



242-246 West Side Road City of Port Colborne Transportation Impact Study

Paradigm Transportation Solutions Limited

June 2024
230107



Project Summary



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Client
Bensanti Developments Ltd
1950 Calgary Court
Mississauga, ON

Client Contact
Mr. Tirdad Gharacholrloo
CEO

242-246 West Side Road City of Port Colborne Transportation Impact Study



Consultant Project Team
Stew Elkins, BES
Scott Catton, C.E.T.
Erica Bayley, P. Eng.
Creighton Chartier

Erica Bayley, P.Eng.

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Paradigm Transportation Solutions Limited
5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684
www.ptsl.com



Executive Summary

Content

Bensanti Developments Ltd. has retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study (TIS) for a proposed residential development located at 242-246 West Side Road in the City of Port Colborne.

Official Plan Amendment and Zoning By-law Amendment applications are required to permit the proposed development.

This study determines the impacts of the development traffic on the surrounding road network and identifies the recommended improvements, if necessary, to accommodate the site generated traffic.

Development Concept

The development concept includes an 8-storey residential building containing approximately 112 units. Build-out and occupancy is anticipated to occur by Year 2027. The site's parking demand is proposed to be accommodated by 116 parking spaces (0.97 per unit).

Vehicle access is proposed by two driveways to the future extension of Franklin Avenue. Driveway 1 is located approximately 48 metres west of West Side Road (corner clearance) and Driveway 2 is located approximately 95 metres west of West Side Road (corner clearance).

Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Operations:** The intersections within the study area are operating with acceptable levels of service and well within capacity during the AM and PM peak hours. No critical movements are noted.
- ▶ **Site Generated Traffic:** The subject site is forecast to generate approximately 38 new vehicle trips during the AM peak hour and 44 new trips during the PM peak hour.
- ▶ **Opening Year Background Traffic Operations:** One critical movement is noted during the Opening Year Background Traffic horizon:
 - West Side Road and Main Street West
 - Eastbound Left-Turn – PM peak hour, v/c ratio greater than 0.85.



No other critical movements are noted.

- ▶ **Opening Year Total Traffic Operations:** The critical movements identified in the Opening Date Background Traffic scenario are forecast to continue to worsen under the Opening Year Total Traffic conditions. No new critical movements are noted within the study area.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle or less.

- ▶ **Five-Year Background Traffic Operations:** The critical movements identified in the Opening Date Background Traffic and Opening Year Total Traffic conditions are forecast to continue to worsen under the Five-Year Background scenario. One additional critical movement is noted during the Five-Year Background Traffic horizon:

- West Side Road and Main Street West
 - Westbound Through – PM peak hour, LOS E.

No other critical movements are noted.

- ▶ **Five-Year Background Total Traffic Operations:** The critical movements identified in the Five-Year Background Traffic scenario are forecast to continue to worsen under the Five-Year Total Traffic conditions. No new critical movements are noted within the study area.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle or less.

- ▶ **Ten-Year Background Traffic Operations:** Two additional critical movements are forecast to occur during the Ten-Year Background Traffic horizon:

- West Side Road and Main Street West
 - Westbound Through – AM and PM peak hour, LOS E with a v/c ratio nearing 0.85.
 - Southbound Left– PM peak hour, queue lengths nearing storage length, and a v/c ratio approaching 0.85.

No other critical movements are noted within the study area.

- ▶ **Ten-Year Total Traffic Operations:** The critical movements identified under the background traffic conditions are forecast to continue to occur with the introduction of site generated traffic.



Site generated traffic does not create any new critical movements at the study area intersections.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle or less.

- ▶ **Remedial Measures:** Based on the warrant analysis, traffic control signals are not warranted at the intersection of West Side Road and Coronation Drive / Franklin Avenue. Stop control is an appropriate form of traffic control for the Coronation Drive and Franklin Avenue approaches to West Side Road.

The warrant analysis indicates that left-turn lanes at the site driveway intersections with Franklin Avenue are not warranted.

Driveway 1 is positioned with a corner clearance exceeding the spacing outlined in the TAC guide and the driveway is also located outside the functional area of the intersection as the queue length is less than 20 metres.

Recommendations

Based on the findings of this study, it is recommended that the road authorities continue to monitor and adjust the signal timings at the intersection of West Side Road and Main Street West to account for future changes in traffic volumes.



Contents

1	Introduction	1
1.1	Overview	1
2	Existing Conditions	3
2.1	Road Network	3
2.2	Pedestrian Network	5
2.3	Cycling Network	5
2.4	Transit Service	5
2.5	Traffic Volumes	7
2.6	Traffic Operations	9
3	Development Concept	12
3.1	Description	12
3.2	Site Trip Generation	14
4	Future Traffic Conditions	17
4.1	Forecast Traffic	17
4.2	Opening Date Traffic Operations	25
4.2.1	Opening Date Background Traffic Operations	25
4.2.2	Opening Year Total Traffic Operations	25
4.3	Five-Year Traffic Operations	28
4.3.1	Five-Year Background Traffic Operations	28
4.3.2	Five-Year Total Traffic Operations	28
4.4	10-Year Traffic Operations	31
4.4.1	10-Year Background Traffic Operations	31
4.4.2	10-Year Total Traffic Operations	31
5	Remedial Measures	34
5.1	Traffic Control Improvements	34
5.1.2	Signal Optimization	34
5.2	Auxiliary Turn Lanes	36
5.3	Access Management	36
6	Conclusions and Recommendations	37
6.1	Conclusions	37
6.2	Recommendations	39



Appendices

Appendix A	Pre-Study Consultation
Appendix B	Existing Data
Appendix C	Base Year Traffic Operations Reports
Appendix D	Background Traffic Forecast
Appendix E	Opening Year Background Traffic Operations Reports
Appendix F	Opening Year Total Traffic Operations Reports
Appendix G	Five-Year Background Traffic Operations Reports
Appendix H	Five-Year Total Traffic Operations Reports
Appendix I	Ten-Year Background Traffic Operations Reports
Appendix J	Ten-Year Total Traffic Operations Reports
Appendix K	OTM Signal Warrant
Appendix L	10-Year Total Traffic Remedial Measures Operations Report
Appendix M	Left Turn Lane Warrant Nomograph
Appendix N	SimTraffic Ten-Year Total Traffic Report



Figures

Figure 1.1:	Site Location	2
Figure 2.1:	Existing Lane Configuration and Traffic Control	4
Figure 2.2:	Welland Transit Port Colborne – Welland Link	6
Figure 2.3:	Existing Traffic Volumes	8
Figure 3.1:	Site Concept Plan	13
Figure 3.2:	Site Generated Traffic Volumes	16
Figure 4.1:	Opening Year Background Traffic Volumes	19
Figure 4.2:	Opening Year Total Traffic Volumes	20
Figure 4.3:	Five-Year Background Traffic Volumes	21
Figure 4.4:	Five-Year Total Traffic Volumes	22
Figure 4.5:	10-Year Background Traffic Volumes	23
Figure 4.6:	10-Year Total Traffic Volumes	24

Tables

Table 2.1:	Existing Turning Movement Counts	7
Table 2.2:	Existing Traffic Operations	11
Table 3.1:	Site Generated Traffic	14
Table 3.2:	Estimated Trip Distribution	15
Table 4.1:	Opening Year Background Traffic Operations	26
Table 4.2:	Opening Year Total Traffic Operations	27
Table 4.3:	Five-Year Background Traffic Operations	29
Table 4.4:	Five-Year Total Traffic Operations	30
Table 4.5:	10-Year Background Traffic Operations	32
Table 4.6:	10-Year Total Traffic Operations	33
Table 5.1:	10-Year Total Traffic Remedial Operations	35



1 Introduction

1.1 Overview

Bensanti Developments Ltd has retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study (TIS) for the proposed residential development located at 242-246 West Side Road in the City of Port Colborne. **Figure 1.1** illustrates the site location.

Official Plan Amendment and Zoning By-law Amendment applications are required to permit the proposed development.

The scope of the study includes:

- ▶ Estimates of background traffic growth;
- ▶ Estimates of additional traffic generated by the subject site;
- ▶ Estimates of additional inline development traffic;
- ▶ Analyses of the impact of the future traffic on the surrounding road network; and
- ▶ Recommendations necessary to mitigate this future traffic in a satisfactory manner, if necessary.

Appendix A contains the pre-study consultation material and responses from the Ministry of Transportation Ontario (MTO), Niagara Region and the City of Port Colborne. The study generally follows the Niagara Region Transportation Impact Assessment Guidelines¹ and the Ministry of Transportation General Guidelines for the Preparation of Traffic Impact Study².

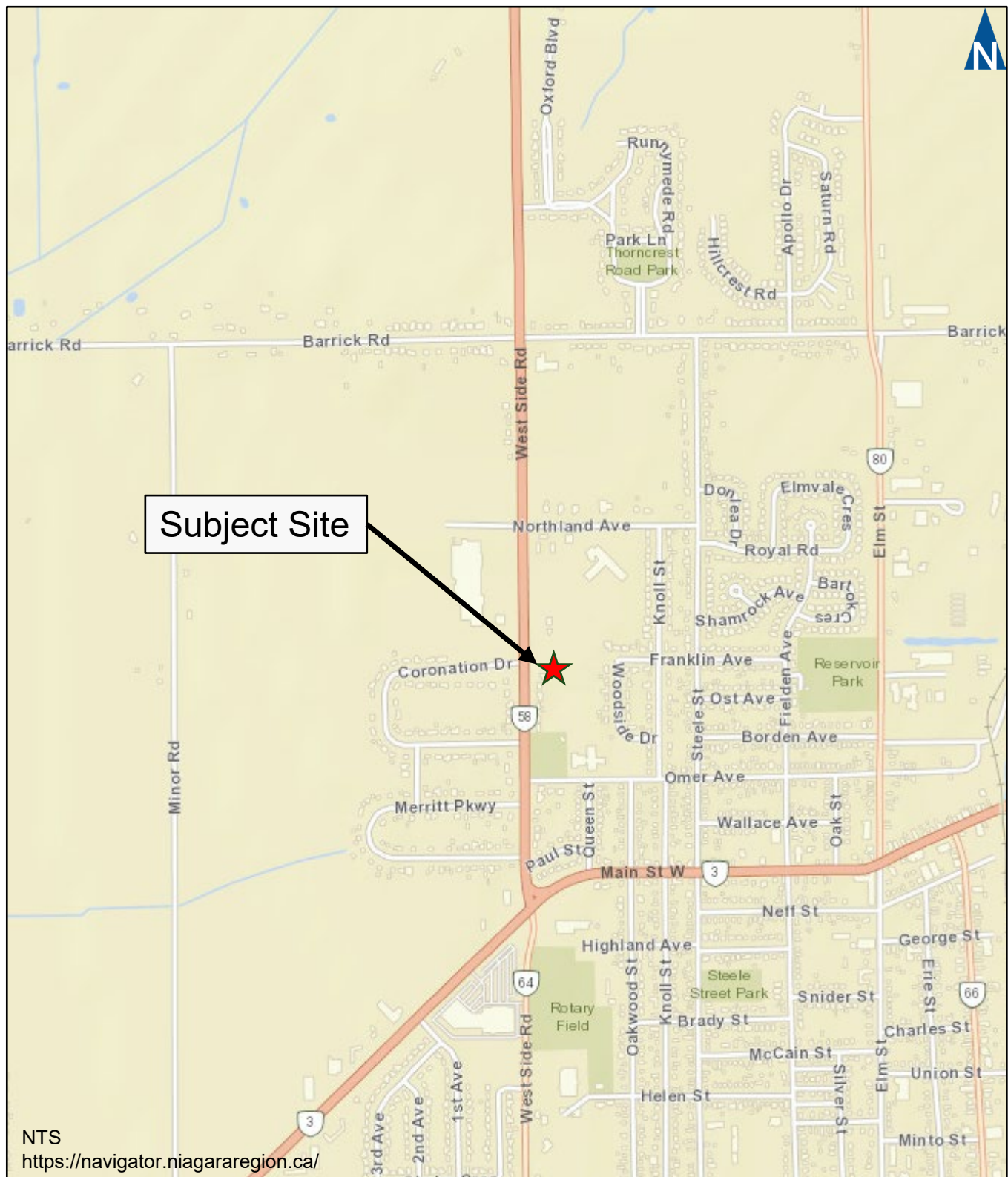
The study area intersections assessed include:

- ▶ West Side Road at Coronation Drive/Future Franklin Avenue (unsignalized);
- ▶ West Side Road at Main Street West/Highway 3 (signalized); and
- ▶ The proposed site driveways to the future Franklin Avenue.

¹ Niagara Region. *Niagara Region Transportation Impact Assessment Guidelines*. (Niagara: July 2023).

² Ministry of Transportation Ontario. *General Guidelines for the Preparation of Traffic Impact Studies*. (Ontario: March 2023).





2 Existing Conditions

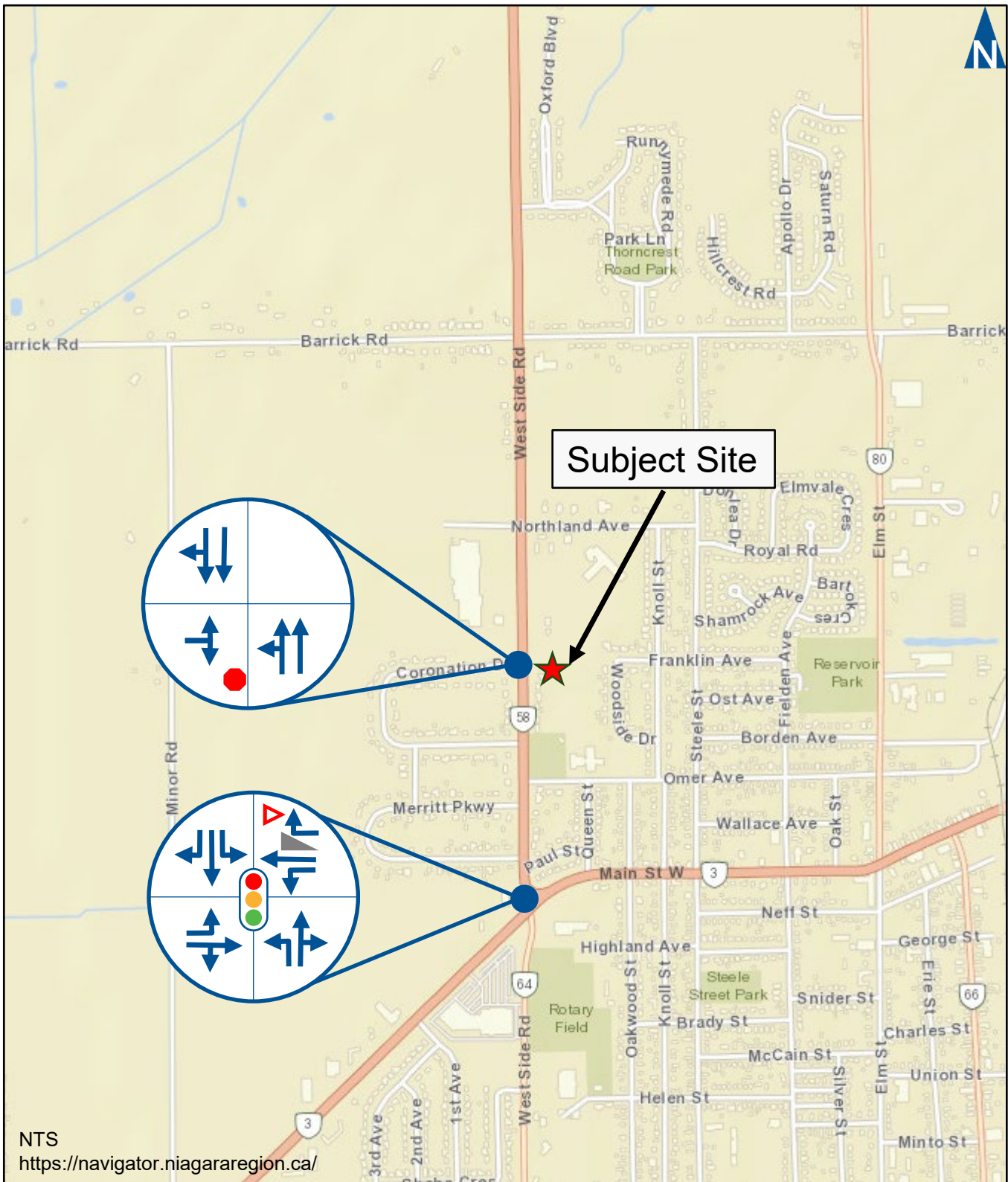
2.1 Road Network

The roadways of interest within the study area include:

- ▶ **West Side Road** (Highway 58) within the study area is a north-south five-lane urban cross-section provincial roadway with a centre two-way left-turn lane (TWLTL). The speed limit is 50 km/h south of Coronation Drive (north leg). The speed limit increases to 70 km/h north of Coronation Drive (north leg). The intersection with Main Street West is signalized.
- ▶ **Main Street West** (Highway 3) within the study area is an east-west two-lane regional roadway with a rural cross-section west of West Side Road and an urban cross-section east of West Side Road. The speed limit is 50 km/h within the study area.
- ▶ **Coronation Drive** within the study area is an east-west two-lane local roadway with an urban cross-section. The roadway is crescent shaped with two intersections to West Side Road. The speed limit is 50 km/h within the study area.

Figure 2.1 illustrates the existing lane configuration and traffic control at the study area intersections.





2.2 Pedestrian Network

Sidewalks are provided on both sides of West Side Road within the study area. While discontinuous sidewalks are also provided along Main Street West, east of West Side Road within the study area. No sidewalks are provided along Coronation Drive.

The signalized intersection of West Side Road and Main Street West provides pedestrian push buttons and crosswalks on all approaches.

2.3 Cycling Network

There are no identifiable existing cycling facilities within the study area. The Niagara Region official plan identifies future cycling facilities along Main Street West. The specific type of facility and timeline is not currently identified.

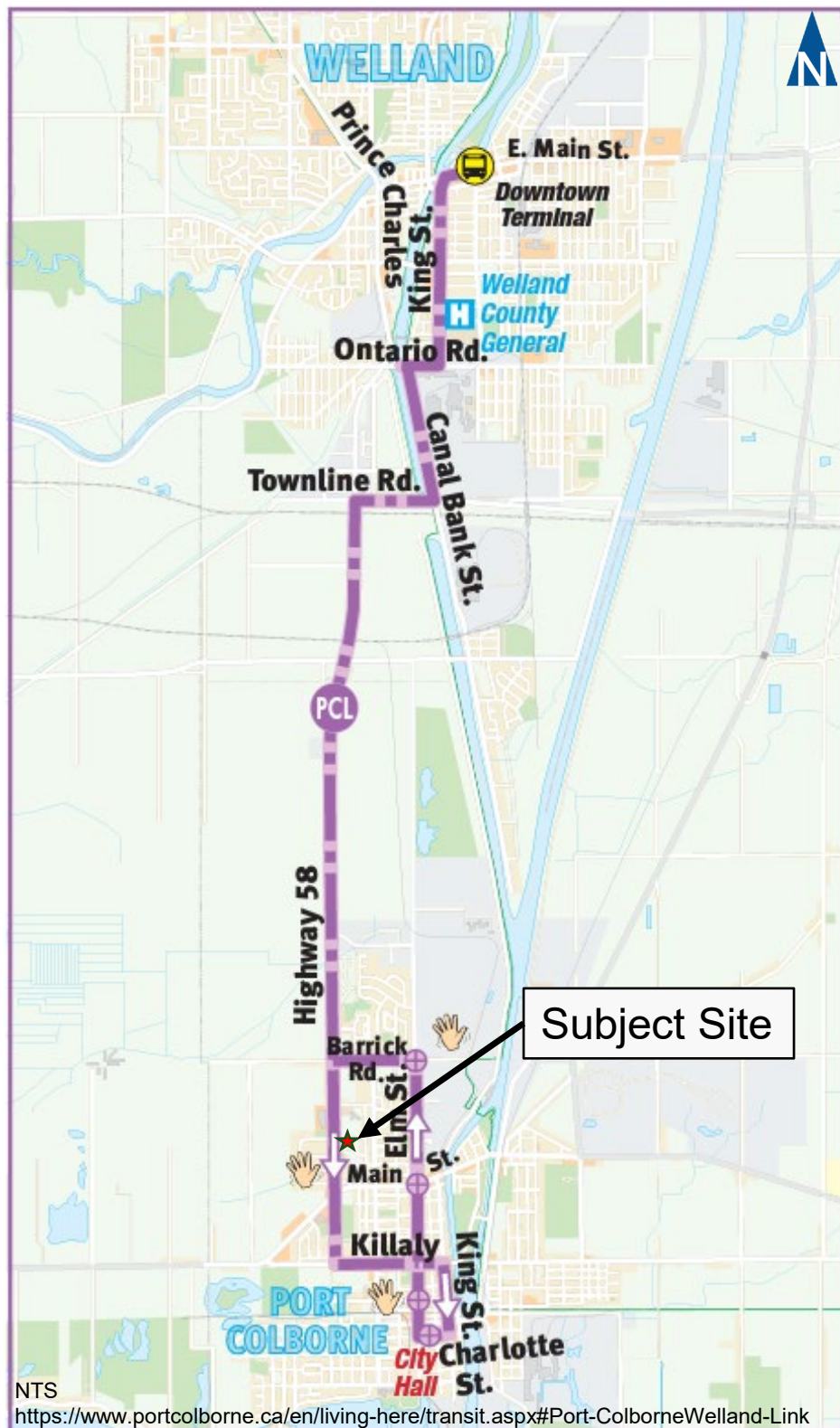
2.4 Transit Service

Transit service within the City of Port Colborne is provided by the newly consolidated Niagara Region Transit. Niagara Region Transit offers a non-fixed route transit service to residents called OnDemand transit.

OnDemand transit is a shared-ride public transit service without a fixed schedule or route. The vehicles' travel is optimized by software, and it is based upon rider trip requests. OnDemand Transit operates within the entire City allowing riders to travel from point to point without transfers. Riders may have to walk up to 400 metres to a bus stop or point of interest to meet their vehicle.

A fixed transit route operated by Welland Transit called The Port Colborne – Welland Link provides a direct route between the Town of Welland and the City of Port Colborne. The nearest stop is provided at West Side Road and Main Street West approximately 500 metres or a 6-minute walk south of the subject site. Service is provided Monday to Saturday between 6:30 AM and 9:30 PM with 60-minute headways. Fixed route stops are provided at the City of Port Colborne City Hall and the Welland Downtown Terminal. The bus is also accessible from designated flag stop locations. **Figure 2.2** illustrates The Port Colborne – Welland Link service map, flag stop locations are denoted on the map with a hand.





2.5 Traffic Volumes

Table 2.1 summarizes the location and date of the existing turning movement count (TMC) data used in the analysis. The TMC data used was collected by Paradigm in April 2023. **Appendix B** contains the traffic count data and signal timing data. **Figure 2.3** illustrates the existing traffic volumes.

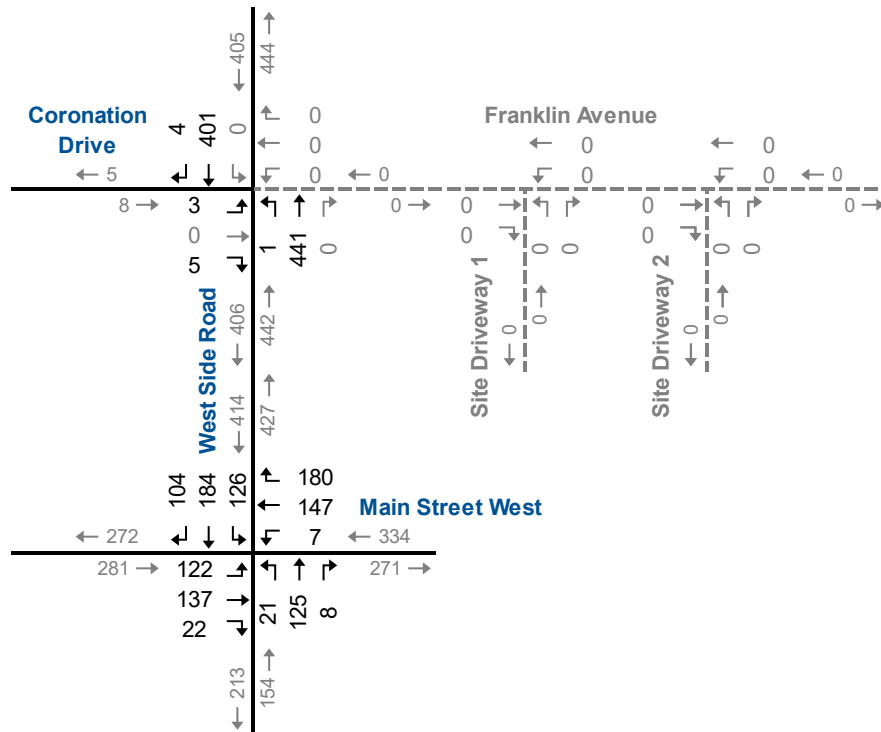
TABLE 2.1: EXISTING TURNING MOVEMENT COUNTS

Intersection	Date
West Side Road and Coronation Drive / Franklin Avenue	Tuesday, April 25, 2023
West Side Road and Main Street West	Tuesday, April 25, 2023

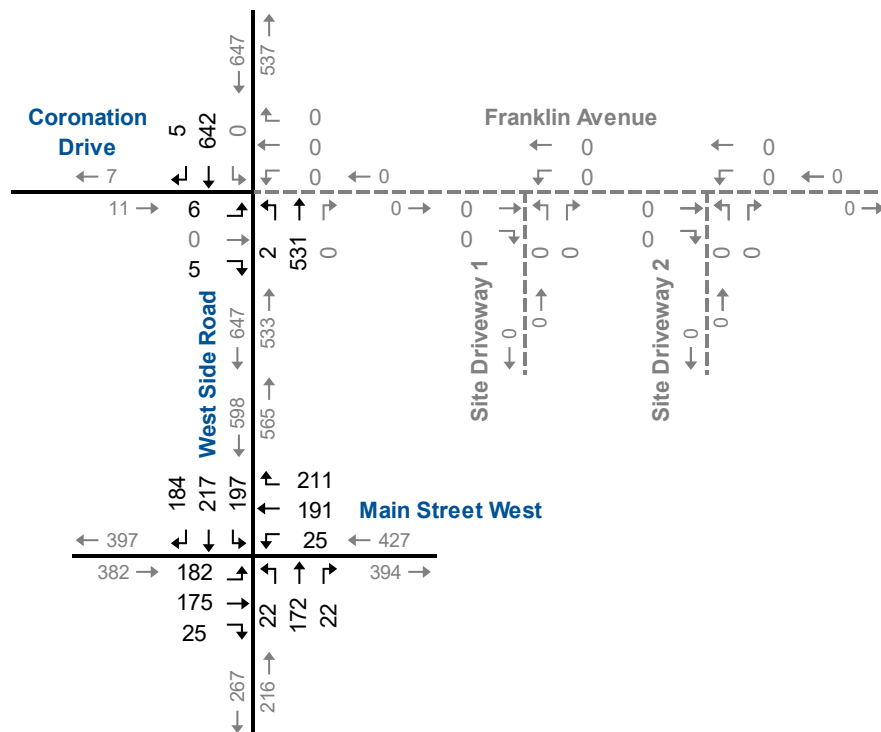




AM PEAK HOUR



PM PEAK HOUR



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2.6 Traffic Operations

Intersection level of service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles wanting to make a movement, compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flows. The highest possible rating is LOS A, under which the average total delay is equal or less than 10.0 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections (50 seconds at unsignalized intersections), the movement is considered to have a LOS F and remedial measures are usually implemented if they are feasible.

The intersection analysis considered three separate measures of performance:

- ▶ The LOS for each turning movement. LOS is based on the average control delay per vehicle;
- ▶ The volume to capacity ratio for each intersection; and
- ▶ 95th percentile queue length (metres) using Synchro 11.

The intersection operations follow the Niagara Region's TIA guidelines for saturation flow rate, heavy vehicles percentages and Peak Hour Factor (PHF).

Under the Region's TIA Guidelines, the following criteria indicate critical conditions and signify that mitigation measures may need to be considered:

- ▶ At signalized intersections,
 - Any movement increased to 0.85 v/c or LOS E and above; or
 - Queues for an individual movement are projected to exceed turning lane storage.
- ▶ At unsignalized intersections,
 - Any individual movement that meets or exceeds LOS "D;" or
 - Queues for an individual movement are projected to exceed turning lane storage.

The evaluation criteria used to analyze signalized and unsignalized intersections are based on the Highway Capacity Manual (HCM) 2000 using Synchro 11 software.



The operations of the intersections in the study area were evaluated using the existing lane configuration, signal timings, and traffic control along with the existing traffic volumes.

Table 2.2 summarizes the level of service conditions.

The intersections within the study area are operating with acceptable levels of service and well within capacity during the AM and PM peak hours. No critical movements are noted.

Appendix C contains the detailed Synchro 11 reports.



TABLE 2.2: EXISTING TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				OVERALL
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	West Side Road and Coronation Drive / Franklin Avenue	TWSC	LOS Delay V/C 95th	B 11 0.01 0	> > >	> > >	B 11					< < < <	A 0 0.19 0		A 0	A 0 0.17 0	> > > >	A 0	A 0	
	West Side Road and Main Street West	TCS	LOS Delay V/C 95th Storage Avail.	C 27 0.52 33 130 97	C 28 0.47 44 - -	> > > > >	C 27	C 34 0.06 6 25 20	D 47 0.70 53 -	D 35 0.20 14 60 46	D 40	B 17 0.07 9 35 26	C 20 0.30 39 - -	> > > >	B 20	B 12 0.30 27 75 48	B 13 0.26 41 - -	B 12 0.13 8 - -	C 25 0.43	
PM Peak Hour	West Side Road and Coronation Drive / Franklin Avenue	TWSC	LOS Delay V/C 95th	B 13 0.02 1	> > >	> > >	B 13					< < < <	A 0 0.21 0		A 0	A 0 0.26 0	> > > >	A 0	A 0	
	West Side Road and Main Street West	TCS	LOS Delay V/C 95th Storage Avail.	C 31 0.67 47 130 83	C 28 0.48 54 - -	> > > > >	C 29	D 36 0.19 13 25 12	D 50 0.74 65 -	D 36 0.20 22 60 38	D 42	B 19 0.06 9 35 26	C 23 0.36 54 - -	> > > >	C 22	B 14 0.40 41 75 34	B 14 0.27 47 - -	B 13 0.18 12 - -	C 26 0.54	

MOE - Measure of Effectiveness
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
LOS - Level of Service

V/C - Volume to Capacity Ratio
95th - 95th Percentile Queue Length
Ex. - Existing Storage (m)
Avail. - Available Storage (m)

> - Shared Right-Turn Lane
< - Shared Left-Turn Lane



3 Development Concept

3.1 Description

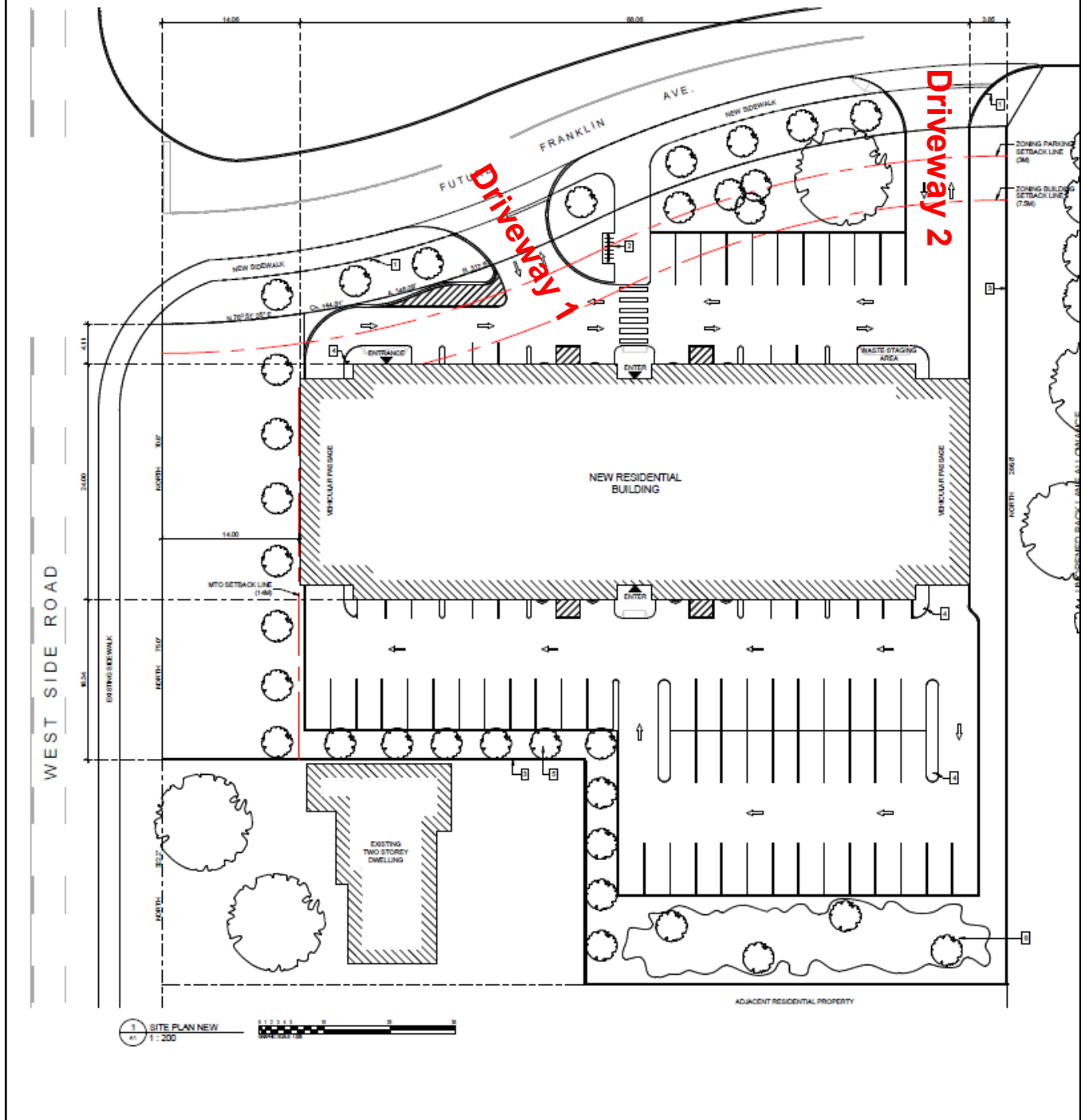
The subject site is located at 242-246 West Side Road in the City of Port Colborne. **Figure 3.1** illustrates the site concept plan. The MTO's 14-metre setback is illustrated and dimensioned on the plan.

The development concept includes an 8-storey residential building containing approximately 112 residential units. Build-out and occupancy is anticipated to occur by Year 2027.

The site's parking demand is proposed to be accommodated by 116 parking spaces (0.97 per unit).

Vehicle access is proposed by two driveways to the future extension of Franklin Avenue. Driveway 1 is located approximately 48 metres west of West Side Road (corner clearance) and Driveway 2 is located approximately 95 metres west of West Side Road (corner clearance).





3.2 Site Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation 11th edition³ data was used to estimate the vehicular site trip generation. Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) was used to estimate the site's trip generation.

Table 3.1 summarizes the estimated trip generation. To remain conservative, no modal split adjustments have been applied to the trip generation estimate to account for active transportation or transit-oriented trips.

The subject site is forecast to generate approximately 38 new vehicle trips during the AM peak hour and 44 new trips during the PM peak hour.

TABLE 3.1: SITE GENERATED TRAFFIC

Land Use	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
LUC 221 - 112 units	9	29	38	27	17	44
Total Generation	9	29	38	27	17	44

AM - $T = 0.44(X) - 11.61$, PM - $T = 0.39(X) + 0.34$

The surrounding area is primarily residential land uses along West Side Road. As such the trip distribution for the subject site reflects existing travel patterns as documented under existing conditions. This methodology was approved during pre-consultation with the MTO, Region and City staff. **Table 3.2** summarizes the estimated trip distribution. **Figure 3.2** illustrates the site generated traffic assignment.

³ Trip Generation Manual Eleventh Edition, Institute of Transportation Engineers, Washington D.C., 2021



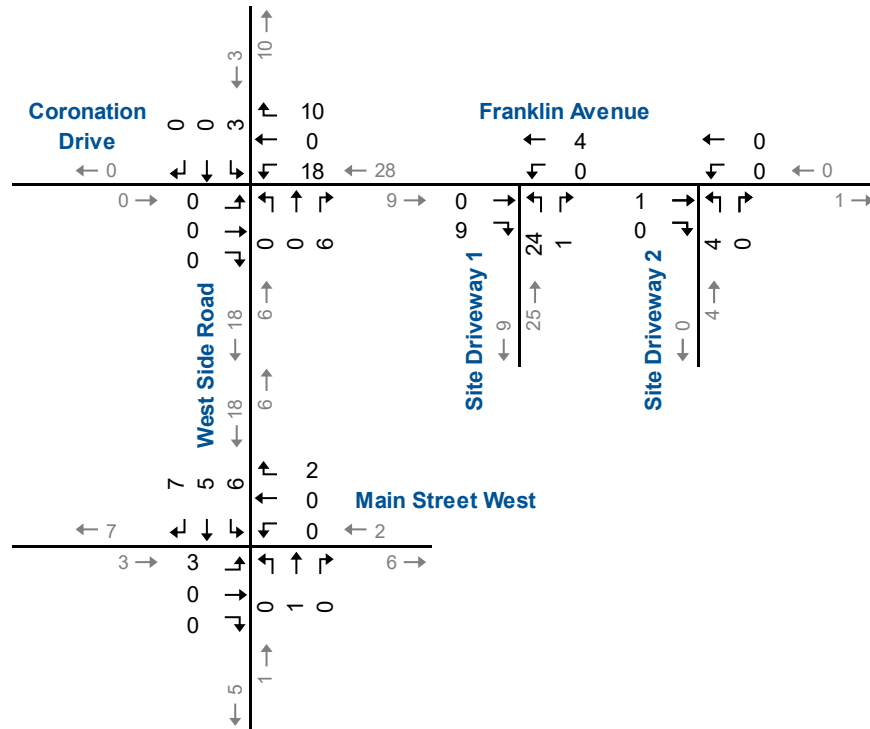
TABLE 3.2: ESTIMATED TRIP DISTRIBUTION

Origin/Destination	AM Peak Hour		PM Peak Hour	
	In	Out	In	Out
North via West Side Road	35%	35%	40%	35%
South via West Side Road	10%	15%	10%	10%
East via Franklin Drive	5%	5%	5%	5%
West via Main Street Road	25%	25%	20%	25%
East via Main Street Road	25%	20%	25%	25%
Total	100%	100%	100%	100%

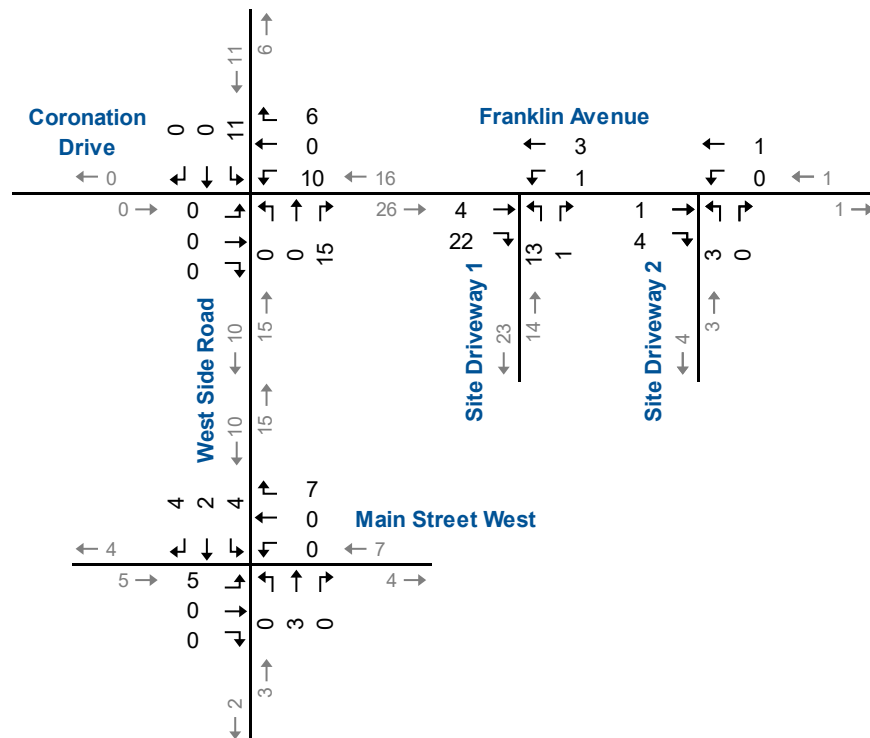




AM PEAK HOUR



PM PEAK HOUR



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4 Future Traffic Conditions

The assessment of future conditions in this section includes the following components:

- ▶ Future background traffic estimates;
- ▶ Level of service analysis for background traffic (pre-development);
- ▶ Future total traffic estimates; and
- ▶ Level of service analysis for total traffic (post-development).

4.1 Forecast Traffic

An opening-year horizon (Year 2027), five-year horizon (Year 2032), and 10-year horizon (Year 2037) following the expected opening-year of the site has been assessed. The likely future traffic volumes near the subject site are estimated to consist of:

- ▶ Increased non-site traffic (generalized background traffic growth);
- ▶ Traffic generated by the adjacent developments of:
 - 250 West Side Road⁴ – five-storey, 75-unit condominium building. Vehicle trips are estimated using the TIS prepared for the site;
 - Northland Estates⁵ – residential subdivision consisting of 122 single family detached units, 50 townhouse units, and a 50-unit mid-rise apartment block with ground floor commercial. Vehicle trips are estimated using the TIS prepared for the site;
 - 135 Coronation Drive North – approximately 114 townhouse units;
 - Barrick Road and West Side Road (west side) – consisting of 53 single detached units, 98 townhouse units, and 182 medium/high density residential units. Vehicle trips estimated using ITE trip generation data; and

⁴ Paradigm Transportation Solutions Limited. *250 West Side Road Transportation Impact Study Update*. (Cambridge. October 2018).

⁵ R.V. Anderson Associates Limited. *Northland Estates Residential Development Traffic Impact Study Final*. (Burlington. July 2022).



- Barrick Road and West Side Road (east side)⁶ – consisting of 79 townhouse units and a 6-storey, 100-unit apartment building. Vehicle trips are estimated using the TIS prepared for the site.
- ▶ Traffic generated by the subject site.

During pre-study consultation, MTO, Regional and City staff confirmed a generalized background growth rate of 2% per annum and the planned future adjacent developments for inclusion in the traffic forecast.

Appendix D contains the forecast traffic volumes for the adjacent development sites.

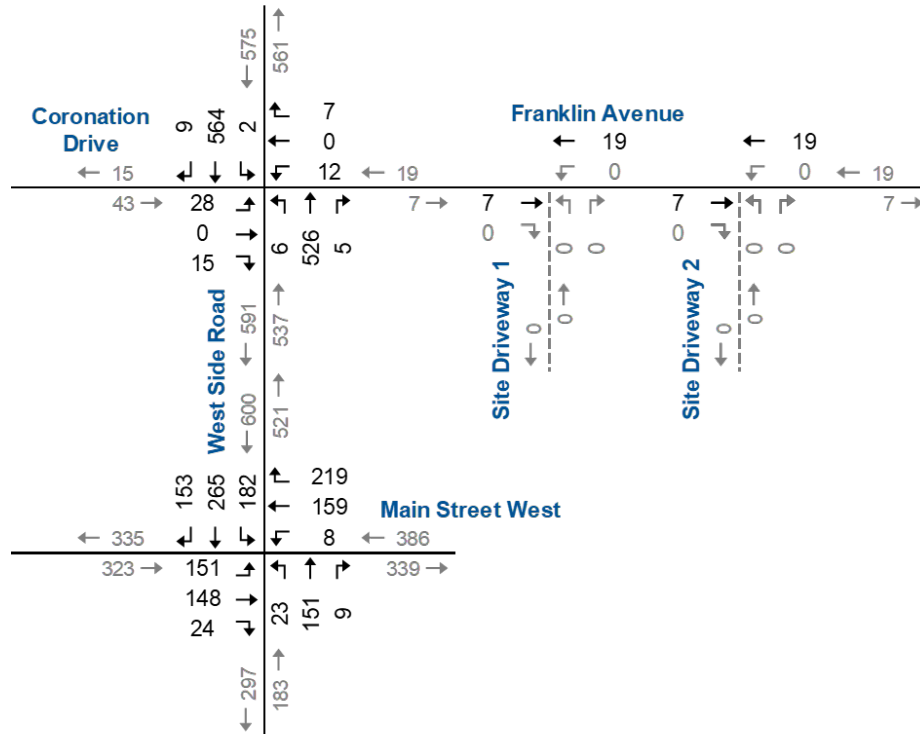
Figure 4.1 illustrates the forecast Opening Year background traffic volumes. **Figure 4.2** illustrates the forecast Opening Year total traffic volumes. **Figure 4.3** illustrates the forecast Five-Year background traffic volumes. **Figure 4.4** illustrates the forecast Five-Year total traffic volumes. **Figure 4.5** illustrates the forecast 10-Year background traffic volumes. **Figure 4.6** illustrates the forecast 10-Year total traffic volumes.

⁶ Paradigm Transportation Solutions Limited. *Barrick Road & Highway 58 (West Side Road) Traffic Impact & Parking Study*. (Cambridge. December 2023).

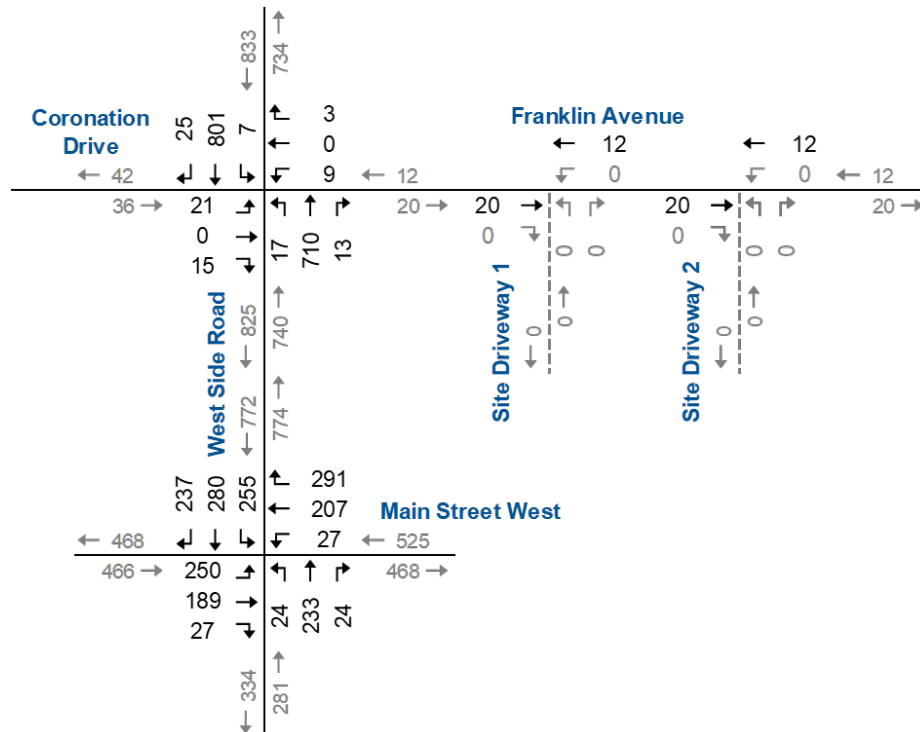




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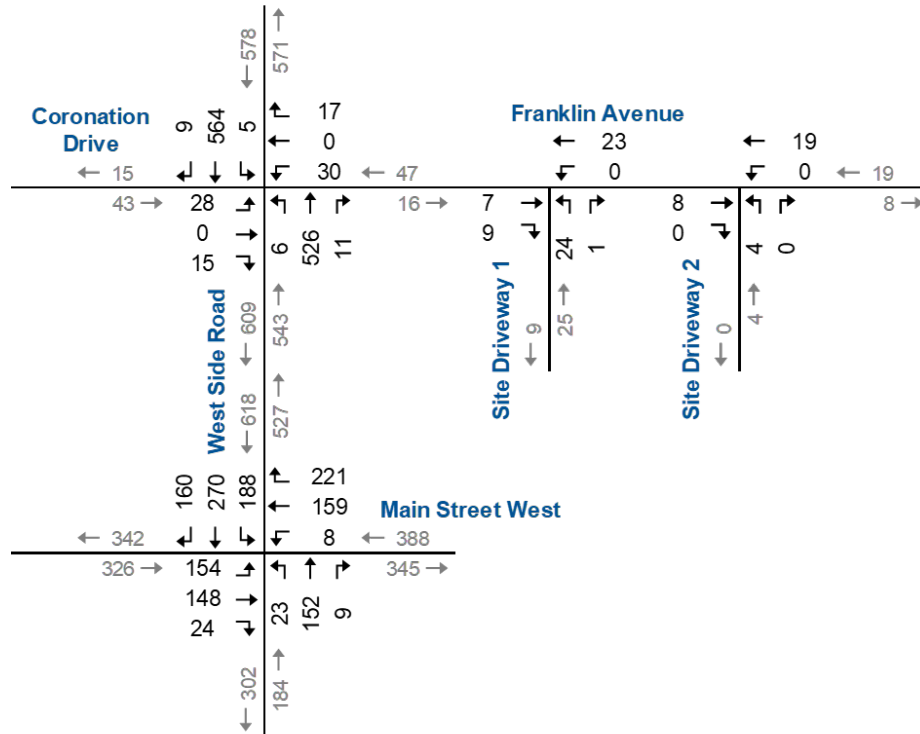
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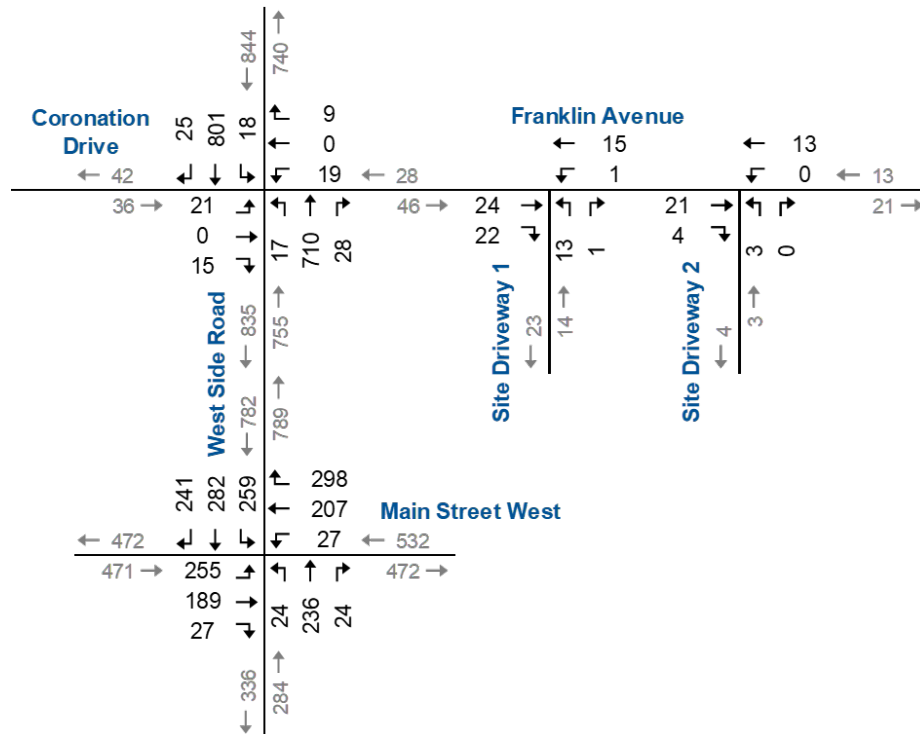
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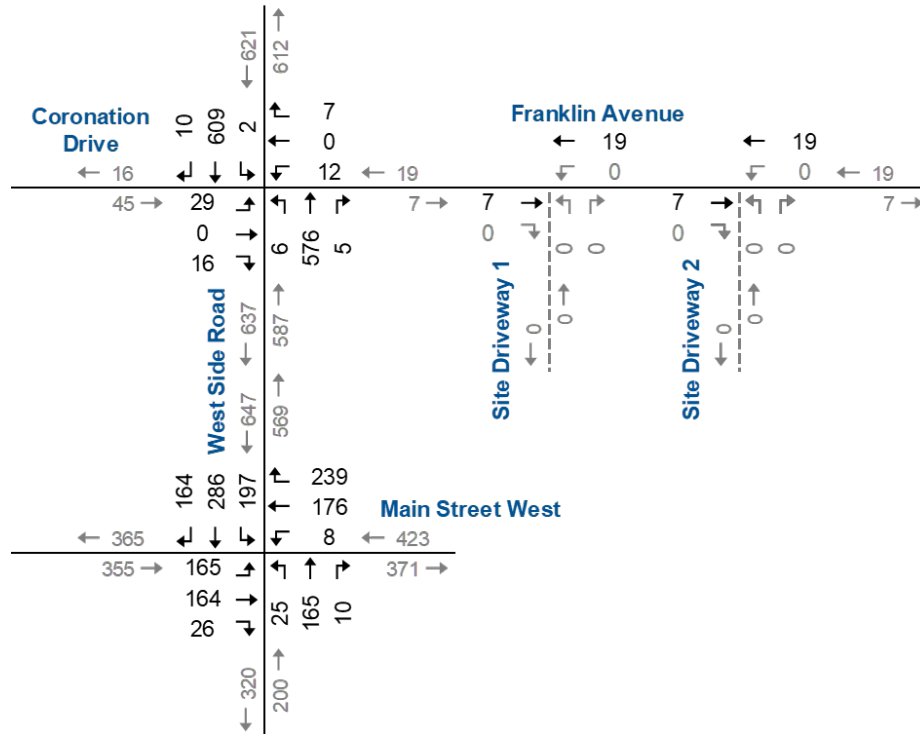
Opening Year Total Traffic Volumes

242-246 West Side Road
230107

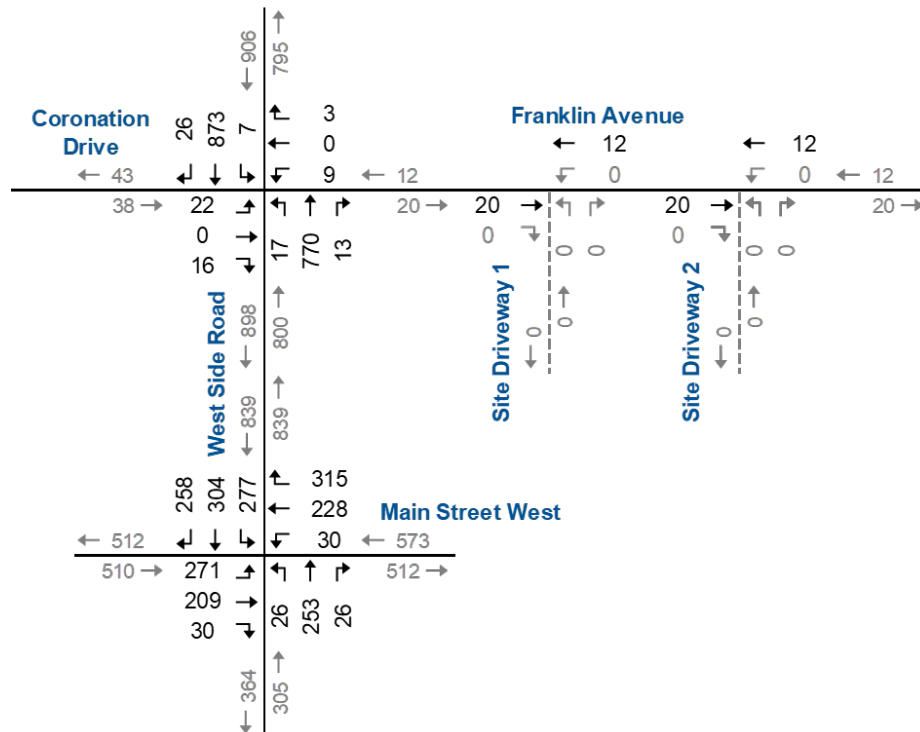
Figure 4.2



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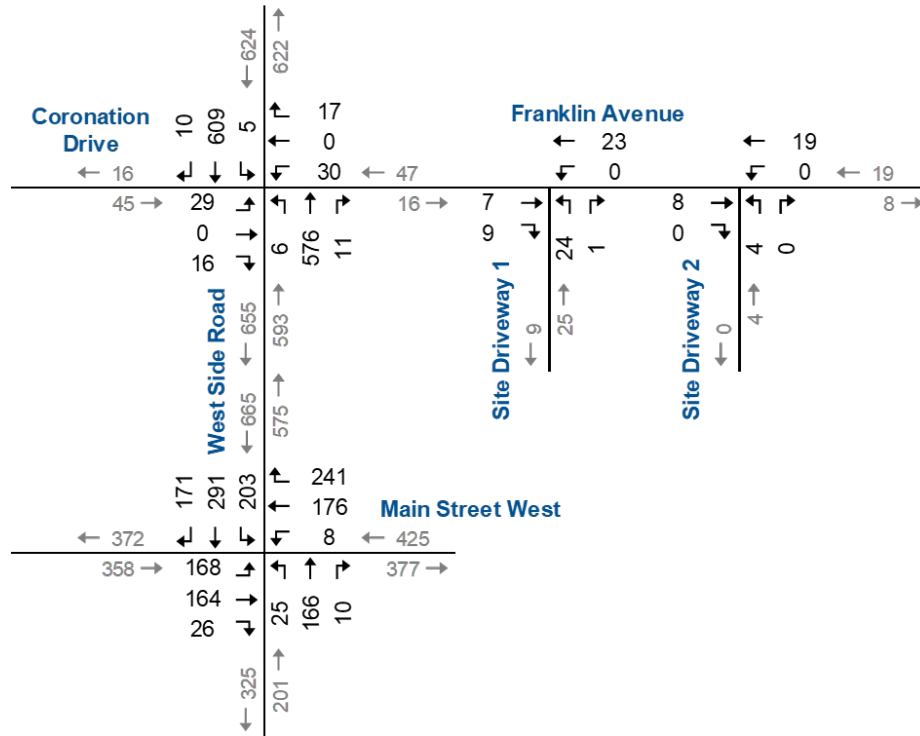
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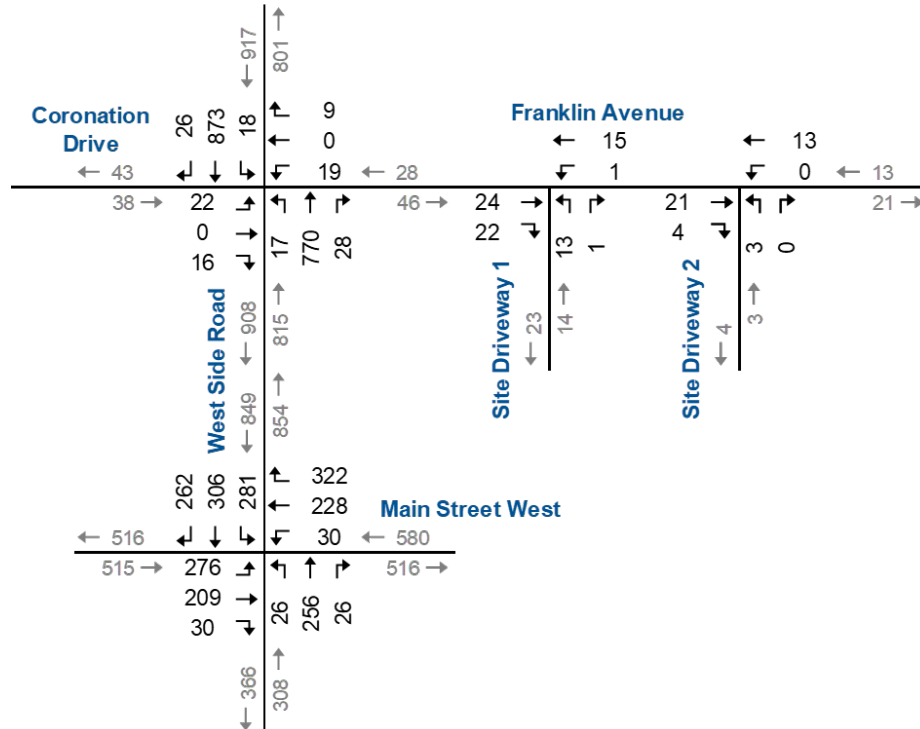
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AM PEAK HOUR



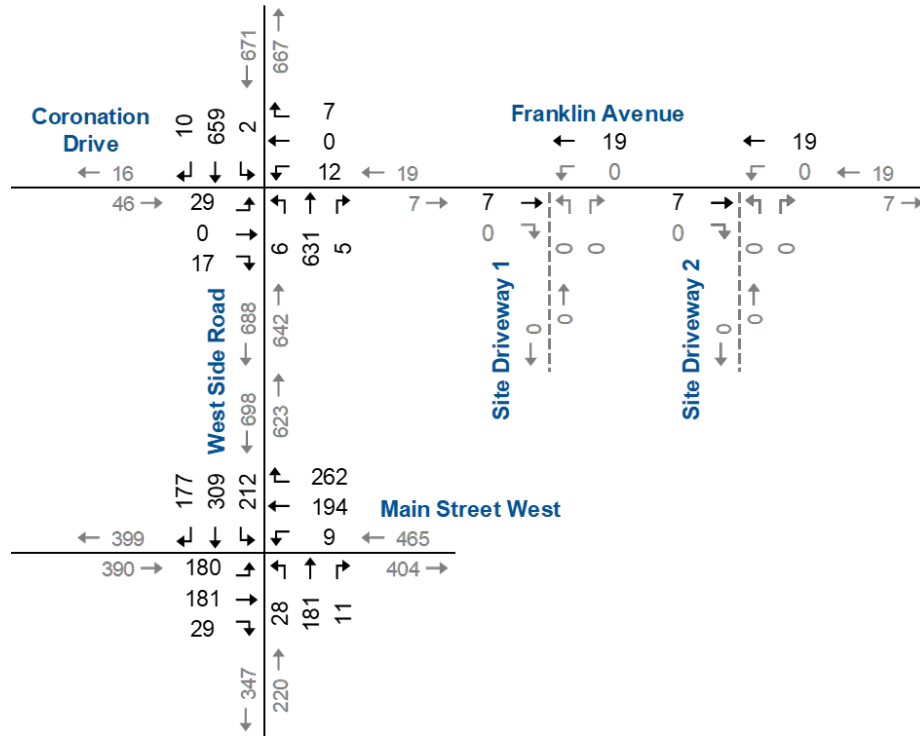
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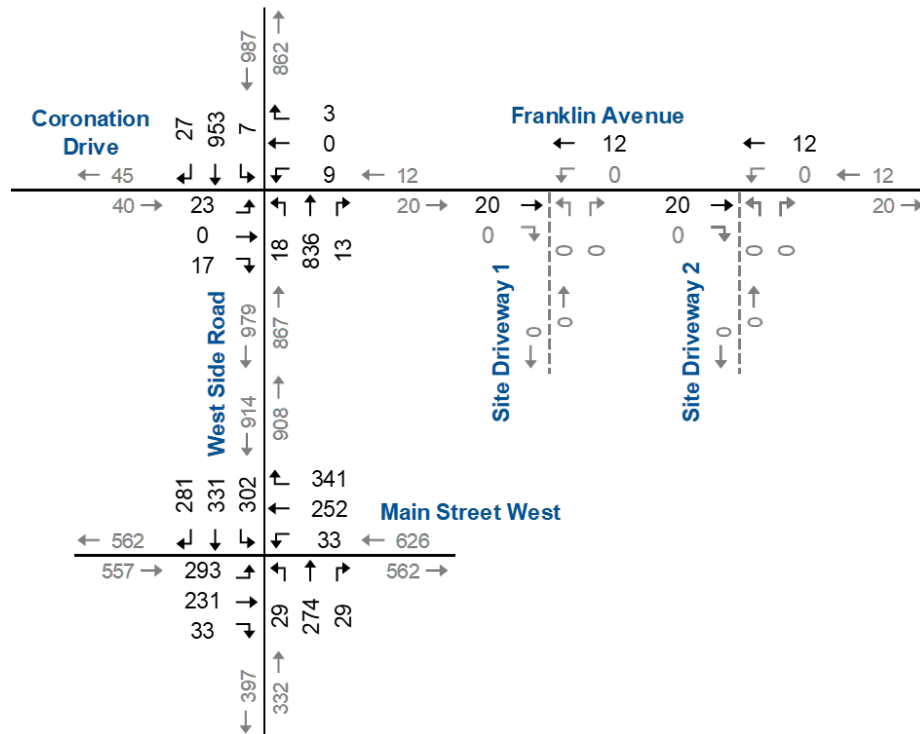
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AM PEAK HOUR



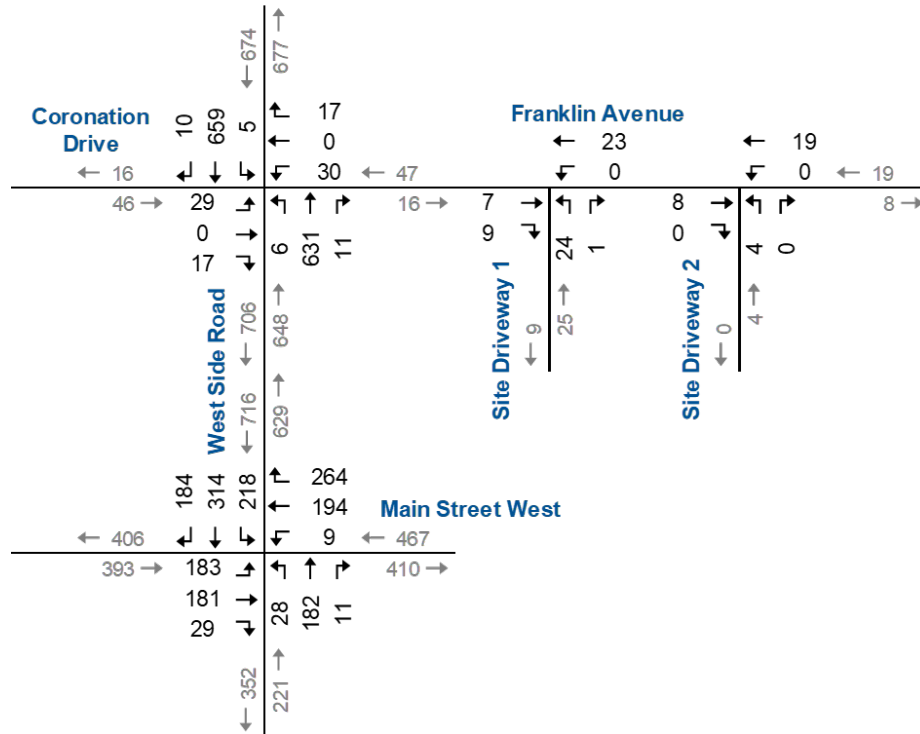
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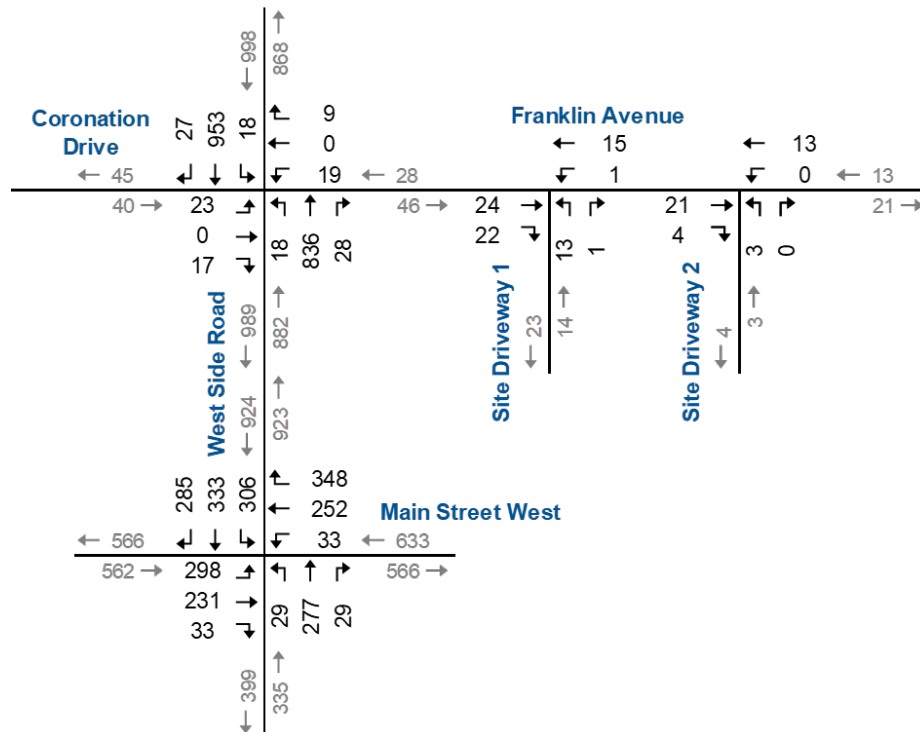
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AM PEAK HOUR



PM PEAK HOUR



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4.2 Opening Date Traffic Operations

The study area intersection operations analyses followed the same methodology used for existing conditions. No changes to the existing lane configurations or signal timings are assumed.

4.2.1 Opening Date Background Traffic Operations

Table 4.1 summarizes the level of service conditions, and the following critical movement is noted at West Side Road and Main Street West:

- ▶ Eastbound Left-Turn – PM peak hour, v/c ratio greater than 0.85.

No other critical movements are noted within the study area.

Appendix E contains the detailed Synchro 11 reports.

4.2.2 Opening Year Total Traffic Operations

Table 4.2 summarizes the level of service conditions.

The critical movements identified in the Opening Date Background Traffic scenario are forecast to continue to worsen under the Opening Year Total Traffic conditions.

No new critical movements are noted within the study area.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle. The westbound approach to the intersection of West Side Road and Franklin Avenue is forecast to operate with low levels of delay and queues of about one vehicle or less. The queue length is not expected to block the Driveway 1 approach to Franklin Avenue.

Appendix F contains the detailed Synchro 11 reports.



TABLE 4.1: OPENING YEAR BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS	<	B	>	B	<	B	>	B	<	A	>	A	<	A	>	A	A
			Delay	<	14	>	14	<	13	>	13	<	0	>	0	<	0	>	0	0.7
			V/C	<	0.1	>		<	0.04	>		<	0.17	>		<	0.19	>		
			Q	<	3	>		<	1	>		<	0	>		<	0	>		
West Side Road & Main Street West	TCS	LOS	C	C	>	C	C	D	D	D	B	C	>	C	B	B	B	B	C	
		Delay	29	28	>	29	35	50	36	42	19	23	>	22	14	15	13	14	25	
		V/C	0.63	0.49	>		0.06	0.74	0.24		0.08	0.37	>		0.45	0.38	0.19		0.74	
		Q	40	48	>		6	57	15		10	47	>		40	62	9			
Stor.	Avail.	90	-	>		25	-	60		35	-	>		75	-	-				
PM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS	<	C	>	C	<	C	>	C	<	A	>	A	<	A	>	A	A
			Delay	<	17	>	17	<	16	>	16	<	1	>	0	<	0	>	0	0.7
			V/C	<	0.11	>		<	0.03	>		<	0.22	>		<	0.26	>		
			Q	<	3	>		<	1	>		<	1	>		<	0	>		
West Side Road & Main Street West	TCS	LOS	D	C	>	D	D	D	D	B	C	>	C	B	B	B	B	B	C	
		Delay	54	27	>	42	36	52	37	43	20	27	>	26	18	16	15	16	30	
		V/C	0.89	0.49	>		0.20	0.77	0.28		0.07	0.50	>		0.59	0.36	0.23		0.89	
		Q	77	58	>		14	70	27		10	74	>		54	62	14			
Stor.	Avail.	130	-	>		25	-	60		35	-	>		75	-	-				
53	-	>		11	-	33		25	-	>		21	-	-						

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



TABLE 4.2: OPENING YEAR TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	B 14 0.1 3	> > >	B 14	< < <	B 14 0.1 3	> > >	B 14	< < <	A 0 0.18 0	> > >	A 0	< < <	A 0 0.19 0	> > >	A 0	A 1.1
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	C 30 0.64 41 130 89	C 28 0.49 48 - -	> > >	C 29	C 35 0.06 6 25 19	D 50 0.74 57 15 60 45	D 36 0.24 15 60 45	D 42	B 19 0.08 10 35 25	C 23 0.37 48 - -	> > >	C 22	B 14 0.47 41 75 34	B 15 0.39 63 - -	B 13 0.20 9 - -	B 14	C 26 0.74
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.01 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.03 1		> > >	A 9					A 3.4
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.01 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.00 0		> > >	A 9					A 1.0
PM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 17 0.11 3	> > >	C 17	< < <	C 16 0.08 2	> > >	C 16	< < <	A 1 0.23 1	> > >	A 0	< < <	A 1 0.26 1	> > >	A 0	B 0.9
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	E 58 0.90 80 130 50	C 27 0.49 58 - -	> > >	D 44	D 36 0.19 14 25 11	D 51 0.76 70 - -	D 37 0.28 27 60 33	D 43	C 20 0.07 10 35 25	C 27 0.51 75 - -	> > >	C 27	B 19 0.61 55 75 20	B 16 0.36 63 - -	B 15 0.23 14 - -	B 17	C 31 0.90
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.03 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.02 0		> > >	A 9					A 1.7
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.02 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.00 0		> > >	A 9					A 0.6

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



4.3 Five-Year Traffic Operations

The study area intersection operations analyses followed the same methodology used for existing conditions. No changes to the existing lane configurations or signal timings are assumed.

4.3.1 Five-Year Background Traffic Operations

Table 4.3 summarizes the level of service conditions.

The critical movements identified in the Opening Date Background Traffic and Opening Year Total Traffic conditions are forecast to continue to worsen under the Five-Year Background scenario. Additionally, the following critical movement is noted at West Side Road and Main Street West:

- ▶ Westbound Through – PM peak hour, LOS E.

Appendix G contains the detailed Synchro 11 reports.

4.3.2 Five-Year Total Traffic Operations

Table 4.4 summarizes the level of service conditions.

The critical movements identified in the Five-Year Background Traffic scenario are forecast to continue to worsen under the Five-Year Total Traffic conditions.

No new critical movements are noted within the study area.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle. The westbound approach to the intersection of West Side Road and Franklin Avenue is forecast to operate with low levels of delay and queues of about one vehicle or less. The queue length is not expected to block the Driveway 1 approach to Franklin Avenue.

Appendix H contains the detailed Synchro 11 reports.



TABLE 4.3: FIVE-YEAR BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																			
				Eastbound				Westbound				Northbound				Southbound				Overall			
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach				
AM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS	<	B	>	B 14	<	B	>	B 13	<	A	>	A 0	<	A	>	A 0	A 0.8			
			Delay	<	14	>		<	13	>		<	0	>		<	0	>					
			V/C	<	0.11	>		<	0.05	>		<	0.19	>		<	0.20	>					
	West Side Road & Main Street West	TCS	Q	<	3	>		<	1	>		<	0	>		<	0	>					
			LOS	C	C	>	C 30	C	D	D	D 43	B	C	>	C 24	B	B	B	B 15	C 27			
			Delay	32	28	>		34	53	36		20	24	>		15	16	14					
			V/C	0.69	0.53	>		0.06	0.78	0.26		0.09	0.41	>		0.51	0.42	0.21					
			Q	44	54	>		6	63	15		10	52	>		43	67	9					
			Stor. Avail.	130	-	>		25	-	60		35	-	>		75	-	-					
			Q	86	-	>		19	-	45		25	-	>		32	-	-					
			PM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS	<	C	>	C 18	<	C	>	C 16	<	A	>	A 0	<	A	>	A 0	A 0.7
						Delay	<	18	>		<	16	>		<	1	>		<	0	>		
V/C	<	0.12				>		<	0.04	>		<	0.24	>		<	0.28	>					
	West Side Road & Main Street West	TCS	Q	<	3	>		<	1	>		<	1	>		<	0	>					
			LOS	E	C	>	D 54	D	E	D	D 44	C	C	>	C 29	C	B	B	B 18	C 35			
			Delay	76	28	>		36	55	37		21	30	>		22	17	16					
			V/C	0.98	0.53	>		0.21	0.80	0.30		0.08	0.55	>		0.68	0.39	0.25					
			Q	96	65	>		15	78	28		10	82	>		59	68	14					
			Stor. Avail.	130	-	>		25	-	60		35	-	>		75	-	-					
			Q	34	-	>		10	-	32		25	-	>		16	-	-					

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



TABLE 4.4: FIVE-YEAR TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	B 15 > 0.12 > 3	> > >	B 15	< < <	B 14 > 0.11 > 3	> > >	B 14	< < <	A 0 > 0.19 > 0	> > >	A 0	< < <	A 0 > 0.20 > 0	> > >	A 0	A 1.1
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	C 33 0.70 45 130 85	C 28 0.53 54 - -	> > >	C 30	C 35 0.06 6 25 19	D 53 0.78 63 - -	D 36 0.27 15 60 45	D 44	B 20 0.09 10 35 25	C 24 > 0.41 > -	> > >	C 24	B 16 0.53 45 75 30	B 16 0.43 68 - -	B 14 0.21 9 - -	B 16	C 27 0.78
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.01 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.03 1		> > >	A 9					A 3.4
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.01 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.00 0		> > >	A 9					A 1.0
PM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 19 > 0.13 > 3	> > >	C 19	< < <	C 17 > 0.08 > 2	> > >	C 17	< < <	A 0 > 0.25 > 1	> > >	A 0	< < <	A 1 > 0.28 > 1	> > >	A 0	B 1.0
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	F 82 0.99 100 130 30	C 28 0.53 65 - -	> > >	E 57	D 37 0.21 15 25 10	E 56 0.81 78 - -	D 37 0.30 29 60 31	D 44	C 21 0.08 10 35 25	C 30 0.56 83 - -	> > >	C 29	C 23 0.69 60 75 15	B 17 0.40 69 - -	B 16 0.25 14 - -	B 19	D 36 0.99
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.03 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.02 0		> > >	A 9					A 1.7
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.02 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.00 0		> > >	A 9					A 0.6

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



4.4 10-Year Traffic Operations

The study area intersection operations analyses followed the same methodology used for existing conditions. No changes to the existing lane configurations or signal timings are assumed.

4.4.1 10-Year Background Traffic Operations

Table 4.5 summarizes the level of service conditions, and the following new critical movements are noted at West Side Road and Main Street West:

- ▶ Westbound Through – AM and PM peak hour, LOS E with a v/c ratio near 0.85; and
- ▶ Southbound Left– PM peak hour, queue lengths nearing storage length, and a v/c ratio approaching 0.85.

No other critical movements are noted within the study area.

Appendix I contains the detailed Synchro 11 reports.

4.4.2 10-Year Total Traffic Operations

Table 4.6 summarizes the level of service conditions.

The critical movements identified in the Eastbound and Westbound direction at the intersection of West Side Road and Main Street West in the 10-Year Background Traffic horizon are forecast to continue to worsen in the 10-Year Total Traffic horizon.

No new critical movements are noted within the study area.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle or less. The westbound approach to the intersection of West Side Road and Franklin Avenue is forecast to operate with low levels of delay and queues of about one vehicle or less. The queue length is not expected to block the Driveway 1 approach to Franklin Avenue.

Appendix J contains the detailed Synchro 11 reports.



TABLE 4.5: 10-YEAR BACKGROUND TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 15 0.12 3	> > >	C 15	< < <	B 14 0.05 1	> > >	B 14	< < <	A 0 0.20 0	> > >	A 0	< < <	A 0 0.22 0	> > >	A 0	A 0.8
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	D 37 0.76 48 130 82	C 29 0.57 60 - -	> > > > >	C 33	C 34 0.06 6 25 19	E 56 0.82 69 - -	D 36 0.29 15 60 45	D 45	C 21 0.11 11 35 24	C 26 0.46 57 - -	> > > > >	C 26	B 18 0.58 47 75 28	B 18 0.46 74 - -	B 15 0.22 9 - -	B 17	C 29 0.82
PM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 16 0.07 2	> > >	C 16	< < <	C 18 0.04 1	> > >	C 18	< < <	A 1 0.26 1	> > >	A 0	< < <	A 0 0.30 0	> > >	A 0	B 0.6
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	F 105 1.07 117 130 13	C 29 0.57 74 - -	> > > > >	E 69	D 36 0.23 16 25 9	E 61 0.85 93 - -	D 37 0.32 30 60 30	D 47	C 22 0.10 12 35 23	C 32 0.61 90 - -	> > > >	C 31	C 31 0.79 73 75 2	B 19 0.44 76 - -	B 16 0.27 15 - -	C 22	D 40 1.07

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



TABLE 4.6: 10-YEAR TOTAL TRAFFIC OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 15 > 0.13 > 3 >	> > >	C 15	< < <	B 15 > 0.12 > 3 >	> > >	B 15	< < <	A 0 > 0.21 > 0 >	> > >	A 0	< < <	A 0 > 0.22 > 0 >	> > >	A 0	A 1.1
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	D 37 0.77 49 130 81	C 29 0.57 60 - -	> > >	C 33	C 34 0.06 6 25 19	E 57 0.82 69 - -	D 37 0.29 16 60 44	D 45	C 21 0.11 12 35 23	C 26 > 0.46 > 58 >	> > >	C 26	B 18 0.60 48 75 27	B 18 0.47 75 - -	B 15 0.23 9 - -	B 17	C 29 0.82
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 > 0.01 > 0 >	> > >	A 0	< < <	A 0 > 0.00 > 0 >		A 0	A 9 > 0.03 > 1 >	> > >	> > >	A 9					A 3.4
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 > 0.01 > 0 >	> > >	A 0	< < <	A 0 > 0.00 > 0 >		A 0	A 9 > 0.00 > 0 >	> > >	> > >	A 9					A 1.0
PM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 21 > 0.15 > 4 >	> > >	C 21	< < <	C 18 > 0.09 > 2 >	> > >	C 18	< < <	A 0 > 0.27 > 1 >	> > >	A 0	< < <	A 1 > 0.30 > 1 >	> > >	A 0	B 1.0
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	F 111 1.09 121 130 9	C 29 0.57 74 - -	> > >	E 72	D 36 0.23 16 25 9	E 61 0.85 93 - -	D 37 0.33 31 60 29	D 47	C 22 0.10 12 35 23	C 32 > 0.62 > 91 >	> > >	C 32	C 32 0.80 76 -1	B 19 0.44 76 - -	B 17 0.27 15 - -	C 23	D 41 1.09
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 > 0.03 > 0 >	> > >	A 0	< < <	A 0 > 0.00 > 0 >		A 0	A 9 > 0.02 > 0 >	> > >	> > >	A 9					A 1.7
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 > 0.02 > 0 >	> > >	A 0	< < <	A 0 > 0.00 > 0 >		A 0	A 9 > 0.00 > 0 >	> > >	> > >	A 9					A 0.6

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



5 Remedial Measures

5.1 Traffic Control Improvements

The West Side Road and Coronation Drive / Franklin Avenue intersection was assessed using the Ontario Traffic Manual (OTM Book 12 – Justification 7) signal warrant procedures⁷. **Appendix K** contains the warrant analysis.

Based on the warrant analysis, traffic control signals are not warranted at the intersection of West Side Road and Coronation Drive / Franklin Avenue. Stop control is an appropriate form of traffic control for the West Side Road and Coronation Drive / Franklin Avenue.

5.1.2 Signal Optimization

To address critical traffic movements forecast at the intersection of West Side Road and Main Street West over the next ten years, an analysis of potential mitigation strategies was conducted. This analysis included optimizing traffic signal timings using Synchro 11 software.

The study area intersection operations analyses followed the same methodology used for existing conditions with no changes to the existing lane configurations are assumed.

Table 5.1 summarizes the 10-Year Total Traffic Remedial measures operation analysis. **Appendix L** contains the detailed Synchro 11 reports.

After optimizing the signal timings, there are no critical movements in the AM Peak period, and the West Side Road and Main Street West Eastbound Left Turn movement operates under capacity (v/c less than 1.00) during the PM Peak period.

The road authorities should continue to monitor and adjust the signal timings at the intersection of West Side Road and Main Street West to adjust for future changes in traffic volumes.

⁷ Ministry Transportation Ontario. *Ontario Traffic Manual Book 12*. Justification 7. (St. Catharines, November 2007).



TABLE 5.1: 10-YEAR TOTAL TRAFFIC REMEDIAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall	
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
AM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 15 > 0.13 > 3 >	> > >	C 15	< < <	B 15 > 0.12 > 3 >	> > >	B 15	< < <	A 0 > 0.21 > 0 >	> > >	A 0	< < <	A 0 > 0.22 > 0 >	> > >	A 0	A 1.1	
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	D 46 0.83 48 130 82	C 30 0.59 59 - -	> > >	D 38	C 33 0.06 6 25 19	D 49 0.76 66 - 46	C 35 0.29 14 60 46	D 41	C 20 0.11 12 35 23	C 26 0.45 60 - -	> > >	C 25	B 17 0.58 51 75 24	B 17 0.46 79 - -	B 14 0.23 10 - -	B 16	C 28 0.83	
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.01 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.03 1		> > >	A 9						A 3.4
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.01 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.00 0		> > >	A 9						A 1.0
PM Peak Hour	West Side Road & Coronation Drive/Franklin Avenue	TWSC	LOS Delay V/C Q	< < <	C 21 > 0.15 > 4 >	> > >	C 21	< < <	C 18 > 0.09 > 2 >	> > >	C 18	< < <	A 0 > 0.27 > 1 >	> > >	A 0	< < <	A 1 > 0.3 > 1 >	> > >	A 0	B 1.0	
	West Side Road & Main Street West	TCS	LOS Delay V/C Q Stor. Avail.	E 78 0.99 105 130 25	C 27 0.54 71 - -	> > >	D 54	D 38 0.22 16 25 9	E 60 0.83 88 - 30	D 39 0.33 30 60 30	D 47	C 24 0.10 13 35 22	D 36 0.64 106 - -	> > >	C 35	D 41 0.85 107 -32	C 21 0.46 92 - -	B 18 0.27 18 - -	C 27	D 39 0.99	
	Driveway 1 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.03 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.02 0		> > >	A 9						A 1.7
	Driveway 2 & Franklin Avenue	TWSC	LOS Delay V/C Q		A 0 0.02 0	> > >	A 0	< < <	A 0 0.00 0		A 0	A 9 0.00 0		> > >	A 9						A 0.6

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

Stor. - Existing Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



5.2 Auxiliary Turn Lanes

The Ministry of Transportation's (MTO) Design Supplement for the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads⁸ provides guidance on the assessment and/or need for auxiliary left-turn lanes.

The need for left-turn lanes at the proposed site driveway intersections with Franklin Avenue are assessed.

The warrant analysis indicates that left-turn lanes at the site driveway intersections with Franklin Avenue are not warranted. A single shared eastbound and westbound lane is appropriate at the site driveway intersections with Franklin Avenue.

Appendix M contains the left-turn lane warrant nomographs.

5.3 Access Management

The proposed site Driveway 1 has a corner clearance of approximately 48 metres from West Side Road. The driveway's position exceeds the corner clearance dimension of 15 metres⁹ as set out in the TAC Guide for a private driveway to a local roadway.

The operational area of the Franklin Avenue intersection with West Side Road is also defined by the queue reach generated by the stop control at the West Side Road intersection.

SimTraffic analysis was completed for the 10-Year Total Traffic horizon for ten 60-minute simulations with 15-minutes of seed time.

The queue reach for the westbound approach of Franklin Avenue to West Side Road is forecast to be less than 20 metres and is not expected to spill back into the site Driveway 1 intersection.

Appendix N contains the detailed SimTraffic reports.

⁸ Ministry of Transportation Ontario. *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads. Appendix 9 for Chapter 9 Intersections.* (Washington. June 2017).

⁹ Transportation Association of Canada. *TAC Geometric Design Guide for Canadian Roads. Chapter 8 – Figure 8.8.2: Suggested Minimum Corner Clearance.* (Washington. 2017).



6 Conclusions and Recommendations

6.1 Conclusions

- ▶ **Existing Traffic Operations:** The intersections within the study area are operating with acceptable levels of service and well within capacity during the AM and PM peak hours. No critical movements are noted.
- ▶ **Site Generated Traffic:** The subject site is forecast to generate approximately 38 new vehicle trips during the AM peak hour and 44 new trips during the PM peak hour.
- ▶ **Opening Year Background Traffic Operations:** One critical movement is noted during the Opening Year Background Traffic horizon:
 - West Side Road and Main Street West
 - Eastbound Left-Turn – PM peak hour, v/c ratio greater than 0.85.

No other critical movements are noted.

- ▶ **Opening Year Total Traffic Operations:** The critical movements identified in the Opening Date Background Traffic scenario are forecast to continue to worsen under the Opening Year Total Traffic conditions. No new critical movements are noted within the study area.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle or less.

- ▶ **Five-Year Background Traffic Operations:** The critical movements identified in the Opening Date Background Traffic and Opening Year Total Traffic conditions are forecast to continue to worsen under the Five-Year Background scenario. One additional critical movement is noted during the Five-Year Background Traffic horizon:
 - West Side Road and Main Street West
 - Westbound Through – PM peak hour, LOS E.

No other critical movements are noted.

- ▶ **Five-Year Background Total Traffic Operations:** The critical movements identified in the Five-Year Background Traffic scenario are forecast to continue to worsen under the Five-Year



Total Traffic conditions. No new critical movements are noted within the study area.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle or less.

- ▶ **Ten-Year Background Traffic Operations:** Two additional critical movements are forecast to occur during the Ten-Year Background Traffic horizon:
 - West Side Road and Main Street West
 - Westbound Through – AM and PM peak hour, LOS E with a v/c ratio nearing 0.85.
 - Southbound Left– PM peak hour, queue lengths nearing storage length, and a v/c ratio approaching 0.85.

No other critical movements are noted within the study area.

- ▶ **Ten-Year Total Traffic Operations:** The critical movements identified under the background traffic conditions are forecast to continue to occur with the introduction of site generated traffic. Site generated traffic does not create any new critical movements at the study area intersections.

The site driveway approaches to Franklin Avenue are forecast to operate with low levels of delay. Delays are forecast to be in the LOS A range with queue lengths of about one vehicle or less.

- ▶ **Remedial Measures:** Based on the warrant analysis, traffic control signals are not warranted at the intersection of West Side Road and Coronation Drive / Franklin Avenue. Stop control is an appropriate form of traffic control for the Coronation Drive and Franklin Avenue approaches to West Side Road.

The warrant analysis indicates that left-turn lanes at the site driveway intersections with Franklin Avenue are not warranted.

Driveway 1 is positioned with a corner clearance exceeding the spacing outlined in the TAC guide and the driveway is also located outside the functional area of the intersection as the queue length is less than 20 metres.



6.2 Recommendations

Based on the findings of this study, it is recommended that the road authorities continue to monitor and adjust the signal timings at the intersection of West Side Road and Main Street West to account for future changes in traffic volumes.



Appendix A

Pre-Study Consultation



Creighton Chartier

From: Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>
Sent: April 18, 2023 3:55 PM
To: Scott Catton; Creighton Chartier
Cc: David Schulz; Nicholas Olschansky; Constantine, Neave (MTO)
Subject: RE: (230107) 246 West Side - Transportation Impact and Parking Study - Scope of Work
Attachments: RE: Port Colborne Pre-consultation Agenda - October 13, 2022

Hi Scott,

Re: TIS Scope of Work – Request for Comments
242-246 West Side Road, Port Colborne, ON. (future Site Plan Control/Draft Plan of Condo),
Hwy 58, 2B – Arterial (Controlled-Access Highway)

The MTO's pre-consultation comments are still applicable to the latest concept plan.

Hwy 58 (West Side Road) is classified as a Controlled-Access Highway, therefore, any redevelopment of the subject sites must include the closing of the existing residential entrance on Hwy 58 (West Side Road). All access should be from the municipal road (Franklin Avenue extension).

Also, no features which are essential to the overall viability of the site are permitted within the **MTO 14 m setback** area. Essential features include, but are not limited to, buildings/structures (above or below grade), required parking spaces (required per the municipal zoning by-law), retaining walls, utilities, stormwater management features, snow storage, loading spaces, fire routes, essential landscaping, etc. Please note that non-essential parking may be located within the MTO 14 m setback area, but must be set back a minimum of 3 m from the MTO property line.

Use the link below to the MTO Highway Corridor Management Manual (April 2022):

[Ontario Ministry of Transportation Library \(gov.on.ca\)](https://www.ontario.ca/gov/ontario-ministry-of-transportation-library)

Thanks,

PaulN

From: Scott Catton <scatton@ptsl.com>
Sent: April 18, 2023 1:35 PM
To: Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; Creighton Chartier <cchartier@ptsl.com>
Cc: David Schulz <David.Schulz@portcolborne.ca>; Nicholas Olschansky <Nicholas.Olschansky@portcolborne.ca>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; Constantine, Neave (MTO) <Neave.Constantine@ontario.ca>
Subject: RE: (230107) 246 West Side - Transportation Impact and Parking Study - Scope of Work

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Paul,

The site plan has changed since the October 2022 pre-consultation meeting. The concept plans from the pre-con are attached. The current plan most closely resembles Concept A which was a five-storey apartment building with 34 dwelling units.

In addition to providing comments on the terms of reference for the TIS can you also confirm if the 14-m setback is required for this site from West Side Road (Hwy 58)?

Thanks

Scott Catton, C.E.T.

Senior Project Manager, Associate

Paradigm Transportation Solutions Limited

5A-150 Pinebush Road, Cambridge ON N1R 8J8

p: 905.381.2229 x302

e: scatton@ptsl.com

w: www.ptsl.com



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From: Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>

Sent: Tuesday, April 18, 2023 12:59 PM

To: Creighton Chartier <cchartier@ptsl.com>

Cc: Scott Catton <scatton@ptsl.com>; David Schulz <David.Schulz@portcolborne.ca>; Nicholas Olschansky <Nicholas.Olschansky@portcolborne.ca>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; Constantine, Neave (MTO) <Neave.Constantine@ontario.ca>

Subject: RE: (230107) 246 West Side - Transportation Impact and Parking Study - Scope of Work

Hi Creighton,

Re: TIS Scope of Work – Request for Comments

242-246 West Side Road, Port Colborne, ON. (future Site Plan Control/Draft Plan of Condo),
Hwy 58, 2B – Arterial (Controlled-Access Highway)

The attached Concept Plan has not been previously submitted to the Ministry for review and preliminary comments, as per the municipality's pre-consultation process. Therefore, the MTO can not provide comments for the proposed TIS scope of work at this time.

Thanks,

Paul Nunes | Senior Project Manager (West)

Highway Corridor Management Section | Central Operations | Ontario Ministry of Transportation

159 Sir William Hearst Avenue, 7th Floor, Toronto, ON. M3M 0B7

Telephone: 416-270-3108 | Email: paul.nunes@ontario.ca



From: Creighton Chartier <cchartier@ptsl.com>

Sent: April 12, 2023 1:36 PM

To: Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; David Schulz <David.Schulz@portcolborne.ca>; Nicholas Olschansky <Nicholas.Olschansky@portcolborne.ca>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>

Cc: Scott Catton <scatton@ptsl.com>

Subject: (230107) 246 West Side - Transportation Impact and Parking Study - Scope of Work

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Paradigm has been retained to prepare a Transportation Impact Study for the proposed development of 242-246 West Side Road in the City of Port Colborne. The conceptual site plan is attached. The property owner is proposing to develop the site to include a five-story mid-rise multi-family residential building containing approximately 60 units.

Vehicle access is proposed by two private driveways, one to West Side Road and one to the future extension of Franklin Avenue. The first driveway is located approximately 95 metres east of West Side Road along the newly formed extension of Franklin Avenue. The driveway is proposed to operate as a full moves driveway. The second driveway is located approximately 35 metres south of Coronation Drive (North leg)/Franklin Avenue extension and is proposed to operate as a one-way inbound driveway.

Build-out is anticipated to occur by Year 2025.

Proposed Terms of Reference Transportation Impact Study

Study Guidelines:

- Generally follow the MTO and Niagara Region TIS Guidelines

Study Area Intersections:

- West Side Road at Coronation Drive/Future Franklin Avenue (unsignalized);
- West Side Road at Main Street/Highway 3 (signalized); and
- The proposed site driveways.

Analysis Periods:

- Weekday AM peak hour
- Weekday PM peak hour

Existing Data:

- Paradigm to collect new TMC data for the study area intersections. .

Horizon Year:

- Existing Conditions
- Opening date of development (Year 2025)
- Five years from opening date (Year 2030)
- Ten years from opening date (Year 2035)

Analysis:

- Synchro 11 with HCM analysis
- SimTraffic queue lengths.

Traffic Forecast:

- Background traffic annual growth rate of 2% per annum.
- Other approved developments to include in background. **To be identified by City or MTO**

Trip Generation:

- ITE Trip Generation Data 11th Edition
- Preliminary trip generation
 - AM Peak Period – 15 total
 - PM Peak Period – 24 total
- No modal split reductions.

Trip Distribution:

- Existing Traffic Patterns

Future Road Improvements:

- Extension of Franklin Avenue
- **Other improvements to be identified by City or MTO**

Remedial Measure:

- OTM Traffic Control signal warrants
- Left-Turn lane warrants

Report:

- Report documenting the study methodologies, findings and conclusions.

Regards,

Creighton Chartier

Transportation Consultant, Associate
(he/him)

Paradigm Transportation Solutions Limited

5A-150 Pinebush Road, Cambridge ON N1R 8J8

p: 905.381.2229 x504

m: 905.252.2420

w: www.ptsl.com



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- Weekday AM peak hour

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- Paradigm to collect new TMC data for the study area intersections. .

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- Existing Conditions

- analysis:

- Synchro 11 with HCM analysis

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- o Generation:

- ITE Trip Generation Data 11th Edition

- o Distribution:

1

- Existing Traffic Patterns

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- Extension of Franklin Avenue
- **Other improvements to be identified by City or MTO**

Remedial Measure:

- OTM Traffic Control signal warrants
- Left-Turn lane warrants

Report:

- Report documenting the study methodologies, findings and conclusions.

Best,



www.portcolborne.ca

Chris Roome
Planner
City of Port Colborne

66 Charlotte Street
Port Colborne, ON L3K 3C8
Phone 905-835-2900 x205
Email Chris.Roome@portcolborne.ca

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Creighton Chartier

From: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Sent: April 12, 2023 3:09 PM
To: Creighton Chartier; Nunes, Paul (MTO); David Schulz; Nicholas Olschansky
Cc: Scott Catton
Subject: RE: (230107) 246 West Side - Transportation Impact and Parking Study - Scope of Work

Hello

Thank you for including the Region in the scope of work. The Region did not require a TIS therefore we have no comments on the scope of work. If Regional traffic data is required it can be requested through the Regional website using the following link:

<https://www.niagararegion.ca/living/roads/permits/traffic-data-requests.aspx>.

If you require anything further please contact me at your convenience.

Thank you

Susan M. Dunsmore, P. Eng.

Manager, Development Engineering
Planning and Development Services

Phone: (905) 980-6000 or 1-800-263-7215 ext 3661

Address: 1815 Sir Isaac Brock Way, Thorold ON, L2V4T7



From: Creighton Chartier <cchartier@ptsl.com>
Sent: Wednesday, April 12, 2023 1:36 PM
To: Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; David Schulz <David.Schulz@portcolborne.ca>; Nicholas Olschansky <Nicholas.Olschansky@portcolborne.ca>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>
Cc: Scott Catton <scatton@ptsl.com>
Subject: (230107) 246 West Side - Transportation Impact and Parking Study - Scope of Work

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- Preliminary trip generation
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- Extension of Franklin Avenue
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- OTM Traffic Control signal warrants
- Left-Turn lane warrants

Report:

- Report documenting the study methodologies, findings and conclusions.

Regards,

Creighton Chartier

Transportation Consultant, Associate

(he/him)

Paradigm Transportation Solutions Limited

5A-150 Pinebush Road, Cambridge ON N1R 8J8

p: 905.381.2229 x504

m: 905.252.2420

w: www.ptsl.com



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Appendix B

Existing Data



Signal Code: 003H58**Intersection: RR3 (MAIN ST.)/HWY 3 & HWY 58/WESTSIDE RD.****Municipality: ptc colborne****Owner: MTO****Last Modified: 2019-10-16 3:24:41 PM**

Timing Parameters	SBD ADV HWY 58	NBD & SBD WESTSIDE	EBD ADV HWY 3	EBD & WBD HWY 3/MAIN	n/a	n/a
Min Green	7	20	7	10	0	0
Walk	0	15	0	14	0	0
Ped Clearance	0	25	0	23	0	0
Vehicle Ext.	3	3	0	3	0	0
Max Green	10	30	15	25	0	0
Yellow	3	4.5	3	4.5	0	0
All Red	0	2.5	0	2.6	0	0

Offset

Minimum Cycle	44.1	0
Pedestrian Cycle	91.1	
Maximum Cycle	100.1	0
Operation	FA	

Installed On: 2019-10-15

Count Date: 2005-06-14

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

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Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsI.com

Count Name: West Side Road & Coronation
Drive
Site Code: 230107
Start Date: 04/25/2023
Page No: 1

Turning Movement Data

Start Time	Coronation Drive Eastbound					West Side Road Northbound					West Side Road Southbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	1	0	0	1	1	1	50	0	0	51	37	0	0	0	37	89
7:15 AM	0	0	0	0	0	2	79	0	0	81	64	0	0	0	64	145
7:30 AM	3	1	0	0	4	2	102	0	0	104	71	3	0	0	74	182
7:45 AM	2	1	0	1	3	0	84	0	0	84	98	0	0	0	98	185
Hourly Total	6	2	0	2	8	5	315	0	0	320	270	3	0	0	273	601
8:00 AM	2	1	0	0	3	0	107	0	0	107	87	1	0	0	88	198
8:15 AM	1	1	0	1	2	0	100	0	0	100	102	2	0	0	104	206
8:30 AM	0	1	0	1	1	0	130	0	0	130	100	1	0	0	101	232
8:45 AM	0	2	0	1	2	1	104	0	0	105	112	0	0	0	112	219
Hourly Total	3	5	0	3	8	1	441	0	0	442	401	4	0	0	405	855
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	1	0	0	0	1	1	139	0	0	140	144	2	0	0	146	287
3:15 PM	1	0	0	1	1	2	142	0	0	144	144	1	0	0	145	290
3:30 PM	1	2	0	0	3	2	158	0	0	160	135	2	0	0	137	300
3:45 PM	0	0	0	1	0	0	128	0	0	128	164	0	0	0	164	292
Hourly Total	3	2	0	2	5	5	567	0	0	572	587	5	0	0	592	1169
4:00 PM	4	0	0	0	4	1	129	0	0	130	157	3	0	0	160	294
4:15 PM	0	0	0	3	0	1	133	0	0	134	163	0	0	0	163	297
4:30 PM	2	0	0	1	2	0	141	0	0	141	158	2	1	0	161	304
4:45 PM	0	0	0	3	0	0	120	0	0	120	154	1	0	0	155	275
Hourly Total	6	0	0	7	6	2	523	0	0	525	632	6	1	0	639	1170
5:00 PM	1	0	0	0	1	1	112	0	0	113	146	2	0	0	148	262
5:15 PM	0	2	0	0	2	1	101	0	0	102	141	0	0	0	141	245
5:30 PM	1	1	0	0	2	4	113	0	0	117	128	1	0	0	129	248
5:45 PM	0	1	0	0	1	2	77	0	0	79	106	0	0	0	106	186
Hourly Total	2	4	0	0	6	8	403	0	0	411	521	3	0	0	524	941
Grand Total	20	13	0	14	33	21	2249	0	0	2270	2411	21	1	0	2433	4736
Approach %	60.6	39.4	0.0	-	-	0.9	99.1	0.0	-	-	99.1	0.9	0.0	-	-	-
Total %	0.4	0.3	0.0	-	0.7	0.4	47.5	0.0	-	47.9	50.9	0.4	0.0	-	51.4	-
Motorcycles	0	0	0	-	0	1	1	0	-	2	3	0	0	-	3	5
% Motorcycles	0.0	0.0	-	-	0.0	4.8	0.0	-	-	0.1	0.1	0.0	0.0	-	0.1	0.1
Cars & Light Goods	19	11	0	-	30	19	2153	0	-	2172	2315	18	1	-	2334	4536
% Cars & Light Goods	95.0	84.6	-	-	90.9	90.5	95.7	-	-	95.7	96.0	85.7	100.0	-	95.9	95.8
Buses	1	0	0	-	1	1	20	0	-	21	33	1	0	-	34	56
% Buses	5.0	0.0	-	-	3.0	4.8	0.9	-	-	0.9	1.4	4.8	0.0	-	1.4	1.2
Single-Unit Trucks	0	2	0	-	2	0	62	0	-	62	47	2	0	-	49	113

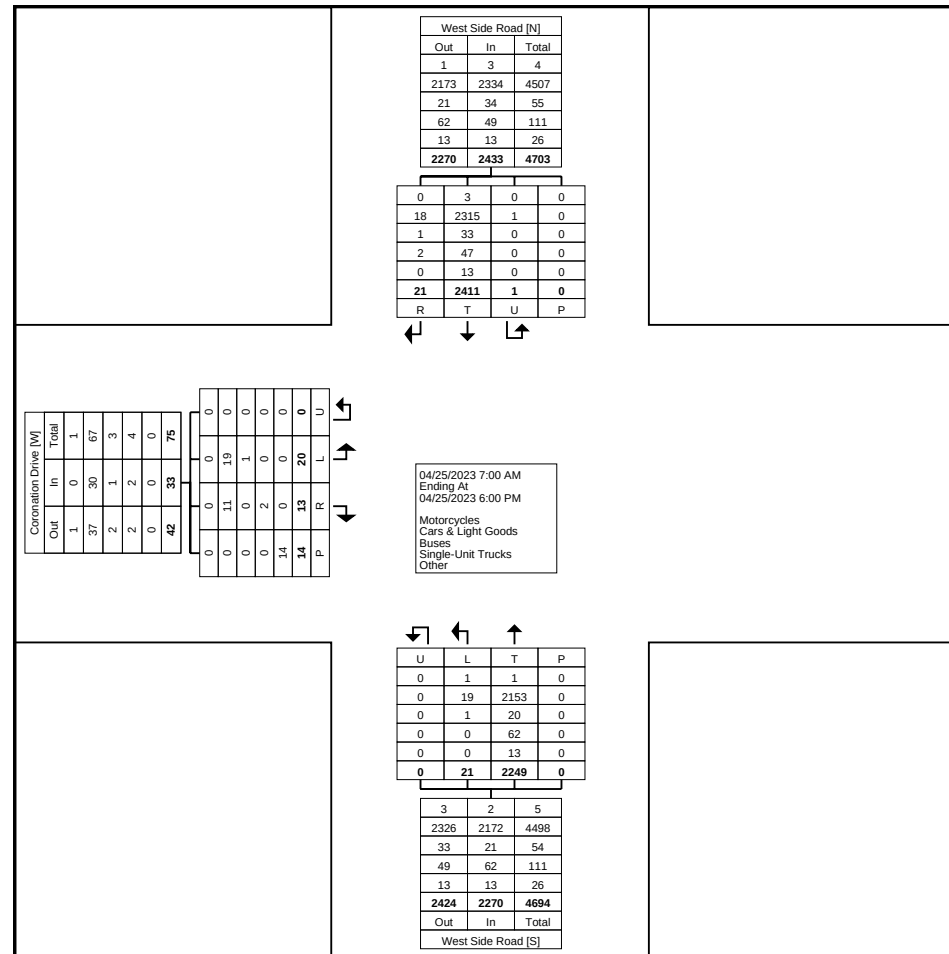
[illegible]



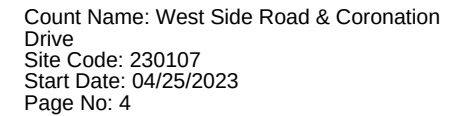
Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: West Side Road & Coronation
Drive
Site Code: 230107
Start Date: 04/25/2023
Page No: 3



Turning Movement Data Plot



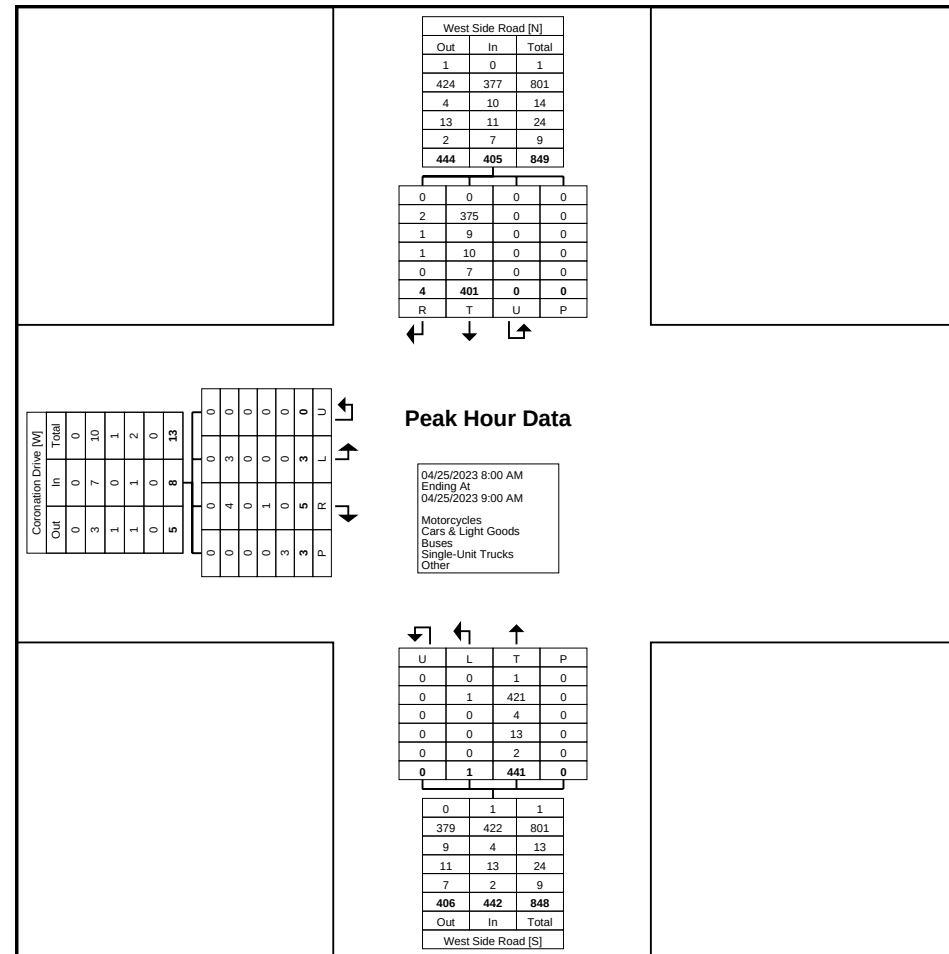
Start Time	Coronation Drive Eastbound					West Side Road Northbound					West Side Road Southbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	2	1	0	0	3	0	107	0	0	107	87	1	0	0	88	198
8:15 AM	1	1	0	1	2	0	100	0	0	100	102	2	0	0	104	206
8:30 AM	0	1	0	1	1	0	130	0	0	130	100	1	0	0	101	232
8:45 AM	0	2	0	1	2	1	104	0	0	105	112	0	0	0	112	219
Total	3	5	0	3	8	1	441	0	0	442	401	4	0	0	405	855
Approach %	37.5	62.5	0.0	-	-	0.2	99.8	0.0	-	-	99.0	1.0	0.0	-	-	-
Total %	0.4	0.6	0.0	-	0.9	0.1	51.6	0.0	-	51.7	46.9	0.5	0.0	-	47.4	-
PHF	0.375	0.625	0.000	-	0.667	0.250	0.848	0.000	-	0.850	0.895	0.500	0.000	-	0.904	0.921
Motorcycles	0	0	0	-	0	0	1	0	-	1	0	0	0	-	0	1
% Motorcycles	0.0	0.0	-	-	0.0	0.0	0.2	-	-	0.2	0.0	0.0	-	-	0.0	0.1
Cars & Light Goods	3	4	0	-	7	1	421	0	-	422	375	2	0	-	377	806
% Cars & Light Goods	100.0	80.0	-	-	87.5	100.0	95.5	-	-	95.5	93.5	50.0	-	-	93.1	94.3
Buses	0	0	0	-	0	0	4	0	-	4	9	1	0	-	10	14
% Buses	0.0	0.0	-	-	0.0	0.0	0.9	-	-	0.9	2.2	25.0	-	-	2.5	1.6
Single-Unit Trucks	0	1	0	-	1	0	13	0	-	13	10	1	0	-	11	25
% Single-Unit Trucks	0.0	20.0	-	-	12.5	0.0	2.9	-	-	2.9	2.5	25.0	-	-	2.7	2.9
Articulated Trucks	0	0	0	-	0	0	2	0	-	2	6	0	0	-	6	8
% Articulated Trucks	0.0	0.0	-	-	0.0	0.0	0.5	-	-	0.5	1.5	0.0	-	-	1.5	0.9
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	1	0	0	-	1	1
% Bicycles on Road	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.2	0.0	-	-	0.2	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	3	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-



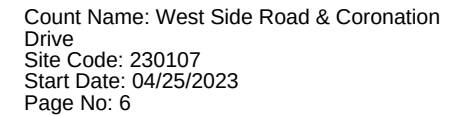
Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: West Side Road & Coronation
Drive
Site Code: 230107
Start Date: 04/25/2023
Page No: 5



Turning Movement Peak Hour Data Plot (8:00 AM)

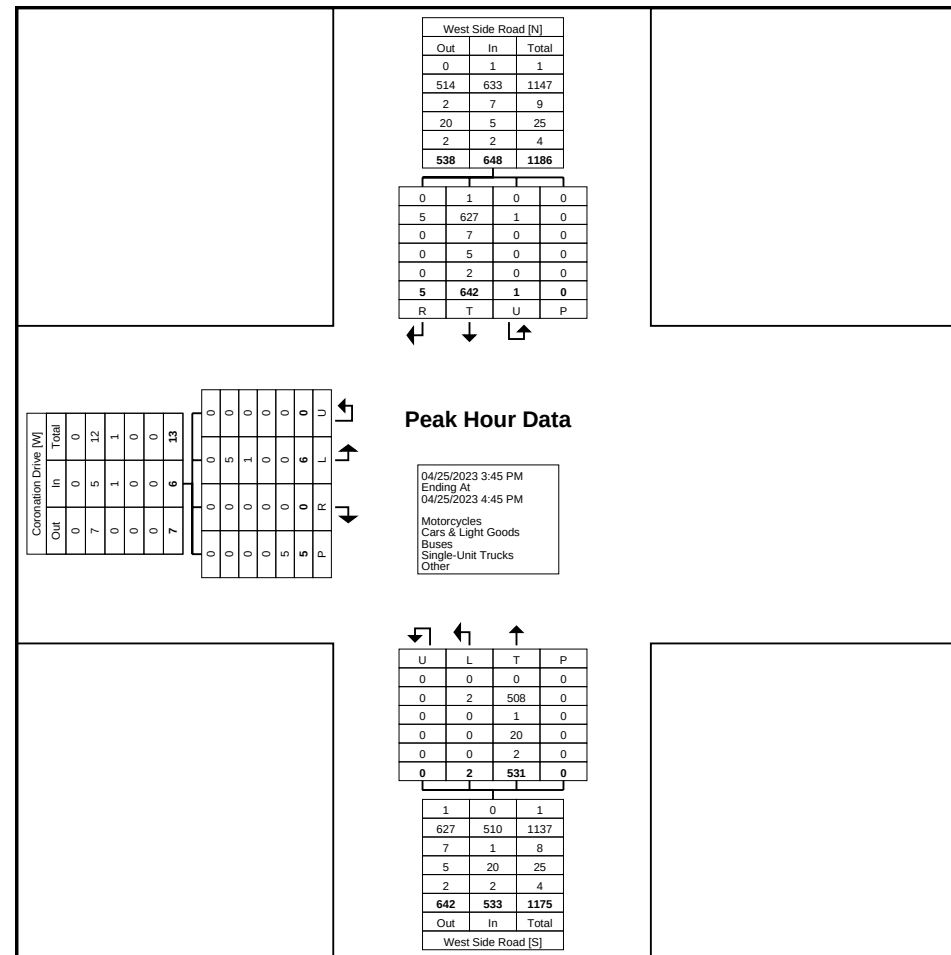
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519-896-3163 cbowness@pts1.com

Count Name: West Side Road & Coronation
Drive
Site Code: 230107
Start Date: 04/25/2023
Page No: 7



Turning Movement Peak Hour Data Plot (3:45 PM)



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Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: West Side Road & Main Street
Site Code: 230107
Start Date: 04/25/2023
Page No: 1

Turning Movement Data

Start Time	Main Street Eastbound						Main Street Westbound						West Side Road Northbound						West Side Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	21	19	1	0	1	41	0	19	15	0	0	34	1	14	0	0	0	15	9	11	18	0	0	38	128
7:15 AM	28	30	4	0	0	62	1	25	31	0	0	57	3	12	2	0	0	17	23	27	15	0	0	65	201
7:30 AM	43	26	1	0	0	70	0	23	26	0	0	49	4	27	1	0	1	32	28	24	17	0	1	69	220
7:45 AM	28	36	3	0	0	67	3	37	36	0	0	76	8	21	2	0	1	31	43	36	24	0	0	103	277
Hourly Total	120	111	9	0	1	240	4	104	108	0	0	216	16	74	5	0	2	95	103	98	74	0	1	275	826
8:00 AM	31	29	6	0	0	66	0	35	56	0	0	91	7	29	0	0	0	36	35	31	23	0	0	89	282
8:15 AM	32	35	6	0	1	73	1	22	35	0	0	58	1	19	4	0	2	24	24	51	33	0	0	108	263
8:30 AM	34	22	4	0	0	60	2	37	37	0	0	76	6	44	3	0	2	53	24	40	25	0	1	89	278
8:45 AM	25	51	6	0	1	82	4	53	52	0	0	109	7	33	1	0	0	41	43	62	23	0	0	128	360
Hourly Total	122	137	22	0	2	281	7	147	180	0	0	334	21	125	8	0	4	154	126	184	104	0	1	414	1183
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	34	42	9	0	0	85	6	37	52	0	0	95	8	46	5	0	1	59	42	50	42	0	0	134	373
3:15 PM	36	36	4	0	0	76	4	53	58	0	0	115	8	47	8	0	4	63	40	59	47	0	0	146	400
3:30 PM	49	46	6	0	0	101	6	48	60	0	0	114	6	62	7	0	0	75	42	43	45	0	0	130	420
3:45 PM	47	43	8	0	0	98	7	42	54	0	5	103	3	28	9	0	5	40	49	67	41	0	1	157	398
Hourly Total	166	167	27	0	0	360	23	180	224	0	5	427	25	183	29	0	10	237	173	219	175	0	1	567	1591
4:00 PM	46	52	6	0	0	104	7	47	50	0	5	104	5	33	2	0	5	40	45	57	47	0	0	149	397
4:15 PM	40	34	5	0	1	79	5	54	47	0	0	106	8	49	4	0	0	61	61	50	51	0	0	162	408
4:30 PM	50	42	9	0	1	101	7	51	55	0	0	113	5	40	5	0	0	50	49	51	46	0	0	146	410
4:45 PM	39	46	5	0	0	90	6	51	40	0	0	97	3	36	3	0	0	42	50	59	48	0	0	157	386
Hourly Total	175	174	25	0	2	374	25	203	192	0	5	420	21	158	14	0	5	193	205	217	192	0	0	614	1601
5:00 PM	41	43	3	0	0	87	4	39	38	0	0	81	5	39	3	0	0	47	30	57	45	0	0	132	347
5:15 PM	29	45	4	0	2	78	1	45	48	0	0	94	8	33	6	0	0	47	38	64	40	0	0	142	361
5:30 PM	31	35	1	0	0	67	6	56	49	0	0	111	3	31	5	0	1	39	38	46	45	0	0	129	346
5:45 PM	21	37	3	0	0	61	0	44	35	0	0	79	8	23	4	0	0	35	45	37	25	0	0	107	282
Hourly Total	122	160	11	0	2	293	11	184	170	0	0	365	24	126	18	0	1	168	151	204	155	0	0	510	1336
Grand Total	705	749	94	0	7	1548	70	818	874	0	10	1762	107	666	74	0	22	847	758	922	700	0	3	2380	6537
Approach %	45.5	48.4	6.1	0.0	-	-	4.0	46.4	49.6	0.0	-	-	12.6	78.6	8.7	0.0	-	-	31.8	38.7	29.4	0.0	-	-	-
Total %	10.8	11.5	1.4	0.0	-	23.7	1.1	12.5	13.4	0.0	-	27.0	1.6	10.2	1.1	0.0	-	13.0	11.6	14.1	10.7	0.0	-	36.4	-
Motorcycles	0	3	1	0	-	4	0	2	3	0	-	5	0	0	0	0	-	0	1	2	1	0	-	4	13
% Motorcycles	0.0	0.4	1.1	-	-	0.3	0.0	0.2	0.3	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.1	0.2	0.1	-	-	0.2	0.2
Cars & Light Goods	651	706	86	0	-	1443	63	781	852	0	-	1696	106	649	72	0	-	827	733	890	657	0	-	2280	6246
% Cars & Light Goods	92.3	94.3	91.5	-	-	93.2	90.0	95.5	97.5	-	-	96.3	99.1	97.4	97.3	-	-	97.6	96.7	96.5	93.9	-	-	95.8	95.5
Buses	9	13	2	0	-	24	4	7	6	0	-	17	0	5	1	0	-	6	14	21	6	0	-	41	88
% Buses	1.3	1.7	2.1	-	-	1.6	5.7	0.9	0.7	-	-	1.0	0.0	0.8	1.4	-	-	0.7	1.8	2.3	0.9	-	-	1.7	1.3

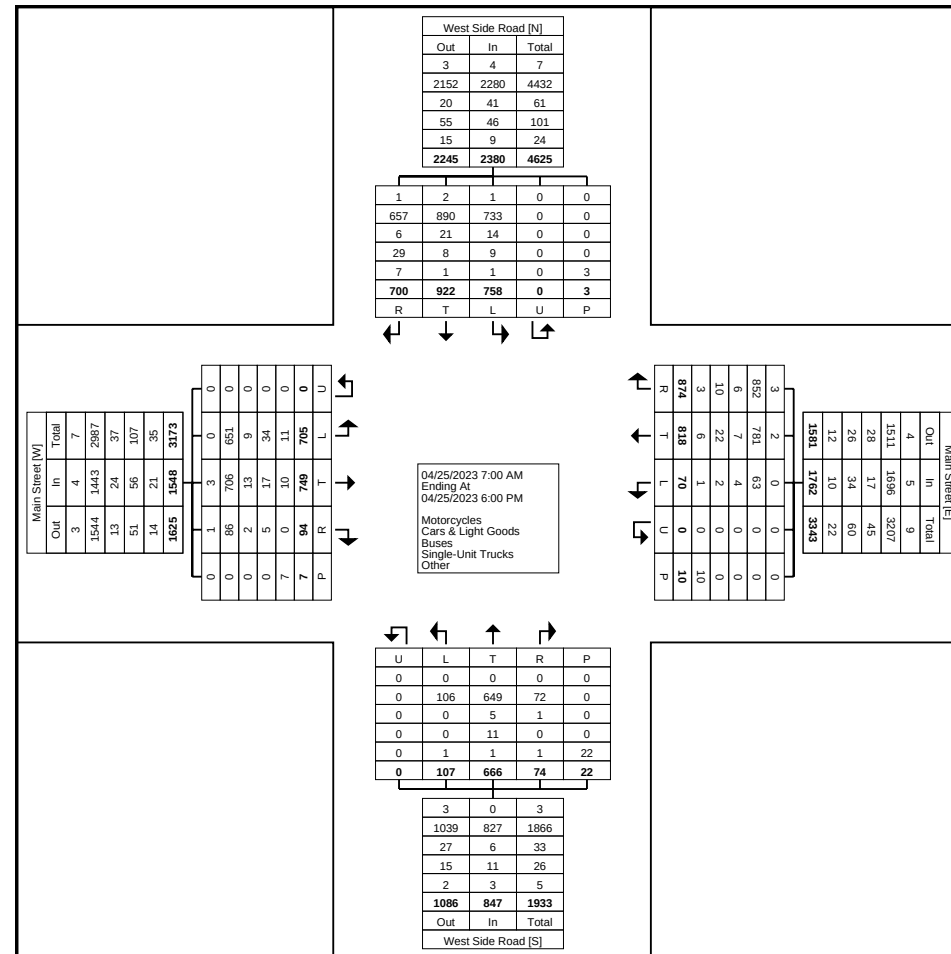
Single-Unit Trucks	34	17	5	0	-	56	2	22	10	0	-	34	0	11	0	0	-	11	9	8	29	0	-	46	147
% Single-Unit Trucks	4.8	2.3	5.3	-	-	3.6	2.9	2.7	1.1	-	-	1.9	0.0	1.7	0.0	-	-	1.3	1.2	0.9	4.1	-	-	1.9	2.2
Articulated Trucks	11	10	0	0	-	21	1	6	3	0	-	10	1	1	1	0	-	3	1	1	7	0	-	9	43
% Articulated Trucks	1.6	1.3	0.0	-	-	1.4	1.4	0.7	0.3	-	-	0.6	0.9	0.2	1.4	-	-	0.4	0.1	0.1	1.0	-	-	0.4	0.7
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	4.5	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	7	-	-	-	-	-	10	-	-	-	-	-	21	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	95.5	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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519-896-3163 cbowness@pts1.com

Count Name: West Side Road & Main Street
Site Code: 230107
Start Date: 04/25/2023
Page No: 3



Turning Movement Data Plot



Paradigm Transportation Solutions Limited
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Count Name: West Side Road & Main Street
Site Code: 230107
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Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

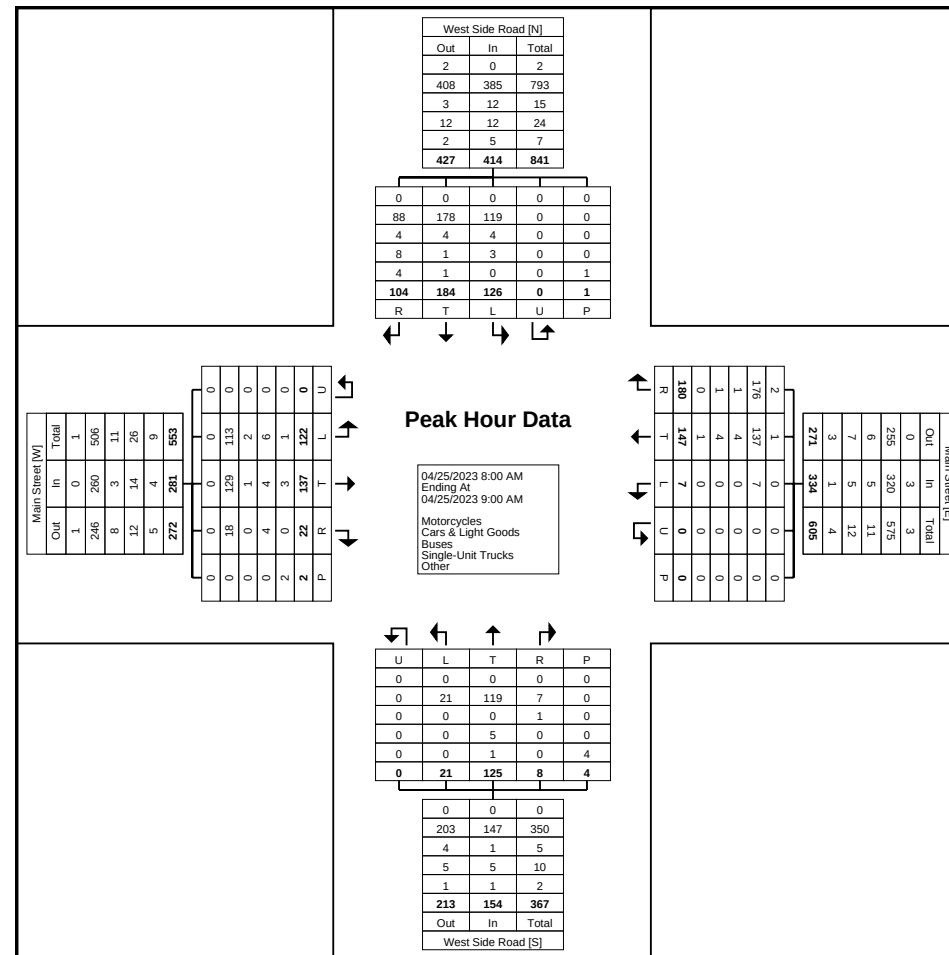
Start Time	Main Street Eastbound						Main Street Westbound						West Side Road Northbound						West Side Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	31	29	6	0	0	66	0	35	56	0	0	91	7	29	0	0	0	36	35	31	23	0	0	89	282
8:15 AM	32	35	6	0	1	73	1	22	35	0	0	58	1	19	4	0	2	24	24	51	33	0	0	108	263
8:30 AM	34	22	4	0	0	60	2	37	37	0	0	76	6	44	3	0	2	53	24	40	25	0	1	89	278
8:45 AM	25	51	6	0	1	82	4	53	52	0	0	109	7	33	1	0	0	41	43	62	23	0	0	128	360
Total	122	137	22	0	2	281	7	147	180	0	0	334	21	125	8	0	4	154	126	184	104	0	1	414	1183
Approach %	43.4	48.8	7.8	0.0	-	-	2.1	44.0	53.9	0.0	-	-	13.6	81.2	5.2	0.0	-	-	30.4	44.4	25.1	0.0	-	-	-
Total %	10.3	11.6	1.9	0.0	-	23.8	0.6	12.4	15.2	0.0	-	28.2	1.8	10.6	0.7	0.0	-	13.0	10.7	15.6	8.8	0.0	-	35.0	-
PHF	0.897	0.672	0.917	0.000	-	0.857	0.438	0.693	0.804	0.000	-	0.766	0.750	0.710	0.500	0.000	-	0.726	0.733	0.742	0.788	0.000	-	0.809	0.822
Motorcycles	0	0	0	0	-	0	0	1	2	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	3
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.7	1.1	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.3
Cars & Light Goods	113	129	18	0	-	260	7	137	176	0	-	320	21	119	7	0	-	147	119	178	88	0	-	385	1112
% Cars & Light Goods	92.6	94.2	81.8	-	-	92.5	100.0	93.2	97.8	-	-	95.8	100.0	95.2	87.5	-	-	95.5	94.4	96.7	84.6	-	-	93.0	94.0
Buses	2	1	0	0	-	3	0	4	1	0	-	5	0	0	1	0	-	1	4	4	4	0	-	12	21
% Buses	1.6	0.7	0.0	-	-	1.1	0.0	2.7	0.6	-	-	1.5	0.0	0.0	12.5	-	-	0.6	3.2	2.2	3.8	-	-	2.9	1.8
Single-Unit Trucks	6	4	4	0	-	14	0	4	1	0	-	5	0	5	0	0	-	5	3	1	8	0	-	12	36
% Single-Unit Trucks	4.9	2.9	18.2	-	-	5.0	0.0	2.7	0.6	-	-	1.5	0.0	4.0	0.0	-	-	3.2	2.4	0.5	7.7	-	-	2.9	3.0
Articulated Trucks	1	3	0	0	-	4	0	1	0	0	-	1	0	1	0	0	-	1	0	1	4	0	-	5	11
% Articulated Trucks	0.8	2.2	0.0	-	-	1.4	0.0	0.7	0.0	-	-	0.3	0.0	0.8	0.0	-	-	0.6	0.0	0.5	3.8	-	-	1.2	0.9
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	25.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	75.0	-	-	-	-	-	100.0	-	-



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Count Name: West Side Road & Main Street
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Start Date: 04/25/2023
Page No: 5



Turning Movement Peak Hour Data Plot (8:00 AM)



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519-896-3163 cdowness@ptsl.com

Count Name: West Side Road & Main Street
Site Code: 230107
Start Date: 04/25/2023
Page No: 6

Turning Movement Peak Hour Data (3:30 PM)

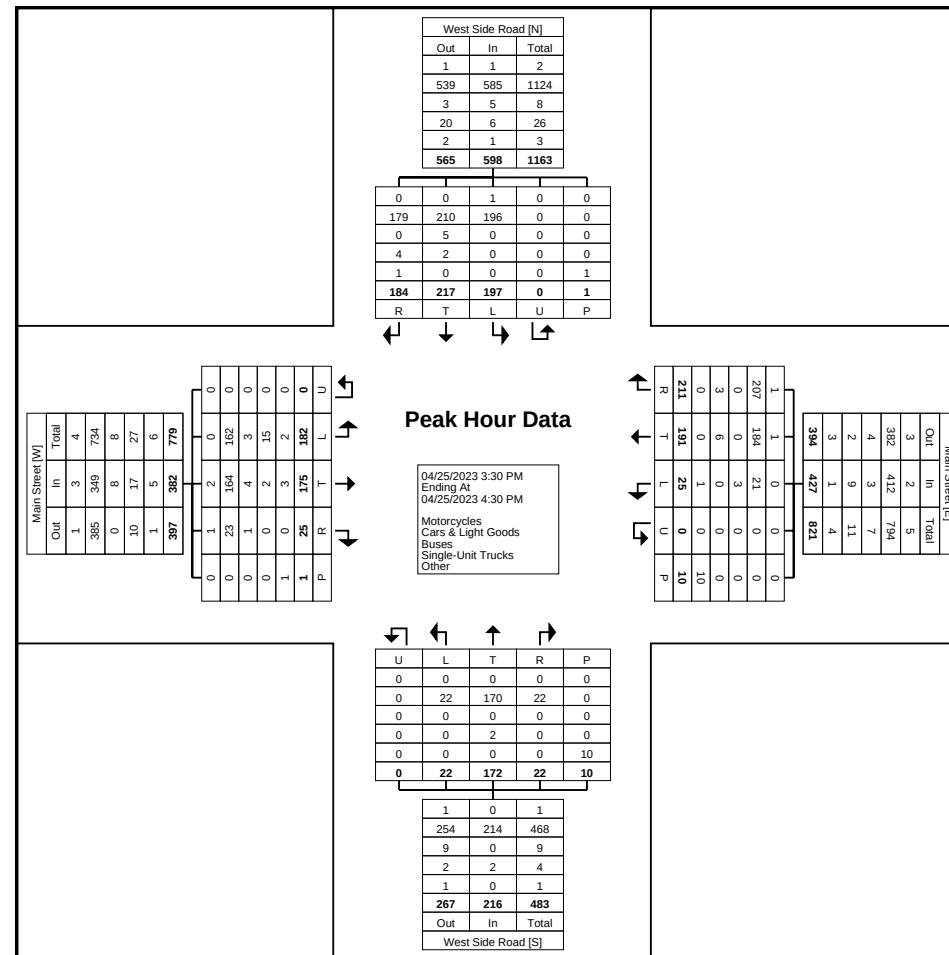
Start Time	Main Street Eastbound						Main Street Westbound						West Side Road Northbound						West Side Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:30 PM	49	46	6	0	0	101	6	48	60	0	0	114	6	62	7	0	0	75	42	43	45	0	0	130	420
3:45 PM	47	43	8	0	0	98	7	42	54	0	5	103	3	28	9	0	5	40	49	67	41	0	1	157	398
4:00 PM	46	52	6	0	0	104	7	47	50	0	5	104	5	33	2	0	5	40	45	57	47	0	0	149	397
4:15 PM	40	34	5	0	1	79	5	54	47	0	0	106	8	49	4	0	0	61	61	50	51	0	0	162	408
Total	182	175	25	0	1	382	25	191	211	0	10	427	22	172	22	0	10	216	197	217	184	0	1	598	1623
Approach %	47.6	45.8	6.5	0.0	-	-	5.9	44.7	49.4	0.0	-	-	10.2	79.6	10.2	0.0	-	-	32.9	36.3	30.8	0.0	-	-	-
Total %	11.2	10.8	1.5	0.0	-	23.5	1.5	11.8	13.0	0.0	-	26.3	1.4	10.6	1.4	0.0	-	13.3	12.1	13.4	11.3	0.0	-	36.8	-
PHF	0.929	0.841	0.781	0.000	-	0.918	0.893	0.884	0.879	0.000	-	0.936	0.688	0.694	0.611	0.000	-	0.720	0.807	0.810	0.902	0.000	-	0.923	0.966
Motorcycles	0	2	1	0	-	3	0	1	1	0	-	2	0	0	0	0	-	0	1	0	0	0	-	1	6
% Motorcycles	0.0	1.1	4.0	-	-	0.8	0.0	0.5	0.5	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.5	0.0	0.0	-	-	0.2	0.4
Cars & Light Goods	162	164	23	0	-	349	21	184	207	0	-	412	22	170	22	0	-	214	196	210	179	0	-	585	1560
% Cars & Light Goods	89.0	93.7	92.0	-	-	91.4	84.0	96.3	98.1	-	-	96.5	100.0	98.8	100.0	-	-	99.1	99.5	96.8	97.3	-	-	97.8	96.1
Buses	3	4	1	0	-	8	3	0	0	0	-	3	0	0	0	0	-	0	0	5	0	0	-	5	16
% Buses	1.6	2.3	4.0	-	-	2.1	12.0	0.0	0.0	-	-	0.7	0.0	0.0	0.0	-	-	0.0	0.0	2.3	0.0	-	-	0.8	1.0
Single-Unit Trucks	15	2	0	0	-	17	0	6	3	0	-	9	0	2	0	0	-	2	0	2	4	0	-	6	34
% Single-Unit Trucks	8.2	1.1	0.0	-	-	4.5	0.0	3.1	1.4	-	-	2.1	0.0	1.2	0.0	-	-	0.9	0.0	0.9	2.2	-	-	1.0	2.1
Articulated Trucks	2	3	0	0	-	5	1	0	0	0	-	1	0	0	0	0	-	0	0	0	1	0	-	1	7
% Articulated Trucks	1.1	1.7	0.0	-	-	1.3	4.0	0.0	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.5	-	-	0.2	0.4
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	10	-	-	-	-	-	10	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: West Side Road & Main Street
Site Code: 230107
Start Date: 04/25/2023
Page No: 7



Turning Movement Peak Hour Data Plot (3:30 PM)

Appendix C

Base Year Traffic Operations Reports



HCM Unsignalized Intersection Capacity Analysis 101: West Side Road & Coronation Drive

(230107) 246 West Side Road
AM Existing Traffic

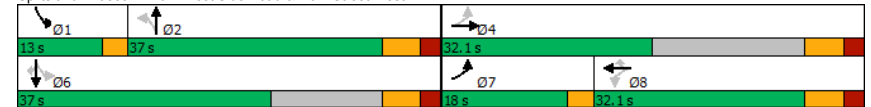
						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	5	1	441	401	4
Future Volume (Veh/h)	3	5	1	441	401	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	5	1	479	436	4
Pedestrians	3					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage (veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	682	223	443			
vC1, stage 1 conf vol	441					
vC2, stage 2 conf vol	242					
vCu, unblocked vol	682	223	443			
tC, single (s)	6.8	7.3	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.5	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	564	726	1125			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	8	161	319	291	149	
Volume Left	3	1	0	0	0	
Volume Right	5	0	0	0	4	
cSH	656	1125	1700	1700	1700	
Volume to Capacity	0.01	0.00	0.19	0.17	0.09	
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0	
Control Delay (s)	10.6	0.1	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	10.6	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			26.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Timings 102: West Side Road & Main Street West

(230107) 246 West Side Road
AM Existing Traffic

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	122	137	7	147	180	21	125	126	184	104
Future Volume (vph)	122	137	7	147	180	21	125	126	184	104
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	7	4		8			2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	8	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.5	44.1	44.1	44.1	44.1	47.0	47.0	11.5	47.0	47.0
Total Split (s)	18.0	32.1	32.1	32.1	32.1	37.0	37.0	13.0	37.0	37.0
Total Split (%)	18.0%	32.1%	32.1%	32.1%	32.1%	37.0%	37.0%	13.0%	37.0%	37.0%
Yellow Time (s)	3.0	4.5	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	0.0	2.6	2.6	2.6	2.6	2.5	2.5	0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	7.1	7.1	7.0	7.0	3.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	34.6	30.4	16.2	16.2	16.2	40.3	40.3	56.5	52.4	52.4
Actuated g/C Ratio	0.36	0.31	0.17	0.17	0.17	0.42	0.42	0.58	0.54	0.54
v/c Ratio	0.47	0.48	0.06	0.71	0.60	0.07	0.30	0.28	0.26	0.22
Control Delay	27.3	29.4	35.3	54.3	12.4	21.2	22.8	12.8	14.5	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	29.4	35.3	54.3	12.4	21.2	22.8	12.8	14.5	3.7
LOS	C	C	D	D	B	C	C	B	B	A
Approach Delay		28.5		31.3			22.6		11.3	
Approach LOS		C		C			C		B	
Intersection Summary										
Cycle Length: 100.1										
Actuated Cycle Length: 97.1										
Natural Cycle: 115										
Control Type: Actuated-Uncoordinated										
Maximum v/c Ratio: 0.71										
Intersection Signal Delay: 22.5					Intersection LOS: C					
Intersection Capacity Utilization 94.2%					ICU Level of Service F					
Analysis Period (min) 15										

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Existing Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	149	194	9	179	220	26	162	154	224	127
v/c Ratio	0.47	0.48	0.06	0.71	0.60	0.07	0.30	0.28	0.26	0.22
Control Delay	27.3	29.4	35.3	54.3	12.4	21.2	22.8	12.8	14.5	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	29.4	35.3	54.3	12.4	21.2	22.8	12.8	14.5	3.7
Queue Length 50th (m)	21.3	29.4	1.5	34.1	0.0	3.1	20.9	13.5	22.5	0.0
Queue Length 95th (m)	32.7	44.2	5.5	52.6	14.2	9.2	38.8	27.3	41.1	7.7
Internal Link Dist (m)	180.6		191.4		159.3		540.5			
Turn Bay Length (m)	130.0		25.0		60.0		35.0		75.0	
Base Capacity (vph)	343	567	248	395	451	385	543	552	854	585
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.34	0.04	0.45	0.49	0.07	0.30	0.28	0.26	0.22
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Existing Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	137	22	7	147	180	21	125	8	126	184	104
Future Volume (vph)	122	137	22	7	147	180	21	125	8	126	184	104
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1334	1258		1427	1522	1110	1426	1304		1348	1582	976
Flt Permitted	0.48	1.00		0.64	1.00	1.00	0.62	1.00		0.61	1.00	1.00
Satd. Flow (perm)	678	1258		955	1522	1110	929	1304		864	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	149	167	27	9	179	220	26	152	10	154	224	127
RTOR Reduction (vph)	0	7	0	0	0	183	0	2	0	0	0	58
Lane Group Flow (vph)	149	187	0	9	179	37	26	160	0	154	224	69
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	30.4	30.4		16.2	16.2	16.2	40.3	40.3		52.4	52.4	52.4
Effective Green, g (s)	30.4	30.4		16.2	16.2	16.2	40.3	40.3		52.4	52.4	52.4
Actuated g/C Ratio	0.31	0.31		0.17	0.17	0.17	0.42	0.42		0.54	0.54	0.54
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	288	394		159	254	185	386	542		512	855	527
v/s Ratio Prot	c0.06	0.15			c0.12			0.12		c0.03	0.14	
v/s Ratio Perm	0.10			0.01		0.03	0.03			c0.13		0.07
v/c Ratio	0.52	0.47		0.06	0.70	0.20	0.07	0.30		0.30	0.26	0.13
Uniform Delay, d1	25.8	26.8		33.9	38.1	34.8	17.0	18.8		11.6	11.9	11.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.9		0.1	8.6	0.5	0.3	1.4		0.3	0.7	0.5
Delay (s)	26.5	27.7		34.1	46.7	35.3	17.3	20.2		11.9	12.7	11.5
Level of Service	C	C		C	D	D	B	C		B	B	B
Approach Delay (s)	27.2			40.3			19.8			12.1		
Approach LOS	C			D			B			B		
Intersection Summary												
HCM 2000 Control Delay	24.7			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.43											
Actuated Cycle Length (s)	96.9			Sum of lost time (s)			20.1					
Intersection Capacity Utilization	94.2%			ICU Level of Service			F					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
101: West Side Road & Coronation Drive

(230107) 246 West Side Road
PM Existing Traffic

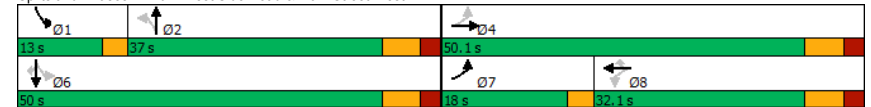
						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	5	2	531	642	5
Future Volume (Veh/h)	6	5	2	531	642	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	6	5	2	542	655	5
Pedestrians	5					
Lane Width (m)	3.6					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage (veh)				2	2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	938	335	665			
vC1, stage 1 conf vol	662					
vC2, stage 2 conf vol	275					
vCu, unblocked vol	938	335	665			
tC, single (s)	7.1	6.9	4.1			
tC, 2 stage (s)	6.1					
tF (s)	3.7	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	402	664	930			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	11	183	361	437	223	
Volume Left	6	2	0	0	0	
Volume Right	5	0	0	0	5	
cSH	490	930	1700	1700	1700	
Volume to Capacity	0.02	0.00	0.21	0.26	0.13	
Queue Length 95th (m)	0.6	0.1	0.0	0.0	0.0	
Control Delay (s)	12.5	0.1	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	12.5	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			32.9%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
102: West Side Road & Main Street West

(230107) 246 West Side Road
PM Existing Traffic

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	182	175	25	191	211	22	172	197	217	184
Future Volume (vph)	182	175	25	191	211	22	172	197	217	184
Turn Type	pm+pt	NA	Perm	NA	Perm	Perm	NA	pm+pt	NA	Perm
Protected Phases	7	4		8			2	1	6	
Permitted Phases	4		8		8	2		6		6
Detector Phase	7	4	8	8	8	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.5	44.1	44.1	44.1	44.1	47.0	47.0	11.5	47.0	47.0
Total Split (s)	18.0	50.1	32.1	32.1	32.1	37.0	37.0	13.0	50.0	50.0
Total Split (%)	18.0%	50.0%	32.1%	32.1%	32.1%	37.0%	37.0%	13.0%	50.0%	50.0%
Yellow Time (s)	3.0	4.5	4.5	4.5	4.5	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	0.0	2.6	2.6	2.6	2.6	2.5	2.5	0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	7.1	7.1	7.0	7.0	3.0	7.0	7.0
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	37.1	32.9	17.1	17.1	17.1	40.3	40.3	56.8	52.8	52.8
Actuated g/C Ratio	0.37	0.33	0.17	0.17	0.17	0.40	0.40	0.57	0.53	0.53
v/c Ratio	0.62	0.49	0.19	0.74	0.59	0.06	0.37	0.38	0.27	0.29
Control Delay	32.1	29.2	38.9	56.7	12.1	22.1	24.6	14.8	15.6	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.1	29.2	38.9	56.7	12.1	22.1	24.6	14.8	15.6	3.5
LOS	C	C	D	E	B	C	C	B	B	A
Approach Delay		30.6		33.6			24.4		11.6	
Approach LOS		C		C			C		B	
Intersection Summary										
Cycle Length: 100.1										
Actuated Cycle Length: 99.9										
Natural Cycle: 115										
Control Type: Actuated-Uncoordinated										
Maximum v/c Ratio: 0.74										
Intersection Signal Delay: 23.6					Intersection LOS: C					
Intersection Capacity Utilization 100.8%					ICU Level of Service G					
Analysis Period (min) 15										

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Existing Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	190	208	26	199	220	23	202	205	226	192
v/c Ratio	0.62	0.49	0.19	0.74	0.59	0.06	0.37	0.38	0.27	0.29
Control Delay	32.1	29.2	38.9	56.7	12.1	22.1	24.6	14.8	15.6	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.1	29.2	38.9	56.7	12.1	22.1	24.6	14.8	15.6	3.5
Queue Length 50th (m)	28.3	32.2	4.7	40.0	0.0	3.0	28.6	20.9	25.3	0.0
Queue Length 95th (m)	47.0	53.8	12.8	65.0	21.8	9.3	54.0	40.8	47.3	12.2
Internal Link Dist (m)	180.6		191.4		60.0		159.3		540.5	
Turn Bay Length (m)	130.0		25.0		35.0		75.0			
Base Capacity (vph)	324	559	204	394	442	373	547	548	835	666
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.37	0.13	0.51	0.50	0.06	0.37	0.37	0.27	0.29
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Existing Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	182	175	25	25	191	211	22	172	22	197	217	184
Future Volume (vph)	182	175	25	25	191	211	22	172	22	197	217	184
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.99	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1284	1278		1230	1566	1103	1427	1347		1422	1582	1091
Flt Permitted	0.44	1.00		0.63	1.00	1.00	0.62	1.00		0.58	1.00	1.00
Satd. Flow (perm)	592	1278		813	1566	1103	928	1347		868	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	190	182	26	26	199	220	23	179	23	205	226	192
RTOR Reduction (vph)	0	6	0	0	0	182	0	4	0	0	0	90
Lane Group Flow (vph)	190	202	0	26	199	38	23	198	0	205	226	102
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	32.9	32.9		17.1	17.1	17.1	40.3	40.3		52.8	52.8	52.8
Effective Green, g (s)	32.9	32.9		17.1	17.1	17.1	40.3	40.3		52.8	52.8	52.8
Actuated g/C Ratio	0.33	0.33		0.17	0.17	0.17	0.40	0.40		0.53	0.53	0.53
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	283	421		139	268	188	374	543		511	836	577
v/s Ratio Prot	c0.09	0.16			0.13			0.15		c0.04	0.14	
v/s Ratio Perm	c0.13			0.03		0.03	0.02			c0.17		0.09
v/c Ratio	0.67	0.48		0.19	0.74	0.20	0.06	0.36		0.40	0.27	0.18
Uniform Delay, d1	26.6	26.6		35.4	39.3	35.5	18.2	20.8		13.0	12.9	12.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.9	0.9		0.7	10.6	0.5	0.3	1.9		0.5	0.8	0.7
Delay (s)	31.4	27.5		36.1	49.8	36.0	18.5	22.7		13.5	13.7	12.9
Level of Service	C	C		D	D	D	B	C		B	B	B
Approach Delay (s)	29.4				42.2		22.3				13.4	
Approach LOS	C				D		C				B	
Intersection Summary												
HCM 2000 Control Delay	25.9		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.54											
Actuated Cycle Length (s)	99.8		Sum of lost time (s)		20.1							
Intersection Capacity Utilization	100.8%		ICU Level of Service		G							
Analysis Period (min)	15											
c Critical Lane Group												

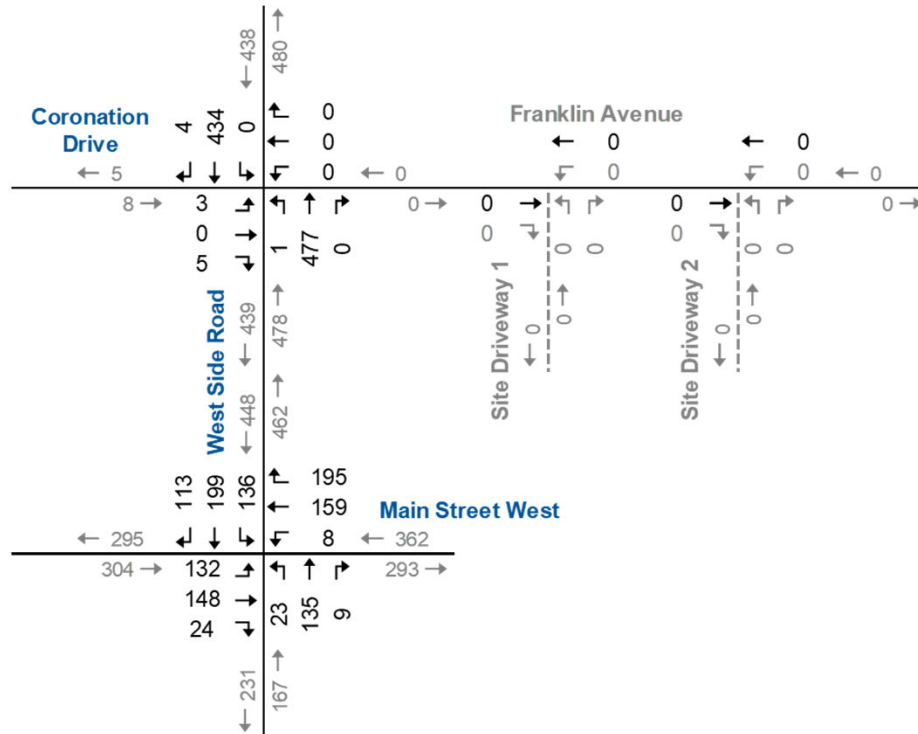
Appendix D

Background Traffic Forecast

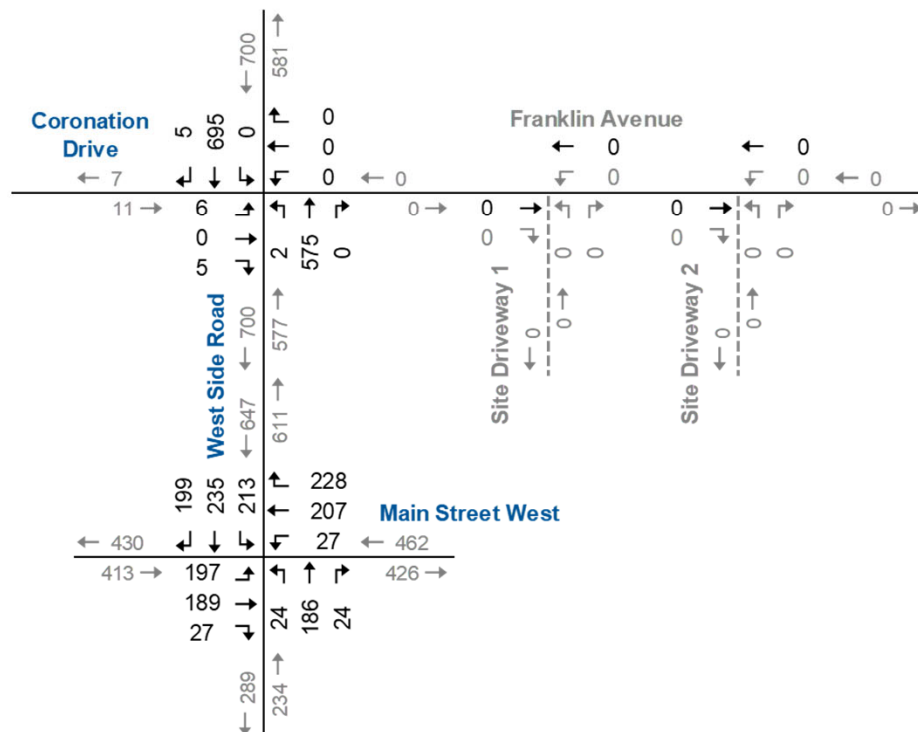




AM PEAK HOUR



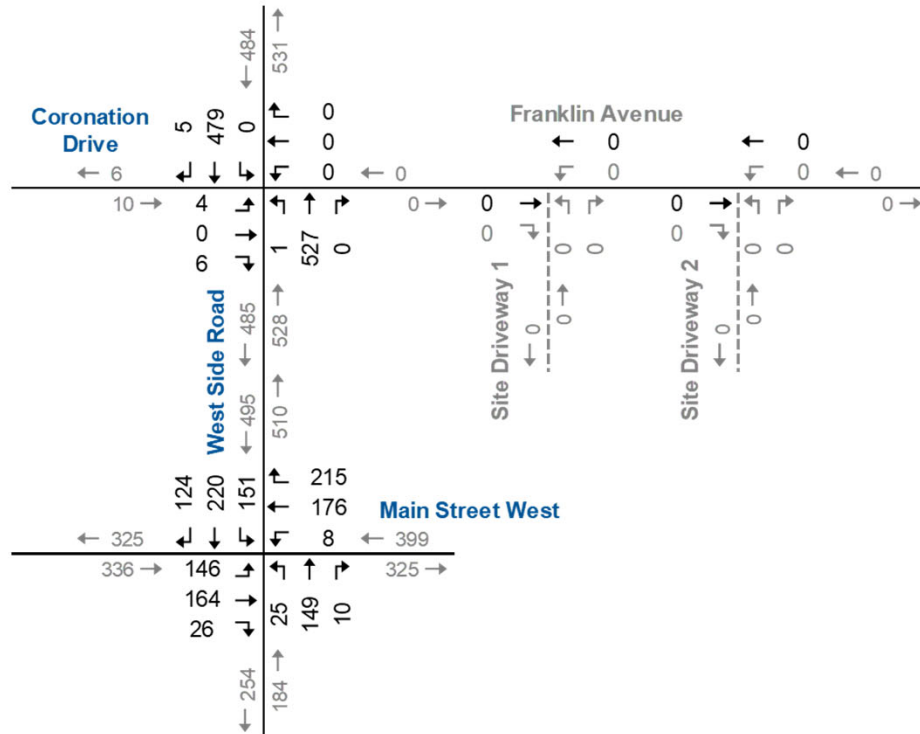
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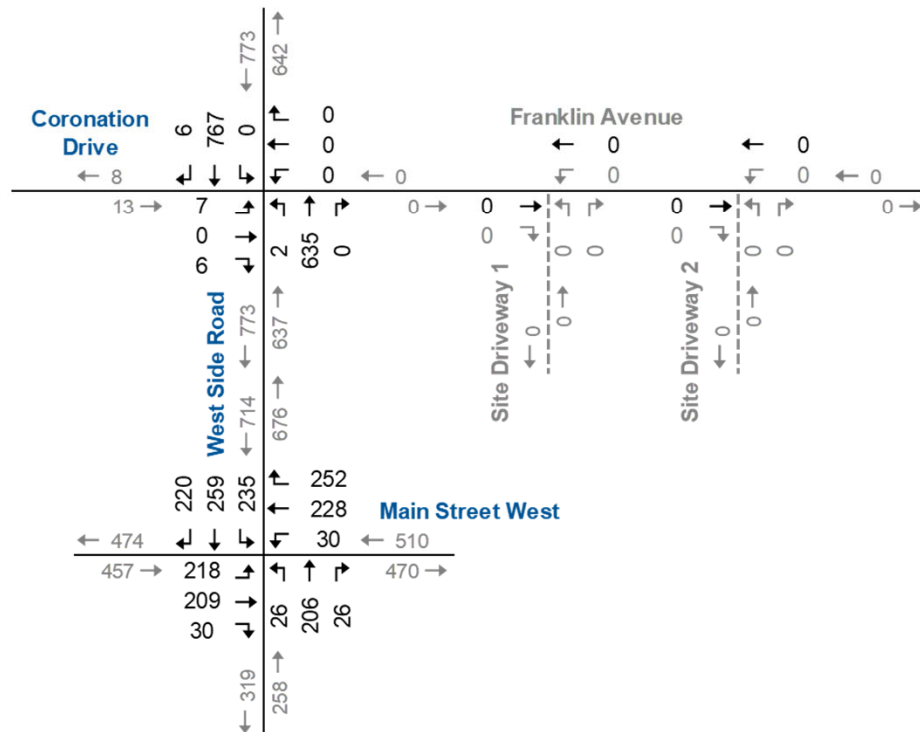
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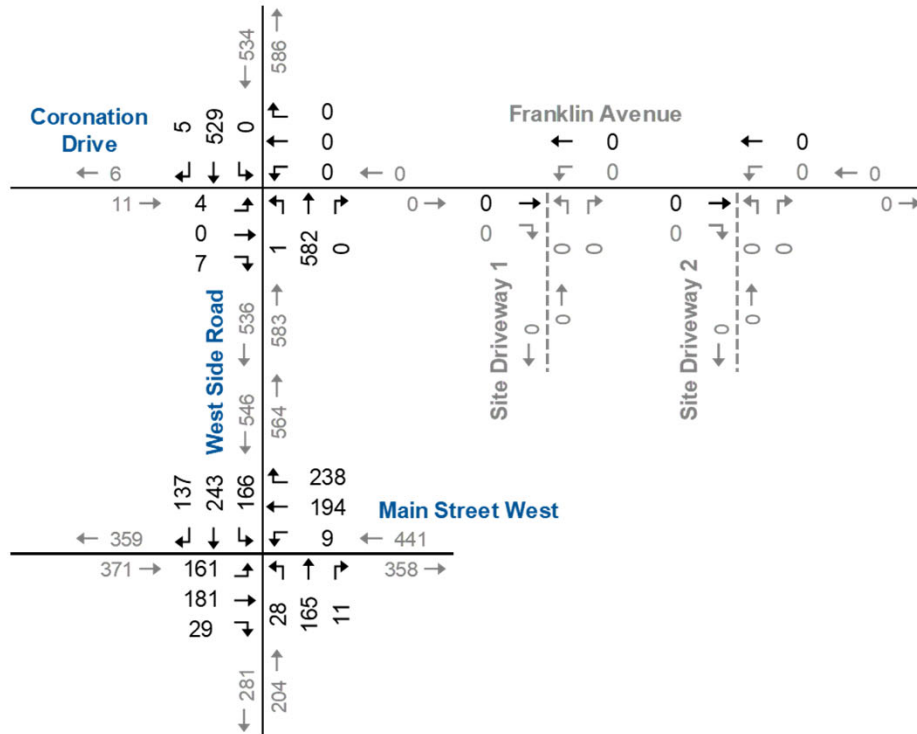
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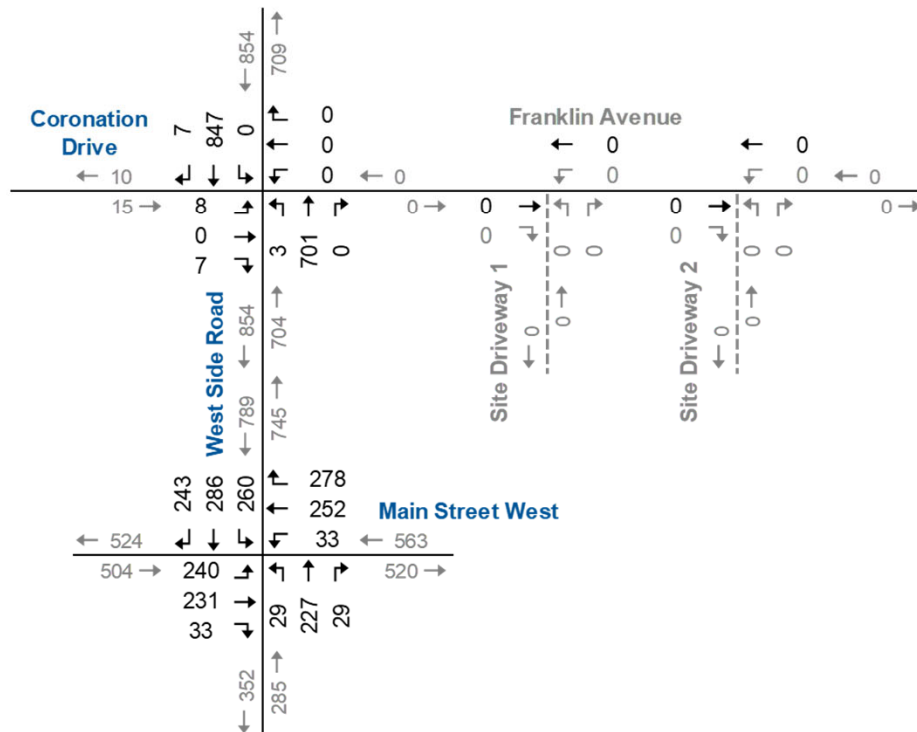
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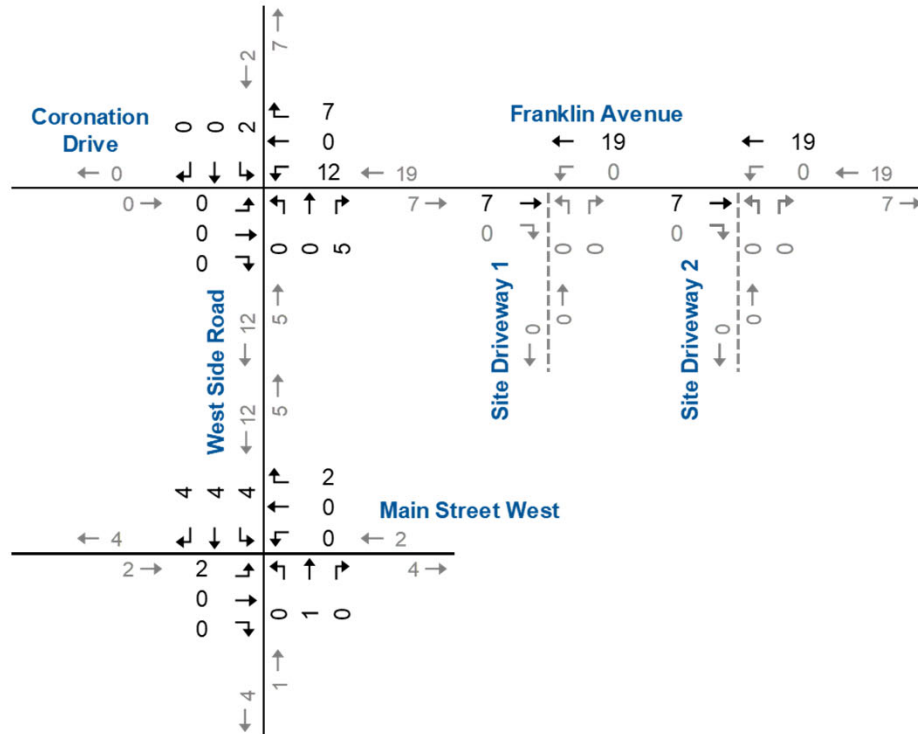
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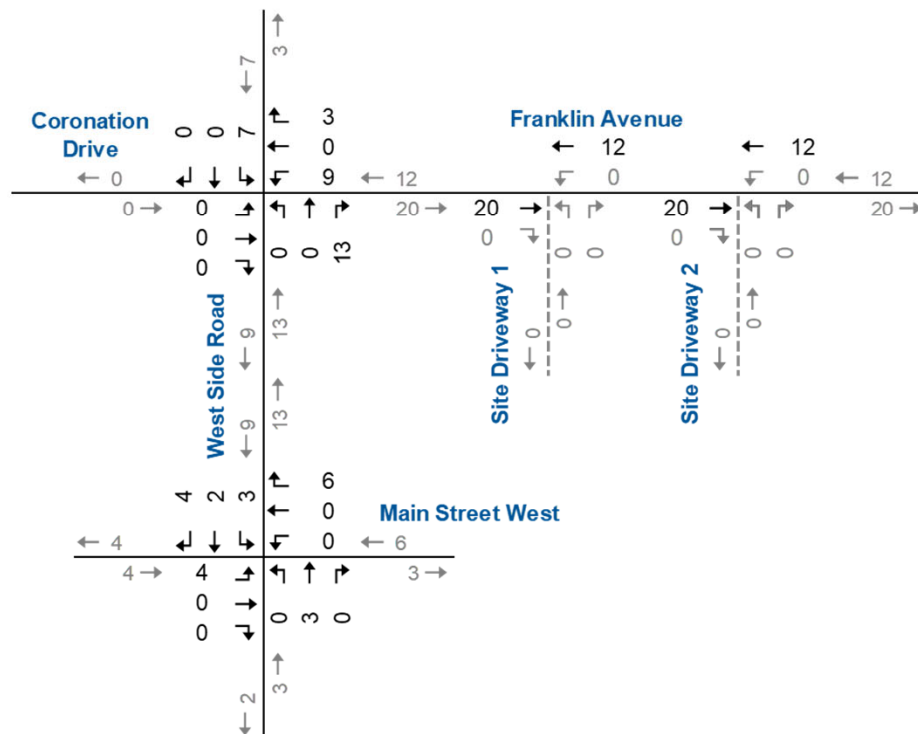
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AM PEAK HOUR



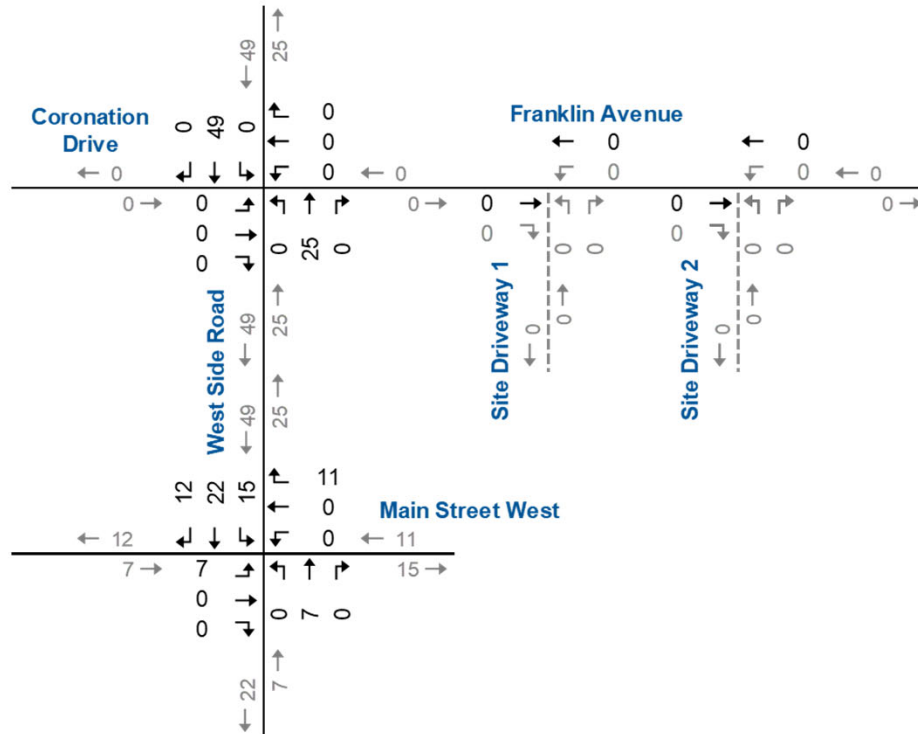
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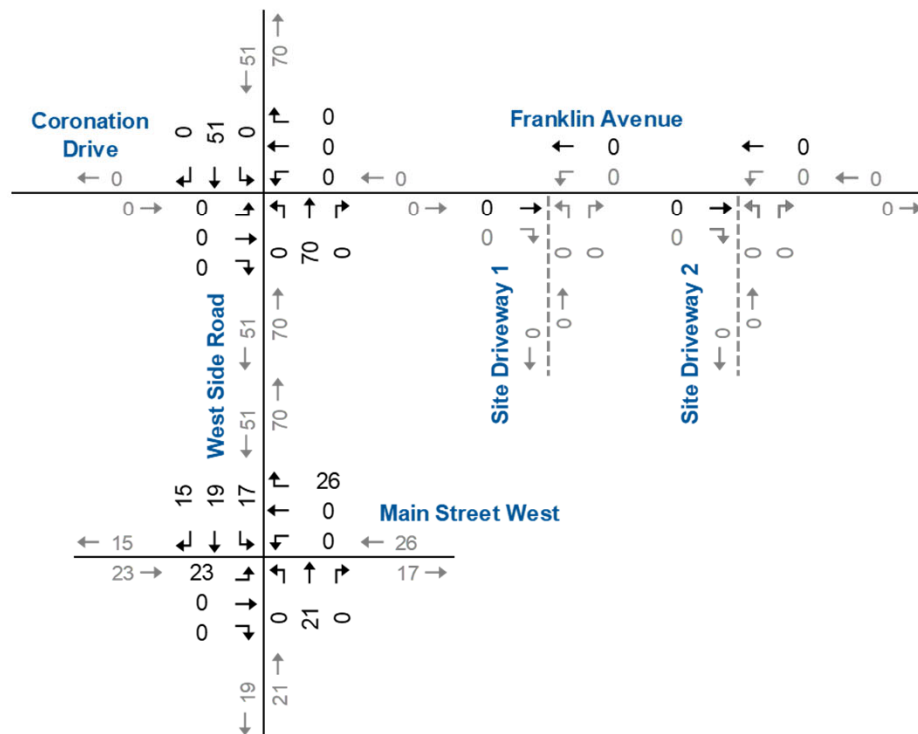
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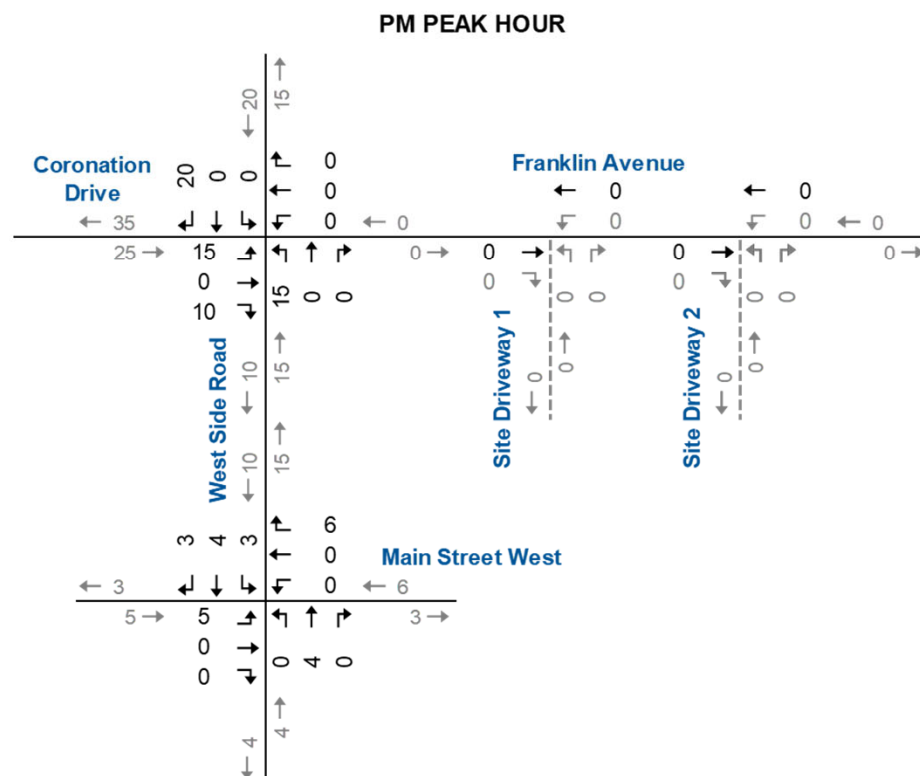
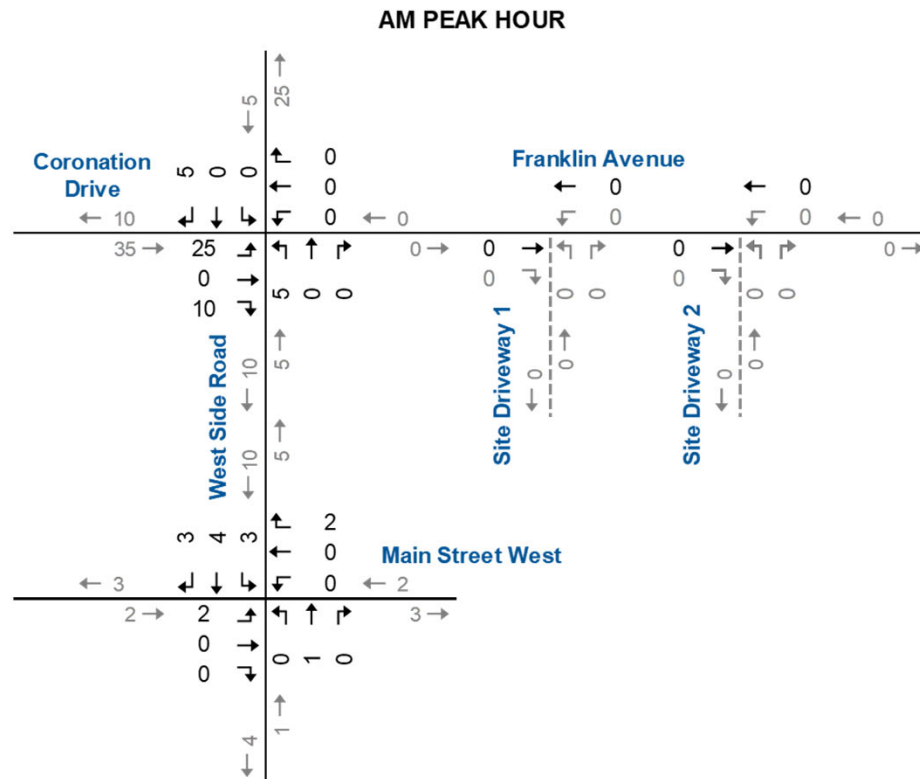
AM PEAK HOUR



PM PEAK HOUR



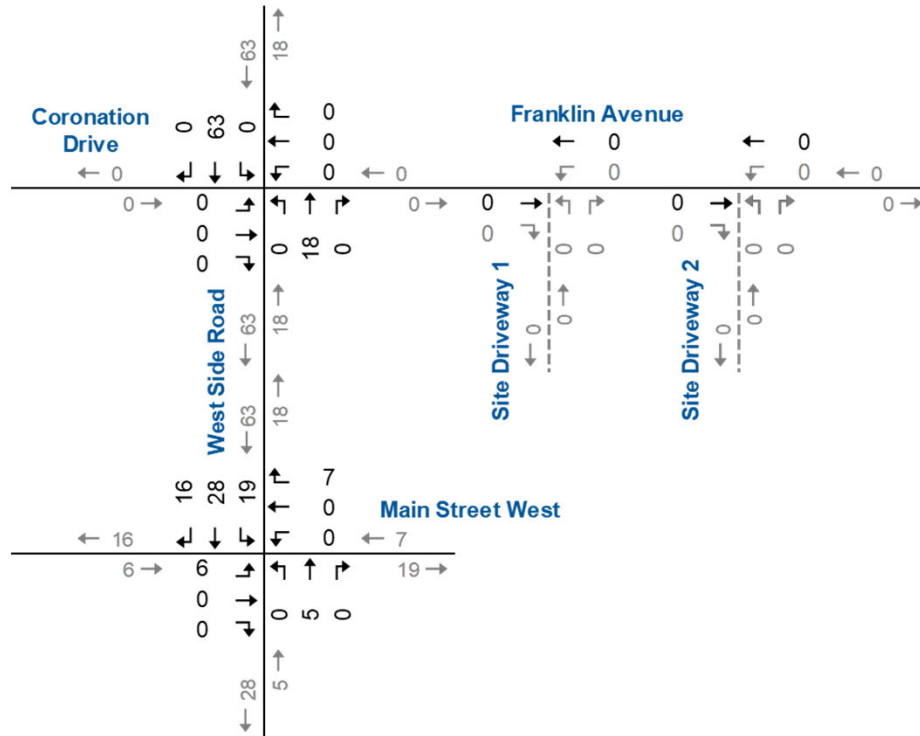
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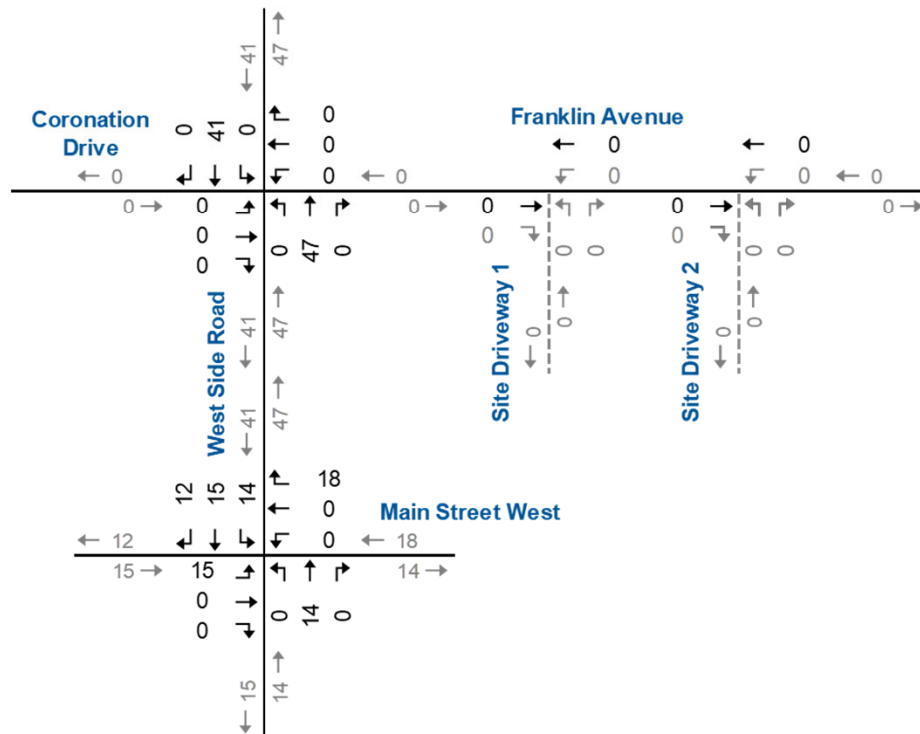
Appendix D



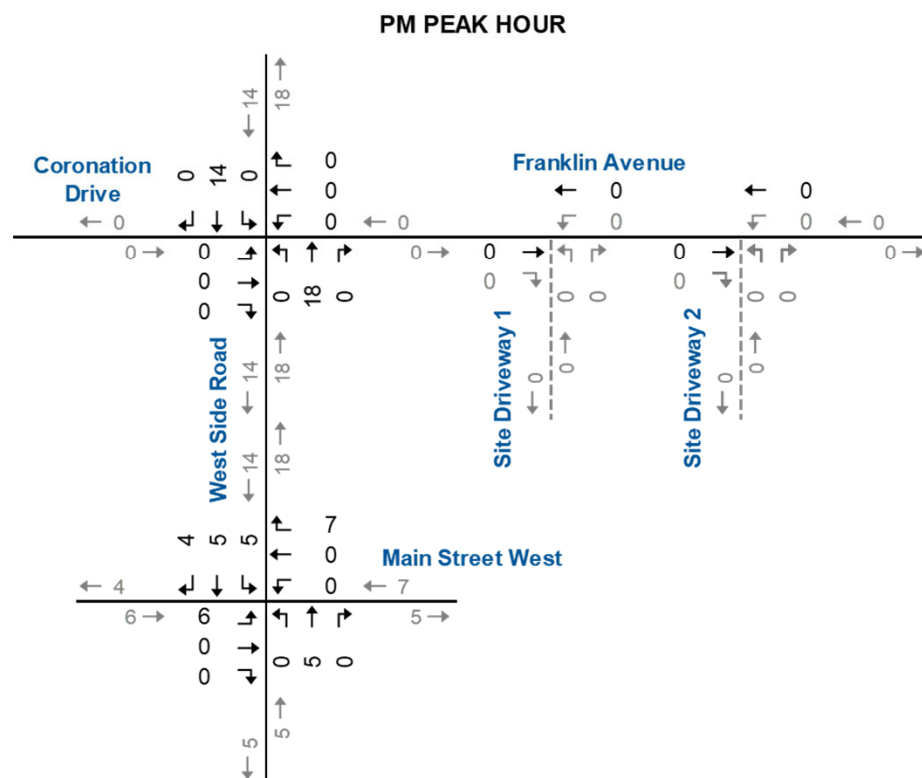
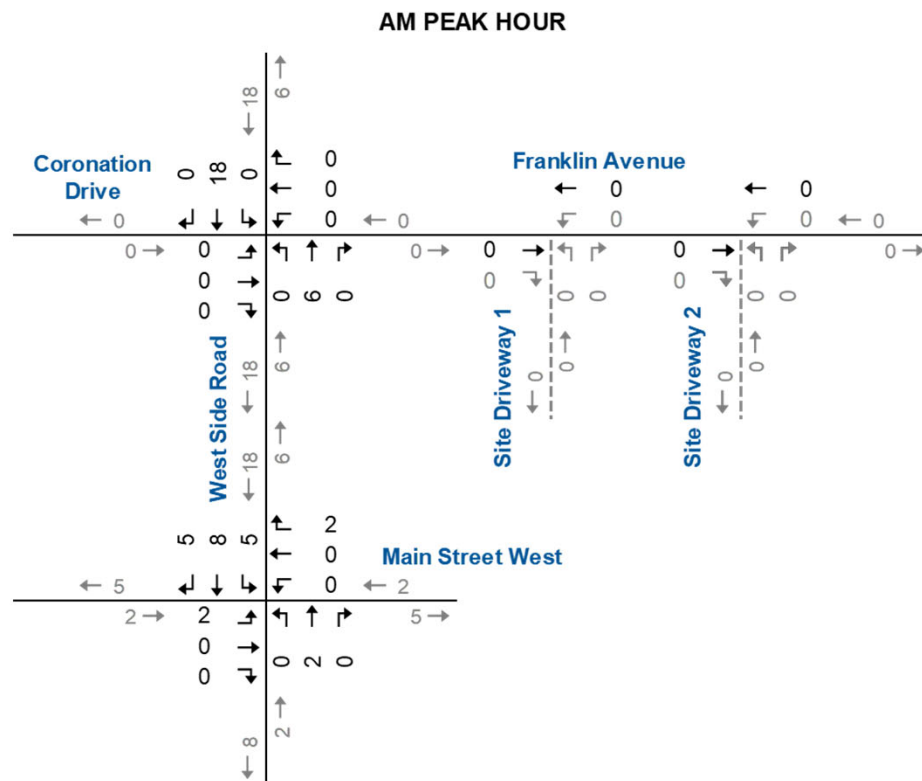
AM PEAK HOUR



PM PEAK HOUR



NTS



Appendix D

Appendix E

Opening Year Background Traffic Operations Reports



Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Background Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	28	0	15	12	0	7	1	526	5	2	564	9
Future Volume (vph)	28	0	15	12	0	7	1	526	5	2	564	9
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.953			0.949			0.999			0.998	
Flt Protected		0.968			0.970							
Satd. Flow (prot)	0	1279	0	0	1338	0	0	2707	0	0	2612	0
Flt Permitted		0.968			0.970							
Satd. Flow (perm)	0	1279	0	0	1338	0	0	2707	0	0	2612	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			53.8			564.5			135.2	
Travel Time (s)		6.6			3.9			29.0			7.0	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	4%	2%	2%	7%	50%
Adj. Flow (vph)	30	0	16	13	0	8	1	572	5	2	613	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	46	0	0	21	0	0	578	0	0	625	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane							Yes				Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 32.6%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Background Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	28	0	15	12	0	7	1	526	5	2	564	9
Future Volume (Veh/h)	28	0	15	12	0	7	1	526	5	2	564	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	0	16	13	0	8	1	572	5	2	613	10
Pedestrians		3										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT	TL			TWLT	TL
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	921	1204	314	903	1206	288	626				577	
vC1, stage 1 conf vol	625	625		576	576							
vC2, stage 2 conf vol	296	579		326	630							
vCu, unblocked vol	921	1204	314	903	1206	288	626				577	
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	93	100	97	97	100	99	100				100	
cM capacity (veh/h)	403	374	629	416	374	708	963				993	

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	46	21	287	291	308	316
Volume Left	30	13	1	0	2	0
Volume Right	16	8	0	5	0	10
cSH	461	493	963	1700	993	1700
Volume to Capacity	0.10	0.04	0.00	0.17	0.00	0.19
Queue Length 95th (m)	2.6	1.1	0.0	0.0	0.0	0.0
Control Delay (s)	13.7	12.6	0.0	0.0	0.1	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.7	12.6	0.0		0.0	
Approach LOS	B	B				

Intersection Summary

Average Delay 0.7

Intersection Capacity Utilization 32.6%

ICU Level of Service

A

Analysis Period (min) 15

Lanes, Volumes, Timings
102: West Side Road & Main Street West

(230107) 246 West Side Road
AM Background Opening Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	151	148	24	8	159	219	23	151	9	182	265	153
Future Volume (vph)	151	148	24	8	159	219	23	151	9	182	265	153
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00					0.98
Frt		0.979				0.850		0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1258	0	1429	1522	1126	1429	1306	0	1348	1582	999
Flt Permitted	0.451			0.627			0.565			0.588		
Satd. Flow (perm)	633	1258	0	942	1522	1110	848	1306	0	834	1582	976
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				267		3				187
Link Speed (k/h)		50			50			70				70
Link Distance (m)		204.6			215.4			183.3				564.5
Travel Time (s)		14.7			15.5			9.4				29.0
Confl. Peds. (#/hr)	3		1	1		3	2					2
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Adj. Flow (vph)	184	180	29	10	194	267	28	184	11	222	323	187
Shared Lane Traffic (%)												
Lane Group Flow (vph)	184	209	0	10	194	267	28	195	0	222	323	187
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6				3.6			3.6			3.6
Link Offset(m)		0.0				0.0			0.0			0.0
Crosswalk Width(m)		4.8				4.8			4.8			4.8
Two way Left Turn Lane												Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
102: West Side Road & Main Street West

(230107) 246 West Side Road
AM Background Opening Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	36.6	32.5		17.1	17.1	17.1	40.3	40.3		57.0	52.9	52.9
Actuated g/C Ratio	0.37	0.33		0.17	0.17	0.17	0.40	0.40		0.57	0.53	0.53
v/c Ratio	0.58	0.50		0.06	0.74	0.65	0.08	0.37		0.42	0.38	0.31
Control Delay	30.3	29.7		35.2	57.0	12.6	22.3	25.0		15.6	17.0	3.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	30.3	29.7		35.2	57.0	12.6	22.3	25.0		15.6	17.0	3.8
LOS	C	C		D	E	B	C	C		B	B	A
Approach Delay		30.0			31.4			24.7			13.2	
Approach LOS		C			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 99.6

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 22.9

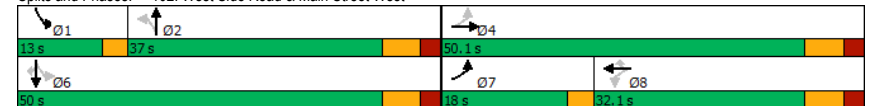
Intersection LOS: C

Intersection Capacity Utilization 95.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Background Opening Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	184	209	10	194	267	28	195	222	323	187
v/c Ratio	0.58	0.50	0.06	0.74	0.65	0.08	0.37	0.42	0.38	0.31
Control Delay	30.3	29.7	35.2	57.0	12.6	22.3	25.0	15.6	17.0	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.3	29.7	35.2	57.0	12.6	22.3	25.0	15.6	17.0	3.8
Queue Length 50th (m)	27.0	32.3	1.8	38.6	0.0	3.6	27.7	22.6	38.1	0.0
Queue Length 95th (m)	40.1	47.7	6.0	56.9	14.8	9.9	47.3	39.9	61.5	8.9
Internal Link Dist (m)	180.6		191.4		159.3		540.5			
Turn Bay Length (m)	130.0		25.0		60.0		35.0		75.0	
Base Capacity (vph)	338	552	237	384	480	343	530	529	840	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.38	0.04	0.51	0.56	0.08	0.37	0.42	0.38	0.31
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Background Opening Year Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	151	148	24	8	159	219	23	151	9	182	265	153
Future Volume (vph)	151	148	24	8	159	219	23	151	9	182	265	153
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1334	1259		1427	1522	1110	1427	1306		1348	1582	976
Flt Permitted	0.45	1.00		0.63	1.00	1.00	0.57	1.00		0.59	1.00	1.00
Satd. Flow (perm)	634	1259		942	1522	1110	848	1306		835	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	184	180	29	10	194	267	28	184	11	222	323	187
RTOR Reduction (vph)	0	7	0	0	0	221	0	2	0	0	0	87
Lane Group Flow (vph)	184	202	0	10	194	46	28	193	0	222	323	100
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	32.5	32.5		17.2	17.2	17.2	40.4	40.4		53.0	53.0	53.0
Effective Green, g (s)	32.5	32.5		17.2	17.2	17.2	40.4	40.4		53.0	53.0	53.0
Actuated g/C Ratio	0.33	0.33		0.17	0.17	0.17	0.41	0.41		0.53	0.53	0.53
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	293	410		162	262	191	343	529		493	841	519
v/s Ratio Prot	c0.08	0.16			c0.13			0.15		c0.04	0.20	
v/s Ratio Perm	0.13			0.01		0.04	0.03			c0.20		0.10
v/c Ratio	0.63	0.49		0.06	0.74	0.24	0.08	0.37		0.45	0.38	0.19
Uniform Delay, d1	26.4	26.9		34.5	39.1	35.6	18.2	20.7		13.1	13.7	12.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.0	0.9		0.2	10.7	0.7	0.5	1.9		0.7	1.3	0.8
Delay (s)	29.4	27.9		34.6	49.8	36.2	18.7	22.6		13.8	15.0	13.0
Level of Service	C	C		C	D	D	B	C		B	B	B
Approach Delay (s)	28.6			41.8			22.1			14.1		
Approach LOS	C			D			C			B		
Intersection Summary												
HCM 2000 Control Delay	25.4			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.56											
Actuated Cycle Length (s)	99.6			Sum of lost time (s)			20.1					
Intersection Capacity Utilization	95.1%			ICU Level of Service			F					
Analysis Period (min)	15											

c Critical Lane Group

Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Background Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	21	0	15	9	0	3	17	710	13	7	801	25
Future Volume (vph)	21	0	15	9	0	3	17	710	13	7	801	25
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.944			0.966			0.997			0.995	
Flt Protected		0.972			0.964			0.999				
Satd. Flow (prot)	0	1238	0	0	1354	0	0	2702	0	0	2750	0
Flt Permitted		0.972			0.964			0.999				
Satd. Flow (perm)	0	1238	0	0	1354	0	0	2702	0	0	2750	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			30.0			564.5			135.2	
Travel Time (s)		6.6			2.2			29.0			7.0	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	17%	2%	0%	2%	2%	2%	0%	4%	2%	2%	0%	0%
Adj. Flow (vph)	21	0	15	9	0	3	17	724	13	7	817	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	12	0	0	754	0	0	850	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane							Yes			Yes		
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 51.3%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Background Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	21	0	15	9	0	3	17	710	13	7	801	25
Future Volume (Veh/h)	21	0	15	9	0	3	17	710	13	7	801	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	21	0	15	9	0	3	17	724	13	7	817	26
Pedestrians		5										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT			TWLT		
Median storage (veh)							2			2		
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1248	1620	426	1202	1626	368	848			737		
vC1, stage 1 conf vol	849	849		764	764							
vC2, stage 2 conf vol	399	771		438	862							
vCu, unblocked vol	1248	1620	426	1202	1626	368	848			737		
tC, single (s)	7.8	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.8	5.5		6.5	5.5							
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	97	97	100	100	98			99		
cM capacity (veh/h)	263	280	580	310	274	629	795			865		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	36	12	379	375	416	434						
Volume Left	21	9	17	0	7	0						
Volume Right	15	3	0	13	0	26						
cSH	340	355	795	1700	865	1700						
Volume to Capacity	0.11	0.03	0.02	0.22	0.01	0.26						
Queue Length 95th (m)	2.8	0.8	0.5	0.0	0.2	0.0						
Control Delay (s)	16.8	15.5	0.7	0.0	0.3	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	16.8	15.5	0.3		0.1							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.7									
Intersection Capacity Utilization			51.3%				ICU Level of Service			A		
Analysis Period (min)			15									

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Background Opening Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	250	189	27	27	207	291	24	233	24	255	280	237
Future Volume (vph)	250	189	27	27	207	291	24	233	24	255	280	237
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.98	1.00	1.00		0.99		0.98
Frt		0.981				0.850		0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1287	1278	0	1232		1566	1126	1429	1352	0	1429	1582
Flt Permitted	0.409			0.618			0.581			0.499		
Satd. Flow (perm)	551	1278	0	800		1566	1103	873	1352	0	745	1582
Right Turn on Red			Yes			Yes		Yes			Yes	
Satd. Flow (RTOR)	9					303		5				247
Link Speed (k/h)	50			50			70				70	
Link Distance (m)	204.6			215.4			183.3				564.5	
Travel Time (s)	14.7			15.5			9.4				29.0	
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Adj. Flow (vph)	260	197	28	28	216	303	25	243	25	266	292	247
Shared Lane Traffic (%)												
Lane Group Flow (vph)	260	225	0	28	216	303	25	268	0	266	292	247
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6			3.6			3.6			3.6		
Link Offset(m)	0.0			0.0			0.0			0.0		
Crosswalk Width(m)	4.8			4.8			4.8			4.8		
Two way Left Turn Lane												
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Background Opening Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8		2		6		6
Detector Phase	7	4		8	8	8		2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0		20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1		47.0	47.0	11.5	47.0	47.0
Total Split (s)	18.0	50.1		32.1	32.1	32.1		37.0	37.0	13.0	50.0	50.0
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%		37.0%	37.0%	13.0%	50.0%	50.0%
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0		30.0	30.0	10.0	43.0	43.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5		4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6		2.5	2.5	0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1		7.0	7.0	3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag		Lag	Lag	Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes		Yes	Yes	Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None		Max	Max	None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0		15.0	15.0		15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0		25.0	25.0		25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0		0	0		0	0
Act Effect Green (s)	39.8	35.7		18.5	18.5	18.5		40.2	40.2	57.0	53.0	53.0
Actuated g/C Ratio	0.39	0.35		0.18	0.18	0.18		0.39	0.39	0.55	0.52	0.52
v/c Ratio	0.83	0.50		0.20	0.77	0.68		0.07	0.50	0.56	0.36	0.36
Control Delay	47.5	29.3		38.8	58.6	12.7		22.9	28.9	19.5	17.6	3.7
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	29.3		38.8	58.6	12.7		22.9	28.9	19.5	17.6	3.7
LOS	D	C		D	E	B		C	C	B	B	A
Approach Delay		39.1			32.2			28.4			14.0	
Approach LOS		D			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 102.8

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 26.3

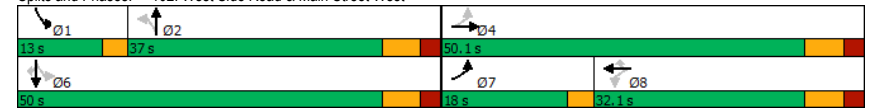
Intersection LOS: C

Intersection Capacity Utilization 106.3%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Background Opening Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	260	225	28	216	303	25	268	266	292	247
v/c Ratio	0.83	0.50	0.20	0.77	0.68	0.07	0.50	0.56	0.36	0.36
Control Delay	47.5	29.3	38.8	58.6	12.7	22.9	28.9	19.5	17.6	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	29.3	38.8	58.6	12.7	22.9	28.9	19.5	17.6	3.7
Queue Length 50th (m)	41.3	35.4	5.1	44.0	0.0	3.3	42.3	29.9	35.9	0.0
Queue Length 95th (m)	#77.0	58.4	13.5	70.4	26.7	10.0	74.3	53.7	62.4	13.8
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	321	541	195	382	498	341	531	479	815	681
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.42	0.14	0.57	0.61	0.07	0.50	0.56	0.36	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Background Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	250	189	27	27	207	291	24	233	24	255	280	237
Future Volume (vph)	250	189	27	27	207	291	24	233	24	255	280	237
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Fr	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1285	1279		1230	1566	1103	1428	1352		1423	1582	1091
Flt Permitted	0.41	1.00		0.62	1.00	1.00	0.58	1.00		0.50	1.00	1.00
Satd. Flow (perm)	553	1279		800	1566	1103	873	1352		747	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	260	197	28	28	216	303	25	243	25	266	292	247
RTOR Reduction (vph)	0	6	0	0	0	248	0	3	0	0	0	120
Lane Group Flow (vph)	260	219	0	28	216	55	25	265	0	266	292	127
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	35.7	35.7		18.5	18.5	18.5	40.2	40.2		53.0	53.0	53.0
Effective Green, g (s)	35.7	35.7		18.5	18.5	18.5	40.2	40.2		53.0	53.0	53.0
Actuated g/C Ratio	0.35	0.35		0.18	0.18	0.18	0.39	0.39		0.52	0.52	0.52
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	293	444		143	281	198	341	528		449	815	562
v/s Ratio Prot	c0.12	0.17			0.14			0.20		c0.06	0.18	
v/s Ratio Perm	c0.19			0.03		0.05	0.03			c0.25		0.12
v/c Ratio	0.89	0.49		0.20	0.77	0.28	0.07	0.50		0.59	0.36	0.23
Uniform Delay, d1	29.1	26.4		35.8	40.1	36.4	19.6	23.7		15.9	14.8	13.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.3	0.9		0.7	11.9	0.8	0.4	3.4		2.1	1.2	0.9
Delay (s)	54.4	27.3		36.5	52.0	37.1	20.0	27.1		18.0	16.0	14.6
Level of Service	D	C		D	D	D	C	C		B	B	B
Approach Delay (s)		41.8			43.0			26.5			16.2	
Approach LOS		D			D			C			B	

Intersection Summary

HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	102.8	Sum of lost time (s)	20.1
Intersection Capacity Utilization	106.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Appendix F

Opening Year Total Traffic Operations Reports



Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Total Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	28	0	15	30	0	17	6	526	11	5	564	9
Future Volume (vph)	28	0	15	30	0	17	6	526	11	5	564	9
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.953			0.952			0.997			0.998	
Flt Protected		0.968			0.969			0.999				
Satd. Flow (prot)	0	1279	0	0	1341	0	0	2701	0	0	2612	0
Flt Permitted		0.968			0.969			0.999				
Satd. Flow (perm)	0	1279	0	0	1341	0	0	2701	0	0	2612	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	4%	2%	2%	7%	50%
Adj. Flow (vph)	30	0	16	33	0	18	7	572	12	5	613	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	46	0	0	51	0	0	591	0	0	628	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 35.5%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Total Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	28	0	15	30	0	17	6	526	11	5	564	9
Future Volume (Veh/h)	28	0	15	30	0	17	6	526	11	5	564	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	0	16	33	0	18	7	572	12	5	613	10
Pedestrians		3										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT	TL			TWLT	TL
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	949	1229	314	924	1228	292	626			584		
vC1, stage 1 conf vol	631	631		592	592							
vC2, stage 2 conf vol	318	598		332	636							
vCu, unblocked vol	949	1229	314	924	1228	292	626			584		
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	97	92	100	97	99			99		
cM capacity (veh/h)	393	365	629	404	365	704	963			987		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	46	51	293	298	312	316
Volume Left	30	33	7	0	5	0
Volume Right	16	18	0	12	0	10
cSH	452	475	963	1700	987	1700
Volume to Capacity	0.10	0.11	0.01	0.18	0.01	0.19
Queue Length 95th (m)	2.7	2.9	0.2	0.0	0.1	0.0
Control Delay (s)	13.9	13.5	0.3	0.0	0.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.9	13.5	0.1		0.1	
Approach LOS	B	B				

Intersection Summary

Average Delay 1.1

Intersection Capacity Utilization 35.5% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total Opening Year Traffic

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	154	148	24	8	159	221	23	152	9	188	270	160	
Future Volume (vph)	154	148	24	8	159	221	23	152	9	188	270	160	
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351	
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0	
Storage Lanes	1		0	1		1	1		0	1		1	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00						0.98
Frt		0.979				0.850		0.992				0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1335	1258	0	1429	1522	1126	1429	1306	0	1348	1582	999	
Flt Permitted	0.450			0.627			0.562			0.587			
Satd. Flow (perm)	631	1258	0	942	1522	1110	844	1306	0	833	1582	976	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		10				270		3				195	
Link Speed (k/h)		50			50			70				70	
Link Distance (m)		204.6			215.4			183.3				564.5	
Travel Time (s)		14.7			15.5			9.4				29.0	
Confl. Peds. (#/hr)	3		1	1		3	2					2	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%	
Adj. Flow (vph)	188	180	29	10	194	270	28	185	11	229	329	195	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	188	209	0	10	194	270	28	196	0	229	329	195	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.6				3.6				3.6			
Link Offset(m)		0.0				0.0				0.0			
Crosswalk Width(m)		4.8				4.8				4.8			
Two way Left Turn Lane													Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53	
Turning Speed (k/h)	25		15	25		15	25		15	25		15	
Number of Detectors	1	2		1	2	1	1	2		1	2	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel													
Detector 2 Extend (s)		0.0			0.0			0.0			0.0		

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total Opening Year Traffic

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	
Protected Phases	7	4			8			2		1	6		
Permitted Phases	4			8		8	2			6		6	
Detector Phase	7	4		8	8	8	2	2		1	6	6	
Switch Phase													
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0	
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0	
Total Split (s)	18.0	32.1		32.1	32.1	32.1	37.0	37.0		13.0	37.0	37.0	
Total Split (%)	18.0%	32.1%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	37.0%	37.0%	
Maximum Green (s)	15.0	25.0		25.0	25.0	25.0	30.0	30.0		10.0	30.0	30.0	
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead			
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes			
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max	
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0	
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0	
Act Effect Green (s)	36.8	32.6		17.1	17.1	17.1	40.3	40.3		57.0	53.0	53.0	
Actuated g/C Ratio	0.37	0.33		0.17	0.17	0.17	0.40	0.40		0.57	0.53	0.53	
v/c Ratio	0.59	0.50		0.06	0.74	0.65	0.08	0.37		0.44	0.39	0.32	
Control Delay	30.7	29.6		35.4	57.2	12.6	22.4	25.2		15.9	17.2	3.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	30.7	29.6		35.4	57.2	12.6	22.4	25.2		15.9	17.2	3.8	
LOS	C	C		D	E	B	C	C		B	B	A	
Approach Delay		30.1			31.3			24.8			13.3		
Approach LOS		C			C			C			B		

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 99.8

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 22.9

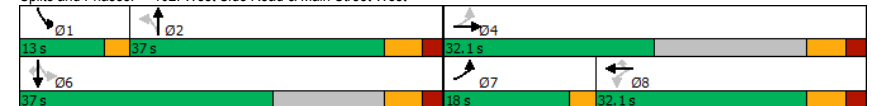
Intersection LOS: C

Intersection Capacity Utilization 95.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total Opening Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	188	209	10	194	270	28	196	229	329	195
v/c Ratio	0.59	0.50	0.06	0.74	0.65	0.08	0.37	0.44	0.39	0.32
Control Delay	30.7	29.6	35.4	57.2	12.6	22.4	25.2	15.9	17.2	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	29.6	35.4	57.2	12.6	22.4	25.2	15.9	17.2	3.8
Queue Length 50th (m)	27.7	32.3	1.8	38.8	0.0	3.6	28.0	23.7	39.2	0.0
Queue Length 95th (m)	40.9	47.7	6.0	56.9	15.1	9.9	47.7	41.1	62.8	8.8
Internal Link Dist (m)	180.6		191.4		159.3		540.5			
Turn Bay Length (m)	130.0		25.0		60.0		35.0		75.0	
Base Capacity (vph)	338	551	237	383	481	340	529	527	839	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.38	0.04	0.51	0.56	0.08	0.37	0.43	0.39	0.32
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total Opening Year Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	154	148	24	8	159	221	23	152	9	188	270	160
Future Volume (vph)	154	148	24	8	159	221	23	152	9	188	270	160
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1334	1259		1427	1522	1110	1427	1306		1348	1582	976
Flt Permitted	0.45	1.00		0.63	1.00	1.00	0.56	1.00		0.59	1.00	1.00
Satd. Flow (perm)	632	1259		942	1522	1110	844	1306		833	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	188	180	29	10	194	270	28	185	11	229	329	195
RTOR Reduction (vph)	0	7	0	0	0	224	0	2	0	0	0	91
Lane Group Flow (vph)	188	202	0	10	194	46	28	194	0	229	329	104
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	32.6	32.6		17.1	17.1	17.1	40.3	40.3		53.0	53.0	53.0
Effective Green, g (s)	32.6	32.6		17.1	17.1	17.1	40.3	40.3		53.0	53.0	53.0
Actuated g/C Ratio	0.33	0.33		0.17	0.17	0.17	0.40	0.40		0.53	0.53	0.53
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	294	411		161	261	190	341	527		492	840	518
v/s Ratio Prot	c0.08	0.16			c0.13			0.15		c0.05	0.21	
v/s Ratio Perm	0.13			0.01		0.04	0.03			c0.20		0.11
v/c Ratio	0.64	0.49		0.06	0.74	0.24	0.08	0.37		0.47	0.39	0.20
Uniform Delay, d1	26.5	26.9		34.6	39.2	35.7	18.3	20.8		13.2	13.8	12.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.3	0.9		0.2	10.9	0.7	0.5	2.0		0.7	1.4	0.9
Delay (s)	29.8	27.8		34.7	50.1	36.4	18.8	22.8		13.9	15.2	13.1
Level of Service	C	C		C	D	D	B	C		B	B	B
Approach Delay (s)	28.8			42.0			22.3			14.3		
Approach LOS	C			D			C			B		
Intersection Summary												
HCM 2000 Control Delay	25.5			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.57											
Actuated Cycle Length (s)	99.7			Sum of lost time (s)			20.1					
Intersection Capacity Utilization	95.1%			ICU Level of Service			F					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total Opening Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	7	9	0	23	24	1
Future Volume (vph)	7	9	0	23	24	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.925				0.995	
Flt Protected					0.954	
Satd. Flow (prot)	1259	0	0	1204	1380	0
Flt Permitted					0.954	
Satd. Flow (perm)	1259	0	0	1204	1380	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	10	0	25	26	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	0	0	25	27	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total Opening Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	↖
Traffic Volume (veh/h)	7	9	0	23	24	1
Future Volume (Veh/h)	7	9	0	23	24	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	10	0	25	26	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			18		38	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			18		38	13
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1599		974	1067
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	18	25	27			
Volume Left	0	0	26			
Volume Right	10	0	1			
cSH	1700	1599	977			
Volume to Capacity	0.01	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.7			
Control Delay (s)	0.0	0.0	8.8			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total Opening Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	8	0	0	19	4	0
Future Volume (vph)	8	0	0	19	4	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	1361	0	0	1204	1381	0
Flt Permitted					0.950	
Satd. Flow (perm)	1361	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	0	0	21	4	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	0	0	21	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total Opening Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	8	0	0	19	4	0
Future Volume (Veh/h)	8	0	0	19	4	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	0	21	4	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			9		30	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			9		30	9
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1611		984	1073
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	9	21	4			
Volume Left	0	0	4			
Volume Right	0	0	0			
cSH	1700	1611	984			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings

(230107) 246 West Side Road

101: West Side Road & Coronation Drive/Franklin Avenue

PM Total Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	21	0	15	19	0	9	17	710	28	18	801	25
Future Volume (vph)	21	0	15	19	0	9	17	710	28	18	801	25
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.944			0.957			0.994			0.995	
Flt Protected		0.972			0.967			0.999			0.999	
Satd. Flow (prot)	0	1238	0	0	1345	0	0	2695	0	0	2748	0
Flt Permitted		0.972			0.967			0.999			0.999	
Satd. Flow (perm)	0	1238	0	0	1345	0	0	2695	0	0	2748	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	17%	2%	0%	2%	2%	2%	0%	4%	2%	2%	0%	0%
Adj. Flow (vph)	21	0	15	19	0	9	17	724	29	18	817	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	0	28	0	0	770	0	0	861	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 55.9%

ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

(230107) 246 West Side Road

101: West Side Road & Coronation Drive/Franklin Avenue

PM Total Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	21	0	15	19	0	9	17	710	28	18	801	25
Future Volume (Veh/h)	21	0	15	19	0	9	17	710	28	18	801	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	21	0	15	19	0	9	17	724	29	18	817	26
Pedestrians		5										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1276	1658	426	1232	1656	376	848			753		
vC1, stage 1 conf vol	871	871		772	772							
vC2, stage 2 conf vol	405	787		460	884							
vCu, unblocked vol	1276	1658	426	1232	1656	376	848			753		
tC, single (s)	7.8	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.8	5.5		6.5	5.5							
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	97	94	100	99	98			98		
cM capacity (veh/h)	251	268	580	303	266	621	795			853		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	36	28	379	391	426	434						
Volume Left	21	19	17	0	18	0						
Volume Right	15	9	0	29	0	26						
cSH	328	363	795	1700	853	1700						
Volume to Capacity	0.11	0.08	0.02	0.23	0.02	0.26						
Queue Length 95th (m)	2.9	2.0	0.5	0.0	0.5	0.0						
Control Delay (s)	17.3	15.8	0.7	0.0	0.6	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	17.3	15.8	0.3		0.3							
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			55.9%									
ICU Level of Service										B		
Analysis Period (min)			15									

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total Opening Year Traffic

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	189	27	27	207	298	24	236	24	259	282	241
Future Volume (vph)	255	189	27	27	207	298	24	236	24	259	282	241
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.98	1.00	1.00		0.99		0.98
Frt		0.981				0.850		0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1287	1278	0	1232	1566	1126	1429	1352	0	1429	1582	1115
Flt Permitted	0.410			0.618			0.580			0.494		
Satd. Flow (perm)	552	1278	0	800	1566	1103	872	1352	0	737	1582	1091
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	9					310			5			251
Link Speed (k/h)		50			50			70			70	
Link Distance (m)	204.6				215.4			183.3			564.5	
Travel Time (s)		14.7			15.5			9.4			29.0	
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Adj. Flow (vph)	266	197	28	28	216	310	25	246	25	270	294	251
Shared Lane Traffic (%)												
Lane Group Flow (vph)	266	225	0	28	216	310	25	271	0	270	294	251
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane											Yes	
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total Opening Year Traffic

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	40.1	36.0		18.7	18.7	18.7	40.2	40.2		57.1	53.0	53.0
Actuated g/C Ratio	0.39	0.35		0.18	0.18	0.18	0.39	0.39		0.55	0.51	0.51
v/c Ratio	0.84	0.50		0.19	0.76	0.68	0.07	0.51		0.57	0.36	0.37
Control Delay	49.2	29.2		38.7	57.9	12.7	23.1	29.2		20.1	17.8	3.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	49.2	29.2		38.7	57.9	12.7	23.1	29.2		20.1	17.8	3.7
LOS	D	C		D	E	B	C	C		C	B	A
Approach Delay		40.1			31.6			28.7			14.2	
Approach LOS		D			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 103.2

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 26.6

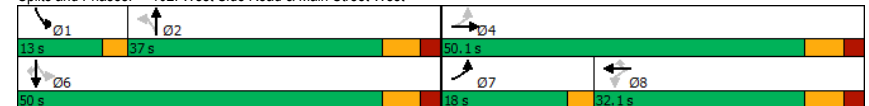
Intersection LOS: C

Intersection Capacity Utilization 106.6%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total Opening Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	266	225	28	216	310	25	271	270	294	251
v/c Ratio	0.84	0.50	0.19	0.76	0.68	0.07	0.51	0.57	0.36	0.37
Control Delay	49.2	29.2	38.7	57.9	12.7	23.1	29.2	20.1	17.8	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.2	29.2	38.7	57.9	12.7	23.1	29.2	20.1	17.8	3.7
Queue Length 50th (m)	42.5	35.4	5.1	44.0	0.0	3.3	42.9	30.5	36.2	0.0
Queue Length 95th (m)	#80.4	58.4	13.5	70.4	27.1	10.0	75.1	54.8	62.8	13.8
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	321	539	194	381	503	339	529	474	812	682
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.42	0.14	0.57	0.62	0.07	0.51	0.57	0.36	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total Opening Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	255	189	27	27	207	298	24	236	24	259	282	241
Future Volume (vph)	255	189	27	27	207	298	24	236	24	259	282	241
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1284	1279		1230	1566	1103	1428	1352		1423	1582	1091
Flt Permitted	0.41	1.00		0.62	1.00	1.00	0.58	1.00		0.49	1.00	1.00
Satd. Flow (perm)	555	1279		800	1566	1103	872	1352		741	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	266	197	28	28	216	310	25	246	25	270	294	251
RTOR Reduction (vph)	0	6	0	0	0	254	0	3	0	0	0	122
Lane Group Flow (vph)	266	219	0	28	216	56	25	268	0	270	294	129
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	36.0	36.0		18.7	18.7	18.7	40.2	40.2		53.0	53.0	53.0
Effective Green, g (s)	36.0	36.0		18.7	18.7	18.7	40.2	40.2		53.0	53.0	53.0
Actuated g/C Ratio	0.35	0.35		0.18	0.18	0.18	0.39	0.39		0.51	0.51	0.51
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	294	446		145	284	200	340	527		445	813	560
v/s Ratio Prot	c0.13	0.17			0.14			0.20		c0.06	0.19	
v/s Ratio Perm	c0.19			0.03		0.05	0.03			c0.25		0.12
v/c Ratio	0.90	0.49		0.19	0.76	0.28	0.07	0.51		0.61	0.36	0.23
Uniform Delay, d1	29.4	26.4		35.8	40.1	36.4	19.8	23.9		16.3	15.0	13.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	28.6	0.9		0.7	11.4	0.8	0.4	3.5		2.3	1.2	1.0
Delay (s)	58.0	27.2		36.5	51.4	37.2	20.2	27.4		18.6	16.2	14.8
Level of Service	E	C		D	D	D	C	C		B	B	B
Approach Delay (s)		43.9			42.7			26.8			16.6	
Approach LOS		D			D			C			B	

Intersection Summary

HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	103.1	Sum of lost time (s)	20.1
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total Opening Year Traffic

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	↖
Traffic Volume (vph)	24	22	1	15	13	1
Future Volume (vph)	24	22	1	15	13	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.991	
Flt Protected				0.997	0.955	
Satd. Flow (prot)	1272	0	0	1200	1376	0
Flt Permitted				0.997	0.955	
Satd. Flow (perm)	1272	0	0	1200	1376	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	24	1	16	14	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	0	17	15	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 13.6%
Analysis Period (min) 15

ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total Opening Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	↖
Traffic Volume (veh/h)	24	22	1	15	13	1
Future Volume (Veh/h)	24	22	1	15	13	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	24	1	16	14	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			50		56	38
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			50		56	38
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1557		951	1034

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	50	17	15
Volume Left	0	1	14
Volume Right	24	0	1
cSH	1700	1557	956
Volume to Capacity	0.03	0.00	0.02
Queue Length 95th (m)	0.0	0.0	0.4
Control Delay (s)	0.0	0.4	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	0.4	8.8
Approach LOS		A	

Intersection Summary

Average Delay 1.7
Intersection Capacity Utilization 13.6%
Analysis Period (min) 15

ICU Level of Service

A

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
PM Total Opening Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	21	4	0	13	3	0
Future Volume (vph)	21	4	0	13	3	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980					
Flt Protected					0.950	
Satd. Flow (prot)	1334	0	0	1204	1381	0
Flt Permitted					0.950	
Satd. Flow (perm)	1334	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	4	0	14	3	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	14	3	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
PM Total Opening Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	21	4	0	13	3	0
Future Volume (Veh/h)	21	4	0	13	3	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	4	0	14	3	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			27		39	25
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			27		39	25
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1587		973	1051
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	27	14	3			
Volume Left	0	0	3			
Volume Right	4	0	0			
cSH	1700	1587	973			
Volume to Capacity	0.02	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Appendix G

Five-Year Background Traffic Operations Reports



Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Background 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	29	0	16	12	0	7	6	576	5	2	609	10
Future Volume (vph)	29	0	16	12	0	7	6	576	5	2	609	10
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.953			0.949			0.999			0.998	
Flt Protected		0.968			0.970			0.999				
Satd. Flow (prot)	0	1279	0	0	1338	0	0	2705	0	0	2611	0
Flt Permitted		0.968			0.970			0.999				
Satd. Flow (perm)	0	1279	0	0	1338	0	0	2705	0	0	2611	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			53.8			564.5			135.2	
Travel Time (s)		6.6			3.9			29.0			7.0	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	4%	2%	2%	7%	50%
Adj. Flow (vph)	32	0	17	13	0	8	7	626	5	2	662	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	49	0	0	21	0	0	638	0	0	675	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane							Yes				Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 36.6%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Background 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	29	0	16	12	0	7	6	576	5	2	609	10
Future Volume (Veh/h)	29	0	16	12	0	7	6	576	5	2	609	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	17	13	0	8	7	626	5	2	662	11
Pedestrians		3										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT	TL			TWLT	TL
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1010	1320	340	994	1322	316	676			631		
vC1, stage 1 conf vol	674	674		642	642							
vC2, stage 2 conf vol	335	645		352	680							
vCu, unblocked vol	1010	1320	340	994	1322	316	676			631		
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	97	97	100	99	99			100		
cM capacity (veh/h)	373	346	605	377	343	680	923			947		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	49	21	320	318	333	342						
Volume Left	32	13	7	0	2	0						
Volume Right	17	8	0	5	0	11						
cSH	431	455	923	1700	947	1700						
Volume to Capacity	0.11	0.05	0.01	0.19	0.00	0.20						
Queue Length 95th (m)	3.1	1.2	0.2	0.0	0.1	0.0						
Control Delay (s)	14.4	13.3	0.3	0.0	0.1	0.0						
Lane LOS	B	B	A		A							
Approach Delay (s)	14.4	13.3	0.1		0.0							
Approach LOS	B	B										
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			36.6%			ICU Level of Service				A		
Analysis Period (min)			15									

Lanes, Volumes, Timings
102: West Side Road & Main Street West

(230107) 246 West Side Road
AM Background 5 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	165	164	26	8	176	239	25	165	10	197	286	164
Future Volume (vph)	165	164	26	8	176	239	25	165	10	197	286	164
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00					0.98
Frt		0.979				0.850		0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1259	0	1429		1522	1126		1429	1306	0	1348
Flt Permitted	0.414			0.614			0.552			0.564		
Satd. Flow (perm)	581	1259	0	923		1522	1110		829	1306	0	800
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	10					291			3			200
Link Speed (k/h)	50				50			70				70
Link Distance (m)	204.6				215.4			183.3				564.5
Travel Time (s)	14.7				15.5			9.4				29.0
Confl. Peds. (#/hr)	3		1	1		3	2					2
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Adj. Flow (vph)	201	200	32	10	215	291	30	201	12	240	349	200
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	232	0	10	215	291	30	213	0	240	349	200
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6			3.6				3.6
Link Offset(m)	0.0				0.0			0.0				0.0
Crosswalk Width(m)	4.8				4.8			4.8				4.8
Two way Left Turn Lane												Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
102: West Side Road & Main Street West

(230107) 246 West Side Road
AM Background 5 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	38.3	34.2		18.3	18.3	18.3	40.3	40.3		57.0	53.0	53.0
Actuated g/C Ratio	0.38	0.34		0.18	0.18	0.18	0.40	0.40		0.56	0.52	0.52
v/c Ratio	0.64	0.54		0.06	0.78	0.66	0.09	0.41		0.48	0.42	0.33
Control Delay	32.6	30.5		35.0	59.9	12.4	23.0	26.6		17.4	18.3	3.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	32.6	30.5		35.0	59.9	12.4	23.0	26.6		17.4	18.3	3.9
LOS	C	C		C	E	B	C	C		B	B	A
Approach Delay		31.5			32.6			26.2			14.4	
Approach LOS		C			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 101.4

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 24.3

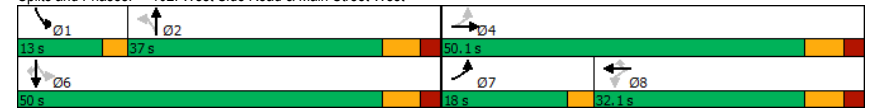
Intersection LOS: C

Intersection Capacity Utilization 96.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Background 5 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	201	232	10	215	291	30	213	240	349	200
v/c Ratio	0.64	0.54	0.06	0.78	0.66	0.09	0.41	0.48	0.42	0.33
Control Delay	32.6	30.5	35.0	59.9	12.4	23.0	26.6	17.4	18.3	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.6	30.5	35.0	59.9	12.4	23.0	26.6	17.4	18.3	3.9
Queue Length 50th (m)	30.0	36.8	1.8	44.0	0.0	4.0	32.2	26.5	44.6	0.0
Queue Length 95th (m)	43.7	53.5	6.0	62.7	15.0	10.4	51.8	43.4	67.3	9.0
Internal Link Dist (m)	180.6		191.4		159.3		540.5			
Turn Bay Length (m)	130.0		25.0		60.0		35.0		75.0	
Base Capacity (vph)	331	543	229	377	494	329	520	504	826	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.43	0.04	0.57	0.59	0.09	0.41	0.48	0.42	0.33
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Background 5 Year Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	164	26	8	176	239	25	165	10	197	286	164
Future Volume (vph)	165	164	26	8	176	239	25	165	10	197	286	164
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1334	1259		1427	1522	1110	1427	1306		1348	1582	976
Flt Permitted	0.41	1.00		0.61	1.00	1.00	0.55	1.00		0.56	1.00	1.00
Satd. Flow (perm)	582	1259		923	1522	1110	828	1306		801	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	201	200	32	10	215	291	30	201	12	240	349	200
RTOR Reduction (vph)	0	7	0	0	0	238	0	2	0	0	0	95
Lane Group Flow (vph)	201	225	0	10	215	53	30	211	0	240	349	105
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	34.2	34.2		18.3	18.3	18.3	40.3	40.3		53.0	53.0	53.0
Effective Green, g (s)	34.2	34.2		18.3	18.3	18.3	40.3	40.3		53.0	53.0	53.0
Actuated g/C Ratio	0.34	0.34		0.18	0.18	0.18	0.40	0.40		0.52	0.52	0.52
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	292	425		166	274	200	329	519		471	827	510
v/s Ratio Prot	c0.09	0.18			c0.14			0.16		c0.05	0.22	
v/s Ratio Perm	0.14			0.01		0.05	0.04			c0.22		0.11
v/c Ratio	0.69	0.53		0.06	0.78	0.26	0.09	0.41		0.51	0.42	0.21
Uniform Delay, d1	26.5	27.1		34.4	39.6	35.7	19.1	21.9		14.3	14.8	12.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.3	1.3		0.2	13.7	0.7	0.5	2.4		0.9	1.6	0.9
Delay (s)	31.8	28.3		34.5	53.3	36.4	19.6	24.3		15.2	16.4	13.8
Level of Service	C	C		C	D	D	B	C		B	B	B
Approach Delay (s)	29.9			43.4			23.7			15.4		
Approach LOS	C			D			C			B		
Intersection Summary												
HCM 2000 Control Delay	26.9			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.62											
Actuated Cycle Length (s)	101.3			Sum of lost time (s)			20.1					
Intersection Capacity Utilization	96.4%			ICU Level of Service			F					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Background 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	22	0	16	9	0	3	17	770	13	7	873	26
Future Volume (vph)	22	0	16	9	0	3	17	770	13	7	873	26
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.943			0.966			0.998			0.996	
Flt Protected		0.972			0.964			0.999				
Satd. Flow (prot)	0	1238	0	0	1354	0	0	2704	0	0	2753	0
Flt Permitted		0.972			0.964			0.999				
Satd. Flow (perm)	0	1238	0	0	1354	0	0	2704	0	0	2753	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			30.0			564.5			135.2	
Travel Time (s)		6.6			2.2			29.0			7.0	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	17%	2%	0%	2%	2%	2%	0%	4%	2%	2%	0%	0%
Adj. Flow (vph)	22	0	16	9	0	3	17	786	13	7	891	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	12	0	0	816	0	0	925	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane							Yes			Yes		
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 53.4%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Background 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	22	0	16	9	0	3	17	770	13	7	873	26
Future Volume (Veh/h)	22	0	16	9	0	3	17	770	13	7	873	26
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	22	0	16	9	0	3	17	786	13	7	891	27
Pedestrians		5										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT				TWLT	
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1354	1756	464	1302	1764	400	923			799		
vC1, stage 1 conf vol	924	924		826	826							
vC2, stage 2 conf vol	430	833		476	937							
vCu, unblocked vol	1354	1756	464	1302	1764	400	923			799		
tC, single (s)	7.8	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.8	5.5		6.5	5.5							
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	97	97	100	100	98			99		
cM capacity (veh/h)	236	256	548	283	250	600	745			819		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	38	12	410	406	452	472
Volume Left	22	9	17	0	7	0
Volume Right	16	3	0	13	0	27
cSH	310	326	745	1700	819	1700
Volume to Capacity	0.12	0.04	0.02	0.24	0.01	0.28
Queue Length 95th (m)	3.3	0.9	0.6	0.0	0.2	0.0
Control Delay (s)	18.2	16.4	0.7	0.0	0.3	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	18.2	16.4	0.3		0.1	
Approach LOS	C	C				

Intersection Summary

Average Delay 0.7

Intersection Capacity Utilization 53.4%

ICU Level of Service

A

Analysis Period (min) 15

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Background 5 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	271	209	30	30	228	315	26	253	26	277	304	258
Future Volume (vph)	271	209	30	30	228	315	26	253	26	277	304	258
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.98	1.00	1.00		0.99		0.98
Frt		0.981				0.850		0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1287	1278	0	1232	1566	1126	1429	1352	0	1429	1582	1115
Flt Permitted	0.374			0.605			0.568			0.468		
Satd. Flow (perm)	504	1278	0	784	1566	1103	854	1352	0	699	1582	1091
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	9					328			5			269
Link Speed (k/h)	50				50			70				70
Link Distance (m)	204.6				215.4			183.3				564.5
Travel Time (s)	14.7				15.5			9.4				29.0
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Adj. Flow (vph)	282	218	31	31	238	328	27	264	27	289	317	269
Shared Lane Traffic (%)												
Lane Group Flow (vph)	282	249	0	31	238	328	27	291	0	289	317	269
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6			3.6				3.6
Link Offset(m)	0.0				0.0			0.0				0.0
Crosswalk Width(m)	4.8				4.8			4.8				4.8
Two way Left Turn Lane												Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Background 5 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	41.5	37.4		19.8	19.8	19.8	40.1	40.1		57.2	53.2	53.2
Actuated g/C Ratio	0.40	0.36		0.19	0.19	0.19	0.38	0.38		0.55	0.51	0.51
v/c Ratio	0.92	0.54		0.21	0.81	0.69	0.08	0.56		0.64	0.39	0.39
Control Delay	60.8	30.3		38.9	61.2	12.5	23.5	31.1		23.2	18.7	3.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	60.8	30.3		38.9	61.2	12.5	23.5	31.1		23.2	18.7	3.8
LOS	E	C		D	E	B	C	C		C	B	A
Approach Delay		46.5			33.3			30.5			15.6	
Approach LOS		D			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 104.7

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 29.3

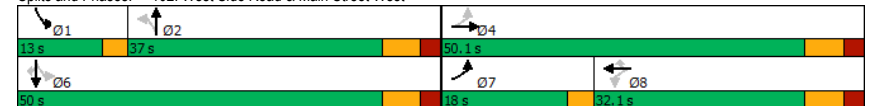
Intersection LOS: C

Intersection Capacity Utilization 108.9%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Background 5 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	282	249	31	238	328	27	291	289	317	269
v/c Ratio	0.92	0.54	0.21	0.81	0.69	0.08	0.56	0.64	0.39	0.39
Control Delay	60.8	30.3	38.9	61.2	12.5	23.5	31.1	23.2	18.7	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.8	30.3	38.9	61.2	12.5	23.5	31.1	23.2	18.7	3.8
Queue Length 50th (m)	45.8	40.4	5.7	49.3	0.0	3.7	48.7	34.8	41.6	0.0
Queue Length 95th (m)	#96.1	65.4	14.6	77.8	28.1	10.5	81.6	59.0	68.5	14.2
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	312	531	188	375	513	327	521	451	803	686
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.47	0.16	0.63	0.64	0.08	0.56	0.64	0.39	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Background 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	271	209	30	30	228	315	26	253	26	277	304	258
Future Volume (vph)	271	209	30	30	228	315	26	253	26	277	304	258
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Fr	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1285	1279		1230	1566	1103	1428	1352		1424	1582	1091
Flt Permitted	0.37	1.00		0.60	1.00	1.00	0.57	1.00		0.47	1.00	1.00
Satd. Flow (perm)	506	1279		783	1566	1103	854	1352		702	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	282	218	31	31	238	328	27	264	27	289	317	269
RTOR Reduction (vph)	0	6	0	0	0	266	0	3	0	0	0	132
Lane Group Flow (vph)	282	243	0	31	238	62	27	288	0	289	317	137
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	37.4	37.4		19.8	19.8	19.8	40.2	40.2		53.2	53.2	53.2
Effective Green, g (s)	37.4	37.4		19.8	19.8	19.8	40.2	40.2		53.2	53.2	53.2
Actuated g/C Ratio	0.36	0.36		0.19	0.19	0.19	0.38	0.38		0.51	0.51	0.51
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	289	456		148	296	208	327	519		425	803	554
v/s Ratio Prot	c0.14	0.19			0.15			0.21		c0.06	0.20	
v/s Ratio Perm	c0.21			0.04		0.06	0.03			c0.28		0.13
v/c Ratio	0.98	0.53		0.21	0.80	0.30	0.08	0.55		0.68	0.39	0.25
Uniform Delay, d1	30.5	26.7		35.8	40.6	36.5	20.5	25.2		18.0	15.8	14.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	45.7	1.2		0.7	14.6	0.8	0.5	4.2		4.4	1.5	1.1
Delay (s)	76.2	27.9		36.5	55.2	37.3	21.0	29.5		22.5	17.3	15.5
Level of Service	E	C		D	E	D	C	C		C	B	B
Approach Delay (s)		53.6			44.4			28.8			18.5	
Approach LOS		D			D			C			B	

Intersection Summary

HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	104.7	Sum of lost time (s)	20.1
Intersection Capacity Utilization	108.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Appendix H

Five-Year Total Traffic Operations Reports



Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Total 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	29	0	16	30	0	17	6	576	11	5	609	10
Future Volume (vph)	29	0	16	30	0	17	6	576	11	5	609	10
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.953			0.952			0.997			0.998	
Flt Protected		0.968			0.969			0.999				
Satd. Flow (prot)	0	1279	0	0	1341	0	0	2701	0	0	2612	0
Flt Permitted		0.968			0.969			0.999				
Satd. Flow (perm)	0	1279	0	0	1341	0	0	2701	0	0	2612	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	4%	2%	2%	7%	50%
Adj. Flow (vph)	32	0	17	33	0	18	7	626	12	5	662	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	49	0	0	51	0	0	645	0	0	678	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 37.2%

ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

AM Total 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	29	0	16	30	0	17	6	576	11	5	609	10
Future Volume (Veh/h)	29	0	16	30	0	17	6	576	11	5	609	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	17	33	0	18	7	626	12	5	662	11
Pedestrians		3										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1026	1332	340	1004	1332	319	676			638		
vC1, stage 1 conf vol	680	680		646	646							
vC2, stage 2 conf vol	345	652		358	686							
vCu, unblocked vol	1026	1332	340	1004	1332	319	676			638		
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	97	91	100	97	99			99		
cM capacity (veh/h)	366	341	605	374	341	677	923			942		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	49	51	320	325	336	342
Volume Left	32	33	7	0	5	0
Volume Right	17	18	0	12	0	11
cSH	424	445	923	1700	942	1700
Volume to Capacity	0.12	0.11	0.01	0.19	0.01	0.20
Queue Length 95th (m)	3.1	3.1	0.2	0.0	0.1	0.0
Control Delay (s)	14.6	14.1	0.3	0.0	0.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	14.6	14.1	0.1		0.1	
Approach LOS	B	B				

Intersection Summary

Average Delay 1.1

Intersection Capacity Utilization 37.2%

ICU Level of Service

A

Analysis Period (min) 15

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total 5 Year Traffic

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘	↙	↘	↘		↙	↘	↘	
Traffic Volume (vph)	168	164	26	8	176	241	25	166	10	203	291	171	
Future Volume (vph)	168	164	26	8	176	241	25	166	10	203	291	171	
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351	
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0	
Storage Lanes	1		0	1		1	1		0	1		1	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00						0.98
Frt		0.979				0.850		0.992				0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1335	1259	0	1429	1522	1126	1429	1306	0	1348	1582	999	
Flt Permitted	0.413			0.614			0.549			0.563			
Satd. Flow (perm)	580	1259	0	923	1522	1110	824	1306	0	799	1582	976	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)	10					294		3				209	
Link Speed (k/h)	50				50			70				70	
Link Distance (m)	204.6				215.4			183.3				564.5	
Travel Time (s)	14.7				15.5			9.4				29.0	
Confl. Peds. (#/hr)	3		1	1		3	2					2	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%	
Adj. Flow (vph)	205	200	32	10	215	294	30	202	12	248	355	209	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	205	232	0	10	215	294	30	214	0	248	355	209	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	3.6				3.6			3.6				3.6	
Link Offset(m)	0.0				0.0			0.0				0.0	
Crosswalk Width(m)	4.8				4.8			4.8				4.8	
Two way Left Turn Lane												Yes	
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53	
Turning Speed (k/h)	25		15	25		15	25		15	25		15	
Number of Detectors	1	2		1	2	1	1	2		1	2	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel													
Detector 2 Extend (s)		0.0			0.0			0.0			0.0		

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total 5 Year Traffic

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	
Protected Phases	7	4			8			2		1	6		
Permitted Phases	4			8		8	2			6		6	
Detector Phase	7	4		8	8	8	2	2		1	6	6	
Switch Phase													
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0	
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0	
Total Split (s)	18.0	32.1		32.1	32.1	32.1	37.0	37.0		13.0	37.0	37.0	
Total Split (%)	18.0%	32.1%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	37.0%	37.0%	
Maximum Green (s)	15.0	25.0		25.0	25.0	25.0	30.0	30.0		10.0	30.0	30.0	
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead			
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes			
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max	
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0	
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0	
Act Effect Green (s)	38.5	34.3		18.3	18.3	18.3	40.3	40.3		57.1	53.1	53.1	
Actuated g/C Ratio	0.38	0.34		0.18	0.18	0.18	0.40	0.40		0.56	0.52	0.52	
v/c Ratio	0.65	0.54		0.06	0.78	0.67	0.09	0.41		0.50	0.43	0.34	
Control Delay	33.1	30.5		35.0	60.0	12.4	23.1	26.7		17.7	18.4	3.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	33.1	30.5		35.0	60.0	12.4	23.1	26.7		17.7	18.4	3.9	
LOS	C	C		C	E	B	C	C		B	B	A	
Approach Delay		31.7			32.6			26.2			14.5		
Approach LOS		C			C			C			B		

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 101.6

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 24.3

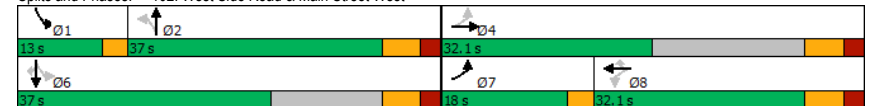
Intersection LOS: C

Intersection Capacity Utilization 96.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total 5 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	205	232	10	215	294	30	214	248	355	209
v/c Ratio	0.65	0.54	0.06	0.78	0.67	0.09	0.41	0.50	0.43	0.34
Control Delay	33.1	30.5	35.0	60.0	12.4	23.1	26.7	17.7	18.4	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	30.5	35.0	60.0	12.4	23.1	26.7	17.7	18.4	3.9
Queue Length 50th (m)	30.7	36.8	1.8	44.0	0.0	4.0	32.4	27.6	45.6	0.0
Queue Length 95th (m)	44.8	53.5	6.0	62.7	15.1	10.4	52.3	44.8	68.5	9.1
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	331	542	228	376	496	326	519	503	826	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.43	0.04	0.57	0.59	0.09	0.41	0.49	0.43	0.34
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	168	164	26	8	176	241	25	166	10	203	291	171
Future Volume (vph)	168	164	26	8	176	241	25	166	10	203	291	171
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1334	1259		1427	1522	1110	1427	1306		1348	1582	976
Flt Permitted	0.41	1.00		0.61	1.00	1.00	0.55	1.00		0.56	1.00	1.00
Satd. Flow (perm)	580	1259		923	1522	1110	824	1306		799	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	205	200	32	10	215	294	30	202	12	248	355	209
RTOR Reduction (vph)	0	7	0	0	0	241	0	2	0	0	0	100
Lane Group Flow (vph)	205	225	0	10	215	53	30	212	0	248	355	109
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	34.3	34.3		18.3	18.3	18.3	40.3	40.3		53.1	53.1	53.1
Effective Green, g (s)	34.3	34.3		18.3	18.3	18.3	40.3	40.3		53.1	53.1	53.1
Actuated g/C Ratio	0.34	0.34		0.18	0.18	0.18	0.40	0.40		0.52	0.52	0.52
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	292	425		166	274	200	327	518		471	827	510
v/s Ratio Prot	c0.09	0.18			0.14			0.16		c0.05	0.22	
v/s Ratio Perm	c0.15			0.01		0.05	0.04			c0.22		0.11
v/c Ratio	0.70	0.53		0.06	0.78	0.27	0.09	0.41		0.53	0.43	0.21
Uniform Delay, d1	26.6	27.1		34.5	39.7	35.8	19.1	22.0		14.6	14.9	13.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.1	1.3		0.2	13.7	0.7	0.6	2.4		1.1	1.6	1.0
Delay (s)	32.7	28.4		34.6	53.4	36.5	19.7	24.4		15.6	16.5	14.0
Level of Service	C	C		C	D	D	B	C		B	B	B
Approach Delay (s)		30.4			43.5			23.8			15.6	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM 2000 Control Delay		27.0								C		
HCM 2000 Volume to Capacity ratio		0.63										
Actuated Cycle Length (s)		101.5						20.1				
Intersection Capacity Utilization		96.4%						F				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total 5 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	7	9	0	23	24	1
Future Volume (vph)	7	9	0	23	24	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.925				0.995	
Flt Protected					0.954	
Satd. Flow (prot)	1259	0	0	1204	1380	0
Flt Permitted					0.954	
Satd. Flow (perm)	1259	0	0	1204	1380	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	10	0	25	26	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	0	0	25	27	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total 5 Year Traffic

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Traffic Volume (veh/h)	7	9	0	23	24	1
Future Volume (Veh/h)	7	9	0	23	24	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	10	0	25	26	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			18		38	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			18		38	13
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1599		974	1067
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	18	25	27			
Volume Left	0	0	26			
Volume Right	10	0	1			
cSH	1700	1599	977			
Volume to Capacity	0.01	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.7			
Control Delay (s)	0.0	0.0	8.8			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total 5 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	8	0	0	19	4	0
Future Volume (vph)	8	0	0	19	4	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	1361	0	0	1204	1381	0
Flt Permitted					0.950	
Satd. Flow (perm)	1361	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	0	0	21	4	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	0	0	21	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total 5 Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	8	0	0	19	4	0
Future Volume (Veh/h)	8	0	0	19	4	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	0	21	4	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			9		30	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			9		30	9
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1611		984	1073
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	9	21	4			
Volume Left	0	0	4			
Volume Right	0	0	0			
cSH	1700	1611	984			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Total 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	22	0	16	19	0	9	17	770	28	18	873	26
Future Volume (vph)	22	0	16	19	0	9	17	770	28	18	873	26
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.943			0.957			0.995			0.996	
Flt Protected		0.972			0.967			0.999			0.999	
Satd. Flow (prot)	0	1238	0	0	1345	0	0	2697	0	0	2750	0
Flt Permitted		0.972			0.967			0.999			0.999	
Satd. Flow (perm)	0	1238	0	0	1345	0	0	2697	0	0	2750	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	17%	2%	0%	2%	2%	2%	0%	4%	2%	2%	0%	0%
Adj. Flow (vph)	22	0	16	19	0	9	17	786	29	18	891	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	0	0	28	0	0	832	0	0	936	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 58.5%

ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Total 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	22	0	16	19	0	9	17	770	28	18	873	26
Future Volume (Veh/h)	22	0	16	19	0	9	17	770	28	18	873	26
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	22	0	16	19	0	9	17	786	29	18	891	27
Pedestrians		5										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1382	1794	464	1332	1794	408	923			815		
vC1, stage 1 conf vol	946	946		834	834							
vC2, stage 2 conf vol	436	849		498	959							
vCu, unblocked vol	1382	1794	464	1332	1794	408	923			815		
tC, single (s)	7.8	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.8	5.5		6.5	5.5							
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	100	97	93	100	98	98			98		
cM capacity (veh/h)	225	245	548	277	243	593	745			808		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	38	28	410	422	464	472						
Volume Left	22	19	17	0	18	0						
Volume Right	16	9	0	29	0	27						
cSH	299	334	745	1700	808	1700						
Volume to Capacity	0.13	0.08	0.02	0.25	0.02	0.28						
Queue Length 95th (m)	3.4	2.2	0.6	0.0	0.5	0.0						
Control Delay (s)	18.8	16.8	0.7	0.0	0.6	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	18.8	16.8	0.3		0.3							
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			58.5%									
ICU Level of Service										B		
Analysis Period (min)			15									

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total 5 Year Traffic

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	276	209	30	30	228	322	26	256	26	281	306	262	
Future Volume (vph)	276	209	30	30	228	322	26	256	26	281	306	262	
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351	
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0	
Storage Lanes	1		0	1		1	1		0	1		1	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	0.99	1.00		1.00		0.98	1.00	1.00		0.99			
Frt		0.981				0.850		0.986				0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1287	1278	0	1232		1566	1126	1429	1352	0	1429	1582	1115
Flt Permitted	0.374			0.605			0.567			0.465			
Satd. Flow (perm)	504	1278	0	784		1566	1103	852	1352	0	694	1582	1091
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)	9					335			5			273	
Link Speed (k/h)	50				50			70				70	
Link Distance (m)	204.6				215.4			183.3				564.5	
Travel Time (s)	14.7				15.5			9.4				29.0	
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%	
Adj. Flow (vph)	288	218	31	31	238	335	27	267	27	293	319	273	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	288	249	0	31	238	335	27	294	0	293	319	273	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	3.6				3.6			3.6				3.6	
Link Offset(m)	0.0				0.0			0.0				0.0	
Crosswalk Width(m)	4.8				4.8			4.8				4.8	
Two way Left Turn Lane													Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53	
Turning Speed (k/h)	25		15	25		15	25		15	25		15	
Number of Detectors	1	2		1	2	1	1	2		1	2	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel													
Detector 2 Extend (s)		0.0			0.0			0.0			0.0		

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total 5 Year Traffic

	←	→	↖	↗	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	
Protected Phases	7	4			8			2		1	6		
Permitted Phases	4			8		8	2			6		6	
Detector Phase	7	4		8	8	8	2	2		1	6	6	
Switch Phase													
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0	
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0	
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0	
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%	
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0	
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead			
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes			
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max	
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0	
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0	
Act Effect Green (s)	41.6	37.5		19.8	19.8	19.8	40.1	40.1		57.2	53.2	53.2	
Actuated g/C Ratio	0.40	0.36		0.19	0.19	0.19	0.38	0.38		0.55	0.51	0.51	
v/c Ratio	0.93	0.54		0.21	0.81	0.70	0.08	0.57		0.65	0.40	0.40	
Control Delay	63.8	30.3		38.9	61.2	12.6	23.5	31.3		23.8	18.8	3.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	63.8	30.3		38.9	61.2	12.6	23.5	31.3		23.8	18.8	3.9	
LOS	E	C		D	E	B	C	C		C	B	A	
Approach Delay	48.3			33.1			30.7			15.9			
Approach LOS	D			C			C			B			

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 104.8

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 29.7

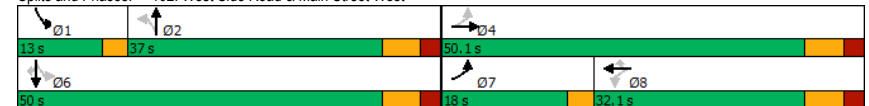
Intersection LOS: C

Intersection Capacity Utilization 109.5%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total 5 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	288	249	31	238	335	27	294	293	319	273
v/c Ratio	0.93	0.54	0.21	0.81	0.70	0.08	0.57	0.65	0.40	0.40
Control Delay	63.8	30.3	38.9	61.2	12.6	23.5	31.3	23.8	18.8	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.8	30.3	38.9	61.2	12.6	23.5	31.3	23.8	18.8	3.9
Queue Length 50th (m)	47.0	40.4	5.7	49.3	0.0	3.7	49.4	35.4	41.9	0.0
Queue Length 95th (m)	#100.4	65.4	14.6	77.8	28.7	10.5	82.7	59.9	68.8	14.2
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	312	531	187	374	518	325	520	449	802	687
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.47	0.17	0.64	0.65	0.08	0.57	0.65	0.40	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total 5 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	276	209	30	30	228	322	26	256	26	281	306	262
Future Volume (vph)	276	209	30	30	228	322	26	256	26	281	306	262
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1285	1279		1230	1566	1103	1428	1352		1424	1582	1091
Flt Permitted	0.37	1.00		0.60	1.00	1.00	0.57	1.00		0.46	1.00	1.00
Satd. Flow (perm)	505	1279		783	1566	1103	852	1352		696	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	288	218	31	31	238	335	27	267	27	293	319	273
RTOR Reduction (vph)	0	6	0	0	0	272	0	3	0	0	0	134
Lane Group Flow (vph)	288	243	0	31	238	63	27	291	0	293	319	139
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	37.5	37.5		19.8	19.8	19.8	40.2	40.2		53.2	53.2	53.2
Effective Green, g (s)	37.5	37.5		19.8	19.8	19.8	40.2	40.2		53.2	53.2	53.2
Actuated g/C Ratio	0.36	0.36		0.19	0.19	0.19	0.38	0.38		0.51	0.51	0.51
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	290	457		147	295	208	326	518		422	803	553
v/s Ratio Prot	c0.14	0.19			0.15		0.22			c0.07	0.20	
v/s Ratio Perm	c0.22			0.04		0.06	0.03			c0.29		0.13
v/c Ratio	0.99	0.53		0.21	0.81	0.30	0.08	0.56		0.69	0.40	0.25
Uniform Delay, d1	30.9	26.7		35.9	40.7	36.6	20.6	25.4		18.3	15.9	14.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	50.7	1.2		0.7	14.8	0.8	0.5	4.4		4.9	1.5	1.1
Delay (s)	81.5	27.9		36.6	55.5	37.4	21.1	29.7		23.2	17.4	15.6
Level of Service	F	C		D	E	D	C	C		C	B	B
Approach Delay (s)		56.7			44.5			29.0			18.8	
Approach LOS		E			D			C			B	

Intersection Summary

HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	104.8	Sum of lost time (s)	20.1
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total 5 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	24	22	1	15	13	1
Future Volume (vph)	24	22	1	15	13	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.991	
Flt Protected				0.997	0.955	
Satd. Flow (prot)	1272	0	0	1200	1376	0
Flt Permitted				0.997	0.955	
Satd. Flow (perm)	1272	0	0	1200	1376	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	24	1	16	14	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	0	17	15	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.6%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total 5 Year Traffic

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Traffic Volume (veh/h)	24	22	1	15	13	1
Future Volume (Veh/h)	24	22	1	15	13	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	24	1	16	14	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			50		56	38
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			50		56	38
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1557		951	1034
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	50	17	15			
Volume Left	0	1	14			
Volume Right	24	0	1			
cSH	1700	1557	956			
Volume to Capacity	0.03	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.4			
Control Delay (s)	0.0	0.4	8.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.4	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			13.6%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
PM Total 5 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	21	4	0	13	3	0
Future Volume (vph)	21	4	0	13	3	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980					
Flt Protected					0.950	
Satd. Flow (prot)	1334	0	0	1204	1381	0
Flt Permitted					0.950	
Satd. Flow (perm)	1334	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	4	0	14	3	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	14	3	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
PM Total 5 Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	21	4	0	13	3	0
Future Volume (Veh/h)	21	4	0	13	3	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	4	0	14	3	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			27		39	25
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			27		39	25
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1587		973	1051
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	27	14	3			
Volume Left	0	0	3			
Volume Right	4	0	0			
cSH	1700	1587	973			
Volume to Capacity	0.02	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Appendix I

Ten-Year Background Traffic Operations Reports



Lanes, Volumes, Timings (230107) 246 West Side Road
101: West Side Road & Coronation Drive/Franklin Avenue AM Background 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	29	0	17	12	0	7	6	631	5	2	659	10
Future Volume (vph)	29	0	17	12	0	7	6	631	5	2	659	10
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.951			0.949			0.999			0.998	
Flt Protected		0.969			0.970			0.999				
Satd. Flow (prot)	0	1275	0	0	1338	0	0	2705	0	0	2613	0
Flt Permitted		0.969			0.970			0.999				
Satd. Flow (perm)	0	1275	0	0	1338	0	0	2705	0	0	2613	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			53.8			564.5			135.2	
Travel Time (s)		6.6			3.9			29.0			7.0	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	4%	2%	2%	7%	50%
Adj. Flow (vph)	32	0	18	13	0	8	7	686	5	2	716	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	50	0	0	21	0	0	698	0	0	729	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane							Yes			Yes		
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 38.6%	ICU Level of Service A											
Analysis Period (min) 15												

HCM Unsignalized Intersection Capacity Analysis (230107) 246 West Side Road
101: West Side Road & Coronation Drive/Franklin Avenue AM Background 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	29	0	17	12	0	7	6	631	5	2	659	10
Future Volume (Veh/h)	29	0	17	12	0	7	6	631	5	2	659	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	18	13	0	8	7	686	5	2	716	11
Pedestrians		3										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT	TL			TWLT	TL
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1094	1434	366	1082	1436	346	730			691		
vC1, stage 1 conf vol	728	728		702	702							
vC2, stage 2 conf vol	365	705		380	734							
vCu, unblocked vol	1094	1434	366	1082	1436	346	730			691		
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	97	96	100	99	99			100		
cM capacity (veh/h)	346	321	580	347	319	651	881			900		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	50	21	350	348	360	369						
Volume Left	32	13	7	0	2	0						
Volume Right	18	8	0	5	0	11						
cSH	405	422	881	1700	900	1700						
Volume to Capacity	0.12	0.05	0.01	0.20	0.00	0.22						
Queue Length 95th (m)	3.4	1.3	0.2	0.0	0.1	0.0						
Control Delay (s)	15.1	14.0	0.3	0.0	0.1	0.0						
Lane LOS	C	B	A		A							
Approach Delay (s)	15.1	14.0	0.1		0.0							
Approach LOS	C	B										
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization 38.6%							ICU Level of Service			A		
Analysis Period (min)			15									

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Background 10 Year Traffic

	←	→	↖	↗	←	↖	↗	←	↖	↗	←	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	180	181	29	9	194	262	28	181	11	212	309	177	
Future Volume (vph)	180	181	29	9	194	262	28	181	11	212	309	177	
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351	
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0	
Storage Lanes	1		0	1		1	1		0	1		1	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00						0.98
Frt		0.979				0.850		0.992				0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1335	1259	0	1429		1126	1429	1306	0	1348		1582	999
Flt Permitted	0.381			0.601			0.538			0.536			
Satd. Flow (perm)	535	1259	0	903		1522	1110	808	1306	0	761	1582	976
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		10				320			3				216
Link Speed (k/h)		50			50			70				70	
Link Distance (m)		204.6			215.4			183.3				564.5	
Travel Time (s)		14.7			15.5			9.4				29.0	
Confl. Peds. (#/hr)	3		1	1		3	2					2	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%	
Adj. Flow (vph)	220	221	35	11	237	320	34	221	13	259	377	216	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	220	256	0	11	237	320	34	234	0	259	377	216	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.6				3.6			3.6			3.6	
Link Offset(m)		0.0				0.0			0.0			0.0	
Crosswalk Width(m)		4.8				4.8			4.8			4.8	
Two way Left Turn Lane													Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53	
Turning Speed (k/h)	25		15	25		15	25		15	25		15	
Number of Detectors	1	2		1	2	1	1	2		1	2	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel													
Detector 2 Extend (s)		0.0			0.0			0.0			0.0		

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Background 10 Year Traffic

	←	→	↖	↗	←	↖	↗	←	↖	↗	←	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	
Protected Phases	7	4			8			2		1	6		
Permitted Phases	4			8		8	2			6		6	
Detector Phase	7	4		8	8	8	2	2		1	6	6	
Switch Phase													
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0	
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0	
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0	
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%	
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0	
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead			
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes			
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max	
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0	
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0	
Act Effect Green (s)	40.1	36.0		19.6	19.6	19.6	40.2	40.2		57.1	53.1	53.1	
Actuated g/C Ratio	0.39	0.35		0.19	0.19	0.19	0.39	0.39		0.55	0.51	0.51	
v/c Ratio	0.71	0.58		0.06	0.82	0.68	0.11	0.46		0.54	0.46	0.36	
Control Delay	36.4	31.6		34.9	62.9	12.2	23.9	28.4		19.7	19.7	4.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	36.4	31.6		34.9	62.9	12.2	23.9	28.4		19.7	19.7	4.0	
LOS	D	C		C	E	B	C	C		B	B	A	
Approach Delay		33.8			33.8			27.8			15.7		
Approach LOS		C			C			C			B		

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 103.2

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 25.9

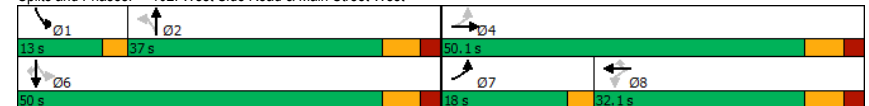
Intersection LOS: C

Intersection Capacity Utilization 97.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Background 10 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	220	256	11	237	320	34	234	259	377	216
v/c Ratio	0.71	0.58	0.06	0.82	0.68	0.11	0.46	0.54	0.46	0.36
Control Delay	36.4	31.6	34.9	62.9	12.2	23.9	28.4	19.7	19.7	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	31.6	34.9	62.9	12.2	23.9	28.4	19.7	19.7	4.0
Queue Length 50th (m)	33.4	41.8	2.0	49.3	0.0	4.7	37.3	30.4	51.3	0.0
Queue Length 95th (m)	48.0	59.8	6.2	69.3	15.4	11.4	57.4	46.9	73.5	9.1
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	324	533	220	370	512	314	510	478	813	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.48	0.05	0.64	0.63	0.11	0.46	0.54	0.46	0.36
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Background 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	181	29	9	194	262	28	181	11	212	309	177
Future Volume (vph)	180	181	29	9	194	262	28	181	11	212	309	177
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Fr	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1335	1259		1427	1522	1110	1427	1306		1348	1582	976
Flt Permitted	0.38	1.00		0.60	1.00	1.00	0.54	1.00		0.54	1.00	1.00
Satd. Flow (perm)	535	1259		903	1522	1110	807	1306		761	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	220	221	35	11	237	320	34	221	13	259	377	216
RTOR Reduction (vph)	0	7	0	0	0	259	0	2	0	0	0	105
Lane Group Flow (vph)	220	249	0	11	237	61	34	232	0	259	377	111
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	36.0	36.0		19.7	19.7	19.7	40.3	40.3		53.1	53.1	53.1
Effective Green, g (s)	36.0	36.0		19.7	19.7	19.7	40.3	40.3		53.1	53.1	53.1
Actuated g/C Ratio	0.35	0.35		0.19	0.19	0.19	0.39	0.39		0.51	0.51	0.51
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	289	439		172	290	211	315	509		447	813	502
v/s Ratio Prot	c0.10	0.20			0.16			0.18		c0.05	0.24	
v/s Ratio Perm	c0.17			0.01		0.06	0.04			c0.24		0.11
v/c Ratio	0.76	0.57		0.06	0.82	0.29	0.11	0.46		0.58	0.46	0.22
Uniform Delay, d1	26.7	27.3		34.2	40.0	35.8	20.0	23.3		16.0	16.0	13.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.2	1.7		0.2	16.1	0.8	0.7	2.9		1.8	1.9	1.0
Delay (s)	36.8	29.0		34.4	56.2	36.5	20.7	26.3		17.8	17.9	14.7
Level of Service	D	C		C	E	D	C	C		B	B	B
Approach Delay (s)		32.6			44.7			25.5			17.1	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM 2000 Control Delay		28.8								C		
HCM 2000 Volume to Capacity ratio		0.69										
Actuated Cycle Length (s)		103.2			Sum of lost time (s)			20.1				
Intersection Capacity Utilization		97.8%			ICU Level of Service			F				
Analysis Period (min)		15										

c Critical Lane Group

Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Background 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	8	0	17	9	0	3	18	836	13	7	953	27
Future Volume (vph)	8	0	17	9	0	3	18	836	13	7	953	27
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.908			0.966			0.998			0.996	
Flt Protected		0.984			0.964			0.999				
Satd. Flow (prot)	0	1257	0	0	1354	0	0	2704	0	0	2753	0
Flt Permitted		0.984			0.964			0.999				
Satd. Flow (perm)	0	1257	0	0	1354	0	0	2704	0	0	2753	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			30.0			564.5			135.2	
Travel Time (s)		6.6			2.2			29.0			7.0	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	17%	2%	0%	2%	2%	2%	0%	4%	2%	2%	2%	0%
Adj. Flow (vph)	8	0	17	9	0	3	18	853	13	7	972	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	25	0	0	12	0	0	884	0	0	1007	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 56.6%

ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Background 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	8	0	17	9	0	3	18	836	13	7	953	27
Future Volume (Veh/h)	8	0	17	9	0	3	18	836	13	7	953	27
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	8	0	17	9	0	3	18	853	13	7	972	28
Pedestrians		5										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1470	1907	505	1412	1914	433	1005			866		
vC1, stage 1 conf vol	1005	1005		896	896							
vC2, stage 2 conf vol	466	902		517	1019							
vCu, unblocked vol	1470	1907	505	1412	1914	433	1005			866		
tC, single (s)	7.8	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.8	5.5		6.5	5.5							
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	97	96	100	99	97			99		
cM capacity (veh/h)	210	233	516	256	226	571	694			773		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	25	12	444	440	493	514
Volume Left	8	9	18	0	7	0
Volume Right	17	3	0	13	0	28
cSH	351	297	694	1700	773	1700
Volume to Capacity	0.07	0.04	0.03	0.26	0.01	0.30
Queue Length 95th (m)	1.8	1.0	0.6	0.0	0.2	0.0
Control Delay (s)	16.0	17.6	0.8	0.0	0.3	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	16.0	17.6	0.4		0.1	
Approach LOS	C	C				

Intersection Summary

Average Delay 0.6

Intersection Capacity Utilization 56.6%

ICU Level of Service

B

Analysis Period (min) 15

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Background 10 Year Traffic

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	293	231	33	33	252	341	29	274	29	302	331	281
Future Volume (vph)	293	231	33	33	252	341	29	274	29	302	331	281
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00	1.00		0.99		0.98
Frt		0.981				0.850		0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1287	1278	0	1232	1566	1126	1429	1352	0	1429	1582	1115
Flt Permitted	0.336			0.590			0.554			0.437		
Satd. Flow (perm)	453	1278	0	764	1566	1103	833	1352	0	653	1582	1091
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	9					355		5				293
Link Speed (k/h)	50				50			70				70
Link Distance (m)	204.6				215.4			183.3				564.5
Travel Time (s)	14.7				15.5			9.4				29.0
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Adj. Flow (vph)	305	241		34	263	355	30	285	30	315	345	293
Shared Lane Traffic (%)												
Lane Group Flow (vph)	305	275	0	34	263	355	30	315	0	315	345	293
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6			3.6				3.6
Link Offset(m)	0.0				0.0			0.0				0.0
Crosswalk Width(m)	4.8				4.8			4.8				4.8
Two way Left Turn Lane												Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Background 10 Year Traffic

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	43.1	39.0		20.9	20.9	20.9	40.1	40.1		57.1	53.1	53.1
Actuated g/C Ratio	0.41	0.37		0.20	0.20	0.20	0.38	0.38		0.54	0.50	0.50
v/c Ratio	1.01	0.58		0.23	0.85	0.71	0.10	0.61		0.74	0.44	0.42
Control Delay	83.6	31.5		39.3	66.1	12.5	24.0	33.5		29.7	19.9	4.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	83.6	31.5		39.3	66.1	12.5	24.0	33.5		29.7	19.9	4.0
LOS	F	C		D	E	B	C	C		C	B	A
Approach Delay		58.9			35.5			32.7			18.3	
Approach LOS		E			D			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 106.2

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 34.0

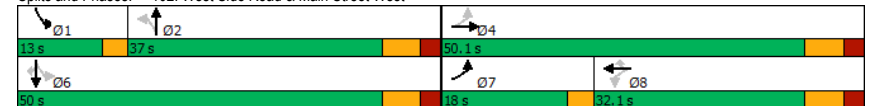
Intersection LOS: C

Intersection Capacity Utilization 113.2%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Background 10 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	305	275	34	263	355	30	315	315	345	293
v/c Ratio	1.01	0.58	0.23	0.85	0.71	0.10	0.61	0.74	0.44	0.42
Control Delay	83.6	31.5	39.3	66.1	12.5	24.0	33.5	29.7	19.9	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.6	31.5	39.3	66.1	12.5	24.0	33.5	29.7	19.9	4.0
Queue Length 50th (m)	~50.7	45.9	6.3	55.6	0.0	4.3	55.8	40.6	48.3	0.0
Queue Length 95th (m)	#117.3	73.7	15.7	#92.6	30.2	11.6	89.9	#73.2	75.5	14.9
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	301	523	180	369	531	314	513	424	790	691
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.53	0.19	0.71	0.67	0.10	0.61	0.74	0.44	0.42

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Background 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	293	231	33	33	252	341	29	274	29	302	331	281
Future Volume (vph)	293	231	33	33	252	341	29	274	29	302	331	281
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frft	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1285	1279		1231	1566	1103	1428	1352		1424	1582	1091
Flt Permitted	0.34	1.00		0.59	1.00	1.00	0.55	1.00		0.44	1.00	1.00
Satd. Flow (perm)	455	1279		765	1566	1103	832	1352		655	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	305	241	34	34	262	355	30	285	30	315	345	293
RTOR Reduction (vph)	0	6	0	0	0	285	0	3	0	0	0	147
Lane Group Flow (vph)	305	269	0	34	263	70	30	312	0	315	345	147
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	39.0	39.0		21.0	21.0	21.0	40.1	40.1		53.1	53.1	53.1
Effective Green, g (s)	39.0	39.0		21.0	21.0	21.0	40.1	40.1		53.1	53.1	53.1
Actuated g/C Ratio	0.37	0.37		0.20	0.20	0.20	0.38	0.38		0.50	0.50	0.50
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	284	469		151	309	218	314	510		399	791	545
v/s Ratio Prot	c0.15	0.21			0.17			0.23		c0.07	0.22	
v/s Ratio Perm	c0.24			0.04		0.06	0.04			c0.32		0.13
v/c Ratio	1.07	0.57		0.23	0.85	0.32	0.10	0.61		0.79	0.44	0.27
Uniform Delay, d1	30.5	26.9		35.8	41.1	36.5	21.3	26.7		20.9	17.0	15.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	74.4	1.7		0.8	19.6	0.9	0.6	5.4		10.0	1.7	1.2
Delay (s)	104.9	28.6		36.5	60.7	37.4	21.9	32.1		30.9	18.7	16.5
Level of Service	F	C		D	E	D	C	C		C	B	B
Approach Delay (s)		68.8			46.7			31.3			22.1	
Approach LOS		E			D			C			C	

Intersection Summary

HCM 2000 Control Delay	40.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	106.2	Sum of lost time (s)	20.1
Intersection Capacity Utilization	113.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Appendix J

Ten-Year Total Traffic Operations Reports



Lanes, Volumes, Timings (230107) 246 West Side Road
101: West Side Road & Coronation Drive/Franklin Avenue AM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	29	0	17	30	0	17	6	631	11	5	659	10
Future Volume (vph)	29	0	17	30	0	17	6	631	11	5	659	10
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.951			0.952			0.997			0.998	
Flt Protected		0.969			0.969							
Satd. Flow (prot)	0	1275	0	0	1341	0	0	2703	0	0	2613	0
Flt Permitted		0.969			0.969							
Satd. Flow (perm)	0	1275	0	0	1341	0	0	2703	0	0	2613	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	4%	2%	2%	7%	50%
Adj. Flow (vph)	32	0	18	33	0	18	7	686	12	5	716	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	50	0	0	51	0	0	705	0	0	732	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 39.0%	ICU Level of Service A											
Analysis Period (min) 15												

HCM Unsignalized Intersection Capacity Analysis (230107) 246 West Side Road
101: West Side Road & Coronation Drive/Franklin Avenue AM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	29	0	17	30	0	17	6	631	11	5	659	10
Future Volume (Veh/h)	29	0	17	30	0	17	6	631	11	5	659	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	18	33	0	18	7	686	12	5	716	11
Pedestrians		3										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT				TWLT	
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1110	1446	366	1092	1446	349	730				698	
vC1, stage 1 conf vol	734	734		706	706							
vC2, stage 2 conf vol	375	712		386	740							
vCu, unblocked vol	1110	1446	366	1092	1446	349	730				698	
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	91	100	97	90	100	97	99				99	
cM capacity (veh/h)	339	317	580	344	316	647	881				894	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	50	51	350	355	363	369						
Volume Left	32	33	7	0	5	0						
Volume Right	18	18	0	12	0	11						
cSH	399	413	881	1700	894	1700						
Volume to Capacity	0.13	0.12	0.01	0.21	0.01	0.22						
Queue Length 95th (m)	3.4	3.4	0.2	0.0	0.1	0.0						
Control Delay (s)	15.3	15.0	0.3	0.0	0.2	0.0						
Lane LOS	C	B	A		A							
Approach Delay (s)	15.3	15.0	0.1		0.1							
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization 39.0%							ICU Level of Service			A		
Analysis Period (min)			15									

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total 10 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Future Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00					0.98
Frt		0.979				0.850		0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1259	0	1429		1522	1126	1429	1307	0	1348	1582
Flt Permitted	0.379			0.601			0.535			0.535		
Satd. Flow (perm)	532	1259	0	903		1522	1110	803	1307	0	759	1582
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	10					322		3				224
Link Speed (k/h)	50				50			70				70
Link Distance (m)	204.6				215.4			183.3				564.5
Travel Time (s)	14.7				15.5			9.4				29.0
Confl. Peds. (#/hr)	3		1	1		3	2					2
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Adj. Flow (vph)	223	221	35	11	237	322	34	222	13	266	383	224
Shared Lane Traffic (%)												
Lane Group Flow (vph)	223	256	0	11	237	322	34	235	0	266	383	224
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.6				3.6			3.6				3.6
Link Offset(m)	0.0				0.0			0.0				0.0
Crosswalk Width(m)	4.8				4.8			4.8				4.8
Two way Left Turn Lane												Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total 10 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	18.0	32.1		32.1	32.1	32.1	37.0	37.0		13.0	37.0	37.0
Total Split (%)	18.0%	32.1%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	37.0%	37.0%
Maximum Green (s)	15.0	25.0		25.0	25.0	25.0	30.0	30.0		10.0	30.0	30.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	40.2	36.0		19.6	19.6	19.6	40.2	40.2		57.1	53.1	53.1
Actuated g/C Ratio	0.39	0.35		0.19	0.19	0.19	0.39	0.39		0.55	0.51	0.51
v/c Ratio	0.72	0.58		0.06	0.82	0.68	0.11	0.46		0.56	0.47	0.37
Control Delay	37.1	31.5		34.9	63.0	12.3	23.9	28.5		20.2	19.9	4.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	37.1	31.5		34.9	63.0	12.3	23.9	28.5		20.2	19.9	4.1
LOS	D	C		C	E	B	C	C		C	B	A
Approach Delay		34.1			33.8			27.9			15.9	
Approach LOS		C			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 103.3

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 26.0

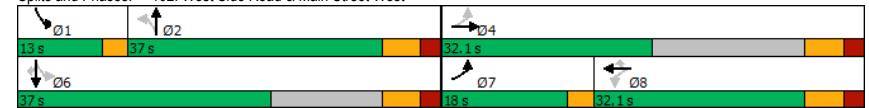
Intersection LOS: C

Intersection Capacity Utilization 97.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total 10 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	223	256	11	237	322	34	235	266	383	224
v/c Ratio	0.72	0.58	0.06	0.82	0.68	0.11	0.46	0.56	0.47	0.37
Control Delay	37.1	31.5	34.9	63.0	12.3	23.9	28.5	20.2	19.9	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.1	31.5	34.9	63.0	12.3	23.9	28.5	20.2	19.9	4.1
Queue Length 50th (m)	33.9	41.8	2.0	49.3	0.0	4.7	37.5	31.5	52.5	0.0
Queue Length 95th (m)	48.7	59.8	6.2	69.3	15.6	11.5	57.5	48.4	74.8	9.2
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	323	532	219	370	513	312	510	477	813	610
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.48	0.05	0.64	0.63	0.11	0.46	0.56	0.47	0.37
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Future Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Fr	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1335	1259		1427	1522	1110	1427	1306		1348	1582	976
Flt Permitted	0.38	1.00		0.60	1.00	1.00	0.53	1.00		0.53	1.00	1.00
Satd. Flow (perm)	533	1259		903	1522	1110	803	1306		759	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	223	221	35	11	237	322	34	222	13	266	383	224
RTOR Reduction (vph)	0	7	0	0	0	261	0	2	0	0	0	109
Lane Group Flow (vph)	223	249	0	11	237	61	34	233	0	266	383	115
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	36.0	36.0		19.6	19.6	19.6	40.2	40.2		53.1	53.1	53.1
Effective Green, g (s)	36.0	36.0		19.6	19.6	19.6	40.2	40.2		53.1	53.1	53.1
Actuated g/C Ratio	0.35	0.35		0.19	0.19	0.19	0.39	0.39		0.51	0.51	0.51
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	290	439		171	289	210	312	508		447	813	502
v/s Ratio Prot	c0.10	0.20			0.16			0.18		c0.06	0.24	
v/s Ratio Perm	c0.17			0.01		0.06	0.04			c0.25		0.12
v/c Ratio	0.77	0.57		0.06	0.82	0.29	0.11	0.46		0.60	0.47	0.23
Uniform Delay, d1	26.8	27.3		34.3	40.1	35.8	20.1	23.4		16.2	16.1	13.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	10.5	1.7		0.2	16.7	0.8	0.7	3.0		2.1	2.0	1.1
Delay (s)	37.3	29.0		34.4	56.9	36.6	20.8	26.4		18.3	18.0	14.9
Level of Service	D	C		C	E	D	C	C		B	B	B
Approach Delay (s)		32.9			45.0			25.7			17.3	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM 2000 Control Delay		28.9								C		
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		103.2				Sum of lost time (s)		20.1				
Intersection Capacity Utilization		97.8%				ICU Level of Service		F				
Analysis Period (min)		15										

c Critical Lane Group

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	7	9	0	23	24	1
Future Volume (vph)	7	9	0	23	24	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.925				0.995	
Flt Protected					0.954	
Satd. Flow (prot)	1259	0	0	1204	1380	0
Flt Permitted					0.954	
Satd. Flow (perm)	1259	0	0	1204	1380	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	10	0	25	26	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	0	0	25	27	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Traffic Volume (veh/h)	7	9	0	23	24	1
Future Volume (Veh/h)	7	9	0	23	24	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	10	0	25	26	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			18		38	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			18		38	13
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1599		974	1067
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	18	25	27			
Volume Left	0	0	26			
Volume Right	10	0	1			
cSH	1700	1599	977			
Volume to Capacity	0.01	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.7			
Control Delay (s)	0.0	0.0	8.8			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	8	0	0	19	4	0
Future Volume (vph)	8	0	0	19	4	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	1361	0	0	1204	1381	0
Flt Permitted					0.950	
Satd. Flow (perm)	1361	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	0	0	21	4	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	0	0	21	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	8	0	0	19	4	0
Future Volume (Veh/h)	8	0	0	19	4	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	0	21	4	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			9		30	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			9		30	9
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1611		984	1073
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	9	21	4			
Volume Left	0	0	4			
Volume Right	0	0	0			
cSH	1700	1611	984			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	23	0	17	19	0	9	18	836	28	18	953	27
Future Volume (vph)	23	0	17	19	0	9	18	836	28	18	953	27
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.943			0.957			0.995			0.996	
Flt Protected		0.972			0.967			0.999			0.999	
Satd. Flow (prot)	0	1238	0	0	1345	0	0	2697	0	0	2750	0
Flt Permitted		0.972			0.967			0.999			0.999	
Satd. Flow (perm)	0	1238	0	0	1345	0	0	2697	0	0	2750	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	17%	2%	0%	2%	2%	2%	0%	4%	2%	2%	0%	0%
Adj. Flow (vph)	23	0	17	19	0	9	18	853	29	18	972	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	28	0	0	900	0	0	1018	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane							Yes			Yes		
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 61.3%

ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	23	0	17	19	0	9	18	836	28	18	953	27
Future Volume (Veh/h)	23	0	17	19	0	9	18	836	28	18	953	27
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	23	0	17	19	0	9	18	853	29	18	972	28
Pedestrians		5										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type							TWLT	TL			TWLT	TL
Median storage (veh)							2				2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1498	1945	505	1442	1944	441	1005			882		
vC1, stage 1 conf vol	1027	1027		904	904							
vC2, stage 2 conf vol	472	918		539	1041							
vCu, unblocked vol	1498	1945	505	1442	1944	441	1005			882		
tC, single (s)	7.8	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.8	5.5		6.5	5.5							
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	97	92	100	98	97			98		
cM capacity (veh/h)	200	222	516	250	219	564	694			762		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	40	28	444	456	504	514
Volume Left	23	19	18	0	18	0
Volume Right	17	9	0	29	0	28
cSH	270	304	694	1700	762	1700
Volume to Capacity	0.15	0.09	0.03	0.27	0.02	0.30
Queue Length 95th (m)	4.1	2.4	0.6	0.0	0.6	0.0
Control Delay (s)	20.6	18.0	0.8	0.0	0.7	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	20.6	18.0	0.4		0.3	
Approach LOS	C	C				

Intersection Summary

Average Delay 1.0

Intersection Capacity Utilization 61.3%

ICU Level of Service

B

Analysis Period (min) 15

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total 10 Year Traffic

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘		↙	↘	↙	↘	↘		↙	↘	↘	
Traffic Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285	
Future Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285	
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351	
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0	
Storage Lanes	1		0	1		1	1		0	1		1	
Taper Length (m)	7.5			7.5			7.5			7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		0.98	1.00	1.00		0.99		0.98	
Frt		0.981				0.850		0.986				0.850	
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1287	1278	0	1232		1566	1126	1429	1352	0	1429	1582	1115
Flt Permitted	0.336			0.590			0.553			0.432			
Satd. Flow (perm)	453	1278	0	764		1566	1103	1352	0	645	1582	1091	
Right Turn on Red			Yes			Yes		Yes			Yes		
Satd. Flow (RTOR)	9					363		5				297	
Link Speed (k/h)	50				50			70				70	
Link Distance (m)	204.6				215.4			183.3				564.5	
Travel Time (s)	14.7				15.5			9.4				29.0	
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%	
Adj. Flow (vph)	310	241		34	263	363	30	289	30	319	347	297	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	310	275	0	34	263	363	30	319	0	319	347	297	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	3.6				3.6			3.6				3.6	
Link Offset(m)	0.0				0.0			0.0				0.0	
Crosswalk Width(m)	4.8				4.8			4.8				4.8	
Two way Left Turn Lane													Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53	
Turning Speed (k/h)	25		15	25		15	25		15	25		15	
Number of Detectors	1	2		1	2	1	1	2		1	2	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right	
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel													
Detector 2 Extend (s)		0.0			0.0			0.0			0.0		

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total 10 Year Traffic

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	
Protected Phases	7	4			8			2		1	6		
Permitted Phases	4			8		8	2			6		6	
Detector Phase	7	4		8	8	8	2	2		1	6	6	
Switch Phase													
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0	
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0	
Total Split (s)	18.0	50.1		32.1	32.1	32.1	37.0	37.0		13.0	50.0	50.0	
Total Split (%)	18.0%	50.0%		32.1%	32.1%	32.1%	37.0%	37.0%		13.0%	50.0%	50.0%	
Maximum Green (s)	15.0	43.0		25.0	25.0	25.0	30.0	30.0		10.0	43.0	43.0	
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5	
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead			
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes			
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max	
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0	
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0	
Act Effect Green (s)	43.1	39.0		21.0	21.0	21.0	40.1	40.1		57.1	53.1	53.1	
Actuated g/C Ratio	0.41	0.37		0.20	0.20	0.20	0.38	0.38		0.54	0.50	0.50	
v/c Ratio	1.03	0.58		0.23	0.85	0.71	0.10	0.62		0.76	0.44	0.43	
Control Delay	87.9	31.5		39.2	65.8	12.5	24.0	33.8		30.9	20.0	4.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	87.9	31.5		39.2	65.8	12.5	24.0	33.8		30.9	20.0	4.0	
LOS	F	C		D	E	B	C	C		C	C	A	
Approach Delay		61.4			35.2			33.0			18.7		
Approach LOS		E			D			C			B		

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 106.2

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 34.7

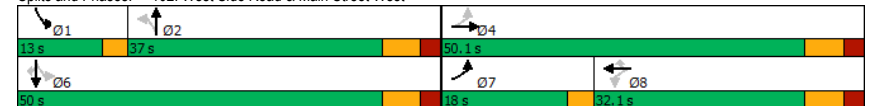
Intersection LOS: C

Intersection Capacity Utilization 113.8%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total 10 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	310	275	34	263	363	30	319	319	347	297
v/c Ratio	1.03	0.58	0.23	0.85	0.71	0.10	0.62	0.76	0.44	0.43
Control Delay	87.9	31.5	39.2	65.8	12.5	24.0	33.8	30.9	20.0	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.9	31.5	39.2	65.8	12.5	24.0	33.8	30.9	20.0	4.0
Queue Length 50th (m)	~53.2	45.9	6.3	55.6	0.0	4.3	56.8	41.3	48.6	0.0
Queue Length 95th (m)	#121.3	73.7	15.7	#92.6	30.8	11.6	91.3	#76.5	76.0	14.9
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	301	523	180	369	537	313	513	420	790	693
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.53	0.19	0.71	0.68	0.10	0.62	0.76	0.44	0.43

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285
Future Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1285	1279		1231	1566	1103	1428	1352		1425	1582	1091
Flt Permitted	0.34	1.00		0.59	1.00	1.00	0.55	1.00		0.43	1.00	1.00
Satd. Flow (perm)	455	1279		765	1566	1103	831	1352		648	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	310	241	34	34	262	362	30	289	30	319	347	297
RTOR Reduction (vph)	0	6	0	0	0	291	0	3	0	0	0	149
Lane Group Flow (vph)	310	269	0	34	263	72	30	316	0	319	347	149
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	39.0	39.0		21.0	21.0	21.0	40.1	40.1		53.1	53.1	53.1
Effective Green, g (s)	39.0	39.0		21.0	21.0	21.0	40.1	40.1		53.1	53.1	53.1
Actuated g/C Ratio	0.37	0.37		0.20	0.20	0.20	0.38	0.38		0.50	0.50	0.50
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	284	469		151	309	218	313	510		397	791	545
v/s Ratio Prot	c0.15	0.21			0.17			0.23		c0.08	0.22	
v/s Ratio Perm	c0.25			0.04		0.07	0.04			c0.33		0.14
v/c Ratio	1.09	0.57		0.23	0.85	0.33	0.10	0.62		0.80	0.44	0.27
Uniform Delay, d1	30.5	26.9		35.8	41.1	36.6	21.3	26.9		21.2	17.0	15.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	80.1	1.7		0.8	19.6	0.9	0.6	5.6		11.2	1.8	1.2
Delay (s)	110.6	28.6		36.5	60.7	37.4	22.0	32.4		32.4	18.8	16.6
Level of Service	F	C		D	E	D	C	C		C	B	B
Approach Delay (s)		72.1			46.7			31.5			22.6	
Approach LOS		E			D			C			C	

Intersection Summary

HCM 2000 Control Delay	41.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	106.2	Sum of lost time (s)	20.1
Intersection Capacity Utilization	113.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total 10 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	24	22	1	15	13	1
Future Volume (vph)	24	22	1	15	13	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.991	
Flt Protected				0.997	0.955	
Satd. Flow (prot)	1272	0	0	1200	1376	0
Flt Permitted				0.997	0.955	
Satd. Flow (perm)	1272	0	0	1200	1376	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	24	1	16	14	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	0	17	15	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.6%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total 10 Year Traffic

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Traffic Volume (veh/h)	24	22	1	15	13	1
Future Volume (Veh/h)	24	22	1	15	13	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	24	1	16	14	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			50		56	38
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			50		56	38
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1557		951	1034
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	50	17	15			
Volume Left	0	1	14			
Volume Right	24	0	1			
cSH	1700	1557	956			
Volume to Capacity	0.03	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.4			
Control Delay (s)	0.0	0.4	8.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.4	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			13.6%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
PM Total 10 Year Traffic

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (vph)	21	4	0	13	3	0
Future Volume (vph)	21	4	0	13	3	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980					
Flt Protected					0.950	
Satd. Flow (prot)	1334	0	0	1204	1381	0
Flt Permitted					0.950	
Satd. Flow (perm)	1334	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	4	0	14	3	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	14	3	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 13.3%
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
PM Total 10 Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	21	4	0	13	3	0
Future Volume (Veh/h)	21	4	0	13	3	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	4	0	14	3	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			27		39	25
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			27		39	25
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1587		973	1051

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	27	14	3
Volume Left	0	0	3
Volume Right	4	0	0
cSH	1700	1587	973
Volume to Capacity	0.02	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	8.7
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.7
Approach LOS			A

Intersection Summary

Average Delay 0.6
Intersection Capacity Utilization 13.3%
Analysis Period (min) 15

Appendix K

OTM Signal Warrant



Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: Ten-Year Total Traffic
Region/City/Township: City of Port Colborne

Major Street: West Side Road North/South: Y
Minor Street: Coronation Drive/Franklin Avenue

Number of Approach Lanes: 2 or more
Tee Intersection? N
Flow Conditions: Restricted

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	West Side Road						Coronation Drive/Franklin Avenue						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM Peak Hour	6	631	11	5	659	10	29	0	17	30	0	17	0
PM Peak Hour	18	836	28	18	953	27	23	0	17	19	0	9	0
Average Hourly Volume	6	367	10	6	403	9	13	0	9	12	0	7	0

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	All Approaches	480	720	600	900	
					% Fulfilled	93%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Minor Street Approaches	120	170	120	170	
					% Fulfilled	24%

Warrant	AHV
1A - All	841
1B - Minor	40
2A - Major	801
2B - Cross	25

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Major Street Approaches	480	720	600	900	
					% Fulfilled	89%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
					X	
	Traffic Crossing Major Street	50	75	50	75	
					% Fulfilled	34%

Appendix L

10-Year Total Traffic Remedial Measures Operations Report



Lanes, Volumes, Timings (230107) 246 West Side Road
101: West Side Road & Coronation Drive/Franklin Avenue AM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	29	0	17	30	0	17	6	631	11	5	659	10
Future Volume (vph)	29	0	17	30	0	17	6	631	11	5	659	10
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.951			0.952			0.997			0.998	
Flt Protected		0.969			0.969							
Satd. Flow (prot)	0	1275	0	0	1341	0	0	2703	0	0	2613	0
Flt Permitted		0.969			0.969							
Satd. Flow (perm)	0	1275	0	0	1341	0	0	2703	0	0	2613	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							3					3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	4%	2%	2%	7%	50%
Adj. Flow (vph)	32	0	18	33	0	18	7	686	12	5	716	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	50	0	0	51	0	0	705	0	0	732	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 39.0%	ICU Level of Service A											
Analysis Period (min) 15												

HCM Unsignalized Intersection Capacity Analysis (230107) 246 West Side Road
101: West Side Road & Coronation Drive/Franklin Avenue AM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement		↔			↔			↔			↔	
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	29	0	17	30	0	17	6	631	11	5	659	10
Future Volume (Veh/h)	29	0	17	30	0	17	6	631	11	5	659	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	0	18	33	0	18	7	686	12	5	716	11
Pedestrians		3										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1110	1446	366	1092	1446	349	730				698	
vC1, stage 1 conf vol	734	734		706	706							
vC2, stage 2 conf vol	375	712		386	740							
vCu, unblocked vol	1110	1446	366	1092	1446	349	730				698	
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	91	100	97	90	100	97	99				99	
cM capacity (veh/h)	339	317	580	344	316	647	881				894	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	50	51	350	355	363	369						
Volume Left	32	33	7	0	5	0						
Volume Right	18	18	0	12	0	11						
cSH	399	413	881	1700	894	1700						
Volume to Capacity	0.13	0.12	0.01	0.21	0.01	0.22						
Queue Length 95th (m)	3.4	3.4	0.2	0.0	0.1	0.0						
Control Delay (s)	15.3	15.0	0.3	0.0	0.2	0.0						
Lane LOS	C	B	A		A							
Approach Delay (s)	15.3	15.0	0.1		0.1							
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization 39.0%							ICU Level of Service			A		
Analysis Period (min)			15									

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total 10 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Future Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00					0.98
Frt		0.979				0.850		0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1259	0	1429		1522	1126	1429	1307	0	1348	1582
Flt Permitted	0.401			0.601			0.535			0.538		
Satd. Flow (perm)	563	1259	0	903		1522	1110	803	1307	0	763	1582
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				322			3			224
Link Speed (k/h)		50			50			70				70
Link Distance (m)		204.6			215.4			183.3				564.5
Travel Time (s)		14.7			15.5			9.4				29.0
Confl. Peds. (#/hr)	3		1	1		3	2					2
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Adj. Flow (vph)	223	221	35	11	237	322	34	222	13	266	383	224
Shared Lane Traffic (%)												
Lane Group Flow (vph)	223	256	0	11	237	322	34	235	0	266	383	224
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												Yes
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

AM Total 10 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	14.0	32.1		41.1	41.1	41.1	32.0	32.0		13.0	37.0	37.0
Total Split (%)	14.0%	32.1%		41.1%	41.1%	41.1%	32.0%	32.0%		13.0%	37.0%	37.0%
Maximum Green (s)	11.0	25.0		34.0	34.0	34.0	25.0	25.0		10.0	30.0	30.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	38.6	34.4		20.8	20.8	20.8	40.2	40.2		57.3	53.3	53.3
Actuated g/C Ratio	0.38	0.34		0.20	0.20	0.20	0.39	0.39		0.56	0.52	0.52
v/c Ratio	0.76	0.59		0.06	0.76	0.67	0.11	0.45		0.55	0.46	0.36
Control Delay	42.0	32.3		31.8	54.2	11.1	23.5	27.7		19.3	19.1	4.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	42.0	32.3		31.8	54.2	11.1	23.5	27.7		19.3	19.1	4.1
LOS	D	C		C	D	B	C	C		B	B	A
Approach Delay		36.8			29.4			27.2			15.3	
Approach LOS		D			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 101.9

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 25.2

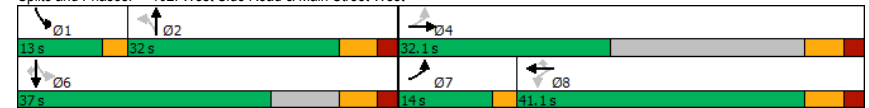
Intersection LOS: C

Intersection Capacity Utilization 97.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total 10 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	223	256	11	237	322	34	235	266	383	224
v/c Ratio	0.76	0.59	0.06	0.76	0.67	0.11	0.45	0.55	0.46	0.36
Control Delay	42.0	32.3	31.8	54.2	11.1	23.5	27.7	19.3	19.1	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.0	32.3	31.8	54.2	11.1	23.5	27.7	19.3	19.1	4.1
Queue Length 50th (m)	33.9	41.6	1.9	46.8	0.0	4.4	34.7	28.2	47.4	0.0
Queue Length 95th (m)	48.4	59.0	5.9	65.6	14.2	11.8	59.6	51.0	78.6	9.6
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	296	602	302	510	586	317	517	486	827	617
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.43	0.04	0.46	0.55	0.11	0.45	0.55	0.46	0.36
Intersection Summary										

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West AM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Future Volume (vph)	183	181	29	9	194	264	28	182	11	218	314	184
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Fr	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1335	1259		1427	1522	1110	1427	1306		1348	1582	976
Flt Permitted	0.40	1.00		0.60	1.00	1.00	0.53	1.00		0.54	1.00	1.00
Satd. Flow (perm)	563	1259		903	1522	1110	803	1306		763	1582	976
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	223	221	35	11	237	322	34	222	13	266	383	224
RTOR Reduction (vph)	0	7	0	0	0	256	0	2	0	0	0	107
Lane Group Flow (vph)	223	249	0	11	237	66	34	233	0	266	383	117
Confl. Peds. (#/hr)	3		1	1		3	2					2
Heavy Vehicles (%)	7%	6%	18%	0%	7%	2%	0%	5%	12%	6%	3%	15%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	34.4	34.4		20.8	20.8	20.8	40.2	40.2		53.3	53.3	53.3
Effective Green, g (s)	34.4	34.4		20.8	20.8	20.8	40.2	40.2		53.3	53.3	53.3
Actuated g/C Ratio	0.34	0.34		0.20	0.20	0.20	0.39	0.39		0.52	0.52	0.52
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	270	425		184	310	226	317	515		457	828	511
v/s Ratio Prot	c0.09	0.20			0.16			0.18		c0.06	0.24	
v/s Ratio Perm	c0.19			0.01		0.06	0.04			c0.25		0.12
v/c Ratio	0.83	0.59		0.06	0.76	0.29	0.11	0.45		0.58	0.46	0.23
Uniform Delay, d1	29.0	27.8		32.6	38.2	34.3	19.5	22.7		15.2	15.2	13.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.5	2.1		0.1	10.7	0.7	0.7	2.9		1.9	1.9	1.0
Delay (s)	46.5	29.9		32.8	48.9	35.0	20.1	25.6		17.1	17.1	14.2
Level of Service	D	C		C	D	C	C	C		B	B	B
Approach Delay (s)		37.6			40.7			24.9			16.3	
Approach LOS		D			D			C			B	
Intersection Summary												
HCM 2000 Control Delay		28.4								C		
HCM 2000 Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		101.8					Sum of lost time (s)			20.1		
Intersection Capacity Utilization		97.8%					ICU Level of Service			F		
Analysis Period (min)		15										

c Critical Lane Group

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

	→	↗	↖	←	↙	↘
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↙	↘
Traffic Volume (vph)	7	9	0	23	24	1
Future Volume (vph)	7	9	0	23	24	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.925				0.995	
Flt Protected					0.954	
Satd. Flow (prot)	1259	0	0	1204	1380	0
Flt Permitted					0.954	
Satd. Flow (perm)	1259	0	0	1204	1380	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	10	0	25	26	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	0	0	25	27	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 13.3%	ICU Level of Service A					
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

	→	↗	↖	←	↙	↘
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↙	↘
Traffic Volume (veh/h)	7	9	0	23	24	1
Future Volume (Veh/h)	7	9	0	23	24	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	10	0	25	26	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			18		38	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			18		38	13
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1599		974	1067
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	18	25	27			
Volume Left	0	0	26			
Volume Right	10	0	1			
cSH	1700	1599	977			
Volume to Capacity	0.01	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.7			
Control Delay (s)	0.0	0.0	8.8			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization 13.3%			ICU Level of Service		A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				 	 	
Traffic Volume (vph)	8	0	0	19	4	0
Future Volume (vph)	8	0	0	19	4	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Frt Protected					0.950	
Satd. Flow (prot)	1361	0	0	1204	1381	0
Frt Permitted					0.950	
Satd. Flow (perm)	1361	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	0	0	21	4	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	9	0	0	21	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
AM Total 10 Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	8	0	0	19	4	0
Future Volume (Veh/h)	8	0	0	19	4	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	0	21	4	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			9		30	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			9		30	9
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1611		984	1073
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	9	21	4			
Volume Left	0	0	4			
Volume Right	0	0	0			
cSH	1700	1611	984			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	23	0	17	19	0	9	18	836	28	18	953	27
Future Volume (vph)	23	0	17	19	0	9	18	836	28	18	953	27
Ideal Flow (vphpl)	1900	1483	1900	1900	1483	1900	1228	1483	1388	1228	1483	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor												
Frt		0.943			0.957			0.995			0.996	
Flt Protected		0.972			0.967			0.999			0.999	
Satd. Flow (prot)	0	1238	0	0	1345	0	0	2697	0	0	2750	0
Flt Permitted		0.972			0.967			0.999			0.999	
Satd. Flow (perm)	0	1238	0	0	1345	0	0	2697	0	0	2750	0
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		92.2			60.0			564.5			135.2	
Travel Time (s)		6.6			4.3			29.0			7.0	
Confl. Peds. (#/hr)							5					5
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	17%	2%	0%	2%	2%	2%	0%	4%	2%	2%	0%	0%
Adj. Flow (vph)	23	0	17	19	0	9	18	853	29	18	972	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	28	0	0	900	0	0	1018	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.37	1.00	1.00	1.37	1.00	1.71	1.37	1.48	1.71	1.37	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 61.3%

ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

101: West Side Road & Coronation Drive/Franklin Avenue

(230107) 246 West Side Road

PM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	23	0	17	19	0	9	18	836	28	18	953	27
Future Volume (Veh/h)	23	0	17	19	0	9	18	836	28	18	953	27
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	23	0	17	19	0	9	18	853	29	18	972	28
Pedestrians		5										
Lane Width (m)		3.6										
Walking Speed (m/s)		1.2										
Percent Blockage		0										
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1498	1945	505	1442	1944	441	1005			882		
vC1, stage 1 conf vol	1027	1027		904	904							
vC2, stage 2 conf vol	472	918		539	1041							
vCu, unblocked vol	1498	1945	505	1442	1944	441	1005			882		
tC, single (s)	7.8	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.8	5.5		6.5	5.5							
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	97	92	100	98	97			98		
cM capacity (veh/h)	200	222	516	250	219	564	694			762		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	40	28	444	456	504	514						
Volume Left	23	19	18	0	18	0						
Volume Right	17	9	0	29	0	28						
cSH	270	304	694	1700	762	1700						
Volume to Capacity	0.15	0.09	0.03	0.27	0.02	0.30						
Queue Length 95th (m)	4.1	2.4	0.6	0.0	0.6	0.0						
Control Delay (s)	20.6	18.0	0.8	0.0	0.7	0.0						
Lane LOS	C	C	A		A							
Approach Delay (s)	20.6	18.0	0.4		0.3							
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			61.3%				ICU Level of Service			B		
Analysis Period (min)			15									

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total 10 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285
Future Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Storage Length (m)	130.0		0.0	25.0		60.0	35.0		0.0	75.0		0.0
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00		0.98	1.00	1.00		0.99		0.98
Frt		0.981				0.850		0.986				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1287	1278	0	1232	1566	1126	1429	1352	0	1429	1582	1115
Flt Permitted	0.337			0.590			0.553			0.420		
Satd. Flow (perm)	454	1278	0	764	1566	1103	831	1352	0	627	1582	1091
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				363		5				297
Link Speed (k/h)		50			50			70				70
Link Distance (m)		204.6			215.4			183.3				564.5
Travel Time (s)		14.7			15.5			9.4				29.0
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Adj. Flow (vph)	310	241		34	263	363	30	289	30	319	347	297
Shared Lane Traffic (%)												
Lane Group Flow (vph)	310	275	0	34	263	363	30	319	0	319	347	297
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.48	1.00	1.34	1.22	1.53	1.34	1.48	1.00	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

102: West Side Road & Main Street West

(230107) 246 West Side Road

PM Total 10 Year Traffic

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Detector Phase	7	4		8	8	8	2	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0	10.0	20.0	20.0		7.0	20.0	20.0
Minimum Split (s)	11.5	44.1		44.1	44.1	44.1	47.0	47.0		11.5	47.0	47.0
Total Split (s)	22.0	62.1		40.1	40.1	40.1	25.0	25.0		13.0	38.0	38.0
Total Split (%)	22.0%	62.0%		40.1%	40.1%	40.1%	25.0%	25.0%		13.0%	38.0%	38.0%
Maximum Green (s)	19.0	55.0		33.0	33.0	33.0	18.0	18.0		10.0	31.0	31.0
Yellow Time (s)	3.0	4.5		4.5	4.5	4.5	4.5	4.5		3.0	4.5	4.5
All-Red Time (s)	0.0	2.6		2.6	2.6	2.6	2.5	2.5		0.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max		None	Max	Max
Walk Time (s)		14.0		14.0	14.0	14.0	15.0	15.0			15.0	15.0
Flash Dont Walk (s)		23.0		23.0	23.0	23.0	25.0	25.0			25.0	25.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	0
Act Effect Green (s)	47.4	43.3		22.3	22.3	22.3	40.3	40.3		57.4	53.3	53.3
Actuated g/C Ratio	0.43	0.39		0.20	0.20	0.20	0.36	0.36		0.52	0.48	0.48
v/c Ratio	0.94	0.54		0.22	0.83	0.71	0.10	0.65		0.80	0.46	0.44
Control Delay	63.4	28.9		39.9	64.8	12.2	27.8	38.1		38.5	23.3	4.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	63.4	28.9		39.9	64.8	12.2	27.8	38.1		38.5	23.3	4.6
LOS	E	C		D	E	B	C	D		D	C	A
Approach Delay		47.2			34.6			37.2			22.5	
Approach LOS		D			C			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 100.1

Actuated Cycle Length: 110.8

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 33.3

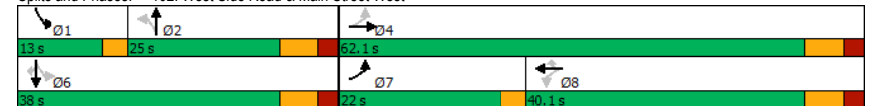
Intersection LOS: C

Intersection Capacity Utilization 113.8%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 102: West Side Road & Main Street West



Queues (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total 10 Year Traffic

	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	310	275	34	263	363	30	319	319	347	297
v/c Ratio	0.94	0.54	0.22	0.83	0.71	0.10	0.65	0.80	0.46	0.44
Control Delay	63.4	28.9	39.9	64.8	12.2	27.8	38.1	38.5	23.3	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.4	28.9	39.9	64.8	12.2	27.8	38.1	38.5	23.3	4.6
Queue Length 50th (m)	51.8	45.5	6.6	58.4	0.0	4.5	59.2	43.7	51.2	0.0
Queue Length 95th (m)	#104.8	71.4	15.8	88.5	29.7	13.2	105.6	#106.6	91.5	18.1
Internal Link Dist (m)		180.6		191.4			159.3		540.5	
Turn Bay Length (m)	130.0		25.0		60.0	35.0		75.0		
Base Capacity (vph)	337	643	228	469	585	301	494	397	761	679
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.43	0.15	0.56	0.62	0.10	0.65	0.80	0.46	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis (230107) 246 West Side Road
102: West Side Road & Main Street West PM Total 10 Year Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285
Future Volume (vph)	298	231	33	33	252	348	29	277	29	306	333	285
Ideal Flow (vphpl)	1504	1388	1900	1504	1629	1351	1504	1388	1900	1504	1629	1351
Total Lost time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flt	1.00	0.98		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1285	1279		1230	1566	1102	1428	1352		1425	1582	1091
Flt Permitted	0.34	1.00		0.59	1.00	1.00	0.55	1.00		0.42	1.00	1.00
Satd. Flow (perm)	456	1279		765	1566	1102	831	1352		630	1582	1091
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	310	241	34	34	262	362	30	289	30	319	347	297
RTOR Reduction (vph)	0	7	0	0	0	290	0	3	0	0	0	154
Lane Group Flow (vph)	310	268	0	34	263	73	30	316	0	319	347	143
Confl. Peds. (#/hr)	10		1	1		10	1		10	10		1
Heavy Vehicles (%)	11%	6%	8%	16%	4%	2%	0%	1%	0%	0%	3%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	43.3	43.3		22.3	22.3	22.3	40.2	40.2		53.3	53.3	53.3
Effective Green, g (s)	43.3	43.3		22.3	22.3	22.3	40.2	40.2		53.3	53.3	53.3
Actuated g/C Ratio	0.39	0.39		0.20	0.20	0.20	0.36	0.36		0.48	0.48	0.48
Clearance Time (s)	3.0	7.1		7.1	7.1	7.1	7.0	7.0		3.0	7.0	7.0
Vehicle Extension (s)	0.2	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	313	500		154	315	221	301	490		375	761	525
v/s Ratio Prot	c0.16	0.21			0.17			0.23		c0.08	0.22	
v/s Ratio Perm	c0.23			0.04		0.07	0.04			c0.33		0.13
v/c Ratio	0.99	0.54		0.22	0.83	0.33	0.10	0.64		0.85	0.46	0.27
Uniform Delay, d1	29.8	26.0		36.9	42.4	37.8	23.3	29.3		24.4	19.1	17.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	48.1	1.1		0.7	17.1	0.9	0.7	6.4		16.7	2.0	1.3
Delay (s)	77.9	27.1		37.7	59.5	38.7	24.0	35.7		41.1	21.0	18.4
Level of Service	E	C		D	E	D	C	D		D	C	B
Approach Delay (s)		54.0			46.9			34.7			26.9	
Approach LOS		D			D			C			C	

Intersection Summary

HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	110.7	Sum of lost time (s)	20.1
Intersection Capacity Utilization	113.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total 10 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	24	22	1	15	13	1
Future Volume (vph)	24	22	1	15	13	1
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.991	
Flt Protected				0.997	0.955	
Satd. Flow (prot)	1272	0	0	1200	1376	0
Flt Permitted				0.997	0.955	
Satd. Flow (perm)	1272	0	0	1200	1376	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	60.0			47.7	54.0	
Travel Time (s)	4.3			3.4	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	24	1	16	14	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	0	17	15	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.6%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Driveway 1 & Franklin Avenue

(230107) 246 West Side Road
PM Total 10 Year Traffic

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	24	22	1	15	13	1
Future Volume (Veh/h)	24	22	1	15	13	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	24	1	16	14	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			50		56	38
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			50		56	38
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1557		951	1034
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	50	17	15			
Volume Left	0	1	14			
Volume Right	24	0	1			
cSH	1700	1557	956			
Volume to Capacity	0.03	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.4			
Control Delay (s)	0.0	0.4	8.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.4	8.8			
Approach LOS		A				
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			13.6%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
104: Driveway 2 & Franklin Avenue

(230107) 246 West Side Road
PM Total 10 Year Traffic

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	21	4	0	13	3	0
Future Volume (vph)	21	4	0	13	3	0
Ideal Flow (vphpl)	1388	1900	1900	1228	1483	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980					
Flt Protected					0.950	
Satd. Flow (prot)	1334	0	0	1204	1381	0
Flt Permitted					0.950	
Satd. Flow (perm)	1334	0	0	1204	1381	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.7			77.7	60.8	
Travel Time (s)	3.4			5.6	4.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	4	0	14	3	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	0	0	14	3	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.48	1.00	1.00	1.71	1.37	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
104: Driveway 2 & Franklin Avenue

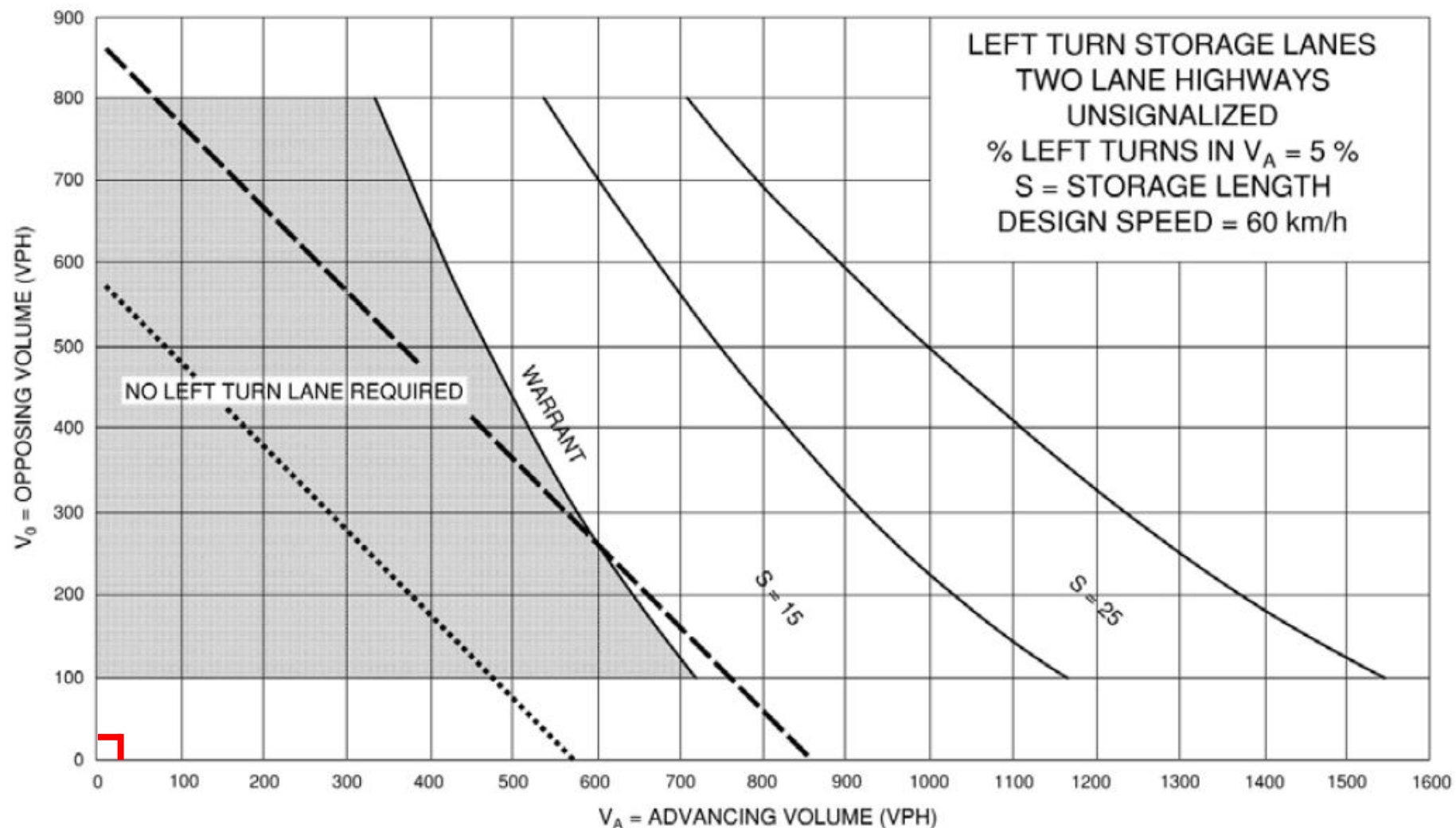
(230107) 246 West Side Road
PM Total 10 Year Traffic

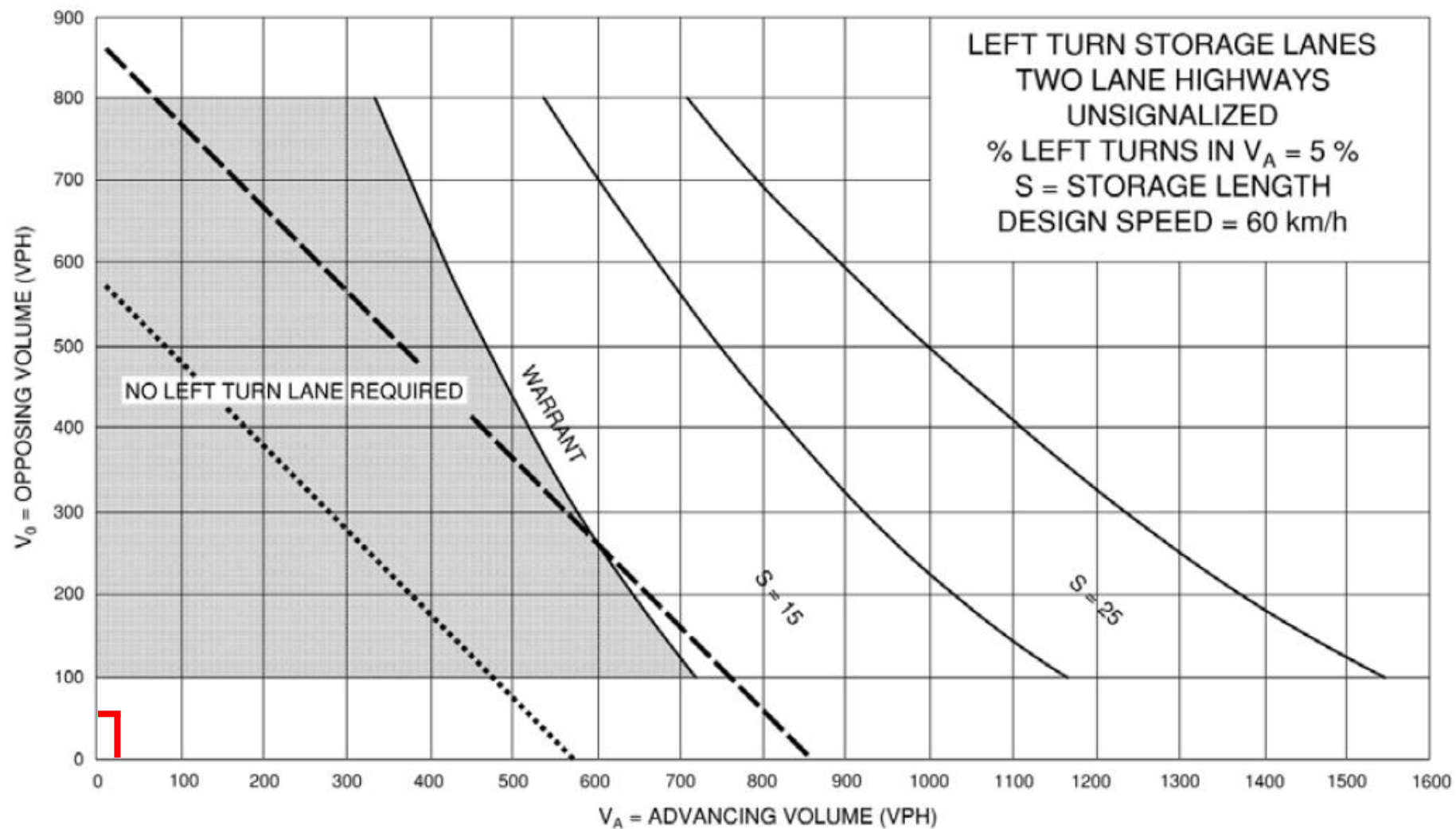
	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↖	↖	
Traffic Volume (veh/h)	21	4	0	13	3	0
Future Volume (Veh/h)	21	4	0	13	3	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	4	0	14	3	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			27		39	25
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			27		39	25
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1587		973	1051
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	27	14	3			
Volume Left	0	0	3			
Volume Right	4	0	0			
cSH	1700	1587	973			
Volume to Capacity	0.02	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	8.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			13.3%		ICU Level of Service	A
Analysis Period (min)			15			

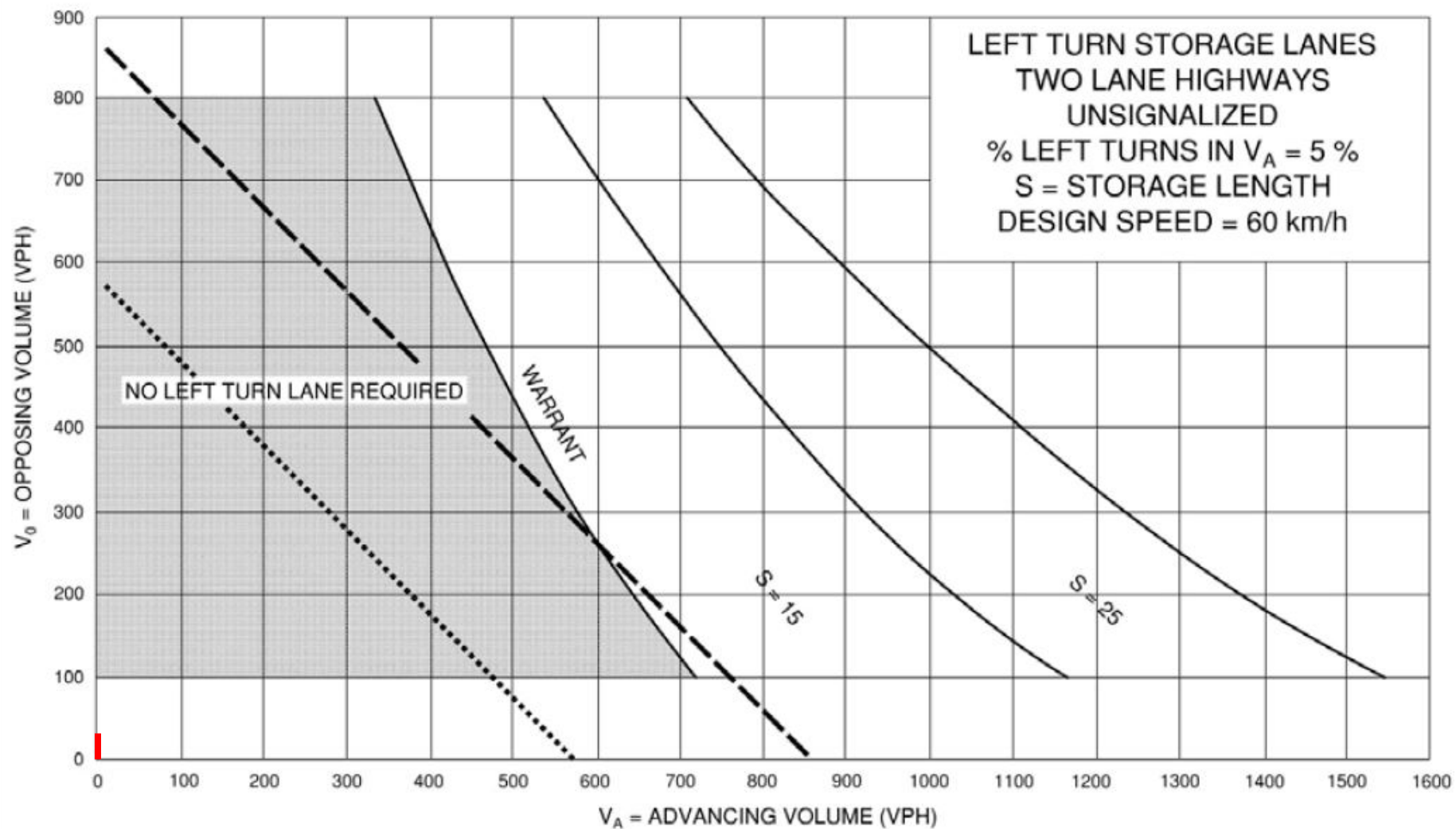
Appendix M

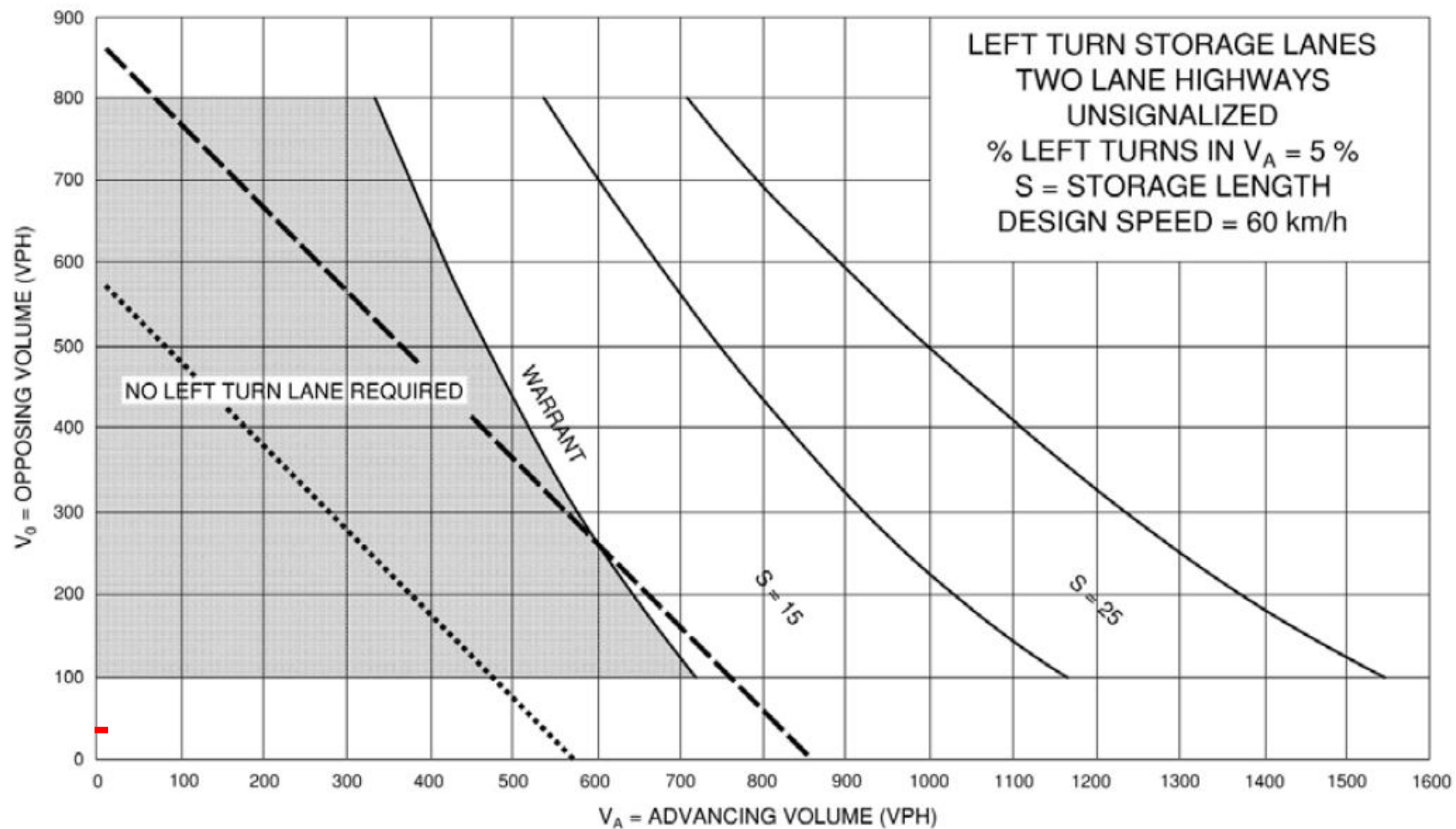
Left Turn Lane Warrant Nomograph











Appendix N

SimTraffic Ten-Year Total Traffic Report



Intersection: 101: West Side Road & Coronation Drive/Franklin Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (m)	13.2	12.9	3.1	2.7
Average Queue (m)	8.3	8.1	1.0	0.7
95th Queue (m)	16.3	16.0	5.1	4.7
Link Distance (m)	78.3	34.8	538.0	125.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 102: West Side Road & Main Street West

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	40.3	33.2	7.5	135.1	11.4	14.7	45.8	46.8	41.9	20.1
Average Queue (m)	27.5	22.1	1.5	119.4	5.5	7.0	31.4	26.4	27.0	8.1
95th Queue (m)	48.2	39.1	12.0	252.6	21.6	18.5	55.7	53.2	46.6	22.9
Link Distance (m)		192.5		194.7			170.7		538.0	538.0
Upstream Blk Time (%)				48						
Queuing Penalty (veh)				0						
Storage Bay Dist (m)	130.0		25.0		60.0	35.0		75.0		
Storage Blk Time (%)				63			9			
Queuing Penalty (veh)				172			2			

Intersection: 103: Driveway 1 & Franklin Avenue

Movement	NB
Directions Served	LR
Maximum Queue (m)	7.8
Average Queue (m)	4.8
95th Queue (m)	11.8
Link Distance (m)	45.0
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 104: Driveway 2 & Franklin Avenue

Movement	NB
Directions Served	LR
Maximum Queue (m)	5.4
Average Queue (m)	1.3
95th Queue (m)	6.4
Link Distance (m)	52.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 175

Intersection: 101: West Side Road & Coronation Drive/Franklin Avenue

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LT
Maximum Queue (m)	19.8	13.2	5.3	14.4
Average Queue (m)	11.3	6.8	1.9	4.8
95th Queue (m)	27.9	19.2	7.8	16.1
Link Distance (m)	78.3	34.8	538.0	125.6
Upstream Blk Time (%)	2			
Queuing Penalty (veh)	1			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 102: West Side Road & Main Street West

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (m)	97.7	78.0	18.9	126.7	22.4	23.9	70.8	68.2	139.9	22.2
Average Queue (m)	75.2	51.7	5.4	108.1	7.7	10.4	48.5	62.7	99.1	11.5
95th Queue (m)	139.6	131.4	23.3	227.8	36.5	31.1	84.6	96.7	220.0	24.7
Link Distance (m)	192.5		194.7		170.7		538.0		538.0	
Upstream Blk Time (%)	0		40							
Queuing Penalty (veh)	0		0							
Storage Bay Dist (m)	130.0		25.0		60.0	35.0		75.0		
Storage Blk Time (%)	6	1		56	0		28	40	0	
Queuing Penalty (veh)	15	4		214	0		8	134	0	

Intersection: 103: Driveway 1 & Franklin Avenue

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	0.8	9.3
Average Queue (m)	0.2	3.6
95th Queue (m)	2.1	11.0
Link Distance (m)	31.2	45.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 104: Driveway 2 & Franklin Avenue

Movement	NB
Directions Served	LR
Maximum Queue (m)	5.4
Average Queue (m)	1.3
95th Queue (m)	6.4
Link Distance (m)	52.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 376
