francais Ave



22-1640 Assembly & Francis & Nine Mile/Driscoll
Option A AM

2: Assembly St & Francis Ave
HCM 7th Signalized Intersection Summary

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	384	530	238	237	8	174	3	132	1	16	25
Future Volume (veh/h)	56	384	768	238	237	8	234	3	132	1	16	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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		
Adj Sat Flow, veh/h/ln	1794	1794	1794	1513	1513	1513	1778	1778	1778	1661	1661	1661
Adj Flow Rate, veh/h	60	409	0	264	263	9	308	4	174	2	29	45
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.76	0.76	0.76	0.56	0.56	0.56
Percent Heavy Veh, %	0	0	0	1	1	1	0	0	0	0	0	0
Cap, veh/h	76	556		288	904	31	377	16	675	3	202	313
Arrive On Green	0.04	0.16	0.00	0.20	0.32	0.32	0.11	0.46	0.46	0.00	0.34	0.34
Sat Flow, veh/h	1709	3409	1521	1441	2835	97	3284	34	1478	1581	587	910
Grp Volume(v), veh/h	60	409	0	264	133	139	308	0	178	2	0	74
Grp Sat Flow(s),veh/h/ln	1709	1705	1521	1441	1437	1495	1642	0	1512	1581	0	1497
Q Serve(g_s), s	3.1	10.3	0.0	16.2	6.2	6.3	8.2	0.0	6.5	0.1	0.0	3.1
Cycle Q Clear(g_c), s	3.1	10.3	0.0	16.2	6.2	6.3	8.2	0.0	6.5	0.1	0.0	3.1
Prop In Lane	1.00		1.00	1.00		0.06	1.00		0.98	1.00		0.61
Lane Grp Cap(c), veh/h	76	556		288	458	477	377	0	691	3	0	515
V/C Ratio(X)	0.79	0.74		0.92	0.29	0.29	0.82	0.00	0.26	0.58	0.00	0.14
Avail Cap(c_a), veh/h	152	1099		288	623	648	401	0	691	70	0	515
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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	0.62	0.00	0.62	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.6	35.8	0.0	35.3	23.0	23.0	38.9	0.0	15.0	44.9	0.0	20.4
Incr Delay (d2), s/veh	16.4	1.9	0.0	32.1	0.3	0.3	7.7	0.0	0.6	102.7	0.0	0.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	4.3	0.0	8.1	2.1	2.2	3.7	0.0	2.3	0.1	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	58.9	37.7	0.0	67.4	23.4	23.4	46.6	0.0	15.6	147.5	0.0	20.9
LnGrp LOS	E	D		E	C	C	D		B	F		C
Approach Vol, veh/h	469			536			486			76		
Approach Delay, s/veh	40.4			45.0			35.2			24.3		
Approach LOS	D			D			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	4.2	45.1	8.0	32.7	14.3	35.0	22.0	18.7				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	4.0	23.0	8.0	39.0	11.0	16.0	18.0	29.0				
Max Q Clear Time (g_c+I1), s	2.1	8.5	5.1	8.3	10.2	5.1	18.2	12.3				
Green Ext Time (p_c), s	0.0	0.9	0.0	1.6	0.1	0.2	0.0	2.4				

Intersection Summary												
HCM 7th Control Delay, s/veh	39.6											
HCM 7th LOS	D											

Notes
User approved pedestrian interval to be less than phase max green.
Unsignalized delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

22-1640 Assembly & Francis & Nine Mile/Driscoll
Option A PM

2: Assembly St & Francis Ave
HCM 7th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	363	317	246	428	13	555	4	274	2	10	15
Future Volume (veh/h)	56	486	427	246	615	13	763	4	274	2	10	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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		
Adj Sat Flow, veh/h/ln	1794	1794	1794	1527	1527	1527	1778	1778	1778	1661	1661	1661
Adj Flow Rate, veh/h	59	512	0	265	661	14	887	5	319	3	14	49
Peak Hour Factor	0.95	0.95	0.95	0.93	0.93	0.93	0.86	0.86	0.86	0.73	0.73	0.73
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	184	586		293	773	16	944	10	662	5	52	183
Arrive On Green	0.11	0.17	0.00	0.20	0.27	0.27	0.29	0.45	0.45	0.00	0.16	0.16
Sat Flow, veh/h	1709	3409	1521	1454	2904	61	3284	23	1487	1581	324	1133
Grp Volume(v), veh/h	59	512	0	265	330	345	887	0	324	3	0	63
Grp Sat Flow(s), veh/h/ln	1709	1705	1521	1454	1450	1516	1642	0	1510	1581	0	1457
Q Serve(g_s), s	2.9	13.2	0.0	16.0	19.5	19.5	23.7	0.0	13.6	0.2	0.0	3.4
Cycle Q Clear(g_c), s	2.9	13.2	0.0	16.0	19.5	19.5	23.7	0.0	13.6	0.2	0.0	3.4
Prop In Lane	1.00		1.00	1.00		0.04	1.00		0.98	1.00		0.78
Lane Grp Cap(c), veh/h	184	586		293	386	403	944	0	673	5	0	235
V/C Ratio(X)	0.32	0.87		0.90	0.86	0.86	0.94	0.00	0.48	0.59	0.00	0.27
Avail Cap(c_a), veh/h	184	606		323	467	488	949	0	673	70	0	235
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
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	0.66	0.00	0.66	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.1	36.3	0.0	35.1	31.4	31.4	31.3	0.0	17.6	44.8	0.0	33.1
Incr Delay (d2), s/veh	1.0	13.1	0.0	25.9	12.5	12.1	12.2	0.0	1.6	77.7	0.0	2.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	6.4	0.0	7.6	7.9	8.3	10.7	0.0	4.8	0.2	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.1	49.4	0.0	61.0	43.8	43.4	43.5	0.0	19.2	122.5	0.0	35.9
LnGrp LOS	D	D		E	D	D	D		B	F		D
Approach Vol, veh/h	571			940			1211			66		
Approach Delay, s/veh	48.2			48.5			37.0			39.8		
Approach LOS	D			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	4.3	44.1	13.7	27.9	29.9	18.5	22.2	19.5				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	4.0	34.0	7.0	29.0	26.0	12.0	20.0	16.0				
Max Q Clear Time (g_c+I1), s	2.2	15.6	4.9	21.5	25.7	5.4	18.0	15.2				
Green Ext Time (p_c), s	0.0	2.0	0.0	2.5	0.1	0.1	0.2	0.3				

Intersection Summary												
HCM 7th Control Delay, s/veh	43.3											
HCM 7th LOS	D											

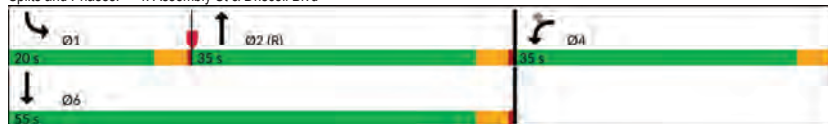
Notes
User approved pedestrian interval to be less than phase max green.
Unsignalized delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

22-1640 Assembly & Francis& Nine Mile/Driscoll
Option A AM

4: Assembly St & Driscoll Blvd
Timings

					
Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	10	143	160	198	586
Future Volume (vph)	10	161	202	198	712
Turn Type	Prot	Perm	NA	Prot	NA
Protected Phases	4		2	1	6
Permitted Phases		4			
Detector Phase	4	4	2	1	6
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	20.0	55.0
Total Split (%)	38.9%	38.9%	38.9%	22.2%	61.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	
Recall Mode	None	None	C-Max	Max	Max
Act Effct Green (s)	7.8	7.8	31.0	39.2	74.2
Actuated g/C Ratio	0.09	0.09	0.34	0.44	0.82
v/c Ratio	0.09	0.65	0.74	0.34	0.32
Control Delay (s/veh)	36.8	15.4	30.5	16.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.6
Total Delay (s/veh)	36.8	15.4	30.5	16.0	5.3
LOS	D	B	C	B	A
Approach Delay (s/veh)	16.7		30.5		7.7
Approach LOS	B		C		A
Intersection Summary					
Cycle Length: 90					
Actuated Cycle Length: 90					
Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green					
Natural Cycle: 60					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.74					
Intersection Signal Delay (s/veh): 17.3			Intersection LOS: B		
Intersection Capacity Utilization 29.9%			ICU Level of Service A		
Analysis Period (min) 15					

Splits and Phases: 4: Assembly St & Driscoll Blvd



22-1640 Assembly & Francis& Nine Mile/Driscoll
Option A PM

4: Assembly St & Driscoll Blvd
Timings

					
Lane Group	WBL	WBR	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	10	310	523	145	428
Future Volume (vph)	10	372	669	173	510
Turn Type	Prot	Perm	NA	Prot	NA
Protected Phases	4		2	1	6
Permitted Phases		4			
Detector Phase	4	4	2	1	6
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	35.0	20.0	55.0
Total Split (%)	38.9%	38.9%	38.9%	22.2%	61.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	
Recall Mode	None	None	C-Max	Max	Max
Act Effct Green (s)	9.3	9.3	31.0	37.7	72.7
Actuated g/C Ratio	0.10	0.10	0.34	0.42	0.81
v/c Ratio	0.06	0.78	0.64	0.29	0.22
Control Delay (s/veh)	33.2	14.9	27.9	20.7	5.3
Queue Delay	0.0	1.0	0.0	0.0	0.0
Total Delay (s/veh)	33.2	15.9	27.9	20.7	5.3
LOS	C	B	C	C	A
Approach Delay (s/veh)	16.3		27.9		9.2
Approach LOS	B		C		A
Intersection Summary					
Cycle Length: 90					
Actuated Cycle Length: 90					
Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green					
Natural Cycle: 60					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.78					
Intersection Signal Delay (s/veh): 17.8			Intersection LOS: B		
Intersection Capacity Utilization 42.5%			ICU Level of Service A		
Analysis Period (min) 15					

Splits and Phases: 4: Assembly St & Driscoll Blvd



22-1640 Assembly & Francis& Nine Mile/Driscoll
Option A AM

4: Assembly St & Driscoll Blvd
HCM 7th Signalized Intersection Summary

	←	↖	↑	↗	→	↘
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↑	↘	↖	↗
Traffic Volume (veh/h)	10	143	160	10	198	586
Future Volume (veh/h)	10	161	202	10	198	712
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No	
Adj Sat Flow, veh/h/ln	1794	1794	1766	1766	1711	1711
Adj Flow Rate, veh/h	13	209	808	40	248	890
Peak Hour Factor	0.77	0.77	0.25	0.25	0.80	0.80
Percent Heavy Veh, %	0	0	2	2	0	0
Cap, veh/h	277	247	1714	85	290	2434
Arrive On Green	0.16	0.16	0.53	0.53	0.36	1.00
Sat Flow, veh/h	1709	1521	3343	161	1629	3336
Grp Volume(v), veh/h	13	209	417	431	248	890
Grp Sat Flow(s), veh/h/ln	1709	1521	1678	1737	1629	1625
Q Serve(g_s), s	0.6	12.0	14.1	14.1	12.7	0.0
Cycle Q Clear(g_c), s	0.6	12.0	14.1	14.1	12.7	0.0
Prop In Lane	1.00	1.00		0.09	1.00	
Lane Grp Cap(c), veh/h	277	247	884	915	290	2434
V/C Ratio(X)	0.05	0.85	0.47	0.47	0.86	0.37
Avail Cap(c_a), veh/h	589	524	884	915	290	2434
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.41	0.41
Uniform Delay (d), s/veh	31.8	36.6	13.4	13.4	27.9	0.0
Incr Delay (d2), s/veh	0.1	7.9	1.8	1.7	12.7	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.9	5.4	5.6	4.9	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	31.9	44.5	15.2	15.2	40.6	0.2
LnGrp LOS	C	D	B	B	D	A
Approach Vol, veh/h	222		848		1138	
Approach Delay, s/veh	43.7		15.2		9.0	
Approach LOS	D		B		A	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	20.0	51.4		18.6		71.4
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	16.0	31.0		31.0		51.0
Max Q Clear Time (g_c+I1), s	14.7	16.1		14.0		2.0
Green Ext Time (p_c), s	0.1	4.8		0.6		7.9
Intersection Summary						
HCM 7th Control Delay, s/veh			14.9			
HCM 7th LOS			B			

22-1640 Assembly & Francis& Nine Mile/Driscoll
Option A PM

4: Assembly St & Driscoll Blvd
HCM 7th Signalized Intersection Summary

	←	↖	↑	↗	→	↘
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↑	↘	↖	↗
Traffic Volume (veh/h)	10	310	523	10	145	428
Future Volume (veh/h)	10	372	669	10	173	510
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No	
Adj Sat Flow, veh/h/ln	1794	1794	1766	1766	1711	1711
Adj Flow Rate, veh/h	11	409	727	11	201	593
Peak Hour Factor	0.91	0.91	0.92	0.92	0.86	0.86
Percent Heavy Veh, %	0	0	2	2	0	0
Cap, veh/h	498	443	1344	20	290	2014
Arrive On Green	0.29	0.29	0.40	0.40	0.36	1.00
Sat Flow, veh/h	1709	1521	3472	51	1629	3336
Grp Volume(v), veh/h	11	409	360	378	201	593
Grp Sat Flow(s), veh/h/ln	1709	1521	1678	1757	1629	1625
Q Serve(g_s), s	0.4	23.5	14.8	14.8	9.5	0.0
Cycle Q Clear(g_c), s	0.4	23.5	14.8	14.8	9.5	0.0
Prop In Lane	1.00	1.00		0.03	1.00	
Lane Grp Cap(c), veh/h	498	443	667	698	290	2014
V/C Ratio(X)	0.02	0.92	0.54	0.54	0.69	0.29
Avail Cap(c_a), veh/h	589	524	667	698	290	2014
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.66	0.66
Uniform Delay (d), s/veh	22.7	30.9	20.8	20.8	26.9	0.0
Incr Delay (d2), s/veh	0.0	20.1	3.1	3.0	8.7	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	10.8	6.2	6.4	3.8	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	22.7	51.0	24.0	23.8	35.7	0.2
LnGrp LOS	C	D	C	C	D	A
Approach Vol, veh/h	420		738		794	
Approach Delay, s/veh	50.2		23.9		9.2	
Approach LOS	D		C		A	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	20.0	39.8		30.2		59.8
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	16.0	31.0		31.0		51.0
Max Q Clear Time (g_c+I1), s	11.5	16.8		25.5		2.0
Green Ext Time (p_c), s	0.2	4.0		0.8		4.7
Intersection Summary						
HCM 7th Control Delay, s/veh			23.6			
HCM 7th LOS			C			

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background B AM

1: Nine Mile Rd & Francis Ave
Timings

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↔↔	↔↔	↔↔	↔↔	↔↔
Traffic Volume (vph)	502	514	254	216	174
Future Volume (vph)	502	514	254	234	216
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	4
Permitted Phases		2	6		
Detector Phase	2	2	1	6	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	22.0	22.0	12.0	34.0	26.0
Total Split (%)	36.7%	36.7%	20.0%	56.7%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	C-Max	C-Max	None	C-Max	Max
Act Effct Green (s)	18.0	18.0	30.0	30.0	22.0
Actuated g/C Ratio	0.30	0.30	0.50	0.50	0.37
v/c Ratio	0.55	0.67	0.80	0.17	0.42
Control Delay (s/veh)	19.9	6.0	28.9	8.6	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.9	6.0	28.9	8.6	9.4
LOS	B	A	C	A	A
Approach Delay (s/veh)	12.9			19.1	9.4
Approach LOS	B			B	A

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 13.6

Intersection LOS: B

Intersection Capacity Utilization 55.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Nine Mile Rd & Francis Ave



22-1640 Assembly & Francis & Nine Mile/Driscoll
Background B PM

1: Nine Mile Rd & Francis Ave
Timings

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↔↔	↔↔	↔↔	↔↔	↔↔
Traffic Volume (vph)	406	318	256	441	544
Future Volume (vph)	565	403	256	711	690
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	4
Permitted Phases		2	6		
Detector Phase	2	2	1	6	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	22.0	22.0	12.0	34.0	26.0
Total Split (%)	36.7%	36.7%	20.0%	56.7%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	C-Max	C-Max	None	C-Max	Max
Act Effct Green (s)	18.0	18.0	30.0	30.0	22.0
Actuated g/C Ratio	0.30	0.30	0.50	0.50	0.37
v/c Ratio	0.54	0.54	0.72	0.46	0.81
Control Delay (s/veh)	19.8	5.0	22.6	10.9	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.8	5.0	22.6	10.9	21.7
LOS	B	A	C	B	C
Approach Delay (s/veh)	13.6			14.0	21.7
Approach LOS	B			B	C

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay (s/veh): 16.4

Intersection LOS: B

Intersection Capacity Utilization 63.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Nine Mile Rd & Francis Ave



22-1640 Assembly & Francis & Nine Mile/Driscoll
Background B AM

1: Nine Mile Rd & Francis Ave
HCM 7th Signalized Intersection Summary

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕	↘↗	↙↘	↕↕	↖↗	↖↗
Traffic Volume (veh/h)	502	514	254	216	174	145
Future Volume (veh/h)	502	514	254	234	216	145
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	2307	2307	1513	1513	1736	1736
Adj Flow Rate, veh/h	598	0	302	279	269	273
Peak Hour Factor	0.84	0.84	0.84	0.84	0.67	0.67
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	1315		445	1437	606	539
Arrive On Green	0.30	0.00	0.13	0.50	0.37	0.37
Sat Flow, veh/h	4499	1955	1441	2949	1653	1471
Grp Volume(v), veh/h	598	0	302	279	269	273
Grp Sat Flow(s), veh/h/ln	2192	1955	1441	1437	1653	1471
Q Serve(g_s), s	6.6	0.0	8.0	3.2	7.4	8.7
Cycle Q Clear(g_c), s	6.6	0.0	8.0	3.2	7.4	8.7
Prop In Lane		1.00			1.00	1.00
Lane Grp Cap(c), veh/h	1315		445	1437	606	539
V/C Ratio(X)	0.45		0.68	0.19	0.44	0.51
Avail Cap(c_a), veh/h	1315		445	1437	606	539
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.90	0.90	1.00	1.00
Uniform Delay (d), s/veh	17.0	0.0	12.4	8.3	14.4	14.8
Incr Delay (d2), s/veh	1.1	0.0	3.7	0.3	2.3	3.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	2.7	0.9	2.9	3.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	18.2	0.0	16.1	8.6	16.7	18.1
LnGrp LOS	B		B	A	B	B
Approach Vol, veh/h	598			581	542	
Approach Delay, s/veh	18.2			12.5	17.4	
Approach LOS	B			B	B	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	12.0	22.0		26.0		34.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	8.0	18.0		22.0		30.0
Max Q Clear Time (g_c+I1), s	10.0	8.6		10.7		5.2
Green Ext Time (p_c), s	0.0	2.7		1.5		1.8

Intersection Summary						
HCM 7th Control Delay, s/veh			16.0			
HCM 7th LOS			B			

Notes
User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [EBR, WBT] is excluded from calculations of the approach delay and intersection delay.

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background B PM

1: Nine Mile Rd & Francis Ave
HCM 7th Signalized Intersection Summary

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕	↘↗	↙↘	↕↕	↖↗	↖↗
Traffic Volume (veh/h)	406	318	256	441	544	296
Future Volume (veh/h)	565	403	256	711	690	296
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	2322	2322	1527	1527	1750	1750
Adj Flow Rate, veh/h	595	0	275	765	508	523
Peak Hour Factor	0.95	0.95	0.93	0.93	0.97	0.97
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1323		449	1450	611	544
Arrive On Green	0.30	0.00	0.13	0.50	0.37	0.37
Sat Flow, veh/h	4527	1967	1454	2977	1666	1483
Grp Volume(v), veh/h	595	0	275	765	508	523
Grp Sat Flow(s), veh/h/ln	2206	1967	1454	1450	1666	1483
Q Serve(g_s), s	6.5	0.0	7.5	10.7	16.7	20.7
Cycle Q Clear(g_c), s	6.5	0.0	7.5	10.7	16.7	20.7
Prop In Lane		1.00			1.00	1.00
Lane Grp Cap(c), veh/h	1323		449	1450	611	544
V/C Ratio(X)	0.45		0.61	0.53	0.83	0.96
Avail Cap(c_a), veh/h	1323		449	1450	611	544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.50	0.50	1.00	1.00
Uniform Delay (d), s/veh	17.0	0.0	11.5	10.2	17.3	18.6
Incr Delay (d2), s/veh	1.1	0.0	1.2	0.7	12.5	30.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	2.2	3.0	7.7	10.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	18.1	0.0	12.8	10.9	29.8	48.8
LnGrp LOS	B		B	B	C	D
Approach Vol, veh/h	595			1040	1031	
Approach Delay, s/veh	18.1			11.4	39.4	
Approach LOS	B			B	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	12.0	22.0		26.0		34.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	8.0	18.0		22.0		30.0
Max Q Clear Time (g_c+I1), s	9.5	8.5		22.7		12.7
Green Ext Time (p_c), s	0.0	2.7		0.0		5.0

Intersection Summary						
HCM 7th Control Delay, s/veh			23.7			
HCM 7th LOS			C			

Notes
User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [EBR, WBT] is excluded from calculations of the approach delay and intersection delay.

22-1640 Assembly & Francis& Nine Mile/Driscoll
Background B AM

2: Assembly St & Francais Ave
Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰↱	↰	↰	↰↱	↰	↰	↰	↰
Traffic Volume (vph)	56	384	530	238	237	174	3	1	16
Future Volume (vph)	56	384	642	238	237	192	3	1	16
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	3	8		7	4	5	2	1	6
Permitted Phases			8						
Detector Phase	3	8	8	7	4	5	2	1	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	8.0	20.0	8.0	20.0
Total Split (s)	12.0	31.0	31.0	24.0	43.0	13.0	27.0	8.0	22.0
Total Split (%)	13.3%	34.4%	34.4%	26.7%	47.8%	14.4%	30.0%	8.9%	24.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max	None
Act Effct Green (s)	7.3	20.9	20.9	18.0	33.5	10.6	37.5	5.3	24.5
Actuated g/C Ratio	0.08	0.23	0.23	0.20	0.37	0.12	0.42	0.06	0.27
v/c Ratio	0.43	0.52	0.80	0.81	0.22	0.65	0.24	0.02	0.16
Control Delay (s/veh)	49.1	31.8	11.0	53.6	18.8	47.3	5.3	41.0	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	49.1	31.8	11.0	53.6	18.8	47.3	5.3	41.0	15.8
LOS	D	C	B	D	B	D	A	D	B
Approach Delay (s/veh)		20.4			36.0		29.9		16.5
Approach LOS		C			D		C		B

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay (s/veh): 25.9

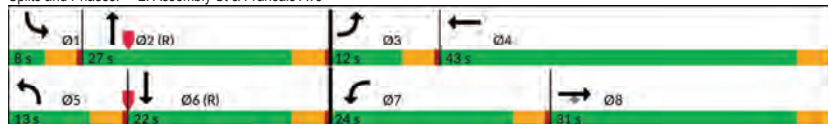
Intersection LOS: C

Intersection Capacity Utilization 61.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Assembly St & Francais Ave



22-1640 Assembly & Francis& Nine Mile/Driscoll
Background B PM

2: Assembly St & Francais Ave
Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↰	↰↱	↰	↰	↰↱	↰	↰	↰	↰
Traffic Volume (vph)	44	363	317	246	428	555	4	2	10
Future Volume (vph)	56	473	354	246	615	617	4	2	10
Turn Type	Prot	NA	Perm	Prot	NA	Prot	NA	Prot	NA
Protected Phases	3	8		7	4	5	2	1	6
Permitted Phases			8						
Detector Phase	3	8	8	7	4	5	2	1	6
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	8.0	20.0	8.0	20.0
Total Split (s)	11.0	20.0	20.0	25.0	34.0	25.0	37.0	8.0	20.0
Total Split (%)	12.2%	22.2%	22.2%	27.8%	37.8%	27.8%	41.1%	8.9%	22.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	None	C-Max
Act Effct Green (s)	9.4	16.6	16.6	18.2	27.3	21.3	41.6	4.6	17.9
Actuated g/C Ratio	0.10	0.18	0.18	0.20	0.30	0.24	0.46	0.05	0.20
v/c Ratio	0.33	0.80	0.64	0.79	0.68	0.92	0.37	0.04	0.18
Control Delay (s/veh)	43.1	46.1	9.3	51.4	31.5	52.9	3.7	42.0	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	43.1	46.1	9.3	51.4	31.5	52.9	3.7	42.0	14.4
LOS	D	D	A	D	C	D	A	D	B
Approach Delay (s/veh)		31.2			37.1		37.6		15.6
Approach LOS		C			D		D		B

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay (s/veh): 34.9

Intersection LOS: C

Intersection Capacity Utilization 58.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Assembly St & Francais Ave



22-1640 Assembly & Francis & Nine Mile/Driscoll
Background B AM

2: Assembly St & Francis Ave
HCM 7th Signalized Intersection Summary

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	384	530	238	237	8	174	3	132	1	16	25
Future Volume (veh/h)	56	384	642	238	237	8	192	3	132	1	16	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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		
Adj Sat Flow, veh/h/ln	1794	1794	1794	1513	1513	1513	1778	1778	1778	1661	1661	1661
Adj Flow Rate, veh/h	60	409	0	264	263	9	253	4	174	2	29	45
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.76	0.76	0.76	0.56	0.56	0.56
Percent Heavy Veh, %	0	0	0	1	1	1	0	0	0	0	0	0
Cap, veh/h	76	552		292	907	31	321	15	673	3	211	328
Arrive On Green	0.04	0.16	0.00	0.20	0.32	0.32	0.10	0.46	0.46	0.00	0.36	0.36
Sat Flow, veh/h	1709	3409	1521	1441	2835	97	3284	34	1478	1581	587	910
Grp Volume(v), veh/h	60	409	0	264	133	139	253	0	178	2	0	74
Grp Sat Flow(s),veh/h/ln	1709	1705	1521	1441	1437	1495	1642	0	1512	1581	0	1497
Q Serve(g_s), s	3.1	10.3	0.0	16.1	6.2	6.3	6.8	0.0	6.5	0.1	0.0	3.0
Cycle Q Clear(g_c), s	3.1	10.3	0.0	16.1	6.2	6.3	6.8	0.0	6.5	0.1	0.0	3.0
Prop In Lane	1.00		1.00	1.00		0.06	1.00		0.98	1.00		0.61
Lane Grp Cap(c), veh/h	76	552		292	460	479	321	0	689	3	0	539
V/C Ratio(X)	0.79	0.74		0.90	0.29	0.29	0.79	0.00	0.26	0.58	0.00	0.14
Avail Cap(c_a), veh/h	152	1023		320	623	648	328	0	689	70	0	539
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
Upstream Filter(I)	0.82	0.82	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.6	35.9	0.0	35.0	22.9	22.9	39.7	0.0	15.1	44.9	0.0	19.4
Incr Delay (d2), s/veh	13.7	1.6	0.0	26.3	0.3	0.3	12.0	0.0	0.9	102.7	0.0	0.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	4.3	0.0	7.6	2.1	2.2	3.2	0.0	2.3	0.1	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	56.3	37.5	0.0	61.3	23.3	23.3	51.7	0.0	16.0	147.5	0.0	19.9
LnGrp LOS	E	D		E	C	C	D		B	F		B
Approach Vol, veh/h	469			536			431			76		
Approach Delay, s/veh	39.9			42.0			36.9			23.3		
Approach LOS	D			D			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	4.2	45.0	8.0	32.8	12.8	36.4	22.2	18.6				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	4.0	23.0	8.0	39.0	9.0	18.0	20.0	27.0				
Max Q Clear Time (g_c+I1), s	2.1	8.5	5.1	8.3	8.8	5.0	18.1	12.3				
Green Ext Time (p_c), s	0.0	0.9	0.0	1.6	0.0	0.2	0.2	2.3				

Intersection Summary

HCM 7th Control Delay, s/veh	39.0
HCM 7th LOS	D

Notes

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

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

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Synchro 11 Report

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22-1640 Assembly & Francis & Nine Mile/Driscoll
Background B PM

2: Assembly St & Francis Ave
HCM 7th Signalized Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	363	317	246	428	13	555	4	274	2	10	15
Future Volume (veh/h)	56	473	354	246	615	13	617	4	274	2	10	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width 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
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		
Adj Sat Flow, veh/h/ln	1794	1794	1794	1527	1527	1527	1778	1778	1778	1661	1661	1661
Adj Flow Rate, veh/h	59	498	0	265	661	14	717	5	319	3	14	49
Peak Hour Factor	0.95	0.95	0.95	0.93	0.93	0.93	0.86	0.86	0.86	0.73	0.73	0.73
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	176	576		294	778	16	766	10	666	5	70	247
Arrive On Green	0.10	0.17	0.00	0.20	0.27	0.27	0.23	0.45	0.45	0.00	0.22	0.22
Sat Flow, veh/h	1709	3409	1521	1454	2904	61	3284	23	1487	1581	324	1133
Grp Volume(v), veh/h	59	498	0	265	330	345	717	0	324	3	0	63
Grp Sat Flow(s), veh/h/ln	1709	1705	1521	1454	1450	1516	1642	0	1510	1581	0	1457
Q Serve(g_s), s	2.9	12.8	0.0	16.0	19.4	19.4	19.3	0.0	13.6	0.2	0.0	3.2
Cycle Q Clear(g_c), s	2.9	12.8	0.0	16.0	19.4	19.4	19.3	0.0	13.6	0.2	0.0	3.2
Prop In Lane	1.00		1.00	1.00		0.04	1.00		0.98	1.00		0.78
Lane Grp Cap(c), veh/h	176	576		294	389	406	766	0	676	5	0	317
V/C Ratio(X)	0.33	0.86		0.90	0.85	0.85	0.94	0.00	0.48	0.59	0.00	0.20
Avail Cap(c_a), veh/h	176	606		339	483	505	766	0	676	70	0	317
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
Upstream Filter(I)	0.82	0.82	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.5	36.4	0.0	35.0	31.2	31.2	33.8	0.0	17.5	44.8	0.0	28.8
Incr Delay (d2), s/veh	0.9	10.1	0.0	23.8	11.2	10.8	18.7	0.0	2.4	77.7	0.0	1.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	6.0	0.0	7.5	7.8	8.1	9.4	0.0	5.0	0.2	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.4	46.5	0.0	58.8	42.4	42.1	52.5	0.0	19.9	122.5	0.0	30.2
LnGrp LOS	D	D		E	D	D	D		B	F		C
Approach Vol, veh/h	557			940			1041			66		
Approach Delay, s/veh	45.7			46.9			42.3			34.4		
Approach LOS	D			D			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	4.3	44.3	13.3	28.1	25.0	23.6	22.2	19.2				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	4.0	33.0	7.0	30.0	21.0	16.0	21.0	16.0				
Max Q Clear Time (g_c+I1), s	2.2	15.6	4.9	21.4	21.3	5.2	18.0	14.8				
Green Ext Time (p_c), s	0.0	2.0	0.0	2.7	0.0	0.2	0.2	0.4				

Intersection Summary

HCM 7th Control Delay, s/veh	44.5
HCM 7th LOS	D

Notes

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

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

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Synchro 11 Report

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22-1640 Assembly & Francis& Nine Mile/Driscoll
Background C AM

1: Nine Mile Rd & Francais Ave
Timings

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↕↕	↕	↕	↕↕	↕↕
Traffic Volume (vph)	502	514	254	216	174
Future Volume (vph)	502	514	254	234	216
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	4
Permitted Phases		2	6		
Detector Phase	2	2	1	6	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	22.0	22.0	12.0	34.0	26.0
Total Split (%)	36.7%	36.7%	20.0%	56.7%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	C-Max	C-Max	None	C-Max	Max
Act Effct Green (s)	18.0	18.0	30.0	30.0	22.0
Actuated g/C Ratio	0.30	0.30	0.50	0.50	0.37
v/c Ratio	0.55	0.67	0.80	0.17	0.42
Control Delay (s/veh)	19.9	6.0	28.9	8.6	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.9	6.0	28.9	8.6	9.4
LOS	B	A	C	A	A
Approach Delay (s/veh)	12.9			19.1	9.4
Approach LOS	B			B	A

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 13.6

Intersection LOS: B

Intersection Capacity Utilization 55.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Nine Mile Rd & Francais Ave



22-1640 Assembly & Francis& Nine Mile/Driscoll
Background C PM

1: Nine Mile Rd & Francais Ave
Timings

	→	↘	↙	←	↖
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↕↕	↕	↕	↕↕	↕↕
Traffic Volume (vph)	406	318	256	441	544
Future Volume (vph)	565	403	256	711	690
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	4
Permitted Phases		2	6		
Detector Phase	2	2	1	6	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	22.0	22.0	12.0	34.0	26.0
Total Split (%)	36.7%	36.7%	20.0%	56.7%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	C-Max	C-Max	None	C-Max	Max
Act Effct Green (s)	18.0	18.0	30.0	30.0	22.0
Actuated g/C Ratio	0.30	0.30	0.50	0.50	0.37
v/c Ratio	0.54	0.54	0.72	0.46	0.81
Control Delay (s/veh)	19.8	5.0	22.6	10.9	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.8	5.0	22.6	10.9	21.7
LOS	B	A	C	B	C
Approach Delay (s/veh)	13.6			14.0	21.7
Approach LOS	B			B	C

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay (s/veh): 16.4

Intersection LOS: B

Intersection Capacity Utilization 63.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Nine Mile Rd & Francais Ave



22-1640 Assembly & Francis & Nine Mile/Driscoll
Background C AM

1: Nine Mile Rd & Francis Ave
HCM 7th Signalized Intersection Summary

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕	↕	↕	↕↕	↕↕	↕↕
Traffic Volume (veh/h)	502	514	254	216	174	145
Future Volume (veh/h)	502	514	254	234	216	145
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	2307	2307	1513	1513	1736	1736
Adj Flow Rate, veh/h	598	0	302	279	269	273
Peak Hour Factor	0.84	0.84	0.84	0.84	0.67	0.67
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	1315		445	1437	606	539
Arrive On Green	0.30	0.00	0.13	0.50	0.37	0.37
Sat Flow, veh/h	4499	1955	1441	2949	1653	1471
Grp Volume(v), veh/h	598	0	302	279	269	273
Grp Sat Flow(s), veh/h/ln	2192	1955	1441	1437	1653	1471
Q Serve(g_s), s	6.6	0.0	8.0	3.2	7.4	8.7
Cycle Q Clear(g_c), s	6.6	0.0	8.0	3.2	7.4	8.7
Prop In Lane		1.00			1.00	1.00
Lane Grp Cap(c), veh/h	1315		445	1437	606	539
V/C Ratio(X)	0.45		0.68	0.19	0.44	0.51
Avail Cap(c_a), veh/h	1315		445	1437	606	539
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.0	0.0	12.4	8.3	14.4	14.8
Incr Delay (d2), s/veh	1.1	0.0	4.1	0.3	2.3	3.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	2.8	0.9	2.9	3.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	18.2	0.0	16.5	8.6	16.7	18.1
LnGrp LOS	B		B	A	B	B
Approach Vol, veh/h	598			581	542	
Approach Delay, s/veh	18.2			12.7	17.4	
Approach LOS	B			B	B	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	12.0	22.0		26.0		34.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	8.0	18.0		22.0		30.0
Max Q Clear Time (g_c+I1), s	10.0	8.6		10.7		5.2
Green Ext Time (p_c), s	0.0	2.7		1.5		1.8

Intersection Summary

HCM 7th Control Delay, s/veh	16.1
HCM 7th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [EBR, WBT] is excluded from calculations of the approach delay and intersection delay.

07/22/2025
CivTech Inc. -MZA

Synchro 11 Report
Page 2

22-1640 Assembly & Francis & Nine Mile/Driscoll
Background C PM

1: Nine Mile Rd & Francis Ave
HCM 7th Signalized Intersection Summary

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕	↕	↕	↕↕	↕↕	↕↕
Traffic Volume (veh/h)	406	318	256	441	544	296
Future Volume (veh/h)	565	403	256	711	690	296
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	2322	2322	1527	1527	1750	1750
Adj Flow Rate, veh/h	595	0	275	765	508	523
Peak Hour Factor	0.95	0.95	0.93	0.93	0.97	0.97
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1323		449	1450	611	544
Arrive On Green	0.30	0.00	0.13	0.50	0.37	0.37
Sat Flow, veh/h	4527	1967	1454	2977	1666	1483
Grp Volume(v), veh/h	595	0	275	765	508	523
Grp Sat Flow(s), veh/h/ln	2206	1967	1454	1450	1666	1483
Q Serve(g_s), s	6.5	0.0	7.5	10.7	16.7	20.7
Cycle Q Clear(g_c), s	6.5	0.0	7.5	10.7	16.7	20.7
Prop In Lane		1.00			1.00	1.00
Lane Grp Cap(c), veh/h	1323		449	1450	611	544
V/C Ratio(X)	0.45		0.61	0.53	0.83	0.96
Avail Cap(c_a), veh/h	1323		449	1450	611	544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.0	0.0	11.5	10.2	17.3	18.6
Incr Delay (d2), s/veh	1.1	0.0	2.4	1.4	12.5	30.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	2.3	3.1	7.7	10.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	18.1	0.0	14.0	11.6	29.8	48.8
LnGrp LOS	B		B	B	C	D
Approach Vol, veh/h	595			1040	1031	
Approach Delay, s/veh	18.1			12.2	39.4	
Approach LOS	B			B	D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	12.0	22.0		26.0		34.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	8.0	18.0		22.0		30.0
Max Q Clear Time (g_c+I1), s	9.5	8.5		22.7		12.7
Green Ext Time (p_c), s	0.0	2.7		0.0		5.0

Intersection Summary

HCM 7th Control Delay, s/veh	24.1
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [EBR, WBT] is excluded from calculations of the approach delay and intersection delay.

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CivTech Inc. -MZA

Synchro 11 Report
Page 2

22-1640 Assembly & Francis& Nine Mile/Driscoll
Background C AM

2: Assembly St & Francais Ave
HCM 7th TWSC

Intersection												
Int Delay, s/veh	44.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Vol, veh/h	56	384	530	238	237	8	174	0	135	0	0	41
Future Vol, veh/h	56	384	642	238	237	8	192	0	135	0	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	None	-	-	None	-	-	None
Storage Length	100	-	150	0	-	-	150	-	0	-	-	0
Veh in Median Storage, #	-	1	-	-	1	-	-	1	-	-	1	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	94	94	94	90	90	90	76	76	76	56	56	56
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	60	409	683	264	263	9	253	0	178	0	0	73

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	272	0	- 409	0 0 1188
Stage 1	-	-	-	- 528
Stage 2	-	-	-	- 661
Critical Hdwy	4.1	-	- 4.12	- 7.9
Critical Hdwy Stg 1	-	-	-	- 6.9
Critical Hdwy Stg 2	-	-	-	- 6.9
Follow-up Hdwy	2.2	-	- 2.21	- 3.5
Pot Cap-1 Maneuver	1303	-	0 1275	- ~ 154
Stage 1	-	-	0	- 593
Stage 2	-	-	0	- 393
Platoon blocked, %	-	-	0	- 0
Mov Cap-1 Maneuver	1303	-	- 1275	- ~ 107
Mov Cap-2 Maneuver	-	-	-	- ~ 184
Stage 1	-	-	-	- 566
Stage 2	-	-	-	- 286

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	1	4.22	149.07	9.48
HCM LOS			F	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	184	1009	1303	-	1275	-	-	877
HCM Lane V/C Ratio	1.374	0.176	0.046	-	0.207	-	-	0.083
HCM Ctrl Dly (s/v)	247.3	9.3	7.9	-	8.6	-	-	9.5
HCM Lane LOS	F	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	14.9	0.6	0.1	-	0.8	-	-	0.3

Notes	
~: Volume exceeds capacity	~: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

22-1640 Assembly & Francis& Nine Mile/Driscoll
Background C PM

2: Assembly St & Francais Ave
HCM 7th TWSC

Intersection												
Int Delay, s/veh	650.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Vol, veh/h	44	363	317	246	428	13	555	0	278	0	0	27
Future Vol, veh/h	56	473	354	246	615	13	617	0	278	0	0	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	None	-	-	None	-	-	None
Storage Length	100	-	150	0	-	-	150	-	0	-	-	0
Veh in Median Storage, #	-	1	-	-	1	-	-	1	-	-	1	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	95	95	95	93	93	93	86	86	86	73	73	73
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	59	498	373	265	661	14	717	0	323	0	0	66

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	675	0	- 498	0 0 1475
Stage 1	-	-	-	- 616
Stage 2	-	-	-	- 860
Critical Hdwy	4.1	-	- 4.1	- 7.9
Critical Hdwy Stg 1	-	-	-	- 6.9
Critical Hdwy Stg 2	-	-	-	- 6.9
Follow-up Hdwy	2.2	-	- 2.2	- 3.5
Pot Cap-1 Maneuver	926	-	0 1182	- ~ 88
Stage 1	-	-	0	- 516
Stage 2	-	-	0	- 292
Platoon blocked, %	-	-	0	- 0
Mov Cap-1 Maneuver	926	-	- 1182	- ~ 57
Mov Cap-2 Maneuver	-	-	-	- ~ 118
Stage 1	-	-	-	- ~ 483
Stage 2	-	-	-	- ~ 203

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.97	2.51	\$ 1624.33	11.34
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	118	971	926	-	1182	-	-	634
HCM Lane V/C Ratio	6.067	0.333	0.064	-	0.224	-	-	0.104
HCM Ctrl Dly (s/v)	\$ 2351.5	10.6	9.2	-	8.9	-	-	11.3
HCM Lane LOS	F	B	A	-	A	-	-	B
HCM 95th %tile Q(veh)	78.3	1.5	0.2	-	0.9	-	-	0.3

Notes	
~: Volume exceeds capacity	~: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

22-1640 Assembly & Francis & Nine Mile/Driscoll 1: Assembly St & Nine Mile Rd/Francis Ave
Option D - Background AM Timings

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↔↔	↔↔	↔↔	↔↔	↔↔
Traffic Volume (vph)	502	514	254	216	174
Future Volume (vph)	833	845	254	327	285
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	4
Permitted Phases		2	6		
Detector Phase	2	2	1	6	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	22.0	22.0	12.0	34.0	26.0
Total Split (%)	36.7%	36.7%	20.0%	56.7%	43.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	Max	Max	None	Max	C-Max
Act Effct Green (s)	18.0	18.0	30.0	30.0	22.0
Actuated g/C Ratio	0.30	0.30	0.50	0.50	0.37
v/c Ratio	0.91	0.95	0.91	0.24	0.50
Control Delay (s/veh)	35.2	24.0	46.7	9.0	11.3
Queue Delay	0.0	2.4	1.3	0.0	0.0
Total Delay (s/veh)	35.2	26.3	48.0	9.0	11.3
LOS	D	C	D	A	B
Approach Delay (s/veh)	30.7			26.1	11.3
Approach LOS	C			C	B
Intersection Summary					
Cycle Length: 60					
Actuated Cycle Length: 60					
Offset: 28 (47%), Referenced to phase 4:NBL, Start of Green					
Natural Cycle: 70					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.95					
Intersection Signal Delay (s/veh): 26.1					
Intersection Capacity Utilization 55.1%					
Analysis Period (min) 15					
Intersection LOS: C					
ICU Level of Service B					

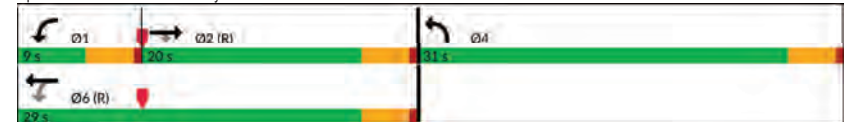
Splits and Phases: 1: Assembly St & Nine Mile Rd/Francis Ave



22-1640 Assembly & Francis & Nine Mile/Driscoll 1: Assembly St & Nine Mile Rd/Francis Ave
Option D - Background PM Timings

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Configurations	↔↔	↔↔	↔↔	↔↔	↔↔
Traffic Volume (vph)	406	318	256	441	544
Future Volume (vph)	630	543	256	822	924
Turn Type	NA	Perm	pm+pt	NA	Prot
Protected Phases	2		1	6	4
Permitted Phases		2	6		
Detector Phase	2	2	1	6	4
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	20.0	9.0	29.0	31.0
Total Split (%)	33.3%	33.3%	15.0%	48.3%	51.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes	Yes		
Recall Mode	C-Max	C-Max	None	C-Max	Max
Act Effct Green (s)	16.0	16.0	25.0	25.0	27.0
Actuated g/C Ratio	0.27	0.27	0.42	0.42	0.45
v/c Ratio	0.68	0.67	1.09	0.64	0.84
Control Delay (s/veh)	23.9	6.4	102.8	16.6	18.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.9	6.4	102.8	16.6	18.9
LOS	C	A	F	B	B
Approach Delay (s/veh)	15.8			37.1	18.9
Approach LOS	B			D	B
Intersection Summary					
Cycle Length: 60					
Actuated Cycle Length: 60					
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green					
Natural Cycle: 60					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 1.09					
Intersection Signal Delay (s/veh): 23.6					
Intersection Capacity Utilization 62.7%					
Analysis Period (min) 15					
Intersection LOS: C					
ICU Level of Service B					

Splits and Phases: 1: Assembly St & Nine Mile Rd/Francis Ave



22-1640 Assembly & Francis& Nine Mile/Driscoll 1: Assembly St & Nine Mile Rd/Francis Ave
Option D - Background AM HCM 7th Signalized Intersection Summary

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕	↕	↕	↕↕	↕↕	↕↕
Traffic Volume (veh/h)	502	514	254	216	174	135
Future Volume (veh/h)	833	845	254	327	285	135
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	2307	2307	1513	1513	1736	1736
Adj Flow Rate, veh/h	992	0	302	389	313	321
Peak Hour Factor	0.84	0.84	0.84	0.84	0.67	0.67
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	1315		358	1437	606	539
Arrive On Green	0.30	0.00	0.13	0.50	0.37	0.37
Sat Flow, veh/h	4499	1955	1441	2949	1653	1471
Grp Volume(v), veh/h	992	0	302	389	313	321
Grp Sat Flow(s),veh/h/ln	2192	1955	1441	1437	1653	1471
Q Serve(g_s), s	12.3	0.0	8.0	4.7	8.9	10.6
Cycle Q Clear(g_c), s	12.3	0.0	8.0	4.7	8.9	10.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1315		358	1437	606	539
V/C Ratio(X)	0.75		0.84	0.27	0.52	0.60
Avail Cap(c_a), veh/h	1315		358	1437	606	539
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	0.0	14.3	8.7	14.8	15.4
Incr Delay (d2), s/veh	4.1	0.0	16.5	0.5	3.1	4.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.5	0.0	7.1	2.4	6.3	7.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	23.1	0.0	30.8	9.1	18.0	20.2
LnGrp LOS	C		C	A	B	C
Approach Vol, veh/h	992			691	634	
Approach Delay, s/veh	23.1			18.6	19.1	
Approach LOS	C			B	B	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	12.0	22.0		26.0		34.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	8.0	18.0		22.0		30.0
Max Q Clear Time (g_c+I1), s	10.0	0.0		12.6		6.7
Green Ext Time (p_c), s	0.0	0.0		1.6		2.6

Intersection Summary						
HCM 7th Control Delay, s/veh			20.6			
HCM 7th LOS			C			

Notes
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

22-1640 Assembly & Francis& Nine Mile/Driscoll 1: Assembly St & Nine Mile Rd/Francis Ave
Option D - Background PM HCM 7th Signalized Intersection Summary

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕	↕	↕	↕↕	↕↕	↕↕
Traffic Volume (veh/h)	406	318	256	441	544	286
Future Volume (veh/h)	630	543	256	822	924	286
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	2322	2322	1527	1527	1750	1750
Adj Flow Rate, veh/h	663	0	275	884	624	648
Peak Hour Factor	0.95	0.95	0.93	0.93	0.97	0.97
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	1176		332	1209	750	667
Arrive On Green	0.27	0.00	0.08	0.42	0.45	0.45
Sat Flow, veh/h	4527	1967	1454	2977	1666	1483
Grp Volume(v), veh/h	663	0	275	884	624	648
Grp Sat Flow(s),veh/h/ln	2206	1967	1454	1450	1666	1483
Q Serve(g_s), s	7.8	0.0	5.0	15.3	19.8	25.6
Cycle Q Clear(g_c), s	7.8	0.0	5.0	15.3	19.8	25.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1176		332	1209	750	667
V/C Ratio(X)	0.56		0.83	0.73	0.83	0.97
Avail Cap(c_a), veh/h	1176		332	1209	750	667
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	0.0	19.6	14.7	14.5	16.1
Incr Delay (d2), s/veh	2.0	0.0	15.8	3.9	10.5	28.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	3.2	5.0	8.4	12.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	20.9	0.0	35.4	18.6	25.0	44.6
LnGrp LOS	C		D	B	C	D
Approach Vol, veh/h	663			1159	1272	
Approach Delay, s/veh	20.9			22.6	34.9	
Approach LOS	C			C	C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	9.0	20.0		31.0		29.0
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	5.0	16.0		27.0		25.0
Max Q Clear Time (g_c+I1), s	7.0	0.0		27.6		17.3
Green Ext Time (p_c), s	0.0	0.0		0.0		3.6

Intersection Summary						
HCM 7th Control Delay, s/veh			27.3			
HCM 7th LOS			C			

Notes
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background AM

2: Assembly St & Francis Ave
HCM 7th TWSC

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↕	↕	↕			↕			↕
Traffic Vol, veh/h	0	583	10	10	475	8	0	0	10	0	0	61
Future Vol, veh/h	0	914	10	10	586	8	0	0	10	0	0	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	100	-	-	0	-	-	0
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	94	94	94	90	90	90	76	76	76	56	56	56
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	0	972	11	11	651	9	0	0	13	0	0	109

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	-	0	0	983
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	4.115
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	2.2095
Pot Cap-1 Maneuver	0	-	-	705
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	705
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.17	12.19	16.15
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	514	-	-	705	-	-	431
HCM Lane V/C Ratio	0.026	-	-	0.016	-	-	0.253
HCM Ctrl Dly (s/v)	12.2	-	-	10.2	-	-	16.1
HCM Lane LOS	B	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	1

22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background PM

2: Assembly St & Francis Ave
HCM 7th TWSC

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↕	↕	↕			↕			↕
Traffic Vol, veh/h	0	694	10	10	674	13	0	0	10	0	0	45
Future Vol, veh/h	0	918	10	10	1055	13	0	0	10	0	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	100	-	-	0	-	-	0
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	1	-	-	7	-	-	2	-	-	5	-
Peak Hour Factor	95	95	95	93	93	93	86	86	86	73	73	73
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	966	11	11	1134	14	0	0	12	0	0	62

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	-	0	0	977
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	-	-	4.1
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	-	-	2.2
Pot Cap-1 Maneuver	0	-	-	714
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	714
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.09	12.13	28.73
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	516	-	-	714	-	-	212
HCM Lane V/C Ratio	0.023	-	-	0.015	-	-	0.29
HCM Ctrl Dly (s/v)	12.1	-	-	10.1	-	-	28.7
HCM Lane LOS	B	-	-	B	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	0	-	-	1.2

22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background AM

4: Assembly St & Driscoll Blvd
Timings

Lane Group	WBL	NBT	SBL	SBT	Ø4
Lane Configurations					
Traffic Volume (vph)	10	160	198	586	
Future Volume (vph)	10	238	298	817	
Turn Type	pm+pt	NA	pm+pt	NA	
Protected Phases	7	2	1	6	4
Permitted Phases	4		6		
Detector Phase	7	2	1	6	
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	32.0	8.0	40.0	20.0
Total Split (%)	33.3%	53.3%	13.3%	66.7%	33%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	
Lead/Lag		Lag	Lead		
Lead-Lag Optimize?		Yes	Yes		
Recall Mode	None	C-Max	None	C-Max	None
Act Effct Green (s)	8.6	28.0	43.4	43.4	
Actuated g/C Ratio	0.14	0.47	0.72	0.72	
v/c Ratio	0.63	1.21	0.75	0.71	
Control Delay (s/veh)	13.9	127.8	27.5	10.1	
Queue Delay	0.0	0.0	0.0	0.4	
Total Delay (s/veh)	13.9	127.8	27.5	10.5	
LOS	B	F	C	B	
Approach Delay (s/veh)	13.9	127.8		15.0	
Approach LOS	B	F		B	
Intersection Summary					
Cycle Length: 60					
Actuated Cycle Length: 60					
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green					
Natural Cycle: 90					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 1.21					
Intersection Signal Delay (s/veh): 60.5			Intersection LOS: E		
Intersection Capacity Utilization 49.5%			ICU Level of Service A		
Analysis Period (min) 15					

Splits and Phases: 4: Assembly St & Driscoll Blvd



22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background PM

4: Assembly St & Driscoll Blvd
Timings

Lane Group	WBL	NBT	SBL	SBT	Ø4
Lane Configurations					
Traffic Volume (vph)	10	533	145	428	
Future Volume (vph)	10	800	213	585	
Turn Type	pm+pt	NA	pm+pt	NA	
Protected Phases	7	2	1	6	4
Permitted Phases	4		6		
Detector Phase	7	2	1	6	
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0
Total Split (s)	20.0	32.0	8.0	40.0	20.0
Total Split (%)	33.3%	53.3%	13.3%	66.7%	33%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	
Lead/Lag		Lag	Lead		
Lead-Lag Optimize?		Yes	Yes		
Recall Mode	None	C-Max	None	C-Max	None
Act Effct Green (s)	14.3	28.0	37.7	37.7	
Actuated g/C Ratio	0.24	0.47	0.63	0.63	
v/c Ratio	0.89	1.08	0.86	0.59	
Control Delay (s/veh)	33.1	74.2	45.3	8.6	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay (s/veh)	33.1	74.2	45.3	8.6	
LOS	C	E	D	A	
Approach Delay (s/veh)	33.1	74.2		18.4	
Approach LOS	C	E		B	
Intersection Summary					
Cycle Length: 60					
Actuated Cycle Length: 60					
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green					
Natural Cycle: 90					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 1.08					
Intersection Signal Delay (s/veh): 43.6			Intersection LOS: D		
Intersection Capacity Utilization 69.6%			ICU Level of Service C		
Analysis Period (min) 15					

Splits and Phases: 4: Assembly St & Driscoll Blvd



22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background AM

4: Assembly St & Driscoll Blvd
HCM 7th Signalized Intersection Summary

	←	↖	↑	↗	→	↘
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Volume (veh/h)	10	149	160	10	198	586
Future Volume (veh/h)	10	182	238	10	298	817
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No	
Adj Sat Flow, veh/h/ln	1794	1794	1766	1766	1711	1683
Adj Flow Rate, veh/h	13	0	952	0	324	888
Peak Hour Factor	0.77	0.77	0.25	0.25	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	0	2
Cap, veh/h	22		1271		451	1435
Arrive On Green	0.01	0.00	0.72	0.00	0.07	0.85
Sat Flow, veh/h	1592	0	1766	0	1629	1683
Grp Volume(v), veh/h	14	0	952	0	324	888
Grp Sat Flow(s), veh/h/ln	1715	0	1766	0	1629	1683
Q Serve(g_s), s	0.5	0.0	19.7	0.0	2.7	9.9
Cycle Q Clear(g_c), s	0.5	0.0	19.7	0.0	2.7	9.9
Prop In Lane	0.93	0.00		0.00	1.00	
Lane Grp Cap(c), veh/h	24		1271		451	1435
V/C Ratio(X)	0.59		0.75		0.72	0.62
Avail Cap(c_a), veh/h	457		1271		451	1435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	29.4	0.0	5.1	0.0	10.1	1.4
Incr Delay (d2), s/veh	21.0	0.0	4.1	0.0	5.4	2.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	0.0	8.9	0.0	5.5	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	50.4	0.0	9.2	0.0	15.6	3.4
LnGrp LOS	D		A		B	A
Approach Vol, veh/h	14		952		1212	
Approach Delay, s/veh	50.4		9.2		6.6	
Approach LOS	D		A		A	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	8.0	47.2		4.8		55.2
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	4.0	28.0		16.0		36.0
Max Q Clear Time (g_c+I1), s	4.7	21.7		2.5		11.9
Green Ext Time (p_c), s	0.0	3.6		0.0		7.6

Intersection Summary					
HCM 7th Control Delay, s/veh			8.0		
HCM 7th LOS			A		

Notes
Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background PM

4: Assembly St & Driscoll Blvd
HCM 7th Signalized Intersection Summary

	←	↖	↑	↗	→	↘
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Volume (veh/h)	10	310	533	10	145	428
Future Volume (veh/h)	10	423	800	10	213	585
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No		No	
Adj Sat Flow, veh/h/ln	1794	1794	1766	1766	1683	1683
Adj Flow Rate, veh/h	11	0	870	0	232	636
Peak Hour Factor	0.91	0.91	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	19		1276		499	1438
Arrive On Green	0.01	0.00	0.72	0.00	0.07	0.85
Sat Flow, veh/h	1573	0	1766	0	1603	1683
Grp Volume(v), veh/h	12	0	870	0	232	636
Grp Sat Flow(s), veh/h/ln	1716	0	1766	0	1603	1683
Q Serve(g_s), s	0.4	0.0	16.2	0.0	1.8	5.3
Cycle Q Clear(g_c), s	0.4	0.0	16.2	0.0	1.8	5.3
Prop In Lane	0.92	0.00		0.00	1.00	
Lane Grp Cap(c), veh/h	21		1276		499	1438
V/C Ratio(X)	0.58		0.68		0.47	0.44
Avail Cap(c_a), veh/h	458		1276		501	1438
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	29.5	0.0	4.5	0.0	5.6	1.0
Incr Delay (d2), s/veh	23.0	0.0	3.0	0.0	0.7	1.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	4.0	0.0	0.9	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	52.5	0.0	7.5	0.0	6.3	2.0
LnGrp LOS	D		A		A	A
Approach Vol, veh/h	12		870		868	
Approach Delay, s/veh	52.5		7.5		3.1	
Approach LOS	D		A		A	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	7.9	47.4		4.7		55.3
Change Period (Y+Rc), s	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s	4.0	28.0		16.0		36.0
Max Q Clear Time (g_c+I1), s	3.8	18.2		2.4		7.3
Green Ext Time (p_c), s	0.0	4.5		0.0		4.8

Intersection Summary					
HCM 7th Control Delay, s/veh			5.7		
HCM 7th LOS			A		

Notes
Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background AM

6: Nine Mile Rd/Assembly St
HCM 7th TWSC

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑			↑
Traffic Vol, veh/h	0	5	0	10	0	0
Future Vol, veh/h	0	5	111	10	0	331
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	-	2	-	-	1
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	5	121	11	0	360

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	126	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.22	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.318	-
Pot Cap-1 Maneuver	0	924	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	924	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	8.92	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	924	-
HCM Lane V/C Ratio	-	0.006	-
HCM Ctrl Dly (s/v)	-	8.9	-
HCM Lane LOS	-	A	-
HCM 95th %tile Q(veh)	-	0	-

22-1640 Assembly & Francis & Nine Mile/Driscoll
Option D - Background PM

6: Nine Mile Rd/Assembly St
HCM 7th TWSC

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↑	↑			↑
Traffic Vol, veh/h	0	5	0	10	0	0
Future Vol, veh/h	0	5	380	10	0	225
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	-	2	-	-	1
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	5	413	11	0	245

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	418	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.22	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.318	-
Pot Cap-1 Maneuver	0	635	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	635	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	10.72	0	0
HCM LOS	B		

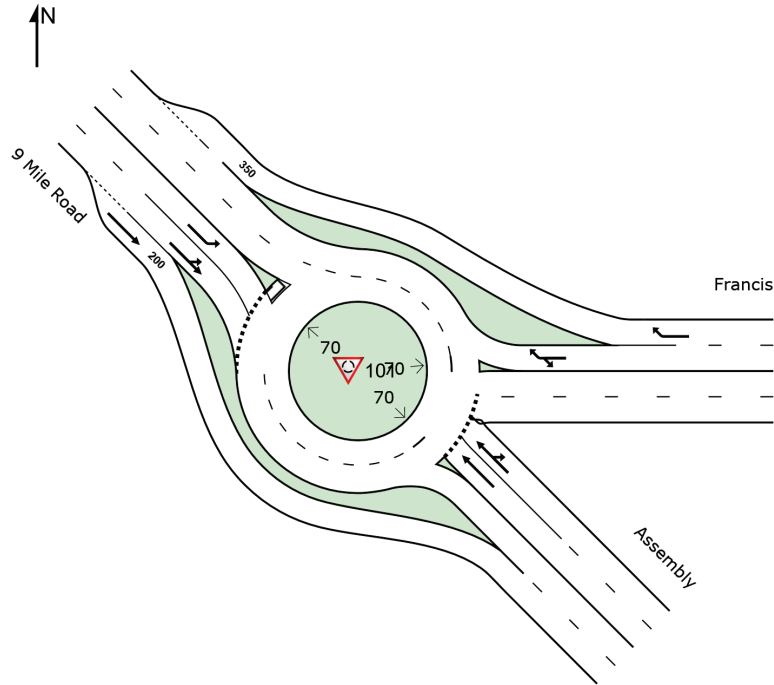
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	635	-
HCM Lane V/C Ratio	-	0.009	-
HCM Ctrl Dly (s/v)	-	10.7	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q(veh)	-	0	-

SITE LAYOUT

Site: 101 [Francis & Assembly_v5 - AM (Site Folder: General)]

New Site
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

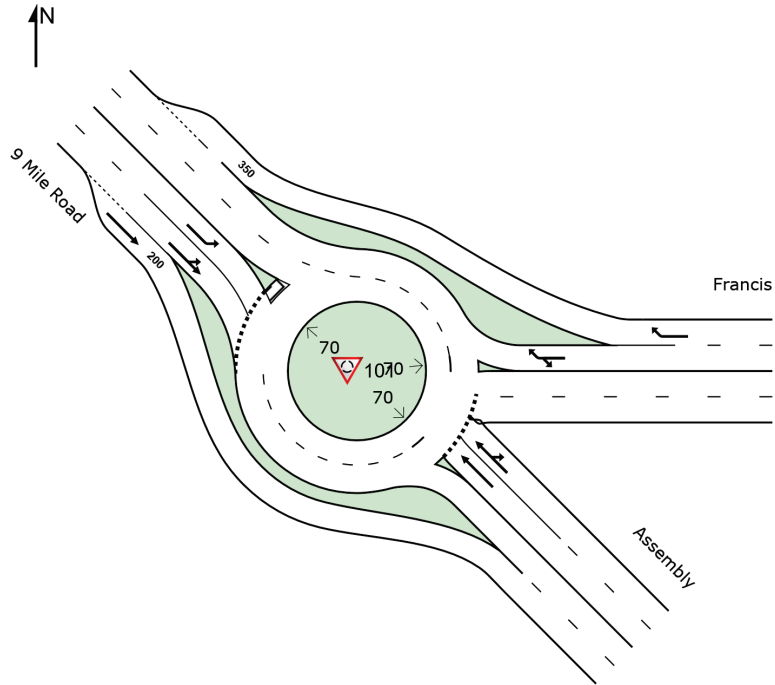


SITE LAYOUT

Site: 101 [Francis & Assembly_v5 - PM (Site Folder: General)]

New Site
Site Category: Proposed Design 1
Roundabout

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MOVEMENT SUMMARY

Site: 101 [Francis & Assembly_v5 - AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] ft				mph
SouthEast: Assembly															
8x	T1	All MCs	265	2.0	265	2.0	0.246	7.0	LOS A	1.0	24.8	0.55	0.45	0.55	26.4
18bx	R3	All MCs	145	2.0	145	2.0	0.246	6.8	LOS A	1.0	24.7	0.54	0.44	0.54	26.2
Approach			410	2.0	410	2.0	0.246	6.9	LOS A	1.0	24.8	0.55	0.45	0.55	26.4
East: Francis															
1b	L3	All MCs	254	3.0	254	3.0	0.199	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	32.5
16a	R1	All MCs	308	2.0	308	2.0	0.199	2.5	LOS A	0.0	0.0	0.00	0.00	0.00	32.9
Approach			562	2.5	562	2.5	0.199	1.4	LOS A	0.0	0.0	0.00	0.00	0.00	32.7
NorthWest: 9 Mile Road															
7ax	L1	All MCs	528	2.0	528	2.0	0.320	6.4	LOS A	1.6	39.6	0.45	0.28	0.45	28.4
4x	T1	All MCs	788	2.0	788	2.0	0.320	1.5	LOS A	1.6	39.6	0.10	0.06	0.10	31.8
Approach			1316	2.0	1316	2.0	0.320	3.4	LOS A	1.6	39.6	0.24	0.15	0.24	30.3
All Vehicles			2288	2.1	2288	2.1	0.320	3.6	LOS A	1.6	39.6	0.23	0.17	0.23	30.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Francis & Assembly_v5 - PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] ft				mph
SouthEast: Assembly															
8x	T1	All MCs	856	2.0	856	2.0	0.730	19.4	LOS C	8.2	205.5	0.85	1.08	1.66	23.1
18bx	R3	All MCs	291	2.0	291	2.0	0.730	18.6	LOS C	8.2	205.5	0.85	1.07	1.65	23.1
Approach			1147	2.0	1147	2.0	0.730	19.2	LOS C	8.2	205.5	0.85	1.08	1.66	23.1
East: Francis															
1b	L3	All MCs	256	3.0	256	3.0	0.348	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	32.3
16a	R1	All MCs	754	2.0	754	2.0	0.348	3.5	LOS A	0.0	0.0	0.00	0.00	0.00	32.9
Approach			1010	2.3	1010	2.3	0.348	2.6	LOS A	0.0	0.0	0.00	0.00	0.00	32.7
NorthWest: 9 Mile Road															
7ax	L1	All MCs	590	2.0	590	2.0	0.271	5.8	LOS A	1.3	31.9	0.43	0.27	0.43	28.4
4x	T1	All MCs	503	2.0	503	2.0	0.260	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	32.6
Approach			1093	2.0	1093	2.0	0.271	3.2	LOS A	1.3	31.9	0.23	0.15	0.23	30.2
All Vehicles			3250	2.1	3250	2.1	0.730	8.7	LOS A	8.2	205.5	0.38	0.43	0.66	27.8

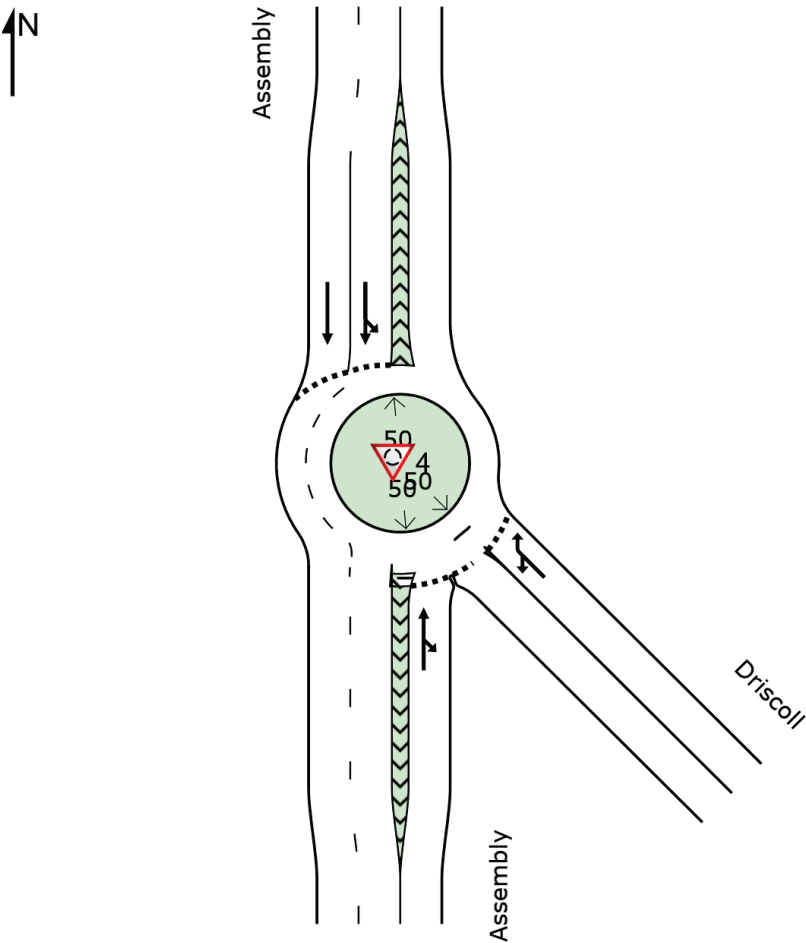
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 4 [Driscoll & Assembly AM (Site Folder: AM)]

New Site
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

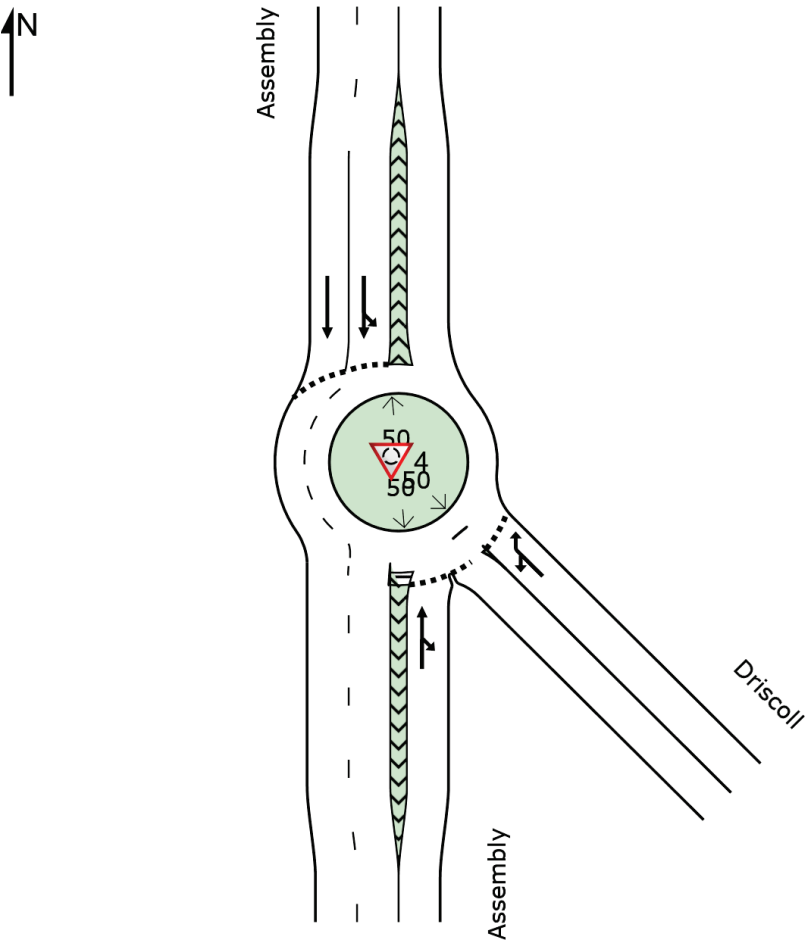


SITE LAYOUT

Site: 4 [Driscoll & Assembly PM (Site Folder: PM)]

New Site
Site Category: Proposed Design 1
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 4 [Driscoll & Assembly AM (Site Folder: AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
South: Assembly															
NBT	T1	All MCs	238	2.0	238	2.0	0.254	6.3	LOS A	1.3	32.3	0.42	0.54	0.42	34.5
NBR	R3	All MCs	12	2.0	12	2.0	0.254	6.5	LOS A	1.3	32.3	0.42	0.54	0.42	34.0
Approach			249	2.0	249	2.0	0.254	6.3	LOS A	1.3	32.3	0.42	0.54	0.42	34.4
SouthEast: Driscoll															
WBL	L3	All MCs	15	2.0	15	2.0	0.298	11.2	LOS B	1.4	34.7	0.41	0.57	0.41	34.1
WBR	R1	All MCs	248	2.0	248	2.0	0.298	5.8	LOS A	1.4	34.7	0.41	0.57	0.41	34.7
Approach			263	2.0	263	2.0	0.298	6.1	LOS A	1.4	34.7	0.41	0.57	0.41	34.6
North: Assembly															
SBL	L1	All MCs	239	0.0	239	0.0	0.397	7.9	LOS A	2.7	67.8	0.12	0.53	0.12	34.2
SBT	T1	All MCs	858	0.0	858	0.0	0.397	4.7	LOS A	2.7	67.9	0.12	0.47	0.12	35.3
Approach			1096	0.0	1096	0.0	0.397	5.4	LOS A	2.7	67.9	0.12	0.49	0.12	35.0
All Vehicles			1609	0.6	1609	0.6	0.397	5.6	LOS A	2.7	67.9	0.21	0.51	0.21	34.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

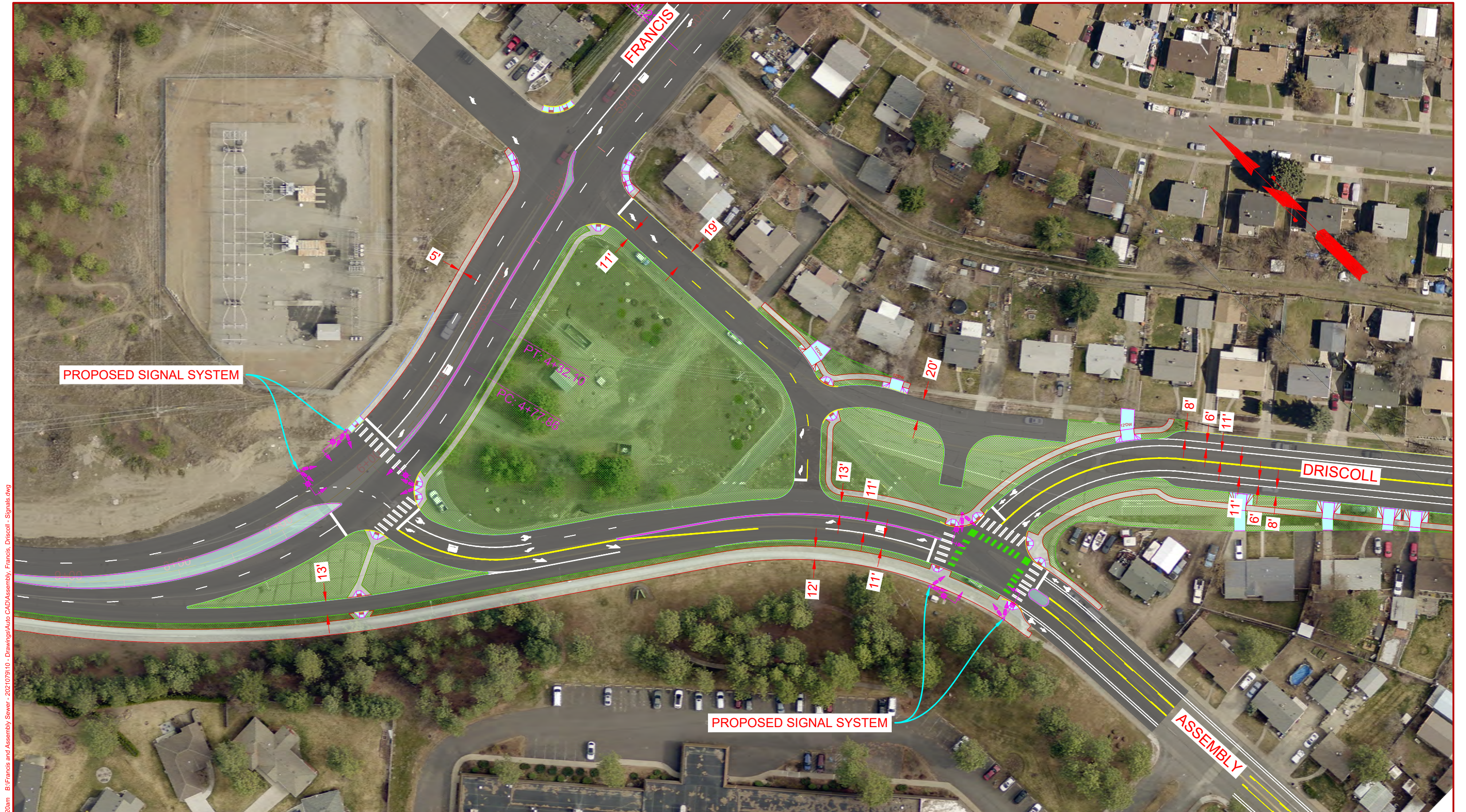
Site: 4 [Driscoll & Assembly PM (Site Folder: PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
South: Assembly															
NBT	T1	All MCs	743	2.0	743	2.0	0.754	9.1	LOS A	8.9	225.6	0.74	0.66	0.84	33.4
NBR	R3	All MCs	11	2.0	11	2.0	0.754	9.4	LOS A	8.9	225.6	0.74	0.66	0.84	32.9
Approach			754	2.0	754	2.0	0.754	9.1	LOS A	8.9	225.6	0.74	0.66	0.84	33.4
SouthEast: Driscoll															
WBL	L3	All MCs	11	2.0	11	2.0	0.818	26.1	LOS C	9.0	228.4	0.98	1.11	1.61	28.0
WBR	R1	All MCs	409	2.0	409	2.0	0.818	20.7	LOS C	9.0	228.4	0.98	1.11	1.61	28.4
Approach			420	2.0	420	2.0	0.818	20.8	LOS C	9.0	228.4	0.98	1.11	1.61	28.4
North: Assembly															
SBL	L1	All MCs	208	2.0	208	2.0	0.303	7.9	LOS A	2.2	57.1	0.11	0.55	0.11	34.0
SBT	T1	All MCs	614	2.0	614	2.0	0.303	4.7	LOS A	2.3	57.3	0.11	0.47	0.11	35.2
Approach			823	2.0	823	2.0	0.303	5.5	LOS A	2.3	57.3	0.11	0.49	0.11	34.9
All Vehicles			1997	2.0	1997	2.0	0.818	10.1	LOS B	9.0	228.4	0.53	0.69	0.70	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA HCM.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.



Plotted On: Dec 23, 2024 - 11:20am B:\Francis and Assembly Sewer - 20210709\10 - Drawings\Auto CAD\Assembly - Francis, Driscoll - Signals.dwg

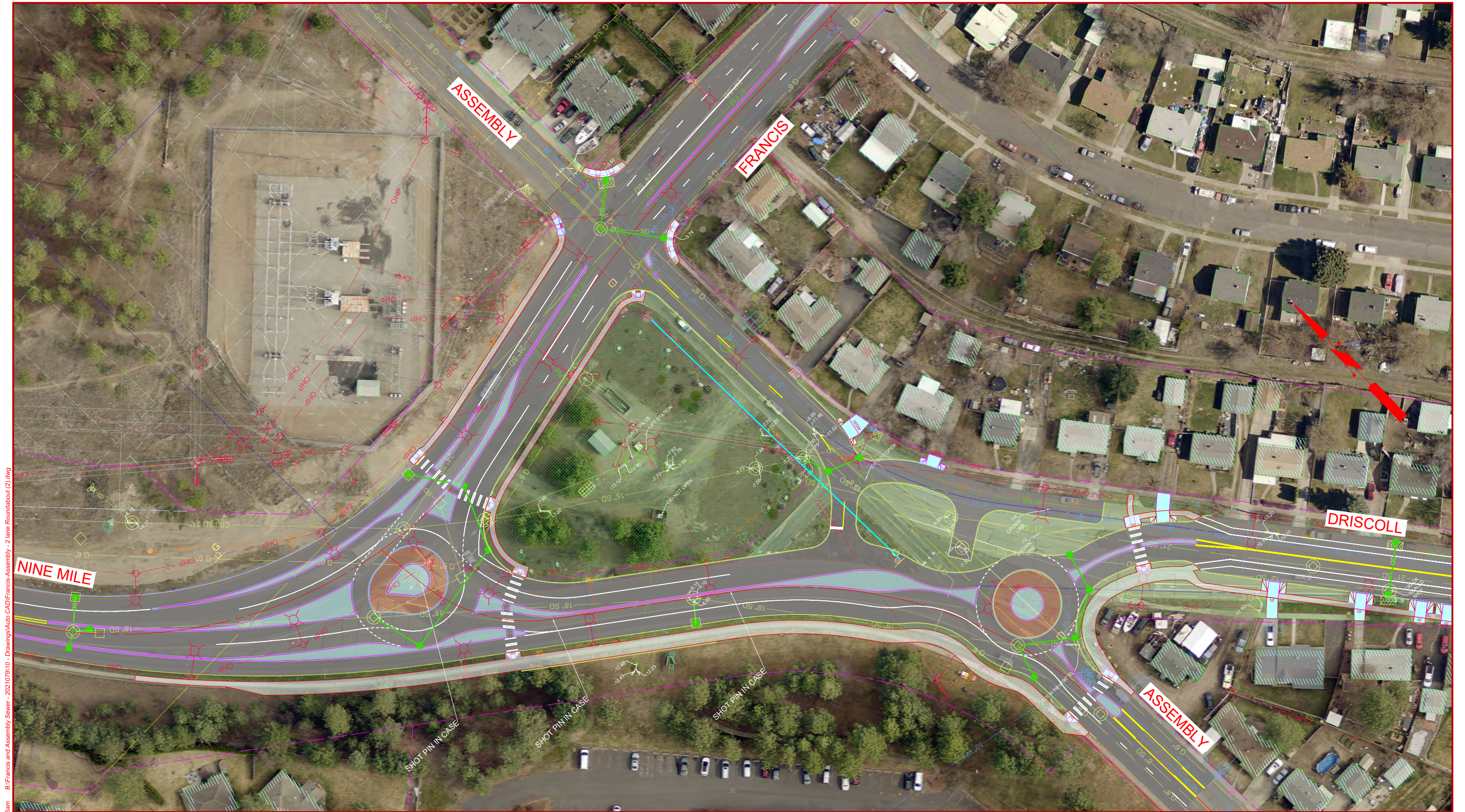


PUBLIC WORKS DIVISION
INTEGRATED CAPITAL MANAGEMENT

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FRANCIS, ASSEMBLY & DRISCOLL

PROJECT # 2021079
INTERSECTIONS
PROPOSED SIGNAL SYSTEMS



Printed On: Jun 03, 2025 - 7:56am B:\Francis and Assembly Sewer - 202107910 - Drawings\Auto CAD\Francis-Assembly - 2 lane Roundabout (2).dwg



PUBLIC WORKS DIVISION
INTEGRATED CAPITAL MANAGEMENT

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BE USED FOR DESIGN OR CONSTRUCTION.

FRANCIS - ASSEMBLY

PROJECT # 2021079
INTERSECTION
DOUBLE ROUNDABOUT

[illegible]

[illegible]

[illegible]

[illegible]

JURISDICTION	COUNTY	CITY	INVESTIGATIVE AGENCY	REPORT NUMBER	INDEXED PRIMARY TRAFFICWAY	PRIMARY TRAFFICWAY	BLOCK NUMBER	SR ONLY HISTORY/ SUSPENSE	INTERSECTING TRAFFICWAY	DATE	DAY NAME	TIME 24	TIME	MOST SEVERE INJURY TYPE CODE	MOST SEVERE INJURY TYPE	FATAL COLS	SUSP SER INJ COLS
State Route	Spokane	Spokane	Municipal/0	E912595	291	291		No		04/19/2019	Friday	20:12	8:12 PM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	E995320	291	291		No		12/18/2019	Wednesday	08:32	8:32 AM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EA05247	291	291		No		01/21/2020	Tuesday	03:33	3:33 AM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EA34361	291	291		No		05/16/2020	Saturday	20:07	8:07 PM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EA47511	291	291		No		07/15/2020	Wednesday	16:00	4:00 PM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EA51948	291	291		No		08/02/2020	Sunday	12:16	12:16 PM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EB12976	291	291		No		03/11/2021	Thursday	13:41	1:41 PM	1	No Apparent Injury	0	0
City Street	Spokane	Spokane	Municipal/0	EB39053	W FRANCIS	W FRANCIS AVE		No	W NINE MILL	06/13/2021	Sunday	13:28	1:28 PM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EC61653	291	291		No		07/05/2022	Tuesday	10:30	10:30 AM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EC71024	291	291		No		08/04/2022	Thursday	10:46	10:46 AM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	ED15442	291	291		No		12/13/2022	Tuesday	09:46	9:46 AM	1	No Apparent Injury	0	0
State Route	Spokane	Spokane	Municipal/0	E781829	291	291		No		03/17/2018	Saturday	16:30	4:30 PM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	E920949	291	291		No		05/12/2019	Sunday	19:45	7:45 PM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	E940415	291	291		No		07/16/2019	Tuesday	11:55	11:55 AM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	E997407	291	291		No		12/25/2019	Wednesday	22:07	10:07 PM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EA41004	291	291		No		06/17/2020	Wednesday	21:18	9:18 PM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EB41729	291	291		No		06/22/2021	Tuesday	17:36	5:36 PM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EB57176	291	291		No		08/06/2021	Friday	15:56	3:56 PM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EC17007	291	291		No		02/03/2022	Thursday	12:09	12:09 PM	7	Possible Injury	0	0
State Route	Spokane	Spokane	Municipal/0	E847237	291	291		No		10/09/2018	Tuesday	07:38	7:38 AM	6	Suspected Minor Injury	0	0
City Street	Spokane	Spokane	Municipal/0	E912765	W NINE MILL	W NINE MILL	6200	No	N DRISCOLL	04/20/2019	Saturday	18:12	6:12 PM	6	Suspected Minor Injury	0	0
State Route	Spokane	Spokane	Municipal/0	E957738	291	291		No		09/07/2019	Saturday	14:03	2:03 PM	6	Suspected Minor Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EA31349	291	291		No		04/30/2020	Thursday	14:24	2:24 PM	6	Suspected Minor Injury	0	0
State Route	Spokane	Spokane	State Patrol	EB31358	291	291		No		05/16/2021	Sunday	16:54	4:54 PM	6	Suspected Minor Injury	0	0
City Street	Spokane	Spokane	Municipal/0	ED73467	W NINE MILL	W NINE MILL	6200	No	N ASSEMBLY	06/24/2023	Saturday	20:44	8:44 PM	6	Suspected Minor Injury	0	0
State Route	Spokane	Spokane	Municipal/0	EC66597	291	291		No		07/18/2022	Monday	15:02	3:02 PM	0	Unknown	0	0

SUSP MINOR INJ COLS	POSS INJ COLS	TOTAL INJ COLS	# FAT	# SUSP SER INJ	# SUSP MINOR INJ	# POS INJ	TOTAL # INJ	# VEH	# PEDS	# PEDAL	FIRST COLLISIO N TYPE CODE	FIRST COLLISIO N TYPE	FIRST OBJECT STRUCK CODE	FIRST OBJECT STRUCK	SECOND COLLISIO N TYPE CODE	SECOND COLLISIO N TYPE
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	1	0	0	50	Fixed objec	16	Street Light Pole or Base		
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	28	From opposite direction - one left turn - one straight				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	2	0	0	10	Entering at angle				
0	1	1	0	0	0	2	2	2	0	0	10	Entering at angle				
0	1	1	0	0	0	1	1	1	0	0	50	Fixed objec	14	Metal Sign	50	Fixed objec
0	1	1	0	0	0	1	1	2	0	0	10	Entering at angle				
0	1	1	0	0	0	1	1	2	0	0	10	Entering at angle				
0	1	1	0	0	0	2	2	2	0	0	10	Entering at angle			50	Fixed objec
0	1	1	0	0	0	1	1	2	0	0	10	Entering at angle				
0	1	1	0	0	0	2	2	2	0	0	10	Entering at angle				
1	0	1	0	0	3	0	3	2	0	0	10	Entering at angle				
1	0	1	0	0	1	1	2	2	0	0	10	Entering at angle				
1	0	1	0	0	1	2	3	2	0	0	10	Entering at angle				
1	0	1	0	0	1	0	1	1	0	0	50	Fixed objec	83	Linear Curb	50	Fixed objec
1	0	1	0	0	1	0	1	2	0	0	10	Entering at angle				
0	0	0	0	0	0	0	0	1	0	0	50	Fixed objec	14	Metal Sign Post		

JUNCTION RELATION SHIP CODE	JUNCTION RELATION SHIP	WEATHER CODE	WEATHER	ROADWAY SURFACE CONDITIO N CODE	ROADWAY SURFACE CONDITIO N	ROADWAY CHARACT ERISTIC CODE	ROADWAY CHARACT ERISTIC	LIGHTING CONDITIO N CODE	LIGHTING CONDITIO N	MISCELLA NEOUS TRAFFICW AY TYPE	FIRST IMPACT LOCATION CODE	FIRST IMPACT LOCATION (City, County & Misc Trafficway s - 2010 forward)
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	3	Dusk		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
4	Not at Inter	1	Clear	4	Ice	6	Curve & Gra	4	Dark-Street Lights On		DL	Decreasing
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	2	Straight & G	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	2	Straight & G	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	5	Curve & Lev	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear	1	Dry	5	Curve & Lev	1	Daylight		C1	Lane of Prin
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	5	Curve & Lev	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear	4	Ice	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	7	Curve at Hi	1	Daylight		D1	Lane 1 Dec
5	At Intersect	1	Clear or Pa	1	Dry	1	Straight & L	1	Daylight		D0	Past Right S
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	1	Straight & L	4	Dark-Street Lights On		D1	Lane 1 Dec
1	At Intersect	1	Clear	1	Dry			4	Dark-Street Lights On		D1	Lane 1 Dec
1	At Intersect	1	Clear	1	Dry	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	2	Overcast	3	Snow/Slush			1	Daylight		D1	Lane 1 Dec
1	At Intersect	3	Raining	2	Wet	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	1	Daylight		C1	Lane of Prin
1	At Intersect	1	Clear or Pa	1	Dry	6	Curve & Gra	1	Daylight		D1	Lane 1 Dec
1	At Intersect	1	Clear	1	Dry	2	Straight & G	1	Daylight		D2	Lane 2 Dec
4	Not at Inter	1	Clear	1	Dry	6	Curve & Gra	1	Daylight		A8	Median Sho
1	At Intersect	1	Clear	1	Dry	6	Curve & Gra	3	Dusk		C1	Lane of Prin
1	At Intersect	1	Clear	1	Dry	6	Curve & Gra	1	Daylight		DL	Decreasing

SR ONLY VEH 1 MOVEMENT	SR ONLY VEH 2 MOVEMENT	VEHICLE 1 TYPE	VEHICLE 1 ACTION	VEHICLE 1 COMPASS DIRECTION FROM	VEHICLE 1 COMPASS DIRECTION TO	VEHICLE 1 TRAFFIC CONTROL	VEHICLE 1 POSTED SPEED	VEHICLE 1 ROADWAY TYPE	VEHICLE 1 ROADWAY SURFACE TYPE	VEHICLE 2 TYPE
Turning Left	Moving Straight	Passenger Car	Making Left Turn	South	North	Stop Sign	30	Other	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	South	West	Stop Sign	35	with Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Moving Straight	Unknown or Non-Moving	Pickup, Panel Truck or Vanette	Negotiating Right of Way	West	East	No Traffic Control	35	Other	Blacktop	
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	South	Northwest	Stop Sign	y - Divided, with Barrier		Blacktop	Passenger Car
Turning Left	Moving Straight	Passenger Car	Making Left Turn	South	West	Stop Sign	35	Other	Blacktop	Passenger Car
Turning Left	Moving Straight	Passenger Car	Making Left Turn	South	Northwest	Stop Sign	30	with Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Passenger Car	Making Left Turn	South	Northwest	Stop Sign	30	with Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Primary Trafficway		Passenger Car	Going Straight	South	North	Stop Sign		Two Way - Left Turn	Blacktop	Passenger Car
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	South	North	Stop Sign	30	One Way	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Passenger Car	Making Left Turn	South	North	Stop Sign	30	with Barrier	Blacktop	Passenger Car
Moving Straight	Moving Straight	Pickup, Panel Truck or Vanette	Starting in Turn Lane	South	Northwest	Stop Sign	30	with Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	East	West	Stop Sign	25	Other	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Moving Straight	Unknown or Non-Moving	Pickup, Panel Truck or Vanette	Going Straight	West	East	No Traffic Control	y - Divided, with Barrier		Blacktop	
Turning Left	Moving Straight	Passenger Car	Making Left Turn	South	Northwest	Stop Sign	ay - Divided, no Barrier		Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	South	North	Stop Sign	30	with Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Moving Straight	Moving Straight	Pickup, Panel Truck or Vanette	Starting in Turn Lane	South	North	Stop Sign	30	with Barrier	Concrete	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	South	Northwest	Stop Sign	y - Divided, with Barrier		Blacktop	Passenger Car
Turning Left	Moving Straight	Passenger Car	Making Left Turn	South	West	Stop Sign	30	, no Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Passenger Car	Making Left Turn	Southeast	Northwest	Stop Sign			Blacktop	Passenger Car
Moving Straight	Moving Straight	Passenger Car	Starting in Turn Lane	South	Northwest	Stop Sign	35	with Barrier	Blacktop	Passenger Car
Primary Trafficway		Passenger Car	Going Straight	Southeast	Northwest	Stop Sign		Two Way - Left Turn	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	Southeast	Northwest	Stop Sign	30	with Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Turning Left	Moving Straight	Pickup, Panel Truck or Vanette	Making Left Turn	South	North	Stop Sign	30	, no Barrier	Blacktop	Pickup, Panel Truck or Vanette under 10,000 lb
Moving Straight	Unknown or Non-Moving	Motorcycle	Negotiating Right of Way	South	North	No Traffic Control	35	with Barrier	Blacktop	
Primary Trafficway		Passenger Car	Making Left Turn	East	South	Stop Sign		Two Way - Left Turn	Blacktop	Passenger Car
Turning Right	Unknown or Non-Moving	Pickup, Panel Truck or Vanette	Making Right Turn	Northwest	South	No Traffic Control	30	Other	Blacktop	

VEHICLE 2 ACTION	VEHICLE 2 COMPASS DIRECTION FROM	VEHICLE 2 COMPASS DIRECTIO N TO	VEHICLE 2 TRAFFIC CONTROL	VEHICLE 2 POSTED SPEED	VEHICLE 2 ROADWAY TYPE	VEHICLE 2 ROADWA Y SURFACE TYPE	MV DRIVER CONTRIBUTING CIRCUMSTANCE 1 (UNIT 1)	MV DRIVER CONTRIB UTING CIRCUMS TANCE 1 (UNIT 2)	WA STATE PLANE SOUTH - X	WA STATE PLANE SOUTH - Y
Going Straight Ahead	North	South	No Traffic Control	35	Other	Blacktop	Disregard Stop Sign - Flashing Red	None	2384506.39	882956.72
Going Straight Ahead	West	East	No Traffic Control	35	Two Way - Divided, with Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384506.18	882956.86
							Exceeding Reas. Safe Speed		2384289.72	883096.23
Going Straight Ahead	North	East	No Traffic Control		Two Way - Divided, with Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384507.55	882956.83
Going Straight Ahead	West	East	No Traffic Control	35	Other	Blacktop	Improper Turn/Merge	None	2384506.33	882956.33
Going Straight Ahead	Northwest	East	No Traffic Control	35	Two Way - Divided, with Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384507.62	882957.21
Going Straight Ahead	Northwest	East	No Traffic Control	30	Two Way - Divided, with Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384509.04	882955.75
Making Left Turn	North	East	No Traffic Control		Two Way - Divided, with Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384495.59	882941.51
Going Straight Ahead	North	East	No Traffic Control	30	One Way	Blacktop	Did Not Grant RW to Vehicle	None	2384506.44	882957.25
Going Straight Ahead	North	East	No Traffic Control		Two Way - Divided, with Barrier	Blacktop	Disregard Traffic Sign and Signals	None	2384504.01	882958.36
Going Straight Ahead	West	East	No Traffic Control		Two Way - Divided, with Barrier	Blacktop	Unknown Distraction	None	2384506.44	882976.24
Going Straight Ahead	West	East	No Traffic Control	25	Other	Blacktop	Unknown Distraction	None	2384500.36	882960.38
							Operating Other Electronic Devices (comp		2384505.35	882959.71
Going Straight Ahead	Northwest	Southeast	No Traffic Control		Two Way - Divided, no Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384504.59	882958.8
Going Straight Ahead	West	East	No Traffic Control	30	Two Way - Divided, with Barrier	Blacktop	None	None	2384508.69	882936.8
Negotiating a Curve	North	South	No Traffic Control	30	Two Way - Divided, with Barrier	Concrete	Disregard Traffic Sign and Signals	None	2384507.28	882955.53
Going Straight Ahead	Northwest	East	No Traffic Control	35	Two Way - Divided, with Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384506.44	882976.24
Going Straight Ahead	West	East	No Traffic Control	30	Two Way - Divided, no Barrier	Blacktop	Did Not Grant RW to Vehicle	None	2384506.44	882976.24
Going Straight Ahead	Northwest	East	No Traffic Control			Blacktop	Did Not Grant RW to Vehicle	None	2384506.44	882976.24
Going Straight Ahead	Northwest	Southeast	No Traffic Control	35	Two Way - Divided, with Barrier	Blacktop	Inattention	None	2384506.69	882937.73
Going Straight Ahead	Southwest	Northeast	No Traffic Control		Two Way - Divided, with Barrier	Blacktop	Other Contributing Circ Not Listed	None	2384761.94	882699.56
Going Straight Ahead	Northwest	East	No Traffic Control	35	Two Way - Divided, with Barrier	Blacktop	None	None	2384507.55	882956.83
Going Straight Ahead	Northwest	Southeast	No Traffic Control	35	Two Way - Divided, no Barrier	Blacktop	Disregard Traffic Sign and Signals	None	2384507.31	882977.43
							Other Contributing Circ Not Listed		2384372.47	883024.38
Going Straight Ahead	South	North	No Traffic Control		Two Way - Undivided	Blacktop	Disregard Traffic Sign and Signals	None	2384744.99	882677.16
							Improper Turn/Merge		2384500.58	882961.49

[illegible]

[illegible]

[illegible]

[illegible]

Nine Mile & Francis

		Intersection Crash rates			
Daily Entering Vehicles	Number of Crashes	Number of Years		Intersection Crash rate	
20600	8	6		1	0.177328545 crashes per million entering vehicles

Average rate 92.46 per 100,000,000 miles

avg(am/0.08, PM/0.1)

Nine Mile Rd/Francis Ave & Driscoll

		Intersection Crash rates			
Daily Entering Vehicles	Number of Crashes	Number of Years		Intersection Crash rate	
30955	26	6		1	0.383529191 crashes per million entering vehicles

Assembly St & Driscoll

		Intersection Crash rates			
Daily Entering Vehicles	Number of Crashes	Number of Years		Intersection Crash rate	
7088	4	5		1	0.309224157 crashes per million entering vehicles

Date Prepared: 4/3/2025 Prepared by: J. BALL
Date Updated: 8/12/2025 Updated by: J. BALL

Project Name: Francis - Assembly & Assembly- Driscoll Roundabouts & Street only		\$8,978,173	Proj ID: 2021079	
Description: Construct 2 lane roundabouts at Francis & Assembly & Assembly & Driscoll. Full depth rebuild (SR 291 8" over 8", Discroll & Assembly 5" over 6"). Includes stormwater upgrades, Ramp Meter & Fiber Conduit to Fire Station.				
Item Description	Qty	Unit	Unit Cost	Extension
Division 1 - General Requirements				
SPCC Plan	1.0	LS	\$2,000	\$2,000
Public Liaison Representative	1.0	LS	\$5,000	\$5,000
Reference and Reestablish Survey Monument	6	EA	\$1,000	\$6,000
Mobilization	1.0	LS	\$393,000	\$393,000
Project Temporary Traffic Control	1.0	LS	\$393,000	\$393,000
			subtotal:	\$799,000
Division 2 - Earthwork				
Clearing & Grubbing	1	LS	\$15,000	\$15,000
Remove Existing Curb and/or Gutter	7,900	LF	\$12	\$94,800
Remove Cement Concrete Sidewalk & Driveway	3,106	SY	\$20	\$62,120
Remove Manhole, Catch Basin, or Drywell	14	EA	\$1,200	\$16,800
Sawcutting Curb	14	EA	\$45	\$630
Sawcutting Rigid and Flexible Pavement	14,210	LFI	\$1.50	\$21,315
Roadway Excavation Including Haul	7,758	CY	\$30	\$232,740
Common Borrow Incl. Haul	2,000	CY	\$30	\$60,000
Preparation of Untreated Roadway	17,767	SY	\$3	\$53,301
			subtotal:	\$556,706
Division 4 - Bases				
Crushed Surfacing Base Course	3,546	CY	\$75	\$265,950
CSTC for Sidewalk and Driveways	141	CY	\$150	\$21,150
			subtotal:	\$287,100
Division 5 - Surface Treatments & Pavements				
HMA CL 1/2 IN. Heavy Traffic, 8 INCH THICK - SR291	10,667	SY	\$58	\$618,686
HMA CL 1/2 IN. Heavy Traffic, 5 INCH THICK - Driscoll & Assembly	7,100	SY	\$37	\$262,700
HMA for Pavement Repair, CL 1/2 IN. Heavy Traffic, 5 In. Thick	556	SY	\$45	\$25,020
Soil Residual Herbicide	18,287	SY	\$1	\$18,287
Pavement Repair Excavaton Including Haul	556	SY	\$40	\$22,240
Furnishing Concrete for Cement Concrete Pavement-Truck Apron	116	CY	\$350	\$40,600
Portland Cement Concrete Pavement, 8 Depth - Truck Apron	520	SY	\$75	\$39,000
			subtotal:	\$1,026,533
Division 6 - Structures				
Reinforced Concrete Retaining Wall	800	SF	\$100	\$80,000
Cement Concrete Curb Wall	185	LF	\$85	\$15,725
			subtotal:	\$95,725
Division 7 - Drainage Structures, Storm Sewers, Sanitary Sewers, Water mains & Conduits				
Catch basin Type 1	19	EA	\$3,500	\$66,500
MH or DW Frame & Cover	20	EA	\$1,300	\$26,000
Connect ___In. Dia. Pipe to Existing CB, DW or MH	13	EA	\$850	\$11,050
Trench Safety	1	LS	\$5,000	\$5,000
Catch Basin Ductile Iron Sewer Pipe 8 In. Diam.	775	LF	\$85	\$65,875
			subtotal:	\$174,425
Division 8 - Miscellaneous Construction				
Landscaping	1	LS	\$15,000	\$15,000
Topsoil Type A, 2 Inch Thick	8,617	SY	\$6	\$51,702
Hydroseeding	6,667	SY	\$5	\$33,335
Sod Installation	1,950	SY	\$25	\$48,750
Irrigation System - new and modify	1	LS	\$15,000	\$15,000
Cement Concrete Curb and/or Gutter	4,400	LF	\$45	\$198,000
Roundabout Central Island Cement Concrete Curb	625	LF	\$50	\$31,250
Roundabout Cement Concrete Curb & Gutter	4,525	LF	\$50	\$226,250
Cement Concrete Driveway	261	SY	\$95	\$24,795
Cement Concrete Sidewalk	2,000	SY	\$110	\$220,000
Ramp Detectable Warning	112	SF	\$35	\$3,920
Traffic Signal System - Ramp Meter	1	LS	\$300,000	\$300,000
Illumination System (Street Lights)	10	EA	\$10,000	\$100,000
Communication Conduit System - Ramp Meter	3,675	LF	\$50	\$183,750
Communication Cables and Interfaces - Ramp Meter	3,675	LF	\$15	\$55,125
Signing, Permanent - City Manufactured Signs	1	LS	\$30,000	\$30,000
Pavement Marking (Durable Heat Applied, Inlay Tape, Durable, Paint)	1	LS	\$45,000	\$45,000
Reinforced Doweled Curb	550	LF	\$50	\$27,500
Traffic Island Concrete - 4 Inch Thick	1,475	SY	\$70	\$103,250
Traffic Island Fill - CSTC	165	CY	\$150	\$24,750
			subtotal:	\$1,737,377
Legacy ICM Items				
Utility Relocate - power pole	9	EA	\$5,000	\$45,000
			subtotal:	\$45,000
			Construction Subtotal	\$4,721,866
Scope Contingency	20.0%			\$944,373
			Construction Subtotal	\$5,666,239
Construction Contingency	15.0%			\$849,936
			Construction Total	\$6,516,175
Property Purchase - 125 SF +/-				\$5,000
Geotech	1.0%			\$65,162
Surveying	3.0%			\$195,485
Design & Bid Docs	7.0%			\$456,132
Admin, Legal, & Permits	1.5%			\$97,743
Construction Mgmt	15.0%			\$977,426
			Project Total	\$8,313,123
Unit costs from year...		for construction in...		
2025		2027		
For Program				
Preconstruction	815		\$879,684	
Property Purchase	5		\$5,400	
Construction Total	6,516		\$7,037,469	
Const mgmt	977		\$1,055,620	
	8,313		\$8,978,173	Project Cost

Date Prepared: 4/3/2025
Date Updated: 7/17/2025

Prepared by: J. BALL
Updated by: J. BALL

Project Name: Francis, Assembly & Driscoll Intersection - Street work only \$8,748,655 Proj ID: 2021079
Description: Construct Signals at Francis/Driscoll & Assembly/Driscoll. Full depth rebuild (SR 291 = 8" over 8", Dris & Assem = 5" over 6").

Item Description	Bid Item No.	Qty	Unit	Unit Cost	Extension
Division 1 - General Requirements					
SPCC Plan	1071020	1.0	LS	\$2,000	\$2,000
Public Liaison Representative	1070050	1.0	LS	\$5,000	\$5,000
Reference and Reestablish Survey Monument	1070060	6	EA	\$1,000	\$6,000
Mobilization	1090000	1.0	LS	\$391,000	\$391,000
Project Temporary Traffic Control	1100000	1.0	LS	\$391,000	\$391,000
				subtotal:	\$795,000
Division 2 - Earthwork					
Clearing & Grubbing	2010000	1	LS	\$10,000	\$10,000
Remove Existing Curb and/or Gutter	20200_0	6,625	LF	\$12	\$79,500
Remove Cement Concrete Sidewalk & Driveway	2020040	3,206	SY	\$20	\$64,120
Remove Manhole, Catch Basin, or Drywell	2020050	11	EA	\$1,200	\$13,200
Sawcutting Curb	2020130	18	EA	\$45	\$810
Sawcutting Rigid and Flexible Pavement	202015_	13,950	LFI	\$1.50	\$20,925
Roadway Excavation Including Haul	2030000	7,866	CY	\$30	\$235,980
Preparation of Untreated Roadway	2030090	18,577	SY	\$3	\$55,731
				subtotal:	\$480,266
Division 4 - Bases					
Crushed Surfacing Base Course	4040020	3,794	CY	\$75	\$284,550
CSTC for Sidewalk and Driveways	4040030	144	CY	\$150	\$21,600
				subtotal:	\$306,150
Division 5 - Surface Treatments & Pavements					
HMA CL 1/2 IN. Heavy Traffic, 8 INCH THICK - SR291	50400_	10,333	SY	\$58	\$599,314
HMA CL 1/2 IN. Heavy Traffic, 5 INCH THICK - Driscoll & Assembly	50400_	8,244	SY	\$37	\$305,028
HMA for Pavement Repair, CL 1/2 IN. Heavy Traffic, 5 In. Thick	50401_	534	SY	\$85	\$45,390
Soil Residual Herbicide	5040300	18,577	SY	\$1	\$18,577
Pavement Repair Excavaton Including Haul	5040320	534	SY	\$40	\$21,360
				subtotal:	\$989,669
Division 6 - Structures					
Cement Concrete Curb Wall	6020080	325	LF	\$85	\$27,625
				subtotal:	\$27,625
Division 7 - Drainage Structures, Storm Sewers, Sanitary Sewers, Water mains & Conduits					
Adjust Existing MH, CB, DW or Grate Inlet in Asphalt or Concrete	70502_	6	EA	\$800	\$4,800
Catch basin Type 1	7050221	14	EA	\$3,500	\$49,000
MH or DW Frame & Cover	705028_	20	EA	\$1,300	\$26,000
Valve Box and Cover	7050283	12	EA	\$650	\$7,800
Connect ___ In. Dia. Pipe to Existing CB, DW or MH	705029_	7	EA	\$850	\$5,950
Connect ___ In. Dia. Sewer Pipe to Existing Sewer Pipe	705032_	3	EA	\$750	\$2,250
Trench Safety	7080030	1	LS	\$5,000	\$5,000
Catch Basin Ductile Iron Sewer Pipe 8 In. Diam.	7080082	400	LF	\$85	\$34,000
				subtotal:	\$134,800
Division 8 - Miscellaneous Construction					
Landscaping	8020000	1	LS	\$15,000	\$15,000
Topsoil Type A, 2 Inch Thick	8020010	3,589	SY	\$6	\$21,534
Hydroseeding	8020260	1,456	SY	\$5	\$7,280
Sod Installation	8020300	2,133	SY	\$25	\$53,325
Irrigation System - new and modify	8030000	1	LS	\$15,000	\$15,000
Cement Concrete Curb and/or Gutter	80400_	3,425	LF	\$45	\$154,125
Cement Concrete Driveway	8060000	194	SY	\$95	\$18,430
Cement Concrete Driveway Transition	8060020	50	SY	\$90	\$4,500
Cement Concrete Sidewalk	8140000	2,197	SY	\$90	\$197,730
Ramp Detectable Warning	8140040	152	SF	\$35	\$5,320
Traffic Signal System	8200000	2	LS	\$400,000	\$800,000
Illumination System (Street Lights)	8200040	5	EA	\$10,000	\$50,000
Communication Conduit System	8200060	3,100	LF	\$50	\$155,000
Communication Cables and Interfaces	8200070	3,100	LF	\$15	\$46,500
Signing, Permanent - City Manufactured Signs	8210070	1	LS	\$20,000	\$20,000
Pavement Marking (Durable Heat Applied, Inlay Tape, Durable, Paint)	82200_0	1	LS	\$74,000	\$74,000
Reinforced Doweled Curb	8910000	3,250	LF	\$50	\$162,500
Traffic Island Concrete - 4 Inch Thick	8910050	1,525	SY	\$70	\$106,750
Traffic Island Fill - CSTC		170	CY	\$150	\$25,500
				subtotal:	\$1,932,494
Legacy ICM Items					
Utility Relocate - power pole		6	EA	\$5,000	\$30,000
				subtotal:	\$30,000
Construction Subtotal					\$4,696,004
Scope Contingency	20.0%				\$939,201
Construction Subtotal					\$5,635,205
Construction Contingency	15.0%				\$845,281
Construction Total					\$6,480,486
Property Purchase					\$0
Geotech	0.5%				\$32,402
Surveying	1.0%				\$64,805
Design & Bid Docs	7.0%				\$453,634
Admin, Legal, & Permits	1.5%				\$97,207
Construction Mgmt	15.0%				\$972,073
Project Total					\$8,100,607
		Unit costs from year...		for construction in...	
		2025		2027	
For Program					
Preconstruction		648		\$699,892	
Property Purchase		0		\$0	
Construction Total		6,480		\$6,998,924	
Const mgmt		972		\$1,049,839	
		8,101		\$8,748,655	Project Cost

Crash Type	Cost
Fatality (K)	\$11,295,400
Suspected Serious Injury (A)	\$655,000
Suspected Minor Injury (B)	\$198,500
Possible Injury (C)	\$125,600
Property Damage Only (O)	\$11,900
CMF ID:	7966
CMF	0.541
CRF	0.459

Source:

Crash Costs for Highway Safety Analysis, January 2018

For WSDOT facilities only

Crash Type	2018-2023	Crash Costs	CMF	Expected Crashes	Difference	Crash Benefits
Fatality (K)	0	\$0	0.54	0.00	0.00	\$0
Suspected Serious Injury (A)	1	\$655,000	0.54	0.54	0.46	\$300,645
Suspected Minor Injury (B)	8	\$1,588,000	0.54	4.33	3.67	\$728,892
Possible Injury (C)	14	\$1,758,400	0.54	7.57	6.43	\$807,106
Property Damage Only (O)	16	\$190,400	0.54	8.66	7.34	\$87,394
Total Crash Costs	39	\$4,191,800		21.099	17.901	\$1,924,036
Project Costs (C)	\$8,748,655					
Worth of Benefits (WB)	\$23,049,954					
<i>From 2017 FHWA guidance</i>						
Net Benefits (B = WB - C)	\$14,301,298					
Benefit to Cost Ratio	2.63					

Crash Type	Cost
Fatality (K)	\$11,295,400
Suspected Serious Injury (A)	\$655,000
Suspected Minor Injury (B)	\$198,500
Possible Injury (C)	\$125,600
Property Damage Only (O)	\$11,900
CMF ID:	10082
CMF	0.623
CRF	0.377

Source:

Crash Costs for Highway Safety Analysis, January 2018

For WSDOT facilities only

Crash Type	2018-2023	Crash Costs	CMF	Expected Crashes	Difference	Crash Benefits
Fatality (K)	0	\$0	0.62	0.00	0.00	\$0
Suspected Serious Injury (A)	1	\$655,000	0.62	0.62	0.38	\$246,935
Suspected Minor Injury (B)	8	\$1,588,000	0.62	4.98	3.02	\$598,676
Possible Injury (C)	14	\$1,758,400	0.62	8.72	5.28	\$662,917
Property Damage Only (O)	16	\$190,400	0.62	9.97	6.03	\$71,781
Total Crash Costs	39	\$4,191,800		24.297	14.703	\$1,580,309
Project Costs (C)	\$8,978,173					
Worth of Benefits (WB)	\$18,932,097					
<i>From 2017 FHWA guidance</i>						
Net Benefits (B = WB - C)	\$9,953,924					
Benefit to Cost Ratio	2.11					

Crash Type	Cost
Fatality (K)	\$11,295,400
Suspected Serious Injury (A)	\$655,000
Suspected Minor Injury (B)	\$198,500
Possible Injury (C)	\$125,600
Property Damage Only (O)	\$11,900
CMF ID:	7966
CMF	0.541
CRF	0.459

Source:

Crash Costs for Highway Safety Analysis, January 2018

For WSDOT facilities only

Crash Type	2018-2023	Crash Costs	CMF	Expected Crashes	Difference	Crash Benefits
Fatality (K)	0	\$0	0.54	0.00	0.00	\$0
Suspected Serious Injury (A)	1	\$655,000	0.54	0.54	0.46	\$300,645
Suspected Minor Injury (B)	8	\$1,588,000	0.54	4.33	3.67	\$728,892
Possible Injury (C)	10	\$1,256,000	0.54	5.41	4.59	\$576,504
Property Damage Only (O)	16	\$190,400	0.54	8.66	7.34	\$87,394
Total Crash Costs	35	\$3,689,400		18.935	16.065	\$1,693,435
Project Costs (C)	\$4,905,322					
Worth of Benefits (WB)	\$20,287,347					
<i>From 2017 FHWA guidance</i>						
Net Benefits (B = WB - C)	\$15,382,025					
Benefit to Cost Ratio	4.14					

Crash Type	Cost
Fatality (K)	\$11,295,400
Suspected Serious Injury (A)	\$655,000
Suspected Minor Injury (B)	\$198,500
Possible Injury (C)	\$125,600
Property Damage Only (O)	\$11,900
CMF ID:	10082
CMF	0.623
CRF	0.377

Source:

Crash Costs for Highway Safety Analysis, January 2018

For WSDOT facilities only

Crash Type	2018-2023	Crash Costs	CMF	Expected Crashes	Difference	Crash Benefits
Fatality (K)	0	\$0	0.62	0.00	0.00	\$0
Suspected Serious Injury (A)	1	\$655,000	0.62	0.62	0.38	\$246,935
Suspected Minor Injury (B)	8	\$1,588,000	0.62	4.98	3.02	\$598,676
Possible Injury (C)	10	\$1,256,000	0.62	6.23	3.77	\$473,512
Property Damage Only (O)	16	\$190,400	0.62	9.97	6.03	\$71,781
Total Crash Costs	35	\$3,689,400		21.805	13.195	\$1,390,904
Project Costs (C)	\$5,921,856					
Worth of Benefits (WB)	\$16,663,028					
<i>From 2017 FHWA guidance</i>						
Net Benefits (B = WB - C)	\$10,741,171					
Benefit to Cost Ratio	2.81					