



Final Report

591 Liverpool Road Traffic Impact Study

Pickering Harbour Company Ltd

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HDR TEAM

Project Manager: Carl Wong, P.Eng.

Technical Support: Faisal Ahmed, Jenna Wu, Amanda Chung

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1. Introduction

1.1 Background

HDR Corporation (“HDR”) was retained by Pickering Harbour Company Ltd. to undertake a Traffic Impact Study for a proposed residential and commercial development at 591 Liverpool Road, located at the south end of Liverpool Road, in the City of Pickering (“City”). The site location is shown in **Exhibit 1**. The site is currently occupied by Frenchman’s Bay Marina and a public parking lot with 72 parking spaces.

The proposed development consists of 498 condominium units in 2 buildings and 1,900 sm of commercial. The site is proposed to supply 739 parking spaces overall including 200 public parking spaces (which will replace and expand the existing public parking lot) and 539 parking spaces for both residential and commercial components.



Exhibit 1: Site Location

1.2 Study Scope of Work

The study scope of work has been reviewed and approved by City of Pickering and Durham Region (“Region”) staff when this study initiated in June 2017, and is summarized below:

- | | |
|---|---|
| Analysis Scenarios | <ul style="list-style-type: none">• Existing traffic conditions• Full Build-out traffic conditions<ul style="list-style-type: none">• 2027 Background Traffic (includes road growth and traffic from approved or under construction background developments in the immediate area)• 2027 Total Traffic (2027 background traffic plus the proposed development traffic)• 5 years from the build-out traffic conditions<ul style="list-style-type: none">• 2032 Background Traffic (includes road growth and traffic from approved or under construction background developments in the immediate area)• 2032 Total Traffic (2032 background traffic plus the proposed development traffic) |
| Analysis Time Periods | <ul style="list-style-type: none">• Weekday AM peak hour (between 7:00am – 9:00am)• Weekday PM peak hour (between 4:00pm – 6:00pm)• Weekend Saturday peak hour (between 12:00pm – 2:00pm) |
| Study Area Intersections to be Analyzed | <ul style="list-style-type: none">• Liverpool Road and Bayly Street• Liverpool Road and Tatra Drive• Liverpool Road and Radom Street• Liverpool Road and Krosno Boulevard• Liverpool Road and Ilona Park Road (north)• Liverpool Road and Ilona Park Road (south)• Liverpool Road and Commerce Street• Liverpool Road and Annland Street• Liverpool Road and Wharf Street• Proposed Site Access |

1.3 Intersections Operations and Analysis Methodology

Intersection operations were assessed for the site driveways and study intersections using the software program Synchro 9 and SimTraffic 9, both of which employ methodology from the **Highway Capacity Manual (HCM2010)** published by the Transportation Research Board National Research Council. Synchro can analyze both signalized and unsignalized intersections in a road corridor or network taking into account the spacing, interaction, queues and operations between intersections.

The signalized intersection analysis considers two separate measures of performance:

- the capacity of all intersection movements, which is based on a volume to capacity ratio; and



- the level of service for all intersection movements, which is based on the average control delay per vehicle for the various movements through the intersection and overall.

The two-way unsignalized intersection analysis also considers two separate measures of performance:

- the capacity of the critical intersection movements, which is based on a volume to capacity ratio; and
- the level of service for the critical movements, which is based on the average control delay per vehicle for the various critical movements within the intersection.

Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection. Pedestrian and bicycle level of service was assessed using HCM 2010 methodology.

2. Existing Traffic Conditions

The subject site is bounded by the existing public road leading to the pumping station to the north, Frenchman's Bay to the east and south, and Liverpool Road to the west.

2.1 Existing Road Network

The existing road network is illustrated in **Exhibit 2**, including existing traffic controls, and described below.

Liverpool Road	Liverpool Road is under the jurisdiction of the City of Pickering and is a north-south collector road with a posted speed limit of 40 km/h within the study area. It is a regional road north of Bayly Street and under the jurisdiction of the Region of Durham. It has a two-lane urban cross section with sidewalks on both sides. Liverpool Road is signalized at Bayly Street and partially signalized at Tatra Drive intersection for pedestrian crossing on the south approach. On-street parking exists on the west side between Commerce Street and Annland Street, and on both sides south of Annland Street.
Bayly Street	Bayly Street is under the jurisdiction of the Region of Durham and is an east-west arterial road that spans between across Pickering and Ajax. Within the study area, it has a four-lane urban cross section with sidewalks on the south side. A multi-use path exists on the north side east of Liverpool Road. It has a posted speed limit of 60 km/h.
Tatra Drive	Tatra Drive is under the jurisdiction of the City of Pickering and is an east-west collector road. It has a two-lane cross section with sidewalks on the south side. It has a posted speed limit of 40 km/h. The west approach serves as a parking lot.
Radom Street	Radom Street is under the jurisdiction of the City of Pickering and is a two-lane east-west collector road. It has a sidewalk on the south side and a posted speed limit of 40 km/h.
Krosno Boulevard	Krosno Boulevard is under the jurisdiction of the City of Pickering and is an east-west collector road. It has a two-lane cross section and has a posted speed limit of 40 km/h. A commercial plaza exists on the south-east corner.
Ilona Park Road	Ilona Park Road is a two-lane local road that forms a crescent. It is under the jurisdiction of the City of Pickering and has a posted speed limit of 40 km/h. Sidewalks are not provided.
Commerce Street	Commerce Street is a two-lane east-west local road under the jurisdiction of the City of Pickering. It has a posted speed limit of 40 km/h. It has a sidewalk on the north side of the east approach.
Annland Street	Annland Street is a two-lane collector road under the jurisdiction of the City of Pickering. It curves and also intersects Commerce Street



(on both sides) and Krosno Boulevard (from the east approach). It has a posted speed limit of 40 km/h and has a sidewalk on the south side of the west approach.

Wharf Street

Wharf Street is a two-lane east-west local road under the jurisdiction of the City of Pickering. Both sides of Wharf Street lead to cul-de-sacs, and the west approach also leads to a small marina and commercial area. It has no posted speed limit sign.

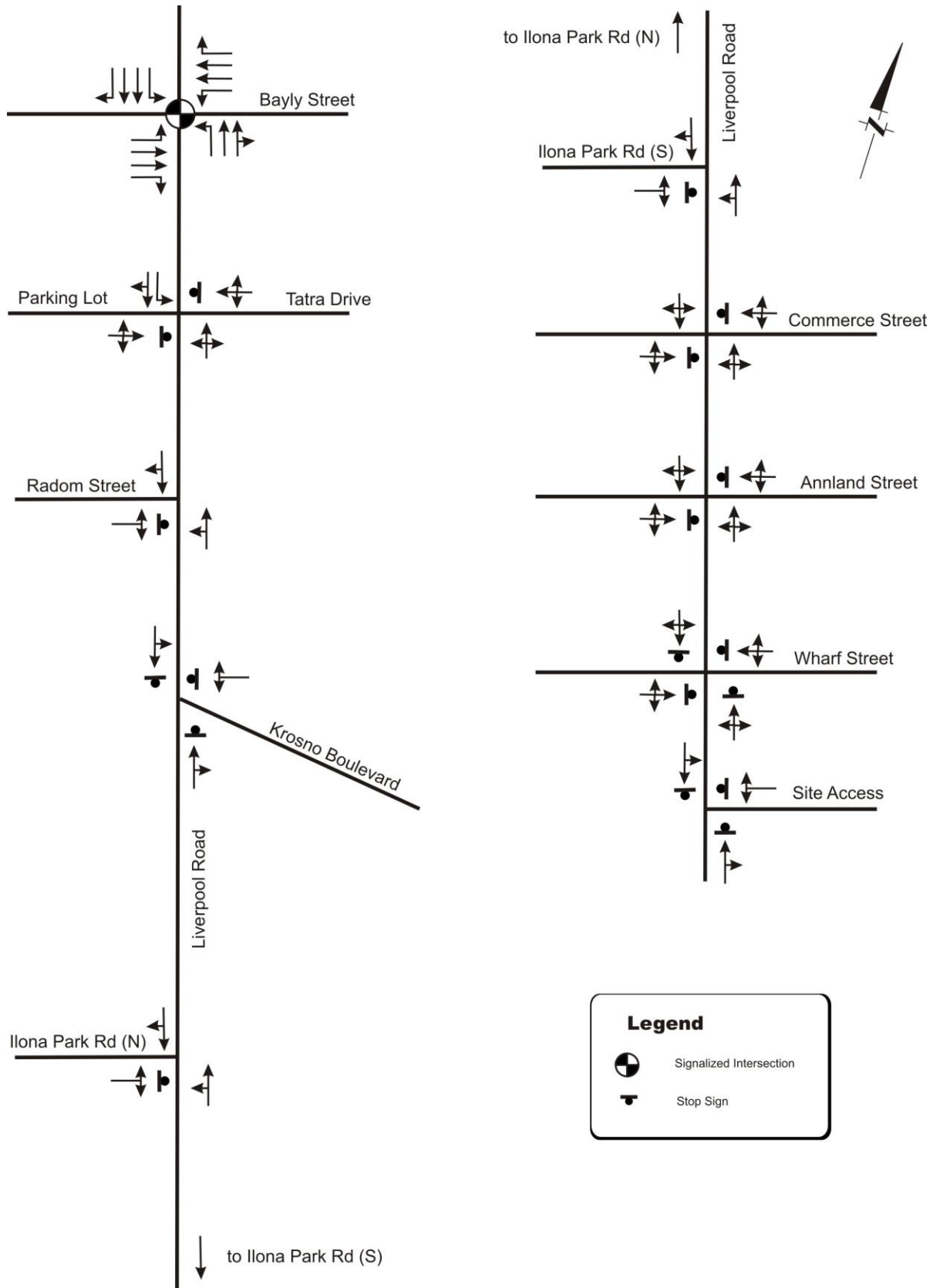


Exhibit 2: Existing Road Network

2.2 Transit Service

Durham Region Transit (DRT) currently operates a few transit routes that operate within the study area. Pickering GO Station is located at the north-east quadrant of the Liverpool Road and Bayly Street intersection, with approximately 2km from the proposed site. A summary of DRT services and bus and train services provided at Pickering GO Station is shown in **Table 1**.

Table 1: DRT Transit Service Summary

Bus / Route	Approximate headways during peak periods
Liverpool Road	
193 Community (DRT)	Weekday PM – 60 minutes Saturday MID – 60 minutes
101A Bay Ridges (DRT)	Weekday AM – 30 minutes
101 Bay Ridges (DRT)	Weekday PM – 60 minutes Saturday MID – 60 minutes
Bayly Street	
110 Finch West (DRT)	Weekday AM – 10 minutes from 7:10 to 7:30, 30 minutes after 7:30
110A Finch West (DRT)	Weekday AM – 30 minutes
107 Rosebank Whites (DRT)	Weekday AM – 30 minutes Weekday PM – 30 minutes
120 Rosebank Whites (DRT)	Weekday AM – 20 minutes Weekday PM – 20 minutes Saturday MID – 30 minutes
103 Glenanna (DRT)	Weekday AM – 30 minutes Weekday PM – 30 minutes Saturday MID – 60 minutes
223 Bayly (DRT)	Weekday AM – 30 minutes Weekday PM – 30 minutes Saturday MID – 60 minutes
GO Transit	
Lakeshore East Train (GO)	Weekday AM – 20 minutes towards Toronto, 30 minutes towards Oshawa Weekday PM – 20 minutes towards Oshawa, 20 minutes towards Toronto Saturday MID – 30 minutes towards Oshawa, 30 minutes towards Toronto
51, 52, 54 – 407 East Bus (GO)	Weekday AM – 40 minutes Weekday PM – 30 minutes

2.3 Existing Traffic Volumes

Existing weekday AM, weekday PM, and Saturday MID peak period turning movement counts (two hours in the morning between 7-9 AM, in the afternoon between 4-6 PM, and on Saturday between 12-2 PM were commissioned by HDR in 2017. The traffic count dates are summarized in **Table 2**.



Table 2: Summary of Traffic Counts

Location	Weekday Count Date (AM and PM)	Weekend Count Date
Bayly Street	Thursday June 1, 2017	Saturday June 3, 2017
Tatra Drive	Thursday June 1, 2017	Saturday June 3, 2017
Radom Street	Thursday June 1, 2017	Saturday June 3, 2017
Krosno Boulevard	Thursday June 1, 2017	Saturday June 3, 2017
Ilona Park Road (N)	Tuesday June 6, 2017	Saturday June 3, 2017
Ilona Park Road (S)	Tuesday June 6, 2017	Saturday June 3, 2017
Commerce Street	Thursday June 1, 2017	Saturday June 3, 2017
Annland Street	Thursday June 1, 2017	Saturday June 3, 2017
Wharf Street	Tuesday June 6, 2017	Saturday June 3, 2017

The existing weekday AM, weekday PM, and Saturday midday peak hour turning movement volumes based on these counts at the study intersections are illustrated in **Exhibit 3**. Since the traffic counts are still within the 2 year time frame of this report, these counts are representative of existing conditions.

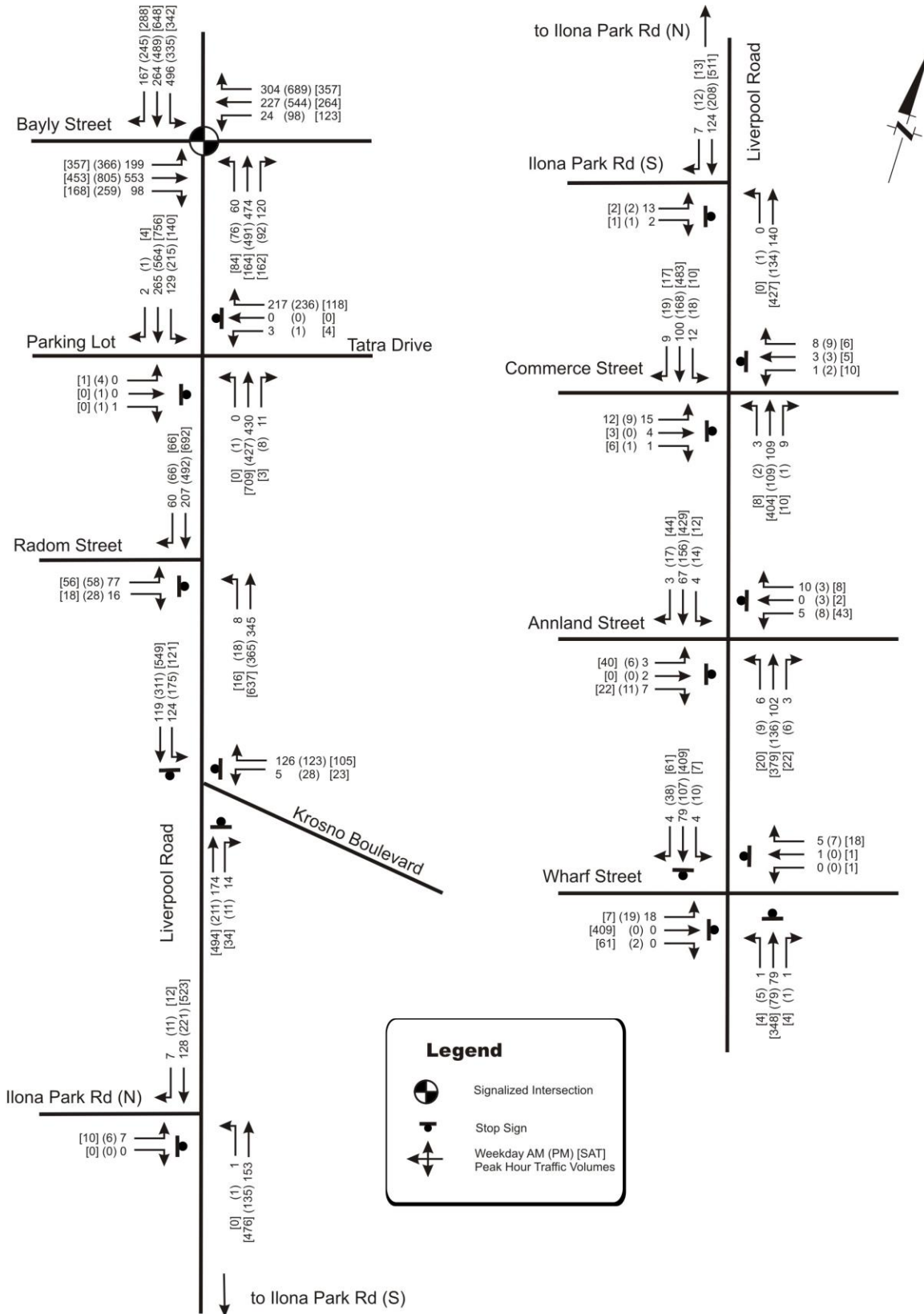


Exhibit 3: Existing Traffic Volumes

2.4 Existing Traffic Operations

Based on the existing road configurations illustrated in **Exhibit 2**, existing traffic volumes shown in **Exhibit 3**, and existing signal timings provided by the Region, the existing Liverpool Road and Bayly Street intersection operations are summarized in **Table 3**. Detailed traffic analysis output sheets generated by Synchro are provided in **Appendix A**.

Table 3: Existing Traffic Signalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Bayly Street						
Eastbound Left-turn	C	0.50	F	1.04	D	0.77
Eastbound Through	D	0.76	D	0.78	C	0.43
Eastbound Right-turn	A	0.27	A	0.45	A	0.31
Westbound Left-turn	C	0.25	C	0.47	C	0.26
Westbound Through	D	0.33	D	0.61	C	0.25
Westbound Right-turn	A	0.40	C	0.88	B	0.48
Northbound Left-turn	B	0.13	B	0.14	B	0.15
Northbound Through-Right	C	0.64	D	0.70	C	0.47
Southbound Left-turn	C	0.80	C	0.70	C	0.70
Southbound Through	B	0.17	D	0.58	B	0.31
Southbound Right-turn	A	0.18	A	0.34	A	0.30

Notes: v/c – volume to capacity ratio, LOS – level of service

Under existing traffic conditions, most individual turning movements for the intersection of Liverpool Road and Bayly Street are all operating at Level of Service 'D' or better, and with a volume to capacity ratio of 0.88 or better, with the exception of the eastbound left-turn at Liverpool Road and Bayly Street, which is currently operating at LOS 'F' with a volume to capacity of 1.04 during the weekday afternoon peak.

Turning movements with volume to capacity ratios over 1.00 indicate that the default or calculated Synchro analysis parameters may likely be too conservative compared with actual field conditions and therefore the results may underestimate the actual available capacity of the intersection. Theoretically it is not possible to have a volume to capacity ratio greater than 1.0 for existing conditions. To be conservative we have worked within the analysis software defaults to optimize intersection operations for future analysis.

The intersection of Liverpool Road and Bayly Street was also analyzed with optimized splits to identify if the critical eastbound left-turn movement could be improved based on existing configurations. The results are summarized in **Table 4** and the detailed traffic analysis output sheets generated by Synchro are provided in **Appendix A**.

Table 4: Liverpool Road/Bayly Street Intersection Operations – Optimized

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Bayly Street (optimized)						
Eastbound Left-turn	C	0.50	D	0.89	C	0.64
Eastbound Through	D	0.66	C	0.71	C	0.35
Eastbound Right-turn	A	0.25	A	0.43	A	0.26
Westbound Left-turn	C	0.25	C	0.44	B	0.28
Westbound Through	C	0.32	D	0.69	C	0.30
Westbound Right-turn	A	0.39	D	0.96	B	0.48
Northbound Left-turn	B	0.16	B	0.20	B	0.19
Northbound Through-Right	D	0.71	D	0.70	D	0.65
Southbound Left-turn	C	0.79	C	0.76	C	0.71
Southbound Through	B	0.17	C	0.41	C	0.35
Southbound Right-turn	A	0.18	A	0.27	A	0.29

Notes: v/c – volume to capacity ratio, LOS – level of service

Under optimized timing in the existing traffic conditions, most individual turning movements for the intersection of Liverpool Road and Bayly Street are all operating at Level of Service 'D' or better, and with a volume to capacity ratio of 0.96 or better.

The existing unsignalized intersection operations are summarized in **Table 5**. Detailed traffic analysis output sheets generated by Synchro are provided in **Appendix A**.

Table 5: Existing Traffic Unsignalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Tatra Drive						
Eastbound Left-Through-Right	A	0.00	F	0.19	F	0.01
Westbound Left-Through-Right	C	0.44	C	0.45	B	0.25
Northbound Left-through-right	-	0.00	A	0.00	-	0.00
Southbound Left-turn	A	0.14	A	0.21	A	0.14
Southbound Through-Right	-	0.17	-	0.35	-	0.31
Liverpool Road/Radom Street						
Eastbound Left-Right	B	0.22	C	0.28	C	0.26
Northbound Left-Through	A	0.01	A	0.02	A	0.01
Liverpool Road/Krosno Boulevard						
Westbound Left-Right	A	0.21	B	0.25	A	0.17
Northbound Right-turn	A	0.31	B	0.35	B	0.37
Southbound Left-Through	B	0.41	C	0.73	B	0.57
Liverpool Road/Ilona Park Road (N)						
Eastbound Left-Right	B	0.01	B	0.01	B	0.02
Northbound Left-Through	A	0.00	A	0.00	-	0.00
Liverpool Road/Ilona Park Road (S)						
Eastbound Left-Right	B	0.03	B	0.01	B	0.01
Northbound Left-Through	-	0.00	A	0.00	-	0.00
Liverpool Road/Commerce Street						
Eastbound Left-Through-Right	B	0.04	B	0.02	B	0.04
Westbound Left-Through-Right	A	0.02	B	0.02	B	0.03
Northbound Left-Through-Right	A	0.00	A	0.00	A	0.00
Southbound Left-Through-Right	A	0.01	A	0.02	A	0.01
Liverpool Road/Annland Street						
Eastbound Left-Through-Right	A	0.02	B	0.03	B	0.03
Westbound Left-Through-Right	A	0.02	B	0.03	B	0.07
Northbound Left-Through-Right	A	0.00	A	0.01	A	0.01
Southbound Left-Through-Right	A	0.00	A	0.01	A	0.01

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
	Liverpool Road/Wharf Street					
Eastbound Left-Through-Right	A	0.03	A	0.03	A	0.06
Westbound Left-Through-Right	A	0.01	A	0.01	A	0.03
Northbound Left-Through-Right	A	0.11	A	0.16	A	0.16
Southbound Left-Through-Right	A	0.12	A	0.27	A	0.29

Under the existing conditions as shown in **Table 5**, the eastbound movements at Liverpool Road and Tatra Drive are operating at LOS 'F' during the weekday PM and Saturday midday peak periods.

A gap survey was conducted at Liverpool Road and Tatra Drive and Liverpool Road and Radom Street on Thursday June 1st, 2017 and Saturday June 3rd, 2017 during peak periods. **Table 6** summarizes the availability of gaps for drivers making the eastbound or westbound turn onto Liverpool Road or pass through Liverpool Road.

Table 6: Vehicle Gap Survey Summary – Eastbound and Westbound

Intersection and Movement	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Left	Through	Right	Left	Through	Right	Left	Through	Right
Liverpool Road/Tatra Drive	256	264	296	212	232	249	108	119	127
Liverpool Road/Radom Street	337	336	381	191	206	222	188	190	209

As shown in **Table 6**, there are sufficient amount of gaps available for drivers turned onto Liverpool Road during all peak periods.

Liverpool Road and Tatra Drive is a two-way stop-controlled intersection but also operates with a pedestrian signal on the south side of Tatra Drive, which is only used when pedestrians use the push button to cross Liverpool Road. Based on the counts obtained, it is noted that there is a frequent pedestrian traffic on the south side of Tatra Drive during the weekday PM peak hour. As a result, a sensitivity analysis was performed to present the partially signalized intersection operations during the weekday PM peak hour, which is summarized in **Table 7**.

Table 7: Liverpool Road/Tatra Drive Signalized PM Peak Sensitive Analysis – Existing

Intersection & Critical Movement	Weekday PM Peak Hour	
	LOS	v/c
	Liverpool Road/Tatra Drive (when pedestrian signals active)	
Eastbound Left-Through-Right	C	0.07
Westbound Left-Through-Right	B	0.64
Northbound Left-through-right	A	0.33
Southbound Left-turn	A	0.31
Southbound Through-Right	A	0.44

As shown in **Exhibit 3**, there is only one vehicle making the eastbound movement during the weekend Saturday peak at Tatra Drive. Therefore, the traffic impact of the one vehicle is not significant as compared to the intersection and overall road network.

Level of Service (LOS) for bicyclists and pedestrians measure and reflect the quality of service by accounting for factors such as comfort, safety, and ease of mobility. The analysis during the weekday AM and PM peak hours are summarized in **Table 8**. Detailed pedestrian and bicycle LOS output sheets generated by Synchro are provided in **Appendix A**

Table 8: Existing Pedestrian and Bicycle Level of Service at Signalized Intersections

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS
Liverpool Road/Bayly Street						
Eastbound	B	C	C	D	B	C
Westbound	B	C	C	D	B	C
Northbound	B	C	B	C	B	C
Southbound	B	C	C	D	C	D

As shown in **Table 8**, pedestrian and bicycle trips experience LOS 'D' or better under existing conditions.

2.5 Existing Traffic Queues

Queuing analysis was undertaken at the key movements within the study intersections. The queuing results are based on the Synchro 95th percentile queues for the weekday AM, weekday PM, and Saturday MID peak hours.

SimTraffic queue results were reported for the two all way stop controlled intersections: (1) Liverpool Road/Krosno Boulevard, and (2) Liverpool Road/Wharf Street because of very low values of 95th percentile queues produced by Synchro. This would represent a very conservative analysis of queues for the all-way stop controlled intersections.

Table 9 summarizes the queue length for key movements. Detailed calculations are provided in **Appendix A**. In addition, the queuing results for the intersection at Liverpool Road and Bayly Street are based on the existing signal timing plan.

Table 9: Existing Traffic 95th Percentile Queue Summary

Intersection	Existing Storage and Link Length	Existing 95 th Percentile Queue (m)		
		AM Peak Hour	PM Peak Hour	SAT Peak Hour
Liverpool Road/Bayly Street				
Eastbound Left-turn	115	47.4	115.4	84.1
Eastbound Through	-	73	99.7	48.2
Eastbound Right-turn	100	6.4	17.7	14.7
Westbound Left-turn	50	16.2	21.6	22.4
Westbound Through	-	31.2	67.8	29.2
Westbound Right-turn	150	36.2	181.2	47.7
Northbound Left-turn	75	9.6	14.7	11.9
Northbound Through-Right	-	69.7	73.0	55.3
Southbound Left-turn	50	103.0	62.1	56.0
Southbound Through	-	23.6	61.8	42.8
Southbound Right-turn	65	7.8	13.7	10.4
Liverpool Road/Tatra Drive				
Eastbound Left-Through-Right	-	0.0	4.4	0.3
Westbound Left-Through-Right	-	17.1	17.6	7.4
Northbound Left-through-right	-	0.0	0.0	0.0
Southbound Left-turn	40	3.6	6.1	3.5
Liverpool Road/Radom Street				
Eastbound Left-Right	-	6.2	8.4	7.6
Northbound Left-Through	-	0.0	0.5	0.3
Liverpool Road/Krosno Boulevard				
Westbound Left-Right	-	16.2	19.9	6.2
Northbound Right-turn	-	20.6	17.3	30.9
Southbound Left-Through	-	24.7	24.6	37.9
Liverpool Road/Ilona Park Road (N)				
Eastbound Left-Right	-	0.3	0.3	0.5
Northbound Left-Through	-	0.0	0.0	0.0
Liverpool Road/Ilona Park Road (S)				
Eastbound Left-Right	-	0.6	0.1	0.1
Northbound Left-Through	-	0.0	0.0	0.0
Liverpool Road/Commerce Street				
Eastbound Left-Through-Right	-	0.9	0.6	1.1
Westbound Left-Through-Right	-	0.5	0.5	0.6
Northbound Left-Through-Right	-	0.1	0.0	0.1
Southbound Left-Through-Right	-	0.2	0.3	0.2
Liverpool Road/Annland Street				
Eastbound Left-Through-Right	-	0.4	0.03	0.6
Westbound Left-Through-Right	-	0.5	0.03	1.6
Northbound Left-Through-Right	-	0.1	0.01	0.2
Southbound Left-Through-Right	-	0.1	0.01	0.2
Liverpool Road/Wharf Street				
Eastbound Left-Through-Right	-	7.8	13.3	16.8
Westbound Left-Through-Right	-	-	-	13.2
Northbound Left-Through-Right	-	16.2	15.2	15.2
Southbound Left-Through-Right	-	14.2	19.1	18.6

2.6 Parking

A parking survey was conducted at the existing public parking lot located at the southwest of the site to understand the existing parking demand. As stated in **Section 1**, the existing public parking lot with 72 parking spaces will be relocated to the northeast of the site and expanded to 200 parking spaces.



HDR conducted a parking survey at the existing parking lot to capture the peak parking demand at the following date and time:

- Saturday June 3rd, 2017 from 3:00pm to 7:00pm; and
- Thursday June 8th, 2017 from 2:00pm to 7:00pm.

The parking demand of the public parking lot is summarized in **Table 10**.

Table 10: Parking Survey Summary

Date	Peak Time	Occupied	Vacant	Vehicle in Aisle	% Utilization
Saturday June 3 rd , 2017	2:00 PM	67	5	0	93%
	2:15 PM	65	7	0	90%
	2:30 PM	64	8	0	89%
	2:45 PM	64	8	0	89%
	3:00 PM	66	6	0	92%
	3:15 PM	57	15	0	79%
	3:30 PM	51	21	0	71%
	3:45 PM	50	22	0	69%
	4:00 PM	52	20	0	72%
	4:15 PM	46	26	0	64%
	4:30 PM	43	29	0	60%
	4:45 PM	44	28	0	61%
	5:00 PM	50	22	0	69%
	5:15 PM	51	21	0	71%
	5:30 PM	59	13	0	82%
	5:45 PM	64	8	0	89%
	6:00 PM	71	1	1	99%
6:15 PM	72	0	1	100%	
6:30 PM	72	0	4	100%	
6:45 PM	72	0	3	100%	
7:00 PM	72	0	3	100%	
Thursday June 8 th , 2017	3:00 PM	72	0	3	100%
	3:15 PM	70	2	2	97%
	3:30 PM	72	0	3	100%
	3:45 PM	72	0	1	100%
	4:00 PM	72	0	2	100%
	4:15 PM	70	2	1	97%
	4:30 PM	72	0	4	100%
	4:45 PM	72	0	4	100%
	5:00 PM	72	0	4	100%
	5:15 PM	71	1	4	99%
	5:30 PM	71	1	5	99%
	5:45 PM	66	6	0	92%
	6:00 PM	72	0	1	100%
	6:15 PM	71	1	1	99%
	6:30 PM	72	0	3	100%
6:45 PM	72	0	4	100%	
7:00 PM	72	0	4	100%	

Based on the results of parking survey as shown in **Table 10**, the public parking lot is fully utilized after 6:00pm on Saturday June 3rd, 2017 and throughout the day on Thursday June 8th, 2017.

3. 2027 and 2032 Background Traffic Conditions

3.1 Planned Road Network Improvements

There are no planned roadway improvements within the vicinity of the study area by 2032. The 2032 background network is expected to remain the same as the existing road network.

3.2 Background Development Traffic

As part of the analysis, adjacent background developments of the study were accounted for in the traffic forecasting process. Based on development applications submitted to the City, there were two background developments that have been taken into account in this analysis.

- A proposed residential development by R.B. Morgan Construction Ltd. (“R.B. Morgan Report”) consisting of 118 condominium apartment units located on the west side of Liverpool Road bounded by Annland Street and Wharfs Street. It is anticipated to be at full build-out by 2020. Weekday peak hour site traffic volumes were obtained from a transportation impact study entitled “Proposed Residential Condominium Development” prepared by Dionne Bacchus & Associates dated December 2016. In addition, Saturday trip estimates were obtained from the 9th Edition of “Trip Generation Manual” published by the Institute of Transportation Engineers (“ITE”) using Land Use Code 232: High-Rise Residential Condo/Townhouse.
- A proposed residential development by Madison Liverpool Limited (“Madison Report”) consisting of 10 single family units and 57 townhouses units was proposed to redevelop Father Fenelon Catholic School at 747 Liverpool Road, which was located at the north side of Commerce Street Park on the northeast corner of Liverpool Road and Commerce Street. Weekday peak hour site traffic volumes were obtained from a transportation brief entitled “Revised Transportation Brief” prepared by Stantec Consulting Ltd. The study did not analyze the Saturday mid peak hour period. As a result, trip estimates were also obtained from the ITE using Land Use Codes 210: Single-Family Detached Housing and Land Use Code 230: Residential Condominium/Townhouse.

The background development traffic volumes are shown in **Exhibit 4**.

3.3 Background Traffic Volumes

A growth rate of 0.5% per annum was applied to through movements on Liverpool Road. This is conservative compared to the R.B. Morgan Report, where 0% was assumed.

Average Annual Daily Traffic (“AADT”) data was also analyzed for Bayly Street and a negative growth rate was observed. In addition, based on a regression analysis of the City’s historical data from May 2014 and the recent June 2017 turning movement counts, the intersection of Bayly Street and Liverpool Road is experiencing an average annual growth rate of 0.5%. As a result, a growth rate of 0.5% was applied to through movements on Bayly Street.

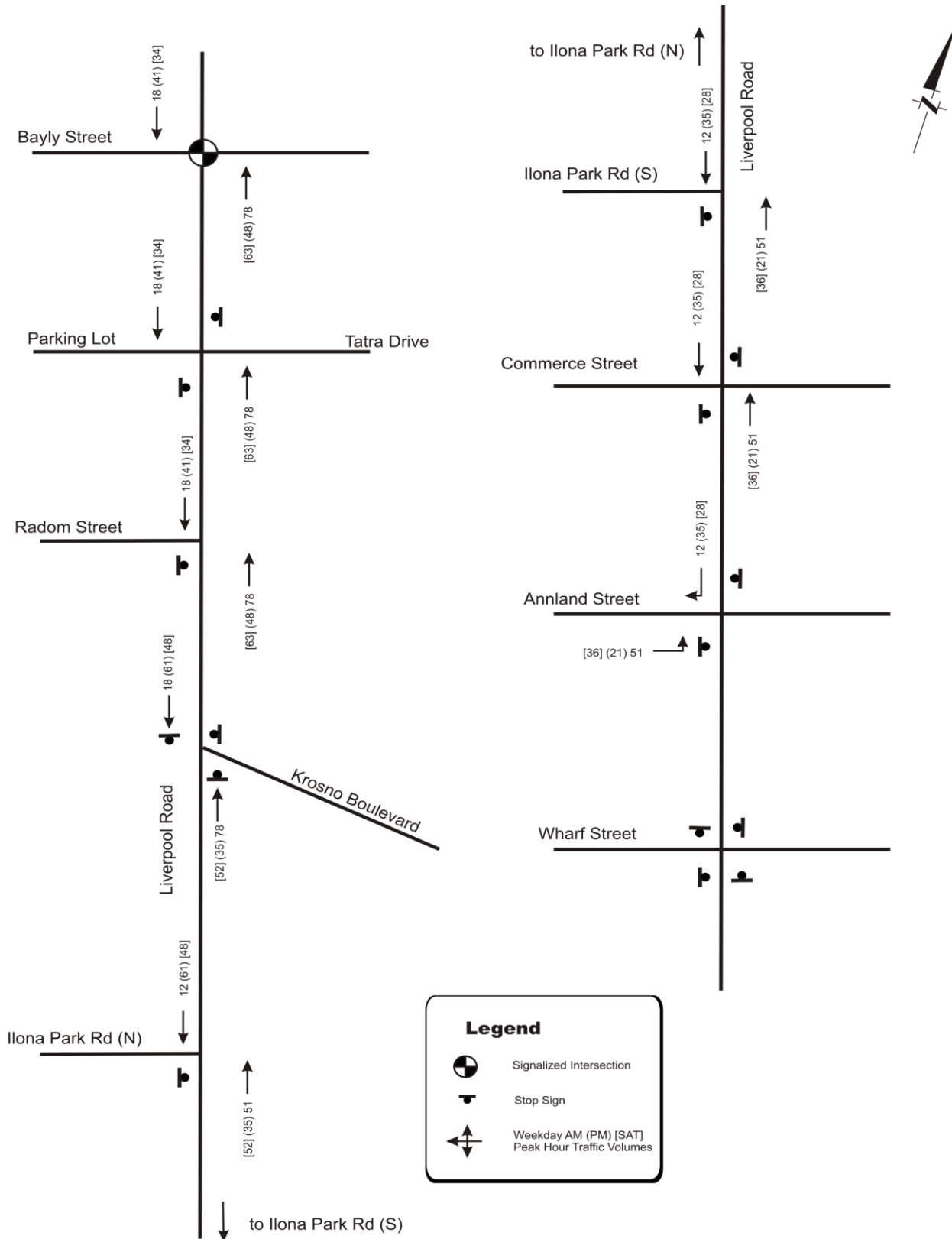


Exhibit 4: Background Development Traffic Volumes

3.4 2027 Background Traffic Operations

Background traffic operations were analyzed based on the background traffic volumes shown in **Exhibit 5** and the existing road network shown in **Exhibit 2**. The 2027 background signalized and unsignalized intersection operations are summarized in **Table 11** and **Table 12**, respectively with signals being optimized. Detailed traffic analysis output sheets generated by Synchro are provided in **Appendix B**.

Table 11: 2027 Background Traffic Signalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Bayly Street						
Eastbound Left-turn	C	0.51	D	0.92	C	0.63
Eastbound Through	D	0.70	C	0.70	C	0.34
Eastbound Right-turn	A	0.25	A	0.42	A	0.25
Westbound Left-turn	C	0.27	C	0.44	B	0.28
Westbound Through	C	0.31	C	0.59	C	0.30
Westbound Right-turn	A	0.38	D	0.91	B	0.48
Northbound Left-turn	B	0.16	B	0.24	B	0.20
Northbound Through-Right	D	0.84	D	0.79	D	0.80
Southbound Left-turn	D	0.85	D	0.89	C	0.79
Southbound Through	B	0.19	C	0.45	C	0.39
Southbound Right-turn	A	0.18	A	0.29	A	0.29

Notes: v/c – volume to capacity ratio, LOS – level of service

Under 2027 background traffic conditions, the individual movements for Bayly Street and Liverpool Road intersection will operate at level of service ‘D’ or better, and with a volume to capacity ratio of 0.92 or better.

Since the eastbound left-turn movements are expected to operate at capacity (i.e. v/c ratio of 0.99 and LOS E if signal is not optimized) in 2027 background traffic conditions, the Region could consider protecting for dual left-turn lanes for this particular movement. However, at this time, HDR does not recommend any geometric improvements for the intersection of Bayly Street and Liverpool Road.

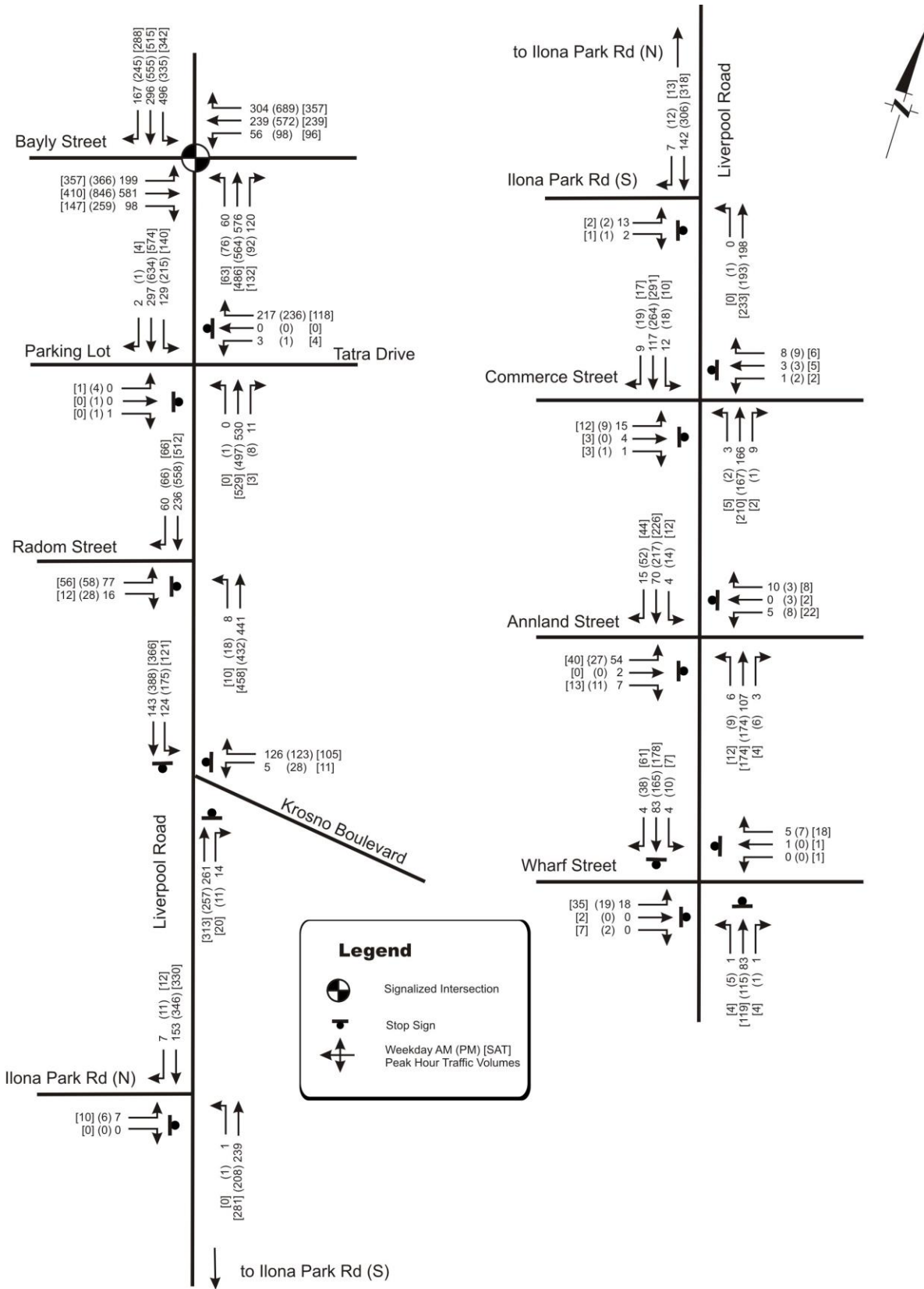


Exhibit 5: 2027 Background Traffic Volumes

Table 12: 2027 Background Traffic Unsignalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Tatra Drive						
Eastbound Left-Through-Right	B	0.00	F	0.27	F	0.02
Westbound Left-Through-Right	C	0.51	C	0.50	C	0.29
Northbound Left-through-right	-	0.00	A	0.00	-	0.00
Southbound Left-turn	A	0.15	A	0.23	A	0.15
Southbound Through-Right	-	0.19	-	0.29	-	0.35
Liverpool Road/Radom Street						
Eastbound Left-Right	C	0.26	D	0.34	D	0.33
Northbound Left-Through	A	0.01	A	0.02	A	0.01
Liverpool Road/Krosno Boulevard						
Westbound Left-Right	A	0.23	B	0.27	A	0.18
Northbound Right-turn	B	0.46	B	0.44	B	0.47
Southbound Left-Through	B	0.46	D	0.86	C	0.66
Liverpool Road/Ilona Park Road (N)						
Eastbound Left-Right	B	0.02	B	0.02	B	0.03
Northbound Left-Through	A	0.00	A	0.00	-	0.00
Liverpool Road/Ilona Park Road (S)						
Eastbound Left-Right	B	0.03	B	0.01	B	0.01
Northbound Left-Through	-	0.00	A	0.00	-	0.00
Liverpool Road/Commerce Street						
Eastbound Left-Through-Right	B	0.04	B	0.03	C	0.05
Westbound Left-Through-Right	B	0.02	B	0.03	B	0.03
Northbound Left-Through-Right	A	0.00	A	0.00	A	0.00
Southbound Left-Through-Right	A	0.01	A	0.02	A	0.01
Liverpool Road/Annland Street						
Eastbound Left-Through-Right	B	0.11	B	0.08	B	0.12
Westbound Left-Through-Right	A	0.02	B	0.03	B	0.07
Northbound Left-Through-Right	A	0.01	A	0.01	A	0.01
Southbound Left-Through-Right	A	0.00	A	0.01	A	0.01
Liverpool Road/Wharf Street						
Eastbound Left-Through-Right	A	0.03	A	0.03	A	0.06
Westbound Left-Through-Right	A	0.01	A	0.01	A	0.03
Northbound Left-Through-Right	A	0.12	A	0.17	A	0.17
Southbound Left-Through-Right	A	0.12	A	0.28	A	0.30

Notes: v/c – volume to capacity ratio, LOS – level of service

Under 2027 background traffic conditions, there will be excess capacity at all unsignalized intersections and drivers/vehicles will experience level of service 'D' or better, with the exception of the eastbound movement at Tatra Drive at Liverpool Road during the weekday PM and Saturday peak periods. As mentioned in **Section 2.4**, the number of vehicles exiting the parking lot from the west is expected to be extremely low during those peaks.

In addition, traffic operations for the intersection of Tatra Drive and Liverpool Road was also assessed based on signalization due to the high number of pedestrians crossing at the pedestrian signal during the PM peak hour. Results are summarized in **Table 13**.

Table 13: Liverpool Road/Tatra Drive Signalized PM Peak Sensitive Analysis – 2027 Background

Intersection & Critical Movement	Weekday PM Peak Hour	
	LOS	v/c
Liverpool Road/Tatra Drive (when pedestrian signals active)		
Eastbound Left-Through-Right	C	0.06
Westbound Left-Through-Right	B	0.65
Northbound Left-through-right	A	0.35
Southbound Left-turn	A	0.31
Southbound Through-Right	A	0.45

Notes: v/c – volume to capacity ratio, LOS – level of service

Pedestrian and bicycle level of service under 2027 background conditions during the weekday AM, PM and Saturday peak hour are summarized in **Table 14**.

Table 14: 2027 Background Pedestrian and Bicycle Level of Service

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday Midday Peak Hour	
	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS
Liverpool Road/Bayly Street						
Eastbound	B	C	C	D	B	C
Westbound	B	C	C	D	B	C
Northbound	B	C	B	C	B	C
Southbound	B	C	C	D	C	D

As shown in **Table 14**, pedestrian and bicycle trips experience LOS 'D' or better under 2027 background conditions.

3.5 2027 Background Traffic Queues

2027 background weekday AM, PM, and weekend Saturday peak hour queues are summarized in **Table 15**.

SimTraffic queue results were reported for the two all way stop controlled intersections: (1) Liverpool Road/Krosno Boulevard, and (2) Liverpool Road/Wharf Street.



Table 15: 2027 Background 95th Percentile Queue Summary

Intersection	Existing Storage and Link Length	95 TH Percentile Queue (m) under 2027 Background Traffic Condition		
		AM Peak Hour	PM Peak Hour	SAT Peak Hour
Liverpool Road/Bayly Street				
Eastbound Left-turn	115	47	90	73
Eastbound Through	-	74	98	47
Eastbound Right-turn	100	<7	19	14
Westbound Left-turn	50	16	20	21
Westbound Through	-	32	70	33
Westbound Right-turn	150	38	134	55
Northbound Left-turn	75	10	16	14
Northbound Through-Right	-	95	84	77
Southbound Left-turn	50	126	93	81
Southbound Through	-	26	60	53
Southbound Right-turn	65	8	23	10
Liverpool Road/Tatra Drive				
Eastbound Left-Through-Right	-	0	<7	<7
Westbound Left-Through-Right	-	22	21	9
Northbound Left-through-right	-	0	<7	<7
Southbound Left-turn	40	<7	<7	<7
Liverpool Road/Radom Street				
Eastbound Left-Right	-	8	11	11
Northbound Left-Through	-	<7	<7	<7
Liverpool Road/Krosno Boulevard				
Westbound Left-Right	-	13	16	15
Northbound Right-turn	-	25	27	35
Southbound Left-Through	-	27	62	48
Liverpool Road/Ilona Park Road (N)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Liverpool Road/Ilona Park Road (S)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Liverpool Road/Commerce Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Annland Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Wharf Street				
Eastbound Left-Through-Right	-	12	14	13
Westbound Left-Through-Right	-	8	8	12
Northbound Left-Through-Right	-	16	17	15
Southbound Left-Through-Right	-	16	22	22

Under 2027 background traffic conditions, 95th percentile queues can be accommodated for all key movements in the study area with the exception of the southbound left-turn at Liverpool / Bayly during all peak periods. The existing southbound left-turn storage lane at Liverpool / Bayly cannot be extended north without significant impacts to the bridge over the Lakeshore East GO Rail and Highway 401.

There are no geometric improvements required in the study area under the 2027 background traffic conditions.

However, because of the future background southbound left turn volumes in 2027 are the heaviest southbound movement at this intersection (destined to the GO station), the Region/City can consider a potential realignment of the southbound lane markings in order to accommodate the full 95th percentile southbound left turn queue.

This potential solution would include converting the existing left turn storage lane as a continuous lane coming directly from the bridge. That is, of the two southbound lanes, the left hand lane leads to the left turn lane at the intersection, and the right hand lane would become the southbound through lane, and a new right turn lane would be introduced. The shifting of the left lane marking on the road can occur upstream (i.e. approximately 130 m from the stop line). The right turn lane would have a storage length of 60 m.

This pavement marking scheme would result in no physical changes to the road and pavement width as only new pavement markings and signage would be required.

3.6 2032 Background Traffic Operations

Background traffic operations were analyzed based on the background traffic volumes shown in **Exhibit 6** and the existing road network shown in **Exhibit 2**. The 2032 background signalized and unsignalized intersection operations are summarized in **Table 16** and **Table 17**, respectively with signals being optimized. Detailed traffic analysis output sheets generated by Synchro are provided in **Appendix C**.

Table 16: 2032 Background Traffic Signalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Bayly Street						
Eastbound Left-turn	C	0.52	D	0.94	C	0.68
Eastbound Through	D	0.71	C	0.72	C	0.36
Eastbound Right-turn	A	0.25	A	0.42	A	0.26
Westbound Left-turn	C	0.28	C	0.46	C	0.27
Westbound Through	C	0.31	C	0.61	C	0.29
Westbound Right-turn	A	0.38	D	0.92	B	0.47
Northbound Left-turn	B	0.16	B	0.25	B	0.19
Northbound Through-Right	D	0.85	D	0.80	D	0.77
Southbound Left-turn	D	0.85	D	0.90	C	0.77
Southbound Through	B	0.19	C	0.46	C	0.39
Southbound Right-turn	A	0.18	A	0.29	A	0.29

Notes: v/c – volume to capacity ratio, LOS – level of service

Under 2032 background traffic conditions, the individual movements for Bayly Street and Liverpool Road intersection will operate at level of service ‘D’ or better, and with a volume to capacity ratio of 0.94 or better when the signal is optimized.

However, if the signal is not optimized, the individual movements for Bayly Street and Liverpool Road intersection will operate at level of service ‘E’ or better, and with a volume to capacity ratio of 0.99 or better.

Similar to **Section 3.4**, the Region could consider improving the intersection for movements that are expected to be operating at capacity.

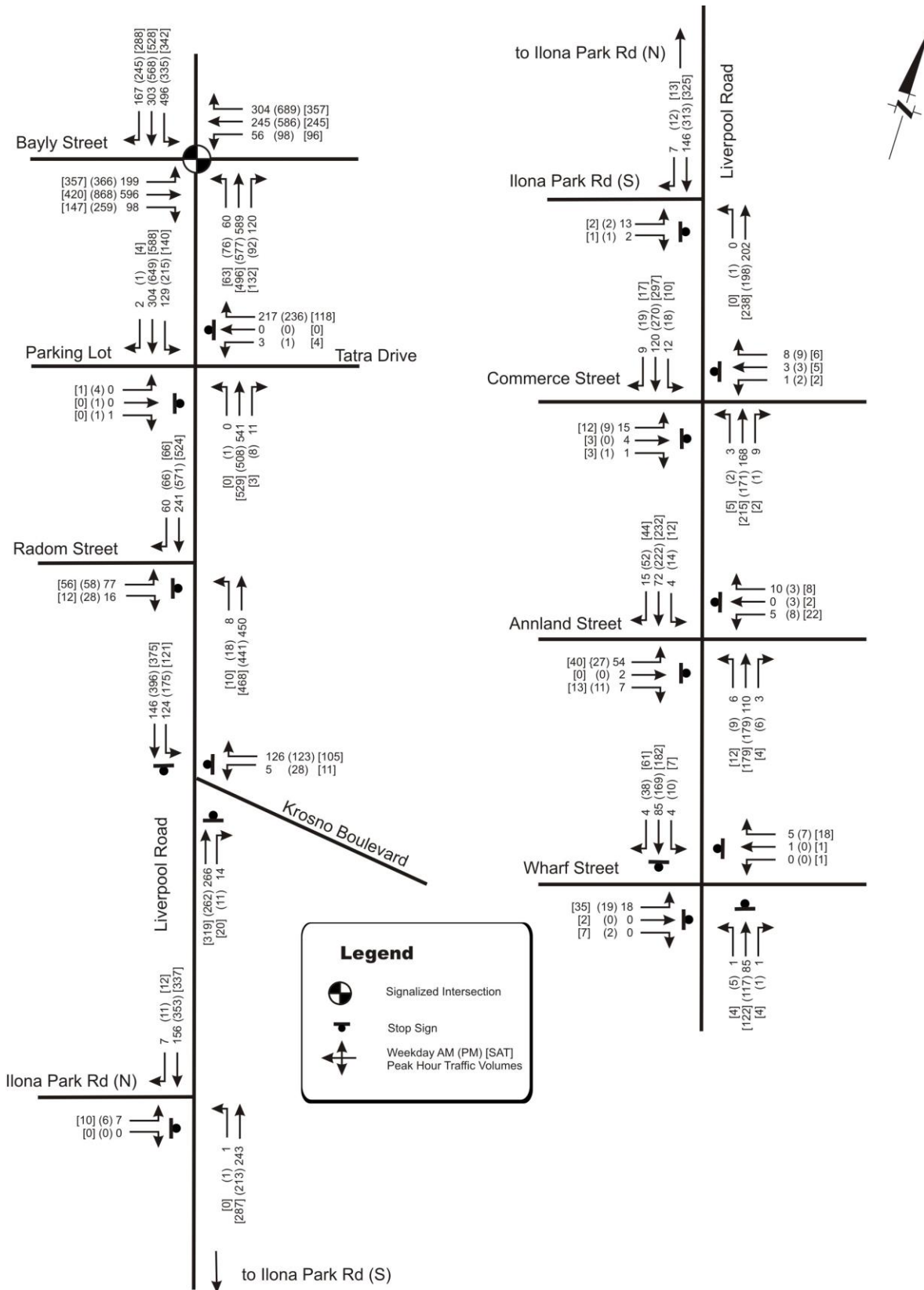


Exhibit 6: 2032 Background Traffic Volumes

Table 17: 2032 Background Traffic Unsignalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Tatra Drive						
Eastbound Left-Through-Right	B	0.00	F	0.29	F	0.02
Westbound Left-Through-Right	C	0.52	C	0.51	C	0.29
Northbound Left-through-right	-	0.00	A	0.00	-	0.00
Southbound Left-turn	A	0.15	A	0.23	A	0.15
Southbound Through-Right	-	0.20	-	0.40	-	0.36
Liverpool Road/Radom Street						
Eastbound Left-Right	C	0.26	D	0.35	D	0.34
Northbound Left-Through	A	0.01	A	0.02	A	0.01
Liverpool Road/Krosno Boulevard						
Westbound Left-Right	A	0.23	B	0.27	A	0.18
Northbound Right-turn	B	0.48	B	0.45	B	0.48
Southbound Left-Through	B	0.47	D	0.87	C	0.67
Liverpool Road/Ilona Park Road (N)						
Eastbound Left-Right	B	0.02	B	0.02	B	0.03
Northbound Left-Through	A	0.00	A	0.00	-	0.00
Liverpool Road/Ilona Park Road (S)						
Eastbound Left-Right	B	0.03	B	0.01	B	0.01
Northbound Left-Through	-	0.00	A	0.00	-	0.00
Liverpool Road/Commerce Street						
Eastbound Left-Through-Right	B	0.04	B	0.03	C	0.05
Westbound Left-Through-Right	B	0.02	B	0.03	B	0.03
Northbound Left-Through-Right	A	0.00	A	0.00	A	0.01
Southbound Left-Through-Right	A	0.01	A	0.02	A	0.01
Liverpool Road/Annland Street						
Eastbound Left-Through-Right	B	0.11	B	0.08	B	0.12
Westbound Left-Through-Right	A	0.02	B	0.03	B	0.07
Northbound Left-Through-Right	A	0.01	A	0.01	A	0.01
Southbound Left-Through-Right	A	0.00	A	0.01	A	0.01
Liverpool Road/Wharf Street						
Eastbound Left-Through-Right	A	0.03	A	0.03	A	0.07
Westbound Left-Through-Right	A	0.01	A	0.01	A	0.03
Northbound Left-Through-Right	A	0.12	A	0.17	A	0.17
Southbound Left-Through-Right	A	0.13	A	0.29	A	0.31

Notes: v/c – volume to capacity ratio, LOS – level of service

Under 2032 background traffic conditions, there will be excess capacity at all unsignalized intersections and drivers/vehicles will experience level of service 'D' or better, with the exception of Tatra Drive at Liverpool Road. As mentioned in **Section 2.4**, the number of vehicles exiting the parking lot from the west is expected to be extremely low.

Traffic operations for the intersection of Tatra Drive and Liverpool Road was again assessed based on signalization due to the high number of pedestrians crossing at the pedestrian signal during the PM peak hour. Results are summarized in **Table 18**.

Table 18: Liverpool Road/Tatra Drive Signalized PM Peak Sensitive Analysis – 2032 Background

Intersection & Critical Movement	Weekday PM Peak Hour	
	LOS	v/c
Liverpool Road/Tatra Drive (when pedestrian signals active)		
Eastbound Left-Through-Right	C	0.08
Westbound Left-Through-Right	B	0.64
Northbound Left-through-right	A	0.39
Southbound Left-turn	A	0.33
Southbound Through-Right	B	0.50

Notes: v/c – volume to capacity ratio, LOS – level of service

Pedestrian and bicycle level of service under 2032 background conditions during the weekday AM, PM, and Saturday peak hour are summarized in **Table 19**.

Table 19: 2032 Background Pedestrian and Bicycle Level of Service

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday Midday Peak Hour	
	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS
Liverpool Road/Bayly Street						
Eastbound	B	C	C	D	B	C
Westbound	B	C	C	D	B	C
Northbound	B	C	B	C	B	C
Southbound	C	C	C	D	C	D

As shown in **Table 19**, pedestrian and bicycle trips will experience LOS 'D' or better under 2032 background conditions.

3.7 2032 Background Traffic Queues

2032 background weekday AM, PM, and weekend Saturday peak hour queues are summarized in **Table 20**.

SimTraffic queue results were reported for the two all way stop controlled intersections: (1) Liverpool Road/Krosno Boulevard, and (2) Liverpool Road/Wharf Street.

Table 20: 2032 Background 95th Percentile Queue Summary

Intersection	Existing Storage and Link Length	95 TH Percentile Queue (m) under 2032 Background Traffic Condition		
		AM Peak Hour	PM Peak Hour	SAT Peak Hour
Liverpool Road/Bayly Street				
Eastbound Left-turn	115	47	92	78
Eastbound Through	-	76	101	50
Eastbound Right-turn	100	<7	20	14
Westbound Left-turn	50	16	20	22
Westbound Through	-	32	72	33
Westbound Right-turn	150	38	134	54
Northbound Left-turn	75	10	16	13
Northbound Through-Right	-	98	86	75
Southbound Left-turn	50	128	96	73
Southbound Through	-	26	61	51
Southbound Right-turn	65	8	24	10
Liverpool Road/Tatra Drive				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	23	22	10
Northbound Left-through-right	-	<7	<7	<7
Southbound Left-turn	40	<7	<7	<7
Liverpool Road/Radom Street				
Eastbound Left-Right	-	8	12	11
Northbound Left-Through	-	<7	<7	<7
Liverpool Road/Krosno Boulevard				
Westbound Left-Right	-	16	15	13
Northbound Right-turn	-	29	28	27
Southbound Left-Through	-	29	58	42
Liverpool Road/Ilona Park Road (N)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Liverpool Road/Ilona Park Road (S)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Liverpool Road/Commerce Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Annland Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Wharf Street				
Eastbound Left-Through-Right	-	11	13	14
Westbound Left-Through-Right	-	8	9	11
Northbound Left-Through-Right	-	12	16	16
Southbound Left-Through-Right	-	16	20	22

Under 2032 background traffic conditions, 95th percentile queues can be accommodated for all key movements in the study area with the exception of the southbound left-turn during all peak periods similar to the 2027 background traffic conditions.

There are no geometric improvements required in the study area under the 2032 background traffic conditions. However, similar to 2027 background condition, City can consider the potential realignment of southbound lane markings to accommodate the full queue length of southbound left traffic at Liverpool Road/Bayly Street.

4. Proposed Development

4.1 Conceptual Site Plan

The proposed development will be a mixed-use development comprising a residential and commercial component, which will be integrated into the same site. The residential component will consist of 498 condominium units in 2 buildings and 1,900 sm (20,451 sf) of commercial space. In addition, the site is proposed to supply 739 parking spaces including 200 public parking spaces and 539 parking spaces for both residential and commercial components. The site concept plan is shown in **Exhibit 7**.

One full movement driveway access is proposed to the site located just south of the pumping station road.

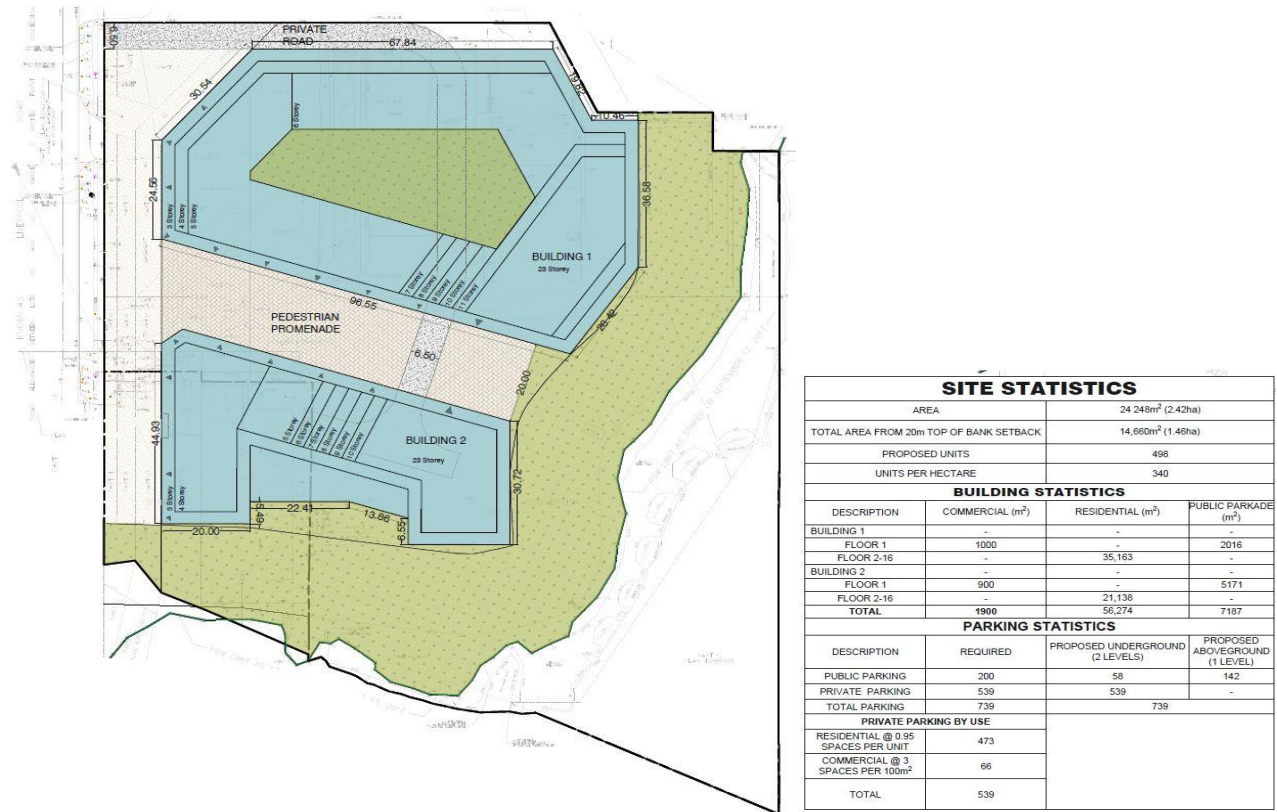


Exhibit 7: Conceptual Site Plan

4.2 Proposed Development Traffic Generation

Site traffic generation for the proposed residential development was based on ITE. The Residential Condominium / Townhouse land use code 230 was used to estimate the trip generation for the 428 condominium units. In addition, the public parking lot expansion traffic generation was based on the survey.

Commercial site traffic generation was determined by using ITE. The Shopping Centre land use 820 and Specialty Retail Centre land use code 826 were reviewed to estimate the trip generation for the 20,451 sf commercial space. The rates are summarized in **Table 21**.

Table 21: Commercial Vehicular Site Traffic Generation – Rates Comparison

		Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
Land Use (820) Shopping Centre				
Trip Rate (equation based on 37,700 sf)	veh / 1000sf	2.89	10.12	15.24
Trip Rate (average rate)	veh / 1000sf	0.96	3.71	4.82
Land Use (826) Specialty Retail Centre				
Trip rate (equation based on 37,700 sf)	veh / 1000sf	10.56	3.45	No data
Trip rate (average rate)	veh / 1000sf	6.84	2.71	No data

The Special Retail Centre equation and average rate for the weekday AM peak hour rates were based on a small sample size from ITE. The AM peak hour trip rate was also higher than the PM peak hour rate. This is counter-intuitive, as the AM peak hour does not coincide with the proposed land use's hours of operation.

Moreover, the Shopping Centre equations tended to overestimate trips when the size of the development is significantly smaller than the average size of the ITE samples.

As a result of the review above, the Shopping Centre average rates were used in this study as an appropriate method to forecast trips generated by the supporting ground floor retail space which will be frequented primarily by the residents and will not be a major generator of external traffic.

Since the proposed development is mixed-use, it is expected that a portion of trips generated by the commercial component will originate from the residential building. In this analysis, an internal capture rate of 10% was used for weekday AM, PM and Saturday peak hours.

As mentioned in **Section 2.6**, a parking survey was conducted on Saturday June 3rd, 2017 and Thursday June 8th, 2017. In addition to the parking survey, a driveway count at the public parking lot was conducted between 4:00pm and 6:00pm on Thursday and 3:00pm and 7:00pm on Saturday.

During the parking survey, it was observed that majority of the drivers were entering and exiting within a short period of time because the parking lot was fully utilized. Assuming the parking lot was able to accommodate all the demand, the trip generation is summarized in



Table 22. It is noted that number of outbound vehicles would be reduced if parking spaces were available.

Table 22: Public Parking Lot Demand

		Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
Public Parking Lot Trip Generation				
Inbound (demand)	veh	-	94	138
Outbound	veh	-	73	134
Total	veh	-	167	272

The new expanded parking lot of 200 parking spaces (an additional 128 spaces) will be able to accommodate the parking demand of 94 and 138 vehicles during the weekday PM and Saturday peak hours, respectively.

However, it is anticipated that more drivers will be using the new expanded public parking lot when it is available; a conservative trip generation was used to estimate the additional demand. In this report, the peak 15 minutes trip generation rates were used based on the driveway counts. The trip generation rates for the existing public parking lot are summarized in **Table 23**.

Table 23: Public Parking Lot Vehicular Site Traffic Generation

		Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
Public Parking Lot – additional 128 Spaces				
Inbound Trip Rate	veh / space	-	0.16	0.24
Outbound Trip Rate	veh / space	-	0.14	0.21
Total Trip Rate	veh / space	-	0.30	0.45

The resulting vehicular traffic generation is summarized in **Table 24**.

Table 24: Site Traffic Generation

		Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
Land Use (826) Specialty Retail Centre – 20,451 sf				
Gross trip rate	veh / 1000 sf	0.96	3.71	4.82
Gross trip generation	veh / h	20	76	99
Gross inbound trips	veh / h	12	36	51
Gross outbound trips	veh / h	8	40	48
Land Use (230) Residential Condominium / Townhouse – 498 units				
Gross trip rate	veh / unit	0.35	0.37	0.36
Gross trips	veh / h	173	185	178
Internal percentage		10%	10%	10%
Internal trip	veh / h	17	19	18
Internal inbound trips	veh / h	3	12	8
Internal outbound trips	veh / h	14	7	10
Net trip	veh / h	156	166	160
Inbound trips	veh / h	30	103	69
Outbound trips	veh / h	126	63	91
Public Parking Lot – additional 128 Spaces				
Gross trip rate	veh / space	-	0.75	1.15
Gross trip generation	veh / h	-	96	148
Gross inbound trips	veh / h	-	52	78
Gross outbound trips	veh / h	-	44	70
Total				
Total net trip generation	veh / h	176	368	453
Total net inbound trips	veh / h	134	207	223
Total net outbound trips	veh / h	42	161	230

4.3 Site Generated Transit Demand

To estimate the amount of transit demand generated by the development the following process was applied:

1. Mode splits from the TTS 2016 were researched and it can be assumed that the vehicular auto-driver mode splits are 86% and 84% during the weekday AM and PM peak periods, respectively.

Bus Transit and GO Train mode splits from TTS 2016 were 4% and 5%, during the AM peak hour, and 7% and 6% during PM peak hour for the site generated trips.

2. Vehicular site trip generation from **Table 24** - which represents auto-driver trips – was then converted to bus transit trips, and GO Transit Trips using the above mode splits. However, only site generated auto-trips to/from the public car parking lot will be excluded for the transit trips estimation.

3. Using the above information the projected transit demand in person trips was estimated. The resulting transit demand is summarized in **Table 25** below.

Table 25: Transit Site Trip Generation

Period	Auto-Driver Trips		Bus Transit Trips	GO Train Trips	Total Transit
	Trips	Split	Trips	Trips	Trips
Weekday AM Peak Hour	86% Auto		4% Bus Transit	5% GO Train	
IN	30	19%	2	2	3
OUT	126	81%	7	7	15
TOTAL	156		9	9	18
Weekday PM Peak Hour	84% Auto		7% Bus Transit	6% GO Train	
IN	103	62%	9	7	16
OUT	63	38%	5	5	10
TOTAL	166		14	12	26

Assuming site generated person trips to/from the GO station also uses the DRT buses on Liverpool Road, the total transit trips would be 18 person-trips during the AM peak hour and 26 person-trips during the PM peak hour.

4.4 Trip Distribution

The distribution for the residential component of the development was based on the review of the information provided in the 2006 Transportation Tomorrow Survey (“TTS”) conducted by the University of Toronto Joint Program in Transportation. The 2016 TTS divides geographical areas into ‘zones’ for the purposes of determining trip patterns from one zone to another. Since there are multiple road facilities available from each zone to the site, a comprehensive review was done on a zone by zone basis to determine an assignment of trips from each zone to the surrounding road network. The zones and routes were then aggregated to determine percentages based on route assignment.

The trip distribution for the residential land use is based on home to work based trips originating from zone adjacent to the site and destined to the zones in the Greater Toronto Area during the weekday peak period.

The trip distribution for the commercial land use was based on the population density in the surrounding area, with consideration given to major routes available to access the proposed development.

The trip distribution for the public parking lot expansion was based on the existing traffic pattern with consideration given to major routes available to access the beach. It is expected that very few trips will be generated during the AM peak hours for the public parking lot. To be conservative, the forecast AM parking demand was assumed to be 72 spaces, which was derived from the observed parking during the PM peak hour.

The trip distribution for the proposed development is summarized in **Table 26**.



Table 26: Site Traffic Distribution

To / From	Via	New Site Trips		
		Residential	Commercial	Public Parking Lot
North	Liverpool Road	60%	15%	70%
South	Liverpool Road	0%	0%	0%
East	Bayly Street	20%	0%	15%
	Krosno Boulevard	10%	10%	0%
	Commerce Street	3%	10%	0%
	Annland Street	2%	30%	0%
West	Bayly Street	5%	5%	15%
	Radom Street	0%	10%	0%
	Commerce Street	0%	5%	0%
	Annland Street	0%	15%	0%
Total		100 %	100 %	100%

The commercial, residential, parking lot expansion and the total site trips are shown in **Exhibit 8**, **Exhibit 9**, **Exhibit 10**, and **Exhibit 11**, respectively.

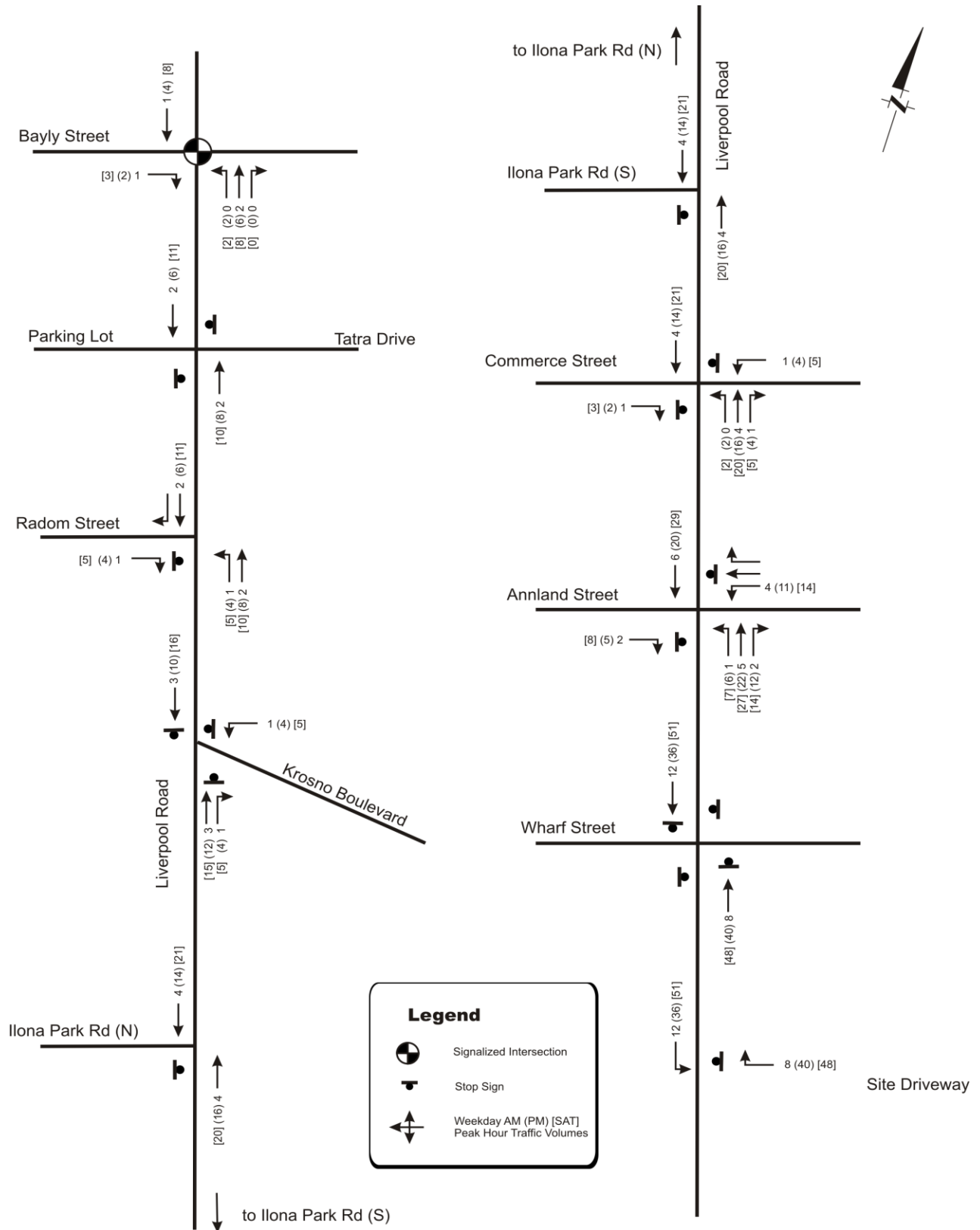


Exhibit 8: Commercial Traffic Volumes

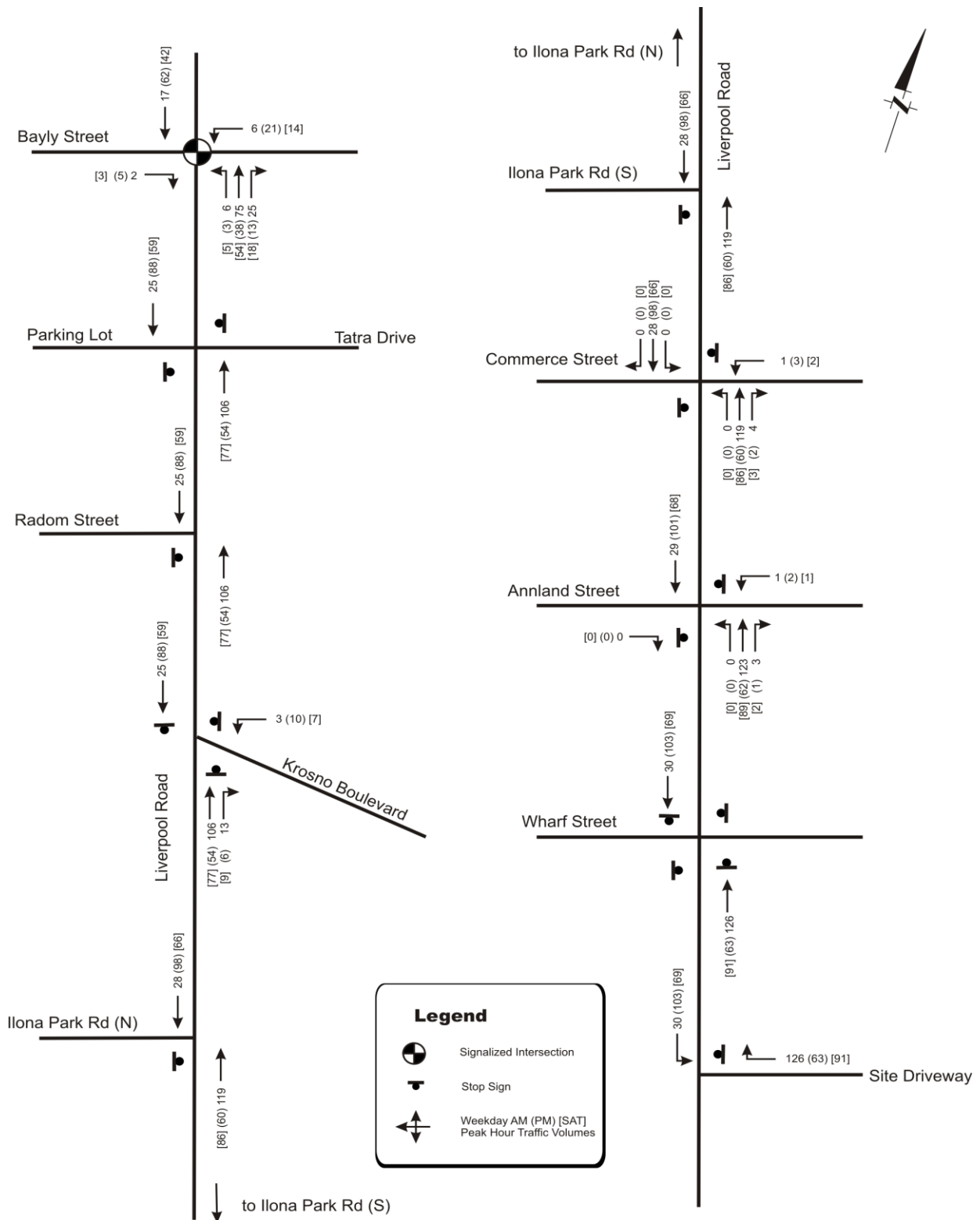


Exhibit 9: Residential Traffic Volumes

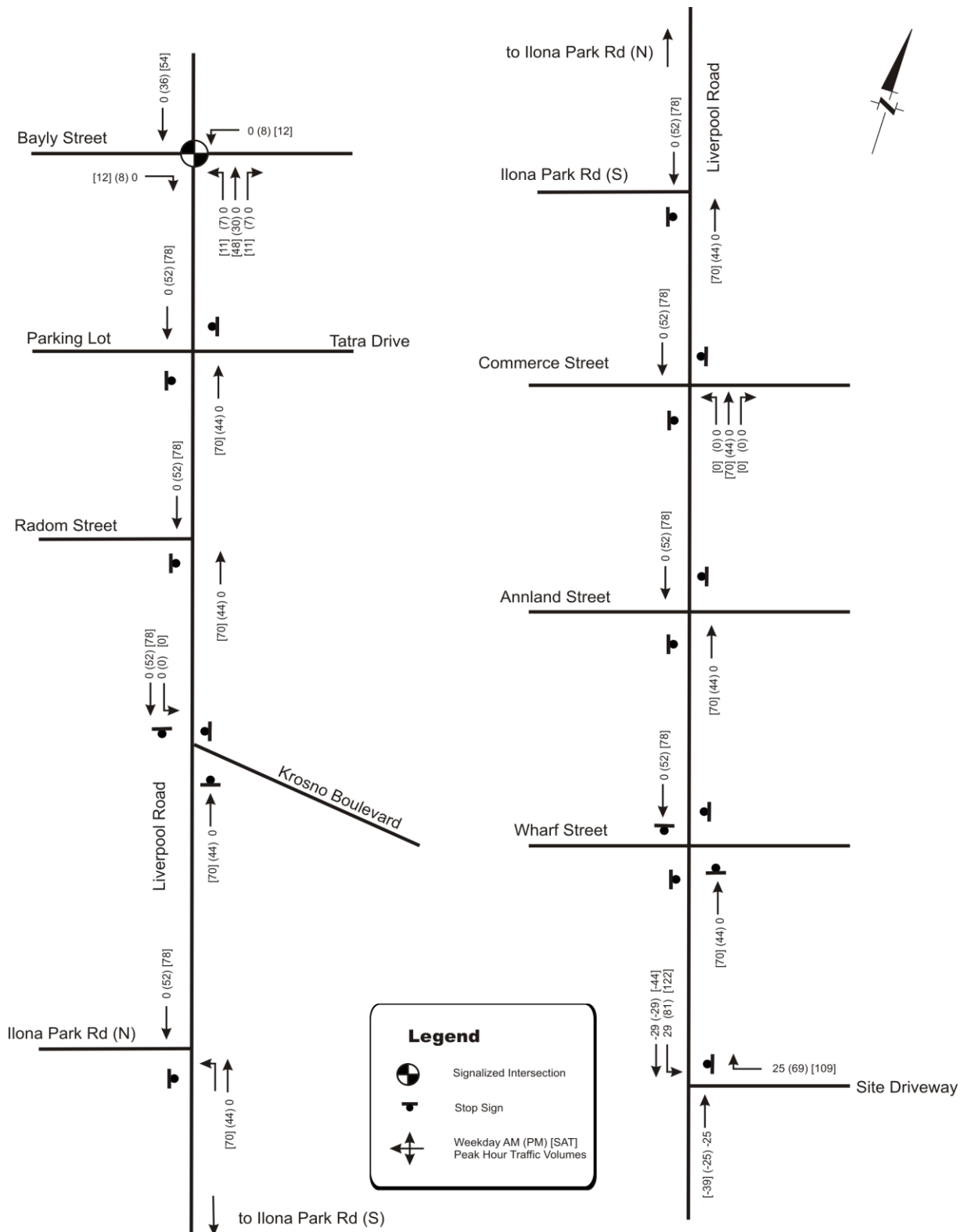


Exhibit 10: Public Parking Lot Expansion Traffic Volumes

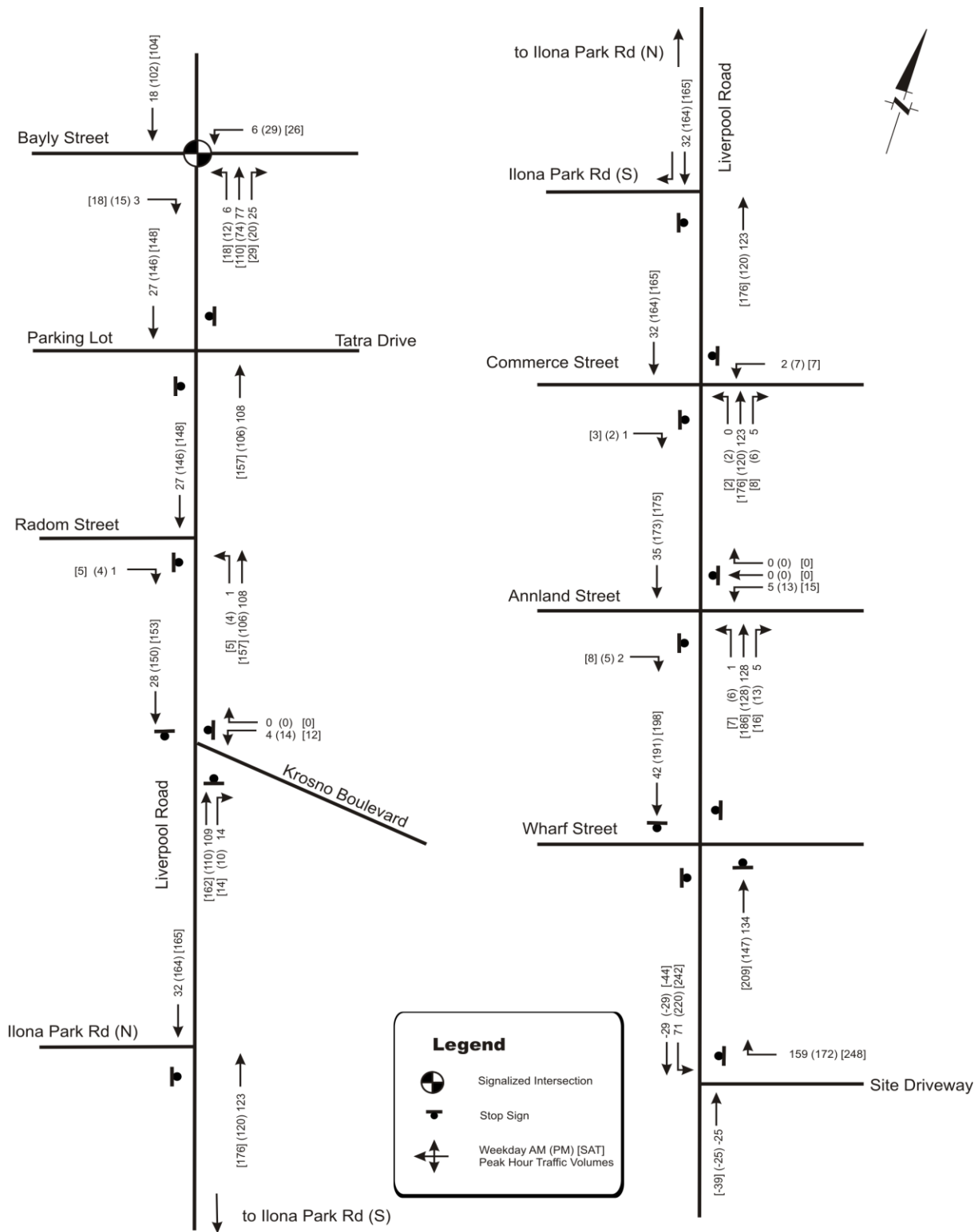


Exhibit 11: Site Traffic Volumes – Total

5. 2027 and 2032 Total Traffic Conditions

5.1 2027 Total Traffic Operations

The 2027 total traffic volumes include 2027 background traffic plus the resulting site traffic for the proposed development are shown in **Exhibit 12**. The 2027 total signalized and unsignalized intersection operations are summarized in **Table 27** and **Table 28**, respectively. Detailed HCM output sheets generated by Synchro are provided in **Appendix C**.

Table 27: 2027 Total Traffic Signalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Bayly Street						
Eastbound Left-turn	C	0.51	D	0.92	C	0.64
Eastbound Through	D	0.70	C	0.70	C	0.36
Eastbound Right-turn	A	0.25	A	0.46	A	0.29
Westbound Left-turn	C	0.30	C	0.57	C	0.36
Westbound Through	C	0.31	C	0.59	C	0.30
Westbound Right-turn	A	0.38	D	0.91	B	0.48
Northbound Left-turn	B	0.18	B	0.30	B	0.27
Northbound Through-Right	E	0.96	D	0.90	D	0.92
Southbound Left-turn	D	0.86	E	0.93	D	0.84
Southbound Through	B	0.20	C	0.54	C	0.45
Southbound Right-turn	A	0.18	A	0.30	A	0.29

Notes: v/c – volume to capacity ratio, LOS – level of service

For 2027 total traffic conditions, the individual movements for Bayly Street at Liverpool Road will all operate at Level of Service ‘E’ or better, and with volume to capacity ratios of 0.96 or better under optimized signal timings.

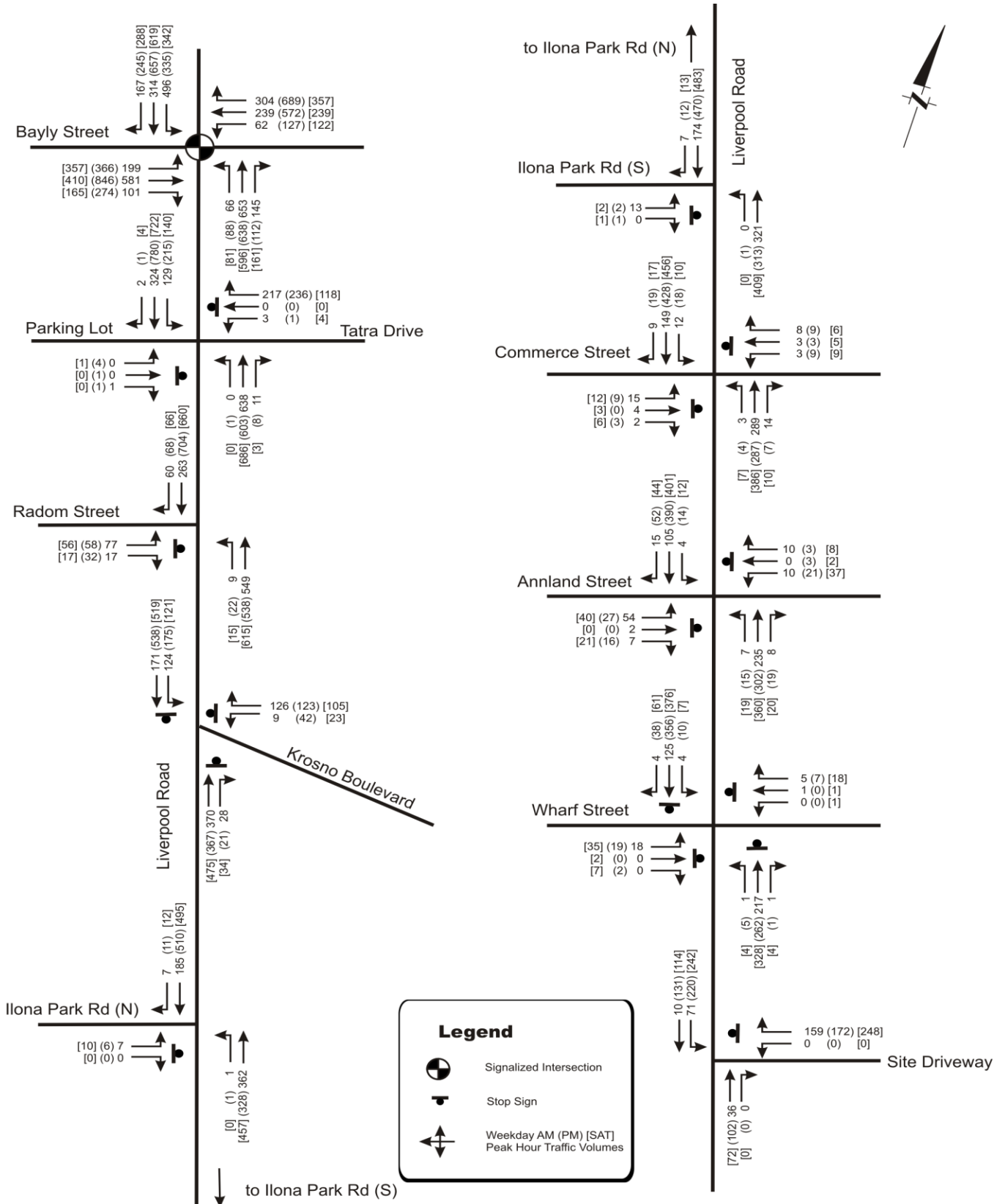


Exhibit 12: 2027 Total Traffic Volumes

Table 28: 2027 Total Traffic Unsignalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Tatra Drive						
Eastbound Left-Through-Right	B	0.00	F	0.59	F	0.04
Westbound Left-Through-Right	D	0.60	D	0.59	C	0.39
Northbound Left-through-right	-	0.00	A	0.00	A	0.00
Southbound Left-turn	B	0.16	B	0.25	B	0.17
Southbound Through-Right	-	0.21	-	0.48	A	0.44
Liverpool Road/Radom Street						
Eastbound Left-Right	C	0.31	E	0.55	F	0.62
Northbound Left-Through	A	0.01	A	0.03	A	0.02
Southbound Through-Right	-	0.20	-	0.47	-	0.47
Liverpool Road/Krosno Boulevard						
Westbound Left-Right	B	0.26	B	0.32	B	0.23
Northbound Right-turn	C	0.69	C	0.66	C	0.77
Southbound Left-Through	B	0.54	F	1.17	E	0.95
Liverpool Road/Ilona Park Road (N)						
Eastbound Left-Right	B	0.02	C	0.03	C	0.04
Northbound Left-Through	A	0.00	A	0.00	A	0.00
Southbound Through-Right	-	0.13	-	0.36	-	0.33
Liverpool Road/Ilona Park Road (S)						
Eastbound Left-Right	B	0.04	C	0.01	C	0.01
Northbound Left-Through	-	0.00	A	0.00	A	0.00
Southbound Through-Right	-	0.13	-	0.33	-	0.31
Liverpool Road/Commerce Street						
Eastbound Left-Through-Right	B	0.06	C	0.05	C	0.10
Westbound Left-Through-Right	B	0.03	C	0.08	C	0.09
Northbound Left-Through-Right	A	0.00	A	0.00	A	0.01
Southbound Left-Through-Right	A	0.01	A	0.02	A	0.01
Liverpool Road/Annland Street						
Eastbound Left-Through-Right	B	0.15	C	0.14	C	0.23
Westbound Left-Through-Right	B	0.04	C	0.10	C	0.20
Northbound Left-Through-Right	A	0.01	A	0.01	A	0.02
Southbound Left-Through-Right	A	0.00	A	0.01	A	0.01
Liverpool Road/Wharf Street						
Eastbound Left-Through-Right	A	0.03	A	0.04	A	0.08
Westbound Left-Through-Right	A	0.01	A	0.01	A	0.03
Northbound Left-Through-Right	A	0.30	B	0.40	B	0.47
Southbound Left-Through-Right	A	0.19	B	0.57	B	0.60
Liverpool Road/Site Access						
Westbound Left-Right	A	0.21	B	0.26	B	0.01
Northbound Through-Right	-	0.03	-	0.08	-	0.20
Southbound Left-Through	A	0.06	A	0.20	A	0.01

Notes: v/c – volume to capacity ratio, LOS – level of service

Under 2027 total traffic conditions, there will be excess capacity at most unsignalized intersections while operating at level of service ‘D’ or better. Some movements will experience long delays, such as eastbound at Tatra Drive at Liverpool Road during the weekday PM and Saturday peak periods as well as eastbound movements at Radom Street at Liverpool Road during the weekday PM and Saturday peak periods.

Southbound movements at Krosno Boulevard at Liverpool Road will operate at level of service ‘F’ and at capacity (v/c ratio > 1.0). As a result, Krosno Boulevard at Liverpool Road was analyzed as a signalized intersection to identify potential improvements. 2027 total signalized intersection operations for Krosno Boulevard at Liverpool Road is summarized in **Table 29**.

Table 29: 2027 Total Traffic Krosno Boulevard Signalized Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Krosno Boulevard						
Westbound Left-Right	B	0.59	C	0.62	B	0.55
Northbound Right-turn	A	0.37	A	0.31	A	0.37
Southbound Left-Through	A	0.40	B	0.73	A	0.57

Notes: v/c – volume to capacity ratio, LOS – level of service

As shown in **Table 29**, all movements at Krosno Boulevard will operate at level of service ‘C’ or better if signalized.

A 1-hour signal warrant analysis was also conducted to determine the need for signalization, and the detailed results can be found in **Appendix C**. The results indicated that both Warrant 1 – Minimum Vehicular Volume and Warrant 2 – Delay to Cross Traffic are not met.

In addition, Tatra Drive at Liverpool Road was also analyzed with signalized operations due to the high volume of pedestrians during the PM peak hour. The results can be found in **Table 30**.

Table 30: 2027 Total Traffic Tatra Drive Signalized PM Peak Operations

Intersection & Critical Movement	Weekday PM Peak Hour	
	LOS	v/c
Liverpool Road/Tatra Drive (when pedestrian signals active)		
Eastbound Left-Through-Right	C	0.08
Westbound Left-Through-Right	B	0.66
Northbound Left-through-right	A	0.46
Southbound Left-turn	A	0.37
Southbound Through-Right	A	0.59

Notes: v/c – volume to capacity ratio, LOS – level of service

The 2027 total pedestrian and bicycle levels of service during the weekday AM peak hour and weekday PM peak hour is summarized in **Table 31**. Pedestrian and bicycle levels of service will continue to operate at LOS ‘D’ or better under the 2027 total conditions, which will be acceptable.



Table 31: 2027 Total Pedestrian and Bicycle Level of Service

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS
Liverpool Road/Bayly Street						
Eastbound	B	C	C	D	B	C
Westbound	B	C	C	D	B	C
Northbound	B	C	B	C	B	C
Southbound	C	C	C	D	C	D

5.2 2027 Total Queues

Queues under 2027 total traffic conditions are summarized in **Table 32** for key movements. Detailed calculations are provided in **Appendix C**.

SimTraffic queue results were reported for the two all way stop controlled intersections: (1) Liverpool Road/Krosno Boulevard, and (2) Liverpool Road/Wharf Street.

Table 32: 2027 Total 95th Percentile Queue Summary

Intersection	Existing Storage and Link Length	95 TH Percentile Queue (m) under 2027 Total Traffic Condition		
		AM Peak Hour	PM Peak Hour	SAT Peak Hour
Liverpool Road/Bayly Street				
Eastbound Left-turn	115	47	90	73
Eastbound Through	-	74	98	46
Eastbound Right-turn	100	<7	30	14
Westbound Left-turn	50	17	25	26
Westbound Through	-	32	70	32
Westbound Right-turn	150	38	133	55
Northbound Left-turn	75	11	18	16
Northbound Through-Right	-	119	108	109
Southbound Left-turn	50	128	100	92
Southbound Through	-	27	72	64
Southbound Right-turn	65	8	24	10
Liverpool Road/Tatra Drive				
Eastbound Left-Through-Right	-	<7	10	<7
Westbound Left-Through-Right	-	29	28	14
Northbound Left-through-right	-	<7	<7	<7
Southbound Left-turn	40	<7	7	<7
Liverpool Road/Radom Street				
Eastbound Left-Right	-	10	22	24
Northbound Left-Through	-	<7	<7	<7
Southbound Through-Right	-	<7	<7	<7
Liverpool Road/Krosno Boulevard				
Westbound Left-Right	-	20	23	<7
Northbound Right-turn	-	33	44	50
Southbound Left-Through	-	23	59	67
Liverpool Road/Ilona Park Road (N)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Southbound Through-Right	-	<7	<7	<7
Liverpool Road/Ilona Park Road (S)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Southbound Through-Right	-	<7	<7	<7
Liverpool Road/Commerce Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Anniand Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Wharf Street				
Eastbound Left-Through-Right	-	13	13	11
Westbound Left-Through-Right	-	8	<7	13
Northbound Left-Through-Right	-	9	15	28
Southbound Left-Through-Right	-	24	26	31
Liverpool Road/Site Access				
Westbound Left-Right	-	<7	8	<7
Northbound Through-Right	-	<7	<7	<7
Southbound Left-Through	-	<7	7	<7

Under 2027 total traffic conditions, 95th percentile queues can be accommodated for all key movements in the study area with the exception of the southbound left-turn during all peak periods.

In conclusion, there are no geometric improvements required in the study area under the 2027 total traffic conditions. However, signalization is recommended at Liverpool Road at Krosno Boulevard as well as signal timing optimization at Liverpool Road at Bayly Street.

5.3 2032 Total Traffic Operations

The 2032 total traffic volumes include 2032 background traffic plus the resulting site traffic for the proposed development are shown in **Exhibit 13**. The 2032 total signalized and unsignalized intersection operations are summarized in **Table 33** and **Table 34**, respectively. Detailed HCM output sheets generated by Synchro are provided in **Appendix C**.

Table 33: 2032 Total Traffic Signalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Bayly Street						
Eastbound Left-turn	C	0.52	D	0.94	C	0.70
Eastbound Through	D	0.71	C	0.72	C	0.40
Eastbound Right-turn	A	0.25	A	0.46	A	0.31
Westbound Left-turn	C	0.31	C	0.59	C	0.35
Westbound Through	C	0.31	C	0.61	C	0.30
Westbound Right-turn	A	0.38	D	0.92	B	0.47
Northbound Left-turn	B	0.18	B	0.31	B	0.26
Northbound Through-Right	E	0.98	D	0.91	D	0.86
Southbound Left-turn	D	0.86	E	0.93	D	0.83
Southbound Through	B	0.20	C	0.55	C	0.44
Southbound Right-turn	A	0.18	A	0.30	A	0.29
Liverpool Road/Krosno Boulevard						
Westbound Left-Right	B	0.59	C	0.62	B	0.55
Northbound Through-Right	A	0.37	A	0.31	A	0.38
Southbound Left-turn	A	0.40	B	0.74	A	0.58

Notes: v/c – volume to capacity ratio, LOS – level of service

Under 2032 total traffic conditions, the individual movements for signalized intersections in the study area will all operate at Level of Service 'E' or better, and with volume to capacity ratios of 0.98 or better if signals are optimized. The analysis included Krosno Boulevard under the assumption that improvements made for 2027 total traffic conditions will be implemented.

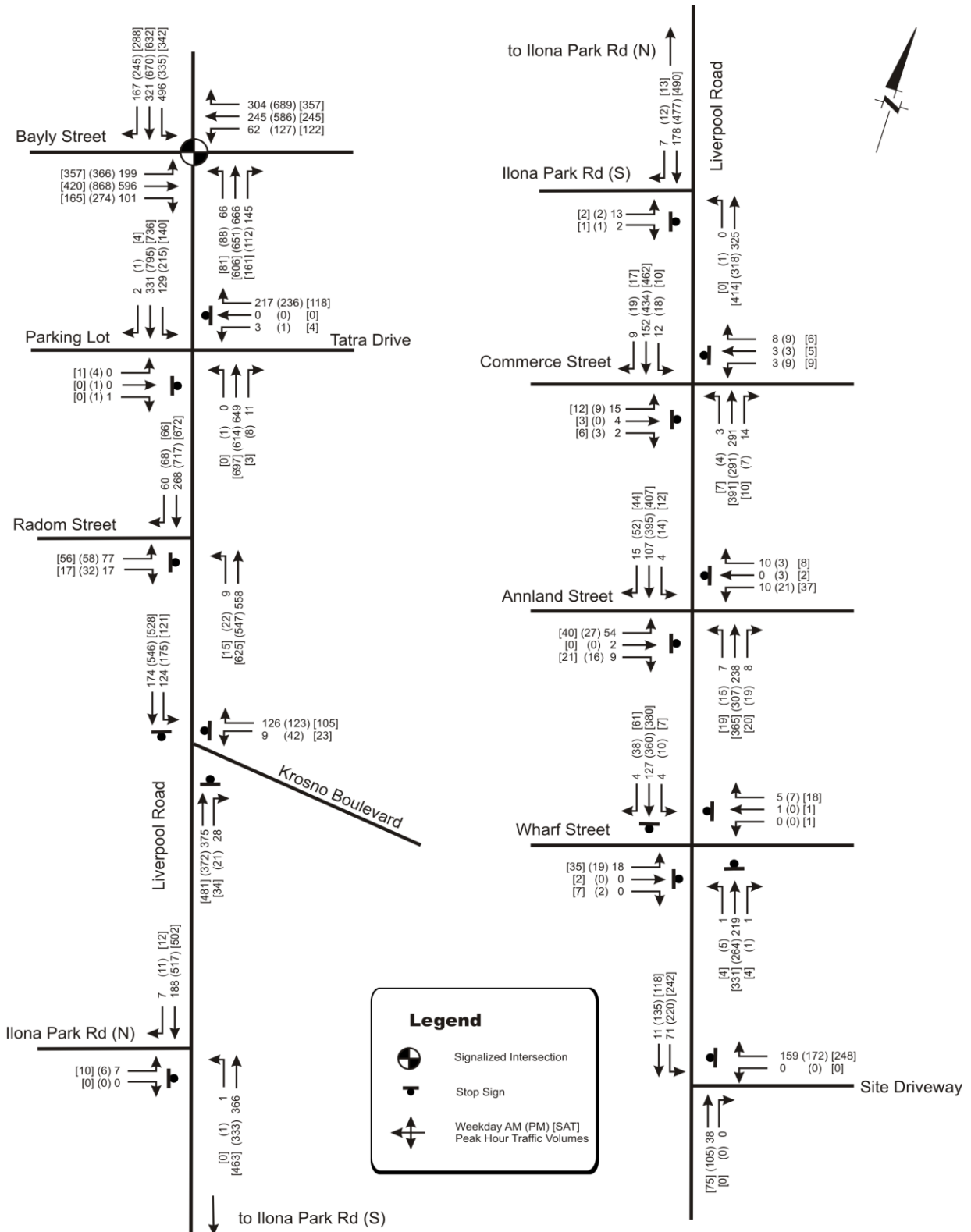


Exhibit 13: 2032 Total Traffic Volumes

Table 34: 2032 Total Traffic Unsignalized Intersection Operations

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c
Liverpool Road/Tatra Drive						
Eastbound Left-Through-Right	B	0.00	F	0.64	F	0.05
Westbound Left-Through-Right	D	0.61	D	0.60	C	0.40
Northbound Left-through-right	-	0.00	A	0.00	-	0.00
Southbound Left-turn	B	0.17	B	0.25	B	0.17
Southbound Through-Right	-	0.22	-	0.49	-	0.45
Liverpool Road/Radom Street						
Eastbound Left-Right	C	0.32	F	0.57	F	0.65
Northbound Left-Through	A	0.01	A	0.03	A	0.02
Southbound Through-Right	-	0.21	-	0.48	-	0.48
Liverpool Road/Ilona Park Road (N)						
Eastbound Left-Right	B	0.02	C	0.03	C	0.05
Northbound Left-Through	A	0.00	A	0.00	-	0.00
Southbound Through-Right	-	0.13	-	0.37	-	0.33
Liverpool Road/Ilona Park Road (S)						
Eastbound Left-Right	B	0.04	C	0.01	C	0.01
Northbound Left-Through	-	0.00	A	0.00	-	0.00
Southbound Through-Right	-	0.13	-	0.33	-	0.32
Liverpool Road/Commerce Street						
Eastbound Left-Through-Right	B	0.06	C	0.05	C	0.10
Westbound Left-Through-Right	B	0.03	C	0.08	C	0.09
Northbound Left-Through-Right	A	0.00	A	0.00	A	0.01
Southbound Left-Through-Right	A	0.01	A	0.02	A	0.01
Liverpool Road/Annland Street						
Eastbound Left-Through-Right	B	0.15	C	0.15	C	0.23
Westbound Left-Through-Right	B	0.04	C	0.10	C	0.20
Northbound Left-Through-Right	A	0.01	A	0.01	A	0.02
Southbound Left-Through-Right	A	0.00	A	0.01	A	0.01
Liverpool Road/Wharf Street						
Eastbound Left-Through-Right	A	0.03	A	0.04	A	0.08
Westbound Left-Through-Right	A	0.01	A	0.01	A	0.03
Northbound Left-Through-Right	A	0.31	B	0.40	B	0.47
Southbound Left-Through-Right	A	0.19	B	0.58	B	0.60
Liverpool Road/Site Access						
Westbound Left-Right	A	0.21	B	0.26	B	0.01
Northbound Through-Right	-	0.03	-	0.08	-	0.2
Southbound Left-Through	A	0.06	A	0.20	A	0.01

Notes: v/c – volume to capacity ratio, LOS – level of service

Under 2032 total traffic conditions, there will be excess capacity at all unsignalized intersections while operating at level of service 'D' or better, with the exception of eastbound movements at both Liverpool Road at Tatra Drive and Liverpool Road at Radom Street during the Weekday PM and Saturday peak periods. As mentioned in **Section 2.4**, the number of vehicles exiting the parking lot from the west is expected to be extremely low during those peaks.

In addition, Tatra Drive at Liverpool Road was also analyzed with signalized operations due to the high volume of pedestrians during the PM peak hour. The results can be found in **Table 35**.

Table 35: 2032 Total Traffic Tatra Drive Signalized PM Peak Operations

Intersection & Critical Movement	Weekday PM Peak Hour	
	LOS	v/c
Liverpool Road/Tatra Drive (when pedestrian signals active)		
Eastbound Left-Through-Right	C	0.08
Westbound Left-Through-Right	B	0.66
Northbound Left-through-right	A	0.46
Southbound Left-turn	A	0.37
Southbound Through-Right	A	0.59

Notes: v/c – volume to capacity ratio, LOS – level of service

The 2032 total pedestrian and bicycle levels of service during the weekday AM, weekday PM, and Saturday peak hours are summarized in **Table 36**. Pedestrian and bicycle levels of service will continue to operate at LOS ‘D’ or better under the 2032 total conditions.

Table 36: 2032 Pedestrian and Bicycle Level of Service

Intersection & Critical Movement	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday MID Peak Hour	
	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS	Pedestrian LOS	Bicycle LOS
Liverpool Road/Bayly Street						
Eastbound	B	C	C	D	B	C
Westbound	B	C	C	D	B	C
Northbound	B	C	B	C	B	C
Southbound	C	C	C	D	C	D
Liverpool Road/Krosno Boulevard						
Westbound	A	B	A	B	A	B
Northbound	B	C	B	B	B	C
Southbound	B	B	B	C	B	C

5.4 2032 Total Queues

Queues under 2032 total traffic conditions are summarized in Table 37 for key movements. Detailed calculations are provided in **Appendix C**.

SimTraffic queue results were reported for the all way stop controlled intersection of Liverpool Road/Wharf Street.

Table 37: 2032 Total 95th Percentile Queue Summary

Intersection	Existing Storage and Link Length	95 TH Percentile Queue (m) under 2032 Total Traffic Condition		
		AM Peak Hour	PM Peak Hour	SAT Peak Hour
Liverpool Road/Bayly Street				
Eastbound Left-turn	115	47	92	77
Eastbound Through	-	76	101	50
Eastbound Right-turn	100	<7	31	15
Westbound Left-turn	50	17	25	27
Westbound Through	-	32	71	33
Westbound Right-turn	150	38	133	54
Northbound Left-turn	75	11	18	15
Northbound Through-Right	-	122	111	96
Southbound Left-turn	50	128	100	91
Southbound Through	-	27	73	62
Southbound Right-turn	65	8	25	10
Liverpool Road/Tatra Drive				
Eastbound Left-Through-Right	-	<7	10	<7
Westbound Left-Through-Right	-	30	29	14
Northbound Left-through-right	-	<7	<7	<7
Southbound Left-turn	40	<7	8	<7
Liverpool Road/Radom Street				
Eastbound Left-Right	-	10	23	30
Northbound Left-Through	-	<7	<7	<7
Southbound Through-Right	-	<7	<7	<7
Liverpool Road/Krosno Boulevard				
Westbound Left-Right	-	13	24	18
Northbound Right-turn	-	33	36	42
Southbound Left-Through	-	29	130	74
Liverpool Road/Ilona Park Road (N)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Southbound Through-Right	-	<7	<7	<7
Liverpool Road/Ilona Park Road (S)				
Eastbound Left-Right	-	<7	<7	<7
Northbound Left-Through	-	<7	<7	<7
Southbound Through-Right	-	<7	<7	<7
Liverpool Road/Commerce Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Annland Street				
Eastbound Left-Through-Right	-	<7	<7	<7
Westbound Left-Through-Right	-	<7	<7	<7
Northbound Left-Through-Right	-	<7	<7	<7
Southbound Left-Through-Right	-	<7	<7	<7
Liverpool Road/Wharf Street				
Eastbound Left-Through-Right	-	12	13	8
Westbound Left-Through-Right	-	5	7	13
Northbound Left-Through-Right	-	17	19	26
Southbound Left-Through-Right	-	19	29	37
Liverpool/Site Access				
Westbound Left-Right	-	<7	8	<7
Northbound Through-Right	-	<7	<7	<7
Southbound Left-Through	-	<7	<7	<7

Under 2032 total traffic conditions, 95th percentile queues can be accommodated for all key movements in the study area with the exception of the southbound left-turn movement at Liverpool



Road/Bayly Street during all peak periods. However, similar to the 2032 background condition, the Region/City can consider the potential realignment of southbound lane markings to accommodate the full queue length of southbound left traffic at Liverpool Road/Bayly Street.

In conclusion, geometric improvements will not be required in the study area under the 2027 total traffic conditions. However, signalization is recommended at Liverpool Road at Krosno Boulevard as well as signal timing optimization at Liverpool Road at Bayly Street.

6. Traffic Demand Management Measures

Various Traffic Demand Management (“TDM”) measures are proposed to encourage non-single occupant vehicle use and dependency for the residents and customers in the proposed development.

6.1.1 Cycling

Based on the City’s Zoning By-law 7553/17, the minimum number of bicycle parking spaces requirement for apartment dwelling is 0.5 spaces per dwelling unit and 1 space for 1,000 sm of gross leasable floor area of commercial space.

As a result, the proposed development will provide 214 and 4 bicycle parking spaces, respectively, for residents and retail customers to meet the City’s By-law requirement.

A maximum of 50% of the required bicycle parking spaces will be vertical spaces and the remaining will be horizontal spaces. In addition, a minimum of 25% of total spaces will be located within a building with a secure area such as a supervised parking lot or enclosure, or bicycle lockers.

6.1.2 Walking

Active transportation access in the form of a hard surface pathway will be provided connecting the building entrance to the existing sidewalk on Liverpool Road to facilitate pedestrian access.

Residents, visitors, employees and customers can easily access the site from the surrounding neighborhoods. This will assist in accommodating residents that choose not to utilize their vehicles and the local road system to access the site.

In addition, existing streetlights along Liverpool Road and lighting from the building will illuminate the sidewalk and the walkway connection to the site. The walk distance (in terms of travel time) from the proposed development to the GO station is 28 minutes.

6.1.3 Transit

As mentioned in **Section 2.2**, the DRT and GO currently provides surface bus routes and GO train along Liverpool Road and the study area. Pickering GO Station is located at the north-east quadrant of the Liverpool Road and Bayly Street intersection, with approximately 2km from the proposed site. The following bus routes provide service to the site:

Bus / Route	Approximate headways during peak periods
Liverpool Road	
193 Community (DRT)	Weekday PM – 60 minutes Saturday MID – 60 minutes
101A Bay Ridges (DRT)	Weekday AM – 30 minutes
101 Bay Ridges (DRT)	Weekday PM – 60 minutes Saturday MID – 60 minutes
Bayly Street	
110 Finch West (DRT)	Weekday AM – 10 minutes from 7:10 to 7:30, 30 minutes after 7:30

Bus / Route	Approximate headways during peak periods
110A Finch West (DRT)	Weekday AM – 30 minutes
107 Rosebank Whites (DRT)	Weekday AM – 30 minutes Weekday PM – 30 minutes
120 Rosebank Whites (DRT)	Weekday AM – 20 minutes Weekday PM – 20 minutes Saturday MID – 30 minutes
103 Glenanna (DRT)	Weekday AM – 30 minutes Weekday PM – 30 minutes Saturday MID – 60 minutes
223 Bayly (DRT)	Weekday AM – 30 minutes Weekday PM – 30 minutes Saturday MID – 60 minutes
GO Transit	
Lakeshore East Train (GO)	Weekday AM – 20 minutes towards Toronto, 30 minutes towards Oshawa Weekday PM – 20 minutes towards Oshawa, 20 minutes towards Toronto Saturday MID – 30 minutes towards Oshawa, 30 minutes towards Toronto
51, 52, 54 – 407 East Bus (GO)	Weekday AM – 40 minutes Weekday PM – 30 minutes

Based on the above listed bus routes, the maximum number of northbound or southbound bus trips on Liverpool Road will be 2 during a peak hour in future traffic conditions.

All transit stops are connected to the existing sidewalk network and as mentioned in the **Section 6.1.2**, a hard surface pathway will be provided connecting the building entrance to the existing sidewalk on Liverpool Road.

Assuming site generated person trips to/from the GO station also use the DRT buses on Liverpool Road, the total transit trips would be 27 person-trips during the AM peak hour and 24 person-trips during the PM peak hour.

Assuming existing traffic counts have already captured these buses during the peak hours as heavy vehicles, it can be stated that the development trips on the Liverpool Road will not be expected to impact the future transit operations within the study area.

On the other hand, if a dedicated shuttle bus (with a seat capacity of 20 seats) is to serve the site to/from the Picketing GO station in future, then it can be assumed that the proposed shuttle bus can also reduce at least 7 vehicles (i.e. assuming an average car occupancy of 1.5) from the road if a 50% occupancy of the bus is considered for both inbound and outbound traffic. Hence, as all of the future north-south flows of all intersections will be operating under acceptable LOS and delays with the Total Traffic Conditions (background plus the subject development), the addition of this shuttle bus will not impact the future road traffic operations.

In addition, if the frequency of DRT 193 and DRT 101 could be increased to 15 min headway, this could further reduce auto-vehicles from the road, and the addition of the increased bus trips will not impact the operations of the intersections significantly.

6.1.4 Carshare/Bikeshare

On-site carshare and bikeshare can be considered for the proposed development. However, coordination with providers is required to determine its feasibility. A carshare parking space can result in a net reduction of auto trips and parking spaces.

6.1.5 Wayfinding and Travel Planning

Since the transit stops are located along Liverpool Road in the vicinity of the proposed development, and this is the main north-south road, improved wayfinding signage would not be necessary for the site. However, residents can be provided with transit route maps and schedules, which can be made available within the building lobby.

6.1.6 Education/Promotion and Incentives

Unbundled resident parking will be offered as an option for many units. By separating the cost of parking from the cost of the residential unit, unbundling makes visible the hidden cost of driving, enabling residents to make more informed transportation decisions, and creates opportunities to use more sustainable modes of transportation and reduce their ownership costs.

7. Conclusions and Recommendations

HDR was retained to undertake a traffic study for the proposed development located at 591 Liverpool Road in the City of Pickering.

The proposed development consists of 498 condominium units in 2 buildings and 1,900 sm of commercial. The site is proposed to supply overall 739 parking spaces including 200 public parking spaces and 539 parking spaces for both residential and commercial components.

Overall the proposed development can be accommodated by the existing transportation network. Below is a summary discussion of minor impacts.

The eastbound one lane approach at the existing unsignalized intersections of Liverpool Road/Tatra Drive and Liverpool Road/Radom Street will experience some longer delays triggered by the increase in background traffic, but these will operate well below the capacity, and the addition of traffic generated by the proposed development will not exacerbate this condition.

Only the southbound left-turn 95th percentile queue at Liverpool / Bayly will exceed the available storage length and this is triggered by existing and background traffic. The proposed development will not add traffic to this movement. The existing southbound left-turn storage lane cannot be extended north without significant impacts to the bridge over the Lakeshore East GO Rail and Highway 401. However, City can consider some potential realignment of the southbound lane markings to accommodate the full queue length of southbound left traffic at Liverpool Road/Bayly Street without significant road and operations impacts.

Therefore, no geometric improvements to the existing road network are recommended, with the exception of new traffic signals at the Krosno Boulevard and Liverpool Road intersection by 2027.

Future residents of the subject development are expected to use the existing transit service on Liverpool Road. In addition, there is an opportunity to work with Durham Region Transit and Metrolinx to provide shuttle buses to/from the site to connect with the GO Station or increased frequency of the DRT 101 and DRT 193, which will further reduce the forecast auto-vehicles that have been estimated and documented in this report. The additional shuttle bus or bus trips will not impact the operations of the road network.

We have been in discussions with City of Pickering Staff regarding the opportunity for a future road connection between Liverpool Road and Sandy Beach Road, in the vicinity of the terminus of Liverpool Road, in order to improve connectivity.

The proposed building entrance will be connected to the existing sidewalk on Liverpool Road for pedestrians with good access to the rest of the neighbourhood. The site will also provide 214 and 4 bicycle parking spaces, respectively, for residents and customers, to meet the City's By-law requirement. Combined with other potential TDM measures, the subject development will likely result in generating less vehicular traffic based on the available active transportation and transit opportunities. The vehicular traffic estimated in this report does not account for potential increases in transit service and the TDM measures.

Appendix A
Existing Intersection Operations

Timings
3: Liverpool Rd & Bayly St

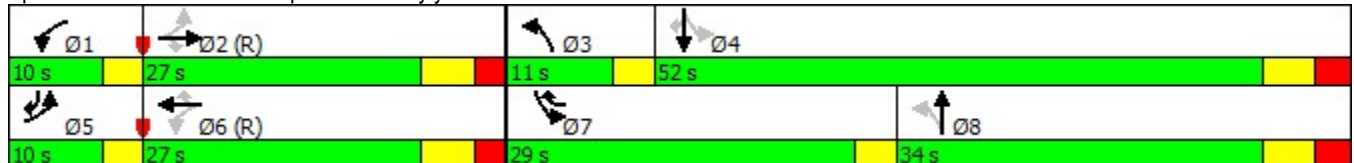
Timing Plan: AM Peak Hour
Existing Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	199	553	98	56	227	304	60	474	496	264	167	
Future Volume (vph)	199	553	98	56	227	304	60	474	496	264	167	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8	7	4	5	
Permitted Phases	2		2	6		6	8		4		4	
Detector Phase	5	2	2	1	6	7	3	8	7	4	5	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0	
Total Split (s)	10.0	27.0	27.0	10.0	27.0	29.0	11.0	34.0	29.0	52.0	10.0	
Total Split (%)	10.0%	27.0%	27.0%	10.0%	27.0%	29.0%	11.0%	34.0%	29.0%	52.0%	10.0%	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0	
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	
Act Effct Green (s)	31.0	20.6	20.6	31.0	20.6	50.0	39.0	27.3	60.0	45.3	56.0	
Actuated g/C Ratio	0.31	0.21	0.21	0.31	0.21	0.50	0.39	0.27	0.60	0.45	0.56	
v/c Ratio	0.50	0.76	0.27	0.25	0.33	0.40	0.13	0.64	0.80	0.17	0.18	
Control Delay	30.5	44.9	4.2	25.5	35.4	9.6	11.4	33.8	25.3	16.6	1.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.5	44.9	4.2	25.5	35.4	9.6	11.4	33.8	25.3	16.6	1.9	
LOS	C	D	A	C	D	A	B	C	C	B	A	
Approach Delay		36.8			21.1			31.8		18.6		
Approach LOS		D			C			C		B		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 27.1
 Intersection LOS: C
 Intersection Capacity Utilization 92.8%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: AM Peak Hour
Existing Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	203	564	100	57	232	310	61	606	506	269	170
v/c Ratio	0.50	0.76	0.27	0.25	0.33	0.40	0.13	0.64	0.80	0.17	0.18
Control Delay	30.5	44.9	4.2	25.5	35.4	9.6	11.4	33.8	25.3	16.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	44.9	4.2	25.5	35.4	9.6	11.4	33.8	25.3	16.6	1.9
Queue Length 50th (m)	29.0	54.4	0.0	7.5	20.3	18.3	4.5	51.5	53.1	15.7	0.0
Queue Length 95th (m)	47.4	73.0	6.4	16.2	31.2	36.2	9.6	69.7	#103.0	23.6	7.8
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		65.0
Base Capacity (vph)	402	744	374	228	696	778	480	951	633	1545	935
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.76	0.27	0.25	0.33	0.40	0.13	0.64	0.80	0.17	0.18

Intersection Summary



















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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.65	2.71	2.49	2.73
Pedestrian Crosswalk LOS	B	B	B	B

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	867	599	667	945
Effct. Green for Bike (s)	20.6	20.6	27.3	45.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	412	412	546	906
Bicycle Delay (s/bike)	31.5	31.5	26.4	15.0
Bicycle Compliance	Poor	Poor	Fair	Fair
Bicycle LOS Score	3.18	3.14	3.20	3.44
Bicycle LOS	C	C	C	C

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: AM Peak Hour
Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	3	0	217	0	430	11	129	265	2
Future Volume (Veh/h)	0	0	1	3	0	217	0	430	11	129	265	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	1	3	0	238	0	473	12	142	291	2
Pedestrians		17			16			6			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			2			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96					
vC, conflicting volume	1311	1094	315	1077	1089	496	310			501		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1303	1076	262	1058	1071	496	257			501		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	58	100			86		
cM capacity (veh/h)	66	177	731	167	178	560	1242			1047		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	241	485	142	293							
Volume Left	0	3	0	142	0							
Volume Right	1	238	12	0	2							
cSH	731	544	1242	1047	1700							
Volume to Capacity	0.00	0.44	0.00	0.14	0.17							
Queue Length 95th (m)	0.0	17.1	0.0	3.6	0.0							
Control Delay (s)	9.9	16.8	0.0	9.0	0.0							
Lane LOS	A	C		A								
Approach Delay (s)	9.9	16.8	0.0	2.9								
Approach LOS	A	C										
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization			63.7%			ICU Level of Service			B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St










Timing Plan: AM Peak Hour
 Existing Traffic Conditions






Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	77	16	8	345	207	60
Future Volume (Veh/h)	77	16	8	345	207	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	83	17	9	371	223	65
Pedestrians	9				1	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked						
vC, conflicting volume	654	264	297			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	654	264	297			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	81	98	99			
cM capacity (veh/h)	427	772	1134			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	100	380	288			
Volume Left	83	9	0			
Volume Right	17	0	65			
cSH	462	1134	1700			
Volume to Capacity	0.22	0.01	0.17			
Queue Length 95th (m)	6.2	0.2	0.0			
Control Delay (s)	14.9	0.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.9	0.3	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			36.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
 Existing Traffic Conditions

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	126	174	14	124	119
Future Volume (vph)	5	126	174	14	124	119
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	6	159	220	18	157	151
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	165	238	308			
Volume Left (vph)	6	0	157			
Volume Right (vph)	159	18	0			
Hadj (s)	-0.54	0.06	0.17			
Departure Headway (s)	4.7	4.8	4.8			
Degree Utilization, x	0.21	0.31	0.41			
Capacity (veh/h)	702	725	725			
Control Delay (s)	8.9	9.9	11.0			
Approach Delay (s)	8.9	9.9	11.0			
Approach LOS	A	A	B			
Intersection Summary						
Delay			10.2			
Level of Service			B			
Intersection Capacity Utilization			42.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	126	174	14	124	119
Future Vol, veh/h	5	126	174	14	124	119
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	0	2	4	36	4	4
Mvmt Flow	6	159	220	18	157	151
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	8.9	9.8	11
HCM LOS	A	A	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	4%	51%
Vol Thru, %	93%	0%	49%
Vol Right, %	7%	96%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	188	131	243
LT Vol	0	5	124
Through Vol	174	0	119
RT Vol	14	126	0
Lane Flow Rate	238	166	308
Geometry Grp	1	1	1
Degree of Util (X)	0.308	0.211	0.404
Departure Headway (Hd)	4.664	4.582	4.726
Convergence, Y/N	Yes	Yes	Yes
Cap	769	779	760
Service Time	2.712	2.63	2.772
HCM Lane V/C Ratio	0.309	0.213	0.405
HCM Control Delay	9.8	8.9	11
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1.3	0.8	2

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: AM Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	0	1	153	128	7
Future Volume (Veh/h)	7	0	1	153	128	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	8	0	1	180	151	8
Pedestrians	21			3	1	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	359	179	180			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	359	179	180			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	629	849	1379			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	181	159			
Volume Left	8	1	0			
Volume Right	0	0	8			
cSH	629	1379	1700			
Volume to Capacity	0.01	0.00	0.09			
Queue Length 95th (m)	0.3	0.0	0.0			
Control Delay (s)	10.8	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.8	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			21.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: AM Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	2	0	140	124	7
Future Volume (Veh/h)	13	2	0	140	124	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	16	2	0	169	149	8
Pedestrians	22					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	2					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	344	175	179			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	344	175	179			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	642	855	1379			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	18	169	157			
Volume Left	16	0	0			
Volume Right	2	0	8			
cSH	661	1379	1700			
Volume to Capacity	0.03	0.00	0.09			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	10.6	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.6	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.6					
Intersection Capacity Utilization	20.3%			ICU Level of Service	A	
Analysis Period (min)	15					

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: AM Peak Hour
 Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	4	1	1	3	8	3	109	9	12	100	9
Future Volume (Veh/h)	15	4	1	1	3	8	3	109	9	12	100	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	18	5	1	1	4	10	4	130	11	14	119	11
Pedestrians		2						14				
Lane Width (m)		3.7						3.7				
Walking Speed (m/s)		1.1						1.1				
Percent Blockage		0						1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	310	304	140	314	304	136	132			141		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	310	304	140	314	304	136	132			141		
tC, single (s)	7.1	6.8	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	97	99	100	100	99	99	100			99		
cM capacity (veh/h)	628	565	899	622	604	887	1463			1455		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	24	15	145	144								
Volume Left	18	1	4	14								
Volume Right	1	10	11	11								
cSH	621	769	1463	1455								
Volume to Capacity	0.04	0.02	0.00	0.01								
Queue Length 95th (m)	0.9	0.5	0.1	0.2								
Control Delay (s)	11.0	9.8	0.2	0.8								
Lane LOS	B	A	A	A								
Approach Delay (s)	11.0	9.8	0.2	0.8								
Approach LOS	B	A										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			27.2%		ICU Level of Service					A		
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Timing Plan: AM Peak Hour
Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	2	7	5	0	10	6	102	3	4	67	3
Future Volume (Veh/h)	3	2	7	5	0	10	6	102	3	4	67	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	4	2	8	6	0	12	7	123	4	5	81	4
Pedestrians		6			3			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	251	243	91	246	243	129	91			130		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	251	243	91	246	243	129	91			130		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.4			2.2		
p0 queue free %	99	100	99	99	100	99	100			100		
cM capacity (veh/h)	683	651	965	692	651	896	1406			1464		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	14	18	134	90								
Volume Left	4	6	7	5								
Volume Right	8	12	4	4								
cSH	813	816	1406	1464								
Volume to Capacity	0.02	0.02	0.00	0.00								
Queue Length 95th (m)	0.4	0.5	0.1	0.1								
Control Delay (s)	9.5	9.5	0.4	0.4								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.5	9.5	0.4	0.4								
Approach LOS	A	A										
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization			18.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: AM Peak Hour
 Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	0	0	0	1	5	1	79	1	4	79	4
Future Volume (vph)	18	0	0	0	1	5	1	79	1	4	79	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	22	0	0	0	1	6	1	95	1	5	95	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	22	7	97	105								
Volume Left (vph)	22	0	1	5								
Volume Right (vph)	0	6	1	5								
Hadj (s)	0.20	-0.51	0.01	0.01								
Departure Headway (s)	4.5	3.8	4.1	4.1								
Degree Utilization, x	0.03	0.01	0.11	0.12								
Capacity (veh/h)	755	884	862	871								
Control Delay (s)	7.7	6.9	7.6	7.6								
Approach Delay (s)	7.7	6.9	7.6	7.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			22.5%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	0	0	0	1	5	1	79	1	4	79	4
Future Vol, veh/h	18	0	0	0	1	5	1	79	1	4	79	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	22	0	0	0	1	6	1	95	1	5	95	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.7	6.9	7.6	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	100%	0%	5%
Vol Thru, %	98%	0%	17%	91%
Vol Right, %	1%	0%	83%	5%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	81	18	6	87
LT Vol	1	18	0	4
Through Vol	79	0	1	79
RT Vol	1	0	5	4
Lane Flow Rate	98	22	7	105
Geometry Grp	1	1	1	1
Degree of Util (X)	0.109	0.027	0.008	0.117
Departure Headway (Hd)	4.022	4.453	3.763	4.004
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	887	793	933	892
Service Time	2.063	2.542	1.858	2.042
HCM Lane V/C Ratio	0.11	0.028	0.008	0.118
HCM Control Delay	7.6	7.7	6.9	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0	0.4

HCM Unsignalized Intersection Capacity Analysis
 26: Liverpool Rd & 591 Liverpool Driveway

Timing Plan: AM Peak Hour
 Existing Traffic Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	58	0	0	37
Future Volume (Veh/h)	0	0	58	0	0	37
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	0	0	78	0	0	50
Pedestrians	7					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	135	85			85	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	135	85			85	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	857	973			1514	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	78	50			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1514			
Volume to Capacity	0.00	0.05	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			8.7%	ICU Level of Service		A
Analysis Period (min)			15			

Timings
3: Liverpool Rd & Bayly St

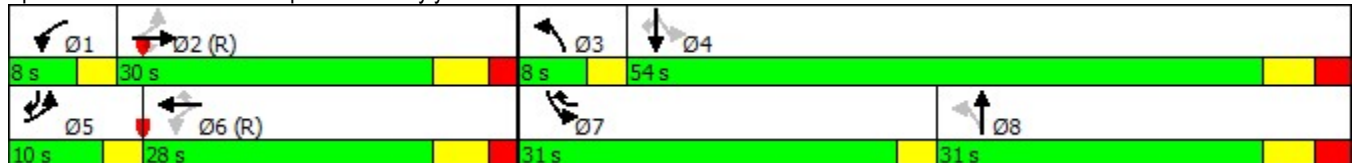
Timing Plan: AM Peak Hour
Existing Traffic Conditions - Bayly Optimized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	553	98	56	227	304	60	474	496	264	167
Future Volume (vph)	199	553	98	56	227	304	60	474	496	264	167
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	10.0	30.0	30.0	8.0	28.0	31.0	8.0	31.0	31.0	54.0	10.0
Total Split (%)	10.0%	30.0%	30.0%	8.0%	28.0%	31.0%	8.0%	31.0%	31.0%	54.0%	10.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	34.0	23.6	23.6	30.0	21.6	53.0	33.0	24.3	59.0	47.3	58.0
Actuated g/C Ratio	0.34	0.24	0.24	0.30	0.22	0.53	0.33	0.24	0.59	0.47	0.58
v/c Ratio	0.50	0.66	0.25	0.25	0.32	0.39	0.16	0.71	0.79	0.17	0.18
Control Delay	29.1	39.0	3.7	25.0	34.4	9.6	13.3	38.4	26.7	15.4	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	39.0	3.7	25.0	34.4	9.6	13.3	38.4	26.7	15.4	1.7
LOS	C	D	A	C	C	A	B	D	C	B	A
Approach Delay		32.6			20.7			36.1		19.0	
Approach LOS		C			C			D		B	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 26.9
 Intersection LOS: C
 Intersection Capacity Utilization 92.8%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	20.6	23.8	41.2
Average Queue (m)	8.2	14.2	17.1
95th Queue (m)	14.3	20.9	26.0
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.3	9.2	20.3	16.7
Average Queue (m)	3.3	0.9	8.9	9.4
95th Queue (m)	10.5	5.2	15.4	16.2
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Timings
3: Liverpool Rd & Bayly St

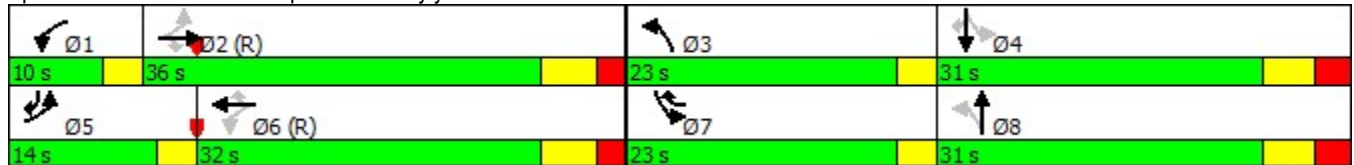
Timing Plan: PM Peak Hour
Existing Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	366	805	259	98	544	689	76	491	335	489	245
Future Volume (vph)	366	805	259	98	544	689	76	491	335	489	245
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	14.0	36.0	36.0	10.0	32.0	23.0	23.0	31.0	23.0	31.0	14.0
Total Split (%)	14.0%	36.0%	36.0%	10.0%	32.0%	23.0%	23.0%	31.0%	23.0%	31.0%	14.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	43.0	29.6	29.6	36.0	25.6	49.0	48.0	24.3	48.0	24.3	39.0
Actuated g/C Ratio	0.43	0.30	0.30	0.36	0.26	0.49	0.48	0.24	0.48	0.24	0.39
v/c Ratio	1.04	0.78	0.45	0.47	0.61	0.88	0.14	0.70	0.70	0.58	0.34
Control Delay	82.1	38.5	6.1	25.0	36.0	32.2	13.3	38.4	24.5	36.5	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.1	38.5	6.1	25.0	36.0	32.2	13.3	38.4	24.5	36.5	3.7
LOS	F	D	A	C	D	C	B	D	C	D	A
Approach Delay		43.8			33.2			35.5		25.2	
Approach LOS		D			C			D		C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 14 (14%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 35.0
 Intersection LOS: D
 Intersection Capacity Utilization 97.4%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: PM Peak Hour
Existing Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	377	830	267	101	561	710	78	601	345	504	253
v/c Ratio	1.04	0.78	0.45	0.47	0.61	0.88	0.14	0.70	0.70	0.58	0.34
Control Delay	82.1	38.5	6.1	25.0	36.0	32.2	13.3	38.4	24.5	36.5	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.1	38.5	6.1	25.0	36.0	32.2	13.3	38.4	24.5	36.5	3.7
Queue Length 50th (m)	~54.3	77.3	0.0	11.5	50.4	94.7	7.4	54.2	38.9	45.4	0.0
Queue Length 95th (m)	#115.4	99.7	17.7	21.6	67.8	#181.2	14.7	73.0	62.1	61.8	13.7
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		65.0
Base Capacity (vph)	364	1059	594	217	925	808	546	860	491	869	752
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.78	0.45	0.47	0.61	0.88	0.14	0.70	0.70	0.58	0.34

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.

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.79	2.82	2.57	2.83
Pedestrian Crosswalk LOS	C	C	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	1474	1372	679	1102
Effct. Green for Bike (s)	29.6	25.6	24.3	24.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	592	512	486	486
Bicycle Delay (s/bike)	24.8	27.7	28.7	28.7
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.68	3.78	3.21	3.57
Bicycle LOS	D	D	C	D

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: PM Peak Hour
Existing Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	↕
Traffic Volume (veh/h)	4	1	1	1	0	236	1	427	8	215	564	1
Future Volume (Veh/h)	4	1	1	1	0	236	1	427	8	215	564	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	4	1	1	1	0	246	1	445	8	224	588	1
Pedestrians		23			32			22			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			3			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.85	0.85	0.85	0.85	0.85		0.85					
vC, conflicting volume	1758	1546	634	1542	1543	483	612			485		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1803	1555	483	1550	1550	483	458			485		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	99	100	98	100	57	100			79		
cM capacity (veh/h)	24	72	479	60	73	568	928			1054		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	6	247	454	224	589							
Volume Left	4	1	1	224	0							
Volume Right	1	246	8	0	1							
cSH	32	549	928	1054	1700							
Volume to Capacity	0.19	0.45	0.00	0.21	0.35							
Queue Length 95th (m)	4.4	17.6	0.0	6.1	0.0							
Control Delay (s)	140.2	16.8	0.0	9.3	0.0							
Lane LOS	F	C	A	A								
Approach Delay (s)	140.2	16.8	0.0	2.6								
Approach LOS	F	C										
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			77.7%		ICU Level of Service					D		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

Timing Plan: PM Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	58	28	18	365	492	68
Future Volume (Veh/h)	58	28	18	365	492	68
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	60	29	19	376	507	70
Pedestrians	11			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.86	0.86	0.86			
vC, conflicting volume	967	554	588			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878	397	436			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	95	98			
cM capacity (veh/h)	267	549	962			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	89	395	577			
Volume Left	60	19	0			
Volume Right	29	0	70			
cSH	321	962	1700			
Volume to Capacity	0.28	0.02	0.34			
Queue Length 95th (m)	8.4	0.5	0.0			
Control Delay (s)	20.5	0.6	0.0			
Lane LOS	C	A				
Approach Delay (s)	20.5	0.6	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			45.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: PM Peak Hour
 Existing Traffic Conditions






Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	28	123	211	11	175	311
Future Volume (vph)	28	123	211	11	175	311
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	31	138	237	12	197	349

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	169	249	546
Volume Left (vph)	31	0	197
Volume Right (vph)	138	12	0
Hadj (s)	-0.45	0.00	0.12
Departure Headway (s)	5.3	5.1	4.8
Degree Utilization, x	0.25	0.35	0.73
Capacity (veh/h)	601	677	729
Control Delay (s)	10.1	10.8	19.8
Approach Delay (s)	10.1	10.8	19.8
Approach LOS	B	B	C

Intersection Summary			
Delay		15.7	
Level of Service		C	
Intersection Capacity Utilization		57.7%	ICU Level of Service
Analysis Period (min)		15	B

Intersection	
Intersection Delay, s/veh	15.4
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	123	211	11	175	311
Future Vol, veh/h	28	123	211	11	175	311
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	0	2	0	2	3
Mvmt Flow	31	138	237	12	197	349
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	10.1	10.7	19.2
HCM LOS	B	B	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	19%	36%
Vol Thru, %	95%	0%	64%
Vol Right, %	5%	81%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	222	151	486
LT Vol	0	28	175
Through Vol	211	0	311
RT Vol	11	123	0
Lane Flow Rate	249	170	546
Geometry Grp	1	1	1
Degree of Util (X)	0.345	0.248	0.72
Departure Headway (Hd)	4.98	5.252	4.746
Convergence, Y/N	Yes	Yes	Yes
Cap	713	675	754
Service Time	3.069	3.351	2.82
HCM Lane V/C Ratio	0.349	0.252	0.724
HCM Control Delay	10.7	10.1	19.2
HCM Lane LOS	B	B	C
HCM 95th-tile Q	1.5	1	6.2

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: PM Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	0	1	165	271	11
Future Volume (Veh/h)	6	0	1	165	271	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	7	0	1	196	323	13
Pedestrians	10			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	538	340	346			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	538	340	346			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	503	699	1212			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	197	336			
Volume Left	7	1	0			
Volume Right	0	0	13			
cSH	503	1212	1700			
Volume to Capacity	0.01	0.00	0.20			
Queue Length 95th (m)	0.3	0.0	0.0			
Control Delay (s)	12.3	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.3	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			25.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: PM Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	1	1	164	258	12
Future Volume (Veh/h)	2	1	1	164	258	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	2	1	1	191	300	14
Pedestrians	9			3		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	512	316	323			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	512	316	323			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	519	723	1237			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	192	314			
Volume Left	2	1	0			
Volume Right	1	0	14			
cSH	573	1237	1700			
Volume to Capacity	0.01	0.00	0.18			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	11.3	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.3	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			24.3%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: PM Peak Hour
 Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	0	1	2	3	9	2	139	1	18	218	19
Future Volume (Veh/h)	9	0	1	2	3	9	2	139	1	18	218	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	10	0	1	2	3	10	2	160	1	21	251	22
Pedestrians		9			12			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	490	490	273	484	500	174	282			173		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	490	490	273	484	500	174	282			173		
tC, single (s)	7.3	6.5	6.2	7.6	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	4.0	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	99	99	100			98		
cM capacity (veh/h)	433	464	762	405	458	864	1281			1399		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	11	15	163	294								
Volume Left	10	2	2	21								
Volume Right	1	10	1	22								
cSH	451	650	1281	1399								
Volume to Capacity	0.02	0.02	0.00	0.02								
Queue Length 95th (m)	0.6	0.5	0.0	0.3								
Control Delay (s)	13.2	10.7	0.1	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.2	10.7	0.1	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			34.1%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Timing Plan: PM Peak Hour
Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	0	11	8	3	3	9	166	6	14	206	17
Future Volume (Veh/h)	6	0	11	8	3	3	9	166	6	14	206	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	6	0	12	9	3	3	10	178	6	15	222	18
Pedestrians		4			1			2			3	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	474	470	237	477	476	185	244			185		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	474	470	237	477	476	185	244			185		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	98	99	100	99			99		
cM capacity (veh/h)	462	483	802	484	479	859	1329			1400		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	18	15	194	255								
Volume Left	6	9	10	15								
Volume Right	12	3	6	18								
cSH	644	529	1329	1400								
Volume to Capacity	0.03	0.03	0.01	0.01								
Queue Length 95th (m)	0.7	0.7	0.2	0.2								
Control Delay (s)	10.8	12.0	0.5	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.8	12.0	0.5	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			27.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: PM Peak Hour
 Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	0	2	0	0	7	5	109	1	10	157	38
Future Volume (vph)	19	0	2	0	0	7	5	109	1	10	157	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	0	2	0	0	8	6	130	1	12	187	45
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	25	8	137	244								
Volume Left (vph)	23	0	6	12								
Volume Right (vph)	2	8	1	45								
Hadj (s)	0.21	-0.60	0.00	-0.09								
Departure Headway (s)	4.9	4.1	4.2	4.0								
Degree Utilization, x	0.03	0.01	0.16	0.27								
Capacity (veh/h)	668	782	831	881								
Control Delay (s)	8.1	7.2	8.0	8.5								
Approach Delay (s)	8.1	7.2	8.0	8.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.3									
Level of Service			A									
Intersection Capacity Utilization			29.5%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	0	2	0	0	7	5	109	1	10	157	38
Future Vol, veh/h	19	0	2	0	0	7	5	109	1	10	157	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	5	0	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	23	0	2	0	0	8	6	130	1	12	187	45
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	7.2	8	8.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	90%	0%	5%
Vol Thru, %	95%	0%	0%	77%
Vol Right, %	1%	10%	100%	19%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	115	21	7	205
LT Vol	5	19	0	10
Through Vol	109	0	0	157
RT Vol	1	2	7	38
Lane Flow Rate	137	25	8	244
Geometry Grp	1	1	1	1
Degree of Util (X)	0.158	0.034	0.01	0.268
Departure Headway (Hd)	4.144	4.926	4.136	3.958
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	856	731	870	901
Service Time	2.218	2.927	2.137	2.019
HCM Lane V/C Ratio	0.16	0.034	0.009	0.271
HCM Control Delay	8	8.1	7.2	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.1	0	1.1

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Timing Plan: PM Peak Hour
Existing Traffic Conditions

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	121	0	0	152
Future Volume (Veh/h)	0	0	121	0	0	152
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	0	155	0	0	195
Pedestrians	33		4			9
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	3		0			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	387	197			188	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	387	197			188	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	447	815			1353	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	155	195			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1353			
Volume to Capacity	0.00	0.09	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			23.6%	ICU Level of Service		A
Analysis Period (min)			15			

Timings
3: Liverpool Rd & Bayly St

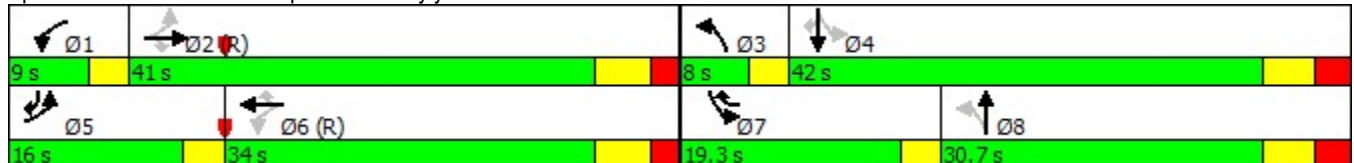
Timing Plan: PM Peak Hour
Existing Volumes - Bayly Optimized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	366	805	259	98	544	689	76	491	335	489	245
Future Volume (vph)	366	805	259	98	544	689	76	491	335	489	245
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	16.0	41.0	41.0	9.0	34.0	19.3	8.0	30.7	19.3	42.0	16.0
Total Split (%)	16.0%	41.0%	41.0%	9.0%	34.0%	19.3%	8.0%	30.7%	19.3%	42.0%	16.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	47.0	34.6	34.6	37.0	27.6	47.3	32.7	24.0	47.0	35.3	52.0
Actuated g/C Ratio	0.47	0.35	0.35	0.37	0.28	0.47	0.33	0.24	0.47	0.35	0.52
v/c Ratio	0.90	0.67	0.41	0.41	0.56	0.91	0.23	0.71	0.82	0.40	0.29
Control Delay	45.2	31.1	5.1	21.0	33.6	36.9	17.7	38.9	35.5	25.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	31.1	5.1	21.0	33.6	36.9	17.7	38.9	35.5	25.5	5.9
LOS	D	C	A	C	C	D	B	D	D	C	A
Approach Delay		30.0			34.4			36.5		24.2	
Approach LOS		C			C			D		C	

Intersection Summary

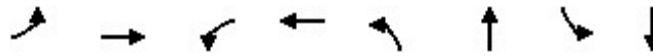
Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 14 (14%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 30.9
 Intersection LOS: C
 Intersection Capacity Utilization 97.4%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Timings
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: PM Peak Hour
Existing Traffic Conditions - Tatra Signalized



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕	↙	↘
Traffic Volume (vph)	4	1	1	0	1	427	215	564
Future Volume (vph)	4	1	1	0	1	427	215	564
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.5	25.5	25.5	25.5	22.5	22.5	22.5	22.5
Total Split (s)	30.0	30.0	30.0	30.0	60.0	60.0	60.0	60.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	66.7%	66.7%	66.7%	66.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5		4.5		4.5	4.5	4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)		7.8		7.8		55.7	55.7	55.7
Actuated g/C Ratio		0.11		0.11		0.77	0.77	0.77
v/c Ratio		0.05		0.63		0.31	0.29	0.41
Control Delay		26.8		12.0		3.6	4.3	4.3
Queue Delay		0.0		0.0		0.0	0.0	0.4
Total Delay		26.8		12.0		3.6	4.3	4.8
LOS		C		B		A	A	A
Approach Delay		26.8		12.0		3.6		4.6
Approach LOS		C		B		A		A

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 72.5	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 5.6	Intersection LOS: A
Intersection Capacity Utilization 78.9%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Liverpool Rd & Parking Lot/Tatra Dr



Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	19.7	24.0	70.3
Average Queue (m)	9.6	14.7	32.6
95th Queue (m)	16.6	22.7	53.7
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	16.5	9.1	16.7	24.3
Average Queue (m)	6.2	0.9	10.0	13.8
95th Queue (m)	13.9	5.3	14.0	20.8
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Timings
3: Liverpool Rd & Bayly St

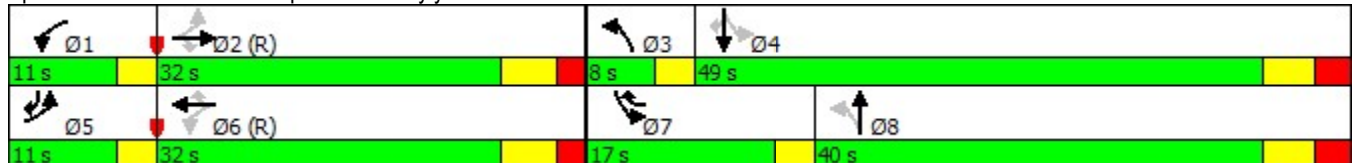
Timing Plan: Sat Peak Hour
Existing Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	357	390	147	96	227	357	63	402	342	458	288	
Future Volume (vph)	357	390	147	96	227	357	63	402	342	458	288	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8	7	4	5	
Permitted Phases	2		2	6		6	8		4		4	
Detector Phase	5	2	2	1	6	7	3	8	7	4	5	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0	
Total Split (s)	11.0	32.0	32.0	11.0	32.0	17.0	8.0	40.0	17.0	49.0	11.0	
Total Split (%)	11.0%	32.0%	32.0%	11.0%	32.0%	17.0%	8.0%	40.0%	17.0%	49.0%	11.0%	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0	
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	
Act Effct Green (s)	37.0	25.6	25.6	37.0	25.6	43.0	42.0	33.3	54.0	42.3	54.0	
Actuated g/C Ratio	0.37	0.26	0.26	0.37	0.26	0.43	0.42	0.33	0.54	0.42	0.54	
v/c Ratio	0.77	0.43	0.31	0.26	0.25	0.48	0.15	0.47	0.70	0.31	0.30	
Control Delay	37.3	32.8	6.8	21.1	30.5	12.4	12.7	25.6	21.9	19.9	2.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.3	32.8	6.8	21.1	30.5	12.4	12.7	25.6	21.9	19.9	2.1	
LOS	D	C	A	C	C	B	B	C	C	B	A	
Approach Delay		30.3			19.7			24.2		15.8		
Approach LOS		C			B			C		B		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 9.6 (10%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 22.1
 Intersection Capacity Utilization 93.0%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: Sat Peak Hour
Existing Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	368	402	152	99	234	368	65	550	353	472	297
v/c Ratio	0.77	0.43	0.31	0.26	0.25	0.48	0.15	0.47	0.70	0.31	0.30
Control Delay	37.3	32.8	6.8	21.1	30.5	12.4	12.7	25.6	21.9	19.9	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	32.8	6.8	21.1	30.5	12.4	12.7	25.6	21.9	19.9	2.1
Queue Length 50th (m)	52.6	34.3	0.0	12.0	19.0	25.0	5.7	40.0	37.1	31.2	0.0
Queue Length 95th (m)	#84.1	48.2	14.7	22.4	29.2	47.7	11.9	55.3	56.0	42.8	10.4
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		65.0
Base Capacity (vph)	480	934	490	382	925	767	430	1161	502	1513	984
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.43	0.31	0.26	0.25	0.48	0.15	0.47	0.70	0.31	0.30

Intersection Summary



















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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.67	2.68	2.53	2.77
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	922	701	615	1122
Effct. Green for Bike (s)	25.6	25.6	33.3	42.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	512	512	666	846
Bicycle Delay (s/bike)	27.7	27.7	22.2	16.6
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.22	3.22	3.16	3.58
Bicycle LOS	C	C	C	D

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: Sat Peak Hour
Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	0	4	0	118	0	443	3	140	514	4
Future Volume (Veh/h)	1	0	0	4	0	118	0	443	3	140	514	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	0	0	4	0	122	0	457	3	144	530	4
Pedestrians		11			23			6				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.1			1.1			1.1				
Percent Blockage		1			2			1				
Right turn flare (veh)												
Median type								None				None
Median storage veh												
Upstream signal (m)												153
pX, platoon unblocked	0.89	0.89	0.89	0.89	0.89		0.89					
vC, conflicting volume	1412	1314	549	1306	1314	482	545			483		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1400	1290	426	1280	1290	482	421			483		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	96	100	79	100			86		
cM capacity (veh/h)	72	122	551	108	122	576	1006			1066		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	126	460	144	534							
Volume Left	1	4	0	144	0							
Volume Right	0	122	3	0	4							
cSH	72	506	1006	1066	1700							
Volume to Capacity	0.01	0.25	0.00	0.14	0.31							
Queue Length 95th (m)	0.3	7.4	0.0	3.5	0.0							
Control Delay (s)	55.8	14.5	0.0	8.9	0.0							
Lane LOS	F	B		A								
Approach Delay (s)	55.8	14.5	0.0	1.9								
Approach LOS	F	B										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			68.2%			ICU Level of Service				C		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

Timing Plan: Sat Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	12	10	376	455	66
Future Volume (Veh/h)	56	12	10	376	455	66
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	62	13	11	413	500	73
Pedestrians	6			5		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.90	0.90	0.90			
vC, conflicting volume	978	548	579			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	917	436	471			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	77	98	99			
cM capacity (veh/h)	266	538	980			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	75	424	573			
Volume Left	62	11	0			
Volume Right	13	0	73			
cSH	292	980	1700			
Volume to Capacity	0.26	0.01	0.34			
Queue Length 95th (m)	7.6	0.3	0.0			
Control Delay (s)	21.6	0.4	0.0			
Lane LOS	C	A				
Approach Delay (s)	21.6	0.4	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			40.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: Sat Peak Hour
 Existing Traffic Conditions






Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	11	105	248	20	121	303
Future Volume (vph)	11	105	248	20	121	303
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	11	109	258	21	126	316

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	120	279	442
Volume Left (vph)	11	0	126
Volume Right (vph)	109	21	0
Hadj (s)	-0.51	0.01	0.09
Departure Headway (s)	5.0	4.7	4.6
Degree Utilization, x	0.17	0.37	0.57
Capacity (veh/h)	632	730	754
Control Delay (s)	9.1	10.5	13.6
Approach Delay (s)	9.1	10.5	13.6
Approach LOS	A	B	B

Intersection Summary			
Delay		11.9	
Level of Service		B	
Intersection Capacity Utilization		54.1%	ICU Level of Service
Analysis Period (min)		15	A

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	105	248	20	121	303
Future Vol, veh/h	11	105	248	20	121	303
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	1	3	5	0	3
Mvmt Flow	11	109	258	21	126	316
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9	10.4	13.3
HCM LOS	A	B	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	9%	29%
Vol Thru, %	93%	0%	71%
Vol Right, %	7%	91%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	268	116	424
LT Vol	0	11	121
Through Vol	248	0	303
RT Vol	20	105	0
Lane Flow Rate	279	121	442
Geometry Grp	1	1	1
Degree of Util (X)	0.364	0.167	0.561
Departure Headway (Hd)	4.691	4.968	4.57
Convergence, Y/N	Yes	Yes	Yes
Cap	762	717	786
Service Time	2.743	3.035	2.616
HCM Lane V/C Ratio	0.366	0.169	0.562
HCM Control Delay	10.4	9	13.3
HCM Lane LOS	B	A	B
HCM 95th-tile Q	1.7	0.6	3.5

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: Sat Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	0	0	218	268	12
Future Volume (Veh/h)	10	0	0	218	268	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	11	0	0	240	295	13
Pedestrians	9			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	550	312	317			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	550	312	317			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	495	726	1243			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	11	240	308			
Volume Left	11	0	0			
Volume Right	0	0	13			
cSH	495	1243	1700			
Volume to Capacity	0.02	0.00	0.18			
Queue Length 95th (m)	0.5	0.0	0.0			
Control Delay (s)	12.4	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	12.4	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	25.2%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: Sat Peak Hour
 Existing Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	2	1	0	1	1	0
Traffic Volume (veh/h)	2	1	0	187	276	13
Future Volume (Veh/h)	2	1	0	187	276	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	1	0	201	297	14
Pedestrians	11					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	516	315	322			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	516	315	322			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	517	722	1236			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	201	311			
Volume Left	2	0	0			
Volume Right	1	0	14			
cSH	571	1236	1700			
Volume to Capacity	0.01	0.00	0.18			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	11.3	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.3	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			25.4%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: Sat Peak Hour
 Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	3	3	2	5	6	5	166	2	10	250	17
Future Volume (Veh/h)	12	3	3	2	5	6	5	166	2	10	250	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	3	3	2	6	7	6	184	2	11	278	19
Pedestrians		10			16							
Lane Width (m)		3.7			3.7							
Walking Speed (m/s)		1.1			1.1							
Percent Blockage		1			2							
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	526	534	298	527	542	201	307			202		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	526	534	298	527	542	201	307			202		
tC, single (s)	7.5	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.9	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	99	100	100	99	99	100			99		
cM capacity (veh/h)	382	438	739	440	433	832	1253			1360		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	19	15	192	308								
Volume Left	13	2	6	11								
Volume Right	3	7	2	19								
cSH	423	560	1253	1360								
Volume to Capacity	0.04	0.03	0.00	0.01								
Queue Length 95th (m)	1.1	0.6	0.1	0.2								
Control Delay (s)	13.9	11.6	0.3	0.3								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.9	11.6	0.3	0.3								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			28.7%		ICU Level of Service					A		
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
 20: Liverpool Rd & Annland St

Timing Plan: Sat Peak Hour
 Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	13	22	2	8	12	166	4	12	215	16
Future Volume (Veh/h)	4	0	13	22	2	8	12	166	4	12	215	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	4	0	14	24	2	9	13	178	4	13	231	17
Pedestrians		15			5			1			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	498	494	256	492	500	187	263			187		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	498	494	256	492	500	187	263			187		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	98	95	100	99	99			99		
cM capacity (veh/h)	457	461	776	465	457	854	1294			1393		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	18	35	195	261								
Volume Left	4	24	13	13								
Volume Right	14	9	4	17								
cSH	672	526	1294	1393								
Volume to Capacity	0.03	0.07	0.01	0.01								
Queue Length 95th (m)	0.6	1.6	0.2	0.2								
Control Delay (s)	10.5	12.3	0.6	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.5	12.3	0.6	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			27.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: Sat Peak Hour
 Existing Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	35	2	7	1	1	18	4	113	4	7	169	61
Future Volume (vph)	35	2	7	1	1	18	4	113	4	7	169	61
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)	38	2	8	1	1	20	4	123	4	8	184	66
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	48	22	131	258								
Volume Left (vph)	38	1	4	8								
Volume Right (vph)	8	20	4	66								
Hadj (s)	0.06	-0.54	-0.01	-0.15								
Departure Headway (s)	4.8	4.3	4.3	4.1								
Degree Utilization, x	0.06	0.03	0.16	0.29								
Capacity (veh/h)	683	759	806	868								
Control Delay (s)	8.2	7.4	8.1	8.7								
Approach Delay (s)	8.2	7.4	8.1	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.4									
Level of Service			A									
Intersection Capacity Utilization			32.6%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	2	7	1	1	18	4	113	4	7	169	61
Future Vol, veh/h	35	2	7	1	1	18	4	113	4	7	169	61
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	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	38	2	8	1	1	20	4	123	4	8	184	66
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	7.4	8.1	8.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	80%	5%	3%
Vol Thru, %	93%	5%	5%	71%
Vol Right, %	3%	16%	90%	26%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	121	44	20	237
LT Vol	4	35	1	7
Through Vol	113	2	1	169
RT Vol	4	7	18	61
Lane Flow Rate	132	48	22	258
Geometry Grp	1	1	1	1
Degree of Util (X)	0.157	0.064	0.026	0.284
Departure Headway (Hd)	4.31	4.819	4.26	3.973
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	838	747	844	889
Service Time	2.31	2.825	2.268	2.063
HCM Lane V/C Ratio	0.158	0.064	0.026	0.29
HCM Control Delay	8.1	8.2	7.4	8.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.2	0.1	1.2

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Timing Plan: Sat Peak Hour
Existing Traffic Conditions

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	106	0	0	150
Future Volume (Veh/h)	0	0	106	0	0	150
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	113	0	0	160
Pedestrians	64		3			3
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	6		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	340	180			177	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	340	180			177	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	617	811			1311	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	113	160			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1311			
Volume to Capacity	0.00	0.07	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			23.4%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
3: Liverpool Rd & Bayly St

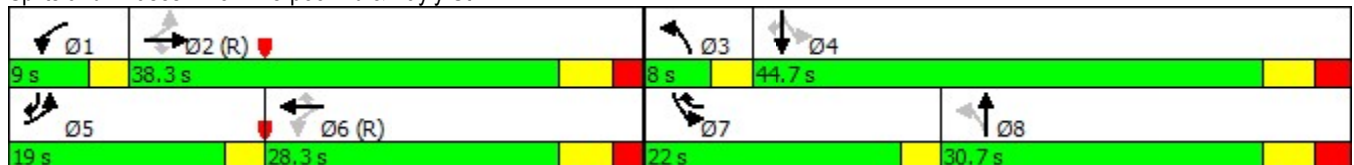
Timing Plan: Sat Peak Hour
Existing Traffic Conditions - Bayly Optimized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	357	390	147	96	227	357	63	402	342	458	288
Future Volume (vph)	357	390	147	96	227	357	63	402	342	458	288
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	19.0	38.3	38.3	9.0	28.3	22.0	8.0	30.7	22.0	44.7	19.0
Total Split (%)	19.0%	38.3%	38.3%	9.0%	28.3%	22.0%	8.0%	30.7%	22.0%	44.7%	19.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	44.3	31.9	31.9	31.3	21.9	44.3	32.7	24.0	49.7	38.0	57.7
Actuated g/C Ratio	0.44	0.32	0.32	0.31	0.22	0.44	0.33	0.24	0.50	0.38	0.58
v/c Ratio	0.64	0.35	0.26	0.28	0.30	0.48	0.19	0.65	0.71	0.35	0.29
Control Delay	25.4	27.1	5.5	19.8	33.8	13.4	16.1	35.7	24.5	23.1	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	27.1	5.5	19.8	33.8	13.4	16.1	35.7	24.5	23.1	1.8
LOS	C	C	A	B	C	B	B	D	C	C	A
Approach Delay		22.8			21.1			33.6		17.9	
Approach LOS		C			C			C		B	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 9.6 (10%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Pretimed
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 22.8
 Intersection Capacity Utilization 93.0%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 3: Liverpool Rd & Bayly St



Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	13.5	35.3	47.8
Average Queue (m)	7.2	17.1	26.7
95th Queue (m)	11.3	27.6	42.3
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.3	9.3	16.4	22.6
Average Queue (m)	7.0	3.9	9.4	13.7
95th Queue (m)	13.3	11.3	14.0	20.8
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Appendix B
2027 and 2032
Background Traffic Intersection Operations

Timings
3: Liverpool Rd & Bayly St

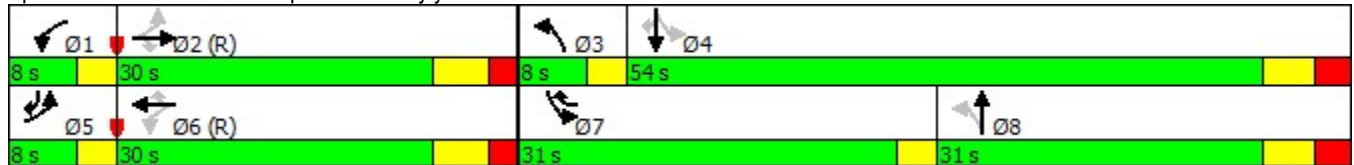
Timing Plan: AM Peak Hour
2027 Background Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	581	98	56	239	304	60	576	496	296	167
Future Volume (vph)	199	581	98	56	239	304	60	576	496	296	167
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	8.0	30.0	30.0	8.0	30.0	31.0	8.0	31.0	31.0	54.0	8.0
Total Split (%)	8.0%	30.0%	30.0%	8.0%	30.0%	31.0%	8.0%	31.0%	31.0%	54.0%	8.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	32.0	23.6	23.6	32.0	23.6	55.0	33.0	24.3	59.0	47.3	56.0
Actuated g/C Ratio	0.32	0.24	0.24	0.32	0.24	0.55	0.33	0.24	0.59	0.47	0.56
v/c Ratio	0.51	0.70	0.25	0.27	0.31	0.38	0.16	0.84	0.85	0.19	0.18
Control Delay	30.7	40.0	3.7	25.3	32.7	9.7	13.4	44.8	36.7	15.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	40.0	3.7	25.3	32.7	9.7	13.4	44.8	36.7	15.6	1.9
LOS	C	D	A	C	C	A	B	D	D	B	A
Approach Delay		33.8			20.4			42.4		24.1	
Approach LOS		C			C			D		C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 30.4
 Intersection LOS: C
 Intersection Capacity Utilization 93.1%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: AM Peak Hour
2027 Background Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	203	593	100	57	244	310	61	710	506	302	170
v/c Ratio	0.51	0.70	0.25	0.27	0.31	0.38	0.16	0.84	0.85	0.19	0.18
Control Delay	30.7	40.0	3.7	25.3	32.7	9.7	13.4	44.8	36.7	15.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	40.0	3.7	25.3	32.7	9.7	13.4	44.8	36.7	15.6	1.9
Queue Length 50th (m)	28.5	55.4	0.0	7.3	20.5	21.1	4.7	67.0	71.4	17.2	0.0
Queue Length 95th (m)	46.6	74.1	6.1	15.9	31.3	37.5	9.9	#94.4	#125.9	25.3	7.8
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	396	852	407	212	797	821	384	850	596	1613	933
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.70	0.25	0.27	0.31	0.38	0.16	0.84	0.85	0.19	0.18

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.65	2.72	2.51	2.75
Pedestrian Crosswalk LOS	B	B	B	B

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	896	611	771	978
Effct. Green for Bike (s)	23.6	23.6	24.3	47.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	472	472	486	946
Bicycle Delay (s/bike)	29.2	29.2	28.7	13.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.20	3.15	3.29	3.46
Bicycle LOS	C	C	C	C

HCM Unsignalized Intersection Capacity Analysis

6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: AM Peak Hour
2027 Background Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (veh/h)	0	0	1	3	0	217	0	530	11	129	297	2
Future Volume (Veh/h)	0	0	1	3	0	217	0	530	11	129	297	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	1	3	0	238	0	582	12	142	326	2
Pedestrians		17			16			6			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			2			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												153
pX, platoon unblocked	0.95	0.95	0.95	0.95	0.95		0.95					
vC, conflicting volume	1455	1238	350	1221	1233	605	345			610		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1452	1223	285	1205	1218	605	280			610		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	51	100			85		
cM capacity (veh/h)	45	141	702	130	142	486	1205			954		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	241	594	142	328							
Volume Left	0	3	0	142	0							
Volume Right	1	238	12	0	2							
cSH	702	470	1205	954	1700							
Volume to Capacity	0.00	0.51	0.00	0.15	0.19							
Queue Length 95th (m)	0.0	21.8	0.0	4.0	0.0							
Control Delay (s)	10.1	20.5	0.0	9.4	0.0							
Lane LOS	B	C		A								
Approach Delay (s)	10.1	20.5	0.0	2.9								
Approach LOS	B	C										
Intersection Summary												
Average Delay			4.8									
Intersection Capacity Utilization			70.7%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

Timing Plan: AM Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	77	16	8	441	236	60
Future Volume (Veh/h)	77	16	8	441	236	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	83	17	9	474	254	65
Pedestrians	9				1	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked						
vC, conflicting volume	788	296	328			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	788	296	328			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	77	98	99			
cM capacity (veh/h)	356	742	1103			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	100	483	319			
Volume Left	83	9	0			
Volume Right	17	0	65			
cSH	391	1103	1700			
Volume to Capacity	0.26	0.01	0.19			
Queue Length 95th (m)	7.6	0.2	0.0			
Control Delay (s)	17.4	0.2	0.0			
Lane LOS	C	A				
Approach Delay (s)	17.4	0.2	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			41.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
 2027 Background Traffic Conditions






Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	126	261	14	124	143
Future Volume (vph)	5	126	261	14	124	143
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	6	159	330	18	157	181

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	165	348	338
Volume Left (vph)	6	0	157
Volume Right (vph)	159	18	0
Hadj (s)	-0.54	0.07	0.16
Departure Headway (s)	5.0	4.8	4.9
Degree Utilization, x	0.23	0.47	0.46
Capacity (veh/h)	645	719	702
Control Delay (s)	9.5	12.0	12.1
Approach Delay (s)	9.5	12.0	12.1
Approach LOS	A	B	B

Intersection Summary			
Delay		11.5	
Level of Service		B	
Intersection Capacity Utilization	47.6%		ICU Level of Service A
Analysis Period (min)		15	

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	126	261	14	124	143
Future Vol, veh/h	5	126	261	14	124	143
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	0	2	4	36	4	4
Mvmt Flow	6	159	330	18	157	181
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.4	11.8	12
HCM LOS	A	B	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	4%	46%
Vol Thru, %	95%	0%	54%
Vol Right, %	5%	96%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	275	131	267
LT Vol	0	5	124
Through Vol	261	0	143
RT Vol	14	126	0
Lane Flow Rate	348	166	338
Geometry Grp	1	1	1
Degree of Util (X)	0.458	0.225	0.457
Departure Headway (Hd)	4.741	4.891	4.867
Convergence, Y/N	Yes	Yes	Yes
Cap	755	728	737
Service Time	2.806	2.966	2.931
HCM Lane V/C Ratio	0.461	0.228	0.459
HCM Control Delay	11.8	9.4	12
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.4	0.9	2.4

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: AM Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	0	1	239	153	7
Future Volume (Veh/h)	7	0	1	239	153	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	8	0	1	281	180	8
Pedestrians	21			3	1	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	489	208	209			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	489	208	209			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	530	818	1346			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	282	188			
Volume Left	8	1	0			
Volume Right	0	0	8			
cSH	530	1346	1700			
Volume to Capacity	0.02	0.00	0.11			
Queue Length 95th (m)	0.3	0.0	0.0			
Control Delay (s)	11.9	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.9	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			24.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: AM Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	2	0	198	142	7
Future Volume (Veh/h)	13	2	0	198	142	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	16	2	0	239	171	8
Pedestrians	22					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	2					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	436	197	201			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	436	197	201			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	569	831	1353			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	18	239	179			
Volume Left	16	0	0			
Volume Right	2	0	8			
cSH	589	1353	1700			
Volume to Capacity	0.03	0.00	0.11			
Queue Length 95th (m)	0.7	0.0	0.0			
Control Delay (s)	11.3	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.3	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			20.8%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: AM Peak Hour
 2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	4	1	1	3	8	3	166	9	12	117	9
Future Volume (Veh/h)	15	4	1	1	3	8	3	166	9	12	117	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	18	5	1	1	4	10	4	198	11	14	139	11
Pedestrians		2						14				
Lane Width (m)		3.7						3.7				
Walking Speed (m/s)		1.1						1.1				
Percent Blockage		0						1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	398	392	160	402	392	204	152			209		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	398	392	160	402	392	204	152			209		
tC, single (s)	7.1	6.8	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	97	99	100	100	99	99	100			99		
cM capacity (veh/h)	548	502	876	544	539	812	1438			1374		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	24	15	213	164								
Volume Left	18	1	4	14								
Volume Right	1	10	11	11								
cSH	546	696	1438	1374								
Volume to Capacity	0.04	0.02	0.00	0.01								
Queue Length 95th (m)	1.0	0.5	0.1	0.2								
Control Delay (s)	11.9	10.3	0.2	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.9	10.3	0.2	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			28.8%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Timing Plan: AM Peak Hour
2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	2	7	5	0	10	6	107	3	4	70	15
Future Volume (Veh/h)	54	2	7	5	0	10	6	107	3	4	70	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	65	2	8	6	0	12	7	129	4	5	84	18
Pedestrians		6			3			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	267	259	101	262	266	135	108			136		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	267	259	101	262	266	135	108			136		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.4			2.2		
p0 queue free %	90	100	99	99	100	99	99			100		
cM capacity (veh/h)	667	638	952	675	632	889	1386			1456		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	75	18	140	107								
Volume Left	65	6	7	5								
Volume Right	8	12	4	18								
cSH	688	804	1386	1456								
Volume to Capacity	0.11	0.02	0.01	0.00								
Queue Length 95th (m)	2.8	0.5	0.1	0.1								
Control Delay (s)	10.9	9.6	0.4	0.4								
Lane LOS	B	A	A	A								
Approach Delay (s)	10.9	9.6	0.4	0.4								
Approach LOS	B	A										
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			23.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: AM Peak Hour
 2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	0	0	0	1	5	1	83	1	4	83	4
Future Volume (vph)	18	0	0	0	1	5	1	83	1	4	83	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	22	0	0	0	1	6	1	100	1	5	100	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	22	7	102	110								
Volume Left (vph)	22	0	1	5								
Volume Right (vph)	0	6	1	5								
Hadj (s)	0.20	-0.51	0.01	0.01								
Departure Headway (s)	4.6	3.9	4.1	4.1								
Degree Utilization, x	0.03	0.01	0.12	0.12								
Capacity (veh/h)	750	877	861	869								
Control Delay (s)	7.7	6.9	7.6	7.7								
Approach Delay (s)	7.7	6.9	7.6	7.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			22.7%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	0	0	0	1	5	1	83	1	4	83	4
Future Vol, veh/h	18	0	0	0	1	5	1	83	1	4	83	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	22	0	0	0	1	6	1	100	1	5	100	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.7	6.9	7.6	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	100%	0%	4%
Vol Thru, %	98%	0%	17%	91%
Vol Right, %	1%	0%	83%	4%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	85	18	6	91
LT Vol	1	18	0	4
Through Vol	83	0	1	83
RT Vol	1	0	5	4
Lane Flow Rate	102	22	7	110
Geometry Grp	1	1	1	1
Degree of Util (X)	0.115	0.027	0.008	0.122
Departure Headway (Hd)	4.026	4.469	3.878	4.008
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	887	789	928	891
Service Time	2.067	2.563	1.878	2.048
HCM Lane V/C Ratio	0.115	0.028	0.008	0.123
HCM Control Delay	7.6	7.7	6.9	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0	0.4

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd & Site Access

Timing Plan: AM Peak Hour
2027 Background Traffic Conditions

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	61	0	0	39
Future Volume (Veh/h)	0	0	61	0	0	39
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	0	0	82	0	0	53
Pedestrians	7					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	142	89			89	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	142	89			89	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	850	968			1509	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	82	53			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1509			
Volume to Capacity	0.00	0.05	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			8.7%	ICU Level of Service		A
Analysis Period (min)			15			

Timings
3: Liverpool Rd & Bayly St

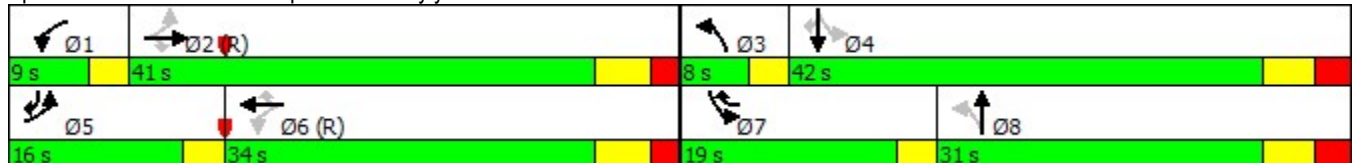
Timing Plan: PM Peak Hour
2027 Background Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	366	846	259	98	572	689	76	564	335	555	245	
Future Volume (vph)	366	846	259	98	572	689	76	564	335	555	245	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8	7	4	5	
Permitted Phases	2		2	6		6	8		4		4	
Detector Phase	5	2	2	1	6	7	3	8	7	4	5	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0	
Total Split (s)	16.0	41.0	41.0	9.0	34.0	19.0	8.0	31.0	19.0	42.0	16.0	
Total Split (%)	16.0%	41.0%	41.0%	9.0%	34.0%	19.0%	8.0%	31.0%	19.0%	42.0%	16.0%	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0	
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	
Act Effct Green (s)	47.0	34.6	34.6	37.0	27.6	47.0	33.0	24.3	47.0	35.3	52.0	
Actuated g/C Ratio	0.47	0.35	0.35	0.37	0.28	0.47	0.33	0.24	0.47	0.35	0.52	
v/c Ratio	0.92	0.70	0.42	0.44	0.59	0.91	0.24	0.79	0.89	0.45	0.29	
Control Delay	50.4	32.0	5.8	22.0	34.2	38.0	17.8	42.0	47.0	26.3	6.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.4	32.0	5.8	22.0	34.2	38.0	17.8	42.0	47.0	26.3	6.3	
LOS	D	C	A	C	C	D	B	D	D	C	A	
Approach Delay		32.0			35.2			39.5		28.1		
Approach LOS		C			D			D		C		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 33.2
 Intersection LOS: C
 Intersection Capacity Utilization 97.5%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: PM Peak Hour
2027 Background Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	377	872	267	101	590	710	78	676	345	572	253
v/c Ratio	0.92	0.70	0.42	0.44	0.59	0.91	0.24	0.79	0.89	0.45	0.29
Control Delay	50.4	32.0	5.8	22.0	34.2	38.0	17.8	42.0	47.0	26.3	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	32.0	5.8	22.0	34.2	38.0	17.8	42.0	47.0	26.3	6.3
Queue Length 50th (m)	47.2	76.1	1.7	10.6	52.0	99.4	8.1	63.2	43.6	44.4	10.4
Queue Length 95th (m)	#89.6	97.6	18.4	20.0	69.5	#133.3	16.1	83.8	#92.9	59.4	22.7
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	408	1238	640	229	997	776	321	861	388	1263	861
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.70	0.42	0.44	0.59	0.91	0.24	0.79	0.89	0.45	0.29

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.80	2.83	2.59	2.85
Pedestrian Crosswalk LOS	C	C	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	1516	1401	754	1170
Effct. Green for Bike (s)	34.6	27.6	24.3	35.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	692	552	486	706
Bicycle Delay (s/bike)	21.4	26.2	28.7	20.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.71	3.80	3.27	3.62
Bicycle LOS	D	D	C	D

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: PM Peak Hour
2027 Background Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	↕
Traffic Volume (veh/h)	4	1	1	1	0	236	1	497	8	215	634	1
Future Volume (Veh/h)	4	1	1	1	0	236	1	497	8	215	634	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	4	1	1	1	0	246	1	518	8	224	660	1
Pedestrians		23			32			22			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			3			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.85	0.85	0.85	0.85	0.85		0.85					
vC, conflicting volume	1904	1692	706	1688	1688	556	684			558		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1976	1726	562	1721	1722	556	537			558		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	75	98	100	98	100	52	100			77		
cM capacity (veh/h)	16	56	430	45	56	517	862			991		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	6	247	527	224	661							
Volume Left	4	1	1	224	0							
Volume Right	1	246	8	0	1							
cSH	22	495	862	991	1700							
Volume to Capacity	0.27	0.50	0.00	0.23	0.39							
Queue Length 95th (m)	6.0	20.8	0.0	6.6	0.0							
Control Delay (s)	217.2	19.3	0.0	9.7	0.0							
Lane LOS	F	C	A	A								
Approach Delay (s)	217.2	19.3	0.0	2.5								
Approach LOS	F	C										
Intersection Summary												
Average Delay			5.0									
Intersection Capacity Utilization			85.0%		ICU Level of Service				E			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
9: Liverpool Rd & Radom St

Timing Plan: PM Peak Hour
2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	58	28	18	432	558	68
Future Volume (Veh/h)	58	28	18	432	558	68
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	60	29	19	445	575	70
Pedestrians	11			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.85	0.85	0.85			
vC, conflicting volume	1104	622	656			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1033	464	504			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	94	98			
cM capacity (veh/h)	213	498	898			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	89	464	645			
Volume Left	60	19	0			
Volume Right	29	0	70			
cSH	262	898	1700			
Volume to Capacity	0.34	0.02	0.38			
Queue Length 95th (m)	11.0	0.5	0.0			
Control Delay (s)	25.6	0.6	0.0			
Lane LOS	D	A				
Approach Delay (s)	25.6	0.6	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			49.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: PM Peak Hour
 2027 Background Traffic Conditions






Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	28	123	257	11	175	388
Future Volume (vph)	28	123	257	11	175	388
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	31	138	289	12	197	436

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	169	301	633
Volume Left (vph)	31	0	197
Volume Right (vph)	138	12	0
Hadj (s)	-0.45	0.01	0.11
Departure Headway (s)	5.7	5.2	4.9
Degree Utilization, x	0.27	0.44	0.87
Capacity (veh/h)	592	659	720
Control Delay (s)	10.8	12.3	31.4
Approach Delay (s)	10.8	12.3	31.4
Approach LOS	B	B	D

Intersection Summary		
Delay		23.0
Level of Service		C
Intersection Capacity Utilization	63.5%	ICU Level of Service
Analysis Period (min)		15
		B

Intersection	
Intersection Delay, s/veh	23
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	123	257	11	175	388
Future Vol, veh/h	28	123	257	11	175	388
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	0	2	0	2	3
Mvmt Flow	31	138	289	12	197	436
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	10.8	12.3	31.3
HCM LOS	B	B	D

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	19%	31%
Vol Thru, %	96%	0%	69%
Vol Right, %	4%	81%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	268	151	563
LT Vol	0	28	175
Through Vol	257	0	388
RT Vol	11	123	0
Lane Flow Rate	301	170	633
Geometry Grp	1	1	1
Degree of Util (X)	0.437	0.268	0.868
Departure Headway (Hd)	5.227	5.683	4.939
Convergence, Y/N	Yes	Yes	Yes
Cap	690	631	740
Service Time	3.26	3.729	2.939
HCM Lane V/C Ratio	0.436	0.269	0.855
HCM Control Delay	12.3	10.8	31.3
HCM Lane LOS	B	B	D
HCM 95th-tile Q	2.2	1.1	10.5

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: PM Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	0	1	208	346	11
Future Volume (Veh/h)	6	0	1	208	346	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	7	0	1	248	412	13
Pedestrians	10			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	678	430	435			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	678	430	435			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	416	623	1124			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	249	425			
Volume Left	7	1	0			
Volume Right	0	0	13			
cSH	416	1124	1700			
Volume to Capacity	0.02	0.00	0.25			
Queue Length 95th (m)	0.4	0.0	0.0			
Control Delay (s)	13.8	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.8	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			29.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: PM Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	1	1	193	306	12
Future Volume (Veh/h)	2	1	1	193	306	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	2	1	1	224	356	14
Pedestrians	9			3		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	601	372	379			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	601	372	379			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	461	672	1180			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	225	370			
Volume Left	2	1	0			
Volume Right	1	0	14			
cSH	515	1180	1700			
Volume to Capacity	0.01	0.00	0.22			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	12.0	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			26.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: PM Peak Hour
 2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	0	1	2	3	9	2	167	1	18	264	19
Future Volume (Veh/h)	9	0	1	2	3	9	2	167	1	18	264	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	10	0	1	2	3	10	2	192	1	21	303	22
Pedestrians		9			12			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	574	574	325	568	584	206	334			205		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	574	574	325	568	584	206	334			205		
tC, single (s)	7.3	6.5	6.2	7.6	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	4.0	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	100	99	99	99	100			98		
cM capacity (veh/h)	379	416	713	354	410	829	1226			1362		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	11	15	195	346								
Volume Left	10	2	2	21								
Volume Right	1	10	1	22								
cSH	396	599	1226	1362								
Volume to Capacity	0.03	0.03	0.00	0.02								
Queue Length 95th (m)	0.7	0.6	0.0	0.4								
Control Delay (s)	14.4	11.2	0.1	0.6								
Lane LOS	B	B	A	A								
Approach Delay (s)	14.4	11.2	0.1	0.6								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			36.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 20: Liverpool Rd & Annland St

















Timing Plan: PM Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	27	0	11	8	3	3	9	174	6	14	217	52
Future Volume (Veh/h)	27	0	11	8	3	3	9	174	6	14	217	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	29	0	12	9	3	3	10	187	6	15	233	56
Pedestrians		4			1			2			3	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	512	509	267	516	534	194	293			194		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	512	509	267	516	534	194	293			194		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	98	98	99	100	99			99		
cM capacity (veh/h)	434	459	772	456	444	849	1275			1390		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	41	15	203	304								
Volume Left	29	9	10	15								
Volume Right	12	3	6	56								
cSH	498	500	1275	1390								
Volume to Capacity	0.08	0.03	0.01	0.01								
Queue Length 95th (m)	2.0	0.7	0.2	0.2								
Control Delay (s)	12.9	12.4	0.5	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.9	12.4	0.5	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			30.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: PM Peak Hour
 2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	0	2	0	0	7	5	115	1	10	165	38
Future Volume (vph)	19	0	2	0	0	7	5	115	1	10	165	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	0	2	0	0	8	6	137	1	12	196	45
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	25	8	144	253								
Volume Left (vph)	23	0	6	12								
Volume Right (vph)	2	8	1	45								
Hadj (s)	0.21	-0.60	0.00	-0.09								
Departure Headway (s)	5.0	4.2	4.2	4.0								
Degree Utilization, x	0.03	0.01	0.17	0.28								
Capacity (veh/h)	662	774	829	878								
Control Delay (s)	8.1	7.2	8.1	8.6								
Approach Delay (s)	8.1	7.2	8.1	8.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.4									
Level of Service			A									
Intersection Capacity Utilization			30.0%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	0	2	0	0	7	5	115	1	10	165	38
Future Vol, veh/h	19	0	2	0	0	7	5	115	1	10	165	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	5	0	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	23	0	2	0	0	8	6	137	1	12	196	45
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	7.2	8.1	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	90%	0%	5%
Vol Thru, %	95%	0%	0%	77%
Vol Right, %	1%	10%	100%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	121	21	7	213
LT Vol	5	19	0	10
Through Vol	115	0	0	165
RT Vol	1	2	7	38
Lane Flow Rate	144	25	8	254
Geometry Grp	1	1	1	1
Degree of Util (X)	0.166	0.034	0.01	0.279
Departure Headway (Hd)	4.15	4.96	4.171	3.967
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	854	726	863	898
Service Time	2.227	2.961	2.172	2.03
HCM Lane V/C Ratio	0.169	0.034	0.009	0.283
HCM Control Delay	8.1	8.1	7.2	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.1	0	1.1

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd & Site Access

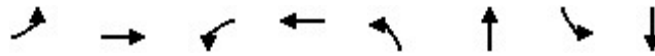
Timing Plan: PM Peak Hour
2027 Background Traffic Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	127	0	0	160
Future Volume (Veh/h)	0	0	127	0	0	160
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	0	163	0	0	205
Pedestrians	33		4			9
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	3		0			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	405	205			196	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	405	205			196	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	435	806			1344	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	163	205			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1344			
Volume to Capacity	0.00	0.10	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			23.7%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: PM Peak Hour
2027 Background Traffic Cond - Tatra Signalized



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕	↗	↘
Traffic Volume (vph)	4	1	1	0	1	497	215	634
Future Volume (vph)	4	1	1	0	1	497	215	634
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	26.0	26.0	26.0	26.0	64.0	64.0	64.0	64.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	71.1%	71.1%	71.1%	71.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		4.5		4.5		4.5		4.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)		7.5		7.5		60.8	60.8	60.8
Actuated g/C Ratio		0.10		0.10		0.79	0.79	0.79
v/c Ratio		0.06		0.65		0.35	0.31	0.45
Control Delay		29.5		13.4		3.5	4.1	4.2
Queue Delay		0.0		0.0		0.0	0.0	0.6
Total Delay		29.5		13.4		3.5	4.1	4.8
LOS		C		B		A	A	A
Approach Delay		29.5		13.4		3.5		4.6
Approach LOS		C		B		A		A

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 77.3
 Natural Cycle: 55
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 5.6
 Intersection Capacity Utilization 86.3%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service E

Splits and Phases: 6: Liverpool Rd & Parking Lot/Tatra Dr



Timings
3: Liverpool Rd & Bayly St

Timing Plan: Sat Peak Hour
2027 Background Traffic Conditions

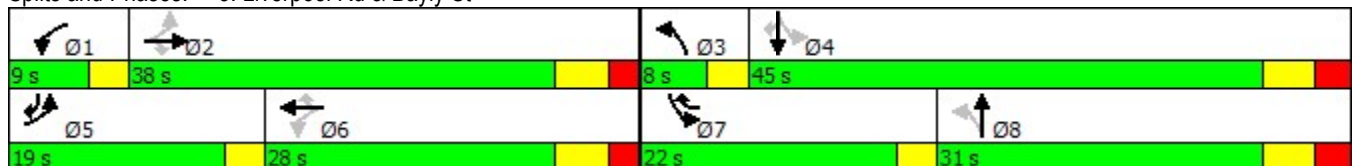


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	357	410	147	96	239	357	63	486	342	515	288
Future Volume (vph)	357	410	147	96	239	357	63	486	342	515	288
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	19.0	38.0	38.0	9.0	28.0	22.0	8.0	31.0	22.0	45.0	19.0
Total Split (%)	19.0%	38.0%	38.0%	9.0%	28.0%	22.0%	8.0%	31.0%	22.0%	45.0%	19.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None
Act Effct Green (s)	43.3	32.9	32.9	31.2	21.8	43.3	30.4	21.7	46.5	36.6	55.3
Actuated g/C Ratio	0.45	0.34	0.34	0.33	0.23	0.45	0.32	0.23	0.49	0.38	0.58
v/c Ratio	0.63	0.34	0.25	0.28	0.30	0.48	0.20	0.80	0.79	0.39	0.29
Control Delay	24.5	25.8	5.4	19.4	33.0	14.1	16.2	41.7	32.1	23.0	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	25.8	5.4	19.4	33.0	14.1	16.2	41.7	32.1	23.0	1.8
LOS	C	C	A	B	C	B	B	D	C	C	A
Approach Delay		22.0			21.4			39.4		20.4	
Approach LOS		C			C			D		C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 95.8
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 24.8
 Intersection LOS: C
 Intersection Capacity Utilization 92.6%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: Sat Peak Hour
2027 Background Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	368	423	152	99	246	368	65	637	353	531	297
v/c Ratio	0.63	0.34	0.25	0.28	0.30	0.48	0.20	0.80	0.79	0.39	0.29
Control Delay	24.5	25.8	5.4	19.4	33.0	14.1	16.2	41.7	32.1	23.0	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	25.8	5.4	19.4	33.0	14.1	16.2	41.7	32.1	23.0	1.8
Queue Length 50th (m)	48.7	33.1	0.0	11.1	21.2	31.4	6.3	57.2	40.8	38.6	0.0
Queue Length 95th (m)	72.9	46.1	13.4	20.8	32.2	54.5	13.1	76.8	#80.6	52.1	9.3
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	592	1253	606	358	822	789	324	894	463	1437	1050
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.34	0.25	0.28	0.30	0.47	0.20	0.71	0.76	0.37	0.28

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.68	2.69	2.56	2.79
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	943	713	702	1181
Effct. Green for Bike (s)	32.9	21.8	21.7	36.6
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	658	436	434	732
Bicycle Delay (s/bike)	22.5	30.6	30.7	20.1
Bicycle Compliance	Fair	Poor	Poor	Fair
Bicycle LOS Score	3.24	3.23	3.23	3.63
Bicycle LOS	C	C	C	D

HCM Unsignalized Intersection Capacity Analysis

6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: Sat Peak Hour
2027 Background Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (veh/h)	1	0	0	4	0	118	0	529	3	140	574	4
Future Volume (Veh/h)	1	0	0	4	0	118	0	529	3	140	574	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	0	0	4	0	122	0	545	3	144	592	4
Pedestrians		11			23			6				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.1			1.1			1.1				
Percent Blockage		1			2			1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												153
pX, platoon unblocked	0.86	0.86	0.86	0.86	0.86		0.86					
vC, conflicting volume	1562	1464	611	1456	1464	570	607			571		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1572	1458	461	1448	1459	570	456			571		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	95	100	76	100			85		
cM capacity (veh/h)	51	92	509	79	92	513	944			989		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	126	548	144	596							
Volume Left	1	4	0	144	0							
Volume Right	0	122	3	0	4							
cSH	51	437	944	989	1700							
Volume to Capacity	0.02	0.29	0.00	0.15	0.35							
Queue Length 95th (m)	0.5	9.0	0.0	3.9	0.0							
Control Delay (s)	77.7	16.5	0.0	9.3	0.0							
Lane LOS	F	C		A								
Approach Delay (s)	77.7	16.5	0.0	1.8								
Approach LOS	F	C										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			75.9%			ICU Level of Service				D		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

Timing Plan: Sat Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	12	10	458	512	66
Future Volume (Veh/h)	56	12	10	458	512	66
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	62	13	11	503	563	73
Pedestrians	6			5		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.85	0.85	0.85			
vC, conflicting volume	1130	610	642			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1066	455	492			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	70	97	99			
cM capacity (veh/h)	206	499	915			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	75	514	636			
Volume Left	62	11	0			
Volume Right	13	0	73			
cSH	229	915	1700			
Volume to Capacity	0.33	0.01	0.37			
Queue Length 95th (m)	10.4	0.3	0.0			
Control Delay (s)	28.2	0.3	0.0			
Lane LOS	D	A				
Approach Delay (s)	28.2	0.3	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			44.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: Sat Peak Hour
 2027 Background Traffic Conditions






Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	11	105	313	20	121	366
Future Volume (vph)	11	105	313	20	121	366
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	11	109	326	21	126	381

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	120	347	507
Volume Left (vph)	11	0	126
Volume Right (vph)	109	21	0
Hadj (s)	-0.51	0.02	0.09
Departure Headway (s)	5.3	4.9	4.7
Degree Utilization, x	0.18	0.47	0.67
Capacity (veh/h)	589	716	740
Control Delay (s)	9.5	12.1	16.8
Approach Delay (s)	9.5	12.1	16.8
Approach LOS	A	B	C

Intersection Summary			
Delay		14.2	
Level of Service		B	
Intersection Capacity Utilization	60.8%		ICU Level of Service B
Analysis Period (min)		15	

Intersection	
Intersection Delay, s/veh	13.9
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	105	313	20	121	366
Future Vol, veh/h	11	105	313	20	121	366
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	1	3	5	0	3
Mvmt Flow	11	109	326	21	126	381
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.5	12	16.2
HCM LOS	A	B	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	9%	25%
Vol Thru, %	94%	0%	75%
Vol Right, %	6%	91%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	333	116	487
LT Vol	0	11	121
Through Vol	313	0	366
RT Vol	20	105	0
Lane Flow Rate	347	121	507
Geometry Grp	1	1	1
Degree of Util (X)	0.462	0.176	0.656
Departure Headway (Hd)	4.793	5.251	4.658
Convergence, Y/N	Yes	Yes	Yes
Cap	746	675	771
Service Time	2.858	3.343	2.716
HCM Lane V/C Ratio	0.465	0.179	0.658
HCM Control Delay	12	9.5	16.2
HCM Lane LOS	B	A	C
HCM 95th-tile Q	2.5	0.6	5

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: Sat Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	0	0	281	330	12
Future Volume (Veh/h)	10	0	0	281	330	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	11	0	0	309	363	13
Pedestrians	9			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	688	380	385			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	688	380	385			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	412	665	1174			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	11	309	376			
Volume Left	11	0	0			
Volume Right	0	0	13			
cSH	412	1174	1700			
Volume to Capacity	0.03	0.00	0.22			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	14.0	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	14.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	28.5%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: Sat Peak Hour
 2027 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	1	0	233	318	13
Future Volume (Veh/h)	2	1	0	233	318	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	1	0	251	342	14
Pedestrians	11					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	611	360	367			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	611	360	367			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	455	682	1190			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	251	356			
Volume Left	2	0	0			
Volume Right	1	0	14			
cSH	512	1190	1700			
Volume to Capacity	0.01	0.00	0.21			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	12.1	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	12.1	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			27.6%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: Sat Peak Hour
 2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	3	3	2	5	6	5	210	2	10	291	17
Future Volume (Veh/h)	12	3	3	2	5	6	5	210	2	10	291	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	3	3	2	6	7	6	233	2	11	323	19
Pedestrians		10			16							
Lane Width (m)		3.7			3.7							
Walking Speed (m/s)		1.1			1.1							
Percent Blockage		1			2							
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	620	628	342	621	636	250	352			251		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	620	628	342	621	636	250	352			251		
tC, single (s)	7.5	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.9	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	99	100	99	98	99	100			99		
cM capacity (veh/h)	328	387	698	381	383	781	1206			1305		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	19	15	241	353								
Volume Left	13	2	6	11								
Volume Right	3	7	2	19								
cSH	367	502	1206	1305								
Volume to Capacity	0.05	0.03	0.00	0.01								
Queue Length 95th (m)	1.2	0.7	0.1	0.2								
Control Delay (s)	15.3	12.4	0.2	0.3								
Lane LOS	C	B	A	A								
Approach Delay (s)	15.3	12.4	0.2	0.3								
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			31.3%		ICU Level of Service					A		
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Timing Plan: Sat Peak Hour
2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	0	13	22	2	8	12	174	4	12	226	44
Future Volume (Veh/h)	40	0	13	22	2	8	12	174	4	12	226	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	43	0	14	24	2	9	13	187	4	13	243	47
Pedestrians		15			5			1			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	534	530	282	528	551	196	305			196		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	534	530	282	528	551	196	305			196		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	100	98	95	100	99	99			99		
cM capacity (veh/h)	432	440	749	440	428	845	1249			1382		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	57	35	204	303								
Volume Left	43	24	13	13								
Volume Right	14	9	4	47								
cSH	482	501	1249	1382								
Volume to Capacity	0.12	0.07	0.01	0.01								
Queue Length 95th (m)	3.0	1.7	0.2	0.2								
Control Delay (s)	13.5	12.7	0.6	0.4								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.5	12.7	0.6	0.4								
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			29.0%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: Sat Peak Hour
 2027 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	35	2	7	1	1	18	4	119	4	7	178	61
Future Volume (vph)	35	2	7	1	1	18	4	119	4	7	178	61
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)	38	2	8	1	1	20	4	129	4	8	193	66
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	48	22	137	267								
Volume Left (vph)	38	1	4	8								
Volume Right (vph)	8	20	4	66								
Hadj (s)	0.06	-0.54	-0.01	-0.14								
Departure Headway (s)	4.9	4.3	4.3	4.1								
Degree Utilization, x	0.06	0.03	0.16	0.30								
Capacity (veh/h)	677	752	803	866								
Control Delay (s)	8.2	7.4	8.2	8.8								
Approach Delay (s)	8.2	7.4	8.2	8.8								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.5									
Level of Service			A									
Intersection Capacity Utilization			33.1%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	2	7	1	1	18	4	119	4	7	178	61
Future Vol, veh/h	35	2	7	1	1	18	4	119	4	7	178	61
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	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	38	2	8	1	1	20	4	129	4	8	193	66
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	7.4	8.2	8.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	80%	5%	3%
Vol Thru, %	94%	5%	5%	72%
Vol Right, %	3%	16%	90%	25%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	127	44	20	246
LT Vol	4	35	1	7
Through Vol	119	2	1	178
RT Vol	4	7	18	61
Lane Flow Rate	138	48	22	267
Geometry Grp	1	1	1	1
Degree of Util (X)	0.165	0.065	0.026	0.296
Departure Headway (Hd)	4.315	4.856	4.297	3.983
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	835	741	836	888
Service Time	2.323	2.862	2.306	2.078
HCM Lane V/C Ratio	0.165	0.065	0.026	0.301
HCM Control Delay	8.2	8.2	7.4	8.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.2	0.1	1.2

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Timing Plan: Sat Peak Hour
2027 Background Traffic Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	5	111	0	6	158
Future Volume (Veh/h)	0	5	111	0	6	158
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	5	118	0	6	168
Pedestrians	64		3			3
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	6		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	365	185			182	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	365	185			182	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	594	806			1306	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	5	118	174			
Volume Left	0	0	6			
Volume Right	5	0	0			
cSH	806	1700	1306			
Volume to Capacity	0.01	0.07	0.00			
Queue Length 95th (m)	0.1	0.0	0.1			
Control Delay (s)	9.5	0.0	0.3			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	0.3			
Approach LOS	A					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			24.1%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
3: Liverpool Rd & Bayly St

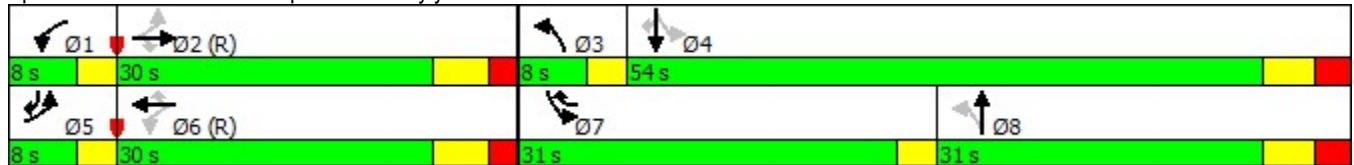
Timing Plan: AM Peak Hour
2032 Background Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	596	98	56	245	304	60	589	496	303	167
Future Volume (vph)	199	596	98	56	245	304	60	589	496	303	167
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	8.0	30.0	30.0	8.0	30.0	31.0	8.0	31.0	31.0	54.0	8.0
Total Split (%)	8.0%	30.0%	30.0%	8.0%	30.0%	31.0%	8.0%	31.0%	31.0%	54.0%	8.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	32.0	23.6	23.6	32.0	23.6	55.0	33.0	24.3	59.0	47.3	56.0
Actuated g/C Ratio	0.32	0.24	0.24	0.32	0.24	0.55	0.33	0.24	0.59	0.47	0.56
v/c Ratio	0.52	0.71	0.25	0.28	0.31	0.38	0.16	0.85	0.85	0.19	0.18
Control Delay	30.8	40.5	3.7	25.5	32.8	9.8	13.4	46.0	37.9	15.7	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	40.5	3.7	25.5	32.8	9.8	13.4	46.0	37.9	15.7	1.9
LOS	C	D	A	C	C	A	B	D	D	B	A
Approach Delay		34.3			20.6			43.5		24.7	
Approach LOS		C			C			D		C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 31.1
 Intersection Capacity Utilization 93.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: AM Peak Hour
2032 Background Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	203	608	100	57	250	310	61	723	506	309	170
v/c Ratio	0.52	0.71	0.25	0.28	0.31	0.38	0.16	0.85	0.85	0.19	0.18
Control Delay	30.8	40.5	3.7	25.5	32.8	9.8	13.4	46.0	37.9	15.7	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	40.5	3.7	25.5	32.8	9.8	13.4	46.0	37.9	15.7	1.9
Queue Length 50th (m)	28.5	57.2	0.0	7.3	21.1	21.4	4.7	68.6	72.7	17.6	0.0
Queue Length 95th (m)	46.6	76.0	6.1	15.9	32.0	37.7	9.9	#97.3	#127.9	25.7	7.8
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	394	852	407	206	797	820	382	850	592	1613	933
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.71	0.25	0.28	0.31	0.38	0.16	0.85	0.85	0.19	0.18

Intersection Summary



















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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.66	2.72	2.52	2.75
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	911	617	784	985
Effct. Green for Bike (s)	23.6	23.6	24.3	47.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	472	472	486	946
Bicycle Delay (s/bike)	29.2	29.2	28.7	13.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.21	3.15	3.30	3.47
Bicycle LOS	C	C	C	C

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: AM Peak Hour
2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	3	0	217	0	541	11	129	304	2
Future Volume (Veh/h)	0	0	1	3	0	217	0	541	11	129	304	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	1	3	0	238	0	595	12	142	334	2
Pedestrians		17			16			6			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			2			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1476	1259	358	1242	1254	618	353			623		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1475	1245	290	1227	1239	618	285			623		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	98	100	50	100			85		
cM capacity (veh/h)	42	136	696	125	137	478	1196			943		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	241	607	142	336							
Volume Left	0	3	0	142	0							
Volume Right	1	238	12	0	2							
cSH	696	461	1196	943	1700							
Volume to Capacity	0.00	0.52	0.00	0.15	0.20							
Queue Length 95th (m)	0.0	22.5	0.0	4.0	0.0							
Control Delay (s)	10.2	21.0	0.0	9.5	0.0							
Lane LOS	B	C		A								
Approach Delay (s)	10.2	21.0	0.0	2.8								
Approach LOS	B	C										
Intersection Summary												
Average Delay			4.8									
Intersection Capacity Utilization			71.6%		ICU Level of Service			C				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

Timing Plan: AM Peak Hour
 2032 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	77	16	8	450	241	60
Future Volume (Veh/h)	77	16	8	450	241	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	83	17	9	484	259	65
Pedestrians	9				1	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked						
vC, conflicting volume	804	300	333			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	804	300	333			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	76	98	99			
cM capacity (veh/h)	349	737	1098			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	100	493	324			
Volume Left	83	9	0			
Volume Right	17	0	65			
cSH	383	1098	1700			
Volume to Capacity	0.26	0.01	0.19			
Queue Length 95th (m)	7.8	0.2	0.0			
Control Delay (s)	17.7	0.2	0.0			
Lane LOS	C	A				
Approach Delay (s)	17.7	0.2	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			42.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
 2032 Background Traffic Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	5	126	266	14	124	146
Future Volume (vph)	5	126	266	14	124	146
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	6	159	337	18	157	185

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	165	355	342
Volume Left (vph)	6	0	157
Volume Right (vph)	159	18	0
Hadj (s)	-0.54	0.07	0.16
Departure Headway (s)	5.0	4.8	4.9
Degree Utilization, x	0.23	0.48	0.47
Capacity (veh/h)	641	718	701
Control Delay (s)	9.5	12.2	12.2
Approach Delay (s)	9.5	12.2	12.2
Approach LOS	A	B	B

Intersection Summary			
Delay		11.7	
Level of Service		B	
Intersection Capacity Utilization		48.1%	ICU Level of Service
Analysis Period (min)		15	A

Intersection	
Intersection Delay, s/veh	11.5
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	126	266	14	124	146
Future Vol, veh/h	5	126	266	14	124	146
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	0	2	4	36	4	4
Mvmt Flow	6	159	337	18	157	185
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.4	12	12.1
HCM LOS	A	B	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	4%	46%
Vol Thru, %	95%	0%	54%
Vol Right, %	5%	96%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	280	131	270
LT Vol	0	5	124
Through Vol	266	0	146
RT Vol	14	126	0
Lane Flow Rate	354	166	342
Geometry Grp	1	1	1
Degree of Util (X)	0.468	0.226	0.463
Departure Headway (Hd)	4.75	4.914	4.875
Convergence, Y/N	Yes	Yes	Yes
Cap	751	723	735
Service Time	2.814	2.992	2.942
HCM Lane V/C Ratio	0.471	0.23	0.465
HCM Control Delay	12	9.4	12.1
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.5	0.9	2.5

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: AM Peak Hour
 2032 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	0	1	243	156	7
Future Volume (Veh/h)	7	0	1	243	156	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	8	0	1	286	184	8
Pedestrians	21			3	1	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	498	212	213			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	498	212	213			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	523	814	1341			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	287	192			
Volume Left	8	1	0			
Volume Right	0	0	8			
cSH	523	1341	1700			
Volume to Capacity	0.02	0.00	0.11			
Queue Length 95th (m)	0.4	0.0	0.0			
Control Delay (s)	12.0	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	24.5%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: AM Peak Hour
 2032 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	2	0	202	146	7
Future Volume (Veh/h)	13	2	0	202	146	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	16	2	0	243	176	8
Pedestrians	22					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	2					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	445	202	206			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	445	202	206			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	562	826	1348			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	18	243	184			
Volume Left	16	0	0			
Volume Right	2	0	8			
cSH	583	1348	1700			
Volume to Capacity	0.03	0.00	0.11			
Queue Length 95th (m)	0.7	0.0	0.0			
Control Delay (s)	11.4	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.4	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			20.9%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: AM Peak Hour
 2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	4	1	1	3	8	3	168	9	12	120	9
Future Volume (Veh/h)	15	4	1	1	3	8	3	168	9	12	120	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	18	5	1	1	4	10	4	200	11	14	143	11
Pedestrians		2						14				
Lane Width (m)		3.7						3.7				
Walking Speed (m/s)		1.1						1.1				
Percent Blockage		0						1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	404	398	164	408	398	206	156			211		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	404	398	164	408	398	206	156			211		
tC, single (s)	7.1	6.8	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	97	99	100	100	99	99	100			99		
cM capacity (veh/h)	543	498	871	539	535	810	1434			1372		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	24	15	215	168								
Volume Left	18	1	4	14								
Volume Right	1	10	11	11								
cSH	542	692	1434	1372								
Volume to Capacity	0.04	0.02	0.00	0.01								
Queue Length 95th (m)	1.1	0.5	0.1	0.2								
Control Delay (s)	12.0	10.3	0.2	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.0	10.3	0.2	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			29.0%		ICU Level of Service					A		
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Timing Plan: AM Peak Hour
2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	2	7	5	0	10	6	110	3	4	72	15
Future Volume (Veh/h)	54	2	7	5	0	10	6	110	3	4	72	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	65	2	8	6	0	12	7	133	4	5	87	18
Pedestrians		6			3			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	274	266	104	269	273	139	111			140		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274	266	104	269	273	139	111			140		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.4			2.2		
p0 queue free %	90	100	99	99	100	99	99			100		
cM capacity (veh/h)	660	632	949	668	626	885	1382			1451		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	75	18	144	110								
Volume Left	65	6	7	5								
Volume Right	8	12	4	18								
cSH	681	798	1382	1451								
Volume to Capacity	0.11	0.02	0.01	0.00								
Queue Length 95th (m)	2.8	0.5	0.1	0.1								
Control Delay (s)	10.9	9.6	0.4	0.4								
Lane LOS	B	A	A	A								
Approach Delay (s)	10.9	9.6	0.4	0.4								
Approach LOS	B	A										
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			23.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: AM Peak Hour
 2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	0	0	0	1	5	1	85	1	4	85	4
Future Volume (vph)	18	0	0	0	1	5	1	85	1	4	85	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	22	0	0	0	1	6	1	102	1	5	102	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	22	7	104	112								
Volume Left (vph)	22	0	1	5								
Volume Right (vph)	0	6	1	5								
Hadj (s)	0.20	-0.51	0.01	0.01								
Departure Headway (s)	4.6	3.9	4.1	4.1								
Degree Utilization, x	0.03	0.01	0.12	0.13								
Capacity (veh/h)	748	874	860	869								
Control Delay (s)	7.7	6.9	7.6	7.7								
Approach Delay (s)	7.7	6.9	7.6	7.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			22.8%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	0	0	0	1	5	1	85	1	4	85	4
Future Vol, veh/h	18	0	0	0	1	5	1	85	1	4	85	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	22	0	0	0	1	6	1	102	1	5	102	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.7	6.9	7.6	7.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	100%	0%	4%
Vol Thru, %	98%	0%	17%	91%
Vol Right, %	1%	0%	83%	4%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	18	6	93
LT Vol	1	18	0	4
Through Vol	85	0	1	85
RT Vol	1	0	5	4
Lane Flow Rate	105	22	7	112
Geometry Grp	1	1	1	1
Degree of Util (X)	0.117	0.027	0.008	0.125
Departure Headway (Hd)	4.029	4.478	3.788	4.01
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	886	788	926	891
Service Time	2.07	2.573	1.888	2.05
HCM Lane V/C Ratio	0.119	0.028	0.008	0.126
HCM Control Delay	7.6	7.7	6.9	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0	0.4

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Timing Plan: AM Peak Hour
2032 Background Traffic Conditions

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	63	0	0	40
Future Volume (Veh/h)	0	0	63	0	0	40
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	0	0	85	0	0	54
Pedestrians	7					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	146	92			92	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	146	92			92	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	845	964			1505	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	85	54			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1505			
Volume to Capacity	0.00	0.05	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			8.7%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	19.7	42.4	30.2
Average Queue (m)	8.3	17.2	19.6
95th Queue (m)	15.7	28.9	28.6
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.3	9.1	15.8	16.4
Average Queue (m)	3.6	1.8	9.2	11.0
95th Queue (m)	10.9	7.7	11.3	16.0
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Timings
3: Liverpool Rd & Bayly St

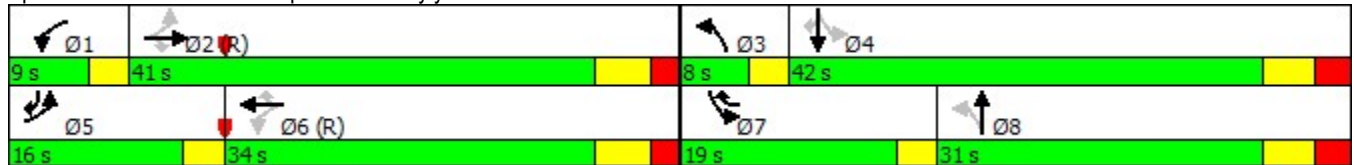
Timing Plan: PM Peak Hour
2032 Background Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	366	868	259	98	586	689	76	577	335	568	245	
Future Volume (vph)	366	868	259	98	586	689	76	577	335	568	245	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8	7	4	5	
Permitted Phases	2		2	6		6	8		4		4	
Detector Phase	5	2	2	1	6	7	3	8	7	4	5	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0	
Total Split (s)	16.0	41.0	41.0	9.0	34.0	19.0	8.0	31.0	19.0	42.0	16.0	
Total Split (%)	16.0%	41.0%	41.0%	9.0%	34.0%	19.0%	8.0%	31.0%	19.0%	42.0%	16.0%	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0	
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	
Act Effct Green (s)	47.0	34.6	34.6	37.0	27.6	47.0	33.0	24.3	47.0	35.3	52.0	
Actuated g/C Ratio	0.47	0.35	0.35	0.37	0.28	0.47	0.33	0.24	0.47	0.35	0.52	
v/c Ratio	0.94	0.72	0.42	0.46	0.61	0.92	0.25	0.80	0.90	0.46	0.29	
Control Delay	53.3	32.6	6.3	22.6	34.5	38.2	17.9	42.9	50.1	26.5	6.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	53.3	32.6	6.3	22.6	34.5	38.2	17.9	42.9	50.1	26.5	6.5	
LOS	D	C	A	C	C	D	B	D	D	C	A	
Approach Delay		33.1			35.5			40.4		29.1		
Approach LOS		C			D			D		C		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 34.0
 Intersection LOS: C
 Intersection Capacity Utilization 97.6%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: PM Peak Hour
2032 Background Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	377	895	267	101	604	710	78	690	345	586	253
v/c Ratio	0.94	0.72	0.42	0.46	0.61	0.92	0.25	0.80	0.90	0.46	0.29
Control Delay	53.3	32.6	6.3	22.6	34.5	38.2	17.9	42.9	50.1	26.5	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	32.6	6.3	22.6	34.5	38.2	17.9	42.9	50.1	26.5	6.5
Queue Length 50th (m)	47.2	78.7	2.6	10.6	53.5	99.4	8.1	64.7	45.1	45.6	10.8
Queue Length 95th (m)	#92.1	101.0	19.8	20.0	71.2	#133.4	16.1	85.7	#95.3	61.1	23.2
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	402	1238	635	221	997	775	318	861	382	1263	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.72	0.42	0.46	0.61	0.92	0.25	0.80	0.90	0.46	0.29

Intersection Summary



















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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.80	2.84	2.59	2.86
Pedestrian Crosswalk LOS	C	C	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	1539	1415	768	1184
Effct. Green for Bike (s)	34.6	27.6	24.3	35.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	692	552	486	706
Bicycle Delay (s/bike)	21.4	26.2	28.7	20.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.73	3.81	3.29	3.63
Bicycle LOS	D	D	C	D

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: PM Peak Hour
2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1	1	1	0	236	1	508	8	215	649	1
Future Volume (Veh/h)	4	1	1	1	0	236	1	508	8	215	649	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	4	1	1	1	0	246	1	529	8	224	676	1
Pedestrians		23			32			22			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			3			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	1930	1718	722	1714	1715	567	700			569		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2012	1760	575	1755	1755	567	549			569		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	73	98	100	98	100	52	100			77		
cM capacity (veh/h)	15	53	420	42	53	509	848			982		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	6	247	538	224	677							
Volume Left	4	1	1	224	0							
Volume Right	1	246	8	0	1							
cSH	21	487	848	982	1700							
Volume to Capacity	0.29	0.51	0.00	0.23	0.40							
Queue Length 95th (m)	6.4	21.4	0.0	6.7	0.0							
Control Delay (s)	238.8	19.7	0.0	9.7	0.0							
Lane LOS	F	C	A	A								
Approach Delay (s)	238.8	19.7	0.0	2.4								
Approach LOS	F	C										
Intersection Summary												
Average Delay			5.0									
Intersection Capacity Utilization			86.4%		ICU Level of Service				E			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

Timing Plan: PM Peak Hour
 2032 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	58	28	18	441	571	68
Future Volume (Veh/h)	58	28	18	441	571	68
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	60	29	19	455	589	70
Pedestrians	11			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.84	0.84	0.84			
vC, conflicting volume	1128	636	670			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1057	471	512			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	71	94	98			
cM capacity (veh/h)	204	488	884			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	89	474	659			
Volume Left	60	19	0			
Volume Right	29	0	70			
cSH	252	884	1700			
Volume to Capacity	0.35	0.02	0.39			
Queue Length 95th (m)	11.6	0.5	0.0			
Control Delay (s)	26.9	0.6	0.0			
Lane LOS	D	A				
Approach Delay (s)	26.9	0.6	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			49.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: PM Peak Hour
 2032 Background Traffic Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	28	123	262	11	175	396
Future Volume (vph)	28	123	262	11	175	396
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	31	138	294	12	197	445

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	169	306	642
Volume Left (vph)	31	0	197
Volume Right (vph)	138	12	0
Hadj (s)	-0.45	0.01	0.11
Departure Headway (s)	5.7	5.3	5.0
Degree Utilization, x	0.27	0.45	0.88
Capacity (veh/h)	589	657	642
Control Delay (s)	10.8	12.5	33.3
Approach Delay (s)	10.8	12.5	33.3
Approach LOS	B	B	D

Intersection Summary			
Delay		24.2	
Level of Service		C	
Intersection Capacity Utilization		64.2%	ICU Level of Service
Analysis Period (min)		15	C

Intersection	
Intersection Delay, s/veh	24.1
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	123	262	11	175	396
Future Vol, veh/h	28	123	262	11	175	396
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	0	2	0	2	3
Mvmt Flow	31	138	294	12	197	445
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	10.9	12.5	33.2
HCM LOS	B	B	D

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	19%	31%
Vol Thru, %	96%	0%	69%
Vol Right, %	4%	81%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	273	151	571
LT Vol	0	28	175
Through Vol	262	0	396
RT Vol	11	123	0
Lane Flow Rate	307	170	642
Geometry Grp	1	1	1
Degree of Util (X)	0.447	0.27	0.883
Departure Headway (Hd)	5.243	5.719	4.952
Convergence, Y/N	Yes	Yes	Yes
Cap	687	626	738
Service Time	3.279	3.767	2.952
HCM Lane V/C Ratio	0.447	0.272	0.87
HCM Control Delay	12.5	10.9	33.2
HCM Lane LOS	B	B	D
HCM 95th-tile Q	2.3	1.1	11.1

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: PM Peak Hour
 2032 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	0	1	213	353	11
Future Volume (Veh/h)	6	0	1	213	353	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	7	0	1	254	420	13
Pedestrians	10			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	692	438	443			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	692	438	443			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	408	617	1117			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	255	433			
Volume Left	7	1	0			
Volume Right	0	0	13			
cSH	408	1117	1700			
Volume to Capacity	0.02	0.00	0.25			
Queue Length 95th (m)	0.4	0.0	0.0			
Control Delay (s)	14.0	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			29.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: PM Peak Hour
 2032 Background Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	2	1	1	1	1	1
Traffic Volume (veh/h)	2	1	1	198	313	12
Future Volume (Veh/h)	2	1	1	198	313	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	2	1	1	230	364	14
Pedestrians	9			3		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	615	380	387			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	615	380	387			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	452	666	1172			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	231	378			
Volume Left	2	1	0			
Volume Right	1	0	14			
cSH	506	1172	1700			
Volume to Capacity	0.01	0.00	0.22			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	12.2	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.2	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			27.2%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: PM Peak Hour
 2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	0	1	2	3	9	2	171	1	18	270	19
Future Volume (Veh/h)	9	0	1	2	3	9	2	171	1	18	270	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	10	0	1	2	3	10	2	197	1	21	310	22
Pedestrians		9			12			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	586	586	332	580	596	210	341			210		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	586	586	332	580	596	210	341			210		
tC, single (s)	7.3	6.5	6.2	7.6	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	4.0	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	100	99	99	99	100			98		
cM capacity (veh/h)	372	409	707	347	404	824	1219			1357		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	11	15	200	353								
Volume Left	10	2	2	21								
Volume Right	1	10	1	22								
cSH	389	592	1219	1357								
Volume to Capacity	0.03	0.03	0.00	0.02								
Queue Length 95th (m)	0.7	0.6	0.0	0.4								
Control Delay (s)	14.5	11.2	0.1	0.6								
Lane LOS	B	B	A	A								
Approach Delay (s)	14.5	11.2	0.1	0.6								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			37.3%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
 20: Liverpool Rd & Annland St

Timing Plan: PM Peak Hour
 2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	0	11	8	3	3	9	179	6	14	222	52
Future Volume (Veh/h)	27	0	11	8	3	3	9	179	6	14	222	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	29	0	12	9	3	3	10	192	6	15	239	56
Pedestrians		4			1			2			3	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	524	520	273	527	545	199	299			199		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	524	520	273	527	545	199	299			199		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	100	98	98	99	100	99			99		
cM capacity (veh/h)	427	453	766	448	438	844	1269			1384		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	41	15	208	310								
Volume Left	29	9	10	15								
Volume Right	12	3	6	56								
cSH	490	492	1269	1384								
Volume to Capacity	0.08	0.03	0.01	0.01								
Queue Length 95th (m)	2.1	0.7	0.2	0.2								
Control Delay (s)	13.0	12.5	0.4	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.0	12.5	0.4	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			30.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: PM Peak Hour
 2032 Background Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	0	2	0	0	7	5	117	1	10	169	38
Future Volume (vph)	19	0	2	0	0	7	5	117	1	10	169	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	0	2	0	0	8	6	139	1	12	201	45
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	25	8	146	258								
Volume Left (vph)	23	0	6	12								
Volume Right (vph)	2	8	1	45								
Hadj (s)	0.21	-0.60	0.00	-0.09								
Departure Headway (s)	5.0	4.2	4.2	4.0								
Degree Utilization, x	0.03	0.01	0.17	0.29								
Capacity (veh/h)	659	770	828	877								
Control Delay (s)	8.2	7.2	8.1	8.7								
Approach Delay (s)	8.2	7.2	8.1	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.4									
Level of Service			A									
Intersection Capacity Utilization			30.2%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	0	2	0	0	7	5	117	1	10	169	38
Future Vol, veh/h	19	0	2	0	0	7	5	117	1	10	169	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	5	0	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	23	0	2	0	0	8	6	139	1	12	201	45
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	7.2	8.1	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	90%	0%	5%
Vol Thru, %	95%	0%	0%	78%
Vol Right, %	1%	10%	100%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	123	21	7	217
LT Vol	5	19	0	10
Through Vol	117	0	0	169
RT Vol	1	2	7	38
Lane Flow Rate	146	25	8	258
Geometry Grp	1	1	1	1
Degree of Util (X)	0.169	0.035	0.01	0.285
Departure Headway (Hd)	4.154	4.977	4.187	3.971
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	852	724	860	896
Service Time	2.234	2.978	2.189	2.036
HCM Lane V/C Ratio	0.171	0.035	0.009	0.288
HCM Control Delay	8.1	8.2	7.2	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.1	0	1.2

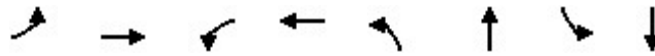
HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Timing Plan: PM Peak Hour
2032 Background Traffic Conditions

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	130	0	0	164
Future Volume (Veh/h)	0	0	130	0	0	164
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	0	167	0	0	210
Pedestrians	33		4			9
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	3		0			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	414	209			200	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	414	209			200	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	429	802			1340	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	0	167	210			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1340			
Volume to Capacity	0.00	0.10	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			23.8%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: PM Peak Hour
2032 Background Traffic Cond. -Tatra Signalized



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕	↗	↘
Traffic Volume (vph)	4	1	1	0	1	508	215	649
Future Volume (vph)	4	1	1	0	1	508	215	649
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.5	25.5	25.5	25.5	22.5	22.5	22.5	22.5
Total Split (s)	26.0	26.0	26.0	26.0	64.0	64.0	64.0	64.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	71.1%	71.1%	71.1%	71.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		7.0		7.0		7.0		7.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effect Green (s)		7.9		7.9		57.1	57.1	57.1
Actuated g/C Ratio		0.10		0.10		0.72	0.72	0.72
v/c Ratio		0.08		0.64		0.39	0.33	0.50
Control Delay		31.2		13.1		5.7	6.3	6.8
Queue Delay		0.0		0.0		0.0	0.0	0.8
Total Delay		31.2		13.1		5.7	6.3	7.6
LOS		C		B		A	A	A
Approach Delay		31.2		13.1		5.7		7.3
Approach LOS		C		B		A		A

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 79	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 7.7	Intersection LOS: A
Intersection Capacity Utilization 93.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 6: Liverpool Rd & Parking Lot/Tatra Dr



Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	13.5	30.4	76.7
Average Queue (m)	9.4	17.6	34.3
95th Queue (m)	14.9	27.7	58.0
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	15.6	9.3	16.3	16.9
Average Queue (m)	4.8	2.1	9.9	14.5
95th Queue (m)	12.9	8.4	15.2	19.5
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Timings
3: Liverpool Rd & Bayly St

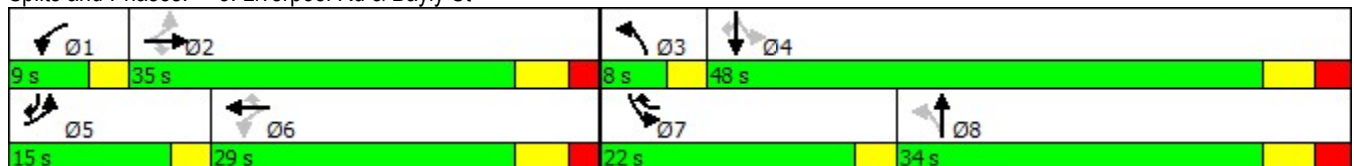
Timing Plan: Sat Peak Hour
2032 Background Traffic Condition

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	357	420	147	96	245	357	63	496	342	528	288	
Future Volume (vph)	357	420	147	96	245	357	63	496	342	528	288	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8	7	4	5	
Permitted Phases	2		2	6		6	8		4		4	
Detector Phase	5	2	2	1	6	7	3	8	7	4	5	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0	
Total Split (s)	15.0	35.0	35.0	9.0	29.0	22.0	8.0	34.0	22.0	48.0	15.0	
Total Split (%)	15.0%	35.0%	35.0%	9.0%	29.0%	22.0%	8.0%	34.0%	22.0%	48.0%	15.0%	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0	
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None	
Act Effct Green (s)	41.2	30.7	30.7	32.1	22.7	43.9	31.4	22.6	47.1	37.2	52.9	
Actuated g/C Ratio	0.44	0.33	0.33	0.34	0.24	0.47	0.33	0.24	0.50	0.39	0.56	
v/c Ratio	0.68	0.36	0.26	0.27	0.29	0.47	0.19	0.77	0.77	0.39	0.29	
Control Delay	28.1	27.3	5.9	20.1	31.5	13.4	14.8	38.2	29.0	21.5	1.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.1	27.3	5.9	20.1	31.5	13.4	14.8	38.2	29.0	21.5	1.9	
LOS	C	C	A	C	C	B	B	D	C	C	A	
Approach Delay		24.2			20.7			36.1		18.8		
Approach LOS		C			C			D		B		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 94.3
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 24.1
 Intersection Capacity Utilization 92.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: Sat Peak Hour
2032 Background Traffic Condition



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	368	433	152	99	253	368	65	647	353	544	297
v/c Ratio	0.68	0.36	0.26	0.27	0.29	0.47	0.19	0.77	0.77	0.39	0.29
Control Delay	28.1	27.3	5.9	20.1	31.5	13.4	14.8	38.2	29.0	21.5	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	27.3	5.9	20.1	31.5	13.4	14.8	38.2	29.0	21.5	1.9
Queue Length 50th (m)	48.3	33.8	0.0	11.0	20.5	28.9	5.9	55.8	38.1	37.5	0.0
Queue Length 95th (m)	77.4	49.5	14.0	22.0	32.6	53.9	12.2	75.0	#73.3	50.6	9.6
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	543	1189	583	370	869	811	335	1015	478	1573	1012
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.36	0.26	0.27	0.29	0.45	0.19	0.64	0.74	0.35	0.29

Intersection Summary



















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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.68	2.69	2.56	2.80
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	953	720	712	1194
Effct. Green for Bike (s)	30.7	22.7	22.6	37.2
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	614	454	452	744
Bicycle Delay (s/bike)	24.0	29.9	30.0	19.7
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.25	3.24	3.24	3.64
Bicycle LOS	C	C	C	D

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: Sat Peak Hour
2032 Background Traffic Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	0	4	0	118	0	540	3	140	588	4
Future Volume (Veh/h)	1	0	0	4	0	118	0	540	3	140	588	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	0	0	4	0	122	0	557	3	144	606	4
Pedestrians		11			23			6				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.1			1.1			1.1				
Percent Blockage		1			2			1				
Right turn flare (veh)												
Median type								None				None
Median storage veh												
Upstream signal (m)												153
pX, platoon unblocked	0.85	0.85	0.85	0.85	0.85		0.85					
vC, conflicting volume	1588	1490	625	1482	1490	582	621			583		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1603	1488	474	1478	1489	582	469			583		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	95	100	76	100			85		
cM capacity (veh/h)	48	88	499	75	88	505	930			979		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	126	560	144	610							
Volume Left	1	4	0	144	0							
Volume Right	0	122	3	0	4							
cSH	48	428	930	979	1700							
Volume to Capacity	0.02	0.29	0.00	0.15	0.36							
Queue Length 95th (m)	0.5	9.2	0.0	3.9	0.0							
Control Delay (s)	82.1	16.9	0.0	9.3	0.0							
Lane LOS	F	C		A								
Approach Delay (s)	82.1	16.9	0.0	1.8								
Approach LOS	F	C										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			77.2%		ICU Level of Service				D			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St










Timing Plan: Sat Peak Hour
 2032 Background Traffic Condition






Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	12	10	468	524	66
Future Volume (Veh/h)	56	12	10	468	524	66
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	62	13	11	514	576	73
Pedestrians	6			5		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.85	0.85	0.85			
vC, conflicting volume	1154	624	655			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1092	466	503			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	69	97	99			
cM capacity (veh/h)	198	490	903			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	75	525	649			
Volume Left	62	11	0			
Volume Right	13	0	73			
cSH	220	903	1700			
Volume to Capacity	0.34	0.01	0.38			
Queue Length 95th (m)	10.9	0.3	0.0			
Control Delay (s)	29.5	0.3	0.0			
Lane LOS	D	A				
Approach Delay (s)	29.5	0.3	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			44.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: Sat Peak Hour
 2032 Background Traffic Condition

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	11	105	319	20	121	375
Future Volume (vph)	11	105	319	20	121	375
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	11	109	332	21	126	391
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	120	353	517			
Volume Left (vph)	11	0	126			
Volume Right (vph)	109	21	0			
Hadj (s)	-0.51	0.02	0.09			
Departure Headway (s)	5.4	4.9	4.8			
Degree Utilization, x	0.18	0.48	0.68			
Capacity (veh/h)	585	714	739			
Control Delay (s)	9.6	12.3	17.4			
Approach Delay (s)	9.6	12.3	17.4			
Approach LOS	A	B	C			
Intersection Summary						
Delay			14.6			
Level of Service			B			
Intersection Capacity Utilization			61.6%	ICU Level of Service	B	
Analysis Period (min)			15			

Intersection	
Intersection Delay, s/veh	14.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	105	319	20	121	375
Future Vol, veh/h	11	105	319	20	121	375
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	1	3	5	0	3
Mvmt Flow	11	109	332	21	126	391
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.5	12.1	16.8
HCM LOS	A	B	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	9%	24%
Vol Thru, %	94%	0%	76%
Vol Right, %	6%	91%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	339	116	496
LT Vol	0	11	121
Through Vol	319	0	375
RT Vol	20	105	0
Lane Flow Rate	353	121	517
Geometry Grp	1	1	1
Degree of Util (X)	0.471	0.177	0.67
Departure Headway (Hd)	4.805	5.285	4.665
Convergence, Y/N	Yes	Yes	Yes
Cap	745	671	770
Service Time	2.873	3.379	2.726
HCM Lane V/C Ratio	0.474	0.18	0.671
HCM Control Delay	12.1	9.5	16.8
HCM Lane LOS	B	A	C
HCM 95th-tile Q	2.5	0.6	5.2

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: Sat Peak Hour
 2032 Background Traffic Condition



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	0	0	287	337	12
Future Volume (Veh/h)	10	0	0	287	337	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	11	0	0	315	370	13
Pedestrians	9			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	700	386	392			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	700	386	392			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	405	659	1167			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	11	315	383			
Volume Left	11	0	0			
Volume Right	0	0	13			
cSH	405	1167	1700			
Volume to Capacity	0.03	0.00	0.23			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	14.1	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	14.1	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			28.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: Sat Peak Hour
 2032 Background Traffic Condition



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	1	0	238	325	13
Future Volume (Veh/h)	2	1	0	238	325	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	1	0	256	349	14
Pedestrians	11					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	623	367	374			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	623	367	374			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	448	675	1183			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	256	363			
Volume Left	2	0	0			
Volume Right	1	0	14			
cSH	505	1183	1700			
Volume to Capacity	0.01	0.00	0.21			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	12.2	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	12.2	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			27.9%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: Sat Peak Hour
 2032 Background Traffic Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	3	3	2	5	6	5	215	2	10	297	17
Future Volume (Veh/h)	12	3	3	2	5	6	5	215	2	10	297	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	3	3	2	6	7	6	239	2	11	330	19
Pedestrians		10			16							
Lane Width (m)		3.7			3.7							
Walking Speed (m/s)		1.1			1.1							
Percent Blockage		1			2							
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	634	640	350	634	649	256	359			257		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	634	640	350	634	649	256	359			257		
tC, single (s)	7.5	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.9	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	99	100	99	98	99	99			99		
cM capacity (veh/h)	321	381	692	373	376	775	1199			1299		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	19	15	247	360								
Volume Left	13	2	6	11								
Volume Right	3	7	2	19								
cSH	360	495	1199	1299								
Volume to Capacity	0.05	0.03	0.01	0.01								
Queue Length 95th (m)	1.3	0.7	0.1	0.2								
Control Delay (s)	15.5	12.5	0.2	0.3								
Lane LOS	C	B	A	A								
Approach Delay (s)	15.5	12.5	0.2	0.3								
Approach LOS	C	B										
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			31.6%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Timing Plan: Sat Peak Hour
2032 Background Traffic Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	0	13	22	2	8	12	179	4	12	232	44
Future Volume (Veh/h)	40	0	13	22	2	8	12	179	4	12	232	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	43	0	14	24	2	9	13	192	4	13	249	47
Pedestrians		15			5			1			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	546	540	288	538	562	201	311			201		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	546	540	288	538	562	201	311			201		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	100	98	94	100	99	99			99		
cM capacity (veh/h)	425	434	744	432	422	839	1242			1376		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	57	35	209	309								
Volume Left	43	24	13	13								
Volume Right	14	9	4	47								
cSH	475	493	1242	1376								
Volume to Capacity	0.12	0.07	0.01	0.01								
Queue Length 95th (m)	3.1	1.7	0.2	0.2								
Control Delay (s)	13.6	12.9	0.6	0.4								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.6	12.9	0.6	0.4								
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			29.4%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: Sat Peak Hour
 2032 Background Traffic Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	35	2	7	1	1	18	4	122	4	7	182	61
Future Volume (vph)	35	2	7	1	1	18	4	122	4	7	182	61
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)	38	2	8	1	1	20	4	133	4	8	198	66
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	48	22	141	272								
Volume Left (vph)	38	1	4	8								
Volume Right (vph)	8	20	4	66								
Hadj (s)	0.06	-0.54	-0.01	-0.14								
Departure Headway (s)	4.9	4.3	4.3	4.1								
Degree Utilization, x	0.07	0.03	0.17	0.31								
Capacity (veh/h)	673	747	802	864								
Control Delay (s)	8.2	7.4	8.2	8.9								
Approach Delay (s)	8.2	7.4	8.2	8.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.6									
Level of Service			A									
Intersection Capacity Utilization			33.3%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	2	7	1	1	18	4	122	4	7	182	61
Future Vol, veh/h	35	2	7	1	1	18	4	122	4	7	182	61
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	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	38	2	8	1	1	20	4	133	4	8	198	66
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	7.4	8.2	8.8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	80%	5%	3%
Vol Thru, %	94%	5%	5%	73%
Vol Right, %	3%	16%	90%	24%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	130	44	20	250
LT Vol	4	35	1	7
Through Vol	122	2	1	182
RT Vol	4	7	18	61
Lane Flow Rate	141	48	22	272
Geometry Grp	1	1	1	1
Degree of Util (X)	0.17	0.065	0.026	0.301
Departure Headway (Hd)	4.32	4.872	4.313	3.988
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	834	738	833	886
Service Time	2.328	2.88	2.324	2.084
HCM Lane V/C Ratio	0.169	0.065	0.026	0.307
HCM Control Delay	8.2	8.2	7.4	8.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.2	0.1	1.3

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Timing Plan: Sat Peak Hour
2032 Background Traffic Condition



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	5	114	0	6	162
Future Volume (Veh/h)	0	5	114	0	6	162
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	5	121	0	6	172
Pedestrians	64		3			3
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	6		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	372	188			185	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	372	188			185	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	589	803			1303	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	5	121	178			
Volume Left	0	0	6			
Volume Right	5	0	0			
cSH	803	1700	1303			
Volume to Capacity	0.01	0.07	0.00			
Queue Length 95th (m)	0.1	0.0	0.1			
Control Delay (s)	9.5	0.0	0.3			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	0.3			
Approach LOS	A					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			24.3%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	13.3	35.4	64.6
Average Queue (m)	7.9	19.5	28.8
95th Queue (m)	12.8	26.8	42.0
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	15.8	9.3	16.8	23.4
Average Queue (m)	7.8	3.3	10.7	14.6
95th Queue (m)	13.9	10.6	15.6	21.2
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Appendix C
2027 and 2032
Total Traffic Intersection Operations

Timings
3: Liverpool Rd & Bayly St

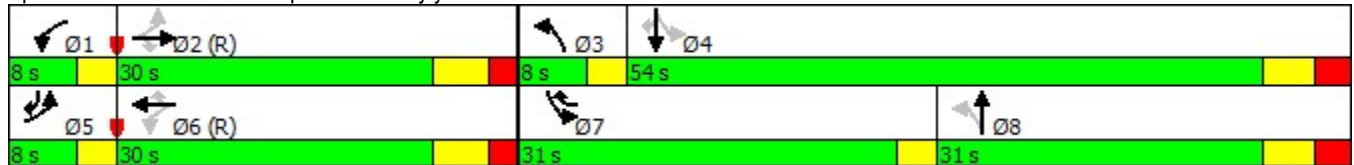
Timing Plan: AM Peak Hour
2027 Total Traffic Condition

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	581	101	62	239	304	66	653	496	314	167
Future Volume (vph)	199	581	101	62	239	304	66	653	496	314	167
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	8.0	30.0	30.0	8.0	30.0	31.0	8.0	31.0	31.0	54.0	8.0
Total Split (%)	8.0%	30.0%	30.0%	8.0%	30.0%	31.0%	8.0%	31.0%	31.0%	54.0%	8.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	32.0	23.6	23.6	32.0	23.6	55.0	33.0	24.3	59.0	47.3	56.0
Actuated g/C Ratio	0.32	0.24	0.24	0.32	0.24	0.55	0.33	0.24	0.59	0.47	0.56
v/c Ratio	0.51	0.70	0.25	0.30	0.31	0.38	0.18	0.96	0.86	0.20	0.18
Control Delay	30.7	40.0	4.0	25.9	32.7	9.9	13.6	59.4	38.1	15.7	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	40.0	4.0	25.9	32.7	9.9	13.6	59.4	38.1	15.7	1.9
LOS	C	D	A	C	C	A	B	E	D	B	A
Approach Delay		33.7			20.6			56.0		24.8	
Approach LOS		C			C			E		C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 34.5
 Intersection LOS: C
 Intersection Capacity Utilization 96.0%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: AM Peak Hour
2027 Total Traffic Condition



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	203	593	103	63	244	310	67	814	506	320	170
v/c Ratio	0.51	0.70	0.25	0.30	0.31	0.38	0.18	0.96	0.86	0.20	0.18
Control Delay	30.7	40.0	4.0	25.9	32.7	9.9	13.6	59.4	38.1	15.7	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	40.0	4.0	25.9	32.7	9.9	13.6	59.4	38.1	15.7	1.9
Queue Length 50th (m)	28.5	55.4	0.0	8.2	20.5	21.7	5.1	80.0	72.8	18.3	0.0
Queue Length 95th (m)	46.6	74.1	6.8	17.1	31.3	38.1	10.6	#118.2	#128.0	26.6	7.8
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	396	852	407	212	797	818	379	849	591	1613	933
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.70	0.25	0.30	0.31	0.38	0.18	0.96	0.86	0.20	0.18

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.65	2.72	2.54	2.76
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	899	617	881	996
Effct. Green for Bike (s)	23.6	23.6	24.3	47.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	472	472	486	946
Bicycle Delay (s/bike)	29.2	29.2	28.7	13.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.20	3.15	3.38	3.48
Bicycle LOS	C	C	C	C

HCM Unsignalized Intersection Capacity Analysis

6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: AM Peak Hour
2027 Total Traffic Condition



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (veh/h)	0	0	1	3	0	217	0	638	11	129	324	2
Future Volume (Veh/h)	0	0	1	3	0	217	0	638	11	129	324	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	1	3	0	238	0	701	12	142	356	2
Pedestrians		17			16			6			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			2			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												153
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1604	1387	380	1370	1382	724	375			729		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1611	1380	307	1362	1374	724	302			729		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	97	100	43	100			84		
cM capacity (veh/h)	29	111	677	99	111	415	1173			861		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	241	713	142	358							
Volume Left	0	3	0	142	0							
Volume Right	1	238	12	0	2							
cSH	677	399	1173	861	1700							
Volume to Capacity	0.00	0.60	0.00	0.16	0.21							
Queue Length 95th (m)	0.0	29.1	0.0	4.5	0.0							
Control Delay (s)	10.3	26.8	0.0	10.0	0.0							
Lane LOS	B	D		B								
Approach Delay (s)	10.3	26.8	0.0	2.8								
Approach LOS	B	D										
Intersection Summary												
Average Delay			5.4									
Intersection Capacity Utilization			77.8%		ICU Level of Service					D		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St










Timing Plan: AM Peak Hour
 2027 Total Traffic Condition






Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	77	17	9	549	263	60
Future Volume (Veh/h)	77	17	9	549	263	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	83	18	10	590	283	65
Pedestrians	9				1	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.99	0.99	0.99			
vC, conflicting volume	936	324	357			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	930	313	345			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	71	97	99			
cM capacity (veh/h)	291	719	1076			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	101	600	348			
Volume Left	83	10	0			
Volume Right	18	0	65			
cSH	325	1076	1700			
Volume to Capacity	0.31	0.01	0.20			
Queue Length 95th (m)	9.8	0.2	0.0			
Control Delay (s)	21.0	0.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	21.0	0.3	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			48.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
 2027 Total Traffic Condition

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	9	126	370	28	124	171
Future Volume (vph)	9	126	370	28	124	171
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	11	159	468	35	157	216
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	170	503	373			
Volume Left (vph)	11	0	157			
Volume Right (vph)	159	35	0			
Hadj (s)	-0.52	0.06	0.15			
Departure Headway (s)	5.5	5.0	5.2			
Degree Utilization, x	0.26	0.70	0.54			
Capacity (veh/h)	582	702	668			
Control Delay (s)	10.4	18.5	14.2			
Approach Delay (s)	10.4	18.5	14.2			
Approach LOS	B	C	B			
Intersection Summary						
Delay			15.7			
Level of Service			C			
Intersection Capacity Utilization			55.9%	ICU Level of Service	B	
Analysis Period (min)			15			

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	126	370	28	124	171
Future Vol, veh/h	9	126	370	28	124	171
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	0	2	4	36	4	4
Mvmt Flow	11	159	468	35	157	216
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	10.4	18.3	14.1
HCM LOS	B	C	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	7%	42%
Vol Thru, %	93%	0%	58%
Vol Right, %	7%	93%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	398	135	295
LT Vol	0	9	124
Through Vol	370	0	171
RT Vol	28	126	0
Lane Flow Rate	504	171	373
Geometry Grp	1	1	1
Degree of Util (X)	0.692	0.259	0.538
Departure Headway (Hd)	4.944	5.451	5.188
Convergence, Y/N	Yes	Yes	Yes
Cap	736	658	695
Service Time	2.944	3.491	3.217
HCM Lane V/C Ratio	0.685	0.26	0.537
HCM Control Delay	18.3	10.4	14.1
HCM Lane LOS	C	B	B
HCM 95th-tile Q	5.6	1	3.2

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

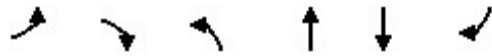
Timing Plan: AM Peak Hour
 2027 Total Traffic Condition



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	0	1	362	185	7
Future Volume (Veh/h)	7	0	1	362	185	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	8	0	1	426	218	8
Pedestrians	21			3	1	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	672	246	247			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	672	246	247			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	415	779	1303			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	427	226			
Volume Left	8	1	0			
Volume Right	0	0	8			
cSH	415	1303	1700			
Volume to Capacity	0.02	0.00	0.13			
Queue Length 95th (m)	0.4	0.0	0.0			
Control Delay (s)	13.9	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.9	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			30.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: AM Peak Hour
 2027 Total Traffic Condition



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	0	0	321	174	7
Future Volume (Veh/h)	13	0	0	321	174	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	16	0	0	387	210	8
Pedestrians	22					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	2					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	623	236	240			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	623	236	240			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	100			
cM capacity (veh/h)	443	791	1310			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	16	387	218			
Volume Left	16	0	0			
Volume Right	0	0	8			
cSH	443	1310	1700			
Volume to Capacity	0.04	0.00	0.13			
Queue Length 95th (m)	0.9	0.0	0.0			
Control Delay (s)	13.4	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	13.4	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			26.9%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: AM Peak Hour
 2027 Total Traffic Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	4	2	3	3	8	3	289	14	12	149	9
Future Volume (Veh/h)	15	4	2	3	3	8	3	289	14	12	149	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	18	5	2	4	4	10	4	344	17	14	177	11
Pedestrians		2						14				
Lane Width (m)		3.7						3.7				
Walking Speed (m/s)		1.1						1.1				
Percent Blockage		0						1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	585	582	198	590	578	352	190			361		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	585	582	198	590	578	352	190			361		
tC, single (s)	7.1	6.8	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	96	99	100	99	99	99	100			99		
cM capacity (veh/h)	410	389	834	407	422	669	1393			1209		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	25	18	365	202								
Volume Left	18	4	4	14								
Volume Right	2	10	17	11								
cSH	423	525	1393	1209								
Volume to Capacity	0.06	0.03	0.00	0.01								
Queue Length 95th (m)	1.4	0.8	0.1	0.3								
Control Delay (s)	14.1	12.1	0.1	0.7								
Lane LOS	B	B	A	A								
Approach Delay (s)	14.1	12.1	0.1	0.7								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			30.6%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Timing Plan: AM Peak Hour
2027 Total Traffic Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	2	9	10	0	10	7	235	8	4	105	15
Future Volume (Veh/h)	54	2	9	10	0	10	7	235	8	4	105	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	65	2	11	12	0	12	8	283	10	5	127	18
Pedestrians		6			3			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	469	464	144	467	468	292	151			296		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	469	464	144	467	468	292	151			296		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.4			2.2		
p0 queue free %	87	100	99	98	100	98	99			100		
cM capacity (veh/h)	489	489	902	492	487	726	1335			1273		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	78	24	301	150								
Volume Left	65	12	8	5								
Volume Right	11	12	10	18								
cSH	523	587	1335	1273								
Volume to Capacity	0.15	0.04	0.01	0.00								
Queue Length 95th (m)	4.0	1.0	0.1	0.1								
Control Delay (s)	13.1	11.4	0.3	0.3								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.1	11.4	0.3	0.3								
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			28.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: AM Peak Hour
 2027 Total Traffic Condition

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	0	0	0	1	5	1	217	1	4	125	4
Future Volume (vph)	18	0	0	0	1	5	1	217	1	4	125	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	22	0	0	0	1	6	1	261	1	5	151	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	22	7	263	161								
Volume Left (vph)	22	0	1	5								
Volume Right (vph)	0	6	1	5								
Hadj (s)	0.20	-0.51	0.02	0.02								
Departure Headway (s)	5.0	4.3	4.2	4.2								
Degree Utilization, x	0.03	0.01	0.30	0.19								
Capacity (veh/h)	652	744	850	831								
Control Delay (s)	8.2	7.4	8.9	8.2								
Approach Delay (s)	8.2	7.4	8.9	8.2								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.6									
Level of Service			A									
Intersection Capacity Utilization			26.6%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	0	0	0	1	5	1	217	1	4	125	4
Future Vol, veh/h	18	0	0	0	1	5	1	217	1	4	125	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	22	0	0	0	1	6	1	261	1	5	151	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	7.4	8.9	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	0%	3%
Vol Thru, %	99%	0%	17%	94%
Vol Right, %	0%	0%	83%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	219	18	6	133
LT Vol	1	18	0	4
Through Vol	217	0	1	125
RT Vol	1	0	5	4
Lane Flow Rate	264	22	7	160
Geometry Grp	1	1	1	1
Degree of Util (X)	0.298	0.03	0.009	0.184
Departure Headway (Hd)	4.067	5.017	4.334	4.135
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	876	718	831	856
Service Time	2.131	3.018	2.335	2.217
HCM Lane V/C Ratio	0.301	0.031	0.008	0.187
HCM Control Delay	8.9	8.2	7.4	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.3	0.1	0	0.7

HCM Unsignalized Intersection Capacity Analysis
 26: Liverpool Rd & Site Access

Timing Plan: AM Peak Hour
 2027 Total Traffic Condition



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	159	36	0	71	10
Future Volume (Veh/h)	0	159	36	0	71	10
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	0	215	49	0	96	14
Pedestrians	7					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	262	56			56	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	262	56			56	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	79			94	
cM capacity (veh/h)	681	1009			1551	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	215	49	110			
Volume Left	0	0	96			
Volume Right	215	0	0			
cSH	1009	1700	1551			
Volume to Capacity	0.21	0.03	0.06			
Queue Length 95th (m)	6.1	0.0	1.5			
Control Delay (s)	9.5	0.0	6.6			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	6.6			
Approach LOS	A					
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			27.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Timings
11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
2027 Total Traffic Condition - Krosno Signalized

Lane Group	WBL	NBT	SBL	SBT
Lane Configurations				
Traffic Volume (vph)	9	370	124	171
Future Volume (vph)	9	370	124	171
Turn Type	Prot	NA	Perm	NA
Protected Phases	8	2		6
Permitted Phases			6	
Detector Phase	8	2	6	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	26.0	64.0	64.0	64.0
Total Split (%)	28.9%	71.1%	71.1%	71.1%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effct Green (s)	7.5	62.3		62.3
Actuated g/C Ratio	0.09	0.76		0.76
v/c Ratio	0.59	0.37		0.40
Control Delay	15.6	4.4		5.3
Queue Delay	0.0	0.0		0.0
Total Delay	15.6	4.4		5.3
LOS	B	A		A
Approach Delay	15.6	4.4		5.3
Approach LOS	B	A		A

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 81.8
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 6.5
 Intersection Capacity Utilization 61.0%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 11: Liverpool Rd & Krosno Blvd



Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	20.4	34.9	22.1
Average Queue (m)	10.2	21.3	16.4
95th Queue (m)	19.5	33.1	23.2
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.2	9.2	9.1	22.0
Average Queue (m)	7.3	1.8	9.1	15.0
95th Queue (m)	13.3	7.9	9.2	24.0
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Timings
3: Liverpool Rd & Bayly St

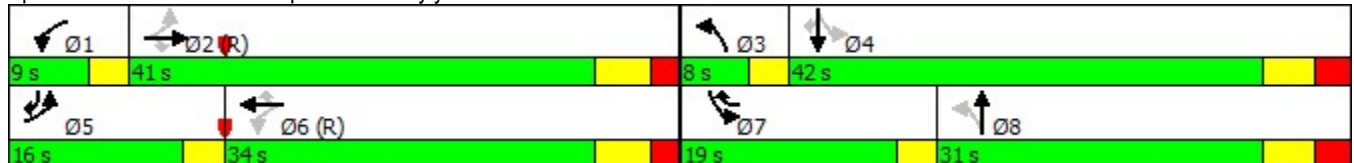
PM Peak Hour
2027 Total Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	366	846	274	127	572	689	88	638	335	657	245
Future Volume (vph)	366	846	274	127	572	689	88	638	335	657	245
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	16.0	41.0	41.0	9.0	34.0	19.0	8.0	31.0	19.0	42.0	16.0
Total Split (%)	16.0%	41.0%	41.0%	9.0%	34.0%	19.0%	8.0%	31.0%	19.0%	42.0%	16.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	47.0	34.6	34.6	37.0	27.6	47.0	33.0	24.3	47.0	35.3	52.0
Actuated g/C Ratio	0.47	0.35	0.35	0.37	0.28	0.47	0.33	0.24	0.47	0.35	0.52
v/c Ratio	0.92	0.70	0.46	0.57	0.59	0.91	0.30	0.90	0.93	0.54	0.30
Control Delay	50.4	32.0	9.4	27.3	34.2	38.0	19.0	50.5	57.6	27.7	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	32.0	9.4	27.3	34.2	38.0	19.0	50.5	57.6	27.7	6.9
LOS	D	C	A	C	C	D	B	D	E	C	A
Approach Delay		32.4			35.4			47.2		31.7	
Approach LOS		C			D			D		C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 35.6
 Intersection LOS: D
 Intersection Capacity Utilization 99.4%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

PM Peak Hour
2027 Total Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	377	872	282	131	590	710	91	773	345	677	253
v/c Ratio	0.92	0.70	0.46	0.57	0.59	0.91	0.30	0.90	0.93	0.54	0.30
Control Delay	50.4	32.0	9.4	27.3	34.2	38.0	19.0	50.5	57.6	27.7	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	32.0	9.4	27.3	34.2	38.0	19.0	50.5	57.6	27.7	6.9
Queue Length 50th (m)	47.2	76.1	8.8	14.0	52.0	99.4	9.5	74.8	48.3	54.4	11.7
Queue Length 95th (m)	#89.6	97.6	29.6	25.0	69.5	#133.3	18.3	#107.8	#100.4	71.7	24.3
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		65.0
Base Capacity (vph)	408	1238	614	229	997	776	299	861	370	1263	854
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.70	0.46	0.57	0.59	0.91	0.30	0.90	0.93	0.54	0.30

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.80	2.84	2.63	2.88
Pedestrian Crosswalk LOS	C	C	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	1531	1431	864	1275
Effct. Green for Bike (s)	34.6	27.6	24.3	35.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	692	552	486	706
Bicycle Delay (s/bike)	21.4	26.2	28.7	20.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.73	3.82	3.36	3.71
Bicycle LOS	D	D	C	D

HCM Unsignalized Intersection Capacity Analysis

6: Liverpool Rd & Parking Lot/Tatra Dr

PM Peak Hour
2027 Total Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	↕
Traffic Volume (veh/h)	4	1	1	1	0	236	1	603	8	215	780	1
Future Volume (Veh/h)	4	1	1	1	0	236	1	603	8	215	780	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	4	1	1	1	0	246	1	628	8	224	813	1
Pedestrians		23			32			22			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			3			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.81	0.81	0.81	0.81	0.81		0.81					
vC, conflicting volume	2166	1954	858	1950	1951	666	837			668		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2326	2064	705	2059	2059	666	678			668		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	45	97	100	96	100	45	100			75		
cM capacity (veh/h)	7	32	339	24	32	448	728			902		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	6	247	637	224	814							
Volume Left	4	1	1	224	0							
Volume Right	1	246	8	0	1							
cSH	10	417	728	902	1700							
Volume to Capacity	0.59	0.59	0.00	0.25	0.48							
Queue Length 95th (m)	9.6	28.2	0.0	7.4	0.0							
Control Delay (s)	580.7	25.4	0.0	10.3	0.0							
Lane LOS	F	D	A	B								
Approach Delay (s)	580.7	25.4	0.0	2.2								
Approach LOS	F	D										
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			98.3%		ICU Level of Service				F			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

PM Peak Hour
 2027 Total Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	58	32	22	538	704	68
Future Volume (Veh/h)	58	32	22	538	704	68
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	60	33	23	555	726	70
Pedestrians	11			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.79	0.79	0.79			
vC, conflicting volume	1373	773	807			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1339	577	620			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	53	92	97			
cM capacity (veh/h)	129	399	756			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	93	578	796			
Volume Left	60	23	0			
Volume Right	33	0	70			
cSH	169	756	1700			
Volume to Capacity	0.55	0.03	0.47			
Queue Length 95th (m)	21.5	0.7	0.0			
Control Delay (s)	49.5	0.8	0.0			
Lane LOS	E	A				
Approach Delay (s)	49.5	0.8	0.0			
Approach LOS	E					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			58.3%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

PM Peak Hour
 2027 Total Traffic Conditions






Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	42	123	367	21	175	538
Future Volume (vph)	42	123	367	21	175	538
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	47	138	412	24	197	604

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	185	436	801
Volume Left (vph)	47	0	197
Volume Right (vph)	138	24	0
Hadj (s)	-0.40	0.00	0.10
Departure Headway (s)	6.2	5.4	5.3
Degree Utilization, x	0.32	0.66	1.17
Capacity (veh/h)	559	646	681
Control Delay (s)	12.0	18.2	111.2
Approach Delay (s)	12.0	18.2	111.2
Approach LOS	B	C	F

Intersection Summary			
Delay		69.8	
Level of Service		F	
Intersection Capacity Utilization		78.6%	ICU Level of Service
Analysis Period (min)		15	D

Intersection	
Intersection Delay, s/veh	68.8
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	42	123	367	21	175	538
Future Vol, veh/h	42	123	367	21	175	538
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	0	0	2	0	2	3
Mvmt Flow	47	138	412	24	197	604
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	12.5	18.4	109.2
HCM LOS	B	C	F

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	25%	25%
Vol Thru, %	95%	0%	75%
Vol Right, %	5%	75%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	388	165	713
LT Vol	0	42	175
Through Vol	367	0	538
RT Vol	21	123	0
Lane Flow Rate	436	185	801
Geometry Grp	1	1	1
Degree of Util (X)	0.647	0.315	1.164
Departure Headway (Hd)	5.648	6.515	5.231
Convergence, Y/N	Yes	Yes	Yes
Cap	645	556	697
Service Time	3.648	4.515	3.231
HCM Lane V/C Ratio	0.676	0.333	1.149
HCM Control Delay	18.4	12.5	109.2
HCM Lane LOS	C	B	F
HCM 95th-tile Q	4.7	1.3	25.8

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

PM Peak Hour
 2027 Total Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	0	1	328	510	11
Future Volume (Veh/h)	6	0	1	328	510	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	7	0	1	390	607	13
Pedestrians	10			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1016	624	630			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1016	624	630			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	263	483	953			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	391	620			
Volume Left	7	1	0			
Volume Right	0	0	13			
cSH	263	953	1700			
Volume to Capacity	0.03	0.00	0.36			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	19.0	0.0	0.0			
Lane LOS	C	A				
Approach Delay (s)	19.0	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			37.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















PM Peak Hour
 2027 Total Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	1	1	313	470	12
Future Volume (Veh/h)	2	1	1	313	470	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	2	1	1	364	547	14
Pedestrians	9			3		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	932	563	570			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	932	563	570			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	295	525	1004			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	365	561			
Volume Left	2	1	0			
Volume Right	1	0	14			
cSH	345	1004	1700			
Volume to Capacity	0.01	0.00	0.33			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	15.5	0.0	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.5	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			35.5%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
17: Liverpool Rd & Commerce St

PM Peak Hour
2027 Total Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	0	3	9	3	9	4	287	7	18	428	19
Future Volume (Veh/h)	9	0	3	9	3	9	4	287	7	18	428	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	10	0	3	10	3	10	5	330	8	21	492	22
Pedestrians		9			12			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	910	914	514	906	921	347	523			350		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	910	914	514	906	921	347	523			350		
tC, single (s)	7.3	6.5	6.2	7.6	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	4.0	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	99	95	99	99	100			98		
cM capacity (veh/h)	220	264	558	202	261	692	1045			1206		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	13	23	343	535								
Volume Left	10	10	5	21								
Volume Right	3	10	8	22								
cSH	256	305	1045	1206								
Volume to Capacity	0.05	0.08	0.00	0.02								
Queue Length 95th (m)	1.2	1.9	0.1	0.4								
Control Delay (s)	19.8	17.8	0.2	0.5								
Lane LOS	C	C	A	A								
Approach Delay (s)	19.8	17.8	0.2	0.5								
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			44.9%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

PM Peak Hour
2027 Total Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	0	16	21	3	3	15	302	19	14	390	52
Future Volume (Veh/h)	27	0	16	21	3	3	15	302	19	14	390	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	29	0	17	23	3	3	16	325	20	15	419	56
Pedestrians		4			1			2			3	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	856	859	453	864	877	339	479			346		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	856	859	453	864	877	339	479			346		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	97	91	99	100	99			99		
cM capacity (veh/h)	251	287	607	262	280	705	1090			1223		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	46	29	361	490								
Volume Left	29	23	16	15								
Volume Right	17	3	20	56								
cSH	320	282	1090	1223								
Volume to Capacity	0.14	0.10	0.01	0.01								
Queue Length 95th (m)	3.8	2.6	0.3	0.3								
Control Delay (s)	18.1	19.2	0.5	0.4								
Lane LOS	C	C	A	A								
Approach Delay (s)	18.1	19.2	0.5	0.4								
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			39.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

PM Peak Hour
 2027 Total Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	0	2	0	0	7	5	262	1	10	356	38
Future Volume (vph)	19	0	2	0	0	7	5	262	1	10	356	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	0	2	0	0	8	6	312	1	12	424	45
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	25	8	319	481								
Volume Left (vph)	23	0	6	12								
Volume Right (vph)	2	8	1	45								
Hadj (s)	0.21	-0.60	0.00	-0.05								
Departure Headway (s)	5.9	5.1	4.5	4.3								
Degree Utilization, x	0.04	0.01	0.40	0.57								
Capacity (veh/h)	535	598	783	823								
Control Delay (s)	9.1	8.1	10.4	12.9								
Approach Delay (s)	9.1	8.1	10.4	12.9								
Approach LOS	A	A	B	B								
Intersection Summary												
Delay			11.8									
Level of Service			B									
Intersection Capacity Utilization			41.3%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	0	2	0	0	7	5	262	1	10	356	38
Future Vol, veh/h	19	0	2	0	0	7	5	262	1	10	356	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	5	0	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	23	0	2	0	0	8	6	312	1	12	424	45
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.1	8.1	10.4	12.8
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	90%	0%	2%
Vol Thru, %	98%	0%	0%	88%
Vol Right, %	0%	10%	100%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	268	21	7	404
LT Vol	5	19	0	10
Through Vol	262	0	0	356
RT Vol	1	2	7	38
Lane Flow Rate	319	25	8	481
Geometry Grp	1	1	1	1
Degree of Util (X)	0.396	0.04	0.012	0.571
Departure Headway (Hd)	4.47	5.818	5.035	4.271
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	807	614	708	846
Service Time	2.492	3.869	3.088	2.289
HCM Lane V/C Ratio	0.395	0.041	0.011	0.569
HCM Control Delay	10.4	9.1	8.1	12.8
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.9	0.1	0	3.7

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd & Site Access

PM Peak Hour
2027 Total Traffic Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	172	102	0	220	131
Future Volume (Veh/h)	0	172	102	0	220	131
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	221	131	0	282	168
Pedestrians	33		4		9	
Lane Width (m)	3.7		3.7		3.7	
Walking Speed (m/s)	1.1		1.1		1.1	
Percent Blockage	3		0		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	900	173			164	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	900	173			164	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	74			80	
cM capacity (veh/h)	163	840			1381	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	221	131	450			
Volume Left	0	0	282			
Volume Right	221	0	0			
cSH	840	1700	1381			
Volume to Capacity	0.26	0.08	0.20			
Queue Length 95th (m)	8.0	0.0	5.8			
Control Delay (s)	10.8	0.0	5.9			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	5.9			
Approach LOS	B					
Intersection Summary						
Average Delay			6.3			
Intersection Capacity Utilization			44.4%	ICU Level of Service		A
Analysis Period (min)			15			

Timings
11: Liverpool Rd & Krosno Blvd

PM Peak Hour
2027 Total Traffic Conditions - Tatra & Krosno Signalized



Lane Group	WBL	NBT	SBL	SBT
Lane Configurations	W	T		T
Traffic Volume (vph)	42	367	175	538
Future Volume (vph)	42	367	175	538
Turn Type	Prot	NA	Perm	NA
Protected Phases	8	2		6
Permitted Phases			6	
Detector Phase	8	2	6	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	24.0	66.0	66.0	66.0
Total Split (%)	26.7%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	8.6	63.8		63.8
Actuated g/C Ratio	0.10	0.76		0.76
v/c Ratio	0.62	0.31		0.73
Control Delay	20.4	4.3		11.7
Queue Delay	0.0	0.0		0.0
Total Delay	20.4	4.3		11.7
LOS	C	A		B
Approach Delay	20.4	4.3		11.7
Approach LOS	C	A		B

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 84.4
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 10.6
 Intersection Capacity Utilization 83.6%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service E

Splits and Phases: 11: Liverpool Rd & Krosno Blvd



Queues
11: Liverpool Rd & Krosno Blvd

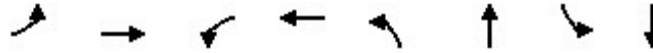
PM Peak Hour
2027 Total Traffic Conditions - Tatra & Krosno Signalized



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	185	436	801
v/c Ratio	0.62	0.31	0.73
Control Delay	20.4	4.3	11.7
Queue Delay	0.0	0.0	0.0
Total Delay	20.4	4.3	11.7
Queue Length 50th (m)	6.8	16.3	52.2
Queue Length 95th (m)	24.2	35.1	126.4
Internal Link Dist (m)	251.2	233.4	388.4
Turn Bay Length (m)			
Base Capacity (vph)	473	1411	1097
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.39	0.31	0.73
Intersection Summary			

Timings
6: Liverpool Rd & Parking Lot/Tatra Dr

PM Peak Hour
2027 Total Traffic Conditions - Tatra & Krosno Signalized



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔		↔	↔	↔
Traffic Volume (vph)	4	1	1	0	1	603	215	780
Future Volume (vph)	4	1	1	0	1	603	215	780
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	25.0	25.0	25.0	25.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0		7.0	7.0	7.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)		7.5		7.5		58.8	58.8	58.8
Actuated g/C Ratio		0.09		0.09		0.73	0.73	0.73
v/c Ratio		0.08		0.66		0.46	0.37	0.59
Control Delay		32.0		13.9		6.0	6.6	7.8
Queue Delay		0.0		0.0		0.0	0.0	1.3
Total Delay		32.0		13.9		6.0	6.6	9.1
LOS		C		B		A	A	A
Approach Delay		32.0		13.9		6.0		8.5
Approach LOS		C		B		A		A

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 80.4	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 8.5	Intersection LOS: A
Intersection Capacity Utilization 105.8%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 6: Liverpool Rd & Parking Lot/Tatra Dr



Queues
6: Liverpool Rd & Parking Lot/Tatra Dr

PM Peak Hour
2027 Total Traffic Conditions - Tatra & Krosno Signalized



Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	6	247	637	224	814
v/c Ratio	0.08	0.66	0.46	0.37	0.59
Control Delay	32.0	13.9	6.0	6.6	7.8
Queue Delay	0.0	0.0	0.0	0.0	1.3
Total Delay	32.0	13.9	6.0	6.6	9.1
Queue Length 50th (m)	0.7	0.2	27.7	8.9	41.7
Queue Length 95th (m)	4.0	19.4	63.3	26.5	96.2
Internal Link Dist (m)	73.5	201.1	160.3		52.8
Turn Bay Length (m)				45.0	
Base Capacity (vph)	184	557	1398	603	1378
Starvation Cap Reductn	0	0	0	0	340
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.44	0.46	0.37	0.78

Intersection Summary

Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	20.0	42.3	52.3
Average Queue (m)	12.6	25.5	36.3
95th Queue (m)	22.9	43.7	58.5
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	9.3	16.2	23.4
Average Queue (m)	5.5	10.5	17.7
95th Queue (m)	12.9	15.2	26.1
Link Distance (m)	104.6	179.8	86.5
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

Timings
3: Liverpool Rd & Bayly St

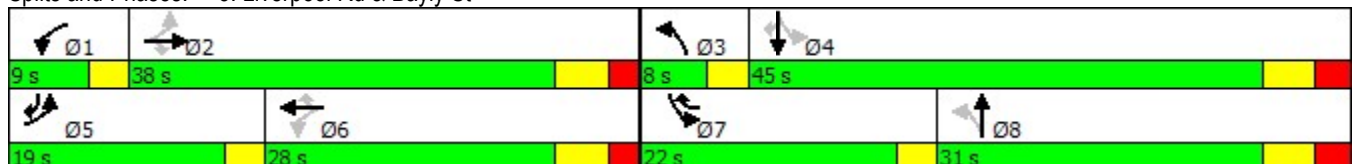
Saturday Peak Hour
2027 Total Traffic Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	357	410	165	122	239	357	81	596	342	619	288	
Future Volume (vph)	357	410	165	122	239	357	81	596	342	619	288	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8	7	4	5	
Permitted Phases	2		2	6		6	8		4		4	
Detector Phase	5	2	2	1	6	7	3	8	7	4	5	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0	
Total Split (s)	19.0	38.0	38.0	9.0	28.0	22.0	8.0	31.0	22.0	45.0	19.0	
Total Split (%)	19.0%	38.0%	38.0%	9.0%	28.0%	22.0%	8.0%	31.0%	22.0%	45.0%	19.0%	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0	
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None	
Act Effct Green (s)	44.0	31.6	31.6	31.8	22.4	44.3	32.5	23.8	49.0	38.9	57.8	
Actuated g/C Ratio	0.44	0.32	0.32	0.32	0.23	0.45	0.33	0.24	0.49	0.39	0.58	
v/c Ratio	0.64	0.36	0.29	0.36	0.30	0.48	0.27	0.92	0.84	0.45	0.29	
Control Delay	25.5	27.3	5.4	21.5	33.6	14.7	17.2	53.1	41.2	23.9	1.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	25.5	27.3	5.4	21.5	33.6	14.7	17.2	53.1	41.2	23.9	1.9	
LOS	C	C	A	C	C	B	B	D	D	C	A	
Approach Delay		22.7			22.2			49.6		23.5		
Approach LOS		C			C			D		C		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 99
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 28.9
 Intersection LOS: C
 Intersection Capacity Utilization 95.3%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Saturday Peak Hour
2027 Total Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	368	423	170	126	246	368	84	780	353	638	297
v/c Ratio	0.64	0.36	0.29	0.36	0.30	0.48	0.27	0.92	0.84	0.45	0.29
Control Delay	25.5	27.3	5.4	21.5	33.6	14.7	17.2	53.1	41.2	23.9	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.5	27.3	5.4	21.5	33.6	14.7	17.2	53.1	41.2	23.9	1.9
Queue Length 50th (m)	48.7	33.1	0.0	14.3	21.2	32.0	8.2	74.7	47.3	48.0	0.5
Queue Length 95th (m)	72.9	46.1	14.0	25.5	32.2	55.2	16.0	#109.3	#92.1	63.6	9.9
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		65.0
Base Capacity (vph)	579	1166	587	352	818	773	308	863	429	1406	1052
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.36	0.29	0.36	0.30	0.48	0.27	0.90	0.82	0.45	0.28

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.68	2.69	2.61	2.82
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	961	740	864	1288
Effct. Green for Bike (s)	31.6	22.4	23.8	38.9
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	632	448	476	778
Bicycle Delay (s/bike)	23.4	30.1	29.0	18.7
Bicycle Compliance	Fair	Poor	Fair	Fair
Bicycle LOS Score	3.25	3.25	3.36	3.72
Bicycle LOS	C	C	C	D

HCM Unsignalized Intersection Capacity Analysis

6: Liverpool Rd & Parking Lot/Tatra Dr

Saturday Peak Hour
2027 Total Traffic Conditions



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (veh/h)	1	0	0	4	0	118	0	686	3	140	722	4
Future Volume (Veh/h)	1	0	0	4	0	118	0	686	3	140	722	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	0	0	4	0	122	0	707	3	144	744	4
Pedestrians		11			23			6				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.1			1.1			1.1				
Percent Blockage		1			2			1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.81	0.81	0.81	0.81	0.81		0.81					
vC, conflicting volume	1876	1778	763	1770	1778	732	759			733		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1963	1843	592	1832	1843	732	587			733		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	100	90	100	71	100			83		
cM capacity (veh/h)	23	50	407	40	50	415	801			861		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	126	710	144	748							
Volume Left	1	4	0	144	0							
Volume Right	0	122	3	0	4							
cSH	23	320	801	861	1700							
Volume to Capacity	0.04	0.39	0.00	0.17	0.44							
Queue Length 95th (m)	1.0	13.8	0.0	4.5	0.0							
Control Delay (s)	167.4	23.4	0.0	10.0	0.0							
Lane LOS	F	C		B								
Approach Delay (s)	167.4	23.4	0.0	1.6								
Approach LOS	F	C										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			91.9%		ICU Level of Service				F			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

Saturday Peak Hour
 2027 Total Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	17	15	615	660	66
Future Volume (Veh/h)	56	17	15	615	660	66
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	62	19	16	676	725	73
Pedestrians	6			5		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.80	0.80	0.80			
vC, conflicting volume	1476	772	804			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1469	585	625			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	43	95	98			
cM capacity (veh/h)	109	393	764			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	81	692	798			
Volume Left	62	16	0			
Volume Right	19	0	73			
cSH	131	764	1700			
Volume to Capacity	0.62	0.02	0.47			
Queue Length 95th (m)	24.4	0.5	0.0			
Control Delay (s)	69.3	0.6	0.0			
Lane LOS	F	A				
Approach Delay (s)	69.3	0.6	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			56.7%	ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Saturday Peak Hour
 2027 Total Traffic Conditions






Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	23	105	475	34	121	519
Future Volume (vph)	23	105	475	34	121	519
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	24	109	495	35	126	541

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	133	530	667
Volume Left (vph)	24	0	126
Volume Right (vph)	109	35	0
Hadj (s)	-0.44	0.01	0.08
Departure Headway (s)	6.3	5.2	5.1
Degree Utilization, x	0.23	0.77	0.95
Capacity (veh/h)	544	671	667
Control Delay (s)	11.2	23.7	45.7
Approach Delay (s)	11.2	23.7	45.7
Approach LOS	B	C	E

Intersection Summary			
Delay		33.5	
Level of Service		D	
Intersection Capacity Utilization		78.9%	ICU Level of Service
Analysis Period (min)		15	D

Intersection	
Intersection Delay, s/veh	32
Intersection LOS	D

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	105	475	34	121	519
Future Vol, veh/h	23	105	475	34	121	519
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	0	1	3	5	0	3
Mvmt Flow	24	109	495	35	126	541
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	11.1	23.3	43
HCM LOS	B	C	E

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	18%	19%
Vol Thru, %	93%	0%	81%
Vol Right, %	7%	82%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	509	128	640
LT Vol	0	23	121
Through Vol	475	0	519
RT Vol	34	105	0
Lane Flow Rate	530	133	667
Geometry Grp	1	1	1
Degree of Util (X)	0.767	0.23	0.94
Departure Headway (Hd)	5.205	6.216	5.074
Convergence, Y/N	Yes	Yes	Yes
Cap	695	576	713
Service Time	3.239	4.273	3.106
HCM Lane V/C Ratio	0.763	0.231	0.935
HCM Control Delay	23.3	11.1	43
HCM Lane LOS	C	B	E
HCM 95th-tile Q	7.2	0.9	13.3

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Saturday Peak Hour
 2027 Total Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	0	0	457	495	12
Future Volume (Veh/h)	10	0	0	457	495	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	11	0	0	502	544	13
Pedestrians	9			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1062	560	566			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1062	560	566			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	100			
cM capacity (veh/h)	248	526	1007			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	11	502	557			
Volume Left	11	0	0			
Volume Right	0	0	13			
cSH	248	1007	1700			
Volume to Capacity	0.04	0.00	0.33			
Queue Length 95th (m)	1.1	0.0	0.0			
Control Delay (s)	20.2	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	20.2	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	37.1%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Saturday Peak Hour
 2027 Total Traffic Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	1	0	409	483	13
Future Volume (Veh/h)	2	1	0	409	483	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	1	0	440	519	14
Pedestrians	11					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	977	537	544			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	977	537	544			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	278	542	1024			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	440	533			
Volume Left	2	0	0			
Volume Right	1	0	14			
cSH	331	1024	1700			
Volume to Capacity	0.01	0.00	0.31			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	16.0	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	16.0	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	36.2%			ICU Level of Service	A	
Analysis Period (min)	15					

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Saturday Peak Hour
 2027 Total Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	3	6	9	5	6	7	386	10	10	456	17
Future Volume (Veh/h)	12	3	6	9	5	6	7	386	10	10	456	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	3	7	10	6	7	8	429	11	11	507	19
Pedestrians		10			16							
Lane Width (m)		3.7			3.7							
Walking Speed (m/s)		1.1			1.1							
Percent Blockage		1			2							
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1009	1020	526	1014	1024	450	536			456		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1009	1020	526	1014	1024	450	536			456		
tC, single (s)	7.5	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.9	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	99	99	95	97	99	99			99		
cM capacity (veh/h)	172	228	550	204	227	603	1032			1098		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	23	23	448	537								
Volume Left	13	10	8	11								
Volume Right	7	7	11	19								
cSH	226	264	1032	1098								
Volume to Capacity	0.10	0.09	0.01	0.01								
Queue Length 95th (m)	2.5	2.2	0.2	0.2								
Control Delay (s)	22.7	19.9	0.2	0.3								
Lane LOS	C	C	A	A								
Approach Delay (s)	22.7	19.9	0.2	0.3								
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			40.4%		ICU Level of Service					A		
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

Saturday Peak Hour
2027 Total Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	0	21	37	2	8	19	360	20	12	401	44
Future Volume (Veh/h)	40	0	21	37	2	8	19	360	20	12	401	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	43	0	23	40	2	9	20	387	22	13	431	47
Pedestrians		15			5			1			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	946	950	470	948	962	405	493			414		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	946	950	470	948	962	405	493			414		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	100	96	82	99	99	98			99		
cM capacity (veh/h)	226	250	588	223	245	646	1065			1150		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	66	51	429	491								
Volume Left	43	40	20	13								
Volume Right	23	9	22	47								
cSH	288	254	1065	1150								
Volume to Capacity	0.23	0.20	0.02	0.01								
Queue Length 95th (m)	6.6	5.6	0.4	0.3								
Control Delay (s)	21.2	22.7	0.6	0.3								
Lane LOS	C	C	A	A								
Approach Delay (s)	21.2	22.7	0.6	0.3								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.9									
Intersection Capacity Utilization			39.8%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Saturday Peak Hour
 2027 Total Traffic Conditions

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	35	2	7	1	1	18	4	328	4	7	376	61
Future Volume (vph)	35	2	7	1	1	18	4	328	4	7	376	61
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)	38	2	8	1	1	20	4	357	4	8	409	66
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	48	22	365	483								
Volume Left (vph)	38	1	4	8								
Volume Right (vph)	8	20	4	66								
Hadj (s)	0.06	-0.54	0.00	-0.08								
Departure Headway (s)	5.9	5.3	4.6	4.4								
Degree Utilization, x	0.08	0.03	0.47	0.60								
Capacity (veh/h)	529	562	757	792								
Control Delay (s)	9.4	8.5	11.6	13.8								
Approach Delay (s)	9.4	8.5	11.6	13.8								
Approach LOS	A	A	B	B								
Intersection Summary												
Delay			12.6									
Level of Service			B									
Intersection Capacity Utilization			44.4%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	2	7	1	1	18	4	328	4	7	376	61
Future Vol, veh/h	35	2	7	1	1	18	4	328	4	7	376	61
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	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	38	2	8	1	1	20	4	357	4	8	409	66
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.4	8.5	11.6	13.7
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	80%	5%	2%
Vol Thru, %	98%	5%	5%	85%
Vol Right, %	1%	16%	90%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	336	44	20	444
LT Vol	4	35	1	7
Through Vol	328	2	1	376
RT Vol	4	7	18	61
Lane Flow Rate	365	48	22	483
Geometry Grp	1	1	1	1
Degree of Util (X)	0.465	0.077	0.032	0.591
Departure Headway (Hd)	4.587	5.816	5.276	4.406
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	782	611	672	816
Service Time	2.629	3.895	3.36	2.442
HCM Lane V/C Ratio	0.467	0.079	0.033	0.592
HCM Control Delay	11.6	9.4	8.5	13.7
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	2.5	0.2	0.1	4

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Saturday Peak Hour
2027 Total Traffic Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	5	320	0	6	356
Future Volume (Veh/h)	0	5	320	0	6	356
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	5	340	0	6	379
Pedestrians	64		3			3
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	6		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	798	407			404	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	798	407			404	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	333	606			1082	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	5	340	385			
Volume Left	0	0	6			
Volume Right	5	0	0			
cSH	606	1700	1082			
Volume to Capacity	0.01	0.20	0.01			
Queue Length 95th (m)	0.2	0.0	0.1			
Control Delay (s)	11.0	0.0	0.2			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.2			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			34.5%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
11: Liverpool Rd & Krosno Blvd

Saturday Peak Hour
2027 Total Traffic Conditions - Krosno Signalized



Lane Group	WBL	NBT	SBL	SBT
Lane Configurations				
Traffic Volume (vph)	23	475	121	519
Future Volume (vph)	23	475	121	519
Turn Type	Prot	NA	Perm	NA
Protected Phases	8	2		6
Permitted Phases			6	
Detector Phase	8	2	6	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	24.0	66.0	66.0	66.0
Total Split (%)	26.7%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	7.7	66.6		66.6
Actuated g/C Ratio	0.09	0.77		0.77
v/c Ratio	0.55	0.37		0.57
Control Delay	19.1	4.3		6.8
Queue Delay	0.0	0.0		0.0
Total Delay	19.1	4.3		6.8
LOS	B	A		A
Approach Delay	19.1	4.3		6.8
Approach LOS	B	A		A

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 86.4
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 7.0
 Intersection Capacity Utilization 83.9%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service E

Splits and Phases: 11: Liverpool Rd & Krosno Blvd



Queues
11: Liverpool Rd & Krosno Blvd

Saturday Peak Hour
2027 Total Traffic Conditions - Krosno Signalized



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	133	530	667
v/c Ratio	0.55	0.37	0.57
Control Delay	19.1	4.3	6.8
Queue Delay	0.0	0.0	0.0
Total Delay	19.1	4.3	6.8
Queue Length 50th (m)	3.7	19.6	31.9
Queue Length 95th (m)	18.4	41.7	72.3
Internal Link Dist (m)	251.2	233.4	388.4
Turn Bay Length (m)			
Base Capacity (vph)	426	1421	1174
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.31	0.37	0.57
Intersection Summary			

Approach	WB	NB	SB
Crosswalk Length (m)	8.51	7.40	7.40
Crosswalk Width (m)	1.20	1.20	1.20
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	6	8
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (km/h)	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.84	2.17	2.24
Pedestrian Crosswalk LOS	A	B	B

Approach	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	133	530	667
Effct. Green for Bike (s)	7.7	66.6	66.6
Cross Street Width (m)	7.40	8.51	7.40
Through Lanes Number	1	1	1
Through Lane Width (m)	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	171	1480	1480
Bicycle Delay (s/bike)	37.6	3.0	3.0
Bicycle Compliance	Poor	Good	Good
Bicycle LOS Score	2.12	2.83	3.00
Bicycle LOS	B	C	C

Intersection: 11: Liverpool Rd & Krosno Blvd

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	6.2	53.6	66.3
Average Queue (m)	6.1	30.0	46.5
95th Queue (m)	6.2	50.3	67.3
Link Distance (m)	265.9	239.9	406.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.0	9.3	28.4	29.1
Average Queue (m)	3.6	5.3	20.3	21.3
95th Queue (m)	10.9	12.5	28.3	31.0
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

Timings
3: Liverpool Rd & Bayly St

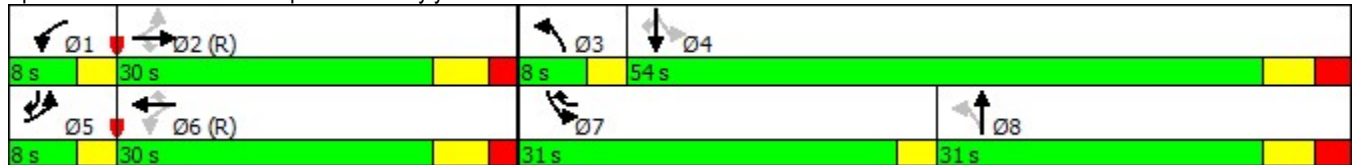
Timing Plan: AM Peak Hour
2032 Total Traffic Cond

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	199	596	101	62	245	304	66	666	496	321	167
Future Volume (vph)	199	596	101	62	245	304	66	666	496	321	167
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	8.0	30.0	30.0	8.0	30.0	31.0	8.0	31.0	31.0	54.0	8.0
Total Split (%)	8.0%	30.0%	30.0%	8.0%	30.0%	31.0%	8.0%	31.0%	31.0%	54.0%	8.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	32.0	23.6	23.6	32.0	23.6	55.0	33.0	24.3	59.0	47.3	56.0
Actuated g/C Ratio	0.32	0.24	0.24	0.32	0.24	0.55	0.33	0.24	0.59	0.47	0.56
v/c Ratio	0.52	0.71	0.25	0.31	0.31	0.38	0.18	0.98	0.86	0.20	0.18
Control Delay	30.8	40.5	4.0	26.1	32.8	9.9	13.6	62.8	38.1	15.8	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	40.5	4.0	26.1	32.8	9.9	13.6	62.8	38.1	15.8	1.9
LOS	C	D	A	C	C	A	B	E	D	B	A
Approach Delay		34.2			20.8			59.1		24.7	
Approach LOS		C			C			E		C	

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Pretimed
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 35.5
 Intersection LOS: D
 Intersection Capacity Utilization 96.4%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Timing Plan: AM Peak Hour
2032 Total Traffic Cond



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	203	608	103	63	250	310	67	828	506	328	170
v/c Ratio	0.52	0.71	0.25	0.31	0.31	0.38	0.18	0.98	0.86	0.20	0.18
Control Delay	30.8	40.5	4.0	26.1	32.8	9.9	13.6	62.8	38.1	15.8	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	40.5	4.0	26.1	32.8	9.9	13.6	62.8	38.1	15.8	1.9
Queue Length 50th (m)	28.5	57.2	0.0	8.2	21.1	21.7	5.1	81.9	72.8	18.8	0.0
Queue Length 95th (m)	46.6	76.0	6.8	17.1	32.0	38.1	10.6	#121.6	#128.0	27.3	7.8
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		
Base Capacity (vph)	394	852	407	206	797	818	377	849	591	1613	933
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.71	0.25	0.31	0.31	0.38	0.18	0.98	0.86	0.20	0.18

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.66	2.72	2.54	2.76
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	914	623	895	1004
Effct. Green for Bike (s)	23.6	23.6	24.3	47.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	472	472	486	946
Bicycle Delay (s/bike)	29.2	29.2	28.7	13.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.22	3.16	3.39	3.48
Bicycle LOS	C	C	C	C

HCM Unsignalized Intersection Capacity Analysis
6: Liverpool Rd & Parking Lot/Tatra Dr

Timing Plan: AM Peak Hour
2032 Total Traffic Cond



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (veh/h)	0	0	1	3	0	217	0	649	11	129	331	2
Future Volume (Veh/h)	0	0	1	3	0	217	0	649	11	129	331	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	1	3	0	238	0	713	12	142	364	2
Pedestrians		17			16			6			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			2			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												153
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1624	1407	388	1390	1402	736	383			741		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1632	1401	312	1383	1395	736	307			741		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	97	100	42	100			83		
cM capacity (veh/h)	27	107	671	95	108	409	1165			852		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	241	725	142	366							
Volume Left	0	3	0	142	0							
Volume Right	1	238	12	0	2							
cSH	671	393	1165	852	1700							
Volume to Capacity	0.00	0.61	0.00	0.17	0.22							
Queue Length 95th (m)	0.0	30.0	0.0	4.5	0.0							
Control Delay (s)	10.4	27.7	0.0	10.1	0.0							
Lane LOS	B	D		B								
Approach Delay (s)	10.4	27.7	0.0	2.8								
Approach LOS	B	D										
Intersection Summary												
Average Delay			5.5									
Intersection Capacity Utilization			78.7%		ICU Level of Service					D		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St










Timing Plan: AM Peak Hour
 2032 Total Traffic Cond






Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	77	17	9	558	268	60
Future Volume (Veh/h)	77	17	9	558	268	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	83	18	10	600	288	65
Pedestrians	9				1	
Lane Width (m)	3.7				3.7	
Walking Speed (m/s)	1.1				1.1	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.99	0.99	0.99			
vC, conflicting volume	950	330	362			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	943	313	346			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	71	97	99			
cM capacity (veh/h)	284	715	1071			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	101	610	353			
Volume Left	83	10	0			
Volume Right	18	0	65			
cSH	319	1071	1700			
Volume to Capacity	0.32	0.01	0.21			
Queue Length 95th (m)	10.1	0.2	0.0			
Control Delay (s)	21.5	0.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	21.5	0.3	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			2.2			
Intersection Capacity Utilization			48.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
 2032 Total Traffic Cond

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	9	126	375	28	124	174
Future Volume (vph)	9	126	375	28	124	174
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	11	159	475	35	157	220
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	170	510	377			
Volume Left (vph)	11	0	157			
Volume Right (vph)	159	35	0			
Hadj (s)	-0.52	0.06	0.15			
Departure Headway (s)	5.5	5.0	5.2			
Degree Utilization, x	0.26	0.71	0.55			
Capacity (veh/h)	579	702	667			
Control Delay (s)	10.5	19.1	14.4			
Approach Delay (s)	10.5	19.1	14.4			
Approach LOS	B	C	B			
Intersection Summary						
Delay			16.0			
Level of Service			C			
Intersection Capacity Utilization			56.3%	ICU Level of Service	B	
Analysis Period (min)			15			

Intersection	
Intersection Delay, s/veh	15.8
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	126	375	28	124	174
Future Vol, veh/h	9	126	375	28	124	174
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	0	2	4	36	4	4
Mvmt Flow	11	159	475	35	157	220
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	10.4	18.8	14.3
HCM LOS	B	C	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	7%	42%
Vol Thru, %	93%	0%	58%
Vol Right, %	7%	93%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	403	135	298
LT Vol	0	9	124
Through Vol	375	0	174
RT Vol	28	126	0
Lane Flow Rate	510	171	377
Geometry Grp	1	1	1
Degree of Util (X)	0.702	0.26	0.545
Departure Headway (Hd)	4.954	5.475	5.199
Convergence, Y/N	Yes	Yes	Yes
Cap	735	654	694
Service Time	2.954	3.517	3.228
HCM Lane V/C Ratio	0.694	0.261	0.543
HCM Control Delay	18.8	10.4	14.3
HCM Lane LOS	C	B	B
HCM 95th-tile Q	5.8	1	3.3

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Timing Plan: AM Peak Hour
 2032 Total Traffic Cond



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	0	1	366	188	7
Future Volume (Veh/h)	7	0	1	366	188	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	8	0	1	431	221	8
Pedestrians	21			3	1	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.1			1.1	1.1	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	680	249	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	680	249	250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	410	776	1300			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	432	229			
Volume Left	8	1	0			
Volume Right	0	0	8			
cSH	410	1300	1700			
Volume to Capacity	0.02	0.00	0.13			
Queue Length 95th (m)	0.5	0.0	0.0			
Control Delay (s)	13.9	0.0	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.9	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			31.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Timing Plan: AM Peak Hour
 2032 Total Traffic Cond



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	2	0	325	178	7
Future Volume (Veh/h)	13	2	0	325	178	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	16	2	0	392	214	8
Pedestrians	22					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	2					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	632	240	244			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	632	240	244			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	100			
cM capacity (veh/h)	438	787	1305			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	18	392	222			
Volume Left	16	0	0			
Volume Right	2	0	8			
cSH	461	1305	1700			
Volume to Capacity	0.04	0.00	0.13			
Queue Length 95th (m)	0.9	0.0	0.0			
Control Delay (s)	13.1	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	13.1	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			27.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Timing Plan: AM Peak Hour
 2032 Total Traffic Cond

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	4	2	3	3	8	3	291	14	12	152	9
Future Volume (Veh/h)	15	4	2	3	3	8	3	291	14	12	152	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	18	5	2	4	4	10	4	346	17	14	181	11
Pedestrians		2						14				
Lane Width (m)		3.7						3.7				
Walking Speed (m/s)		1.1						1.1				
Percent Blockage		0						1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	591	588	202	596	584	354	194			363		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	591	588	202	596	584	354	194			363		
tC, single (s)	7.1	6.8	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	96	99	100	99	99	99	100			99		
cM capacity (veh/h)	406	386	830	403	419	667	1389			1207		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	25	18	367	206								
Volume Left	18	4	4	14								
Volume Right	2	10	17	11								
cSH	419	522	1389	1207								
Volume to Capacity	0.06	0.03	0.00	0.01								
Queue Length 95th (m)	1.4	0.8	0.1	0.3								
Control Delay (s)	14.1	12.1	0.1	0.6								
Lane LOS	B	B	A	A								
Approach Delay (s)	14.1	12.1	0.1	0.6								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			30.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 20: Liverpool Rd & Annland St

Timing Plan: AM Peak Hour
 2032 Total Traffic Cond



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	54	2	9	10	0	10	7	238	8	4	107	15
Future Volume (Veh/h)	54	2	9	10	0	10	7	238	8	4	107	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	65	2	11	12	0	12	8	287	10	5	129	18
Pedestrians		6			3			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	475	470	146	473	474	296	153			300		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	475	470	146	473	474	296	153			300		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.4			2.2		
p0 queue free %	87	100	99	98	100	98	99			100		
cM capacity (veh/h)	485	485	899	488	483	722	1333			1269		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	78	24	305	152								
Volume Left	65	12	8	5								
Volume Right	11	12	10	18								
cSH	518	582	1333	1269								
Volume to Capacity	0.15	0.04	0.01	0.00								
Queue Length 95th (m)	4.0	1.0	0.1	0.1								
Control Delay (s)	13.2	11.5	0.3	0.3								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.2	11.5	0.3	0.3								
Approach LOS	B	B										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			28.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Timing Plan: AM Peak Hour
 2032 Total Traffic Cond



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	0	0	0	1	5	1	219	1	4	127	4
Future Volume (vph)	18	0	0	0	1	5	1	219	1	4	127	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	22	0	0	0	1	6	1	264	1	5	153	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	22	7	266	163
Volume Left (vph)	22	0	1	5
Volume Right (vph)	0	6	1	5
Hadj (s)	0.20	-0.51	0.02	0.02
Departure Headway (s)	5.0	4.3	4.2	4.3
Degree Utilization, x	0.03	0.01	0.31	0.19
Capacity (veh/h)	650	742	850	830
Control Delay (s)	8.2	7.4	9.0	8.3
Approach Delay (s)	8.2	7.4	9.0	8.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay		8.7	
Level of Service		A	
Intersection Capacity Utilization	26.7%		ICU Level of Service A
Analysis Period (min)		15	

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	0	0	0	1	5	1	219	1	4	127	4
Future Vol, veh/h	18	0	0	0	1	5	1	219	1	4	127	4
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	2	0
Mvmt Flow	22	0	0	0	1	6	1	264	1	5	153	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	7.4	8.9	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	100%	0%	3%
Vol Thru, %	99%	0%	17%	94%
Vol Right, %	0%	0%	83%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	221	18	6	135
LT Vol	1	18	0	4
Through Vol	219	0	1	127
RT Vol	1	0	5	4
Lane Flow Rate	266	22	7	163
Geometry Grp	1	1	1	1
Degree of Util (X)	0.301	0.03	0.009	0.187
Departure Headway (Hd)	4.069	5.028	4.345	4.137
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	876	716	828	856
Service Time	2.133	3.029	2.346	2.22
HCM Lane V/C Ratio	0.304	0.031	0.008	0.19
HCM Control Delay	8.9	8.2	7.4	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.3	0.1	0	0.7

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Timing Plan: AM Peak Hour
2032 Total Traffic Cond

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	159	38	0	71	11
Future Volume (Veh/h)	0	159	38	0	71	11
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Hourly flow rate (vph)	0	215	51	0	96	15
Pedestrians	7					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	265	58			58	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	265	58			58	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	79			94	
cM capacity (veh/h)	679	1007			1548	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	215	51	111			
Volume Left	0	0	96			
Volume Right	215	0	0			
cSH	1007	1700	1548			
Volume to Capacity	0.21	0.03	0.06			
Queue Length 95th (m)	6.1	0.0	1.5			
Control Delay (s)	9.5	0.0	6.5			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	6.5			
Approach LOS	A					
Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			27.7%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
2032 Total Traffic Condition - Krosno Signalized



Lane Group	WBL	NBT	SBL	SBT
Lane Configurations	W	T		T
Traffic Volume (vph)	9	375	124	174
Future Volume (vph)	9	375	124	174
Turn Type	Prot	NA	Perm	NA
Protected Phases	8	2		6
Permitted Phases			6	
Detector Phase	8	2	6	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	25.0	65.0	65.0	65.0
Total Split (%)	27.8%	72.2%	72.2%	72.2%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	7.5	63.4		63.4
Actuated g/C Ratio	0.09	0.76		0.76
v/c Ratio	0.59	0.37		0.40
Control Delay	15.8	4.4		5.3
Queue Delay	0.0	0.0		0.0
Total Delay	15.8	4.4		5.3
LOS	B	A		A
Approach Delay	15.8	4.4		5.3
Approach LOS	B	A		A

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 82.9
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 6.5
 Intersection Capacity Utilization 61.4%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 11: Liverpool Rd & Krosno Blvd



Queues
11: Liverpool Rd & Krosno Blvd

Timing Plan: AM Peak Hour
2032 Total Traffic Condition - Krosno Signalized



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	170	510	377
v/c Ratio	0.59	0.37	0.40
Control Delay	15.8	4.4	5.3
Queue Delay	0.0	0.0	0.0
Total Delay	15.8	4.4	5.3
Queue Length 50th (m)	1.6	17.7	13.8
Queue Length 95th (m)	12.6	33.1	28.4
Internal Link Dist (m)	251.2	233.4	388.4
Turn Bay Length (m)			
Base Capacity (vph)	491	1367	931
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.35	0.37	0.40
Intersection Summary			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.3	9.2	20.3	16.7
Average Queue (m)	4.5	0.9	11.0	13.0
95th Queue (m)	12.0	5.4	16.5	18.9
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Timings
3: Liverpool Rd & Bayly St

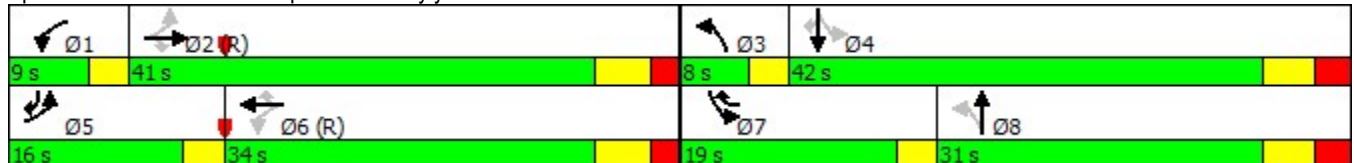
PM Peak Hour
2032 Total Traffic Conditions - Krosno Signalized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	366	868	274	127	586	689	88	651	335	670	245
Future Volume (vph)	366	868	274	127	586	689	88	651	335	670	245
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8	7	4	5
Permitted Phases	2		2	6		6	8		4		4
Detector Phase	5	2	2	1	6	7	3	8	7	4	5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0
Total Split (s)	16.0	41.0	41.0	9.0	34.0	19.0	8.0	31.0	19.0	42.0	16.0
Total Split (%)	16.0%	41.0%	41.0%	9.0%	34.0%	19.0%	8.0%	31.0%	19.0%	42.0%	16.0%
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	47.0	34.6	34.6	37.0	27.6	47.0	33.0	24.3	47.0	35.3	52.0
Actuated g/C Ratio	0.47	0.35	0.35	0.37	0.28	0.47	0.33	0.24	0.47	0.35	0.52
v/c Ratio	0.94	0.72	0.46	0.59	0.61	0.92	0.31	0.91	0.93	0.55	0.30
Control Delay	53.3	32.6	9.8	28.7	34.5	38.2	19.0	52.5	57.6	27.9	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	32.6	9.8	28.7	34.5	38.2	19.0	52.5	57.6	27.9	7.1
LOS	D	C	A	C	C	D	B	D	E	C	A
Approach Delay		33.5			35.8			49.0		31.8	
Approach LOS		C			D			D		C	

Intersection Summary

Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 20 (20%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Pretimed	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 36.3	Intersection LOS: D
Intersection Capacity Utilization 99.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

PM Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	377	895	282	131	604	710	91	786	345	691	253
v/c Ratio	0.94	0.72	0.46	0.59	0.61	0.92	0.31	0.91	0.93	0.55	0.30
Control Delay	53.3	32.6	9.8	28.7	34.5	38.2	19.0	52.5	57.6	27.9	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	32.6	9.8	28.7	34.5	38.2	19.0	52.5	57.6	27.9	7.1
Queue Length 50th (m)	47.2	78.7	9.5	14.0	53.5	99.4	9.5	76.6	48.3	55.8	12.0
Queue Length 95th (m)	#92.1	101.0	30.5	25.0	71.2	#133.4	18.3	#111.3	#100.4	73.3	24.8
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		65.0
Base Capacity (vph)	402	1238	611	221	997	775	296	860	370	1263	852
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.72	0.46	0.59	0.61	0.92	0.31	0.91	0.93	0.55	0.30

Intersection Summary

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



















Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.81	2.85	2.64	2.88
Pedestrian Crosswalk LOS	C	C	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	1554	1445	877	1289
Effct. Green for Bike (s)	34.6	27.6	24.3	35.3
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	692	552	486	706
Bicycle Delay (s/bike)	21.4	26.2	28.7	20.9
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.74	3.84	3.38	3.72
Bicycle LOS	D	D	C	D

HCM Unsignalized Intersection Capacity Analysis

6: Liverpool Rd & Parking Lot/Tatra Dr

PM Peak Hour
2032 Total Traffic Conditions - Krosno Signalized

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1	1	1	0	236	1	614	8	215	795	1
Future Volume (Veh/h)	4	1	1	1	0	236	1	614	8	215	795	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	4	1	1	1	0	246	1	640	8	224	828	1
Pedestrians		23			32			22			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		2			3			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)											153	
pX, platoon unblocked	0.80	0.80	0.80	0.80	0.80		0.80					
vC, conflicting volume	2194	1982	874	1978	1978	678	852			680		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2366	2101	718	2096	2097	678	691			680		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	40	97	100	95	100	44	100			75		
cM capacity (veh/h)	7	30	331	22	30	441	715			893		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	6	247	649	224	829							
Volume Left	4	1	1	224	0							
Volume Right	1	246	8	0	1							
cSH	9	409	715	893	1700							
Volume to Capacity	0.64	0.60	0.00	0.25	0.49							
Queue Length 95th (m)	9.9	29.2	0.0	7.5	0.0							
Control Delay (s)	652.0	26.3	0.0	10.4	0.0							
Lane LOS	F	D	A	B								
Approach Delay (s)	652.0	26.3	0.0	2.2								
Approach LOS	F	D										
Intersection Summary												
Average Delay			6.5									
Intersection Capacity Utilization			99.7%		ICU Level of Service		F					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 9: Liverpool Rd & Radom St

PM Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	58	32	22	547	717	68
Future Volume (Veh/h)	58	32	22	547	717	68
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	60	33	23	564	739	70
Pedestrians	11			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.78	0.78	0.78			
vC, conflicting volume	1395	786	820			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1365	585	628			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	51	92	97			
cM capacity (veh/h)	123	391	744			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	93	587	809			
Volume Left	60	23	0			
Volume Right	33	0	70			
cSH	162	744	1700			
Volume to Capacity	0.57	0.03	0.48			
Queue Length 95th (m)	22.8	0.7	0.0			
Control Delay (s)	53.5	0.8	0.0			
Lane LOS	F	A				
Approach Delay (s)	53.5	0.8	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			3.7			
Intersection Capacity Utilization			58.8%	ICU Level of Service	B	
Analysis Period (min)			15			

Timings
11: Liverpool Rd & Krosno Blvd

PM Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Lane Group	WBL	NBT	SBL	SBT
Lane Configurations	W	T		T
Traffic Volume (vph)	42	372	175	546
Future Volume (vph)	42	372	175	546
Turn Type	Prot	NA	Perm	NA
Protected Phases	8	2		6
Permitted Phases			6	
Detector Phase	8	2	6	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	24.0	66.0	66.0	66.0
Total Split (%)	26.7%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	8.6	63.8		63.8
Actuated g/C Ratio	0.10	0.76		0.76
v/c Ratio	0.62	0.31		0.74
Control Delay	20.4	4.3		12.0
Queue Delay	0.0	0.0		0.0
Total Delay	20.4	4.3		12.0
LOS	C	A		B
Approach Delay	20.4	4.3		12.0
Approach LOS	C	A		B

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 84.4	
Natural Cycle: 80	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 10.7	Intersection LOS: B
Intersection Capacity Utilization 84.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 11: Liverpool Rd & Krosno Blvd



Queues
11: Liverpool Rd & Krosno Blvd

PM Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	185	442	810
v/c Ratio	0.62	0.31	0.74
Control Delay	20.4	4.3	12.0
Queue Delay	0.0	0.0	0.0
Total Delay	20.4	4.3	12.0
Queue Length 50th (m)	6.8	16.6	53.4
Queue Length 95th (m)	24.2	35.6	130.2
Internal Link Dist (m)	251.2	233.4	388.4
Turn Bay Length (m)			
Base Capacity (vph)	473	1411	1097
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.39	0.31	0.74
Intersection Summary			

Approach	WB	NB	SB
Crosswalk Length (m)	8.51	7.40	7.40
Crosswalk Width (m)	1.20	1.20	1.20
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	6	8
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (km/h)	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.89	2.17	2.28
Pedestrian Crosswalk LOS	A	B	B

Approach	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	185	442	810
Effct. Green for Bike (s)	8.6	63.8	63.8
Cross Street Width (m)	7.40	8.51	7.40
Through Lanes Number	1	1	1
Through Lane Width (m)	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	191	1418	1418
Bicycle Delay (s/bike)	36.8	3.8	3.8
Bicycle Compliance	Poor	Good	Good
Bicycle LOS Score	2.21	2.69	3.24
Bicycle LOS	B	B	C

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd

PM Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	0	1	333	517	11
Future Volume (Veh/h)	6	0	1	333	517	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	7	0	1	396	615	13
Pedestrians	10			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					257	
pX, platoon unblocked	0.90	0.90	0.90			
vC, conflicting volume	1030	632	638			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	974	531	537			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	249	489	923			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	397	628			
Volume Left	7	1	0			
Volume Right	0	0	13			
cSH	249	923	1700			
Volume to Capacity	0.03	0.00	0.37			
Queue Length 95th (m)	0.7	0.0	0.0			
Control Delay (s)	19.9	0.0	0.0			
Lane LOS	C	A				
Approach Delay (s)	19.9	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			38.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park

















PM Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	1	1	318	477	12
Future Volume (Veh/h)	2	1	1	318	477	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	2	1	1	370	555	14
Pedestrians	9			3		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				341		
pX, platoon unblocked						
vC, conflicting volume	946	571	578			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	946	571	578			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	289	519	997			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	371	569			
Volume Left	2	1	0			
Volume Right	1	0	14			
cSH	339	997	1700			
Volume to Capacity	0.01	0.00	0.33			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	15.7	0.0	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.7	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			35.9%	ICU Level of Service	A	
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

PM Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	0	3	9	3	9	4	291	7	18	434	19
Future Volume (Veh/h)	9	0	3	9	3	9	4	291	7	18	434	19
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	10	0	3	10	3	10	5	334	8	21	499	22
Pedestrians		9			12			2			1	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	922	925	521	917	932	351	530			354		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	922	925	521	917	932	351	530			354		
tC, single (s)	7.3	6.5	6.2	7.6	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	4.0	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	99	95	99	99	100			98		
cM capacity (veh/h)	216	260	553	198	257	688	1038			1202		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	13	23	347	542								
Volume Left	10	10	5	21								
Volume Right	3	10	8	22								
cSH	252	300	1038	1202								
Volume to Capacity	0.05	0.08	0.00	0.02								
Queue Length 95th (m)	1.2	1.9	0.1	0.4								
Control Delay (s)	20.1	18.0	0.2	0.5								
Lane LOS	C	C	A	A								
Approach Delay (s)	20.1	18.0	0.2	0.5								
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			45.3%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
20: Liverpool Rd & Annland St

PM Peak Hour
2032 Total Traffic Conditions - Krosno Signalized

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	0	16	21	3	3	15	307	19	14	395	52
Future Volume (Veh/h)	27	0	16	21	3	3	15	307	19	14	395	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	29	0	17	23	3	3	16	330	20	15	425	56
Pedestrians		4			1			2			3	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	866	870	459	875	888	344	485			351		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	866	870	459	875	888	344	485			351		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	100	97	91	99	100	99			99		
cM capacity (veh/h)	246	283	603	257	276	701	1084			1218		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	46	29	366	496								
Volume Left	29	23	16	15								
Volume Right	17	3	20	56								
cSH	315	277	1084	1218								
Volume to Capacity	0.15	0.10	0.01	0.01								
Queue Length 95th (m)	3.8	2.6	0.3	0.3								
Control Delay (s)	18.4	19.5	0.5	0.4								
Lane LOS	C	C	A	A								
Approach Delay (s)	18.4	19.5	0.5	0.4								
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			40.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

PM Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	0	2	0	0	7	5	264	1	10	360	38
Future Volume (vph)	19	0	2	0	0	7	5	264	1	10	360	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	0	2	0	0	8	6	314	1	12	429	45
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	25	8	321	486								
Volume Left (vph)	23	0	6	12								
Volume Right (vph)	2	8	1	45								
Hadj (s)	0.21	-0.60	0.00	-0.05								
Departure Headway (s)	5.9	5.1	4.5	4.3								
Degree Utilization, x	0.04	0.01	0.40	0.58								
Capacity (veh/h)	533	596	782	823								
Control Delay (s)	9.1	8.1	10.5	13.0								
Approach Delay (s)	9.1	8.1	10.5	13.0								
Approach LOS	A	A	B	B								
Intersection Summary												
Delay			11.9									
Level of Service			B									
Intersection Capacity Utilization			41.6%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	0	2	0	0	7	5	264	1	10	360	38
Future Vol, veh/h	19	0	2	0	0	7	5	264	1	10	360	38
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	5	0	0	0	0	0	0	0	0	0	0	3
Mvmt Flow	23	0	2	0	0	8	6	314	1	12	429	45
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.1	8.2	10.5	13
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	90%	0%	2%
Vol Thru, %	98%	0%	0%	88%
Vol Right, %	0%	10%	100%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	270	21	7	408
LT Vol	5	19	0	10
Through Vol	264	0	0	360
RT Vol	1	2	7	38
Lane Flow Rate	321	25	8	486
Geometry Grp	1	1	1	1
Degree of Util (X)	0.4	0.041	0.012	0.577
Departure Headway (Hd)	4.476	5.833	5.05	4.274
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	804	612	705	845
Service Time	2.499	3.886	3.106	2.295
HCM Lane V/C Ratio	0.399	0.041	0.011	0.575
HCM Control Delay	10.5	9.1	8.2	13
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	1.9	0.1	0	3.8

HCM Unsignalized Intersection Capacity Analysis
 26: Liverpool Rd & Site Access

PM Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	172	105	0	220	135
Future Volume (Veh/h)	0	172	105	0	220	135
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	221	135	0	282	173
Pedestrians	33		4		9	
Lane Width (m)	3.7		3.7		3.7	
Walking Speed (m/s)	1.1		1.1		1.1	
Percent Blockage	3		0		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	909	177			168	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	909	177			168	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	74			80	
cM capacity (veh/h)	160	836			1376	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	221	135	455			
Volume Left	0	0	282			
Volume Right	221	0	0			
cSH	836	1700	1376			
Volume to Capacity	0.26	0.08	0.20			
Queue Length 95th (m)	8.1	0.0	5.8			
Control Delay (s)	10.8	0.0	5.9			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	5.9			
Approach LOS	B					
Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			44.7%		ICU Level of Service	A
Analysis Period (min)			15			

Timings
6: Liverpool Rd & Parking Lot/Tatra Dr

PM Peak Hour
2027 Total Traffic Conditions - Tatra & Krosno Signalized



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕		↕	↗	↘
Traffic Volume (vph)	4	1	1	0	1	603	215	780
Future Volume (vph)	4	1	1	0	1	603	215	780
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	25.0	25.0	25.0	25.0	65.0	65.0	65.0	65.0
Total Split (%)	27.8%	27.8%	27.8%	27.8%	72.2%	72.2%	72.2%	72.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0		0.0		0.0
Total Lost Time (s)		7.0		7.0		7.0		7.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)		7.5		7.5		58.8	58.8	58.8
Actuated g/C Ratio		0.09		0.09		0.73	0.73	0.73
v/c Ratio		0.08		0.66		0.46	0.37	0.59
Control Delay		32.0		13.9		6.0	6.6	7.8
Queue Delay		0.0		0.0		0.0	0.0	1.3
Total Delay		32.0		13.9		6.0	6.6	9.1
LOS		C		B		A	A	A
Approach Delay		32.0		13.9		6.0		8.5
Approach LOS		C		B		A		A

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 80.4	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 8.5	Intersection LOS: A
Intersection Capacity Utilization 105.8%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 6: Liverpool Rd & Parking Lot/Tatra Dr



Queues
6: Liverpool Rd & Parking Lot/Tatra Dr

PM Peak Hour
2027 Total Traffic Conditions - Tatra & Krosno Signalized



Lane Group	EBT	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	6	247	637	224	814
v/c Ratio	0.08	0.66	0.46	0.37	0.59
Control Delay	32.0	13.9	6.0	6.6	7.8
Queue Delay	0.0	0.0	0.0	0.0	1.3
Total Delay	32.0	13.9	6.0	6.6	9.1
Queue Length 50th (m)	0.7	0.2	27.7	8.9	41.7
Queue Length 95th (m)	4.0	19.4	63.3	26.5	96.2
Internal Link Dist (m)	73.5	201.1	160.3		52.8
Turn Bay Length (m)				45.0	
Base Capacity (vph)	184	557	1398	603	1378
Starvation Cap Reductn	0	0	0	0	340
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.44	0.46	0.37	0.78

Intersection Summary

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.2	8.4	16.2	29.1
Average Queue (m)	5.4	1.7	13.2	20.2
95th Queue (m)	12.8	7.2	18.7	29.1
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Timings
3: Liverpool Rd & Bayly St

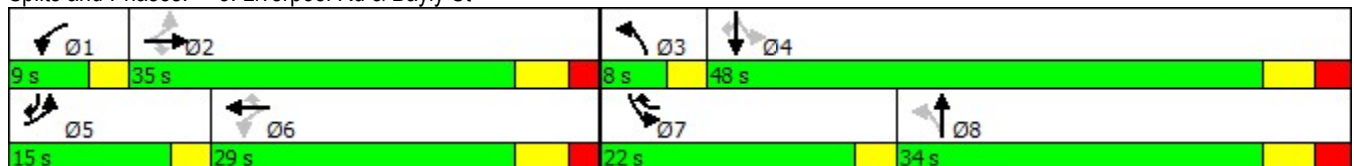
Saturday Peak Hour
2032 Total Traffic Conditions - Krosno Signalized

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	
Lane Configurations												
Traffic Volume (vph)	357	420	165	122	245	357	81	606	342	632	288	
Future Volume (vph)	357	420	165	122	245	357	81	606	342	632	288	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8	7	4	5	
Permitted Phases	2		2	6		6	8		4		4	
Detector Phase	5	2	2	1	6	7	3	8	7	4	5	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	8.0	26.4	26.4	8.0	26.4	8.0	8.0	30.7	8.0	30.7	8.0	
Total Split (s)	15.0	35.0	35.0	9.0	29.0	22.0	8.0	34.0	22.0	48.0	15.0	
Total Split (%)	15.0%	35.0%	35.0%	9.0%	29.0%	22.0%	8.0%	34.0%	22.0%	48.0%	15.0%	
Yellow Time (s)	3.0	4.1	4.1	3.0	4.1	3.0	3.0	3.8	3.0	3.8	3.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	0.0	2.9	0.0	2.9	0.0	
Lost Time Adjust (s)	0.0	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	6.4	6.4	3.0	6.4	3.0	3.0	6.7	3.0	6.7	3.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max	Max	None	Max	None	None	None	None	None	None	
Act Effct Green (s)	41.1	28.6	28.6	32.1	22.7	44.3	34.2	25.5	50.4	40.5	56.2	
Actuated g/C Ratio	0.42	0.29	0.29	0.33	0.23	0.45	0.35	0.26	0.52	0.42	0.58	
v/c Ratio	0.70	0.40	0.31	0.35	0.30	0.47	0.26	0.86	0.83	0.44	0.29	
Control Delay	30.4	29.6	6.0	22.5	32.8	14.1	15.5	43.9	40.1	21.8	1.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.4	29.6	6.0	22.5	32.8	14.1	15.5	43.9	40.1	21.8	1.9	
LOS	C	C	A	C	C	B	B	D	D	C	A	
Approach Delay		25.7			21.8			41.2		22.2		
Approach LOS		C			C			D		C		

Intersection Summary

Cycle Length: 100
 Actuated Cycle Length: 97.5
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 27.3
 Intersection Capacity Utilization 95.6%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 3: Liverpool Rd & Bayly St



Queues
3: Liverpool Rd & Bayly St

Saturday Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	368	433	170	126	253	368	84	791	353	652	297
v/c Ratio	0.70	0.40	0.31	0.35	0.30	0.47	0.26	0.86	0.83	0.44	0.29
Control Delay	30.4	29.6	6.0	22.5	32.8	14.1	15.5	43.9	40.1	21.8	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.4	29.6	6.0	22.5	32.8	14.1	15.5	43.9	40.1	21.8	1.9
Queue Length 50th (m)	51.6	35.7	0.0	15.2	21.6	31.3	7.6	72.7	46.5	46.6	0.2
Queue Length 95th (m)	77.4	49.5	14.7	27.1	32.6	53.9	14.9	#96.2	#90.8	61.7	9.7
Internal Link Dist (m)		177.5			249.4			51.8		146.7	
Turn Bay Length (m)	115.0		100.0	50.0		150.0	75.0		50.0		65.0
Base Capacity (vph)	523	1072	552	358	839	786	323	982	436	1518	1030
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.40	0.31	0.35	0.30	0.47	0.26	0.81	0.81	0.43	0.29

Intersection Summary

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

Approach	EB	WB	NB	SB
Crosswalk Length (m)	22.45	22.36	18.57	22.20
Crosswalk Width (m)	1.20	1.20	1.20	1.20
Total Number of Lanes Crossed	6	6	5	6
Number of Right-Turn Islands	0	0	0	0
Type of Control	None	None	None	None
Corresponding Signal Phase	4	8	2	6
Effective Walk Time (s)	0.0	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0	0
85th percentile speed (km/h)	40	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-	-
Pedestrian Delay (s/p)	50.0	50.0	50.0	50.0
Pedestrian Compliance Code	Poor	Poor	Poor	Poor
Pedestrian Crosswalk Score	2.68	2.70	2.61	2.83
Pedestrian Crosswalk LOS	B	B	B	C

Approach	EB	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0	0
Total Flow Rate (veh/h)	971	747	875	1302
Effct. Green for Bike (s)	28.6	22.7	25.5	40.5
Cross Street Width (m)	18.57	22.20	22.36	22.45
Through Lanes Number	2	2	2	2
Through Lane Width (m)	3.70	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00	0.00
Curb Is Present?	No	No	No	No
On Street Parking?	No	No	No	No
Bicycle Lane Capacity (bike/h)	572	454	510	810
Bicycle Delay (s/bike)	25.5	29.9	27.8	17.7
Bicycle Compliance	Fair	Fair	Fair	Fair
Bicycle LOS Score	3.26	3.26	3.37	3.73
Bicycle LOS	C	C	C	D

HCM Unsignalized Intersection Capacity Analysis

6: Liverpool Rd & Parking Lot/Tatra Dr

Saturday Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (veh/h)	1	0	0	4	0	118	0	697	3	140	736	4
Future Volume (Veh/h)	1	0	0	4	0	118	0	697	3	140	736	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	0	0	4	0	122	0	719	3	144	759	4
Pedestrians		11			23			6				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.1			1.1			1.1				
Percent Blockage		1			2			1				
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												153
pX, platoon unblocked	0.81	0.81	0.81	0.81	0.81		0.81					
vC, conflicting volume	1902	1805	778	1796	1806	744	774			745		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1996	1876	611	1865	1876	744	606			745		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	100	89	100	70	100			83		
cM capacity (veh/h)	22	47	397	38	47	409	789			852		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	1	126	722	144	763							
Volume Left	1	4	0	144	0							
Volume Right	0	122	3	0	4							
cSH	22	311	789	852	1700							
Volume to Capacity	0.05	0.40	0.00	0.17	0.45							
Queue Length 95th (m)	1.0	14.3	0.0	4.6	0.0							
Control Delay (s)	178.2	24.2	0.0	10.1	0.0							
Lane LOS	F	C		B								
Approach Delay (s)	178.2	24.2	0.0	1.6								
Approach LOS	F	C										
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			93.3%		ICU Level of Service		F					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

9: Liverpool Rd & Radom St

Saturday Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	17	15	625	672	66
Future Volume (Veh/h)	56	17	15	625	672	66
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	62	19	16	687	738	73
Pedestrians	6			5		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					337	
pX, platoon unblocked	0.79	0.79	0.79			
vC, conflicting volume	1500	786	817			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1499	600	640			
tC, single (s)	6.4	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.2			
p0 queue free %	40	95	98			
cM capacity (veh/h)	104	385	753			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	81	703	811			
Volume Left	62	16	0			
Volume Right	19	0	73			
cSH	125	753	1700			
Volume to Capacity	0.65	0.02	0.48			
Queue Length 95th (m)	25.8	0.5	0.0			
Control Delay (s)	75.2	0.6	0.0			
Lane LOS	F	A				
Approach Delay (s)	75.2	0.6	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			57.3%	ICU Level of Service	B	
Analysis Period (min)			15			

Timings
11: Liverpool Rd & Krosno Blvd

Saturday Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Lane Group	WBL	NBT	SBL	SBT
Lane Configurations	W	T		T
Traffic Volume (vph)	23	481	121	528
Future Volume (vph)	23	481	121	528
Turn Type	Prot	NA	Perm	NA
Protected Phases	8	2		6
Permitted Phases			6	
Detector Phase	8	2	6	6
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0
Total Split (s)	24.0	66.0	66.0	66.0
Total Split (%)	26.7%	73.3%	73.3%	73.3%
Yellow Time (s)	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0		6.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	Max	Max	Max
Act Effect Green (s)	7.7	66.6		66.6
Actuated g/C Ratio	0.09	0.77		0.77
v/c Ratio	0.55	0.38		0.58
Control Delay	19.1	4.3		7.0
Queue Delay	0.0	0.0		0.0
Total Delay	19.1	4.3		7.0
LOS	B	A		A
Approach Delay	19.1	4.3		7.0
Approach LOS	B	A		A

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 86.4
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.58
 Intersection Signal Delay: 7.1
 Intersection Capacity Utilization 84.7%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service E

Splits and Phases: 11: Liverpool Rd & Krosno Blvd



Queues
11: Liverpool Rd & Krosno Blvd

Saturday Peak Hour
2032 Total Traffic Conditions - Krosno Signalized



Lane Group	WBL	NBT	SBT
Lane Group Flow (vph)	133	536	676
v/c Ratio	0.55	0.38	0.58
Control Delay	19.1	4.3	7.0
Queue Delay	0.0	0.0	0.0
Total Delay	19.1	4.3	7.0
Queue Length 50th (m)	3.7	19.9	32.8
Queue Length 95th (m)	18.4	42.4	74.0
Internal Link Dist (m)	251.2	233.4	388.4
Turn Bay Length (m)			
Base Capacity (vph)	426	1421	1174
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.31	0.38	0.58
Intersection Summary			

Approach	WB	NB	SB
Crosswalk Length (m)	8.51	7.40	7.40
Crosswalk Width (m)	1.20	1.20	1.20
Total Number of Lanes Crossed	2	2	2
Number of Right-Turn Islands	0	0	0
Type of Control	None	None	None
Corresponding Signal Phase	2	6	8
Effective Walk Time (s)	0.0	0.0	0.0
Right Corner Size A (m)	2.74	2.74	2.74
Right Corner Size B (m)	2.74	2.74	2.74
Right Corner Curb Radius (m)	0.00	0.00	0.00
Right Corner Total Area (sq.m)	7.51	7.51	7.51
Ped. Left-Right Flow Rate (p/h)	0	0	0
Ped. Right-Left Flow Rate (p/h)	0	0	0
Ped. R. Sidewalk Flow Rate (p/h)	0	0	0
Veh. Perm. L. Flow in Walk (v/h)	0	0	0
Veh. Perm. R. Flow in Walk (v/h)	0	0	0
Veh. RTOR Flow in Walk (v/h)	0	0	0
85th percentile speed (km/h)	40	40	40
Right Corner Area per Ped (sq.m)	0.0	0.0	0.0
Right Corner Quality of Service	-	-	-
Ped. Circulation Area (sq.m)	0.0	0.0	0.0
Crosswalk Circulation Code	-	-	-
Pedestrian Delay (s/p)	45.0	45.0	45.0
Pedestrian Compliance Code	Poor	Poor	Poor
Pedestrian Crosswalk Score	1.84	2.18	2.25
Pedestrian Crosswalk LOS	A	B	B

Approach	WB	NB	SB
Bicycle Flow Rate (bike/h)	0	0	0
Total Flow Rate (veh/h)	133	536	676
Effct. Green for Bike (s)	7.7	66.6	66.6
Cross Street Width (m)	7.40	8.51	7.40
Through Lanes Number	1	1	1
Through Lane Width (m)	3.70	3.70	3.70
Bicycle Lane Width (m)	0.00	0.00	0.00
Paved Shoulder Width (m)	0.00	0.00	0.00
Curb Is Present?	No	No	No
On Street Parking?	No	No	No
Bicycle Lane Capacity (bike/h)	171	1480	1480
Bicycle Delay (s/bike)	37.6	3.0	3.0
Bicycle Compliance	Poor	Good	Good
Bicycle LOS Score	2.12	2.84	3.02
Bicycle LOS	B	C	C

HCM Unsignalized Intersection Capacity Analysis
 13: Liverpool Rd & Ilona Park Rd (N)

Saturday Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	0	0	463	502	12
Future Volume (Veh/h)	10	0	0	463	502	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	11	0	0	509	552	13
Pedestrians	9			1		
Lane Width (m)	3.7			3.7		
Walking Speed (m/s)	1.1			1.1		
Percent Blockage	1			0		
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					257	
pX, platoon unblocked	0.93	0.93	0.93			
vC, conflicting volume	1076	568	574			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1046	502	508			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	100	100			
cM capacity (veh/h)	236	530	988			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	11	509	565			
Volume Left	11	0	0			
Volume Right	0	0	13			
cSH	236	988	1700			
Volume to Capacity	0.05	0.00	0.33			
Queue Length 95th (m)	1.1	0.0	0.0			
Control Delay (s)	21.0	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	21.0	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			37.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 15: Liverpool Rd & Ilona Park Rd (S)

















Saturday Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	2	1	0	4	2	0
Traffic Volume (veh/h)	2	1	0	414	490	13
Future Volume (Veh/h)	2	1	0	414	490	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	2	1	0	445	527	14
Pedestrians	11					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					341	
pX, platoon unblocked	1.00	1.00	1.00			
vC, conflicting volume	990	545	552			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	989	544	551			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	273	536	1017			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	3	445	541			
Volume Left	2	0	0			
Volume Right	1	0	14			
cSH	326	1017	1700			
Volume to Capacity	0.01	0.00	0.32			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	16.1	0.0	0.0			
Lane LOS	C					
Approach Delay (s)	16.1	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	36.6%			ICU Level of Service	A	
Analysis Period (min)	15					

















HCM Unsignalized Intersection Capacity Analysis
 17: Liverpool Rd & Commerce St

Saturday Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	3	6	9	5	6	7	391	10	10	462	17
Future Volume (Veh/h)	12	3	6	9	5	6	7	391	10	10	462	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	13	3	7	10	6	7	8	434	11	11	513	19
Pedestrians		10			16							
Lane Width (m)		3.7			3.7							
Walking Speed (m/s)		1.1			1.1							
Percent Blockage		1			2							
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1020	1032	532	1024	1036	456	542			461		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1020	1032	532	1024	1036	456	542			461		
tC, single (s)	7.5	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.9	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	99	99	95	97	99	99			99		
cM capacity (veh/h)	169	225	546	200	224	599	1027			1093		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	23	23	453	543								
Volume Left	13	10	8	11								
Volume Right	7	7	11	19								
cSH	223	260	1027	1093								
Volume to Capacity	0.10	0.09	0.01	0.01								
Queue Length 95th (m)	2.6	2.2	0.2	0.2								
Control Delay (s)	23.0	20.2	0.2	0.3								
Lane LOS	C	C	A	A								
Approach Delay (s)	23.0	20.2	0.2	0.3								
Approach LOS	C	C										
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			40.7%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
 20: Liverpool Rd & Annland St

Saturday Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	0	21	37	2	8	19	365	20	12	407	44
Future Volume (Veh/h)	40	0	21	37	2	8	19	365	20	12	407	44
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	43	0	23	40	2	9	20	392	22	13	438	47
Pedestrians		15			5			1			2	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		1			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	958	962	478	960	974	410	500			419		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	958	962	478	960	974	410	500			419		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	100	96	82	99	99	98			99		
cM capacity (veh/h)	222	245	583	219	241	642	1059			1145		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	66	51	434	498								
Volume Left	43	40	20	13								
Volume Right	23	9	22	47								
cSH	283	249	1059	1145								
Volume to Capacity	0.23	0.20	0.02	0.01								
Queue Length 95th (m)	6.7	5.7	0.4	0.3								
Control Delay (s)	21.6	23.1	0.6	0.3								
Lane LOS	C	C	A	A								
Approach Delay (s)	21.6	23.1	0.6	0.3								
Approach LOS	C	C										
Intersection Summary												
Average Delay			2.9									
Intersection Capacity Utilization			40.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 23: Liverpool Rd & Wharf St

Saturday Peak Hour
 2032 Total Traffic Conditions - Krosno Signalized

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	35	2	7	1	1	18	4	331	4	7	380	61
Future Volume (vph)	35	2	7	1	1	18	4	331	4	7	380	61
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)	38	2	8	1	1	20	4	360	4	8	413	66
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	48	22	368	487								
Volume Left (vph)	38	1	4	8								
Volume Right (vph)	8	20	4	66								
Hadj (s)	0.06	-0.54	0.00	-0.08								
Departure Headway (s)	5.9	5.4	4.6	4.4								
Degree Utilization, x	0.08	0.03	0.47	0.60								
Capacity (veh/h)	527	558	756	791								
Control Delay (s)	9.4	8.5	11.7	13.9								
Approach Delay (s)	9.4	8.5	11.7	13.9								
Approach LOS	A	A	B	B								
Intersection Summary												
Delay			12.7									
Level of Service			B									
Intersection Capacity Utilization			44.6%	ICU Level of Service	A							
Analysis Period (min)			15									

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B










Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	35	2	7	1	1	18	4	331	4	7	380	61
Future Vol, veh/h	35	2	7	1	1	18	4	331	4	7	380	61
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	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	38	2	8	1	1	20	4	360	4	8	413	66
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.4	8.6	11.7	13.8
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	80%	5%	2%
Vol Thru, %	98%	5%	5%	85%
Vol Right, %	1%	16%	90%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	339	44	20	448
LT Vol	4	35	1	7
Through Vol	331	2	1	380
RT Vol	4	7	18	61
Lane Flow Rate	368	48	22	487
Geometry Grp	1	1	1	1
Degree of Util (X)	0.47	0.077	0.032	0.597
Departure Headway (Hd)	4.593	5.831	5.292	4.412
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	781	610	670	818
Service Time	2.634	3.913	3.378	2.448
HCM Lane V/C Ratio	0.471	0.079	0.033	0.595
HCM Control Delay	11.7	9.4	8.6	13.8
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	2.5	0.2	0.1	4

HCM Unsignalized Intersection Capacity Analysis
26: Liverpool Rd

Saturday Peak Hour
2032 Total Traffic Conditions - Krosno Signalized

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	5	323	0	6	360
Future Volume (Veh/h)	0	5	323	0	6	360
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	5	344	0	6	383
Pedestrians	64		3			3
Lane Width (m)	3.7		3.7			3.7
Walking Speed (m/s)	1.1		1.1			1.1
Percent Blockage	6		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	806	411			408	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	806	411			408	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	329	603			1079	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	5	344	389			
Volume Left	0	0	6			
Volume Right	5	0	0			
cSH	603	1700	1079			
Volume to Capacity	0.01	0.20	0.01			
Queue Length 95th (m)	0.2	0.0	0.1			
Control Delay (s)	11.0	0.0	0.2			
Lane LOS	B		A			
Approach Delay (s)	11.0	0.0	0.2			
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			34.7%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 23: Liverpool Rd & Wharf St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	9.0	9.3	23.8	35.5
Average Queue (m)	1.8	5.3	17.5	26.0
95th Queue (m)	7.8	12.5	26.0	36.7
Link Distance (m)	104.6	110.2	179.8	86.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

100 York Boulevard, Suite 300
Richmond Hill , ON, CA L4B 1J8

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