30-48 Chamberlain Avenue Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Strategy Report - ZBA

Step 4 Strategy Report - SPA (revision #4)

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1 Screening

This study has been prepared according to the City of Ottawa's 2017 Transportation Impact Assessment (TIA) Guidelines. Accordingly, a Step 1 Screening Form has been prepared and is included as Appendix A, along with the Certification Form for TIA Study PM. As shown in the Screening Form, a TIA is required including the Design Review component and the Network Impact Component. This updated report supports a site plan application.

2 Existing and Planned Conditions

2.1 Proposed Development

The proposed development, located at 30-48 Chamberlain Avenue and zoned as General Mixed-Use (GM4[2735]S448), is planned to include a total of 160 apartment units, and approximately 3,370 sq ft of ground floor retail space. The proposed vehicle parking consists of 77 spaces. The existing site contains a dental clinic and an electrician's office, including approximately 54 parking stalls, both defined and undefined on a paved surface lot. The site will be accessed by a 6.0-metre right-in/right-out access west of a proposed relocation of the stop bar for the half signal serving the crosswalk. The anticipated full build-out and occupancy horizon is 2024. Figure 1 illustrates the Study Area Context. Figure 2 illustrates the proposed concept plan.

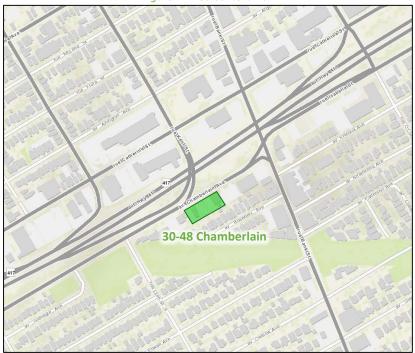
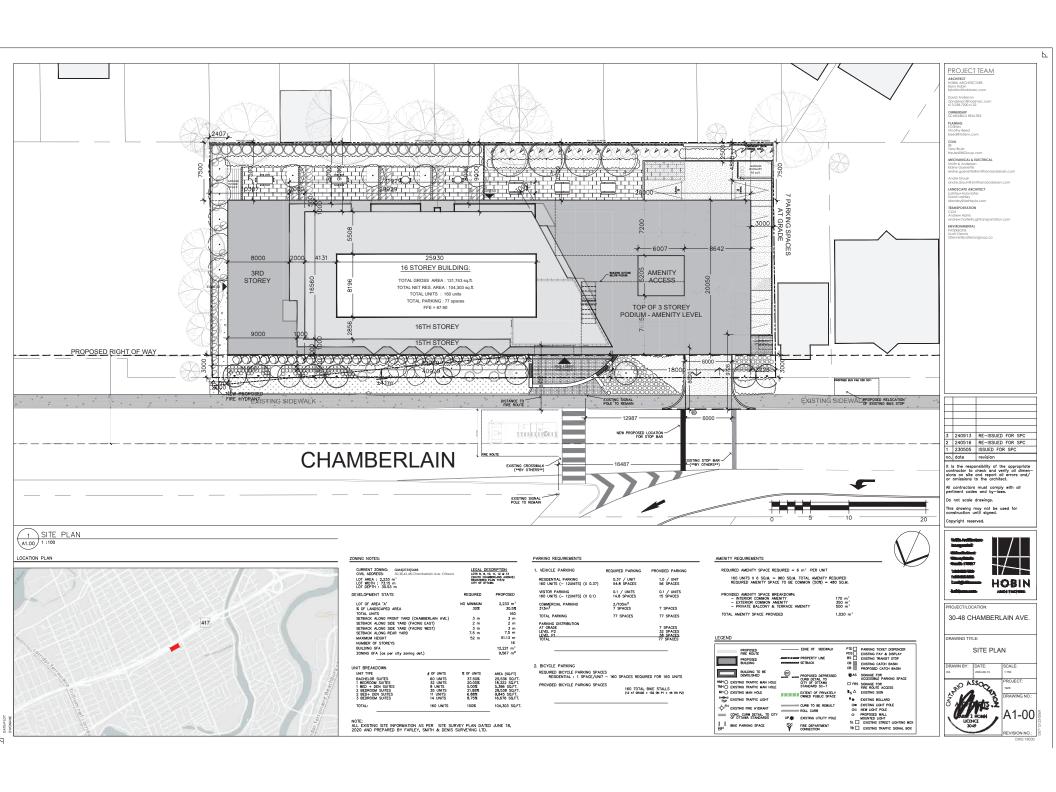


Figure 1: Area Context Plan

Source: http://maps.ottawa.ca/geoOttawa/ Accessed: January 19, 2023





2.2 Existing Conditions

2.2.1 Area Road Network

Bank Street: Bank Street is a City of Ottawa arterial road with a four-lane urban cross-section, sidewalks on both sides of the road, and on-street parking permitted on the east side of the road south of Pretoria Avenue and on both sides of the road south of Strathcona Avenue (no stopping peak hours in peak directions). The posted speed limit transitions at Chamberlain Avenue/Isabella Street from 40km/h to the south, to 50km/h to the north. The City-protected right-of-way is 20.0 metres and Bank Street is a truck route.

Kent Street: Kent Street is a City of Ottawa one-way arterial road (northbound) with a three-lane urban cross-section, sidewalks on both sides of the road, and on-street parking permitted on the east side south of Arlington Avenue in a layby and on the west side in laybys and on the east side in the travel lane (no stopping during AM peak) north of Flora Street. The unposted speed limit is 50 km/h and the City-protected right-of-way is 20.0 metres. Kent Street is a truck route.

Lyon Street: Lyon Street is a City of Ottawa one-way arterial road (southbound) with a two-lane urban cross-section, sidewalks on both sides of the road, a bike lane on the west side of the road, and on-street parking permitted on the east side north of Arlington Avenue in the travel lane (no stopping during PM peak). The unposted speed limit is 50 km/h and the City-protected right-of-way is 20.0 metres.

Catherine Street: Catherine Street is a City of Ottawa arterial road with a three-lane urban cross-section, sidewalks on both sides of the road, and on-street parking permitted on the north side of the road west of Lyon Street. The posted speed limit is 50 km/h and the City-protected right-of-way is 23.0 metres. Catherine Street is a truck route.

Chamberlain Avenue: Chamberlain Avenue is a City of Ottawa arterial road with a two-lane urban cross section, and a bike lane and sidewalk on the south side of the road. The posted speed limit is 50 km/h and the City-protected right-of-way is 23.0 metres. Chamberlain Avenue is a truck route.

Isabella Street: Isabella Street is a City of Ottawa arterial road with a two-lane urban cross section, and a bike lane and sidewalk on the south side of the road. The posted speed limit is 50 km/h and the City-protected right-of-way is 23.0 metres. Isabella Street is a truck route.

2.2.2 Existing Intersections

The key existing signalized intersections within 400 metres of the site have been summarized below:

Lyon Street/Highway 417 On-Ramp & Catherine Street

The intersection of Lyon Street and Bank Street is a signalized intersection. The southbound approach consists of a through lane and a right-turn lane, and the westbound approach consists of a shared left-turn/through lane and two through lanes. As both streets are one-way roadways, the west and south legs are inbound only. It is noted that the south leg of the intersection is an on-ramp to westbound Highway 417. No turn restrictions are noted.

Kent Street & Catherine Street

The intersection of Kent Street and Catherine Street is a signalized intersection. The northbound approach consists of a shared left-turn/through lane, a through lane, and an additional through lane separated by a concrete median. The westbound approach consists of a through lane, a shared through/right-turn lane, and a right-turn lane. Northbound left or right turns are prohibited in the east lane and westbound right turns on red are restricted.



Kent Street & Chamberlain Avenue

The intersection of Kent Street and Chamberlain Avenue is a pedestrian crossing location with a half-signal. The signal only stops eastbound through movements when triggered by a pedestrian crossing. No turn restrictions are noted.

Bank Street & Catherine Street

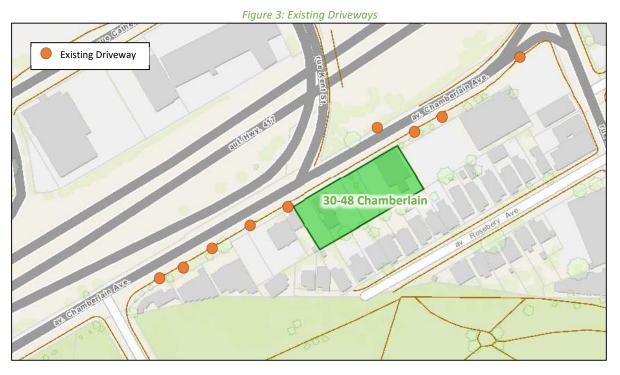
The intersection of Bank Street and Catherine Street is a signalized intersection. The northbound approach consists of a shared left-turn/through lane and a through lane and the southbound approach consists of a through lane and a shared through/right-turn lane. The westbound approach consists of a shared left-turn/through lane, a through lane, and a shared through/right-turn lane. As Catherine Street is a one-way roadway, the west leg is inbound only. No turn restrictions are noted.

Bank Street & Chamberlain Avenue/Isabella Street The intersection of Bank Street and Chamberlain Avenue/Isabella Street is a signalized intersection. The northbound approach consists of a through lane and a shared through/right-turn lane, and the southbound approach consists of a shared left-turn/through lane and a through lane. The eastbound approach consists of a shared left-turn/through lane, a through lane, and an auxiliary channelized right-turn lane. Functionally, driver behaviour results in the southbound approach operating as a left-turn land and a through lane with drivers shifting to the curb lane in expectation of vehicles queuing for a left turn. No turn restrictions are noted.

2.2.3 Existing Driveways

Within 200 metres of the proposed site access, eight driveways exist on the south side of Chamberlain Avenue providing access to various commercial land uses. Additionally, a service entrance is present on the north side of Chamberlain Avenue to the east of the proposed site. Figure 3 illustrates the boundary street driveways within 200 metres of the proposed site access.



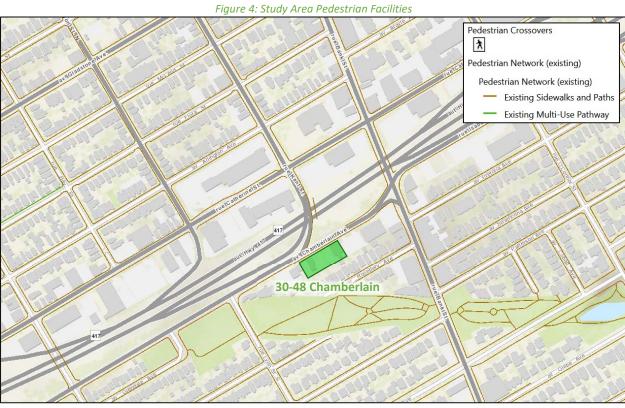


2.2.4 Cycling and Pedestrian Facilities

Figure 4 illustrates the pedestrian facilities in the study area and Figure 5 illustrates the cycling facilities.

Sidewalks are provided along the south side of Chamberlain Street, the east side of Kent Street between Catherine Street and Chamberlain Street, and along both sides of all other study area roads. A southbound curbside bike lane is provided on the Lyon Street, which is a spine route (with a northbound bike lane found one block to the west along Bay Street, also a spine route). Catherine Street is a spine route, and Bank Street is a local cycling route.





Source: http://maps.ottawa.ca/geoOttawa/ Accessed: January 19, 2023



Source: http://maps.ottawa.ca/geoOttawa/ Accessed: January 19, 2023

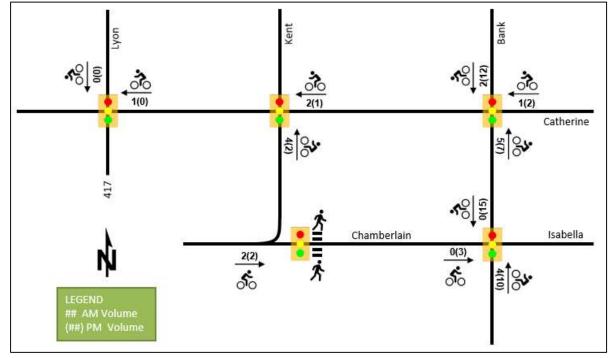


Pedestrian and cyclist volumes included in study area intersection counts, presented in Section 2.2.7, have been compiled and are illustrated in Figure 6 and Figure 7, respectively.

Catherine Chamberlain Isabella

Figure 6: Existing Pedestrian Volumes





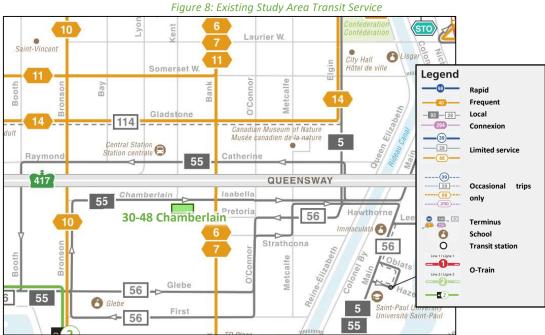


2.2.5 Existing Transit

Figure 8 illustrates the transit system map in the study area and Figure 9 illustrates nearby transit stops, including bus stop #6850 is located on the site frontage. All transit information is from March 15, 2023, and is included for general information purposes and context to the surrounding area.

Within the study area, the routes #6 and #7 travel along Bank Street, #55 travels eastbound along Chamberlain Avenue and westbound along Catherine Street. Stops are located at the intersection of Kent Street and Chamberlain Street, and Bank Street and Chamberlain Avenue/Isabella Street. The frequency of these routes within proximity of the proposed site based on March 15, 2023 service levels are:

- Route #6 5-minute service all day, 10-minute nighttime service
- Route #7 15-minute service all day, 30-minute service during the evening/nighttime
- Route #55 15-minute service all day, 30-minute service during the evening



Source: http://www.octranspo.com/ Accessed: March 15, 2023





Source: http://www.octranspo.com/ Accessed: March 15, 2023

Existing Area Traffic Management Measures

The study area traffic calming measures consist of narrowings of local roads where they intersect arterials, speed humps along Lyon Street, Flora Street, Arlington Avenue, and on-street parking and bulb-outs/planters to delineate the start and end of the parking areas on local roads and Kent Street.

2.2.7 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from City counts for the existing Study Area intersections. Table 1 summarizes the intersection count dates. The counts are all from 2018 and considered acceptable for this area of the City. Typical growth in central and downtown Ottawa is limited and it is not expected to have increased to any significant degree since 2018 beyond the application of typical background growth presented in Section 6.

Intersection **Count Date** Lyon Street/Highway 417 On-Ramp & Catherine Street Wednesday, April 18, 2018 **Kent Street & Catherine Street** Wednesday, April 18, 2018 **Kent Street & Chamberlain Avenue** Wednesday, April 18, 2018 **Bank Street & Catherine Street** Wednesday, April 18, 2018 Wednesday, April 18, 2018 Bank Street & Chamberlain Avenue/Isabella Street

Table 1: Intersection Count Date

Figure 10 illustrates the existing traffic counts and Table 2 summarizes the existing intersection operations. The level of service for signalized intersections is based on the TIA Guidelines for the lane movements and HCM average delay for the overall intersection. The southbound approach has been modeled as a left-turn lane and a through lane during the AM peak hour at all study horizons, in line with the in-situ operation. Detailed turning movement count data is included in Appendix B and the Synchro worksheets are provided in Appendix C.



Kent 110(110) 363(643) 123(255) 258(343) 189(137) 582(484) 219(436) 537(289) 160(225) 222(192) 389(593) Catherine 626(320) 272(182) 372(720) 168(175) Chamberlain Isabella 419(268) **1** 682(772) 74(53) 487(590) 834(448) 142(91) 75(120)

Figure 10: Existing Traffic Volumes

Table 2: Existing Intersection Operations

lusta una asti a u			AM Pe	ak Hour		PM Peak Hour			
Intersection	Lane	LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Lyon St/Highway	WBL/T	Α	0.22	10.0	m25.8	Α	0.46	15.4	11.3
417 On-Ramp &	SBT	Α	0.42	18.7	47.7	Α	0.39	11.0	45.5
Catherine St	SBR	Α	0.21	3.9	9.5	Α	0.33	6.8	24.7
Signalized	Overall	Α	0.28	11.8	-	Α	0.40	12.4	-
V+ C+ 0	WBT/R	В	0.69	26.9	m61.0	Α	0.51	14.1	m42.9
Kent St &	WBR	С	0.73	31.7	m57.3	Α	0.54	16.6	m38.9
Catherine St	NB	С	0.74	19.7	77.9	Α	0.49	18.5	40.6
Signalized	Overall	В	0.70	23.2	-	Α	0.48	16.5	-
Kent St &	EBT	Α	0.36	7.5	31.6	Α	0.31	4.3	36.3
Chamberlain Ave Pedestrian Signal	Overall	Α	0.28	7.5	-	Α	0.32	4.3	-
D 1 C: 0	WB	D	0.86	33.3	#69.1	D	0.83	33.0	#60.2
Bank St &	NBL/T	Е	0.91	18.0	m#34.1	Α	0.54	12.0	19.1
Catherine St	SBT/R	В	0.64	26.4	46.7	Е	0.92	88.3	#92.8
Signalized	Overall	D	0.86	25.9	-	С	0.74	47.8	-
	EBL/T	С	0.74	30.9	55.7	С	0.76	29.6	62.4
Bank St &	EBR	А	0.19	2.3	3.4	Α	0.28	5.3	10.5
Chamberlain Ave	NBT/R	D	0.90	34.6	#122.9	Α	0.35	10.2	34.8
/Isabella St	SBL(/T)	Α	0.60	27.1	m31.4		0.70	20.0	O2 F
Signalized	(SBT)	Α	0.41	9.5	m28.4	С	0.79	26.8	m92.5
	Overall	С	0.80	27.6	-	D	0.87	22.4	-

Notes: Saturation flow rate of 1800 veh/h/lane

Queue is measured in metres

Peak Hour Factor = 0.90

Delay = average vehicle delay in seconds

m = metered queue

= volume for the 95th %ile cycle exceeds capacity

The existing intersections operate adequately during both peak hours.



At the intersection of Bank Street and Catherine Street during the AM peak hour the westbound movement and northbound shared left-turn/through movement may exhibit extended queues. During the PM peak hour at this intersection, the southbound through/right movement may be subject to high delays and extended queues, and the westbound movement may exhibit extended queues.

At the intersection of Bank Street at Chamberlain Avenue/Isabella Street during the AM peak hour, the northbound through/right movement may exhibit extended queues.

2.2.8 Collision Analysis

Collision data have been acquired from the City of Ottawa open data website (data.ottawa.ca) for five years prior to the commencement of this TIA for the surrounding study are road network. Table 3 summarizes the collisions types and conditions in the study area, Figure 11 illustrates the intersections and segments analyzed, and Table 4 summarizes the total collisions for each of these locations. Collision data is included in Appendix D.

Table 3: Study Area Collision Summary, 2016-2020

		Number	%
To	tal Collisions	62	100%
	Fatality	0	0%
Classification	Non-Fatal Injury	10	16%
	Property Damage Only	52	84%
	Angle	17	27%
Initial Images	Rear end	15	24%
Initial Impact	Sideswipe	19	31%
Туре	Turning Movement	8	13%
	SMV Other	3	5%
	Dry	48	77%
Dood Conford	Wet	9	15%
Road Surface Condition	Loose Snow	3	5%
Condition	Slush	1	2%
	Packed Snow	1	2%
Pedestrian Involv	Pedestrian Involved		2%
Cyclists Involved		1	2%



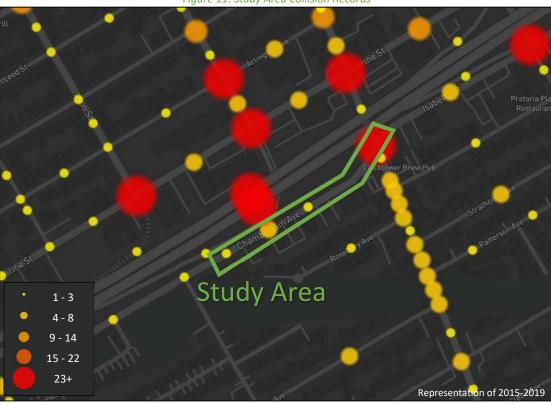


Figure 11: Study Area Collision Records

Table 4: Summary of Collision Locations, 2016-2020

	Number	%
Intersections / Segments	62	100%
Bank Street at Chamberlain Avenue N/Isabella Street	54	87%
Chamberlain Avenue at Kent Street	3	5%
Chamberlain Avenue btwn Kent Street & Bank Street	3	5%
Chamberlain Avenue btwn Lyon Street S & Kent Street	2	3%

Within the study area, the intersection of Bank Street at Chamberlain Avenue/Isabella is noted to show higher collision incidences relative to other area locations. Table 5 summarize the collision types and conditions for the Bank Street at Chamberlain Avenue/Isabella Street intersection.

Table 5: Bank Street at Chamberlain Avenue/Isabella Street Collision Summary

		Number	%
То	tal Collisions	54	100%
	Fatality	0	0%
Classification	Non-Fatal Injury	9	17%
	Property Damage Only	45	83%
	Angle	17	31%
luitial luenaat	Rear end	13	24%
Initial Impact Type	Sideswipe	15	28%
туре	Turning Movement	8	15%
	SMV Other	1	2%
Road Surface	Dry	42	78%
Condition	Wet	8	15%
Condition	Loose Snow	2	4%



		Number	%
To	otal Collisions	54	100%
	Slush	1	2%
	Packed Snow	1	2%
Pedestrian Involved		1	2%
Cyclists Involved		1	2%

The intersection of Bank Street and Chamberlain Avenue/Isabella Street had a total of 54 collisions during the 2016-2020 time period, with 45 involving property damage only, and the remaining nine having non-fatal injuries. The collision types are most represented by angle, with 17 collisions, followed by sideswipe with 15 collisions, rear end with 13, turning movement with eight, and SMV (other) with one.

Historically at this intersection, angle collisions have been primarily represented by southbound through vehicles failing to comply with traffic control colliding with eastbound through vehicles. The lagging left-turn phase in the southbound direction may contribute to this trend as drivers are habituated to continue to drive through after the protected left-turn phase terminates. Sideswipe collisions may partially be a result of southbound traffic switching lanes to get around left-turning vehicles in queue and have historically been mostly due to eastbound drivers making improper lane changes possibly due to the skewed crossing of Bank Street. Turning movement collisions have historically been due to the eastbound drivers turning left into eastbound drivers continuing through. Overall, it is recommended that the City explore the possible addition of "chicken tracking" through the intersection to ensure proper lane use and potentially reduce collisions in the eastbound direction.

Weather conditions do not impact collisions at this location and no mitigation or further review of collisions is required as part of this study.

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

No roadway improvements are included within the Ottawa TMP for the study area road network. Isolated transit priority measures are identified as part of the Affordable Network along Bank Street.

The Chamberlain Avenue, Catherine Street, and Isabella Street Functional Design Study, conducted in 2019, is currently planned for implementation. The plan recommends several improvements on the subject streets including:

- Wider sidewalks and boulevards where feasible
- Cycling connections between the Rideau Canal and the O'Connor Bikeway
- Increased pedestrian queueing area at traffic signals
- Transit priority lane on part of Catherine Street
- Narrower vehicle lane widths
- Reduction in the number of vehicle lanes, where appropriate, including

This Functional Design is currently in the MTO Construction phase through 2027 seeing associated Highway 417 infrastructure under construction, where the design and construction of the plan recommendations will follow. As such, the implementation of these treatments will occur beyond the horizons considered within this TIA.

From the Draft Transportation Master Plan, anticipated for release in 2025, the Glebe Avenue to Percy Street to Chamberlain Avenue, splitting out to Isabella Street, Pretoria Avenue corridor and the O'Connor Street corridor are presently considered for future crosstown bikeways. Also from this draft document, a feasibility study is planned for cycling facilities within the Bank Street corridor south of Highway 417.



2.3.2 Other Study Area Developments

443-447 Kent Street & 423-425 McLeod Street

The proposed development includes a site plan for a four-storey residential building, with 31 apartment units. This application has been approved. A TIA is not available as part of the submission package for this site.

488, 500 Bank Street

The application includes a site plan for a nine-storey mixed use building, which includes 151 residential units and approximately 4350 sq. ft. of ground floor commercial. The development is expected to generate 24 new two-way AM peak hour auto trips and 25 new two-way PM peak hour auto trips (Parsons, 2014).

143-153 Arlington Avenue

The application includes a site plan for four-storey residential building, demolishing a previous building, representing a net increase of four units. A TIA is not available as part of the submission package for this site.

170 Pretoria Avenue

The application includes a site plan for a four-storey, six-unit residential building. A TIA is not available as part of the submission package for this site.

667 Bank Street

The application includes a site plan for a five-storey mixed-use building with 14 residential units, ground floor retail, and eight parking spaces. A TIA is not available as part of the submission package for this site.

3 Study Area and Time Periods

3.1 Study Area

The study area will include the intersections of:

- Lyon Street/Highway 417 On-Ramp & Catherine Street
- Kent Street at:
 - Catherine Street
 - o Chamberlain Avenue (pedestrian signal)
- Bank Street at:
 - Catherine Street
 - o Chamberlain Avenue/Isabella Street

The boundary road is Chamberlain Avenue. No screenlines are present near the development site and none will be reviewed as part of this study.

The site access will not be explicitly modeled in the Synchro analysis, as it is to be located west of the proposed relocated stop bar of the half-signal on Chamberlain Avenue. The volumes projected at the site access will be added to the eastbound through volumes at the Kent Street at Chamberlain Avenue intersection.

3.2 Time Periods

The weekday AM and PM peak hours will be examined for the proposed development.

3.3 Horizon Years

The anticipated build-out year is 2024. As a result, the full build-out plus five years horizon year is 2029.



4 Exemption Review

Table 6 summarizes the exemptions for this TIA.

Table 6: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Compo	nent		
4.1 Development	4.1.2 Circulation and Access	Only required for site plans	Required
Design	4.2.3 New Street Networks	Only required for plans of subdivision	Exempt
	4.2.1 Parking Supply	Only required for site plans	Required
4.2 Parking	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Exempt
Network Impact Comp	onent		
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	Required
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Exempt
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of equivalent volume permitted by established zoning	Exempt

5 Development-Generated Travel Demand

5.1 Mode Shares

Examining the mode shares recommended in the TRANS Trip Generation Manual (2020) for the subject district, derived from the most recent National Capital Region Origin-Destination survey (OD Survey), the existing average district mode shares by land use for Ottawa Inner Area have been summarized in Table 7.

Table 7: TRANS Trip Generation Manual Recommended Mode Shares – Ottawa Inner Area

Travel Mode	Multi-Unit	(High-Rise)	Commercial Generator		
Travel Mode	AM	PM	AM	PM	
Auto Driver	26%	25%	45%	45%	
Auto Passenger	6%	8%	7%	7%	
Transit	28%	21%	29%	29%	
Cycling	5%	6%	8%	8%	
Walking	35%	40%	11%	11%	
Total	100%	100%	100%	100%	

5.2 Trip Generation

This TIA has been prepared using the vehicle and person trip rates for the residential dwellings using the TRANS Trip Generation Manual (2020) and the vehicle trip rates and derived person trip rates for the retail component from the ITE Trip Generation Manual 11th Edition (2021) using the City-prescribed conversion factor of 1.28. Table



8 summarizes the person trip rates for the proposed residential land use for each peak period and the person trip rates for the retail land use by peak hour.

Table 8: Trip Generation Person Trip Rates by Peak Period

	Land Use Code	Peak	Peak	Period	Peak Hour		
Land Use			Vehicle Trip Rate	Person Trip Rates	Vehicle Trip Rate	Person Trip Rates	
Multi Unit Uiah Disa	221 & 222	AM	-	0.80	-	-	
Multi-Unit High-Rise	(TRANS)	PM	-	0.90	-	-	
Dotail (40k on ft	822	AM	-	-	2.36	3.02	
Retail <40k sq. ft.	(ITE)	PM	-	-	6.59	8.44	

Using the above person trip rates, the total person trip generation has been estimated. Table 9 summarizes the total person trip generation for the residential land use and for the retail land use.

Table 9: Total Residential Person Trip Generation by Peak Period

Tuble 5. Total Residential Terson Trip Generation by Teak Teriod								
Land Haa	Units	AM Peak Period			PM Peak Period			
Land Use		In	Out	Total	In	Out	Total	
Multi-Unit High-Rise	160	40	88	128	84	60	144	
Lond Hee	CEA	AM Peak Hour PM Peak I				PM Peak Hou	r	
Land Use	GFA	In	Out	Total	In	Out	Total	
Retail <40k sq. ft.	3,370	6	4	10	14	14	28	

Internal capture rates from the ITE Trip Generation Handbook 3rd Edition have been assigned to the development's retail component for mixed-use developments. The rates summarized in Table 10 represent the percentage of trips to/from the retail use based on the residential component.

Table 10: Internal Capture Rates

Land Use	Α	М	PM		
Land Ose	In	Out	In	Out	
Residential to/from Shopping Centre	17%	14%	10%	26%	

Pass-by reductions applied to the retail trip generation at a rate of 40% have been included using the recommended value presented in the ITE Trip Generation Manual 11th Edition (2021) for the most similar land use with a recommended rate, "Retail (40k – 150k sq. ft.)".

Using the above mode share targets, the internal capture and pass-by rates, and the person trip rates, the person trips by mode have been projected. Trip generation by peak hour has been forecasted using the prescribed peak period conversion factors presented in the TRANS Trip Generation Manual (2020) for the residential component. Table 11 summarizes the residential trip generation and the retail trip generation by mode and peak hour.



Table 11: Trip Generation by Mode

		£	M Peak F	lour		P	M Peak F	lour	
1	Travel Mode	Mode Share	In	Out	Total	Mode Share	In	Out	Total
	Auto Driver	26%	5	11	16	25%	9	7	16
ë ji	Auto Passenger	6%	1	2	3	8%	3	2	5
Multi-Unit (High-Rise)	Transit	28%	6	14	20	21%	8	6	14
ulti gh	Cycling	5%	1	2	3	6%	2	2	4
ΣΞ	Walking	35%	8	18	26	40%	18	12	30
	Total	100%	21	47	68	100%	40	29	69
	Auto Driver	45%	0	0	0	45%	0	0	0
ē	Auto Passenger	7%	0	0	0	7%	1	1	2
Centre	Transit	29%	1	1	2	29%	4	3	7
g O	Cycling	8%	0	0	0	8%	1	1	2
Shopping	Walking	11%	1	0	1	11%	1	1	2
do	Pass-by	40%	-2	-2	-4	40%	-6	-6	-12
S	Internal Capture	varies	-1	0	-1	varies	-1	-2	-3
	Total	100%	2	1	3	100%	7	6	13
	Auto Driver	-	5	11	16	-	9	7	16
	Auto Passenger	-	1	2	3	-	4	3	7
Total	Transit	-	7	15	22	-	12	9	21
P	Cycling	-	1	2	3	-	3	3	6
	Walking	-	9	18	27	-	19	13	32
	Total	-	23	48	71	-	47	35	82

As shown above, a total of 16 AM and 16 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.3 Trip Distribution

To understand the travel patterns of the subject development the OD Survey has been reviewed to determine the travel for the residential component patterns were applied based on the build-out of Ottawa Inner. Table 12 below summarizes the distributions.

Table 12: OD Survey Distribution – Ottawa Inner

To/From	% of Trips	Via (Outbound/Inbound)							
North	25%	15% Kent St/Lyon St, 5 % Bank St,							
North	25/0	5% Metcalfe St/O'Connor St							
South	35%	15% 417 W, 20% Bank St							
East	20%	417 E							
West	20%	417 W							
Total	100%	-							

5.4 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the study area road network. Figure 12 illustrates the new site generated volumes.



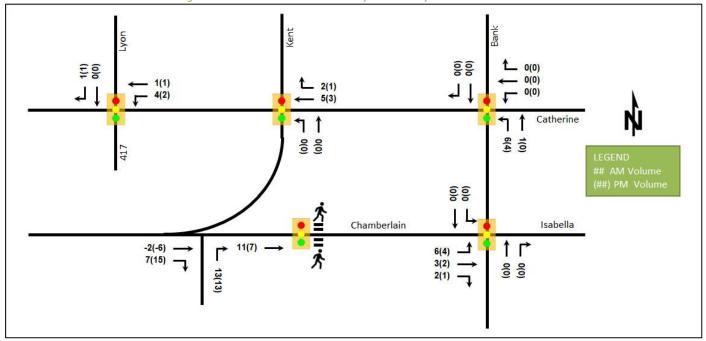


Figure 12: New Site-Generated Primary and Pass-by Auto Volumes

6 Background Network Travel Demands

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3. No substantial changes are planned for the study area within the study horizons of this TIA.

6.2 Background Growth

A review of the background projections from the City's TRANS Regional Model for the 2011 and 2031 horizons was completed to determine the background growth for each of the study area roadways. Table 13 summarizes the results of the model, and the projections are provided in Appendix E.

Direction Growth Percentage Street **Eastbound** Westbound Catherine (E of Bank) N/A -0.04% Catherine (W of Bank) -0.22% N/A Chamberlain 1.43% N/A Isabella 2.16% N/A Northbound Southbound Lyon N/A 0.56% Hwy 417 Ramp 2.19% -0.16% Kent 0.54% **Bank** -0.02% 0.88%

Table 13: TRANS Regional Model Projections – Study Area Growth Rates

In general, the TRANS projections identify a growth rate range of -0.22% and 2.19%. Appropriate growth rates rounded to the nearest 0.25% will be peak-directionally applied to the identified links with negative growth rates being applied at zero. In the case of one-way streets, the peak direction reversal will be applied to the



corresponding opposite-direction one-way street (e.g. the Lyon Street AM growth rate will be applied as the Kent Street PM growth rate). The resultant growth rates applied to the study area roads are summarized in Table 14.

Table 14: Applied Study Area Annual Growth Rates

Chunah	AM Pea	ak Hour	PM Pea	ak Hour
Street	Eastbound	Eastbound Westbound		Westbound
Catherine (E of Bank)	N/A	-	N/A	2.25%
Catherine (W of Bank)	N/A	-	N/A	1.50%
Chamberlain	1.50%	N/A	-	N/A
Isabella	2.25%	N/A -		N/A
	Northbound	Southbound	Northbound	Southbound
Lyon	N/A	0.50%	N/A	0.50%
Hwy 417 Ramp	N/A	-	N/A	2.25%
Kent	0.50%	N/A	0.50%	N/A
Bank	-	1.00%	1.00%	-

6.3 Other Developments

The background developments were discussed in Section 6.2. The 488, 500 Bank Street development's 2014 Transportation Memo concluded that the development-generated traffic would be insignificant and thus it will be assumed to be accounted for by the background traffic growth, along with the other study area developments for which there were no traffic studies.

7 Demand Rationalization

7.1 2024 Future Background Operations

Figure 13 illustrates the 2024 background volumes and Table 15 summarizes the 2024 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2024 future background horizon are provided in Appendix F.



Kent 189(157) 582(553) 219(498) 537(316) 160(257) 222(219) 389(648) Catherine 395(720) 192(175) Chamberlain Isabella 458(268) 81(53) 746(772) 533(590) 82(120) .

Figure 13: 2024 Future Background Volumes

Table 15: 2024 Future Background Intersection Operations

Intorcostion	Lana		AM Pe	ak Hour			PM Pe	ak Hour	
Intersection	Lane	LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Lyon St/Highway	WBL/T	Α	0.20	10.5	26.1	Α	0.47	16.1	12.0
417 On-Ramp & Catherine St Signalized	SBT	Α	0.37	18.1	42.7	Α	0.40	11.1	47.0
	SBR	Α	0.19	3.9	9.2	Α	0.31	6.5	22.7
	Overall	Α	0.25	11.9	-	Α	0.41	12.8	-
Vant Ct 9	WBT/R	В	0.62	26.3	m60.6	Α	0.50	14.3	m41.1
Kent St & Catherine St	WBR	В	0.66	30.1	m57.1	Α	0.53	16.6	m37.1
	NB	В	0.69	18.5	69.8	Α	0.45	18.0	37.2
Signalized	Overall	В	0.64	22.0	-	Α	0.46	16.3	-
Kent St &	EBT	Α	0.36	7.5	31.0	Α	0.28	4.3	32.2
Chamberlain Ave Pedestrian Signal	Overall	Α	0.27	7.5	-	Α	0.29	4.3	-
D l - C + O	WB	С	0.77	28.6	54.9	D	0.85	34.4	#66.1
Bank St &	NBL/T	D	0.81	12.0	m28.8	Α	0.53	12.2	18.9
Catherine St Signalized	SBT/R	Α	0.60	25.6	43.9	D	0.84	37.4	#80.1
Signanzea	Overall	С	0.77	21.5	-	С	0.71	30.1	-
	EBL/T	С	0.73	30.7	54.8	С	0.71	29.0	55.3
Bank St &	EBR	Α	0.19	2.2	3.3	Α	0.26	4.7	8.7
Chamberlain Ave	NBT/R	D	0.82	28.8	#107.6	Α	0.32	9.4	32.7
/Isabella St Signalized	SBL(/T)	Α	0.57	24.6	m33.3	В	0.69	16.2	m00 0
	(SBT)	Α	0.39	9.1	m27.6	В	0.68	16.2	m88.0
	Overall	С	0.75	24.6	-	С	0.77	17.6	-

Saturation flow rate of 1800 veh/h/lane Notes:

Queue is measured in metres Peak Hour Factor = 1.00

Delay = average vehicle delay in seconds

m = metered queue

= volume for the 95th %ile cycle exceeds capacity



During both the AM and PM peak hours, the study area intersections operate well at the 2024 future background conditions with operational improvements from existing at all intersections due to the peak hour factor moving from 0.90 to 1.00 for forecasted conditions. No new capacity issues are noted.

7.2 2029 Future Background Operations

Figure 14 illustrates the 2029 background volumes and Table 16 summarizes the 2029 background intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection, and average delay for unsignalized intersections. The synchro worksheets for the 2029 future background horizon are provided in Appendix G.

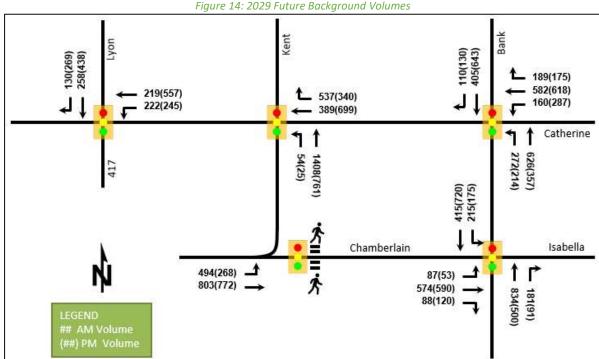


Figure 14: 2029 Future Background Volumes



Intersection	Long		AM Pea	ak Hour			PM Pe	ak Hour	
intersection	Lane	LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Lyon St/Highway	WBL/T	Α	0.20	10.5	26.1	Α	0.53	16.7	15.2
417 On-Ramp &	SBT	Α	0.37	18.1	42.7	Α	0.45	11.8	53.9
Catherine St	SBR	Α	0.20	3.9	9.3	Α	0.32	7.6	25.7
Signalized	Overall	Α	0.25	11.8	-	Α	0.47	13.6	-
Vant Ct 0	WBT/R	В	0.62	26.2	m60.3	Α	0.54	15.4	m40.3
Kent St & Catherine St	WBR	В	0.66	30.0	m56.8	Α	0.57	17.8	m36.9
Signalized	NB	В	0.70	18.8	72.3	Α	0.46	18.2	38.3
Signanzea	Overall	В	0.65	22.1	-	Α	0.49	17.0	-
Kent St & Chamberlain Ave Pedestrian Signal	EBT	Α	0.38	7.5	33.7	Α	0.28	4.3	32.2
	Overall	Α	0.29	7.5	-	Α	0.29	4.3	-



Intovocation	Lana	AM Peak Hour					PM Pe	ak Hour	
Intersection	Lane	LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
D 1 6: 0	WB	С	0.77	28.6	54.9	E	0.95	45.5	#79.9
Bank St &	NBL/T	D	0.82	12.0	m24.2	Α	0.57	12.6	20.0
Catherine St	SBT/R	В	0.63	26.4	46.2	D	0.86	39.1	#81.8
Signalized	Overall	С	0.77	21.7	-	С	0.76	35.7	-
	EBL/T	С	0.76	31.1	59.6	С	0.71	29.0	55.3
Bank St &	EBR	Α	0.19	2.5	4.2	Α	0.26	4.7	8.7
Chamberlain Ave	NBT/R	D	0.86	31.9	#110.8	Α	0.33	9.6	34.4
/Isabella St	SBL(/T)	В	0.66	30.0	m#41.0	В	0.69	16.7	m84.2
Signalized	(SBT)	Α	0.42	9.9	m28.6	В	0.69	10.7	11184.2
	Overall	С	0.80	26.6	-	В	-	17.7	-

Saturation flow rate of 1800 veh/h/lane Notes:

Queue is measured in metres

Peak Hour Factor = 1.00

Delay = average vehicle delay in seconds

m = metered queue

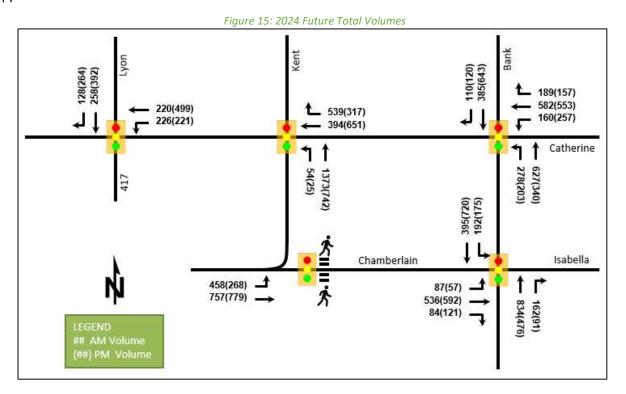
= volume for the 95th %ile cycle exceeds capacity

During both the AM and PM peak hours, the study area intersections operate well at the 2029 future background conditions and similarly to the 2024 background conditions.

At the intersection of Bank Street at Chamberlain Avenue/Isabella Street, the southbound left lane may exhibit extended queues.

7.3 2024 Future Total Operations

Figure 15 illustrates the 2024 total volumes and Table 17 summarizes the 2024 total intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection The synchro worksheets for the 2024 total horizon are provided in Appendix H.



C|G|H

Table 17: 2024 Future Total Intersection Operations

lutana atian			AM Pe	ak Hour			PM Pe	ak Hour	
Intersection	Lane	LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Lyon St/Highway	WBL/T	Α	0.20	10.5	26.4	Α	0.47	16.0	11.9
417 On-Ramp &	SBT	Α	0.37	18.1	42.7	Α	0.40	11.1	47.0
Catherine St	SBR	Α	0.20	3.9	9.2	Α	0.31	6.6	22.8
Signalized	Overall	Α	0.25	11.8	-	Α	0.41	12.8	-
Vant Ct 0	WBT/R	В	0.63	26.2	m60.7	Α	0.51	14.4	m41.5
Kent St & Catherine St	WBR	В	0.66	30.0	m56.8	Α	0.53	16.7	m37.4
Signalized	NB	В	0.69	18.5	69.8	Α	0.45	18.0	37.2
Signanzea	Overall	В	0.64	22.0	-	Α	0.46	16.4	-
Kent St &	EBT	Α	0.36	7.5	31.6	Α	0.28	4.3	32.5
Chamberlain Ave Pedestrian Signal	Overall	Α	0.28	7.5	-	Α	0.29	4.3	-
Davids Ct. O	WB	С	0.77	28.6	54.9	D	0.85	34.4	#66.1
Bank St &	NBL/T	D	0.82	12.3	m29.3	Α	0.54	12.2	19.2
Catherine St Signalized	SBT/R	Α	0.60	25.6	43.9	D	0.84	37.4	#80.1
Signanzea	Overall	С	0.77	21.6	-	С	0.71	30.1	-
	EBL/T	С	0.74	30.9	55.7	С	0.72	29.1	55.7
Bank St &	EBR	Α	0.19	2.3	3.5	Α	0.26	4.7	8.7
Chamberlain Ave	NBT/R	D	0.83	29.0	#107.6	Α	0.32	9.5	32.7
/Isabella St	SBL(/T)	Α	0.57	24.8	m33.4	В	0.60	16.2	m00 0
Signalized	(SBT)	Α	0.39	9.2	m27.6	В	0.69	16.3	m88.0
	Overall	С	0.76	24.8	-	С	0.77	17.7	-

Notes: Saturation flow rate of 1800 veh/h/lane

Queue is measured in metres Peak Hour Factor = 1.00 Delay = average vehicle delay in seconds

m = metered queue

= volume for the 95th %ile cycle exceeds capacity

The network intersection operations for the 2024 future total horizon operate similarly to the 2024 future background conditions. No capacity issues are noted, and no mitigation measures are required.

7.4 2029 Future Total Operations

Figure 16 illustrates the 2029 total volumes and Table 18 summarizes the 2029 total intersection operations. The level of service for signalized intersections is based on v/c calculations for individual lane movements and HCM 2000 v/c calculations for the overall intersection. The synchro worksheets for the 2029 future total horizon are provided in Appendix I.



Kent 189(175) 582(618) 220(558) 539(341) 160(287) 226(247) 394(702) Catherine · 627(357) · 278(218) 415(720) 215(175) Isabella Chamberlain 494(268) 93(57) 577(592) 814(779) 181(91) 834(500) 90(121)

Figure 16: 2029 Future Total Volumes

Table 18: 2029 Future Total Intersection Operations

			AM Pe	ak Hour			PM Pe	ak Hour	
Intersection	Lane	LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Lyon St/Highway	WBL/T	Α	0.20	10.5	26.4	Α	0.53	16.6	15.1
417 On-Ramp &	SBT	Α	0.37	18.1	42.7	Α	0.45	11.8	53.9
Catherine St	SBR	Α	0.20	3.9	9.3	Α	0.32	7.6	25.8
Signalized	Overall	Α	0.25	11.8	-	Α	0.47	13.6	-
Vont Ct 0	WBT/R	В	0.63	26.1	m60.7	Α	0.55	15.5	m40.7
Kent St & Catherine St	WBR	В	0.66	29.9	m56.7	Α	0.57	17.8	m37.1
Signalized	NB	В	0.70	18.8	72.3	Α	0.46	18.2	38.3
Signalizea	Overall	В	0.65	22.1	-	Α	0.49	17.0	-
Kent St &	EBT	Α	0.38	7.5	34.2	Α	0.28	4.3	32.5
Chamberlain Ave Pedestrian Signal	Overall	Α	0.30	7.5	-	Α	0.29	4.3	-
Damle Ct. O	WB	С	0.77	28.6	54.9	Е	0.95	45.5	#79.9
Bank St &	NBL/T	D	0.82	12.2	m24.6	Α	0.57	12.6	20.3
Catherine St	SBT/R	В	0.63	26.4	46.2	D	0.86	39.1	#81.8
Signalized	Overall	С	0.78	21.8	-	С	0.76	35.7	-
	EBL/T	С	0.76	31.3	60.6	С	0.72	29.1	55.7
Bank St &	EBR	Α	0.20	2.6	4.4	Α	0.26	4.7	8.7
Chamberlain Ave	NBT/R	D	0.87	32.3	#110.8	Α	0.34	9.6	34.4
/Isabella St	SBL(/T)	В	0.66	30.2	m#41.1	В	0.60	16.7	m94.3
Signalized	(SBT)	Α	0.42	9.9	m28.6	ь	0.69	16.7	m84.2
	Overall	С	0.80	26.8	-	С	0.78	17.8	-

Saturation flow rate of 1800 veh/h/lane Notes:

Queue is measured in metres

Peak Hour Factor = 1.00

Delay = average vehicle delay in seconds

m = metered queue

= volume for the 95th %ile cycle exceeds capacity



The network intersection operations for the 2029 future total horizon operate similarly to the 2029 future background conditions. No capacity issues are noted, and no mitigation measures are required.

7.5 Modal Share Sensitivity and Demand Rationalization Conclusions

No capacity issues have been noted at the study area intersections. Given this residual capacity, no rationalization for network demand is required.

With respect to site travel demand, negligible impacts are forecast from the low number of auto trips using the unmodified district mode shares. Thus, no rationalization for site-generated travel is required.

8 Development Design

8.1 Design for Sustainable Modes

Bicycle parking within secure rooms and auto parking are both located within the underground parking garage, and hard surface connections are provided from the building entrance to existing area pedestrian facilities. Bicycle parking is also provided via surface racks at the rear of the building and surface vehicle parking accesses the drive aisle.

All area transit stops for routes discussed in Section 2.2.5 are within 400 metres walk of the building entrance. The existing bus stop, partially located within the site driveway, is envisioned to shift westerly to the 54 Chamberlain Avenue frontage. The site plan can accommodate a shift of the bus stop east of the site where no frontage conflicts exist access should future improvements to Chamberlain Avenue by the City of Ottawa require the flexibility to relocate the stop for the ultimate condition.

The infrastructure TDM checklist is provided in Appendix J.

8.2 Circulation and Access

Vehicular and cycling access is provided via a right-in-right-out access onto Chamberlain Avenue, adjacent to the relocated stop bar for the Chamberlain Avenue pedestrian signal. The stop bar is proposed to shift approximately 6.6 metres to the east. The access will maintain the minimum offset requirements for the signals to stop bar distance.

Emergency and services are anticipated to access the site along the Chamberlain Avenue frontage. The site does not support a turn-around, either loop or hammerhead, therefore the garbage collection will take place within the drive aisle with the garbage truck entering the site in a forward direction and exiting the site in reverse with a two-person operation including the driver and a flag person outside of the truck. This operation is typical for urban sites and constrained lot dimensions.

9 Parking

9.1 Parking Supply

The site proposes 163 bicycle parking spaces including 15 at-grade, 76 on P1, and 72 on P2. The site will also provide 77 vehicle parking spaces in total, with seven vehicle spaces within the surface lot and the remaining 70 spaces underground.

The typical parking requirements from the zoning by-law indicate that 80 bicycle and 55 vehicle spaces are required for tenants, 15 vehicle spaces are required for visitors, and a minimum of seven vehicle spaces are required for the commercial space based upon the assumption of a retail store.



The total vehicle parking requirement of 77 spaces is therefore proposed as being met by the development, and the typical bicycle parking provision is proposed as being exceeded by a factor of two.

10 Boundary Street Design

Table 19 summarizes the MMLOS analysis for the boundary street of Chamberlain Avenue. The existing and future conditions for the segment will be considered in separate rows. The boundary street analysis is based on the policy area of "Within 200m of a school". The MMLOS worksheets has been provided in Appendix K.

Table 19: Boundary Street MMLOS Analysis

Sagmant	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS	
Segment	PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target
Chamberlain Avenue (Existing)	F	Α	E	D	D	D	Α	E
Chamberlain Avenue (Future)	D	Α	Α	D	D	D	Α	Е

Chamberlain Avenue along the site frontage does not meet the pedestrian and cycling MMLOS targets. Pedestrian LOS is not met due to the lack of boulevard, the sidewalk width, and high operating speeds and volumes on the arterial road. If the sidewalk were increased from 1.8 metres to 2.0 metres with a 0.5 metre boulevard or more, the segment would score PLOS D, due to the nature of arterial roads. Bicycle LOS targets are not met in the existing conditions given the lack of dedicated cycling facilities along the site frontage. Mixed traffic conditions limit transit LOS.

Per the Chamberlain Avenue, Catherine Street and Isabella Street Functional Design Study, the currently planned future conditions for Chamberlain Avenue include a MUP to replace the sidewalk on the south side of the road separated from the road's edge by a 1.5 metre boulevard. This treatment will improve bicycle LOS to a score of A, meeting targets, and improve pedestrian LOS to a score of D, still failing to meet targets. This treatment is due to occur outside of the time horizons considered by this report.

11 Access Intersections Design

11.1 Location and Design of Access

The proposed site access intersects Chamberlain Avenue just east of Kent Street and just west of a relocated stop line of the half-signal which controls though-movements to permit pedestrian crossings of its crosswalk.

The right-in/right-out access is proposed as being 6.0 metres-wide and right-in/right-out with a throat length between the back of sidewalk and the first point of conflict of 6.4-metres and a distance between the roadway edge and first point of conflict of 8.2 metres. In the ultimate conditions with the proposed Chamberlain Avenue, Catherine Street, and Isabella Street Functional Design Study geometry, the roadway edge is expected to be located approximately 3.1 metres further from the first on-site conflict.

The clear throat length for the access is below the suggested minimum value of 25 metres from Table 8.9.3 of the Geometric Design Guide for Canadian Roadways (Transportation Association of Canada (TAC), 2017) for a residential development of between 100-200 units accessing an arterial road. It is notable that the parcel is only 30.6 metres deep, and the referenced suggestion could not be met in any condition given required setbacks and aisle widths. While it cannot be met, the throat length has been balanced for the site depth, parking requirements and access design. Additionally, the existing properties includes three two-way accesses on Chamberlain Avenue, each with no clear throat length. Ultimately, during the PM peak hour when the highest number of trips are forecast, the inbound trips are anticipated to be 15 vehicles and outbound trips are anticipated to be 13 vehicles. These volumes average out to one vehicle entering or exiting every four-to-five minutes. Overall, spillback onto



Chamberlain Avenue is not anticipated from the site, and space is provided for a vehicle to queue within the driveway without conflict. Therefore, the proposed throat is considered adequate to permit expected site operations without impacts to the arterial roadway.

11.2 Intersection Control

Given the access is a private approach driveway, minor stop control is proposed on the site access approach.

11.3 Access Intersection Design

11.3.1 2024 & 2029 Future Total Access Intersection Operations

The access intersection is anticipated to operate well at both future horizons being right-in/right-out and having 15 or fewer forecasted inbound or outbound movement during a peak hour. No further analysis is required.

11.3.2 Access Intersection MMLOS

As the access intersection is not signalized, no access intersection MMLOS analysis is required.

11.3.3 Recommended Design Elements

The private approach driveway will require a depressed curb and sidewalk through the access, the relocation of the existing bus stop, and reinstatement of any accesses removed to full curb height. No further modifications are required from a transportation perspective.

Notwithstanding the analysis above, the City of Ottawa has proposed two possible changes to Chamberlain Avenue along the site frontage.

- As a traffic calming measure on the arterial road, the City has identified a concrete median extension on the corner of the free-flow lane from Chamberlain Avenue to northbound to Kent Street. This effectively changes a portion of the existing painted gore area to a raised concrete median. This will have no change for site entry or egress and would be removed once Chamberlain Avenue improvements are made in the future.
- 2. To provide more space between the stop bar and the signal heads for the midblock pedestrian crossing, the City has identified the relocation of the existing signals eastward on Chamberlain Avenue. The stop bar would be shifted to a 1 metre offset from the existing crosswalk, the existing crosswalk remain in the current location and new poles would be at a 15-metre spacing from the new stop bar location. It is unknown if the signal locations will be retained in the future.

The concept sketch for the new median is provided in Appendix J and the concept sketch of the signal pole relocation is provided in Appendix K.

12 Transportation Demand Management

12.1 Context for TDM

The existing area modal shares have been applied without modification, with the district of Ottawa Inner already relying heavily on active modes and transit. As such, modal shares are likely to be achieved. However additional TDM measures could be employed to help ensure this outcome, and to support a further shift from auto mode selection.

Total bedrooms across the 150 proposed units within the development is subject to the final unit count and layout selections by purchasers. No age restrictions are noted.



12.2 Need and Opportunity

As stated previously, existing area modal shares have been applied to site generated trips, and therefore, modal share targets should be achieved. Additionally, given the capacity of the study area intersections, deviation from target modal shares will not unduly impact network operations.

12.3 TDM Program

The "suite of post occupancy TDM measures" has been summarized in the TDM checklists for the residential land uses. The checklist is provided in Appendix L. The key TDM measures recommended include:

- Display relevant transit schedules and route maps at entrances
- Provide a multimodal travel option information package to new employees/residents
- Inclusion of a 1-month Presto card for first time new townhome purchase and apartment rental, with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
- Unbundle parking cost from purchase or rental costs

13 Transit

13.1 Route Capacity

In Section 5.1 the trip generation by mode was estimated, including an estimate of the number of transit trips that will be generated by the proposed development. Table 20 summarizes the transit trip generation.

Table 20: Trip Generation by Transit Mode

Tuescal BAcada	Na da Chaus	ΑN	1 Peak Ho	our	PM Peak Hour			
Travel Mode	Mode Share	In	Out	Total	In	Out	Total	
Transit	varies	7	15	22	12	9	21	

The proposed development is anticipated to generate an additional 22 two-way AM peak hour transit trips and 21 two-way PM peak hour transit trips. From the trip distribution found in section 5.2, these values can be further broken down. Table 21 summarizes forecasted site-generated transit ridership trips by direction, the routes that are impacted, and the equivalent bus loads.

Table 21: Forecasted Site-Generated Transit Ridership

Divantian	AM Peak Hour		PM Pe	ak Hour	Comico Turo	Approximate Equivalent Peak
Direction	In	Out	In	Out	Service Type	Hour/Direction Bus Loads
North	2	4	3	2	Bus	Negligible
South	2	5	4	3	Bus	Negligible
East	1	3	2	2	Bus	Negligible
West	1	3	2	2	Bus	Negligible

13.2 Transit Priority

Negligible impacts on area transit are forecast due to site-generated vehicle traffic or site-generated transit ridership. No change in transit LOS is forecast on any approach between the future background and the future total conditions.

14 Network Intersection Design

14.1 Network Intersection Control

No change to the existing signalized control is recommended for the network intersections.



14.2 Network Intersection Design

14.2.1 Future Total Network Intersection Operations

The operations are noted in Section 7.4 and the network intersections at both the 2024 and 2029 future total are anticipated to operate similarly to the background conditions. Negligible impacts from site auto volumes are anticipated.

14.2.2 Network Intersection MMLOS

Table 22 summarizes the MMLOS analysis for the network intersections of Lyon Street/Highway 417 On-Ramp at Catherine Street, Kent Street at Catherine Street, Bank Street at Catherine Street, and Bank Street at Chamberlain Avenue/Isabella Street. The future conditions include the improvements from the Chamberlain Avenue, Catherine Street and Isabella Street Functional Design Study and where the intersections score differently from the existing conditions, they are considered in separate rows. The intersection analysis is based on the policy area of "Within 300m of a school". The MMLOS worksheets have been provided in Appendix M.

Intersection		Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
		PLOS	Target	BLOS	Target	TLOS	Target	TkLOS	Target	ALOS	Targ et
Lyon St & Catherine St	Ex.	В	Α	Α	D	С	D	-	-	Α	Е
	Fut.	Α	Α	Α	D	С	D	-	-	Α	Е
Kent St & Catherine St	Ex.	D	Α	F	D	D	D	D	D	В	Е
	Fut.	В	Α	F	D	D	D	D	D	В	E
Kent St & Chamberlain Ave	Ex.	Α	Α	F	D	В	D	-	-	Α	Е
	Fut.	Α	Α	E	D	В	D	-	-	Α	E
Bank St & Catherine St	Ex.	С	Α	E	В	F	D	D	D	D	Е
	Fut.	С	Α	E	В	F	D	D	D	С	E
Bank St & Chamberlain Ave/ Isabella St	Ex.	С	Α	D	В	E	D	D	D	D	E
	Fut.	С	А	В	В	E	D	D	D	С	Е

Table 22: Study Area Intersection MMLOS Analysis

The MMLOS targets will only be met for pedestrian LOS at Kent Street at Chamberlain Avenue for both the existing and future upgrade conditions and at Lyon Street at Catherine Street once the future upgrades are complete. The bicycle LOS targets will only be met at the intersections of Lyon Street at Catherine Street for both the existing and future upgrade conditions, and Bank Street at Chamberlain Avenue/Isabella Street once future upgrades are in place. Transit LOS targets will not be met at the intersection of Bank Street at Catherine Street and Bank Street and Chamberlain Avenue/Isabella Street for both the existing and future upgrade conditions.

Given the functional design study, the ultimate pedestrian and bicycle LOS at the study area intersections are assumed to be in line with City objectives and balancing of objectives to achieve the overall MMLOS goals of the area. To meet transit LOS, all movements associated with transit routes would require a delay of less than 30 seconds. No changes to network intersections are proposed as part of this study.

14.2.3 Recommended Design Elements

No study area intersection design elements are proposed as part of this study.

15 Summary of Improvements Indicated and Modifications Options

The following summarizes the analysis and results presented in this TIA report:

Proposed Site and Screening



- The proposed site includes 160 apartment units and 3,370 sq. ft. of ground floor retail
- A two-way access will be provided onto Chamberlain Avenue
- The development is proposed to be completed as a single phase by 2024
- The Trip Generation, Location, and Safety triggers were met for the TIA Screening
- This report supports a site plan application

Existing Conditions

- Bank Street, Kent Street, Lyon Street, Catherine Street, Chamberlain Avenue, and Isabella Street are arterial roads in the study area
- Sidewalks are generally provided on both sides of the study area roadways, and on-street bike lanes on Lyon Street and Chamberlain Avenue until Kent Street, Lyon Street and Catherine Street are spine routes, and Bank Street is a local route
- The high volumes roadways have produced a high number of collisions at the study area intersections, primarily at the Bank Street at Chamberlain Avenue/Isabella Street intersection
- The collisions are predominantly angled and sideswipe collisions and have historically been the result of failure to comply with traffic control for angled collisions, and improper lane changes for sideswipe collisions
- Some extended queuing is noted in the peak north-south direction at the Bank Street and Catherine Street intersection in the AM peak hour and Bank Street and Chamberlain Avenue intersection in the PM peak hour, but generally the intersections operate adequately

Development Generated Travel Demand

- The proposed development is forecasted produce 71 two-way people trips during the AM peak hour and 82 two-way people trips during the PM peak hour
- Of the forecasted people trips, 16 two-way trips will be vehicle trips during the AM peak hour and 16 twoway trips will be vehicle trips during the PM peak hour based on a 25-26% residential auto mode share target
- Of the forecasted trips, 25% are anticipated to travel north, 35% to travel south, and 20% to travel each east and west

Background Conditions

- No background developments were explicitly included in the background conditions due to insignificant traffic generation, and volumes were grown along mainline and major turning movements commensurate with growth shown on the appropriate links from the TRANS model projections
- The operations at all study area intersections are expected to be similar to the existing conditions at both future background horizons

Development Design

- Parking for bicycles and autos are each proposed within an underground garage, with limited spaces also present on the surface
- Pedestrian connections will be made from the building entrance to the sidewalk along the site frontage via a hard surface treatment and all area transit routes are within 400 m walk of the building entrance
- A bus stop on the site frontage is recommended to be relocated approximately 3 metres to the west



- The stop bar for the half-signal on Chamberlain Avenue is proposed to shift approximately 6.6 metres to the east and maintain the minimum offset of 12 metres from the nearest signal head
- Garbage collection is anticipated via the site drive aisle with the garbage truck entering in a forward manner and exiting in a reverse manner with a two-person operation including a driver and a flag person, and emergency services are anticipated to access the site via the public road frontage

Parking

- The proposed vehicle parking provision is 77 spaces, and the proposed bicycle parking provision is 160 spaces
- The typical minimum parking provision from the zoning by-law for the site is 77 vehicle spaces and 80 bicycle spaces, and these minimums are each being met

Boundary Street Design

- The boundary street does not currently meet pedestrian MMLOS targets due to sidewalk and boulevard widths along Chamberlain Avenue as well as auto volumes and posted speed limits
- Bicycle MMLOS does not currently meet targets
- Improvements from the Chamberlain Avenue, Catherine Street and Isabella Street Functional Design Study will not meet pedestrian LOS target but will meet bicycle LOS

Access Intersections Design

- A two-way right-in/right-out access is proposed on the west side of the relocated pedestrian signal stop bar at the pedestrian signal on Chamberlain Avenue
- The access is assumed to be stop controlled on its approach
- The access is considered to have adequate throat length with spillback not anticipated onto Chamberlain Avenue
- Intersection operations at the site access are anticipated to perform well given the low volumes and right-in/right-out operation

TDM

- Supportive TDM measures to be included within the proposed development should include:
 - Display relevant transit schedules and route maps at entrances
 - Provide a multimodal travel option information package to new employees/residents
 - Inclusion of a 1-month Presto card for first time new townhome purchase and apartment rental,
 with a set time frame for this offer (e.g. 6-months) from the initial opening of the site
 - Unbundle parking cost from purchase or rental costs

Transit

• Negligible impacts are forecast on the area transit routes from site-generated ridership increases or sitegenerated auto traffic delays

Network Intersection Design

- Generally, the network intersections at both future total horizons will operate similarly to the network intersections at the future background horizons
- Pedestrian LOS targets will only be met at Kent Street at Chamberlain Avenue for both the existing and future upgrade conditions and at Lyon Street at Catherine Street once the future upgrades are complete



- Bicycle LOS targets will only be met at the intersections of Lyon Street at Catherine Street for both the
 existing and future upgrade conditions, and Bank Street at Chamberlain Avenue/Isabella Street once
 future upgrades are in place
- Transit LOS targets will not be met at the intersection of Bank Street at Catherine Street and Bank Street and Chamberlain Avenue/Isabella Street for both the existing and future upgrade conditions
- Given the functional design study for the network intersections, it is assumed that the future conditions will mee the City's desired balance of MMLOS trade-offs

16 Conclusion

It is recommended that, from a transportation perspective, the proposed development application proceed.

Prepared By:

John Kingsley

Transportation Engineering-Intern

Reviewed By:



Andrew Harte, P.Eng. Senior Transportation Engineer



Appendix A

TIA Screening Form and PM Certification Form





City of Ottawa 2017 TIA Guidelines Step 1 - Screening Form Date: 29-Apr-20
Project Number: 2020-40
Project Reference: 30-48 Chamberlain Avenue

1.1 Description of Proposed Development	
Municipal Address	30-48 Chamberlain Avenue
Description of Location	Existing medical and business buildings,
Description of Location	predominantly parking lot area (>60% of surface)
Land Use Classification	General Mixed-Use - GM4
Dovelopment Size	148 residential units, 4,184 sq.ft.
Development Size	commercial/resident, 96 parking spaces
Accesses	Two access loop, existing locations
Phase of Development	Single phase
Buildout Year	2024
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger	
Land Use Type	Townhomes or apartments
Development Size	148 Units
Trip Generation Trigger	Yes

1.3 Location Triggers	
Does the development propose a new driveway to a boundary street that is	
designated as part of the City's Transit Priority, Rapid Transit or Spine	No
Bicycle Networks?	
Is the development in a Design Priority Area (DPA) or Transit-oriented	No
Development (TOD) zone?	No
Location Trigger	No

1.4. Safety Triggers		
Are posted speed limits on a boundary street 80 km/hr or greater?	No	
Are there any horizontal/vertical curvatures on a boundary street limits	No	
sight lines at a proposed driveway?	No	
Is the proposed driveway within the area of influence of an adjacent traffic		
signal or roundabout (i.e. within 300 m of intersection in rural conditions,	Yes	
or within 150 m of intersection in urban/ suburban conditions)?		
Is the proposed driveway within auxiliary lanes of an intersection?	No	
Does the proposed driveway make use of an existing median break that	No	
serves an existing site?	NO	
la though is a decremented history of traffic anarctions or safety consorred on		High area collisions noted
Is there is a documented history of traffic operations or safety concerns on	No	along the Bank St and
the boundary streets within 500 m of the development?		Catherine St corridors.
Does the development include a drive-thru facility?	No	
Safety Trigger	Yes	



TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that s/he meets the four criteria listed below.

CERTIFICATION

- 1. I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines;
- 2. I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
- 3. I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and
- 4. I am either a licensed¹ or registered² professional in good standing, whose field of expertise [check $\sqrt{\text{appropriate field(s)}}$] is either transportation engineering $\sqrt{\text{or}}$ or transportation planning \square .
- License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

Dated at Ottawa (City)	this 20 day of September	, 2018
Name: _	Andrew Harte (Please Print)	
Professional Title: _	Professional Engineer	
	The Rest	
Signature of	of Individual certifier that s/he meets the above four criteria	

Office Contact Information (Please Print)
Address: 13 Markham Avenue
City / Postal Code: Ottawa / K2G 3Z1
Telephone / Extension: (613) 697-3797
E-Mail Address: Andrew.Harte@CGHTransportation.com



Appendix B

Turning Movement Counts





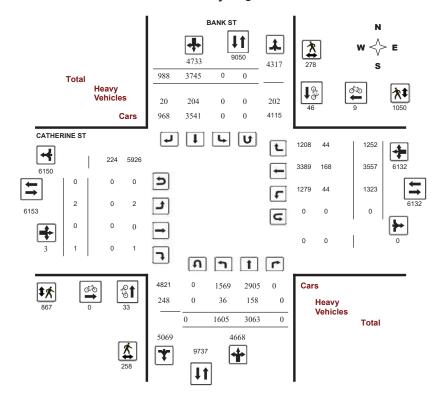
Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision

Full Study Diagram





Transportation Services - Traffic Services

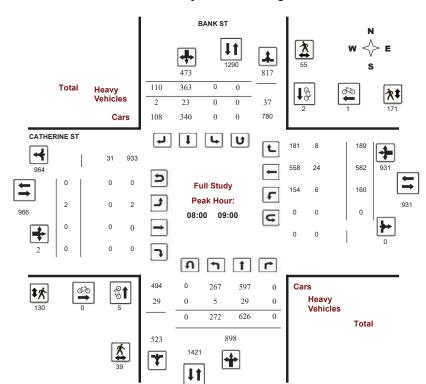
Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision

Full Study Peak Hour Diagram



January 13, 2023 Page 1 of 8 January 13, 2023 Page 2 of 8

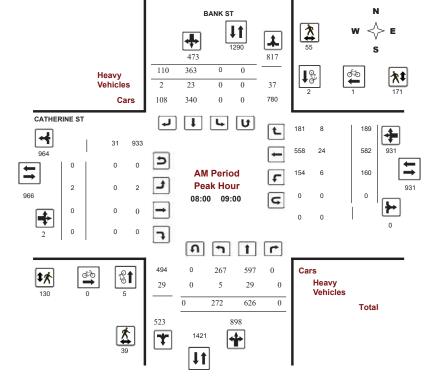


Turning Movement Count - Peak Hour Diagram

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision



Comments



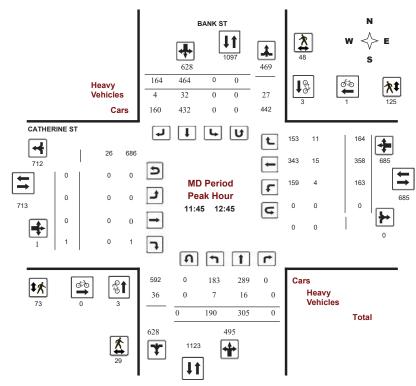
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision



Comments

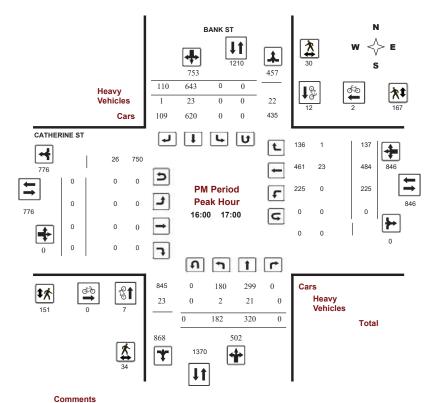


Turning Movement Count - Peak Hour Diagram

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision



Comments

2023-Jan-13 Page 3 of 9



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, April 18, 2018 Total Observed U-Turns AADT Factor

Northbound: 0 Southbound: 0 .90

BA bound ST RT 508 0 626 0 341 0 3316 0 3321 0 3320 0	NB TOT 723 898 548 506 490 502		270 363 387 474 433 523	82 110 127 129 179	SB TOT 352 473 514 603 612	STR TOT 1075 1371 1062 1109	Ea LT 0 2 0 0 0 0	ST 0 0 0 0	_	EB TOT 0 2 0 1	NE ST W LT 96 160 154 179	/estbo ST 544 582 441 343	und RT 162 189 176 149	WB TOT 802 931 771 671	STR TOT 802 933 771 672	Gran Tota 187 230
ST RT 0 0 0 0 0 0 0 0 0	TOT 723 898 548 506 490 502	0 0 0 0	ST 270 363 387 474 433	82 110 127 129 179	352 473 514 603	1075 1371 1062 1109	LT 0 2 0 0 0	0 0 0	0 0 0	0 2 0	96 160 154	ST 544 582 441	162 189 176	802 931 771	TOT 802 933 771	Tot 187 230 183
508 0 626 0 3341 0 3316 0 3305 0	TOT 723 898 548 506 490 502	0 0 0 0	270 363 387 474 433	82 110 127 129 179	352 473 514 603	1075 1371 1062 1109	0 2 0	0 0	0 0	0 2 0	96 160 154	544 582 441	162 189 176	802 931 771	TOT 802 933 771	18 23 18
626 0 341 0 316 0 305 0	898 548 506 490 502	0 0 0	363 387 474 433	110 127 129 179	473 514 603	1371 1062 1109	2 0	0	0	2	160 154	582 441	189 176	931 771	933 771	23 18
341 0 316 0 305 0 321 0	548 506 490 502	0 0	387 474 433	127 129 179	514 603	1062 1109	0	0	0	0	154	441	176	771	771	18
316 0 305 0 321 0	506 490 502	0	474 433	129 179	603	1109	0		-							
305 0 321 0	490 502	0	433	179				0	1	1	179	343	149	674	672	
321 0	502				612	1102	0							0/1	0/2	178
		0	523	400			U	0	0	0	124	306	176	606	606	17
320 0	502			132	655	1157	0	0	0	0	166	509	126	801	801	19
	302	0	643	110	753	1255	0	0	0	0	225	484	137	846	846	21
326 0	499	0	652	119	771	1270	0	0	0	0	219	348	137	704	704	19
063 0	4668	0	3745	988	4733	9401	2	0	1	3	1323	3557	1252	6132	6135	155
	0				0	0				0				0	0	
063 0	4668	0	3745	988	4733	9401	2	0	1	3	1323	3557	1252	6132	6135	155
258 0	6489	0	5206	1373	6579	13067	3	0	1	4	1839	4944	1740	8523	8528	215
alculated by	multiplyi	ing the	totals b	y the a	ppropriat	e expansi	on facto	r.			1.39					
832 0	5840	0	6137	1619	5921	11760	3	0	1	4	1655	4450	1566	7671	7675	194
calculated by	y multip	lying th	ne Equiv	valent 1	2 hr. tota	als by the	AADT fa	ector.			.90					
020 0	7650	0	8039	2121	7757	15406	4	0	1	5	2168	5830	2051	10049	10054	254
e calculated b	ov multip	lvina th	ne Avera	age Dai	lv 12 hr.	totals by	12 to 24	expans	ion fac	tor.	1.31					
06 25 28 83 9 02	3 0 8 0 lculated by 2 0 calculated b 0 0	0 3 0 4668 8 0 6489 Iculated by multiply 2 0 5840 aciculated by multiply 0 0 7650 aciculated by multiply	0 3 0 4668 0 8 0 6489 0 clulated by multiplying the 2 0 5840 0 calculated by multiplying the 0 0 7650 0 calculated by multiplying the	0 3 0 4668 0 3745 8 0 6489 0 5206 culated by multiplying the totals t 2 0 5840 0 6137 calculated by multiplying the Equit 0 0 7650 0 8039 calculated by multiplying the Aver	0 3 0 4668 0 3745 988 8 0 6489 0 5206 1373 culated by multiplying the totals by the al 2 0 5840 0 6137 1619 calculated by multiplying the Equivalent 1 0 0 7650 0 8039 2121 calculated by multiplying the Average Dai	0 0 3 0 4668 0 3745 988 4733 8 0 6489 0 5206 1373 6579 Coulated by multiplying the totals by the appropriat 2 0 5840 0 6137 1619 5921 Coulomb	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 3 0 4668 0 3745 988 4733 9401 2 0 1 8 0 6489 0 5206 1373 6579 13067 3 0 1 1 culated by multiplying the totals by the appropriate expansion factor. 2 0 5840 0 6137 1619 5921 11760 3 0 1 2 0 5840 0 6137 1619 5921 11760 3 0 1 2 0 5840 0 6137 1619 5921 11760 3 0 1 2 0 7650 0 8039 2121 7757 15406 4 0 1 2 0 7650 0 8039 2121 7757 15406 4 0 1 2 0 0 7650 0 8039	1	13 14 15 15 15 15 15 15 15	13 0 4668 0 3745 988 4733 9401 2 0 1 3 1323 3557 8 0 6489 0 5206 1373 6579 13067 3 0 1 4 1839 4944 13 13 13 13 13 13 13	1.50 1.50	1	1

January 13, 2023 Page 3 of 8



Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute Increments

BANK ST CATHERINE ST Northbound LT LT ST RT LT ST 0 132 0 86 31 117 338 585 97 47 185 185 423 419 448 432 493 164 23 187 302 522 161 25 186

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision

Full Study Cyclist Volume

		BANK ST		CATHERINE ST								
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total					
07:00 07:15	0	1	1	0	0	0	1					
7:15 07:30	0	0	0	0	0	0	0					
7:30 07:45	2	0	2	0	0	0	2					
7:45 08:00	0	1	1	0	0	0	1					
08:00 08:15	1	0	1	0	0	0	1					
08:15 08:30	0	1	1	0	1	1	2					
08:30 08:45	1	0	1	0	0	0	1					
08:45 09:00	3	1	4	0	0	0	4					
09:00 09:15	0	0	0	0	0	0	0					
09:15 09:30	0	1	1	0	0	0	1					
09:30 09:45	1	0	1	0	0	0	1					
09:45 10:00	0	1	1	0	0	0	1					
11:30 11:45	1	1	2	0	0	0	2					
11:45 12:00	0	0	0	0	0	0	0					
12:00 12:15	2	0	2	0	1	1	3					
12:15 12:30	1	3	4	0	0	0	4					
12:30 12:45	0	0	0	0	0	0	0					
12:45 13:00	0	1	1	0	0	0	1					
13:00 13:15	0	1	1	0	0	0	1					
13:15 13:30	1	1	2	0	0	0	2					
15:00 15:15	1	4	5	0	1	1	6					
15:15 15:30	2	3	5	0	2	2	7					
15:30 15:45	2	1	3	0	0	0	3					
15:45 16:00	2	2	4	0	0	0	4					
16:00 16:15	2	4	6	0	1	1	7					
16:15 16:30	0	0	0	0	1	1	1					
16:30 16:45	3	5	8	0	0	0	8					
16:45 17:00	2	3	5	0	0	0	5					
17:00 17:15	1	2	3	0	1	1	4					
17:15 17:30	1	4	5	0	0	0	5					
17:30 17:45	3	4	7	0	1	1	8					
17:45 18:00	1	1	2	0	0	0	2					
Total	33	46	79	0	9	9	88					

January 13, 2023 Page 4 of 8 January 13, 2023 Page 5 of 8



Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision

Full Study Pedestrian Volume

BANK ST CATHERINE ST

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	3	2	5	7	14	21	26
07:15 07:30	7	6	13	8	18	26	39
07:30 07:45	2	4	6	19	21	40	46
07:45 08:00	5	6	11	23	19	42	53
08:00 08:15	6	8	14	21	38	59	73
08:15 08:30	10	24	34	23	44	67	101
08:30 08:45	13	18	31	53	51	104	135
08:45 09:00	10	5	15	33	38	71	86
09:00 09:15	14	6	20	13	21	34	54
09:15 09:30	4	7	11	12	22	34	45
09:30 09:45	4	13	17	16	16	32	49
09:45 10:00	6	11	17	31	18	49	66
11:30 11:45	8	0	8	11	25	36	44
11:45 12:00	6	10	16	11	35	46	62
12:00 12:15	7	14	21	24	40	64	85
12:15 12:30	8	14	22	19	15	34	56
12:30 12:45	8	10	18	19	35	54	72
12:45 13:00	12	8	20	23	30	53	73
13:00 13:15	7	4	11	29	32	61	72
13:15 13:30	10	8	18	20	30	50	68
15:00 15:15	6	10	16	20	26	46	62
15:15 15:30	12	18	30	80	28	108	138
15:30 15:45	6	9	15	20	32	52	67
15:45 16:00	6	2	8	21	33	54	62
16:00 16:15	6	4	10	22	33	55	65
16:15 16:30	10	6	16	40	50	90	106
16:30 16:45	9	10	19	36	47	83	102
16:45 17:00	9	10	19	53	37	90	109
17:00 17:15	14	9	23	34	47	81	104
17:15 17:30	14	7	21	41	63	104	125
17:30 17:45	10	13	23	45	54	99	122
17:45 18:00	6	2	8	40	38	78	86
Total	258	278	536	867	1050	1917	2453



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40743

 Start Time:
 07:00
 Device:
 Miovision

Full Study Heavy Vehicles

BANK ST CATHERINE ST

N	orthbo	und		Sc	outhbou	nd		0TD	E	astbour	nd	_	VV	estbour	nd		0TD	0
Time Period LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15 1	6	0	16	0	6	1	14	30	0	0	0	11	3	9	1	13	24	27
07:15 07:30 1	7	0	15	0	5	0	12	27	0	0	0	6	2	5	0	7	13	20
07:30 07:45 3	4	0	12	0	4	1	9	21	0	0	0	10	1	6	0	7	17	19
07:45 08:00 0	6	0	12	0	6	0	13	25	0	0	0	5	0	5	1	6	11	18
08:00 08:15 4	3	0	15	0	7	1	15	30	0	0	0	13	1	8	4	13	26	28
08:15 08:30 1	5	0	13	0	6	0	12	25	0	0	0	5	1	4	1	6	11	18
08:30 08:45 0	8	0	17	0	5	1	15	32	0	0	0	8	4	7	1	12	20	26
08:45 09:00 0	13	0	18	0	5	0	20	38	0	0	0	5	0	5	2	7	12	25
09:00 09:15 2	7	0	21	0	9	0	17	38	0	0	0	7	3	5	1	9	16	27
09:15 09:30 5	5	0	21	0	9	3	21	42	0	0	0	13	2	5	4	11	24	33
09:30 09:45 1	6	0	20	0	10	1	19	39	0	0	0	6	3	4	2	9	15	27
09:45 10:00 2	2	0	21	0	13	0	16	37	0	0	0	8	4	6	1	11	19	28
11:30 11:45 0	3	0	14	0	7	1	13	27	0	0	0	6	4	5	2	11	17	22
11:45 12:00 4	4	0	18	0	8	1	14	32	0	0	0	6	2	1	1	4	10	21
12:00 12:15 0	7	0	13	0	5	0	17	30	0	0	0	3	1	3	5	9	12	21
12:15 12:30 3	2	0	19	0	13	1	18	37	0	0	0	11	1	7	2	10	21	29
12:30 12:45 0	3	0	9	0	6	2	14	23	0	0	0	6	0	4	3	7	13	18
12:45 13:00 1	5	0	13	0	4	1	12	25	0	0	0	2	3	0	2	5	7	16
13:00 13:15 3	3	0	13	0	6	1	10	23	0	0	0	7	1	3	0	4	11	17
13:15 13:30 1	5	0	14	0	6	0	13	27	0	0	0	5	2	4	2	8	13	20
15:00 15:15 1	4	0	12	0	5	3	14	26	0	0	0	15	2	11	2	15	30	28
15:15 15:30 1	3	0	13	0	8	1	14	27	0	0	0	11	1	9	2	12	23	25
15:30 15:45 0	2	0	4	0	2	0	5	9	0	0	0	12	0	12	1	13	25	17
15:45 16:00 0	8	0	17	0	8	0	17	34	0	0	0	6	1	6	1	8	14	24
16:00 16:15 0	6	0	10	0	4	0	10	20	0	0	0	9	0	9	0	9	18	19
16:15 16:30 1	5	0	12	0	6	1	13	25	0	0	0	9	0	7	1	8	17	21
16:30 16:45 1	6	0	16	0	9	0	15	31	0	0	0	6	0	5	0	5	11	21
16:45 17:00 0	4	0	8	0	4	0	8	16	0	0	0	2	0	2	0	2	4	10
17:00 17:15 0	4	0	9	0	5	0	9	18	0	0	0	4	0	4	0	4	8	13
17:15 17:30 0	2	0	9	0	5	0	8	17	0	0	0	1	2	1	1	4	5	11
17:30 17:45 0	7	0	13	0	6	0	13	26	0	0	0	4	0	4	0	4	8	17
17:45 18:00 0	3	0	5	0	2	0	6	11	0	0	0	2	0	2	1	3	5	8
Total: None 36	158	0	442	0	204	20	426	868	0	0	0	224	44	168	44	256	480	674

January 13, 2023 Page 6 of 8 January 13, 2023 Page 7 of 8



Turning Movement Count - Study Results

BANK ST @ CATHERINE ST

Survey Date: Wednesday, April 18, 2018 WO No: 40743 Start Time: 07:00 Miovision Device:

Full Study 15 Minute U-Turn Total BANK ST **CATHERINE ST**

Time F	Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
17:30 17:45	18:00					



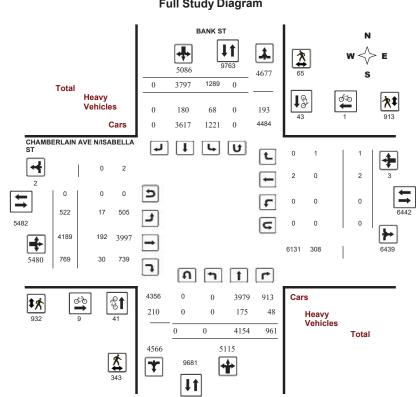
Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

Survey Date: Wednesday, April 18, 2018 WO No: 39632 Start Time: 07:00 Device: Miovision

Full Study Diagram



W.O. 5365004 - WED APR 18TH - CONSULTANT - (8HR REIMPORT)

January 13, 2023 Page 8 of 8 May 28, 2020 Page 1 of 8



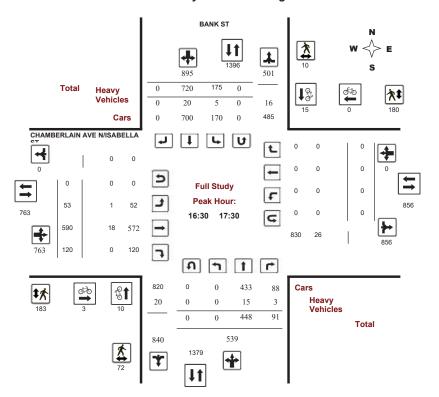
Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision

Full Study Peak Hour Diagram



W.O. 5365004 - WED APR 18TH - CONSULTANT - (8HR REIMPORT)



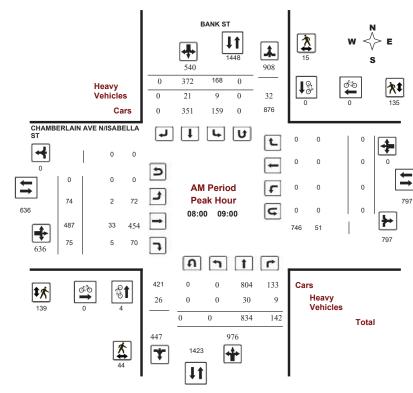
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision



Comments W.O. 5365004 - WED APR 18TH - CONSULTANT - (8HR REIMPORT)

Page 1 of 3
May 28, 2020
Page 2 of 8

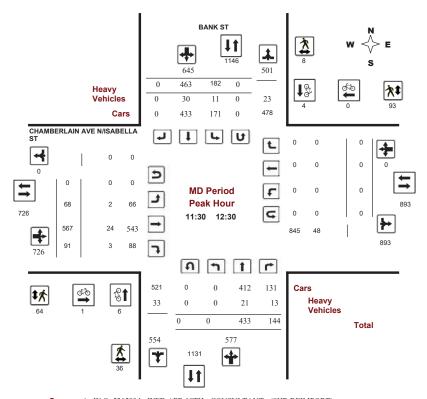


Turning Movement Count - Peak Hour Diagram

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision



 $\textbf{Comments} \ \text{W.O.} \ 5365004 - \text{WED APR } 18\text{TH - CONSULTANT - } (8\text{HR REIMPORT})$



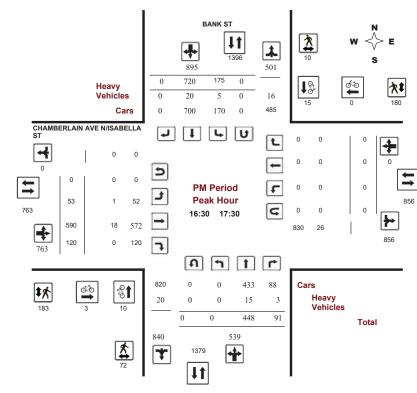
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision



Comments W.O. 5365004 - WED APR 18TH - CONSULTANT - (8HR REIMPORT)



Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, April 18, 2018 Total Observed U-Turns AADT Factor

Eastbound: 0 Westbound: 0

			В	ANK S	T					CH	AMBE	RLAII	N AVE	N/ISA	BELLA	ST			
	No	rthbou	nd		So	uthbou	nd			Е	astbou	und		W	estbou	und			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Grand Total
07:00 08:00	0	655	83	738	105	264	0	369	1107	58	391	56	505	0	2	0	2	507	1614
08:00 09:00	0	834	142	976	168	372	0	540	1516	74	487	75	636	0	0	0	0	636	2152
09:00 10:00	0	471	111	582	158	380	0	538	1120	84	499	68	651	0	0	1	1	652	177
11:30 12:30	0	433	144	577	182	463	0	645	1222	68	567	91	726	0	0	0	0	726	194
12:30 13:30	0	429	139	568	135	432	0	567	1135	67	518	115	700	0	0	0	0	700	1835
15:00 16:00	0	441	139	580	185	523	0	708	1288	63	582	126	771	0	0	0	0	771	205
16:00 17:00	0	442	102	544	174	686	0	860	1404	54	565	99	718	0	0	0	0	718	212
17:00 18:00	0	449	101	550	182	677	0	859	1409	54	580	139	773	0	0	0	0	773	218
Sub Total	0	4154	961	5115	1289	3797	0	5086	10201	522	4189	769	5480	0	2	1	3	5483	1568
U Turns				0				0	0				0				0	0	(
Total	0	4154	961	5115	1289	3797	0	5086	10201	522	4189	769	5480	0	2	1	3	5483	1568
EQ 12Hr	0	5774	1336	7110	1792	5278	0	7070	14179	726	5823	1069	7617	0	3	1	4	7621	2180
Note: These va	alues a	re calcu	lated by	y multipl	ying the	totals b	y the ap	propriat	te expans	ion fac	tor.			1.39					
AVG 12Hr	0	4898	1133	6031	1520	4477	0	5996	12761	615	4939	907	6461	0	2	1	4	6859	1962
lote: These v	olumes	are cal	culated	by multi	plying t	he Equiv	alent 12	2 hr. tota	als by the	AADT	factor.			0.9					
AVG 24Hr	0	6416	1484	7900	1991	5864	0	7855	15755	806	6470	1188	8464	0	3	2	5	8469	2422
Note: These v	olumes	are cal	culated	by multi	plying t	he Avera	ige Dail	y 12 hr.	totals by	12 to 2	4 expan	sion fac	tor.	1.31					

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute Increments

BANK ST CHAMBERLAIN AVE N/ISABELLA S

		N	orthbo	und		Sc	uthbou	nd		Eastbound					Westbound					
Time	Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	118	15	133	24	54	0	78	16	10	74	16	100	0	2	0	2	16	313
07:15	07:30	0	128	15	143	26	54	0	80	18	15	94	22	131	0	0	0	0	18	354
07:30	07:45	0	196	21	217	25	78	0	103	11	20	102	10	132	0	0	0	0	11	452
07:45	08:00	0	213	32	245	30	78	0	108	15	13	121	8	142	0	0	0	0	15	495
08:00	08:15	0	215	37	252	43	81	0	124	18	21	102	20	143	0	0	0	0	18	519
08:15	08:30	0	210	31	241	41	83	0	124	16	23	121	15	159	0	0	0	0	16	524
08:30	08:45	0	214	37	251	41	95	0	136	15	13	118	18	149	0	0	0	0	15	536
08:45	09:00	0	195	37	232	43	113	0	156	20	17	146	22	185	0	0	0	0	20	573
09:00	09:15	0	143	45	188	34	87	0	121	22	21	142	16	179	0	0	0	0	22	488
09:15	09:30	0	113	27	140	37	98	0	135	20	23	141	11	175	0	0	1	1	20	451
09:30	09:45	0	109	14	123	59	94	0	153	22	15	109	19	143	0	0	0	0	22	419
09:45	10:00	0	106	25	131	28	101	0	129	20	25	107	22	154	0	0	0	0	20	414
11:30	11:45	0	110	30	140	36	124	0	160	19	21	137	18	176	0	0	0	0	19	476
11:45	12:00	0	117	27	144	50	106	0	156	16	12	144	28	184	0	0	0	0	16	484
12:00	12:15	0	111	38	149	50	104	0	154	19	20	151	21	192	0	0	0	0	19	495
12:15	12:30	0	95	49	144	46	129	0	175	21	15	135	24	174	0	0	0	0	21	493
12:30	12:45	0	100	31	131	39	109	0	148	12	18	139	20	177	0	0	0	0	12	456
12:45	13:00	0	117	37	154	28	105	0	133	14	17	120	30	167	0	0	0	0	14	454
13:00	13:15	0	98	40	138	34	112	0	146	12	21	141	22	184	0	0	0	0	12	468
13:15	13:30	0	114	31	145	34	106	0	140	15	11	118	43	172	0	0	0	0	15	457
15:00	15:15	0	120	38	158	45	114	0	159	12	16	148	28	192	0	0	0	0	12	509
15:15	15:30	0	114	33	147	51	120	0	171	14	17	141	32	190	0	0	0	0	14	508
15:30	15:45	0	98	38	136	40	131	0	171	6	13	137	41	191	0	0	0	0	6	498
15:45	16:00	0	109	30	139	49	158	0	207	13	17	156	25	198	0	0	0	0	13	544
16:00	16:15	0	132	27	159	35	163	0	198	10	13	133	34	180	0	0	0	0	10	537
16:15	16:30	0	102	28	130	50	165	0	215	12	14	137	22	173	0	0	0	0	12	518
16:30	16:45	0	98	25	123	46	179	0	225	15	17	153	26	196	0	0	0	0	15	544
16:45	17:00	0	110	22	132	43	179	0	222	9	10	142	17	169	0	0	0	0	9	523
17:00	17:15	0	117	24	141	43	174	0	217	10	12	156	35	203	0	0	0	0	10	561
17:15	17:30	0	123	20	143	43	188	0	231	9	14	139	42	195	0	0	0	0	9	569
17:30	17:45	0	100	24	124	50	148	0	198	12	18	141	40	199	0	0	0	0	12	521
17:45	18:00	0	109	33	142	46	167	0	213	8	10	144	22	176	0	0	0	0	8	531
Total:		0	4154	961	5115	1289	3797	0	5086	471	522	4189	769	5480	0	2	1	3	471	15,684

Note: U-Turns are included in Totals.

May 28, 2020 Page 3 of 8 May 28, 2020 Page 4 of 8



Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision

Full Study Cyclist Volume

07:00 07:15 0			BANK ST		CHAMBE	RLAIN AVE N/IS	SABELLA ST	
07:15 07:30 0 0 0 0 0 0 0 0 0	Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:30 07:45 2 0 2 0 0 0 0 0 2 07:45 08:00 0 1 1 1 0 0 0 0 0	07:00 07:15	0	1	1	0	0	0	1
07:45 08:00 0 1 1 1 0 0 0 0 1 1	07:15 07:30	0	0	0	0	0	0	0
08:00 08:15	07:30 07:45	2	0	2	0	0	0	2
08:15 08:30 0 0 0 0 0 0 0 0 0	07:45 08:00	0	1	1	0	0	0	1
08:30 08:45 0 0 0 0 0 0 0 0 0	08:00 08:15	1	0	1	0	0	0	1
08:45 09:00 3 0 3 0 0 0 0 0 1 09:00 09:15 1 0 1 0 0 0 0 0 1 09:30 09:45 1 0 1 0 1 1 1 2 09:45 10:00 0 0 0 0 0 0 0 01:30 11:45 2 1 3 0 0 0 0 0 11:30 11:45 2 1 3 0 0 0 0 0 12:15 12:30 1 2 3 0 0 0 0 0 12:15 12:30 1 2 3 0 0 0 0 0 13:15 13:30 1 1 1 2 0 0 0 0 13:15 13:30 1 1 1 2 0 0 0 0 13:15 13:30 1 1 1 2 0 0 0 0 13:15 15:15 2 2 4 2 0 0 0 0 13:15 15:15 2 2 4 2 0 0 0 15:15 15:15 2 2 3 3 5 0 0 0 0 15:15 15:15 3 1 4 0 0 0 0 15:15 15:15 3 3 1 4 0 0 0 0 15:15 15:30 2 3 3 5 0 0 0 0 15:15 15:30 2 3 5 8 0 0 0 0 16:15 3 5 8 0 0 0 0 0 16:15 15:30 0 1 1 1 0 0 0 0 16:15 15:30 0 1 1 1 0 0 0 0 16:15 15:30 0 0 0 0 0 0 17:15 17:30 0 1 1 1 0 0 0 0 17:15 17:30 2 5 7 0 0 0 0 17:30 17:45 2 1 3 1 0 1 4	08:15 08:30	0	0	0	0	0	0	0
09:00 09:15	08:30 08:45	0	0	0	0	0	0	0
09:15 09:30 0 2 2 1 0 1 3 09:30 0 2 2 1 0 1 3 09:30 09:45 1 0 1 1 1 2 0 3 11145 1 2 1 0 0 0 0 0 0 0 0 0 0 2 0 1 2 1 1 1 1 <td>08:45 09:00</td> <td>3</td> <td>0</td> <td>3</td> <td>0</td> <td>0</td> <td>0</td> <td>3</td>	08:45 09:00	3	0	3	0	0	0	3
09:30 09:45 1 0 1 0 1 1 2 09:45 10:00 0 0 0 0 0 0 0 0 0 0 0 1 1 1 2 0 0 0 0 0 0 0 1 1 1 3 0 0 0 0 0 3 1 1 3 1 1 0 1 1 3 1 1 0 1 1 3 1 1 0 0 0 0 2 2 0 0 0 0 2 2 0 0 0 0 0 0 0 2 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 2 0 0	09:00 09:15	1	0	1	0	0	0	1
09:45 10:00 0 0 0 0 0 0 0 0 0	09:15 09:30	0	2	2	1	0	1	3
11:30 11:45 2 1 3 0 0 0 3 11:46 12:00 1 1 2 1 0 1 3 11:20 12:15 2 0 2 0 0 0 2 12:15 12:30 1 2 3 0 0 0 0 3 12:30 12:45 0 1 1 0 0 0 0 1 1 1 0 0 0 0 1 1 1 1 0 0 0 0 0 1 1 1 0 0 0 0 0 1 1 1 0	09:30 09:45	1	0	1	0	1	1	2
11:45 12:00 1 1 2 1 0 1 3 12:00 12:15 2 0 2 0 0 0 2 12:15 12:30 1 2 3 0 0 0 0 3 12:30 12:45 0 1 1 1 0 0 0 0 1 1 1 1 0 0 0 0 1 1 1 1 0 0 0 0 0 0 0 1 1 1 1 0 1 1 0 0 0 0 0 0 <td>09:45 10:00</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>	09:45 10:00	0	0	0	0	0	0	0
12:00 12:15 2 0 2 0 0 0 2 12:15 12:20 1 2 3 0 0 0 3 12:30 12:45 0 1 1 0 0 0 0 1 12:45 13:00 2 0 2 0 0 0 0 2 13:00 13:15 0	11:30 11:45	2	1	3	0	0	0	3
12:15 12:30 1 2 3 0 0 0 3 12:30 12:45 0 1 1 0 0 0 1 12:45 13:00 2 0 2 0 0 0 0 0 13:00 13:15 0 1 1 1 2 0 0 0 0 0 0 1 1 1 1 2 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 <td>11:45 12:00</td> <td>1</td> <td>1</td> <td>2</td> <td>1</td> <td>0</td> <td>1</td> <td>3</td>	11:45 12:00	1	1	2	1	0	1	3
12:30 12:45 0 1 1 0 0 0 1 12:45 13:00 2 0 2 0 0 0 0 13:00 13:15 0 0 0 0 0 0 0 13:15 13:30 1 1 2 0 0 0 0 2 15:00 15:15 2 2 4 2 0 2 6 15:30 2 3 5 0 0 0 5 15:30 15:45 3 1 4 0 0 0 4 15:45 6:00 0 2 2 0 0 0 4 15:45 3 1 4 0 0 0 0 2 16:00 16:15 3 5 8 0 0 0 0 8 16:16 16:30 0 1 1 0 0 0 1 1 16:30 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2 9 </td <td>12:00 12:15</td> <td>2</td> <td>0</td> <td>2</td> <td>0</td> <td>0</td> <td>0</td> <td>2</td>	12:00 12:15	2	0	2	0	0	0	2
12:45 13:00 2 0 2 0 0 0 2 13:00 13:15 0 0 0 0 0 0 0 0 13:16 13:30 1 1 2 0 0 0 0 2 15:00 15:15 2 2 4 2 0 2 6 15:15 15:30 2 3 5 0 0 0 0 5 15:30 15:45 3 1 4 0 0 0 0 4 15:45 3 1 4 0 0 0 0 4 15:46 3 5 8 0 0 0 2 16:00 16:15 3 5 8 0 0 0 8 16:15 16:30 0 1 1 0 0 0 1 1 16:30 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2	12:15 12:30	1	2	3	0	0	0	3
13:00 13:15 0 0 0 0 0 0 0 13:15 1 1 2 0 0 0 2 15:00 15:15 2 2 4 2 0 2 6 15:15 15:30 2 3 5 0 0 0 0 5 15:30 15:45 3 1 4 0 0 0 0 4 15:45 3 1 4 0 0 0 0 2 16:00 16:45 3 5 8 0 0 0 2 16:00 16:15 16:30 0 1 1 0 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2 9 16:45 3 4 8 0 0 0 8 17:00 1 4 8 0 0 0 8 17:15	12:30 12:45	0	1	1	0	0	0	1
13:15 13:30 1 1 2 0 0 0 2 15:00 15:15 2 2 4 2 0 2 6 15:15 15:30 2 3 5 0 0 0 5 15:30 15:45 3 1 4 0 0 0 0 4 15:45 16:00 0 2 2 0 0 0 2 16:00 16:15 3 5 8 0 0 0 3 16:15 16:30 0 1 1 1 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 17:00 4 4 8 0 0 0 8 17:00 77:15 1 2 3 1 0 1 4 17:30 17:45 2 1 3 1 0 0 0 7	12:45 13:00	2	0	2	0	0	0	2
15:00 15:15 2 2 4 2 0 2 6 15:15 15:30 2 3 5 0 0 0 5 15:30 15:45 3 1 4 0 0 0 4 15:45 16:00 0 2 2 0 0 0 2 16:00 16:15 3 5 8 0 0 0 0 8 16:15 16:30 0 1 1 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2 9 16:46 17:00 4 4 8 0 0 0 8 17:10 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	13:00 13:15	0	0	0	0	0	0	0
15:15 15:30 2 3 5 0 0 0 5 15:30 15:45 3 1 4 0 0 0 4 15:45 3 1 4 0 0 0 0 4 15:45 6:00 0 2 2 0 0 0 0 2 16:00 16:15 3 5 8 0 0 0 0 8 16:15 16:30 0 1 1 0 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2 9 16:45 3 4 8 0 0 0 8 17:00 17:10 4 4 8 0 0 0 8 17:15 17:30 2 5 7 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	13:15 13:30	1	1	2	0	0	0	2
15:30 15:45 3 1 4 0 0 0 4 15:45 16:00 0 2 2 0 0 0 2 16:00 16:15 16:30 0 1 1 0 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 3 4 7 2 0 2 9 16:45 3 4 4 8 0 0 0 8 17:00 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	15:00 15:15	2	2	4	2	0	2	6
15:45 16:00 0 2 2 0 0 0 2 16:00 16:15 3 5 8 0 0 0 0 8 16:30 16:30 1 1 0 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 17:00 4 4 8 0 0 0 8 17:00 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	15:15 15:30	2	3	5	0	0	0	5
16:00 16:15 3 5 8 0 0 0 8 16:15 16:30 0 1 1 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 17:00 4 4 8 0 0 0 8 17:00 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	15:30 15:45	3	1	4	0	0	0	4
16:15 16:30 0 1 1 0 0 0 1 16:30 16:45 3 4 7 2 0 2 9 16:45 17:00 4 4 8 0 0 0 8 17:00 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	15:45 16:00	0	2	2	0	0	0	2
16:30 16:45 3 4 7 2 0 2 9 16:45 17:00 4 4 8 0 0 0 8 17:00 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	16:00 16:15	3	5	8	0	0	0	8
16:45 17:00 4 4 8 0 0 0 8 17:00 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	16:15 16:30	0	1	1	0	0	0	1
17:00 17:15 1 2 3 1 0 1 4 17:15 17:30 2 5 7 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	16:30 16:45	3	4	7	2	0	2	9
17:15 17:30 2 5 7 0 0 0 7 17:30 17:45 2 1 3 1 0 1 4	16:45 17:00	4	4	8	0	0	0	8
17:30 17:45 2 1 3 1 0 1 4	17:00 17:15	1	2	3	1	0	1	4
	17:15 17:30	2	5	7	0	0	0	7
17:45 18:00 2 3 5 1 0 1 6	17:30 17:45	2	1	3	1	0	1	4
	17:45 18:00	2	3	5	1	0	1	6

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Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision

Full Study Pedestrian Volume

BANK ST CHAMBERLAIN AVE N/ISABELLA S

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	6	1	7	11	7	18	25
7:15 07:30	5	2	7	8	14	22	29
7:30 07:45	5	0	5	18	15	33	38
7:45 08:00	4	2	6	19	17	36	42
8:00 08:15	5	2	7	17	32	49	56
8:15 08:30	18	3	21	29	28	57	78
8:30 08:45	12	5	17	60	43	103	120
8:45 09:00	9	5	14	33	32	65	79
9:00 09:15	7	1	8	19	23	42	50
9:15 09:30	7	5	12	13	24	37	49
9:30 09:45	0	1	1	16	12	28	29
9:45 10:00	23	0	23	31	16	47	70
1:30 11:45	8	1	9	13	19	32	41
1:45 12:00	5	2	7	15	25	40	47
2:00 12:15	17	2	19	15	30	45	64
2:15 12:30	6	3	9	21	19	40	49
2:30 12:45	8	2	10	16	29	45	55
2:45 13:00	9	1	10	18	20	38	48
13:00 13:15	3	1	4	22	21	43	47
13:15 13:30	6	0	6	20	31	51	57
15:00 15:15	12	1	13	24	24	48	61
5:15 15:30	21	0	21	95	28	123	144
15:30 15:45	7	1	8	26	31	57	65
5:45 16:00	10	2	12	27	32	59	71
6:00 16:15	15	1	16	23	29	52	68
16:15 16:30	13	5	18	49	41	90	108
6:30 16:45	16	2	18	39	49	88	106
6:45 17:00	19	2	21	46	34	80	101
7:00 17:15	21	3	24	43	43	86	110
7:15 17:30	16	3	19	55	54	109	128
7:30 17:45	19	5	24	50	50	100	124
7:45 18:00	11	1	12	41	41	82	94
Total	343	65	408	932	913	1845	2253

W.O. 5365004 - WED APR 18TH - CONSULTANT - (8HR REIMPORT)

May 28, 2020 Page 5 of 8 May 28, 2020 Page 6 of 8



Northbound

Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision

Southbound

Full Study Heavy Vehicles

BANK ST	CHAMBERLAIN AVE N/ISABELLA S

Eastbound

Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	7	0	7	0	9	0	9	16	0	5	1	6	0	0	0	0	6	22
07:15 07:30	0	9	1	10	1	7	0	8	18	0	6	1	7	0	0	0	0	7	25
07:30 07:45	0	6	0	6	1	4	0	5	11	1	4	1	6	0	0	0	0	6	17
07:45 08:00	0	6	3	9	3	3	0	6	15	0	2	0	2	0	0	0	0	2	17
08:00 08:15	0	8	1	9	4	5	0	9	18	0	8	1	9	0	0	0	0	9	27
08:15 08:30	0	6	3	9	0	7	0	7	16	0	4	0	4	0	0	0	0	4	20
08:30 08:45	0	6	1	7	4	4	0	8	15	1	8	3	12	0	0	0	0	12	27
08:45 09:00	0	10	4	14	1	5	0	6	20	1	13	1	15	0	0	0	0	15	35
09:00 09:15	0	5	6	11	5	6	0	11	22	2	7	1	10	0	0	0	0	10	32
09:15 09:30	0	8	3	11	1	8	0	9	20	3	11	0	14	0	0	1	1	15	35
09:30 09:45	0	6	1	7	6	9	0	15	22	1	7	3	11	0	0	0	0	11	33
09:45 10:00	0	4	1	5	5	10	0	15	20	0	3	3	6	0	0	0	0	6	26
11:30 11:45	0	2	6	8	1	10	0	11	19	1	7	1	9	0	0	0	0	9	28
11:45 12:00	0	6	2	8	1	7	0	8	16	0	5	0	5	0	0	0	0	5	21
12:00 12:15	0	9	1	10	4	5	0	9	19	0	4	0	4	0	0	0	0	4	23
12:15 12:30	0	4	4	8	5	8	0	13	21	1	8	2	11	0	0	0	0	11	32
12:30 12:45	0	3	2	5	1	6	0	7	12	0	4	1	5	0	0	0	0	5	17
12:45 13:00	0	6	1	7	2	5	0	7	14	0	5	3	8	0	0	0	0	8	22
13:00 13:15	0	4	1	5	3	4	0	7	12	1	9	0	10	0	0	0	0	10	22
13:15 13:30	0	7	1	8	2	5	0	7	15	0	7	2	9	0	0	0	0	9	24
15:00 15:15	0	6	0	6	0	6	0	6	12	0	8	0	8	0	0	0	0	8	20
15:15 15:30	0	3	1	4	1	9	0	10	14	1	4	1	6	0	0	0	0	6	20
15:30 15:45	0	3	0	3	2	1	0	3	6	0	4	1	5	0	0	0	0	5	11
15:45 16:00	0	6	0	6	3	4	0	7	13	1	4	1	6	0	0	0	0	6	19
16:00 16:15	0	5	1	6	0	4	0	4	10	1	8	2	11	0	0	0	0	11	21
16:15 16:30	0	5	0	5	5	2	0	7	12	1	6	0	7	0	0	0	0	7	19
16:30 16:45	0	6	1	7	2	6	0	8	15	1	1	0	2	0	0	0	0	2	17
16:45 17:00	0	4	1	5	2	2	0	4	9	0	5	0	5	0	0	0	0	5	14
17:00 17:15	0	4	0	4	0	6	0	6	10	0	6	0	6	0	0	0	0	6	16
17:15 17:30	0	1	1	2	1	6	0	7	9	0	6	0	6	0	0	0	0	6	15
17:30 17:45	0	5	1	6	1	5	0	6	12	0	6	1	7	0	0	0	0	7	19
17:45 18:00	0	5	0	5	1	2	0	3	8	0	7	0	7	0	0	0	0	7	15
Total: None	0	175	48	223	68	180	0	248	471	17	192	30	239	0	0	1	1	240	711



Transportation Services - Traffic Services

Turning Movement Count - Study Results

BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 39632

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute U-Turn Total

BANK ST CHAMI	BERLAIN AVE N/ISABELLA S
---------------	--------------------------

		DAMIN	,,	OTTAMBEREAL	IN AVE INJUADEE	
Time I	Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
Te	otal	0	0	0	0	0

May 28, 2020 Page 7 of 8 May 28, 2020 Page 8 of 8



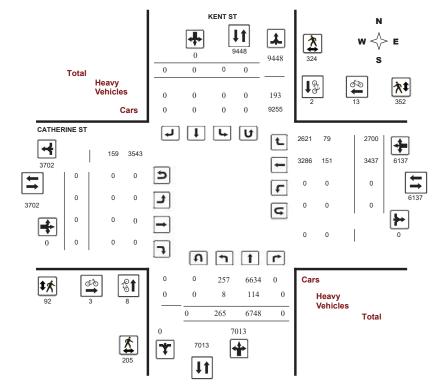
Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision

Full Study Diagram





Transportation Services - Traffic Services

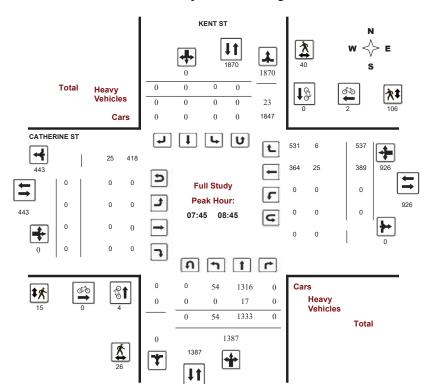
Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision

Full Study Peak Hour Diagram



January 13, 2023 Page 1 of 8 January 13, 2023 Page 2 of 8

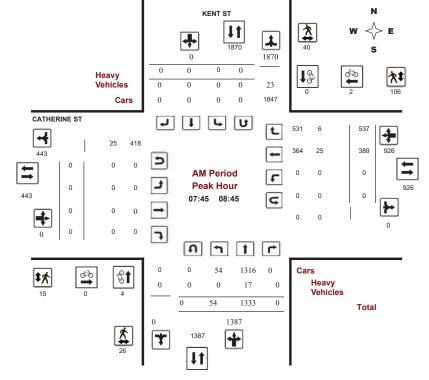


Turning Movement Count - Peak Hour Diagram

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision



Comments



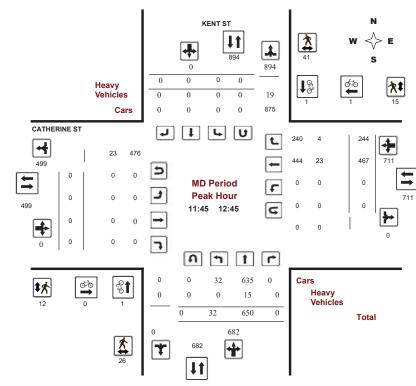
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision



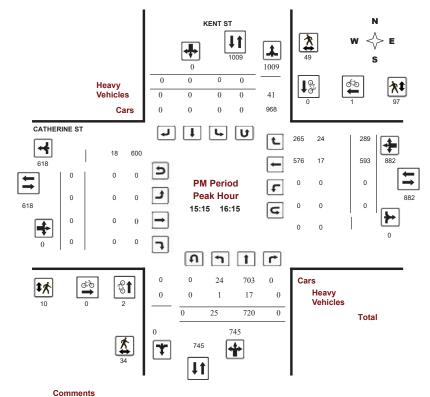
Comments



Turning Movement Count - Peak Hour Diagram

CATHERINE ST @ KENT ST

Survey Date: Wednesday, April 18, 2018 WO No: 40741 Start Time: 07:00 Device: Miovision



2023-Jan-13





Transportation Services - Traffic Services

Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

Survey Date: Wednesday, April 18, 2018 WO No: 40741 Start Time: 07:00 Miovision

Device:

Full Study Summary (8 HR Standard) Survey Date: Wednesday, April 18, 2018

Total Observed U-Turns AADT Factor

Northbound: 0 Southbound: 0 .90 Eastbound: Westbound: 0

			K	ENT S	Γ							CAT	HERIN	IE ST					
	No	rthbour	nd		Sou	ıthbou	nd			Ea	astbou	ınd		V	/estbo	und			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Gran Tota
07:00 08:00	36	1225	0	1261	0	0	0	0	1261	0	0	0	0	0	304	504	808	808	206
08:00 09:00	54	1326	0	1380	0	0	0	0	1380	0	0	0	0	0	392	530	922	922	230
09:00 10:00	41	968	0	1009	0	0	0	0	1009	0	0	0	0	0	411	342	753	753	176
11:30 12:30	36	626	0	662	0	0	0	0	662	0	0	0	0	0	452	231	683	683	134
12:30 13:30	40	631	0	671	0	0	0	0	671	0	0	0	0	0	477	174	651	651	132
15:00 16:00	29	652	0	681	0	0	0	0	681	0	0	0	0	0	556	302	858	858	153
16:00 17:00	18	590	0	608	0	0	0	0	608	0	0	0	0	0	479	311	790	790	139
17:00 18:00	11	730	0	741	0	0	0	0	741	0	0	0	0	0	366	306	672	672	141
Sub Total	265	6748	0	7013	0	0	0	0	7013	0	0	0	0	0	3437	2700	6137	6137	1315
U Turns				0				0	0				0				0	0	(
Total	265	6748	0	7013	0	0	0	0	7013	0	0	0	0	0	3437	2700	6137	6137	1315
EQ 12Hr	368	9380	0	9748	0	0	0	0	9748	0	0	0	0	0	4777	3753	8530	8530	1827
Note: These v	alues a	re calcul	ated by	/ multiply	ing the	totals by	the ap	propriat	e expansi	on facto	or.			1.39					
AVG 12Hr	331	8442	0	8773	0	0	0	0	8773	0	0	0	0	0	4299	3378	7677	7677	1645
Note: These v	olumes	are calc	ulated	by multip	lying th	e Equiv	alent 12	2 hr. tota	ls by the	AADT fa	actor.			.90					
AVG 24Hr	434	11059	0	11493	0	0	0	0	11493	0	0	0	0	0	5632	4425	10057	10057	2155

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

January 13, 2023 Page 3 of 8



Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute Increments

KENT ST **CATHERINE ST** Northbound Time Period LT ST LT LT ST RT LT ST 326 0 326 100 134 234 234 560 493 412 339 314 124 44 168 168 297 100 79 179 179 306 86 90

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision

Full Study Cyclist Volume

		KENT ST			CATHERINE S	ST	
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	0	0	0	0	0	0	0
07:30 07:45	0	0	0	0	0	0	0
07:45 08:00	1	0	1	0	0	0	1
08:00 08:15	1	0	1	0	0	0	1
08:15 08:30	1	0	1	0	2	2	3
08:30 08:45	1	0	1	0	0	0	1
08:45 09:00	0	0	0	0	0	0	0
09:00 09:15	0	0	0	0	2	2	2
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	1	1	1
12:15 12:30	0	1	1	0	0	0	1
12:30 12:45	1	0	1	0	0	0	1
12:45 13:00	0	0	0	0	0	0	0
13:00 13:15	0	0	0	0	0	0	0
13:15 13:30	0	0	0	1	0	1	1
15:00 15:15	0	0	0	0	1	1	1
15:15 15:30	0	0	0	0	0	0	0
15:30 15:45	0	0	0	0	0	0	0
15:45 16:00	0	0	0	0	1	1	1
16:00 16:15	2	0	2	0	0	0	2
16:15 16:30	0	0	0	0	3	3	3
16:30 16:45	0	0	0	0	1	1	1
16:45 17:00	0	1	1	1	0	1	2
17:00 17:15	0	0	0	0	1	1	1
17:15 17:30	0	0	0	1	0	1	1
17:30 17:45	0	0	0	0	0	0	0
17:45 18:00	1	٥	- 1	0	1	1	2

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Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision

Full Study Pedestrian Volume

KENT ST CATHERINE ST

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	2	9	11	3	0	3	14
07:15 07:30	0	4	4	0	3	3	7
07:30 07:45	4	9	13	5	9	14	27
07:45 08:00	7	8	15	4	6	10	25
08:00 08:15	8	12	20	5	8	13	33
08:15 08:30	8	9	17	6	20	26	43
08:30 08:45	3	11	14	0	72	72	86
08:45 09:00	10	10	20	3	15	18	38
09:00 09:15	8	6	14	2	5	7	21
09:15 09:30	4	7	11	4	5	9	20
09:30 09:45	8	15	23	2	2	4	27
09:45 10:00	6	8	14	8	2	10	24
11:30 11:45	8	10	18	2	6	8	26
11:45 12:00	4	12	16	2	6	8	24
12:00 12:15	12	12	24	5	3	8	32
12:15 12:30	5	11	16	3	6	9	25
12:30 12:45	5	6	11	2	0	2	13
12:45 13:00	9	15	24	9	2	11	35
13:00 13:15	7	8	15	0	3	3	18
13:15 13:30	6	11	17	0	7	7	24
15:00 15:15	5	13	18	3	9	12	30
15:15 15:30	8	15	23	4	77	81	104
15:30 15:45	10	12	22	2	2	4	26
15:45 16:00	8	8	16	3	9	12	28
16:00 16:15	8	14	22	1	9	10	32
16:15 16:30	10	12	22	5	11	16	38
16:30 16:45	8	4	12	1	2	3	15
16:45 17:00	4	15	19	0	12	12	31
17:00 17:15	8	10	18	3	13	16	34
17:15 17:30	7	9	16	3	12	15	31
17:30 17:45	4	14	18	2	8	10	28
17:45 18:00	1	5	6	0	8	8	14
Total	205	324	529	92	352	444	973



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision

Full Study Heavy Vehicles

KENT ST CATHERINE ST

KENT ST									CATHERINE ST										
	N	orthbo	und		Sc	outhbou													
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	1	0	1	0	0	0	2	3	0	0	0	11	0	11	1	12	23	13
07:15 07:30	0	2	0	2	0	0	0	4	6	0	0	0	5	0	5	2	7	12	9
07:30 07:45	1	1	0	2	0	0	0	6	8	0	0	0	6	0	5	5	10	16	12
07:45 08:00	0	4	0	4	0	0	0	7	11	0	0	0	4	0	4	3	7	11	11
08:00 08:15	0	3	0	3	0	0	0	5	8	0	0	0	10	0	10	2	12	22	15
08:15 08:30	0	3	0	3	0	0	0	4	7	0	0	0	4	0	4	1	5	9	8
08:30 08:45	0	7	0	7	0	0	0	7	14	0	0	0	7	0	7	0	7	14	14
08:45 09:00	0	5	0	5	0	0	0	7	12	0	0	0	4	0	4	2	6	10	11
09:00 09:15	0	6	0	6	0	0	0	8	14	0	0	0	4	0	4	2	6	10	12
09:15 09:30	0	4	0	4	0	0	0	6	10	0	0	0	10	0	10	2	12	22	16
09:30 09:45	0	4	0	4	0	0	0	5	9	0	0	0	7	0	7	1	8	15	12
09:45 10:00	0	7	0	7	0	0	0	12	19	0	0	0	4	0	4	5	9	13	16
11:30 11:45	1	4	0	5	0	0	0	6	11	0	0	0	2	0	1	2	3	5	8
11:45 12:00	0	2	0	2	0	0	0	2	4	0	0	0	5	0	5	0	5	10	7
12:00 12:15	0	3	0	3	0	0	0	3	6	0	0	0	3	0	3	0	3	6	6
12:15 12:30	0	6	0	6	0	0	0	10	16	0	0	0	8	0	8	4	12	20	18
12:30 12:45	0	4	0	4	0	0	0	4	8	0	0	0	7	0	7	0	7	14	11
12:45 13:00	0	4	0	4	0	0	0	5	9	0	0	0	2	0	2	1	3	5	7
13:00 13:15	0	4	0	4	0	0	0	6	10	0	0	0	5	0	5	2	7	12	11
13:15 13:30	2	1	0	3	0	0	0	3	6	0	0	0	5	0	3	2	5	10	8
15:00 15:15	1	1	0	2	0	0	0	10	12	0	0	0	8	0	7	9	16	24	18
15:15 15:30	0	2	0	2	0	0	0	10	12	0	0	0	4	0	4	8	12	16	14
15:30 15:45	0	4	0	4	0	0	0	12	16	0	0	0	7	0	7	8	15	22	19
15:45 16:00	0	5	0	5	0	0	0	6	11	0	0	0	5	0	5	1	6	11	11
16:00 16:15	1	6	0	7	0	0	0	13	20	0	0	0	2	0	1	7	8	10	15
16:15 16:30	0	2	0	2	0	0	0	3	5	0	0	0	7	0	7	1	8	15	10
16:30 16:45	0	2	0	2	0	0	0	5	7	0	0	0	3	0	3	3	6	9	8
16:45 17:00	2	3	0	5	0	0	0	3	8	0	0	0	4	0	2	0	2	6	7
17:00 17:15	0	4	0	4	0	0	0	7	11	0	0	0	1	0	1	3	4	5	8
17:15 17:30	0	4	0	4	0	0	0	4	8	0	0	0	2	0	2	0	2	4	6
17:30 17:45	0	3	0	3	0	0	0	4	7	0	0	0	2	0	2	1	3	5	6
17:45 18:00	0	3	0	3	0	0	0	4	7	0	0	0	1	0	1	1	2	3	5
Total: None	8	114	0	122	0	0	0	193	315	0	0	0	159	0	151	79	230	389	352

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Turning Movement Count - Study Results

CATHERINE ST @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40741

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute U-Turn Total KENT ST CATHERINE ST

Northbound Southbound Eastbound Westbound Time Period Total **U-Turn Total U-Turn Total U-Turn Total U-Turn Total** 07:00 07:15 07:15 07:30 07:30 07:45 07:45 08:00 0 0 Λ Λ 08:00 08:15 08:15 08:30 08:30 08:45 0 08:45 09:00 09:00 09:15 09:15 09:30 09:30 09:45 09:45 10:00 11:30 11:45 0 0 11:45 12:00 Ω 12:00 12:15 12:15 12:30 12:45 13:00 13:00 13:15 13:15 13:30 15:00 15:15 Ω 15:15 15:30 15:30 15:45 16:00 16:00 16:15 0 0 0 0 16:15 16:30 16:30 16:45 0 17:00 16:45 0 0 0 17:00 17:15 17:15 17:30 17:30 17:45 17:45 18:00 Total



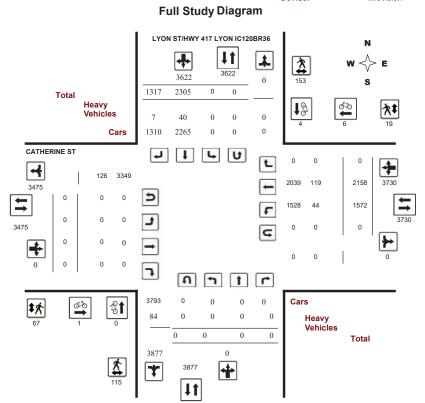
Transportation Services - Traffic Services

Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40740

 Start Time:
 07:00
 Device:
 Miovision



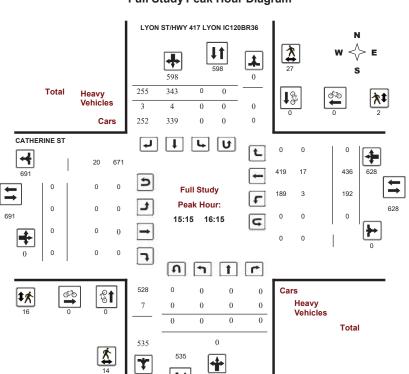
January 13, 2023 Page 8 of 8 January 13, 2023 Page 1 of 8



Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

Survey Date: Wednesday, April 18, 2018 WO No: 40740
Start Time: 07:00 Device: Miovision
Full Study Peak Hour Diagram



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Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

Survey Date: Wednesday, April 18, 2018 WO No: 40740 Start Time: 07:00 Device: Miovision Ν LYON ST/HWY 417 LYON IC120BR36 381 123 258 0 0 Heavy Vehicles Cars 123 253 0 **CATHERINE ST** U 7 4 20 322 199 219 342 5 0 + 222 **AM Period** F **Peak Hour** 441 0 0 342 G 0 08:00 09:00 0 0 **+** 0 0 7 ภ ٦ 1 Cars ₫ð **→** \$1 Heavy 0 0 11 Vehicles 0 Total **★** 4 *

Comments

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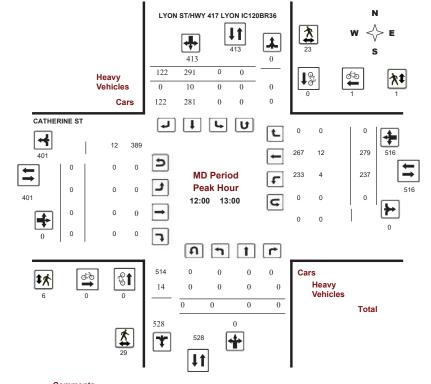


Turning Movement Count - Peak Hour Diagram

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40740

 Start Time:
 07:00
 Device:
 Miovision



Comments



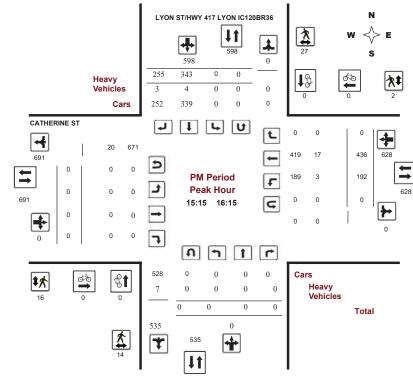
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40740

 Start Time:
 07:00
 Device:
 Miovision



Comments



Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

Survey Date: Wednesday, April 18, 2018 WO No: 40740 Start Time: 07:00 Device: Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, April 18, 2018 **Total Observed U-Turns AADT Factor** Southbound: 0 Northbound: 0 .90 Eastbound: Westbound: 0 LYON ST/HWY 417 LYON IC120BR36 **CATHERINE ST** Northbound Southbound Eastbound Westbound SB STR STR Grand LT ST RT LT ST RT LT ST RT Period LT ST TOT TOT TOT TOT TOT Total 150 192 07:00 08:00 223 342 659 08:00 09:00 222 822 427 748 09:00 10:00 213 108 183 427 11:30 12:30 12:30 13:30 15:00 16:00 402 213 200 607 607 1222 16:00 17:00 513 17:00 18:00 1001 2305 1317 3622 3622 0 1572 2158 Sub Total 3730 3730 7352 II Turns n 0 0 Total 0 1572 0 2305 1317 3622 3622 2158 0 3730 3730 7352 EQ 12Hr 3204 1831 5035 0 2185 3000 5185 10219 1.39 Note: These values are calculated by multiplying the totals by the appropriate expansion factor. Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor .90 2827 0 2575 3537 0 6112 6112 12048

1.31

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

Survey Date: Wednesday, April 18, 2018 WO No: 40740 Start Time: 07:00 Device: Miovision

Full Study 15 Minute Increments

LYON ST/HWY 417 LYON **CATHERINE ST** IC120BR36

Northbound Southbound Eastbound Westbound																			
	N	orthbo	und		Sc	uthbou	ind		0TD	E	astbour	nd	_	VVe	estbour	nd		0.70	0
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	0	0	44	20	64	64	0	0	0	0	37	51	0	88	88	152
07:15 07:30	0	0	0	0	0	58	19	77	77	0	0	0	0	24	38	0	62	62	139
07:30 07:45	0	0	0	0	0	64	30	94	94	0	0	0	0	45	50	0	95	95	189
07:45 08:00	0	0	0	0	0	57	25	82	82	0	0	0	0	44	53	0	97	97	179
08:00 08:15	0	0	0	0	0	62	27	89	89	0	0	0	0	57	57	0	114	114	203
08:15 08:30	0	0	0	0	0	66	29	95	95	0	0	0	0	59	53	0	112	112	207
08:30 08:45	0	0	0	0	0	74	38	112	112	0	0	0	0	56	57	0	113	113	225
08:45 09:00	0	0	0	0	0	56	29	85	85	0	0	0	0	50	52	0	102	102	187
09:00 09:15	0	0	0	0	0	57	34	91	91	0	0	0	0	46	56	0	102	102	193
09:15 09:30	0	0	0	0	0	61	28	89	89	0	0	0	0	53	56	0	109	109	198
09:30 09:45	0	0	0	0	0	64	26	90	90	0	0	0	0	50	61	0	111	111	201
09:45 10:00	0	0	0	0	0	31	20	51	51	0	0	0	0	34	71	0	105	105	156
11:30 11:45	0	0	0	0	0	56	31	87	87	0	0	0	0	62	74	0	136	136	223
11:45 12:00	0	0	0	0	0	68	28	96	96	0	0	0	0	53	58	0	111	111	207
12:00 12:15	0	0	0	0	0	73	31	104	104	0	0	0	0	53	72	0	125	125	229
12:15 12:30	0	0	0	0	0	82	32	114	114	0	0	0	0	68	61	0	129	129	243
12:30 12:45	0	0	0	0	0	65	29	94	94	0	0	0	0	54	72	0	126	126	220
12:45 13:00	0	0	0	0	0	71	30	101	101	0	0	0	0	62	74	0	136	136	237
13:00 13:15	0	0	0	0	0	80	25	105	105	0	0	0	0	62	51	0	113	113	218
13:15 13:30	0	0	0	0	0	51	26	77	77	0	0	0	0	63	72	0	135	135	212
15:00 15:15	0	0	0	0	0	132	47	179	179	0	0	0	0	61	72	0	133	133	312
15:15 15:30	0	0	0	0	0	100	62	162	162	0	0	0	0	50	114	0	164	164	326
15:30 15:45	0	0	0	0	0	92	52	144	144	0	0	0	0	43	131	0	174	174	318
15:45 16:00	0	0	0	0	0	78	52	130	130	0	0	0	0	46	90	0	136	136	266
16:00 16:15	0	0	0	0	0	73	89	162	162	0	0	0	0	53	101	0	154	154	316
16:15 16:30	0	0	0	0	0	88	76	164	164	0	0	0	0	46	115	0	161	161	325
16:30 16:45	0	0	0	0	0	69	62	131	131	0	0	0	0	36	63	0	99	99	230
16:45 17:00	0	0	0	0	0	67	74	141	141	0	0	0	0	34	65	0	99	99	240
17:00 17:15	0	0	0	0	0	93	77	170	170	0	0	0	0	48	57	0	105	105	275
17:15 17:30	0	0	0	0	0	110	60	170	170	0	0	0	0	50	61	0	111	111	281
17:30 17:45	0	0	0	0	0	84	68	152	152	0	0	0	0	35	52	0	87	87	239
17:45 18:00	0	0	0	0	0	79	41	120	120	0	0	0	0	38	48	0	86	86	206
Total:	0	0	0	0	0	2305	1317	3622	3622	0	0	0	0	1572	2158	0	3730	3730	7,352

Note: U-Turns are included in Totals

January 13, 2023 Page 3 of 8 January 13, 2023 Page 4 of 8



Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40740

 Start Time:
 07:00
 Device:
 Miovision

Full Study Cyclist Volume

LYON ST/HWY 417 LYON IC120BR36 CATHERINE ST

Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	0	0	0	0	0	0	0
07:30 07:45	0	0	0	0	0	0	0
07:45 08:00	0	0	0	0	0	0	0
08:00 08:15	0	0	0	0	0	0	0
08:15 08:30	0	0	0	0	1	1	1
08:30 08:45	0	0	0	0	0	0	0
08:45 09:00	0	0	0	0	0	0	0
09:00 09:15	0	0	0	0	0	0	0
09:15 09:30	0	0	0	0	1	1	1
9:30 09:45	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	0	0
1:30 11:45	0	1	1	0	0	0	1
1:45 12:00	0	1	1	0	0	0	1
2:00 12:15	0	0	0	0	0	0	0
2:15 12:30	0	0	0	0	1	1	1
2:30 12:45	0	0	0	0	0	0	0
2:45 13:00	0	0	0	0	0	0	0
3:00 13:15	0	0	0	0	0	0	0
3:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	0	0	0	0
5:15 15:30	0	0	0	0	0	0	0
15:30 15:45	0	0	0	0	0	0	0
5:45 16:00	0	0	0	0	0	0	0
6:00 16:15	0	0	0	0	0	0	0
16:15 16:30	0	0	0	0	2	2	2
16:30 16:45	0	0	0	0	1	1	1
6:45 17:00	0	0	0	1	0	1	1
7:00 17:15	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	0	0	0
17:30 17:45	0	1	1	0	0	0	1
17:45 18:00	0	1	1	0	0	0	1
Total	0	4	4	1	6	7	11



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40740

 Start Time:
 07:00
 Device:
 Miovision

Full Study Pedestrian Volume

LYON ST/HWY 417 LYON CATHERINE ST IC120BR36

	NB Approach or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
7:00 07:15	1	4	5	0	0	0	5
7:15 07:30	0	0	0	1	0	1	1
7:30 07:45	1	3	4	0	0	0	4
7:45 08:00	1	3	4	0	0	0	4
08:00 08:15	1	8	9	0	3	3	12
8:15 08:30	2	5	7	3	1	4	11
8:30 08:45	4	2	6	4	1	5	11
08:45 09:00	1	7	8	1	2	3	11
9:00 09:15	3	6	9	1	1	2	11
9:15 09:30	1	1	2	0	0	0	2
9:30 09:45	7	2	9	5	0	5	14
9:45 10:00	8	2	10	2	0	2	12
1:30 11:45	6	2	8	0	2	2	10
1:45 12:00	5	7	12	0	1	1	13
2:00 12:15	14	7	21	3	0	3	24
2:15 12:30	5	6	11	1	1	2	13
2:30 12:45	7	5	12	1	0	1	13
2:45 13:00	3	5	8	1	0	1	9
3:00 13:15	1	4	5	4	1	5	10
3:15 13:30	7	7	14	3	2	5	19
5:00 15:15	9	11	20	6	0	6	26
5:15 15:30	4	6	10	5	1	6	16
5:30 15:45	0	11	11	6	1	7	18
5:45 16:00	7	5	12	3	0	3	15
6:00 16:15	3	5	8	2	0	2	10
6:15 16:30	4	6	10	5	2	7	17
6:30 16:45	1	1	2	1	0	1	3
6:45 17:00	3	3	6	3	0	3	9
7:00 17:15	3	9	12	4	0	4	16
7:15 17:30	1	7	8	2	0	2	10
7:30 17:45	1	2	3	0	0	0	3
7:45 18:00	1	1	2	0	0	0	2
otal	115	153	268	67	19	86	354

January 13, 2023 Page 5 of 8 January 13, 2023 Page 6 of 8



Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40740

 Start Time:
 07:00
 Device:
 Miovision

Full Study Heavy Vehicles

LYON ST/HWY 417 LYON CATHERINE ST IC120BR36

	N	orthbo	und		Sc	outhbou	ınd			E	astbour	nd		W	estbour	nd			
Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	0	0	8	0	4	0	4	12	0	0	0	9	4	9	0	13	22	17
07:15 07:30	0	0	0	7	0	5	0	5	12	0	0	0	3	2	3	0	5	8	10
07:30 07:45	0	0	0	3	0	2	0	2	5	0	0	0	3	1	3	0	4	7	6
07:45 08:00	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	5	10	5
08:00 08:15	0	0	0	4	0	0	0	0	4	0	0	0	7	4	7	0	11	18	11
08:15 08:30	0	0	0	2	0	1	0	1	3	0	0	0	5	1	5	0	6	11	7
08:30 08:45	0	0	0	3	0	2	0	2	5	0	0	0	4	1	4	0	5	9	7
08:45 09:00	0	0	0	2	0	2	0	2	4	0	0	0	4	0	4	0	4	8	6
09:00 09:15	0	0	0	1	0	0	0	0	1	0	0	0	3	1	3	0	4	7	4
09:15 09:30	0	0	0	5	0	0	0	0	5	0	0	0	4	5	4	0	9	13	9
09:30 09:45	0	0	0	5	0	3	0	3	8	0	0	0	2	2	2	0	4	6	7
09:45 10:00	0	0	0	1	0	1	0	1	2	0	0	0	6	0	6	0	6	12	7
11:30 11:45	0	0	0	1	0	0	2	2	3	0	0	0	4	1	2	0	3	7	5
11:45 12:00	0	0	0	6	0	3	1	4	10	0	0	0	6	3	5	0	8	14	12
12:00 12:15	0	0	0	2	0	2	0	2	4	0	0	0	4	0	4	0	4	8	6
12:15 12:30	0	0	0	5	0	4	0	4	9	0	0	0	4	1	4	0	5	9	9
12:30 12:45	0	0	0	3	0	1	0	1	4	0	0	0	4	2	4	0	6	10	7
12:45 13:00	0	0	0	4	0	3	0	3	7	0	0	0	0	1	0	0	1	1	4
13:00 13:15	0	0	0	3	0	1	0	1	4	0	0	0	3	2	3	0	5	8	6
13:15 13:30	0	0	0	1	0	0	1	1	2	0	0	0	3	1	2	0	3	6	4
15:00 15:15	0	0	0	5	0	1	0	1	6	0	0	0	6	4	6	0	10	16	11
15:15 15:30	0	0	0	2	0	1	0	1	3	0	0	0	2	1	2	0	3	5	4
15:30 15:45	0	0	0	3	0	1	1	2	5	0	0	0	6	2	5	0	7	13	9
15:45 16:00	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	4	8	4
16:00 16:15	0	0	0	2	0	2	2	4	6	0	0	0	8	0	6	0	6	14	10
16:15 16:30	0	0	0	2	0	0	0	0	2	0	0	0	6	2	6	0	8	14	8
16:30 16:45	0	0	0	1	0	0	0	0	1	0	0	0	2	1	2	0	3	5	3
16:45 17:00	0	0	0	1	0	1	0	1	2	0	0	0	4	0	4	0	4	8	5
17:00 17:15	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	4	2
17:15 17:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	2	1
17:30 17:45	0	0	0	2	0	0	0	0	2	0	0	0	2	2	2	0	4	6	4
17:45 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total: None	0	0	0	84	0	40	7	47	131	0	0	0	126	44	119	0	163	289	210



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CATHERINE ST @ LYON ST/HWY 417 LYON IC120BR36

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40740

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute U-Turn Total

		LYON ST/HWY		CAT	HERINE ST	
Time	Period	IC120BR Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
To	otal	0	0	0	0	0

January 13, 2023 Page 7 of 8 January 13, 2023 Page 8 of 8



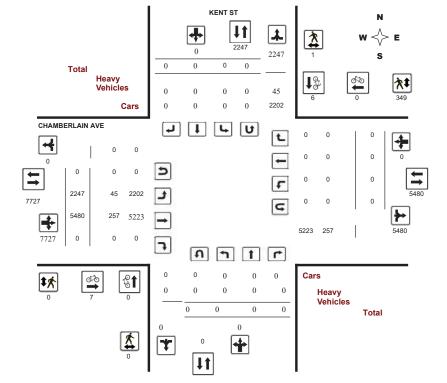
Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study Diagram





Transportation Services - Traffic Services

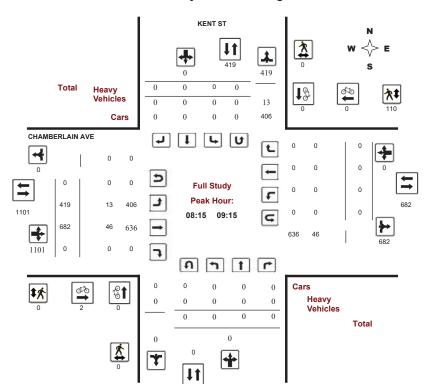
Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study Peak Hour Diagram



January 13, 2023 Page 1 of 8 January 13, 2023 Page 2 of 8

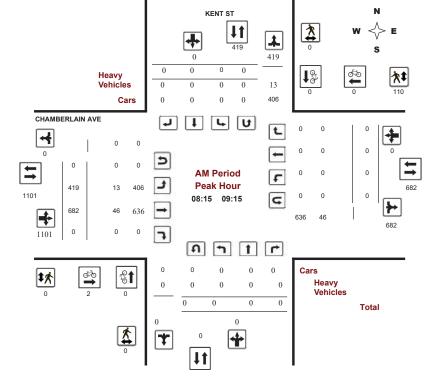


Turning Movement Count - Peak Hour Diagram

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision



Comments

Ottawa

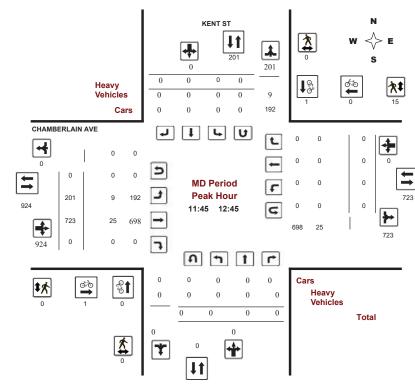
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision



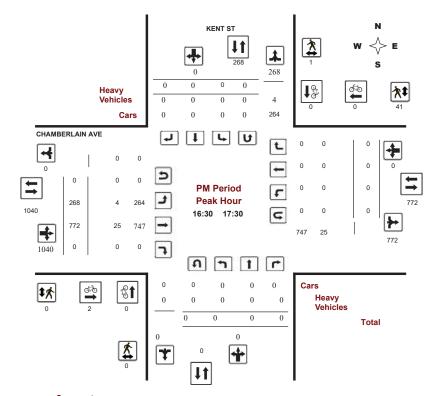
Comments



Turning Movement Count - Peak Hour Diagram

CHAMBERLAIN AVE @ KENT ST

Survey Date:Wednesday, April 18, 2018WO No:40742Start Time:07:00Device:Miovision



Comments



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study Summary (8 HR Standard)

Survey Date: Wednesday, April 18, 2018 Total Observed U-Turns

Northbound: 0 Southbound: 0 .90

Fasthound: 0 Westhound: 0

							E	Eastboun	id: ()		West	bound	0						
			K	ENT S	Т						C	CHAM	IBERL	AIN AV	Έ				
·	Nor	thbou	nd		Sou	ıthbou	nd			E	Eastbou	ınd		W	estbou	und			
Period	LT	ST	RT	NB TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	LT	ST	RT	WB TOT	STR TOT	Gran Tot
07:00 08:00	0	0	0	0	0	0	0	0	0	346	537	0	883	0	0	0	0	883	88
08:00 09:00	0	0	0	0	0	0	0	0	0	438	652	0	1090	0	0	0	0	1090	109
09:00 10:00	0	0	0	0	0	0	0	0	0	291	656	0	947	0	0	0	0	947	94
11:30 12:30	0	0	0	0	0	0	0	0	0	196	716	0	912	0	0	0	0	912	91
12:30 13:30	0	0	0	0	0	0	0	0	0	197	714	0	911	0	0	0	0	911	91
15:00 16:00	0	0	0	0	0	0	0	0	0	255	761	0	1016	0	0	0	0	1016	101
16:00 17:00	0	0	0	0	0	0	0	0	0	265	686	0	951	0	0	0	0	951	95
17:00 18:00	0	0	0	0	0	0	0	0	0	259	758	0	1017	0	0	0	0	1017	101
Sub Total	0	0	0	0	0	0	0	0	0	2247	5480	0	7727	0	0	0	0	7727	772
U Turns				0				0	0				0				0	0	
Total	0	0	0	0	0	0	0	0	0	2247	5480	0	7727	0	0	0	0	7727	772
EQ 12Hr	0	0	0	0	0	0	0	0	0	3123	7617	0	10741	0	0	0	0	10741	1074
lote: These v	alues ar	e calcul	lated by	/ multiply	ing the	totals b	y the ap	propriate	expans	sion fac	tor.			1.39					
AVG 12Hr	. 0	0	0	0	0	0	0	0	0	2811	6855	0	9667	0	0	0	0	9667	966
lote: These v	olumes	are calc	uialed	by mulup	olying th	e Equiv	alent 1.	z nr. totai	s by the	AADI	ractor.			.90					
AVG 24Hr	0	0	0	0	0	0	0	0	0	3682	8980	0	12664	0	0	0	0	12664	1266

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.

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January 13, 2023 Page 3 of 8



Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute Increments

KENT ST **CHAMBERLAIN AVE** Northbound Time Period LT ST LT LT ST 0 109 147 223 218 236 224 251 255 252 240 233 63

Note: U-Turns are included in Totals.



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study Cyclist Volume

		KENT ST	-	C	HAMBERLAIN	AVE	
Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	0	0	0	0	0	0	0
07:30 07:45	0	0	0	0	0	0	0
07:45 08:00	0	0	0	0	0	0	0
08:00 08:15	0	0	0	0	0	0	0
08:15 08:30	0	0	0	1	0	1	1
08:30 08:45	0	0	0	1	0	1	1
08:45 09:00	0	0	0	0	0	0	0
09:00 09:15	0	0	0	0	0	0	0
9:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	0	0	0
12:15 12:30	0	0	0	0	0	0	0
12:30 12:45	0	1	1	1	0	1	2
12:45 13:00	0	0	0	0	0	0	0
13:00 13:15	0	1	1	0	0	0	1
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	1	0	1	1
15:15 15:30	0	3	3	0	0	0	3
15:30 15:45	0	0	0	0	0	0	0
15:45 16:00	0	0	0	0	0	0	0
16:00 16:15	0	0	0	0	0	0	0
16:15 16:30	0	1	1	1	0	1	2
16:30 16:45	0	0	0	2	0	2	2
16:45 17:00	0	0	0	0	0	0	0
17:00 17:15	0	0	0	0	0	0	0
7:15 17:30	0	0	0	0	0	0	0
17:30 17:45	0	0	0	0	0	0	0
7:45 18:00	0	0	0	0	0	0	0

January 13, 2023 Page 4 of 8 January 13, 2023 Page 5 of 8



Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study Pedestrian Volume

KENT ST CHAMBERLAIN AVE

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	0	0	4	4	4
07:15 07:30	0	0	0	0	3	3	3
07:30 07:45	0	0	0	0	9	9	9
07:45 08:00	0	0	0	0	12	12	12
08:00 08:15	0	0	0	0	12	12	12
08:15 08:30	0	0	0	0	21	21	21
08:30 08:45	0	0	0	0	65	65	65
08:45 09:00	0	0	0	0	16	16	16
09:00 09:15	0	0	0	0	8	8	8
09:15 09:30	0	0	0	0	3	3	3
09:30 09:45	0	0	0	0	4	4	4
09:45 10:00	0	0	0	0	4	4	4
11:30 11:45	0	0	0	0	5	5	5
11:45 12:00	0	0	0	0	1	1	1
12:00 12:15	0	0	0	0	8	8	8
12:15 12:30	0	0	0	0	4	4	4
12:30 12:45	0	0	0	0	2	2	2
12:45 13:00	0	0	0	0	2	2	2
13:00 13:15	0	0	0	0	4	4	4
13:15 13:30	0	0	0	0	4	4	4
15:00 15:15	0	0	0	0	6	6	6
15:15 15:30	0	0	0	0	58	58	58
15:30 15:45	0	0	0	0	11	11	11
15:45 16:00	0	0	0	0	4	4	4
16:00 16:15	0	0	0	0	14	14	14
16:15 16:30	0	0	0	0	7	7	7
16:30 16:45	0	0	0	0	8	8	8
16:45 17:00	0	0	0	0	10	10	10
17:00 17:15	0	1	1	0	9	9	10
17:15 17:30	0	0	0	0	14	14	14
17:30 17:45	0	0	0	0	8	8	8
17:45 18:00	0	0	0	0	9	9	9
Total	0	1	1	0	349	349	350



Transportation Services - Traffic Services

Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study Heavy Vehicles

							F	uii S	tud	у не	avy	vei								
					ENT S							C	HAME	BERLA	AIN A	VE				
		N	orthbo	und		So	outhbou	ınd	_		Е	astbour	nd	_	W	estbour	nd			
Time F	Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00	07:15	0	0	0	0	0	0	0	1	1	1	6	0	7	0	0	0	6	13	7
07:15	07:30	0	0	0	0	0	0	0	0	0	0	7	0	7	0	0	0	7	14	7
07:30	07:45	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0	6	12	6
07:45	08:00	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	5	10	5
08:00	08:15	0	0	0	0	0	0	0	1	1	1	8	0	9	0	0	0	8	17	9
08:15	08:30	0	0	0	0	0	0	0	1	1	1	5	0	6	0	0	0	5	11	6
08:30	08:45	0	0	0	0	0	0	0	5	5	5	14	0	19	0	0	0	14	33	19
08:45	09:00	0	0	0	0	0	0	0	3	3	3	16	0	19	0	0	0	16	35	19
09:00	09:15	0	0	0	0	0	0	0	4	4	4	11	0	15	0	0	0	11	26	15
09:15	09:30	0	0	0	0	0	0	0	3	3	3	12	0	15	0	0	0	12	27	15
09:30	09:45	0	0	0	0	0	0	0	0	0	0	13	0	13	0	0	0	13	26	13
09:45	10:00	0	0	0	0	0	0	0	2	2	2	8	0	10	0	0	0	8	18	10
11:30	11:45	0	0	0	0	0	0	0	1	1	1	8	0	9	0	0	0	8	17	9
11:45	12:00	0	0	0	0	0	0	0	2	2	2	3	0	5	0	0	0	3	8	5
12:00	12:15	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	5	10	5
12:15	12:30	0	0	0	0	0	0	0	4	4	4	11	0	15	0	0	0	11	26	15
12:30	12:45	0	0	0	0	0	0	0	3	3	3	6	0	9	0	0	0	6	15	9
12:45	13:00	0	0	0	0	0	0	0	1	1	1	8	0	9	0	0	0	8	17	9
13:00	13:15	0	0	0	0	0	0	0	0	0	0	12	0	12	0	0	0	12	24	12
13:15	13:30	0	0	0	0	0	0	0	1	1	1	9	0	10	0	0	0	9	19	10
15:00	15:15	0	0	0	0	0	0	0	2	2	2	6	0	8	0	0	0	6	14	8
15:15	15:30	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0	6	12	6
15:30	15:45	0	0	0	0	0	0	0	1	1	1	6	0	7	0	0	0	6	13	7
15:45	16:00	0	0	0	0	0	0	0	2	2	2	4	0	6	0	0	0	4	10	6
16:00	16:15	0	0	0	0	0	0	0	1	1	1	13	0	14	0	0	0	13	27	14
16:15	16:30	0	0	0	0	0	0	0	2	2	2	8	0	10	0	0	0	8	18	10
16:30	16:45	0	0	0	0	0	0	0	1	1	1	2	0	3	0	0	0	2	5	3
16:45	17:00	0	0	0	0	0	0	0	1	1	1	5	0	6	0	0	0	5	11	6
17:00	17:15	0	0	0	0	0	0	0	1	1	1	12	0	13	0	0	0	12	25	13
17:15	17:30	0	0	0	0	0	0	0	1	1	1	6	0	7	0	0	0	6	13	7
17:30	17:45	0	0	0	0	0	0	0	0	0	0	7	0	7	0	0	0	7	14	7
17:45	18:00	0	0	0	0	0	0	0	1	1	1	9	0	10	0	0	0	9	19	10
Total:	None	0	0	0	0	0	0	0	45	45	45	257	0	302	0	0	0	257	559	302

January 13, 2023 Page 6 of 8 January 13, 2023 Page 7 of 8



Turning Movement Count - Study Results

CHAMBERLAIN AVE @ KENT ST

 Survey Date:
 Wednesday, April 18, 2018
 WO No:
 40742

 Start Time:
 07:00
 Device:
 Miovision

Full Study 15 Minute U-Turn Total

KENT ST CHAMBERLAIN AVE

Time	Period	Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	0	0	0	0	0
08:00	08:15	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:30	08:45	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:00	09:15	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	0	0	0	0	0
11:30	11:45	0	0	0	0	0
11:45	12:00	0	0	0	0	0
12:00	12:15	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:30	15:45	0	0	0	0	0
15:45	16:00	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
17:45	18:00	0	0	0	0	0
To	otal	0	0	0	0	0

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Appendix C

Synchro Intersection Worksheets – Existing Conditions



Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

Existing 05-16-2024

	ၨ	→	\rightarrow	1	-	*	1	†	-	1	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					414						1	7
Traffic Volume (vph)	0	0	0	222	219	0	0	0	0	0	258	123
Future Volume (vph)	0	0	0	222	219	0	0	0	0	0	258	123
Satd. Flow (prot)	0	0	0	0	4645	0	0	0	0	0	1745	1483
Flt Permitted					0.975							
Satd. Flow (perm)	0	0	0	0	4612	0	0	0	0	0	1745	1454
Satd. Flow (RTOR)					247							137
Lane Group Flow (vph)	0	0	0	0	490	0	0	0	0	0	287	137
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Detector Phase				6	6						4	4
Switch Phase												
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				40.0	40.0						35.0	35.0
Total Split (%)				53.3%	53.3%						46.7%	46.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)				1.0	0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
Lead/Lag					0.2						0.0	0.0
Lead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)				o max	34.8						29.7	29.7
Actuated g/C Ratio					0.46						0.40	0.40
v/c Ratio					0.22						0.42	0.21
Control Delay					10.0						18.7	3.9
Queue Delay					0.0						0.0	0.0
Total Delay					10.0						18.7	3.9
LOS					В						В	A
Approach Delay					10.0						13.9	
Approach LOS					В						В	
Queue Length 50th (m)					19.1						28.5	0.0
Queue Length 95th (m)					m25.8						47.7	9.5
Internal Link Dist (m)		117.8			157.8			120.4			277.6	0.0
Turn Bay Length (m)		117.0			107.0			120.4			211.0	
Base Capacity (vph)					2272						691	658
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.22						0.42	0.21
					0.22						0.72	0.21
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 48 (64%), Referenced	to phase	2: and 6:	WBTL, S	tart of Gr	een							
Natural Cycle: 55												
Control Type: Actuated-Coord	dinated											

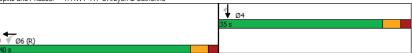
30-48 Chamberlain AM Peak Hour Synchro 10 Light Report
Page 1

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

Existing 05-16-2024

Maximum v/c Ratio: 0.42 Intersection Signal Delay: 11.8 Intersection LOS: B Intersection Capacity Utilization 47.6% ICU Level of Service A Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: HWY 417 OR/Lyon & Catherine



30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 2

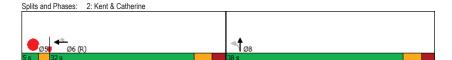
•	\rightarrow	*	•	-	*	1	†	1	-	↓	1
EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
				♠ 1≽	7		4412				
0	0	0	0	389	537	54	1333	0	0	0	
0	0	0	0	389	537	54	1333	0	0	0	
0	0	0	0	2916	1350	0	4755	0	0	0	
		-					0.998	_	-	•	
0	0	0	0	2916	1262	0	4749	0	0	0	
							70				
0	0	0	0	707	322	0	1541	0	0	0	
						Perm		-	-	•	
					6	8					
				6			8				
					•		Ū				
				10.0	10.0	10.0	10.0				
						2.5					
							5.0				
				Lay	Lay						
				C Mov	C Mov	Mov	Mov				
						IVIAX					
				-	C						
					45.0						
	457.0				m5/.3					50.0	
	157.8			130.6			47.0			56.6	
				4040	440		0070				
				0.69	0.73		0.74				
d to phase	2: and 6:	WBT, Sta	rt of Gre	en							
	EBL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	EBL EBT 0 0 0 0 0 0 0 0 0 0 0 0 157.8	EBL EBT EBR 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 10 0 0 10 0 157.8	EBL EBT EBR WBL 0 1 0 0 0 0 1 0 0 0 0 1 1 1 1	EBL EBT EBR WBL WBT 0 0 0 0 0 389 0 0 0 0 0 2916 0 0 0 0 0 2916 0 0 0 0 707 NA 6 10.0 27.8 32.0 42.7% 3.33 2.5 0.69 5.8 Lag C-Max 26.2 0.35 0.69 26.9 0.0 26.9 0.0 28.4 C 49.88 C 49.88 C 49.88 C 49.88 C 49.88 C 6	EBL EBT EBR WBL WBT WBR	EBL EBT EBR WBL WBT WBR NBL	EBL EBT EBR WBL WBT WBR NBL NBT	EBL EBT EBR WBL WBT WBR NBL NBT NBR	EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL	EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT 1

Lane Group	Ø5		
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	5		
Permitted Phases	-		
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0		
Minimum Split (s)	5.0		
Total Split (s)	5.0		
Total Split (%)	7%		
Yellow Time (s)	2.0		
All-Red Time (s)	0.0		
Lost Time Adjust (s)	0.0		
Total Lost Time (s)			
Lead/Lag	Lead		
Lead-Lag Optimize?	Load		
Recall Mode	Max		
Act Effct Green (s)	IVIGA		
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductin			
Reduced v/c Ratio			
Neuuceu Wc Nalio			
Intersection Summary			

Lanes, Volumes, Timings 2: Kent & Catherine

Existing 05-16-2024

Maximum v/c Ratio: 0.74 Intersection Signal Delay: 23.2 Intersection LOS: C
Intersection Capacity Utilization 64.8% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.



30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 5

Lanes, Volumes, Timings 3: Chamberlain & Kent

Existing 05-16-2024

	۶	-	—	4	/	4		
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4	
ane Configurations		^						
raffic Volume (vph)	0	682	0	0	0	0		
uture Volume (vph)	0	682	0	0	0	0		
atd. Flow (prot)	0	3316	0	0	0	0		
Permitted		00.10						
atd. Flow (perm)	0	3316	0	0	0	0		
atd. Flow (RTOR)	-		-	-	-	-		
ane Group Flow (vph)	0	758	0	0	0	0		
urn Type	-	NA	-	-	-			
rotected Phases		2					4	
ermitted Phases		_					•	
etector Phase		2						
witch Phase		_						
linimum Initial (s)		10.0					10.0	
finimum Split (s)		36.0					21.0	
otal Split (s)		36.0					21.0	
otal Split (%)		63.2%					37%	
'ellow Time (s)		3.3					3.0	
II-Red Time (s)		1.7					1.0	
ost Time Adjust (s)		0.0					1.0	
otal Lost Time (s)		5.0						
ead/Lag		5.0						
ead-Lag Optimize?								
Recall Mode		Min					None	
act Effct Green (s)		32.8					NOTIC	
Actuated g/C Ratio		0.63						
/c Ratio		0.36						
Control Delay		7.5						
Queue Delay		0.0						
otal Delay		7.5						
OS OS		7.5 A						
pproach Delay		7.5						
pproach LOS		7.5 A						
Queue Length 50th (m)		21.9						
Queue Length 95th (m)		31.6						
nternal Link Dist (m)		270.2	176.4		31.3			
urn Bay Length (m)		210.2	170.4		31.3			
ase Capacity (vph)		2163						
Starvation Cap Reductn		0						
pillback Cap Reductn		0						
torage Cap Reductn		0						
educed v/c Ratio		0.35						
		0.00						
ntersection Summary								
Cycle Length: 57								
Actuated Cycle Length: 51.7								
latural Cycle: 60								
Control Type: Semi Act-Uncoor	d							
Maximum v/c Ratio: 0.36								

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 6

Lanes, Volumes, Timings 3: Chamberlain & Kent

Existing 05-16-2024

Intersection Signal Delay: 7.5
Intersection Capacity Utilization 24.1% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



Synchro 10 Light Report Page 7 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

Existing 05-16-2024

	•	→	\rightarrow	•	←	*	\blacktriangleleft	†	1	1	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4143			414			† î>	
Traffic Volume (vph)	0	0	0	160	582	189	272	626	0	0	363	110
uture Volume (vph)	0	0	0	160	582	189	272	626	0	0	363	110
Satd. Flow (prot)	0	0	0	0	4481	0	0	3266	0	0	2996	C
Flt Permitted					0.991			0.633				
Satd. Flow (perm)	0	0	0	0	4429	0	0	2035	0	0	2996	C
Satd. Flow (RTOR)					80						51	
Lane Group Flow (vph)	0	0	0	0	1035	0	0	998	0	0	525	(
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				25.0	25.0		15.0	40.0			25.0	
Total Split (%)				33.3%	33.3%		20.0%	53.3%			33.3%	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.6			5.4			5.4	
Lead/Lag				Lag	Lag						Lag	
Lead-Lag Optimize?				Yes	Yes						Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					19.4			34.6			19.6	
Actuated g/C Ratio					0.26			0.46			0.26	
//c Ratio					0.86			0.91			0.64	
Control Delay					33.3			18.0			26.3	
Queue Delay					0.0			0.0			0.2	
Total Delay					33.3			18.0			26.4	
LOS					С			В			С	
Approach Delay					33.3			18.0			26.4	
Approach LOS					С			В			С	
Queue Length 50th (m)					47.3			15.1			31.1	
Queue Length 95th (m)					#69.1			m#34.1			46.7	
Internal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1204			1096			820	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			29	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.86			0.91			0.66	
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75	d to abo	O.NIDTI -	~ 4 C.CD	T Chart -	6 Creer							
Offset: 70 (93%), Reference Natural Cycle: 80	a to phase	Z:NR1F 8	and 6:SB	i, Start o	r Green							

Control Type: Actuated-Coordinated

Synchro 10 Light Report Page 8 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

Existing 05-16-2024

Lane Group	Ø7	Ø9	Ø13
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	7	9	13
Permitted Phases	(J	13
Detector Phase			
Switch Phase			
	1.0	1.0	1.0
Minimum Initial (s)	5.0	5.0	5.0
Minimum Split (s)			
Total Split (s)	5.0	5.0	5.0
Total Split (%)	7%	7%	7%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		Lead
Lead-Lag Optimize?	Yes		Yes
Recall Mode	Max	Max	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductin			
Reduced v/c Ratio			
Reduced V/C Rallo			
Intersection Summary			

Synchro 10 Light Report Page 9 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

Existing 05-16-2024

Maximum v/c Ratio: 0.91 Intersection Signal Delay: 25.9

Intersection LOS: C

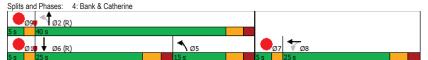
ICU Level of Service D

Intersection Capacity Utilization 79.0% ICL
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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



30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 10

Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2020 Existing 04/13/2023

Lane Group EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT		•	\rightarrow	*	1	-	•	1	Ť		-	¥	4
Traffic Volume (vph) 74 487 75 0 0 0 0 834 142 168 372 Future Volume (vph) 74 487 75 0 0 0 0 834 142 168 372 Future Volume (vph) 74 487 75 0 0 0 0 834 142 168 372 Satd. Flow (prot) 0 3292 1483 0 0 0 0 3154 0 1658 1745 1745 1745 1845 1745 1845 1745 1845 1845 1845 1845 1845 1845 1845 18	Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
Future Volume (vph) 74 487 75 0 0 0 0 834 142 168 372 Satd. Flow (prot) 0 3292 1483 0 0 0 0 3154 0 1658 1745	Lane Configurations		414	7					ħ₽		ሻ	*	
Satd. Flow (prot) 0 3292 1483 0 0 0 0 3154 0 1658 1745 Fit Permitted 0.993 Satd. Flow (perm) 0 3295 1394 0 0 0 0 3154 0 253 1745 Satd. Flow (perm) 0 3285 1394 0 0 0 0 3154 0 253 1745 Satd. Flow (RTOR) 134 27 Lane Group Flow (ph) 0 623 83 0 0 0 0 1085 0 187 413 Turn Type Perm NA Perm NA Perm NA Perm NA Permeted Phases 4 4 4 4 2 2 1 6 Detector Phases 4 4 4 4 2 2 1 6 Switch Phase Minimum Initial (s) 10.0 10.0 10.0 10.0 10.0 10.0 5.0 10.0 Minimum Split (s) 26.2 26.2 26.2 23.1 11.1 23.	Traffic Volume (vph)	74	487	75	0	0		0			168		
Fit Permitted 0,993 Satid. Flow (perm) 0 3285 1394 0 0 0 0 3154 0 253 1745 Satid. Flow (perm) 0 3285 1394 0 0 0 0 3154 0 253 1745 Satid. Flow (RTOR) 134 27 Lane Group Flow (vph) 0 623 83 0 0 0 0 1085 0 187 413 Turn Type Perm NA Perm NA Perm NA pm+pt NA Protected Phases 4 2 1 6 Semitted Phases 4 4 4 4 6 6 Detector Phase 4 4 4 4 6 6 Switch Phase Minimum Initial (s) 10.0 10.0 10.0 10.0 10.0 5.0 10.0 Minimum Spiti (s) 26.2 26.2 26.2 23.1 11.1 23.1 Total Spiti (s) 29.0 29.0 29.0 31.0 15.0 46.0 Total Spiti (s) 29.0 29.0 29.0 31.0 15.0 46.0 Total Spiti (s) 38.7% 38.7% 41.3% 20.0% 61.3% Vellow Time (s) 3.3 3.3 3.3 3.3 3.3 3.0 3.0 3.0 3.0 All-Red Time (s) 2.9 2.9 2.9 2.9 3.1 3.1 3.1 3.1 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 6.2 6.2 6.2 6.2 6.1 6.1 6.1 6.1 6.1 6.1 Lead/Lag Lead-Lag Optimize? Recall Mode None None None C-Max None C-Max Act Effic Green (s) 19.3 19.3 28.4 43.4 43.4 43.4 43.4 43.4 43.4 43.4 4	Future Volume (vph)	74	487	75		0		0	834	142	168	372	
Satd. Flow (perm)	Satd. Flow (prot)	0	3292	1483	0	0	0	0	3154	0	1658	1745	
Satd. Flow (RTOR) Lane Group Flow (vph) 0 623 83 0 0 0 0 1085 0 187 413 Turn Type Perm NA Perm NA pm+pt NA Protected Phases 4 4 4 6 6 Detector Phases 4 4 4 4 2 2 1 6 Switch Phase Minimum Initial (s) Minimum Spiti (s) 26.2 26.2 26.2 26.2 26.2 23.1 11.1 23.1 Total Spiti (s) 29.0 29.0 29.0 31.0 15.0 46.0 Total Spiti (%) 33.7% 38.7% 38.7% 41.3% 20.0% 61.3% Vellow Time (s) 3.3 3.3 3.3 3.3 3.3 3.0 0.3 0.3 0.3 0.3	Flt Permitted												
Lane Group Flow (vph)		0	3285		0	0	0	0		0	253	1745	
Turn Type	Satd. Flow (RTOR)			134									
Protected Phases	Lane Group Flow (vph)	0	623	83	0	0	0	0	1085	0	187	413	
Permitted Phases	Turn Type	Perm		Perm							pm+pt	NA	
Detector Phase 4	Protected Phases		4						2		1	6	
Switch Phase Minimum Initial (s)	Permitted Phases												
Minimum Initial (s) 10.0 10.0 10.0 5.0 10.0 Minimum Spiti (s) 26.2 26.2 26.2 26.2 23.1 11.1 23.1 Total Spiti (s) 29.0 29.0 29.0 31.0 15.0 46.0 Total Spiti (%) 38.7% 38.7% 38.7% 41.3% 20.0% 61.3% Yellow Time (s) 2.9 2.9 2.9 3.1 3.1 3.1 3.1 Lest Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 6.2 6.2 6.2 6.1 6.2 6.2	Detector Phase	4	4	4					2		1	6	
Minimum Split (s)	Switch Phase												
Total Split (s) 29.0 29.0 29.0 31.0 15.0 46.0 Total Split (%) 38.7% 38.													
Total Split (%) 38.7% 38.7% 38.7% 41.3% 20.0% 61.3% Yellow Time (s) 3.3 3.3 3.3 3.3 3.0 3.0 3.0 3.0 3.0 3.0	Minimum Split (s)												
Yellow Time (s)	Total Split (s)	29.0		29.0							15.0	46.0	
All-Red Time (s) 2.9 2.9 2.9 2.9 3.1 3.1 3.1 3.1 Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Total Split (%)	38.7%									20.0%	61.3%	
Lost Time Adjust (s) 0.0 0.0 0.0 0.0 0.0 0.0 Total Lost Time (s) 6.2 6.2 6.1 6.1 6.1 6.1 Lead/Lag	Yellow Time (s)	3.3	3.3	3.3					3.0		3.0	3.0	
Total Lost Time (s) 6.2 6.2 6.2 6.1 6.1 6.1 6.1 Lead/Lag Lead Lag Lead-Lag Optimize? Recall Mode None None None C-Max None C-Max None C-Max Act Effct Green (s) 19.3 19.3 28.4 43.4 43.4 43.4 Actuated g/C Ratio 0.26 0.26 0.38 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.5	All-Red Time (s)	2.9	2.9	2.9							3.1	3.1	
Lead Lag Lead Lag Yes Yes Yes Yes Recall Mode None None None C-Max None	Lost Time Adjust (s)		0.0	0.0					0.0		0.0	0.0	
Lead-Lag Optimize? Yes Yes Recall Mode None None None C-Max Act Effct Green (s) 19.3 19.3 28.4 43.4 43.4 Act Leffct Green (s) 0.26 0.26 0.38 0.58 0.58 Actuated g/C Ratio 0.26 0.26 0.38 0.58 0.58 V/c Ratio 0.74 0.18 0.90 0.60 0.41 Control Delay 30.9 2.2 34.6 27.1 8.2 Queue Delay 0.0 0.0 0.0 0.0 0.0 1.3 Total Delay 30.9 2.2 34.6 27.1 9.5 LOS C A C C A Approach Delay 27.5 34.6 15.0 Approach Delay 27.5 34.6 15.0 Approach LOS C C C B Queue Length 95th (m) 41.8 0.0 73.7 14.1 21.3 121.3 41.2 <t< td=""><td>Total Lost Time (s)</td><td></td><td>6.2</td><td>6.2</td><td></td><td></td><td></td><td></td><td>6.1</td><td></td><td>6.1</td><td>6.1</td><td></td></t<>	Total Lost Time (s)		6.2	6.2					6.1		6.1	6.1	
Recall Mode None None None C-Max None C-Max Act Effet Green (s) 19.3 19.3 28.4 43.4 60.58 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.6 0.4 0.4 0.0 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Lead</td> <td></td> <td>Lag</td> <td></td> <td></td>									Lead		Lag		
Act Effct Green (s) 19.3 19.3 28.4 43.4 43.4 Actuated g/C Ratio 0.26 0.26 0.36 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.58											Yes		
Actuated g/C Ratio 0.26 0.26 0.26 0.38 0.58 0.58 0.58 0/c Ratio 0.74 0.18 0.90 0.60 0.41 0.74 0.18 0.90 0.60 0.41 0.74 0.18 0.90 0.60 0.41 0.74 0.18 0.90 0.60 0.41 0.74 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	Recall Mode	None	None	None					C-Max		None	C-Max	
v/c Ratio 0.74 0.18 0.90 0.60 0.41 Control Delay 30.9 2.2 34.6 27.1 8.2 Queue Delay 0.0 0.0 0.0 0.0 1.3 Total Delay 30.9 2.2 34.6 27.1 9.5 LOS C A C C A Approach Delay 27.5 34.6 15.0 A Approach LOS C C B Queue Length 50th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reductn 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67	Act Effct Green (s)		19.3	19.3					28.4		43.4	43.4	
Control Delay 30.9 2.2 34.6 27.1 8.2 Queue Delay 0.0 0.0 0.0 1.3 Total Delay 30.9 2.2 34.6 27.1 9.5 LOS C A C C A Approach Delay 27.5 34.6 15.0 A 15.0 A Approach LOS C C B Queue Length 50th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 80.8 Turn Bay Length (m) 80.8 Turn Bay Length (m) 80.8 Turn Bay Length (m) 998 517 1211 313 1009 Starvation Cap Reductn 0 0 389 Spillback Cap Reductn 0 0 0 389 Spillback Cap Reductn 0 0 0 0 0 0 0 0 0 0 0 0 <td< td=""><td>Actuated g/C Ratio</td><td></td><td>0.26</td><td>0.26</td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.58</td><td>0.58</td><td></td></td<>	Actuated g/C Ratio		0.26	0.26							0.58	0.58	
Queue Delay 0.0 0.0 0.0 1.3 Total Delay 30.9 2.2 34.6 27.1 9.5 LOS C A C C A Approach Delay 27.5 34.6 15.0 Approach LOS C C B Queue Length 95th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 80.8 80.8 80.8 Turn Bay Length (m) 30.0 0 0 0 0 0 30.9 80.8	v/c Ratio		0.74	0.18							0.60	0.41	
Total Delay 30.9 2.2 34.6 27.1 9.5 LOS C A C C A A C C C A A Approach Delay 27.5 34.6 15.0 Approach LOS C C B Queue Length 50th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reducth 0 0 0 0 0 389 Spillback Cap Reducth 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Control Delay		30.9	2.2					34.6		27.1	8.2	
LOS C A C C A Approach Delay 27.5 34.6 15.0 Approach LOS C C B Queue Length 50th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reductn 0 0 0 0 389 Spillback Cap Reductn 0 0 0 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67	Queue Delay		0.0	0.0					0.0		0.0	1.3	
Approach Delay 27.5 34.6 15.0 Approach LOS C C B Queue Length 50th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 88.8 129.7 1211 313 1009 Starvation Cap Reductn (pyh) 998 517 1211 313 1009 Starvation Cap Reductn 0 0 0 389 Spillback Cap Reductn 0 0 0 0 Storage Cap Reductn 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67 Intersection Summary Cycle Length: 75	Total Delay		30.9	2.2					34.6		27.1	9.5	
Approach LOS C C B Queue Length 50th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reductn 0 0 0 0 0 389 Spillback Cap Reductn 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 Intersection Summary Cycle Length: 75	LOS		С	Α							С	Α	
Queue Length 50th (m) 41.8 0.0 73.7 14.1 21.3 Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reducth 0 0 0 389 Spillback Cap Reducth 0 0 0 0 0 Storage Cap Reducth 0 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67 Intersection Summary Cycle Length: 75	Approach Delay								34.6			15.0	
Queue Length 95th (m) 55.7 3.4 #122.9 m31.4 m28.4 Internal Link Dist (m) 176.4 219.4 129.7 80.8 Turn Bay Length (m) 30.0 Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reductn 0 0 0 389 Spillback Cap Reductn 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 Reduced Vc Ratio 0.62 0.16 0.90 0.60 0.67 Intersection Summary Cycle Length: 75	Approach LOS		С									В	
Internal Link Dist (m)	Queue Length 50th (m)		41.8	0.0					73.7		14.1	21.3	
Turn Bay Length (m) 30.0 Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reductn 0 0 0 0 389 Spillback Cap Reductn 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67	Queue Length 95th (m)		55.7	3.4					#122.9		m31.4	m28.4	
Base Capacity (vph) 998 517 1211 313 1009 Starvation Cap Reducth 0 0 0 0 389 Spillback Cap Reducth 0 0 0 0 0 0 0 Spillback Cap Reducth 0 0 0 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67	Internal Link Dist (m)		176.4			219.4			129.7			80.8	
Starvation Cap Reductn 0 0 0 389 Spillback Cap Reductn 0 0 0 0 0 Storage Cap Reductn 0 <td>Turn Bay Length (m)</td> <td></td> <td></td> <td>30.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Turn Bay Length (m)			30.0									
Spillback Cap Reductn 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67 Intersection Summary Cycle Length: 75	Base Capacity (vph)		998	517					1211		313	1009	
Storage Cap Reductn 0 0 0 0 Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67 Intersection Summary Cycle Length: 75	Starvation Cap Reductn		0	0					0		0	389	
Reduced v/c Ratio 0.62 0.16 0.90 0.60 0.67 Intersection Summary Cycle Length: 75	Spillback Cap Reductn		0	0					0		0	0	
Intersection Summary Cycle Length: 75	Storage Cap Reductn			0					0		0		
Cycle Length: 75	Reduced v/c Ratio		0.62	0.16					0.90		0.60	0.67	
Actuated Cycle Length: 75													
	Actuated Cycle Length: 75												

Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBTL, Start of Green Natural Cycle: 75
Control Type: Actuated-Coordinated

Synchro 10 Light Report Page 1 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2020 Existing 04/13/2023

Maximum v/c Ratio: 0.90 Intersection Signal Delay: 27.6 Intersection LOS: C Intersection Signal Delay: 27.6 Inter
Intersection Capacity Utilization 75.1% ICU
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal. ICU Level of Service D



30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 2 Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

Existing 05-16-2024

	•	-	\rightarrow	•	←	*	1	†	1	1	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					414						^	7
Traffic Volume (vph)	0	0	0	192	436	0	0	0	0	0	343	255
Future Volume (vph)	0	0	0	192	436	0	0	0	0	0	343	255
Satd. Flow (prot)	0	0	0	0	4693	0	0	0	0	0	1745	1483
Flt Permitted					0.985							
Satd. Flow (perm)	0	0	0	0	4657	0	0	0	0	0	1745	1443
Satd. Flow (RTOR)					153							104
Lane Group Flow (vph)	0	0	0	0	697	0	0	0	0	0	381	283
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Detector Phase				6	6						4	4
Switch Phase												
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				28.0	28.0						47.0	47.0
Total Split (%)				37.3%	37.3%						62.7%	62.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)					0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)					22.8						41.7	41.7
Actuated g/C Ratio					0.30						0.56	0.56
v/c Ratio					0.46						0.39	0.33
Control Delay					15.4						11.0	6.8
Queue Delay					0.0						0.0	0.0
Total Delay					15.4						11.0	6.8
LOS					В						В	Α
Approach Delay					15.4						9.2	
Approach LOS					В						Α	
Queue Length 50th (m)					9.1						28.1	11.8
Queue Length 95th (m)					11.3						45.5	24.7
Internal Link Dist (m)		117.8			157.8			120.4			277.6	
Turn Bay Length (m)												
Base Capacity (vph)					1522						970	848
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.46						0.39	0.33
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 24 (32%), Referenced	to phase	2: and 6:	WBTL, S	Start of Gr	een							
Natural Cycle: 55												
Control Type: Actuated-Coord	linated											

30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report Page 1

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

Existing 05-16-2024

Maximum v/c Ratio: 0.46
Intersection Signal Delay: 12.4
Intersection LOS: B
Intersection Capacity Utilization 45.8%
ICU Level of Service A
Analysis Period (min) 15

Solits and Phases: 1: HWY 417 OP/Lyon & Catherine



	•	-	•	•	•	*	1	†	1	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
ane Configurations					↑ ₽	7		ተተቡ				
Traffic Volume (vph)	0	0	0	0	593	289	25	720	0	0	0	
Future Volume (vph)	0	0	0	0	593	289	25	720	0	0	0	
Satd. Flow (prot)	0	0	0	0	3143	1350	0	4755	0	0	0	
Flt Permitted	-	•	-	_				0.998	•	_	-	
Satd. Flow (perm)	0	0	0	0	3143	1247	0	4752	0	0	0	
Satd, Flow (RTOR)								70				
Lane Group Flow (vph)	0	0	0	0	691	289	0	828	0	0	0	
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases						6	8					
Detector Phase					6	6	8	8				
Switch Phase					•	•	0	U				
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
Total Split (s)					38.0	38.0	32.0	32.0				
Total Split (%)					50.7%	50.7%	42.7%	42.7%				
Yellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
Lost Time Adjust (s)					0.0	0.0	2.5	0.0				
Total Lost Time (s)					5.8	5.8		5.8				
								5.0				
_ead/Lag _ead-Lag Optimize?					Lag	Lag						
Recall Mode					C-Max	C-Max	Mari	Mari				
							Max	Max 26.2				
Act Effct Green (s)					32.2	32.2		0.35				
Actuated g/C Ratio					0.43	0.43						
//c Ratio					0.51	0.54		0.49				
Control Delay					14.1	16.6		18.5				
Queue Delay					0.0	0.0		0.0				
Total Delay					14.1	16.6		18.5				
_OS					В	В		В				
Approach Delay					14.8			18.5				
Approach LOS					В			В				
Queue Length 50th (m)					30.2	25.3		30.0				
Queue Length 95th (m)					m42.9	m38.9		40.6				
nternal Link Dist (m)		157.8			130.6			43.8			56.6	
Turn Bay Length (m)												
Base Capacity (vph)					1349	535		1705				
Starvation Cap Reductn					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn					0	0		0				
Reduced v/c Ratio					0.51	0.54		0.49				
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 12 (16%), Reference	d to phase	2: and 6:	WBT, Sta	rt of Gre	en							
latural Cycle: 55												
Control Type: Actuated-Coor	rdinated											

Lane Group	Ø5	
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	
Minimum Split (s)	5.0	
Total Split (s)	5.0	
Total Split (%)	7%	
Yellow Time (s)	2.0	
All-Red Time (s)	0.0	
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	
Lead-Lag Optimize?		
Recall Mode	Max	
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		
y		

Lanes, Volumes, Timings 2: Kent & Catherine

Existing 05-16-2024

Maximum v/c Ratio: 0.54
Intersection Signal Delay: 16.5
Intersection Capacity Utilization 48.2%
Intersection Capacity Utilization 48.2%
Analysis Period (min) 15

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



30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report

Lanes, Volumes, Timings 3: Chamberlain & Kent

Existing 05-16-2024

	۶	→	←	*	-	4		
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4	
Lane Configurations		^						
Traffic Volume (vph)	0	772	0	0	0	0		
Future Volume (vph)	0	772	0	0	0	0		
Satd. Flow (prot)	0	3316	0	0	0	0		
Flt Permitted								
Satd. Flow (perm)	0	3316	0	0	0	0		
Satd. Flow (RTOR)								
Lane Group Flow (vph)	0	858	0	0	0	0		
Turn Type		NA						
Protected Phases		2					4	
Permitted Phases								
Detector Phase		2						
Switch Phase								
Minimum Initial (s)		10.0					10.0	
Minimum Split (s)		36.0					21.0	
Total Split (s)		36.0					21.0	
Total Split (%)		63.2%					37%	
Yellow Time (s)		3.3					3.0	
All-Red Time (s)		1.7					1.0	
Lost Time Adjust (s)		0.0						
Total Lost Time (s)		5.0						
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode		Min					None	
Act Effct Green (s)		35.8						
Actuated g/C Ratio		0.83						
v/c Ratio		0.31						
Control Delay		4.3						
Queue Delay		0.0						
Total Delay		4.3						
LOS		A						
Approach Delay		4.3						
Approach LOS		Α						
Queue Length 50th (m)		0.0						
Queue Length 95th (m)		36.3						
Internal Link Dist (m)		270.2	176.4		23.7			
Turn Bay Length (m)								
Base Capacity (vph)		2764						
Starvation Cap Reductn		0						
Spillback Cap Reductn		0						
Storage Cap Reductn		0						
Reduced v/c Ratio		0.31						
Intersection Summary								
Cycle Length: 57								
Actuated Cycle Length: 43								
Natural Cycle: 60								
Control Type: Semi Act-Uncoor	ď							
Maximum v/c Ratio: 0.31								

30-48 Chamberlain PM PEAK HOUR

Synchro 10 Light Report Page 6

Lanes, Volumes, Timings Existing 3: Chamberlain & Kent 05-16-2024 Intersection Signal Delay: 4.3
Intersection Capacity Utilization 26.7% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent th_{Ø4} →ø2

Synchro 10 Light Report Page 7 30-48 Chamberlain PM PEAK HOUR

Lanes, Volumes, Timings 4: Bank & Catherine

Existing 05-16-2024

	۶	→	*	1	—	*	4	†	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
Lane Configurations					ብተቡ			414			↑ ↑	
Traffic Volume (vph)	0	0	0	225	484	137	182	320	0	0	643	11
uture Volume (vph)	0	0	0	225	484	137	182	320	0	0	643	11
Satd. Flow (prot)	0	0	0	0	4536	0	0	3256	0	0	3095	
It Permitted					0.987			0.547				
Satd. Flow (perm)	0	0	0	0	4474	0	0	1814	0	0	3095	
Satd. Flow (RTOR)					50						26	
ane Group Flow (vph)	0	0	0	0	940	0	0	558	0	0	836	
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				24.0	24.0		14.0	41.0			27.0	
Total Split (%)				32.0%	32.0%		18.7%	54.7%			36.0%	
/ellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
ost Time Adjust (s)					0.0			0.0			0.0	
otal Lost Time (s)					5.6			5.4			5.4	
Lead/Lag				Lag	Lag			0			Lag	
_ead-Lag Optimize?				Lug	209						Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)				max	18.4		max	35.6			21.6	
Actuated g/C Ratio					0.25			0.47			0.29	
/c Ratio					0.83			0.54			0.92	
Control Delay					33.0			12.0			42.4	
Queue Delay					0.0			0.0			46.0	
Total Delay					33.0			12.0			88.3	
.OS					C			12.0 B			60.5 F	
Approach Delay					33.0			12.0			88.3	
Approach LOS					C			12.0 B			00.5 F	
Queue Length 50th (m)					43.8			15.1			58.2	
Queue Length 95th (m)					#60.2			19.1			#92.8	
nternal Link Dist (m)		130.6			383.3			80.8			138.4	
Furn Bay Length (m)		100.0			300.0			00.0			100.4	
Base Capacity (vph)					1135			1026			909	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					2			0			151	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.83			0.54			1.10	
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 50 (67%), Referenced	to phase	2:NBTI :	and 6:SF	T. Start o	of Green						_	
Natural Cycle: 70	.5 p00			., o	. 5.00.1							
Control Type: Actuated-Coord	dinated										_	
Control Type: Actuated-Coord	inated											

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Lanes, Volumes, Timings 4: Bank & Catherine

Existing 05-16-2024

Lane Group	Ø7	Ø9	Ø13
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)		_	
Lane Group Flow (vph)			
Turn Type	-		
Protected Phases	7	9	13
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	7%	7%	7%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)			
Lead/Lag	Lead		Lead
Lead-Lag Optimize?	Lead		Yes
Recall Mode	Max	May	
	IVIAX	Max	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			_
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

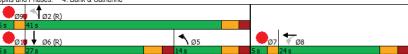
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Lanes, Volumes, Timings 4: Bank & Catherine

Existing 05-16-2024

Maximum v/c Ratio: 0.92
Intersection Signal Delay: 47.8
Intersection LOS: D
Intersection Capacity Utilization 72.7%
ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bank & Catherine



Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella

Control Type: Actuated-Coordinated

Existing 05-16-2024

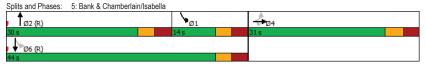
	•	→	•	•	←	*		†	1	-	↓	4
_ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
ane Configurations		414	7					† î>			414	
Traffic Volume (vph)	53	590	120	0	0	0	0	448	91	175	720	
Future Volume (vph)	53	590	120	0	0	0	0	448	91	175	720	
Satd. Flow (prot)	0	3302	1483	0	0	0	0	3097	0	0	3283	
Flt Permitted		0.996									0.701	
Satd. Flow (perm)	0	3299	1345	0	0	0	0	3097	0	0	2284	
Satd. Flow (RTOR)			134					33				
Lane Group Flow (vph)	0	715	133	0	0	0	0	599	0	0	994	
Turn Type	Perm	NA	Perm					NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4							6		
Detector Phase	4	4	4					2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					10.0		5.0	10.0	
Minimum Split (s)	26.2	26.2	26.2					23.1		11.1	23.1	
Total Split (s)	31.0	31.0	31.0					30.0		14.0	44.0	
Total Split (%)	41.3%	41.3%	41.3%					40.0%		18.7%	58.7%	
Yellow Time (s)	3.3	3.3	3.3					3.0		3.0	3.0	
All-Red Time (s)	2.9	2.9	2.9					3.1		3.1	3.1	
ost Time Adjust (s)		0.0	0.0					0.0			0.0	
Total Lost Time (s)		6.2	6.2					6.1			6.1	
Lead/Lag								Lead		Lag		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					C-Max		None	C-Max	
Act Effct Green (s)		21.5	21.5					41.2			41.2	
Actuated g/C Ratio		0.29	0.29					0.55			0.55	
v/c Ratio		0.76	0.28					0.35			0.79	
Control Delay		29.6	5.3					10.2			16.4	
Queue Delay		0.0	0.0					0.0			10.4	
Total Delay		29.6	5.3					10.2			26.8	
LOS		С	Α					В			С	
Approach Delay		25.8						10.2			26.8	
Approach LOS		С						В			С	
Queue Length 50th (m)		47.6	0.0					21.8			81.8	
Queue Length 95th (m)		62.4	10.5					34.8			m92.5	
Internal Link Dist (m)		176.4			219.4			129.7			80.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1090	534					1714			1253	
Starvation Cap Reductn		0	0					0			242	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.66	0.25					0.35			0.98	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 60 (80%), Reference	ed to phase	2:NBT a	nd 6:SBTI	, Start of	f Green							

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Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella Existing 05-16-2024

Maximum v/c Ratio: 0.79
Intersection Signal Delay: 22.4
Intersection Capacity Utilization 81.3%
ICU Level of Service D
Analysis Period (min) 15

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



Appendix D

Collision Data



Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Traffic Control Condition	Classification Of Accident	Initial Impact Type	Road Surface Condition	# Vehicles	# Motorcycles	# Bicycles	# Pedestrians
2016-10-13	2016	10:56	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight		01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2016-10-10	2016	19:17	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2016-10-30 2016-11-05	2016 2016	15:08 13:49	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132) BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal	01 - Functioning 01 - Functioning	02 - Non-fatal injury 03 - P.D. only	02 - Angle 02 - Angle	01 - Dry 01 - Dry	2	0	0	0
2016-12-31	2016	15:23	BANKST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	03 - Snow	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	03 - Loose snow	2	0	0	0
2016-03-21	2016	11:12	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2016-03-04	2016	14:55	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2016-01-11	2016	1:39	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	03 - Snow	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	03 - Loose snow	2	0	0	0
2016-01-11	2016	21:08	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	07 - SMV other	02 - Wet	1	ō	0	1
2016-01-03	2016	22:14	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	02 - Wet	2	0	0	0
2016-04-21	2016	15:40	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2016-05-31	2016	8:32	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	1	0
2016-06-20	2016	2:12	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2016-06-25	2016	10:38	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2016-07-04	2016	0:24	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2016-08-26	2016	13:33	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	3	0	0	0
2016-09-20	2016	18:46	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2017-12-15	2017	16:39	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	03 - Snow	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	02 - Wet	3	0	0	0
2017-02-27	2017	14:49	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2017-04-08 2017-04-29	2017 2017	15:02	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2017-04-29	2017	13:25 10:56	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132) BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal 01 - Traffic signal	01 - Functioning 01 - Functioning	03 - P.D. only 03 - P.D. only	04 - Sideswipe 02 - Angle	01 - Dry 01 - Dry	2	0	0	0
2017-07-16	2017	8:49	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132) BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight 01 - Daylight		01 - Functioning	02 - Non-fatal injury	02 - Angle	01 - Dry	2	0	0	0
2017-07-11	2017	17:16	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	02 - Wet	2	0	0	0
2017-08-24	2017	20:58	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	05 - Dusk	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2017-09-13	2017	5:30	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2017-09-23	2017	14:50	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	02 - Angle	01 - Dry	2	0	0	0
2018-10-18	2018	14:13	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	ō	0	ō
2018-02-06	2018	20:50	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	02 - Wet	2	0	0	0
2018-05-26	2018	11:40	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	02 - Angle	01 - Dry	1	0	0	0
2018-05-14	2018	10:32	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	02 - Angle	01 - Dry	2	0	0	0
2018-05-11	2018	15:08	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2018-07-27	2018	14:15	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2018-08-30	2018	13:20	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2018-01-16	2018	20:05	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	04 - Slush	1	0	0	0
2019-08-21	2019	16:00	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	00 - Unknown	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
2019-09-18	2019	0:37	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2019-02-11	2019	8:44	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	3	0	0	0
2019-02-24	2019	17:05	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	02 - Rain	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	02 - Wet	2	0	0	0
2019-02-16 2019-04-13	2019 2019	22:13 17:26	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132) BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear 01 - Clear	07 - Dark 01 - Daylight	01 - Traffic signal 01 - Traffic signal	00 - Unknown 01 - Functioning	03 - P.D. only 03 - P.D. only	05 - Turning movement 05 - Turning movement	02 - Wet 01 - Dry	2	0	0	0
2019-04-13	2019	13:20	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132) BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight 01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2019-05-05	2019	22:56	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132) BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2019-04-30	2019	18:09	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	03 - Rear end	01 - Dry	2	0	0	0
2019-07-08	2019	21:37	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	05 - Turning movement	01 - Dry	2	0	0	0
2019-07-25	2019	12:16	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	ō	0	ō
2019-08-13	2019	23:31	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2019-08-11	2019	20:50	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2019-08-16	2019	1:01	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	02 - Angle	01 - Dry	2	0	0	0
2020-03-10	2020	10:55	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	02 - Wet	3	0	0	0
2020-02-29	2020	15:57	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2020-09-18	2020	16:30	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2020-09-07	2020	21:29	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	07 - Dark	01 - Traffic signal	01 - Functioning	02 - Non-fatal injury	02 - Angle	01 - Dry	2	0	0	0
2020-11-03	2020	9:42	BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST (0002132)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	05 - Packed snow	2	0	0	0
2016-05-20	2016	15:50	CHAMBERLAIN AVE @ KENT ST (0002131)	01 - Clear	01 - Daylight	01 - Traffic signal	01 - Functioning	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2018-03-13 2020-07-04	2018	2:58	CHAMBERLAIN AVE @ KENT ST (0002131)	03 - Snow	07 - Dark	01 - Traffic signal	01 - Functioning	03 - P.D. only	07 - SMV other	03 - Loose snow	2	0	0	0
	2020	12:45	CHAMBERLAIN AVE @ KENT ST (0002131)	01 - Clear	01 - Daylight	12 - IPS	01 - Functioning	03 - P.D. only	03 - Rear end	01 - Dry 02 - Wet	2	0	0	U O
2017-08-22 2017-09-13	2017 2017	16:28 9:12	CHAMBERLAIN AVE btwn KENT ST & TO BE DETERMINED (3ZA25A) CHAMBERLAIN AVE btwn KENT ST & TO BE DETERMINED (3ZA25A)	01 - Clear 01 - Clear	01 - Daylight	10 - No control 10 - No control	0	03 - P.D. only 02 - Non-fatal injury	04 - Sideswipe 07 - SMV other	02 - Wet 01 - Dry	2	U	0	0
2017-09-13	2017	16:01	CHAMBERLAIN AVE blwn KENT ST & TO BE DETERMINED (3ZAZSA) CHAMBERLAIN AVE blwn KENT ST & TO BE DETERMINED (3ZAZSA)	01 - Clear 01 - Clear	01 - Daylight 01 - Daylight	10 - No control	0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2016-08-30	2016	14:54	CHAMBERLAIN AVE blwn LYON ST S & KENT ST (3ZA2SC)	01 - Clear	01 - Daylight	10 - No control	0	03 - P.D. only	03 - Rear end	01 - Dry	2	0	0	0
2019-04-05	2019	15:49	CHAMBERLAIN AVE blwn LYON ST S & KENT ST (3ZA25C)	01 - Clear	01 - Daylight		0	03 - P.D. only	04 - Sideswipe	01 - Dry	2	0	0	0
2013 04 03	2025	13.43		O2 Cicui	Duyingin	10 control		23 1.5.0119	z. sucswipe	31 biy	-			•



Transportation Services - Traffic Services Collision Details Report - Public Version

From: January 1, 2014 To: December 31, 2018

Location: BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

Traffic Control: Traffic signal

Non-fatal injury

P.D. only

P.D. only

P.D. only

P.D. only

Total Collisions: 56 Surface Cond'n Date/Day/Time Environment Impact Type Classification Veh. Dir Vehicle Manoeuver Vehicle type First Event No. Ped 2014-Mar-13, Thu,01:00 Angle P.D. only Loose snow South Unknown Automobile, station wagon Other motor vehicle Fast Going ahead Automobile, station wagon Other motor vehicle 2014-Jul-18, Fri,22:25 Clear SMV other P.D. only Dry South Turning left Automobile, station wagon Pedestrian 2014-Jul-19, Sat,21:01 Rear end P.D. only Dry South Going ahead Passenger van Other motor vehicle South Slowing or stopping Automobile, station wagon Other motor vehicle 2014-Jul-31, Thu,11:45 Sideswipe P.D. only Dry East Going ahead Automobile, station wagon Other motor vehicle East Going ahead Automobile, station wagon Other motor vehicle 2014-Aug-10, Sun,21:41 Clear Rear end Non-fatal injury Dry South Unknown Unknown Cyclist 0 Turning left Ricycle South Other motor vehicle 2014-Oct-08, Wed,13:59 Clear Sideswipe P.D. only Dry South Changing lanes Automobile, station wagon Other motor vehicle 0 Going ahead Automobile, station wagon Other motor vehicle South 2014-Oct-11, Sat,06:51 Turning left Turning movement Non-fatal injury Dry South Automobile, station wagon Other motor vehicle North Going ahead Motorcycle 2014-Oct-14, Tue,06:30 Clear Non-fatal injury East Other motor vehicle Dry Slowing or stopping Truck - dump 0 Angle South Going ahead Automobile, station wagon Other motor vehicle

Dry

Loose snow

Dry

Dry

Dry

South

East

East

North

South

East

Turning left

Stopped

Going ahead

Going ahead

Going ahead

Going ahead

Turning left

Slowing or stopping Automobile, station wagon

Pick-up truck

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2014-Oct-23, Thu,20:20 Clear

2015-Feb-08, Sun,08:48 Snow

2015-Apr-29, Wed,10:54 Clear

2015-May-09, Sat,20:05 Clear

2015-Aug-06, Thu, 20:59 Clear

SMV other

Rear end

Angle

Angle

SMV other

Transportation Services - Traffic Services Collision Details Report - Public Version

From: January 1, 2014 To: December 31, 2018

Automobile, station wagon Pedestrian

Automobile, station wagon

Automobile, station wagon

Automobile, station wagon

Automobile, station wagon Other motor vehicle

Automobile, station wagon Other motor vehicle

0

Other motor vehicle

Other motor vehicle

Other motor vehicle

Other motor vehicle

Traffic Control: Tra	ffic signal						Total Collisions:	56	
Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuve		First Event	No. Ped
2015-Sep-08, Tue,19:37	Clear	Angle	P.D. only	Dry	South	Turning left	Bicycle	Other motor vehicle	0
					East	Turning left	Automobile, station wagon	Cyclist	
2015-Sep-12, Sat,16:42	Rain	Turning movement	P.D. only	Wet	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Passenger van	Other motor vehicle	
2015-Sep-13, Sun,15:43	Clear	Turning movement	P.D. only	Wet	East	Turning left	Delivery van	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2015-Oct-12, Mon,14:45	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Oct-12, Mon,17:00	Clear	Sideswipe	P.D. only	Dry	East	Unknown	Unknown	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Oct-14, Wed,17:01	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Oct-27, Tue,15:22	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Pick-up truck	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Dec-18, Fri,15:42	Clear	Sideswipe	P.D. only	Dry	South	Stopped	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Truck - dump	Other motor vehicle	
2016-Jan-03, Sun,22:14	Clear	Angle	P.D. only	Wet	South	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Jan-11, Mon,01:39	Snow	Angle	P.D. only	Loose snow	East	Turning right	Pick-up truck	Other motor vehicle	0
					South	Going ahead	Municipal transit bus	Other motor vehicle	
2016-Jan-11, Mon,21:08	Clear	SMV other	Non-fatal injury	Wet	North	Turning right	Automobile, station wagon	Pedestrian	1
2016-Mar-04, Fri,14:55	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Turning left	Pick-up truck	Other motor vehicle	

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Location: BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

Transportation Services - Traffic Services Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Traffic Control: Traffic signal Total Collisions:									
Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuve	r Vehicle type	First Event	No. Ped
2016-Mar-21, Mon,11:12	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Apr-21, Thu,15:40	Clear	Rear end	P.D. only	Dry	East	Going ahead	Police vehicle	Other motor vehicle	0
					East	Slowing or stopping	g Passenger van	Other motor vehicle	
2016-May-31, Tue,08:32	Clear	Sideswipe	P.D. only	Dry	North	Unknown	Bicycle	Other motor vehicle	0
	North Stopped Automobile, station wagor		Automobile, station wagon	Cyclist					
2016-Jun-20, Mon,02:12	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Jun-25, Sat,10:38	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Jul-04, Mon,00:24	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Pick-up truck	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Aug-26, Fri,13:33	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	g Pick-up truck	Other motor vehicle	0
					North	Slowing or stopping	g Automobile, station wagon	Other motor vehicle	
2016-Sep-20, Tue,18:46	Clear	Sideswipe	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Oct-10, Mon,19:17	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Oct-13, Thu,10:56	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Pick-up truck	Other motor vehicle	
2016-Oct-30, Sun,15:08	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	

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Transportation Services - Traffic Services Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2018

Traffic Control: Traf	ffic signal						Total Collisions:	56	
Date/Day/Time	Environment	Impact Type	Classification	Surface	Veh. Dir	Vehicle Manoeuve		First Event	No. Ped
Jale/Day/Time	Environment	ітрасі туре	Classification	Cond'n	ven. Dir	venicie Manoeuve	r venicie type	First Event	No. Ped
2016-Nov-05, Sat,13:49	Clear	Angle	P.D. only	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2016-Dec-31, Sat,15:23	Snow	Rear end	P.D. only	Loose snow	North	Slowing or stopping	g Automobile, station wagon	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2017-Feb-27, Mon,14:49	Clear	Angle	P.D. only	Dry	North	Turning right	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Apr-08, Sat,15:02	Clear	Turning movement	P.D. only	Dry	East	Turning left	Pick-up truck	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Apr-29, Sat,13:25	Clear	Sideswipe	P.D. only	Dry	South	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					South	Changing lanes	Automobile, station wagon	Other motor vehicle	
2017-Jul-11, Tue,17:16	Rain	Rear end	P.D. only	Wet	East	Slowing or stopping	g Automobile, station wagon	Other motor vehicle	0
					East	Stopped	Pick-up truck	Other motor vehicle	
2017-Jul-16, Sun,08:49	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Jul-16, Sun,10:56	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Aug-24, Thu,20:58	Clear	Sideswipe	P.D. only	Dry	East	Changing lanes	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Sep-13, Wed,05:30	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
		-			East	Going ahead	Pick-up truck	Other motor vehicle	
2017-Sep-23, Sat,14:50	Clear	Angle	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
		-			East	Going ahead	Automobile, station wagon	Other motor vehicle	
2017-Dec-15, Fri,16:39	Snow	Sideswipe	P.D. only	Wet	East	Changing lanes	Pick-up truck	Other motor vehicle	0
		•	•		East	Turning left	Truck and trailer	Other motor vehicle	

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Transportation Services - Traffic Services Collision Details Report - Public Version

From: January 1, 2014 To: December 31, 2018

Automobile, station wagon Other motor vehicle

Location: BANK ST @ CHAMBERLAIN AVE N/ISABELLA ST

Traffic Control: Traffic signal **Total Collisions: 56** Date/Day/Time Environment Impact Type Surface Cond'n Classification Veh. Dir Vehicle Manoeuver Vehicle type First Event No. Ped 2018-Jan-16, Tue,20:05 Clear Turning movement P.D. only Slush South Turning left Pick-up truck Other motor vehicle North Going ahead Pick-up truck Other motor vehicle 2018-Feb-06, Tue,20:50 Clear Turning movement P.D. only Wet South Turning left Automobile, station wagon Other motor vehicle North Going ahead
Automobile, station wagon
Other motor vehicle 2018-May-11, Fri,15:08 Clear Sideswipe P.D. only Dry East Overtaking Automobile, station wagon Other motor vehicle Slowing or stopping Automobile, station wagon Other motor vehicle East East Stopped Automobile, station wagon Other motor vehicle Non-fatal injury 2018-May-14, Mon,10:32 Clear Angle Dry South Going ahead Automobile, station wagon Other motor vehicle Going ahead Automobile, station wagon Other motor vehicle Non-fatal injury 2018-May-26, Sat,11:40 Clear Going ahead Automobile, station wagon Other motor vehicle Angle Dry South East Going ahead Automobile, station wagon Other motor vehicle 2018-Jul-27, Fri,14:15 P.D. only Dry Unknown Unknown Other motor vehicle North Stopped Automobile, station wagon Other motor vehicle 2018-Aug-30, Thu,13:20 Clear Turning movement P.D. only East Turning left Delivery van Other motor vehicle East Turning left Passenger van Other motor vehicle 2018-Oct-18, Thu,14:13 Clear Rear end P.D. only Dry Going ahead East Pick-up truck Other motor vehicle 0

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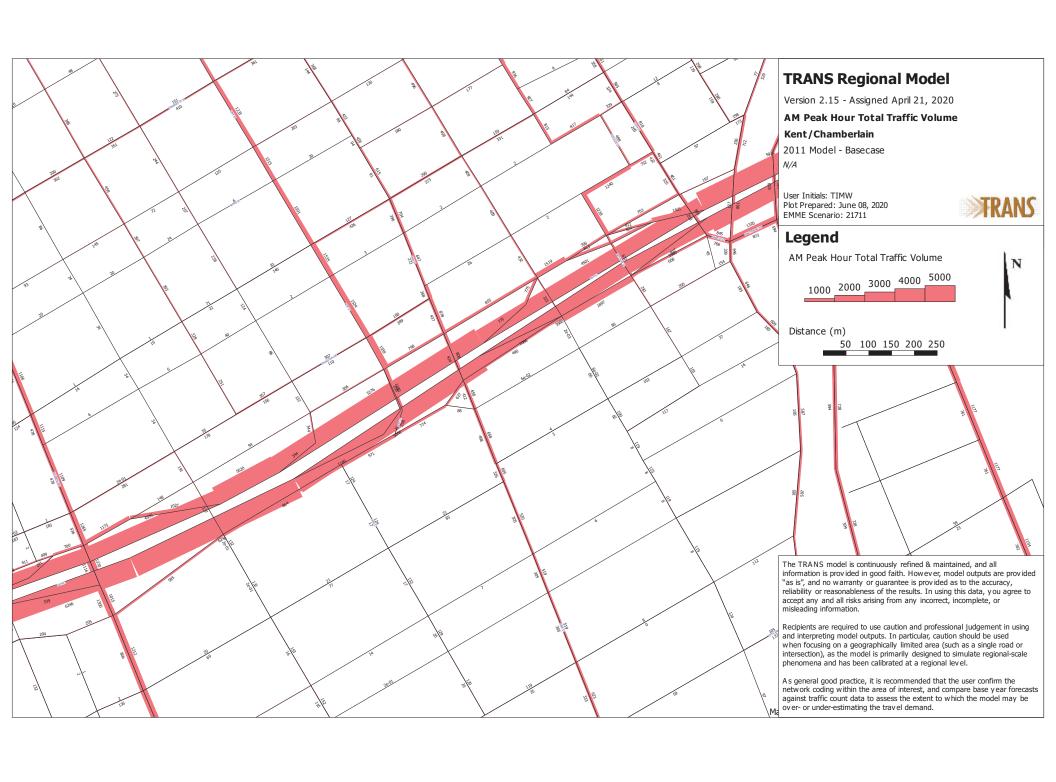
East

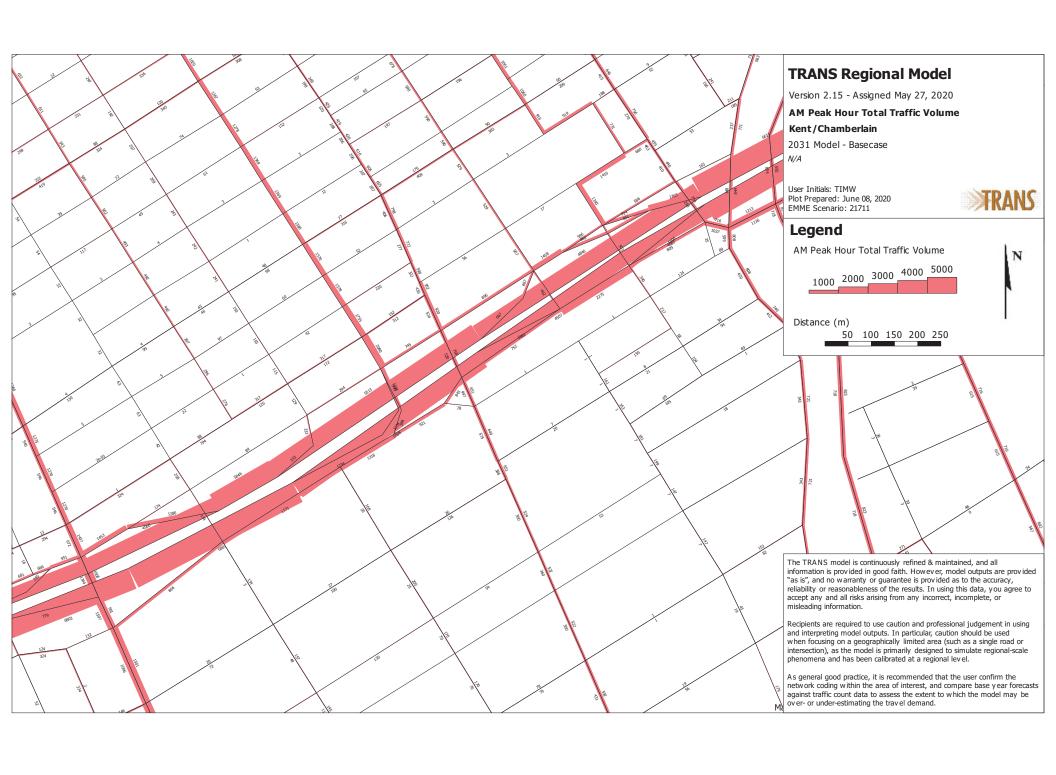
Stopped

Appendix E

TRANS Model Plots







Appendix F

Synchro Intersection Worksheets – 2024 Future Background Conditions



Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

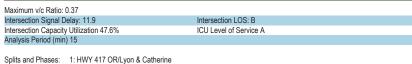
2024 Future Background 05-16-2024

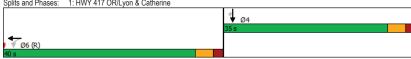
Anne Configurations		•	→	\rightarrow	1	-	•	4	†	-	-	↓	4
Traffic Volume (vph) 0 0 0 2222 219 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 2222 219 0 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 222 219 0 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 268 127 viture Volume (vph) 0 0 0 0 4645 0 0 0 0 0 0 1745 1483 viter Fermitted 0 0.975 viture Volume (vph) 0 0 0 0 4612 0 0 0 0 0 0 1745 1483 viter Volume (vph) 0 0 0 0 4612 0 0 0 0 0 0 1745 1483 viter Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph) 0 0 0 2222 219 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 2222 219 0 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 222 219 0 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 268 127 viture Volume (vph) 0 0 0 0 4645 0 0 0 0 0 0 1745 1483 viter Fermitted 0 0.975 viture Volume (vph) 0 0 0 0 4612 0 0 0 0 0 0 1745 1483 viter Volume (vph) 0 0 0 0 4612 0 0 0 0 0 0 1745 1483 viter Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 0 4411 0 0 0 0 0 288 127 viture Volume (vph) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Lane Configurations					4412						*	1
vilure Volume (vph) 0 0 222 219 0 0 0 288 127 satid. Flow (prot) 0 0 0 4645 0 0 0 1745 1483 site Fermitted 0.975 0 0 0 1745 1483 stadic Flow (prot) 0 0 0 4612 0 0 0 1745 1454 stadic Flow (prot) 0 0 0 4612 0 0 0 1745 1452 stadic Flow (prot) 0 0 0 4411 0 0 0 258 127 um Type Perm NA NA Permitted NA Permitted 44 44 description (Shases) 6 4 44 44 44 44 44 44 44 44 44 44 44 44 44 44 44 44 44 44 44 <th< td=""><td>Traffic Volume (vph)</td><td>0</td><td>0</td><td>0</td><td>222</td><td></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td>127</td></th<>	Traffic Volume (vph)	0	0	0	222		0	0	0	0	0		127
Sald, Flow (prot)		0	0	0	222	219	0	0	0	0	0	258	127
Seads Flow (perm) 0 0 0 0 4612 0 0 0 0 0 1745 1454 5416. Flow (perm) 0 0 0 0 4612 0 0 0 0 0 1745 1454 5416. Flow (RTOR) 222 2 127 127 23ne Group Flow (yph) 0 0 0 0 4411 0 0 0 0 0 0 258 127 23ne Group Flow (yph) 0 0 0 0 4411 0 0 0 0 0 0 258 127 23ne Group Flow (yph) 0 0 0 0 4411 0 0 0 0 0 0 258 127 23ne Group Flow (yph) 0 0 0 0 4411 0 0 0 0 0 0 258 127 23ne Group Flow (yph) 0 0 0 0 4411 0 0 0 0 0 0 258 127 23ne Group Flow (yph) 0 0 0 0 4411 0 0 0 0 0 0 258 127 23ne Group Flow (yph) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				0	0	4645	0	0	0	0	0	1745	1483
Satd. Flow (perm) 0 0 0 4612 0 0 0 0 1745 1454 541d. Flow (RTOR) 222 1727 1454 541d. Flow (RTOR) 222 1727 1454 541d. Flow (RTOR) 122 1722 1722 1722 1722 1722 1722 1722	Flt Permitted	_	-	-	-		-	_		•	-		
Satel. Flow (RTOR) 222 ane Group Flow (yph) 0 0 0 441 0 0 0 0 341 0 0 0 0 481 0 0 0 0 481 0 0 0 0 0 481 0 0 0 0 0 481 0 0 0 0 0 0 481 0 0 0 0 0 0 0 0 0 0 0 0 0	Satd. Flow (perm)	0	0	0	0	4612	0	0	0	0	0	1745	1454
Cane Group Flow (riph) 0		-		-					-	-	-		127
Turn Type		0	0	0	0		0	0	0	0	0	258	127
Protected Phases 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		•	-	-				-	-	-	-		Perm
Permitted Phases 6 6 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4												4	
Detector Phase 6 6 6 6 6 6 6 6 6	Permitted Phases				6	•						•	4
Switch Phase Illinimum Initial (s)						6						4	4
Afinimum Initial (s) 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 26.2 28.3 28.3 28.3 26.3 26.2 28.3 28.3 26.3 26.2 28.3 28.3 26.3 26.2 28.3 35.0 35.0 46.7% 40.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0						•							
Jinimum Split (s) 26.2 26.2 28.3 28.3 Total Split (s) 40.0 40.0 35.0 35.0 Total Split (%) 53.3% 46.7% 46.7% Yellow Time (s) 3.3 3.3 3.3 JII. Red Time (s) 1.9 1.9 1.9 2.0 2.0 Ost Time Adjust (s) 0.0 0.0 0.0 0.0 Ost Time Adjust (s) 0.0 0.0 0.0 0.0 Ost Time Adjust (s) 0.0 0.0 0.0 0.0 Ost Time (s) 5.2 5.3 5.3 Lead/Lag Optimize? 8 8 29.7 29.7 Recall Mode C-Max C-Max Max Max Recall Mode C-Max C-Max Max Max Recall Mode C-Max C-Max Max Max Recall Mode 0.46 0.40 0.40 0.40 Victuated g/C Ratio 0.20 0.37 0.15 Outer Log (s) 10.5 18.1 3.9 Outer Delay 10.5 18.1 3.9 Optract Delay 10.5 18.1 3.9 Approach Delay 10.5 18.1 3.9					10.0	10.0						10.0	10.0
Total Split (s)	(-)												
State Stat													
Vellow Time (s) 3.3													
All-Red Time (s)													
.ost Time Adjust (s) 0.0 0.0 0.0 fotal Lost Time (s) 5.2 5.3 5.3 .ead/Lag (cead/Lag (ce													
Start Star					1.3								
Lead/Lag Optimize? Readal Mode C-Max C-Max At Effet Green (s) 34.8 29.7 29.7 29.7 20.7													
Recal Mode C-Max C-Max Max Max Max Max C-Max						J.Z						5.5	5.5
Recall Mode C-Max C-Max C-Max Max Max Act Effet Green (s) 34.8 29.7 29.7 29.7 29.7 29.7 29.7 29.7 29.7													
Act Effect Green (s) 34.8 29.7 29.7 Actuated g/C Ratio 0.46 0.40 0.46 0.40 0.46 0.40 0.46 0.40 0.46 0.40 0.46 0.40 0.46 0.40 0.40					C May	C May						May	May
Actuated g/C Ratio 0.46 0.46 0.40 0.40 0.40 0.40 0.40 0.40					O-IVIAX								
10.5													
Dueue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.													
10.5													
S													
10.5 13.4													
Approach LOS													A
17.3 25.1 0.0													
Queue Length 95th (m) 26.1 42.7 9.2 Internal Link Dist (m) 117.8 157.8 120.4 277.6 Turn Bay Length (m) 2 8 691 652 Starvation Cap Reductn 0 0 0 0 Spillback Cap Reductn 0 0 0 0 Reduced v/c Ratio 0.20 0.37 0.19 Intersection Summary Cycle Length: 75 Intersection Summary C													0.0
Internal Link Dist (m) 117.8 157.8 120.4 277.6 Furn Bay Length (m) 117.8 157.8 120.4 277.6 Furn Bay Length (m) 117.8 157.8 125.8 1691 1652 1652 1652 1652 1652 1652 1652 165													
Turn Bay Length (m) Jase Capacity (vph) 2258 691 652 Starvation Cap Reductn 0 0 0 0 Storage Cap Reductn 0 0 0 0 Storage Cap Reductn 0 0 0 0 Reduced v/c Ratio 0.20 0.37 0.19 Intersection Summary Sycle Length: 75 Actuated Cycle Length: 75 Actuated Cycle Length: 55 Jatural Cycle: 55			1170						100.4				9.2
Sase Capacity (vph) 2258 691 652			117.0			107.0			120.4			211.0	
Starvation Cap Reductn						0050						004	050
Spillback Cap Reductn													
Storage Cap Reducth													
Neduced v/c Ratio 0.20 0.37 0.19 Intersection Summary Sycle Length: 75 Actuated Cycle Length: 75 Intersection Summary Sycle Length: 75 Intersection Summary Intersection Sum													
ntersection Summary Cycle Length: 75 Actuated Cycle Length: 75 Offset: 48 (64%), Referenced to phase 2: and 6:WBTL, Start of Green Vatural Cycle: 55						-							
Cycle Length: 75 Actuated Cycle Length: 75 Offset: 48 (64%), Referenced to phase 2: and 6:WBTL, Start of Green Valural Cycle: 55	Reduced v/c Ratio					0.20						0.37	0.19
Actuated Öycle Length: 75 Offset: 48 (64%), Referenced to phase 2: and 6:WBTL, Start of Green latural Cycle: 55	Intersection Summary												
Offset: 48 (64%), Referenced to phase 2: and 6:WBTL, Start of Green latural Cycle: 55	Cycle Length: 75												
Natural Cycle: 55	Actuated Cycle Length: 75												
		d to phase	2: and 6:	WBTL, S	Start of G	reen							
Control Type: Actuated-Coordinated	Natural Cycle: 55												
	Control Type: Actuated-Coo	rdinated											

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 1

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2024 Future Background 05-16-2024





30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 2

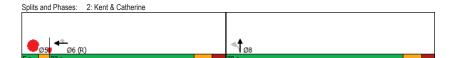
	•	\rightarrow	*	1	-	*	1	†	1	1	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
ane Configurations					∳ Љ	7		4413				
raffic Volume (vph)	0	0	0	0	389	537	54	1373	0	0	0	
uture Volume (vph)	0	0	0	0	389	537	54	1373	0	0	0	
Satd. Flow (prot)	0	0	0	0	2916	1350	0	4755	0	0	0	
It Permitted								0.998				
Satd. Flow (perm)	0	0	0	0	2916	1262	0	4750	0	0	0	
Satd. Flow (RTOR)								70				
ane Group Flow (vph)	0	0	0	0	636	290	0	1427	0	0	0	
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases						6	8					
Detector Phase					6	6	8	8				
Switch Phase												
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
otal Split (s)					32.0	32.0	38.0	38.0				
otal Split (%)					42.7%	42.7%	50.7%	50.7%				
'ellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
ost Time Adjust (s)					0.0	0.0	2.0	0.0				
otal Lost Time (s)					5.8	5.8		5.8				
ead/Lag					Lag	Lag		0.0				
ead-Lag Optimize?					Lug	Lug						
Recall Mode					C-Max	C-Max	Max	Max				
Act Effct Green (s)					26.2	26.2	max	32.2				
Actuated g/C Ratio					0.35	0.35		0.43				
/c Ratio					0.62	0.66		0.69				
Control Delay					26.3	30.1		18.5				
Queue Delay					0.0	0.0		0.0				
otal Delay					26.3	30.1		18.5				
OS					C	C		В				
Approach Delay					27.5	Ū		18.5				
Approach LOS					C			В				
Queue Length 50th (m)					43.3	40.0		54.6				
Queue Length 95th (m)					m60.6	m57.1		69.8				
nternal Link Dist (m)		157.8			130.6	11107.1		47.0			56.6	
Furn Bay Length (m)		101.0			100.0			11.0			00.0	
Base Capacity (vph)					1018	440		2079				
Starvation Cap Reductn					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn					0	0		0				
Reduced v/c Ratio					0.62	0.66		0.69				
ntersection Summary					UIUL	0.00		0.00				
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 15 (20%), Reference	d to phose	2. and C.	MDT Cta	rt of Cro	on							
	u to priase	z. anu 6:	vvoi, ota	it oi Gre	ell							
latural Cycle: 60	ralinata al											
Control Type: Actuated-Coo	ruinated											

Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	5.0
Total Split (s)	5.0
Total Split (%)	7%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	
Recall Mode	Max
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings 2: Kent & Catherine

2024 Future Background 05-16-2024

Maximum v/c Ratio: 0.69
Intersection Signal Delay: 22.0
Intersection Capacity Utilization 65.6%
ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.



30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 5

Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Background 05-16-2024

	۶	→	—	4	/	4			
ane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4		
ane Configurations		^							
raffic Volume (vph)	0	746	0	0	0	0			
uture Volume (vph)	0	746	0	0	0	0			
Satd. Flow (prot)	0	3316	0	0	0	0			
It Permitted	_		-	_	•	•			
Satd. Flow (perm)	0	3316	0	0	0	0			
Satd. Flow (RTOR)	-		-	-	-	-			
ane Group Flow (vph)	0	746	0	0	0	0			
urn Type	-	NA	-	-	-	-			
Protected Phases		2					4		
Permitted Phases		_					7		
etector Phase		2							
Switch Phase		2							
Minimum Initial (s)		10.0					10.0		
finimum Split (s)		36.0					21.0		
otal Split (s)		36.0		_			21.0		
otal Split (%)		63.2%					37%		
		3.3					3.0		
'ellow Time (s)									
III-Red Time (s)		1.7 0.0					1.0		
ost Time Adjust (s)									
otal Lost Time (s)		5.0							
ead/Lag									
ead-Lag Optimize?							NI .		
Recall Mode		Min					None		
ct Effct Green (s)		32.6							
ctuated g/C Ratio		0.63							
/c Ratio		0.36							
Control Delay		7.5							
Queue Delay		0.0							
otal Delay		7.5							
OS		Α							
pproach Delay		7.5							
pproach LOS		Α							
Queue Length 50th (m)		21.4							
Queue Length 95th (m)		31.0							
nternal Link Dist (m)		270.2	176.4		31.3				
urn Bay Length (m)									
Base Capacity (vph)		2163							
Starvation Cap Reductn		0							
Spillback Cap Reductn		0							
Storage Cap Reductn		0							
Reduced v/c Ratio		0.34							
ntersection Summary									
Cycle Length: 57									
actuated Cycle Length: 51.5									
latural Cycle: 60				_					
Control Type: Semi Act-Uncoor	d								

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 6

Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Background 05-16-2024

Intersection Signal Delay: 7.5
Intersection Capacity Utilization 25.9% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



Synchro 10 Light Report Page 7 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Background ____05-16-2024

	≯	→	*	1	←	*	4	†	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
Lane Configurations					414			414			↑ ↑	
Traffic Volume (vph)	0	0	0	160	582	189	272	626	0	0	385	11
uture Volume (vph)	0	0	0	160	582	189	272	626	0	0	385	11
Satd. Flow (prot)	0	0	0	0	4481	0	0	3266	0	0	3011	
It Permitted					0.991			0.648				
Satd. Flow (perm)	0	0	0	0	4429	0	0	2077	0	0	3011	
Satd. Flow (RTOR)					81						47	
ane Group Flow (vph)	0	0	0	0	931	0	0	898	0	0	495	
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				25.0	25.0		15.0	40.0			25.0	
Total Split (%)				33.3%	33.3%		20.0%	53.3%			33.3%	
/ellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
ost Time Adjust (s)					0.0			0.0			0.0	
otal Lost Time (s)					5.6			5.4			5.4	
_ead/Lag				Lag	Lag						Lag	
ead-Lag Optimize?				Yes	Yes						Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					19.4			34.6			19.6	
Actuated g/C Ratio					0.26			0.46			0.26	
/c Ratio					0.77			0.81			0.60	
Control Delay					28.6			12.0			25.5	
Queue Delay					0.0			0.0			0.1	
Total Delay					28.6			12.0			25.6	
.OS					С			В			С	
Approach Delay					28.6			12.0			25.6	
Approach LOS					С			В			С	
Queue Length 50th (m)					40.8			10.3			29.0	
Queue Length 95th (m)					54.9			m28.8			43.9	
nternal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1205			1110			821	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			27	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.77			0.81			0.62	
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 70 (93%), Referenced	d to phase	2:NBTL a	and 6:SE	T, Start o	f Green							
latural Cycle: 70												
Control Type: Actuated-Coor	dinated											

Synchro 10 Light Report Page 8 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

Lane Configurations

2024 Future Background 05-16-2024

Lanes, Volumes, Timings
4: Bank & Catherine
-

2024 Future Background 05-16-2024

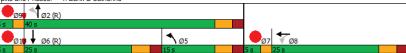
Maximum v/c Ratio: 0.81

Intersection Signal Delay: 21.5 Intersection LOS: C Intersection Capacity Utilization 79.5% ICU

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal. ICU Level of Service D

Splits and Phases: 4: Bank & Catherine



Lane comigarations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	7	9	13
	1	9	13
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	7%	7%	7%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		Lead
Lead-Lag Optimize?	Yes		Yes
Recall Mode	Max	Max	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Synchro 10 Light Report Page 9 30-48 Chamberlain AM Peak Hour

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 10

Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Background 05-16-2024

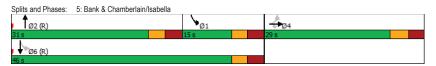
	•	\rightarrow	*	1	-	•	1	†	1	-	¥	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		414	7					↑ ↑		7	†	
Traffic Volume (vph)	81	533	82	0	0	0	0	834	162	192	395	(
Future Volume (vph)	81	533	82	0	0	0	0	834	162	192	395	(
Satd. Flow (prot)	0	3292	1483	0	0	0	0	3137	0	1658	1745	(
Flt Permitted		0.993								0.180		
Satd. Flow (perm)	0	3285	1334	0	0	0	0	3137	0	306	1745	(
Satd. Flow (RTOR)			134					32				
Lane Group Flow (vph)	0	614	82	0	0	0	0	996	0	192	395	(
Turn Type	Perm	NA	Perm					NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4							6		
Detector Phase	4	4	4					2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					10.0		5.0	10.0	
Minimum Split (s)	26.2	26.2	26.2					23.1		11.1	23.1	
Total Split (s)	29.0	29.0	29.0					31.0		15.0	46.0	
Total Split (%)	38.7%	38.7%	38.7%					41.3%		20.0%	61.3%	
Yellow Time (s)	3.3	3.3	3.3					3.0		3.0	3.0	
All-Red Time (s)	2.9	2.9	2.9					3.1		3.1	3.1	
Lost Time Adjust (s)		0.0	0.0					0.0		0.0	0.0	
Total Lost Time (s)		6.2	6.2					6.1		6.1	6.1	
Lead/Lag								Lead		Lag		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					C-Max		None	C-Max	
Act Effct Green (s)		19.2	19.2					28.5		43.5	43.5	
Actuated g/C Ratio		0.26	0.26					0.38		0.58	0.58	
v/c Ratio		0.73	0.19					0.82		0.57	0.39	
Control Delay		30.7	2.2					28.8		24.6	8.0	
Queue Delay		0.0	0.0					0.0		0.0	1.1	
Total Delay		30.7	2.2					28.8		24.6	9.1	
LOS		С	Α					С		С	Α	
Approach Delay		27.3						28.8			14.1	
Approach LOS		С						С			В	
Queue Length 50th (m)		41.1	0.0					64.5		11.9	19.7	
Queue Length 95th (m)		54.8	3.3					#107.6		m33.3	m27.6	
Internal Link Dist (m)		176.4			219.4			129.7			80.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		998	498					1210		337	1011	
Starvation Cap Reductn		0	0					0		0	385	
Spillback Cap Reductn		0	0					0		0	0	
Storage Cap Reductn		0	0					0		0	0	
Reduced v/c Ratio		0.62	0.16					0.82		0.57	0.63	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 1 (1%), Referenced	to phase 2	:NBT and	6:SBTL,	Start of G	ireen							

Natural Cycle: 70

Control Type: Actuated-Coordinated

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 11 Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Background 05-16-2024

Maximum v/c Ratio: 0.82 Intersection Signal Delay: 24.6 Intersection LOS: C Intersection Signal Delay: 24.6 Intersection Capacity Utilization 78.8% ICU I
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal. ICU Level of Service D



30-48 Chamberlain AM Peak Hour Synchro 10 Light Report

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Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2024 Future Background 05-16-2024

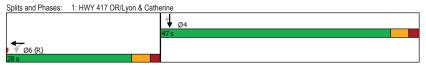
	ၨ	-	\rightarrow	•	-	•		1	1	1	Ţ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					414						1	7
Traffic Volume (vph)	0	0	0	219	498	0	0	0	0	0	392	263
Future Volume (vph)	0	0	0	219	498	0	0	0	0	0	392	263
Satd. Flow (prot)	0	0	0	0	4693	0	0	0	0	0	1745	1483
Flt Permitted					0.985							
Satd. Flow (perm)	0	0	0	0	4657	0	0	0	0	0	1745	1443
Satd. Flow (RTOR)					153							98
Lane Group Flow (vph)	0	0	0	0	717	0	0	0	0	0	392	263
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6	•						•	4
Detector Phase				6	6						4	4
Switch Phase				_	-							
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				28.0	28.0						47.0	47.0
Total Split (%)				37.3%	37.3%						62.7%	62.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)				1.5	0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
Lead/Lag					5.2						0.0	5.5
Lead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)				O-IVIAX	22.8						41.7	41.7
Actuated g/C Ratio					0.30						0.56	0.56
v/c Ratio					0.47						0.40	0.30
Control Delay					16.1						11.1	6.5
Queue Delay					0.0						0.0	0.0
Total Delay					16.1						11.1	6.5
LOS					16.1 B						11.1 B	0.5 A
Approach Delay					16.1						9.3	А
Approach LOS					16.1 B						9.5 A	
					9.3							40.0
Queue Length 50th (m)					12.0						29.2 47.0	10.8
Queue Length 95th (m)		447.0						400.4				22.7
Internal Link Dist (m)		117.8			157.8			120.4			277.6	
Turn Bay Length (m)					4500						000	0.15
Base Capacity (vph)					1522						970	845
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.47						0.40	0.31
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 24 (32%), Referenced	to phase	2: and 6:	WBTL, S	Start of G	reen							
Natural Cycle: 55												
Control Type: Actuated-Coord	dinated											

30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report Page 1

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2024 Future Background 05-16-2024

Maximum v/c Ratio: 0.47
Intersection Signal Delay: 12.8
Intersection Capacity Utilization 50.0%
ICU Level of Service A
Analysis Period (min) 15



	•	-	•	•	-	•	4	†	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					† 1>	7		ተተቡ				
Traffic Volume (vph)	0	0	0	0	648	316	25	742	0	0	0	0
Future Volume (vph)	0	0	0	0	648	316	25	742	0	0	0	0
Satd. Flow (prot)	0	0	0	0	3143	1350	0	4755	0	0	0	0
Flt Permitted								0.998				
Satd. Flow (perm)	0	0	0	0	3143	1247	0	4752	0	0	0	0
Satd. Flow (RTOR)								70				
Lane Group Flow (vph)	0	0	0	0	680	284	0	767	0	0	0	0
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases					_	6	8					
Detector Phase					6	6	8	8				
Switch Phase					Ū	·	Ū	Ū				
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
Total Split (s)					38.0	38.0	32.0	32.0				
Total Split (%)					50.7%	50.7%	42.7%	42.7%				
Yellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
Lost Time Adjust (s)					0.0	0.0	2.0	0.0				
Total Lost Time (s)					5.8	5.8		5.8				
Lead/Lag					Lag	Lag		5.0				
Lead-Lag Optimize?					Lay	Lay						
Recall Mode					C-Max	C-Max	Max	Max				
Act Effct Green (s)					32.2	32.2	IVICIA	26.2				
Actuated g/C Ratio					0.43	0.43		0.35				
v/c Ratio					0.50	0.53		0.45				
Control Delay					14.3	16.6		18.0				
Queue Delay					0.0	0.0		0.0				
Total Delay					14.3	16.6		18.0				
LOS					14.3 B	10.0 B		В				
Approach Delay					15.0	ь		18.0				
Approach LOS					13.0 B			10.0 B				
Queue Length 50th (m)					29.8	25.0		27.1				
Queue Length 95th (m)					m41.1	m37.1		37.2				
Internal Link Dist (m)		157.8			130.6	11137.1		43.8			56.6	
Turn Bay Length (m)		137.0			130.0			43.0			30.0	
Base Capacity (vph)					1349	535		1705				
Starvation Cap Reductn					1349	0		0				
					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn												
Reduced v/c Ratio					0.50	0.53		0.45				
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75	d to abo	Or and C	M/DT Ct-	at at C								_
Offset: 12 (16%), Referenced	u to pnase	 and 6: 	WBI, Sta	irt of Gre	en							
Natural Cycle: 55	adia at a d			_								_
Control Type: Actuated-Coor	rainatea											

Lane Group	Ø5		
Lane Configurations			
Traffic Volume (vph)			
uture Volume (vph)			
Satd. Flow (prot)			
It Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			J
Lane Group Flow (vph)			l
Turn Type			
Protected Phases	5		
Permitted Phases	ŭ		
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0		
Minimum Split (s)	5.0		
Total Split (s)	5.0		
Total Split (%)	5.0 7%		
Yellow Time (s)	2.0	 	
	0.0		
All-Red Time (s)	0.0		
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		
Lead-Lag Optimize?			
Recall Mode	Max		
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

Lanes, Volumes, Timings 2: Kent & Catherine

2024 Future Background 05-16-2024

Maximum v/c Ratio: 0.53 Intersection Signal Delay: 16.3 Intersection LOS: B Intersection Capacity Utilization 50.5% ICU Level of Service A Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Kent & Catherine

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Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Background 05-16-2024

	۶	→	←	•	-	4			
ane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4		
ane Configurations		^							
Traffic Volume (vph)	0	772	0	0	0	0			
uture Volume (vph)	0	772	0	0	0	0			
Satd. Flow (prot)	0	3316	0	0	0	0			
Flt Permitted									
Satd. Flow (perm)	0	3316	0	0	0	0			
Satd. Flow (RTOR)									
ane Group Flow (vph)	0	772	0	0	0	0			
Turn Type		NA							
Protected Phases		2					4		
Permitted Phases		_					•		
Detector Phase		2							
Switch Phase		=							
Minimum Initial (s)		10.0					10.0		
Minimum Split (s)		36.0					21.0		
Fotal Split (s)		36.0					21.0		
Fotal Split (%)		63.2%					37%		
Yellow Time (s)		3.3					3.0		
All-Red Time (s)		1.7					1.0		
ost Time Adjust (s)		0.0					1.0		
Fotal Lost Time (s)		5.0							
Lead/Lag		3.0							
Lead-Lag Optimize?									
Recall Mode		Min					None		
Act Effct Green (s)		34.6					INUITE		
Actuated g/C Ratio		0.83							
//c Ratio		0.03							
Control Delay		4.3							
Queue Delay		0.0							
Fotal Delay		4.3							
OS		4.5 A							
		4.3							
Approach Delay									
Approach LOS		A							
Queue Length 50th (m)		0.0							
Queue Length 95th (m)		32.2	470.4		00.7				
nternal Link Dist (m)		270.2	176.4		23.7				
Turn Bay Length (m)		0700							
Base Capacity (vph)		2738							
Starvation Cap Reductn		0							
Spillback Cap Reductn		0							
Storage Cap Reductn		0							
Reduced v/c Ratio		0.28							
ntersection Summary									
Cycle Length: 57									
Actuated Cycle Length: 41.9									
Natural Cycle: 60									
Control Type: Semi Act-Uncoor	d								
Maximum v/c Ratio: 0.28									

Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Background 05-16-2024

Intersection Signal Delay: 4.3
Intersection Capacity Utilization 26.7% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



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Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Background 05-16-2024

	→	\rightarrow	*	1	-	•	1	†	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
Lane Configurations					414			414			↑ ↑	
Traffic Volume (vph)	0	0	0	257	553	157	199	340	0	0	643	1:
Future Volume (vph)	0	0	0	257	553	157	199	340	0	0	643	1:
Satd. Flow (prot)	0	0	0	0	4536	0	0	3256	0	0	3077	
Flt Permitted					0.987			0.544				
Satd. Flow (perm)	0	0	0	0	4474	0	0	1766	0	0	3077	
Satd. Flow (RTOR)					51						29	
Lane Group Flow (vph)	0	0	0	0	967	0	0	539	0	0	763	
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				24.0	24.0		14.0	41.0			27.0	
Total Split (%)				32.0%	32.0%		18.7%	54.7%			36.0%	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.6			5.4			5.4	
Lead/Lag				Lag	Lag						Lag	
Lead-Lag Optimize?											Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					18.4			35.6			21.6	
Actuated g/C Ratio					0.25			0.47			0.29	
//c Ratio					0.85			0.53			0.84	
Control Delay					34.4			12.2			34.5	
Queue Delay					0.0			0.0			2.9	
Total Delay					34.4			12.2			37.4	
LOS					С			В			D	
Approach Delay					34.4			12.2			37.4	
Approach LOS					С			В			D	
Queue Length 50th (m)					45.4			14.9			51.2	
Queue Length 95th (m)					#66.1			18.9			#80.1	
Internal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1136			1009			906	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					1			0			71	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.85			0.53			0.91	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 50 (67%), Referenced	to phase	2:NBTL a	and 6:SB	T, Start o	of Green							
Natural Cycle: 70												
Control Type: Actuated-Coor	dinated				_			_	_			
VI												

Synchro 10 Light Report 30-48 Chamberlain PM PEAK HOUR

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Lanes, Volumes, Timings 4: Bank & Catherine

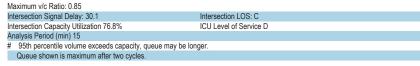
2024	Future	Background
		05-16-2024

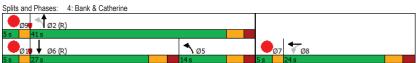
Lane Configurations Traffic Volume (vph) Future Volume (vph) Satd. Flow (prot) Fit Permitted Satd. Flow (prot) Fit Permitted Satd. Flow (RTOR) Lane Group Flow (vph) Turn Type Protected Phases Permitted Phases Permitted Phases Switch Phase Minimum Initial (s) Minimum Split (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	7 1.0 5.0 5.0 7% 2.0 0.0	9 5.0 5.0 7% 2.0 0.0	1.0 5.0 5.0 7% 2.0 0.0
Traffic Volume (vph) Future Volume (vph) Future Volume (vph) Satd. Flow (prot) Fit Permitted Satd. Flow (perm) Satd. Flow (perm) Satd. Flow (RTOR) Lame Group Flow (vph) Turn Type Protected Phases Permitted Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Control (s) Lead-Lag Optimize? Read-Lag Opti	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Future Volume (vph) Satd. Flow (prot) Fit Permitted Satd. Flow (perm) Satd. Flow (perm) Satd. Flow (perm) Satd. Flow (RTOR) Lane Group Flow (vph) Turn Type Protected Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) Soft Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Satd. Flow (prot) Fit Permitted Satd. Flow (perm) Satd. Flow (PTOR) Lane Group Flow (vph) Turn Type Protected Phases Permitted Phases Permitted Phases Switch Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) Total Split (s) Total Split (s) Stime Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Fit Permitted Satd. Flow (perm) Satd. Flow (RTOR) Lane Group Flow (vph) Turn Type Protected Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) Substime Adjust (s) Total Lost Time Agiust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Satd. Flow (perm) Satd. Flow (perm) Satd. Flow (RTOR) Lane Group Flow (vph) Turn Type Protected Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) Total Split (s) Solit (%) Yellow Time (s) All-Red Time (s) Lead'Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio V/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Satd. Flow (RTOR) Lane Group Flow (vph) Tum Type Protected Phases Permitted Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) Total Split (%) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LoS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Lane Group Flow (vph) Turn Type Protected Phases Permitted Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) All-Red Time (s) Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Turn Type Protected Phases Permitted Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Capit (s) Total Lost Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead-Lag Optimize? Read-Lag Optimize? Read-Lag Optimize? Reatio Control Delay Queue Delay Total Delay Uose Delay Control Delay Queue Delay Total Delay LoS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Protected Phases Permitted Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (%) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Permitted Phases Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) Total Split (s) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0	1.0 5.0 5.0 7% 2.0
Detector Phase Switch Phase Minimum Initial (s) Minimum Split (s) Total Split (s) Total Split (s) Total Split (s) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead-Lag Optimize? Read-Lag Optimize? Read-Lag Optimize? Retaic Control Delay Queue Delay Total Delay Los Approach Delay	5.0 5.0 7% 2.0 0.0	5.0 5.0 7% 2.0	5.0 5.0 7% 2.0
Switch Phase Minimum Split (s) Minimum Split (s) Total Split (s) Total Split (s) Total Split (%) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	5.0 5.0 7% 2.0 0.0	5.0 5.0 7% 2.0	5.0 5.0 7% 2.0
Minimum Initial (s) Minimum Split (s) Total Split (s) Total Split (y) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	5.0 5.0 7% 2.0 0.0	5.0 5.0 7% 2.0	5.0 5.0 7% 2.0
Minimum Split (s) Total Split (s) Total Split (s) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	5.0 5.0 7% 2.0 0.0	5.0 5.0 7% 2.0	5.0 5.0 7% 2.0
Total Split (s) Total Split (%) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	5.0 7% 2.0 0.0	5.0 7% 2.0	5.0 7% 2.0
Total Split (%) Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	7% 2.0 0.0	7% 2.0	7% 2.0
Yellow Time (s) All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	2.0 0.0	2.0	2.0
All-Red Time (s) Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Read-Lag Optimize? Read-Lag Optimize? Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	0.0		
Lost Time Adjust (s) Total Lost Time (s) Lead/Lag Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay		0.0	0.0
Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	l ead		
Total Lost Time (s) Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	l ead		
Lead/Lag Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	l ead		
Lead-Lag Optimize? Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay			Lead
Recall Mode Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay			Yes
Act Effct Green (s) Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay	Max	Max	Max
Actuated g/C Ratio v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay			
v/c Ratio Control Delay Queue Delay Total Delay LOS Approach Delay			
Control Delay Queue Delay Total Delay LOS Approach Delay			
Queue Delay Total Delay LOS Approach Delay			
Total Delay LOS Approach Delay			
LOS Approach Delay			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
l-t			
Intersection Summary			

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Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Background 05-16-2024





Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Background 05-16-2024

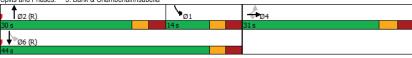
EBL	EBT	EBR	WDI								
		LDIX	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
	414	7					† 1>			414	
53	590	120	0	0	0	0	476	91	175	720	
53	590	120	0	0	0	0	476	91	175	720	
0	3302	1483	0	0	0	0	3106	0	0	3283	
	0.996									0.715	
0	3299	1345	0	0	0	0	3106	0	0	2326	
		134					31				
0	643	120	0	0	0	0	567	0	0	895	
Perm	NA	Perm					NA		pm+pt	NA	
	4						2		1	6	
4		4							6		
4	4	4					2		1	6	
10.0	10.0	10.0					10.0		5.0	10.0	
26.2	26.2	26.2					23.1		11.1	23.1	
31.0	31.0	31.0					30.0		14.0	44.0	
		41.3%					40.0%			58.7%	
3.3	3.3	3.3					3.0		3.0	3.0	
		2.9					3.1		3.1	3.1	
	0.2	0.2							Lag	0.1	
							Yes				
None	None	None					C-Max			C-Max	
										42.2	
	0.71	0.26								0.68	
	29.0	47					9.4				
		- / (
		0.0									
		0.1		219 4							
	170.4	30.0		210.4			120.1			00.0	
	1090						1761			1308	
	-	-					-				
	-	-					-			-	
	0.00	V					0.02			0.00	
	ONDE	10.05	01 1								
to phase	e Z:NB [a	ina 6:SBTI	_, Start of	Green							
	0 0 Perm 4 4 4 10.0 26.2 31.0 41.3% 3.3 3.2.9	0.996 0 3299 0 643 Perm NA 4 4 4 4 10.0 10.0 26.2 26.2 31.0 31.0 41.3% 41.3% 2.9 2.9 0.0 6.2 None None 20.5 0.27 0.71 29.0 0.0 29.0 0.0 25.2 C 43.2 55.3 176.4 1090 0 0.59	0.996 0 3299 1345 0 643 120 Perm NA Perm 4 4 4 4 10.0 10.0 10.0 10.0 26.2 26.2 26.2 26.2 31.0 31.0 31.0 31.0 41.3% 41.3% 41.3% 41.3% 41.3% 2.9 2.9 2.9 2.9 0.0 0.0 6.2 6.2 None None None 20.5 20.5 0.27 0.27 0.71 0.26 29.0 4.7 0.27 0.71 0.26 29.0 4.7 C A 25.2 C C 43.2 0.0 55.3 8.7 176.4 30.0 1090 534 0 0 0 0 0 0 0 0.59 0.22	0.996 0 3299 1345 0 134 0 643 120 0 Perm NA Perm 4 4 4 4 10.0 10.0 10.0 26.2 26.2 26.2 31.0 31.0 31.0 41.3% 41.3% 3.3 3.3 3.3 2.9 2.9 2.9 0.0 0.0 6.2 6.2 None None None 20.5 20.5 0.27 0.27 0.71 0.26 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 29.0 4.7 10.6 2 25.2 10.7 0.26 29.0 4.7 10.8 3.3 3.3 10.9 2.9 2.9 10.0 0.0 10	0.996 0 3299 1345 0 0 134 0 643 120 0 0 Perm NA Perm 4 4 4 4 4 4 4 10.0 10.0 10.0 26.2 26.2 26.2 31.0 31.0 31.0 41.3% 41.3% 3.3 3.3 3.3 2.9 2.9 2.9 0.0 0.0 6.2 6.2 None None None 20.5 20.5 0.27 0.27 0.71 0.26 229.0 4.7 0.0 0.0 229.0 4.7 0.0 0.0 229.0 4.7 0.0 0.0 25.2 C 43.2 0.0 55.3 8.7 176.4 219.4 30.0 1090 534 0 0 0 0 0 0 0 0.59 0.22	0.996 0 3299 1345 0 0 0 134 0 643 120 0 0 0 0 0 Perm NA Perm 4 4 4 4 4 4 4 10.0 10.0 10.0 26.2 26.2 26.2 31.0 31.0 31.0 41.3% 41.3% 41.3% 3.3 3.3 3.3 2.9 2.9 2.9 2.9 0.0 0.0 6.2 6.2 None None None 20.5 20.5 0.27 0.27 0.71 0.26 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 25.2 C 43.2 0.0 55.3 8.7 176.4 219.4 30.0 1090 534 0 0 0 0 0 0 0.59 0.22	0.996 0 3299 1345 0 0 0 0 0 134 0 643 120 0 0 0 0 0 Perm NA Perm 4 4 4 4 4 4 4 10.0 10.0 10.0 26.2 26.2 26.2 31.0 31.0 31.0 41.3% 41.3% 41.3% 3.3 3.3 3.3 2.9 2.9 2.9 0.0 0.0 6.2 6.2 None None None 20.5 20.5 0.27 0.27 0.71 0.26 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 55.3 8.7 176.4 219.4 30.0 1090 534 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.996 0 3299 1345 0 0 0 0 3106	0.996 0 3299 1345 0 0 0 0 3106 0 134 31 0 643 120 0 0 0 0 5667 0 Perm NA Perm NA 4 2 4 4 4 4 4 4 4 2 10.0 10.0 10.0 10.0 26.2 26.2 26.2 23.1 31.0 31.0 31.0 30.0 41.3% 41.3% 41.3% 40.0% 3.3 3.3 3.3 3.3 3.0 2.9 2.9 2.9 2.9 3.1 0.0 0.0 0.0 0.0 6.2 6.2 6.2 6.1 Lead Yes None None None C-Max 20.5 20.5 42.2 0.27 0.27 0.56 0.71 0.26 0.32 29.0 4.7 9.4 0.0 0.0 0.0 29.0 4.7 9.4 0.0 0.0 0.0 29.0 4.7 9.4 0.0 0.0 0.0 29.0 4.7 9.4 0.0 0.0 0.0 29.0 4.7 9.4 0.0 0.0 0.0 29.0 4.7 9.4 0.0 1.0 0.0 0.0 0.0 29.0 4.7 9.4 0.0 1.0 0.0 0.0 0.0 29.0 4.7 9.4 0.0 1.0 0.0 0.0 1.0 0.0	0.996 0 3299 1345 0 0 0 0 3106 0 0 Perm NA Pe	0.996

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Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Background 05-16-2024

Maximum v/c Ratio: 0.71
Intersection Signal Delay: 17.6
Intersection Capacity Utilization 82.0%
ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Bank & Chamberlain/Isabella



Appendix G

Synchro Intersection Worksheets – 2029 Future Background Conditions



Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2029 Future Background 05-16-2024

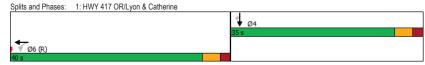
	→	-	*	•	—	•	4	†	1	-	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					ተተቡ						↑	7
Traffic Volume (vph)	0	0	0	222	219	0	0	0	0	0	258	130
Future Volume (vph)	0	0	0	222	219	0	0	0	0	0	258	130
Satd. Flow (prot)	0	0	0	0	4645	0	0	0	0	0	1745	1483
Flt Permitted					0.975							
Satd. Flow (perm)	0	0	0	0	4612	0	0	0	0	0	1745	1454
Satd. Flow (RTOR)					222							130
Lane Group Flow (vph)	0	0	0	0	441	0	0	0	0	0	258	130
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Detector Phase				6	6						4	4
Switch Phase												
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				40.0	40.0						35.0	35.0
Total Split (%)				53.3%	53.3%						46.7%	46.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)					0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)					34.8						29.7	29.7
Actuated g/C Ratio					0.46						0.40	0.40
v/c Ratio					0.20						0.37	0.20
Control Delay					10.5						18.1	3.9
Queue Delay					0.0						0.0	0.0
Total Delay					10.5						18.1	3.9
LOS					В						В	A
Approach Delay					10.5						13.3	
Approach LOS					В						В	
Queue Length 50th (m)					17.2						25.1	0.0
Queue Length 95th (m)					26.1						42.7	9.3
Internal Link Dist (m)		117.8			157.8			120.4			277.6	
Turn Bay Length (m)												
Base Capacity (vph)					2258						691	654
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.20						0.37	0.20
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 48 (64%), Reference	ed to phase	2: and 6:	WBTL, S	Start of G	reen				_			
Natural Cycle: 55												
Control Type: Actuated-Coo	ordinated											
,												

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Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2029 Future Background 05-16-2024

Maximum v/c Ratio: 0.37
Intersection Signal Delay: 11.8
Intersection LOS: B
Intersection Capacity Utilization 47.6%
ICU Level of Service A
Analysis Period (min) 15



30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 2

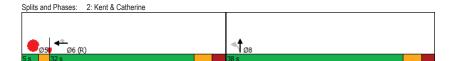
	<i>></i>	-	•	•	—	•	4	†	1	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					† 1>	7		ተተቡ				
Traffic Volume (vph)	0	0	0	0	389	537	54	1408	0	0	0	0
Future Volume (vph)	0	0	0	0	389	537	54	1408	0	0	0	0
Satd. Flow (prot)	0	0	0	0	2916	1350	0	4755	0	0	0	0
Flt Permitted								0.998				
Satd. Flow (perm)	0	0	0	0	2916	1262	0	4750	0	0	0	0
Satd. Flow (RTOR)								70				
Lane Group Flow (vph)	0	0	0	0	636	290	0	1462	0	0	0	0
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases					_	6	8					
Detector Phase					6	6	8	8				
Switch Phase					Ū	·	Ū	Ū				
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
Total Split (s)					32.0	32.0	38.0	38.0				
Total Split (%)					42.7%	42.7%	50.7%	50.7%				
Yellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
Lost Time Adjust (s)					0.0	0.0	2.0	0.0				
Total Lost Time (s)					5.8	5.8		5.8				
Lead/Lag					Lag	Lag		5.0				
Lead-Lag Optimize?					Lay	Lay						
Recall Mode					C-Max	C-Max	Max	Max				
Act Effct Green (s)					26.2	26.2	IVICIA	32.2				
Actuated g/C Ratio					0.35	0.35		0.43				
v/c Ratio					0.62	0.66		0.70				
Control Delay					26.2	30.0		18.8				
Queue Delay					0.0	0.0		0.0				
Total Delay					26.2	30.0		18.8				
LOS					20.2 C	30.0 C		В				
Approach Delay					27.4	U		18.8				
Approach LOS					21.4 C			10.0 B				
Queue Length 50th (m)					42.9	39.6		56.7				
Queue Length 95th (m)					m60.3	m56.8		72.3				
Internal Link Dist (m)		157.8			130.6	0.00111		47.0			56.6	
Turn Bay Length (m)		137.0			130.0			47.0			30.0	
Base Capacity (vph)					1018	440		2079				
Starvation Cap Reductn					0	0		2019				
					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn												
Reduced v/c Ratio					0.62	0.66		0.70				
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75 Offset: 15 (20%), Referenced	d to phose	2: and G	M/DT Ct-	rt of C-	on			_				
	u to priase	2. anu 6:	WDI, Sta	ii t Oi Gre	EII							
Natural Cycle: 60	adha a ta al			_								_
Control Type: Actuated-Coor	rainatea											

Lane Group	Ø5		
Lane Configurations			
Traffic Volume (vph)			
uture Volume (vph)			
Satd. Flow (prot)			
It Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			J
Lane Group Flow (vph)			l
Turn Type			
Protected Phases	5		
Permitted Phases	ŭ		
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0		
Minimum Split (s)	5.0		
Total Split (s)	5.0		
Total Split (%)	5.0 7%		
Yellow Time (s)	2.0	 	
	0.0		
All-Red Time (s)	0.0		
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		
Lead-Lag Optimize?			
Recall Mode	Max		
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

Lanes, Volumes, Timings 2: Kent & Catherine

2029 Future Background 05-16-2024

Maximum v/c Ratio: 0.70 Intersection Signal Delay: 22.1 Intersection LOS: C Intersection Capacity Utilization 66.3% ICU Level of Service C Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.



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Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Background 05-16-2024

Lane Configurations ↑↑ Traffic Volume (vph) 0 803 0 0 0 Future Volume (vph) 0 803 0 0 0 Satd. Flow (prot) 0 3316 0 0 0 Fit Permitted 8 8 8 8 8 8 8 8 8 8 8 8 8 8 9		۶	→	←	*	-	4				
Traffic Volume (vph) 0 803 0 0 0 0 0 Satd. Flow (prot) 0 803 0 0 0 0 0 Satd. Flow (prot) 0 3316 0 0 0 0 0 Fit Permitted Satd. Flow (perm) 0 3316 0 0 0 0 0 Satd. Flow (perm) 0 3316 0 0 0 0 0 Satd. Flow (perm) 0 803 0 0 0 0 0 Satd. Flow (perm) 0 803 0 0 0 0 Turn Type NA	Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4			
Traffic Volume (vph) 0 803 0 0 0 0 0 Satd. Flow (prot) 0 803 0 0 0 0 0 Satd. Flow (prot) 0 3316 0 0 0 0 0 Fit Permitted Satd. Flow (perm) 0 3316 0 0 0 0 0 Satd. Flow (perm) 0 3316 0 0 0 0 0 Satd. Flow (perm) 0 803 0 0 0 0 0 Satd. Flow (perm) 0 803 0 0 0 0 Turn Type NA	Lane Configurations		*								Т
Sald. Flow (profi) 0 3316 0 0 0 0 0 Sald. Flow (profi) 0 3316 0 0 0 0 0 Sald. Flow (profi) 0 3316 0 0 0 0 0 Sald. Flow (RTOR) Sald. Flow (Traffic Volume (vph)	0		0	0	0	0				
Fit Permitted Satid. Flow (perm) 0 3316 0 0 0 0 Satid. Flow (ptOR) Lane Group Flow (vph) 0 803 0 0 0 0 Turn Type NA Protected Phases 2 4 Permitted Phases 5 Detector Phase 5 Switch Phase 6 Minimum Initial (s) 10.0 10.0 Minimum Spit (s) 36.0 21.0 Total Spit (%) 36.0 21.0 Total Spit (%) 36.0 21.0 Total Spit (%) 33.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Detmize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.38 Control Delay 7.5 Coueue Delay 7.5 Coueue Delay 7.5 Coueue Length Soth (m) 23.5 Coueue Length Soth (m) 27.5 Slarvation Cap Reductn 0 Storage Cap Reductn 0 Control Type: Semi Act-Uncoord	Future Volume (vph)	0	803	0	0	0	0				
Satd. Flow (PKTOR) Satd. Flow (RTOR) Satd. Flow (RTOR) Lane Group Flow (vph) 0 803 0 0 0 0 Turn Type NA Protected Phases Permitted Phases Detector Phase Betector Phase Switch Phase Minimum Initial (s) Minimum Split (s) 36.0 21.0 Total Split (%) 36.0 21.0 Total Split (%) 33.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time (s) 1.7 Actuated g/C Ratio Act Efic Green (s) 33.7 Actuated g/C Ratio One One One One One One One On	Satd. Flow (prot)	0	3316	0	0	0	0				
Satd. Flow (RTOR) Lane Group Flow (ph) 0 803 0 0 0 0 Tum Type NA Protected Phases 2 4 Permitted Phases Detector Phase 2 Switch Phase Minimum Initial (s) 10.0 10.0 Minimum Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (s) 33.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag delay (s) 6.0 Le	Flt Permitted										
Lane Group Flow (vph) 0 803 0 0 0 0 Turn Type NA Protected Phases 2 4 Permitted Phases 5 Detector Phase 5 Detector Phase 6 2 Switch Phase 7 Switch Phase 7 Minimum Initial (s) 10.0 10.0 Minimum Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (s) 36.0 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 Vic Ratio 0.38 Control Delay 7.5 Cueue Delay 0.0 Total Delay 7.5 Approach LOS A Approach Delay 7.5 Approach LOS A Cueue Length 50th (m) 23.5 Cueue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Storag	Satd. Flow (perm)	0	3316	0	0	0	0				
Lane Group Flow (vph) 0 803 0 0 0 0 Turn Type NA Protected Phases 2 4 Permitted Phases 5 Detector Phase 5 Detector Phase 6 2 Switch Phase 7 Switch Phase 7 Minimum Initial (s) 10.0 10.0 Minimum Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (s) 36.0 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 Vic Ratio 0.38 Control Delay 7.5 Cueue Delay 0.0 Total Delay 7.5 Approach LOS A Approach Delay 7.5 Approach LOS A Cueue Length 50th (m) 23.5 Cueue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Storag	Satd. Flow (RTOR)										
Tum Type NA Protected Phases 2 4 Permitted Phases Detector Phase 2 Switch Phase 4 Minimum Initial (s) 10.0 10.0 Minimum Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (s) 63.2% 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead/Lag Lead/Lag Lead/Lag Dptimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 V/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 Queue Length Split (m) 23.5 Queue Length Split (m) 23.5 Queue Length Split (m) 23.5 Queue Length Split (m) 27.0 2 176.4 31.3 Tum Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductin 0 Storage Cap Reductin 0 Storage Cap Reductin 0 Splitback Cap Reductin 0 Storage Cap Reductin 0 Splitback C		0	803	0	0	0	0				
Permitted Phases Detector Phase Detector Phase Minimum Initial (s) Minimum Split (s) Minimum Minim	Turn Type		NA								
Detector Phase	Protected Phases		2					4			
Switch Phase Minimum Initial (s) 10.0 10.0 Minimum Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (s) 36.0 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Used/Lag	Permitted Phases										
Minimum Initial (s) 10.0 10.0 Minimum Spit (s) 36.0 21.0 Total Spit (s) 63.2% 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 v/c Ratio 0.38 Control Delay 7.5 Cueue Delay 7.5 Cueue Delay 7.5 LOS Approach LOS A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 50th (m) 23.5 Queue Length 50th (m) 23.5 Queue Length 50th (m) 27.0 2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 O Reduced Vic Ratio Summary Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	Detector Phase		2								
Minimum Split (s) 36.0 21.0 Total Split (s) 36.0 21.0 Total Split (%) 63.2% 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 V/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (yph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Reduced V/c Ratio 0.37 Intersection Summary Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	Switch Phase										
Total Split (s) 36.0 21.0 Total Split (%) 63.2% 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead/Lag Coptimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 v/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 LOS A Approach LOS A Queue Length 50th (m) 23.5 Queue Length 50th (m) 23.5 Queue Length 50th (m) 27.0 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Reduced V/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	Minimum Initial (s)		10.0					10.0			
Total Split (s) 36.0 21.0 Total Split (%) 63.2% 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time (s) 5.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recall Mode Min None Act Effet Green (s) 33.7 Actuated g/C Ratio 0.64 V/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 Queue Length 95th (m) 23.5 Queue Length 95th (m) 23.5 Queue Length 95th (m) 23.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Reduced Vic Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	Minimum Split (s)		36.0					21.0			
Total Split (%) 63.2% 37% Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 v/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 LOS A Approach LOS A Approach LOS A Approach LOS A Cueue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Tum Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Reduced V/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord			36.0					21.0			
Yellow Time (s) 3.3 3.0 All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recail Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 V/C Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Reduced Vic Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord			63.2%					37%			
All-Red Time (s) 1.7 1.0 Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead-Lag Optimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 V/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Approach LOS A Queue Length 95th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Reduced Vic Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord			3.3					3.0			
Lost Time Adjust (s) 0.0 Total Lost Time (s) 5.0 Lead/Lag Optimize? Recall Mode Min None Act Effct Green (s) 33.7 Actuated g/C Ratio 0.64 v/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 Tum Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Reduced V/c Ratio 0.37 Intersection Summary Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord			1.7					1.0			
Total Lost Time (s) 5.0 Lead/Lag Lead-Lag Optimize? Recall Mode Min None Act Effc Green (s) 33.7 Actuated g/C Ratio 0.64 V/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Approach LOS A Approach LOS A Cueue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Reduced Vic Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Lead-Lag Optimize? Lead-Lag Optimize? Recall Mode											
Lead-Lag Optimize? Recall Mode											
Recall Mode											
Actuated g/C Ratio 0.64 v/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Storage Cap Reductn 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	Recall Mode		Min					None			
Actuated g/C Ratio 0.64 v/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Storage Cap Reductn 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
v/c Ratio 0.38 Control Delay 7.5 Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 Turn Bay Length (m) Base Capacity (vph) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 90th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) 38ase Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn Storage Cap Reductn 0 Reduced vic Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	v/c Ratio		0.38								
Queue Delay 0.0 Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 90th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) 38ase Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn Storage Cap Reductn 0 Reduced vic Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	Control Delay		7.5								
Total Delay 7.5 LOS A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
A Approach Delay 7.5 Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Spillback Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord			7.5								
Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord	LOS										
Approach LOS A Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Queue Length 50th (m) 23.5 Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Queue Length 95th (m) 33.7 Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reducth 0 Spillback Cap Reducth 0 Storage Cap Reduct 0 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Internal Link Dist (m) 270.2 176.4 31.3 Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Turn Bay Length (m) Base Capacity (vph) 2155 Starvation Cap Reductn 0 Spillback Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord				176.4		31.3					
Base Capacity (vph) 2155 Starvation Cap Reductn 0 Storage Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Starvation Cap Reductn 0 Spillback Cap Reductn 0 Storage Cap Reductn 0 Reduced vic Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord			2155								
Spillback Cap Reductn 0 Storage Cap Reductn 0 Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Storage Cap Reductn											
Reduced v/c Ratio 0.37 Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Intersection Summary Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Cycle Length: 57 Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord			0.01								
Actuated Cycle Length: 52.5 Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Natural Cycle: 60 Control Type: Semi Act-Uncoord											
Control Type: Semi Act-Uncoord											
Maximum v/c Ratio: 0.38		ď									
	Maximum v/c Ratio: 0.38										

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 6

Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Background 05-16-2024

Intersection Signal Delay: 7.5
Intersection Capacity Utilization 27.6% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



Synchro 10 Light Report Page 7 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Background ____05-16-2024

	≯	→	*	1	←	*	4	†	1	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
Lane Configurations					414			414			↑ ↑	
Traffic Volume (vph)	0	0	0	160	582	189	272	626	0	0	405	11
uture Volume (vph)	0	0	0	160	582	189	272	626	0	0	405	11
Satd. Flow (prot)	0	0	0	0	4481	0	0	3266	0	0	3022	
It Permitted					0.991			0.638				
Satd. Flow (perm)	0	0	0	0	4429	0	0	2049	0	0	3022	
Satd. Flow (RTOR)					81						44	
ane Group Flow (vph)	0	0	0	0	931	0	0	898	0	0	515	
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				25.0	25.0		15.0	40.0			25.0	
Total Split (%)				33.3%	33.3%		20.0%	53.3%			33.3%	
/ellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
ost Time Adjust (s)					0.0			0.0			0.0	
otal Lost Time (s)					5.6			5.4			5.4	
_ead/Lag				Lag	Lag						Lag	
ead-Lag Optimize?				Yes	Yes						Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					19.4			34.6			19.6	
Actuated g/C Ratio					0.26			0.46			0.26	
/c Ratio					0.77			0.82			0.63	
Control Delay					28.6			12.0			26.2	
Queue Delay					0.0			0.0			0.2	
Total Delay					28.6			12.0			26.4	
.OS					С			В			С	
Approach Delay					28.6			12.0			26.4	
Approach LOS					С			В			С	
Queue Length 50th (m)					40.8			10.3			30.8	
Queue Length 95th (m)					54.9			m24.2			46.2	
nternal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1205			1101			822	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			29	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.77			0.82			0.65	
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 70 (93%), Referenced	d to phase	2:NBTL a	and 6:SE	T, Start o	f Green							
latural Cycle: 70												
Control Type: Actuated-Coor	dinated											

Synchro 10 Light Report Page 8 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

Lane Group

2029 Future Background 05-16-2024

Lanes, Volumes, Timings
4: Bank & Catherine

2029 Future Background 05-16-2024

Maximum v/c Ratio: 0.82 Intersection Signal Delay: 21.7

Intersection LOS: C

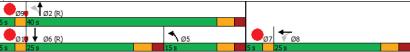
ICU Level of Service D

Intersection Capacity Utilization 80.1%

Analysis Period (min) 15

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

Splits and Phases: 4: Bank & Catherine



97	ane Group	Ø9	Ø13
	ane Configurations		
	raffic Volume (vph)		
	uture Volume (vph)		
	atd. Flow (prot)		
	It Permitted		
	atd. Flow (perm)		
	atd. Flow (RTOR)		
	ane Group Flow (vph)		
	urn Type		
7	rotected Phases	9	13
- 1	ermitted Phases	9	10
	letector Phase		
	witch Phase		
1.0	linimum Initial (s)	1.0	1.0
5.0		5.0	5.0
5.0	finimum Split (s)	5.0	5.0
	otal Split (s)		
7%	otal Split (%)	7%	7%
2.0	ellow Time (s)	2.0	2.0
0.0	II-Red Time (s)	0.0	0.0
	ost Time Adjust (s)		
	otal Lost Time (s)		
Lead	ead/Lag		Lead
Yes	ead-Lag Optimize?		Yes
Max	lecall Mode	Max	Max
	ct Effct Green (s)		
	ctuated g/C Ratio		
	/c Ratio		
	Control Delay		
	lueue Delay		
	otal Delay		
	OS		
	pproach Delay		
	pproach LOS		
	Queue Length 50th (m)		
	Queue Length 95th (m)		
	nternal Link Dist (m)		
	urn Bay Length (m)		
	ase Capacity (vph)		
	tarvation Cap Reductn		
	pillback Cap Reductn		
	torage Cap Reductn leduced v/c Ratio		
	leduced v/c Ratio		
	ntersection Summary		
	,		
	tersection Summary		

Synchro 10 Light Report Page 9 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2029 Future Background 04/13/2023

	•	-	*	1	-	*	1	1	1	-	Ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		414	7					↑ ↑		ሻ	*	
Traffic Volume (vph)	87	574	88	0	0	0	0	834	181	215	415	C
Future Volume (vph)	87	574	88	0	0	0	0	834	181	215	415	C
Satd. Flow (prot)	0	3292	1483	0	0	0	0	3117	0	1658	1745	C
Flt Permitted		0.993								0.167		
Satd. Flow (perm)	0	3285	1334	0	0	0	0	3117	0	284	1745	C
Satd. Flow (RTOR)			134					37				
Lane Group Flow (vph)	0	661	88	0	0	0	0	1015	0	215	415	C
Turn Type	Perm	NA	Perm					NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4							6		
Detector Phase	4	4	4					2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					10.0		5.0	10.0	
Minimum Split (s)	26.2	26.2	26.2					23.1		11.1	23.1	
Total Split (s)	29.0	29.0	29.0					31.0		15.0	46.0	
Total Split (%)	38.7%	38.7%	38.7%					41.3%		20.0%	61.3%	
Yellow Time (s)	3.3	3.3	3.3					3.0		3.0	3.0	
All-Red Time (s)	2.9	2.9	2.9					3.1		3.1	3.1	
Lost Time Adjust (s)		0.0	0.0					0.0		0.0	0.0	
Total Lost Time (s)		6.2	6.2					6.1		6.1	6.1	
Lead/Lag								Lead		Lag		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					C-Max		None	C-Max	
Act Effct Green (s)		19.9	19.9					27.8		42.8	42.8	
Actuated g/C Ratio		0.27	0.27					0.37		0.57	0.57	
v/c Ratio		0.76	0.19					0.86		0.66	0.42	
Control Delay		31.1	2.5					31.9		30.0	8.4	
Queue Delay		0.0	0.0					0.0		0.0	1.4	
Total Delay		31.1	2.5					31.9		30.0	9.9	
LOS		С	Α					С		С	Α	
Approach Delay		27.8						31.9			16.7	
Approach LOS		С						С			В	
Queue Length 50th (m)		44.2	0.0					67.6		18.8	20.5	
Queue Length 95th (m)		59.6	4.2					#110.8		m#41.0	m28.6	
Internal Link Dist (m)		176.4			219.4			129.7			80.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		998	498					1176		325	994	
Starvation Cap Reductn		0	0					0		0	380	
Spillback Cap Reductn		0	0					0		0	0	
Storage Cap Reductn		0	0					0		0	0	
Reduced v/c Ratio		0.66	0.18					0.86		0.66	0.68	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												

Actuated Cycle Length: 75
Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Synchro 10 Light Report Page 1 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2029 Future Background 04/13/2023

Maximum v/c Ratio: 0.86 Intersection Signal Delay: 26.6 Intersection LOS: C Intersection Signal Delay: 26.6 Intersection Capacity Utilization 82.3% ICU Analysis Period (min) 15

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

m Volume for 95th percentile queue is metered by upstream signal. ICU Level of Service E



Synchro 10 Light Report Page 2 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2029 Future Background 05-16-2024

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_ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
ane Configurations					ተተቡ						^	7
Traffic Volume (vph)	0	0	0	245	557	0	0	0	0	0	438	269
Future Volume (vph)	0	0	0	245	557	0	0	0	0	0	438	269
Satd, Flow (prot)	0	0	0	0	4693	0	0	0	0	0	1745	1483
Flt Permitted					0.985							
Satd. Flow (perm)	0	0	0	0	4657	0	0	0	0	0	1745	1443
Satd. Flow (RTOR)					152							75
ane Group Flow (vph)	0	0	0	0	802	0	0	0	0	0	438	269
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Detector Phase				6	6						4	4
Switch Phase												
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				28.0	28.0						47.0	47.0
Total Split (%)				37.3%	37.3%						62.7%	62.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)				1.0	0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
_ead/Lag					0.2						0.0	0.0
_ead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)				O Max	22.8						41.7	41.7
Actuated g/C Ratio					0.30						0.56	0.56
//c Ratio					0.53						0.45	0.32
Control Delay					16.7						11.8	7.6
Queue Delay					0.0						0.0	0.0
Total Delay					16.7						11.8	7.6
OS					В						В	A
Approach Delay					16.7						10.2	
Approach LOS					В						В	
Queue Length 50th (m)					9.4						33.7	13.0
Queue Length 95th (m)					15.2						53.9	25.7
nternal Link Dist (m)		117.8			157.8			120.4			277.6	20.1
Turn Bay Length (m)		111.0			101.0			120.1			211.0	
Base Capacity (vph)					1521						970	835
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.53						0.45	0.32
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 24 (32%), Referenced	to phace	2: and 6:	WRTI 9	tart of C	oon		_				_	
Natural Cycle: 55	to priase	2. anu 0.	TTDIL, C	itali Ul Ul	COII							
Natural Cycle. 55 Control Type: Actuated-Coord	linated				_							

30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report Page 1

Lanes, Volumes, Timings 1: HWY 417 OR/Lyon & Catherine 2029 Future Background 05-16-2024

Maximum v/c Ratio: 0.53
Intersection Signal Delay: 13.6
Intersection Capacity Utilization 54.1%
ICU Level of Service A
Analysis Period (min) 15



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ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
ane Configurations					† 1>	7		4413				
Fraffic Volume (vph)	0	0	0	0	699	340	25	761	0	0	0	
Future Volume (vph)	0	0	0	0	699	340	25	761	0	0	0	
Satd. Flow (prot)	0	0	0	0	3143	1350	0	4755	0	0	0	
Flt Permitted								0.998				
Satd, Flow (perm)	0	0	0	0	3143	1247	0	4752	0	0	0	
Satd. Flow (RTOR)								70				
ane Group Flow (vph)	0	0	0	0	733	306	0	786	0	0	0	
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases						6	8					
Detector Phase					6	6	8	8				
Switch Phase												
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
Total Split (s)					38.0	38.0	32.0	32.0				
Total Split (%)					50.7%	50.7%	42.7%	42.7%				
Yellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
Lost Time Adjust (s)					0.0	0.0	2.0	0.0				
Total Lost Time (s)					5.8	5.8		5.8				
Lead/Lag					Lag	Lag		0.0				
_ead-Lag Optimize?					Lug	209						
Recall Mode					C-Max	C-Max	Max	Max				
Act Effct Green (s)					32.2	32.2		26.2				
Actuated g/C Ratio					0.43	0.43		0.35				
//c Ratio					0.54	0.57		0.46				
Control Delay					15.5	17.8		18.2				
Queue Delay					0.0	0.0		0.0				
Total Delay					15.5	17.8		18.2				
OS					В	В		В				
Approach Delay					16.1			18.2				
Approach LOS					В			В				
Queue Length 50th (m)					35.1	29.3		28.0				
Queue Length 95th (m)					m40.3	m36.9		38.3				
nternal Link Dist (m)		157.8			130.6			43.8			56.6	
Turn Bay Length (m)												
Base Capacity (vph)					1349	535		1705				
Starvation Cap Reductn					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn					0	0		0				
Reduced v/c Ratio					0.54	0.57		0.46				
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 12 (16%), Referenced	to phase	2: and 6:	WBT, Sta	rt of Gre	en							
Natural Cycle: 55	F.1.230	22 0.	2., 50									
Control Type: Actuated-Coord	dinated											

Lane Group	Ø5	
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	
Minimum Split (s)	5.0	
Total Split (s)	5.0	
Total Split (%)	7%	
Yellow Time (s)	2.0	
All-Red Time (s)	0.0	
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	
Lead-Lag Optimize?		
Recall Mode	Max	
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (m)		
Queue Length 95th (m)		
Internal Link Dist (m)		
Turn Bay Length (m)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		

Lanes, Volumes, Timings 2: Kent & Catherine

2029 Future Background 05-16-2024

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 17.0
Intersection LOS: B
Intersection Capacity Utilization 52.7%

Analysis Period (min) 15

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



30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report Page 5

Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Background 05-16-2024

	۶	→	←	4	/	4			
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4		
Lane Configurations		^							
Traffic Volume (vph)	0	772	0	0	0	0			
Future Volume (vph)	0	772	0	0	0	0			
Satd. Flow (prot)	0	3316	0	0	0	0			
Flt Permitted	_		_	-	-	-			
Satd. Flow (perm)	0	3316	0	0	0	0			
Satd. Flow (RTOR)	-		-	-	-	-			
Lane Group Flow (vph)	0	772	0	0	0	0			
Turn Type	-	NA	-	-	-	-			
Protected Phases		2					4		
Permitted Phases		_					•		
Detector Phase		2							
Switch Phase		_							
Minimum Initial (s)		10.0					10.0		
Minimum Split (s)		36.0					21.0		
Total Split (s)		36.0					21.0		
Total Split (%)		63.2%					37%		
Yellow Time (s)		3.3					3.0		
All-Red Time (s)		1.7					1.0		
Lost Time Adjust (s)		0.0					1.0		
Total Lost Time (s)		5.0							
Lead/Lag		5.0							
Lead-Lag Optimize?									
Recall Mode		Min					None		
Act Effct Green (s)		34.6					None		
Actuated g/C Ratio		0.83							
//c Ratio		0.83							
		4.3							
Control Delay		0.0							
Queue Delay									
Total Delay		4.3							
LOS		A 4.3							
Approach Delay									
Approach LOS		A							
Queue Length 50th (m)		0.0							
Queue Length 95th (m)		32.2	470 (00.7				
Internal Link Dist (m)		270.2	176.4		23.7				
Turn Bay Length (m)		0700							
Base Capacity (vph)		2738							
Starvation Cap Reductn		0							
Spillback Cap Reductn		0							
Storage Cap Reductn		0							
Reduced v/c Ratio		0.28							
ntersection Summary									
Cycle Length: 57									
Actuated Cycle Length: 41.9									
Natural Cycle: 60									
Control Type: Semi Act-Uncoord	d								
Maximum v/c Ratio: 0.28									

Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Background 05-16-2024

Intersection Signal Delay: 4.3
Intersection Capacity Utilization 26.7% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



Synchro 10 Light Report Page 7 30-48 Chamberlain PM PEAK HOUR

Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Background 05-16-2024

	•	→	•	•	←	•	1	†	1	1	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4143			414			∱ }	
Traffic Volume (vph)	0	0	0	287	618	175	214	357	0	0	643	130
uture Volume (vph)	0	0	0	287	618	175	214	357	0	0	643	130
Satd. Flow (prot)	0	0	0	0	4536	0	0	3256	0	0	3063	C
Flt Permitted					0.987			0.545				
Satd. Flow (perm)	0	0	0	0	4474	0	0	1770	0	0	3063	C
Satd. Flow (RTOR)					50						32	
Lane Group Flow (vph)	0	0	0	0	1080	0	0	571	0	0	773	(
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				24.0	24.0		14.0	41.0			27.0	
Total Split (%)				32.0%	32.0%		18.7%	54.7%			36.0%	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.6			5.4			5.4	
Lead/Lag				Lag	Lag						Lag	
Lead-Lag Optimize?											Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					18.4			35.6			21.6	
Actuated g/C Ratio					0.25			0.47			0.29	
v/c Ratio					0.95			0.57			0.86	
Control Delay					45.4			12.6			35.4	
Queue Delay					0.1			0.0			3.7	
Total Delay					45.5			12.6			39.1	
LOS					D			В			D	
Approach Delay					45.5			12.6			39.1	
Approach LOS					D			В			D	
Queue Length 50th (m)					52.8			15.8			51.8	
Queue Length 95th (m)					#79.9			20.0			#81.8	
Internal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1135			1010			904	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					1			0			73	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.95			0.57			0.93	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75	d to phose	2-NIDTI -	and G.CD	T Ctort o	of Croon							
Offset: 50 (67%), Reference	u to pnase	Z.NBTL 8	and 6:5B	i, Start c	oreen							
Natural Cycle: 70 Control Type: Actuated-Coo	rdin ata d											
COLLIGITATION LANGUAGE CO.	rumateu											

Control Type: Actuated-Coordinated

Synchro 10 Light Report Page 8 30-48 Chamberlain PM PEAK HOUR

Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Background

1	ruluie	Dackground
		05-16-2024

Lane Group	Ø7	Ø9	Ø13
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	7	9	13
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	7%	7%	7%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)			
Lead/Lag	Lead		Lead
Lead-Lag Optimize?	Load		Yes
Recall Mode	Max	Max	Max
Act Effct Green (s)	IVIAA	IVIAN	IVIAX
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn Reduced v/c Ratio			
Reduced V/C Ratio			
Intersection Summary			_
,			

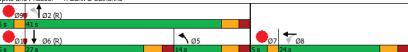
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Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Background 05-16-2024

Maximum v/c Ratio: 0.95
Intersection Signal Delay: 35.7 Intersection LOS: D
Intersection Capacity Utilization 80.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bank & Catherine



Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2029 Future Background 05-16-2024

•	\rightarrow	*	1	-	•	1	Ť		-	¥	4
EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
	413	7					♠ ₽			413	
53	590	120	0	0	0	0	500	91	175	720	
53	590	120	0	0	0	0	500	91	175	720	
0	3302	1483	0	0	0	0	3115	0	0	3283	
	0.996									0.705	
0	3299	1345	0	0	0	0	3115	0	0	2296	
		134					29				
0	643	120	0	0	0	0	591	0	0	895	
Perm	NA	Perm					NA		pm+pt	NA	
							2		1	6	
4		4					_		6		
	4						2			6	
-	-	-					_			· ·	
10.0	10.0	10.0					10.0		5.0	10.0	
			_								
2.9									3.1		
	6.2	6.2								6.1	
										0.11	
None									None		
		Α									
	55.3	8.7					34.4			m84.2	
	176.4			219.4			129.7			80.8	
		30.0									
	1090	534					1765			1291	
	0	0					0			283	
	0	0					0			0	
	0	0					0			0	
	0.59	0.22					0.33			0.89	
ed to phase	e 2:NBT a	ind 6:SBTI	L. Start of	f Green							
zz to pridot		0.0511	_, 0 0	5.00.7							
	EBL 53 53 0 0 Perm 4 4 10.0 26.2 31.0 41.3% 3.3 2.9	EBL EBT 53 590 0 3302 0,996 0 3299 0 643 Perm NA 4 4 4 4 10.0 10.0 26.2 26.2 31.0 31.0 41.3% 41.3% 3.3 3.3 2.9 2.9 0.0 6.2 None None 20.5 0.27 0.71 29.0 0.0 0 29.0 C 25.2 C 43.2 55.3 176.4 1090 0 0 0 0 0 0 0 0 5.59	EBL EBT EBR 53 590 120 53 590 120 0 3302 1483 0 996 0 3299 1345 134 0 643 120 Perm NA Perm 4 4 4 4 4 4 10.0 10.0 10.0 10.0 26.2 26.2 26.2 26.2 31.0 31.0 31.0 31.0 41.3% 41.3% 41.3% 41.3% 3.3 3.3 3.3 2.9 2.9 2.9 0.0 0.0 6.2 6.2 None None 20.5 0.27 0.27 0.71 0.26 29.0 4.7 0.0 0.0 29.0 4.7 C A 25.2 C 43.2 0.0 55.3 8.7 176.4 30.0 1090 534 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	53 590 120 0 53 590 120 0 0 3302 1483 0 0.996 0 3299 1345 0 134 0 643 120 0 Perm NA Perm 4 4 4 4 4 4 4 10.0 10.0 10.0 26.2 26.2 26.2 31.0 31.0 31.0 31.0 31.0 41.3% 41.3% 41.3% 3.3 3.3 3.3 2.9 2.9 2.9 0.0 0.0 6.2 6.2 None None None 20.5 20.5 0.27 0.27 0.71 0.26 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 29.0 4.7 0.0 0.0 55.3 8.7 176.4 30.0 1090 534 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	EBL EBT EBR WBL WBT 3	EBL EBT EBR WBL WBT WBR 1	EBL EBT EBR WBL WBT WBR NBL 3	EBL EBT EBR WBL WBT WBR NBL NBT 1	EBL EBT EBR WBL WBT WBR NBL NBT NBR 3	EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL 3 590 120 0 0 0 0 0 500 91 175 53 590 120 0 0 0 0 0 500 91 175 0 3302 1483 0 0 0 0 0 3115 0 0 0.996 0 3299 1345 0 0 0 0 3115 0 0 Perm NA Perm	EBL EBR WBL WBT WBR NBL NBT NBR SBL SBT

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Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2029 Future Background 05-16-2024

Maximum v/c Ratio: 0.71 Intersection Signal Delay: 17.7 Intersection LOS: B Intersection Capacity Utilization 82.7% ICU Level of Service E Analysis Period (min) 15 ICU Level of Service E ICU Level of Servic

Splits and Phases: 5: Bank & Chamberlain/Isabella



Appendix H

2024 Future Total Conditions



Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2024 Future Total 05-16-2024

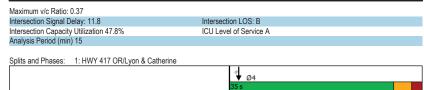
	•	-	*	•	•	_		T		-	+	4
_ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
ane Configurations					414						1	7
Traffic Volume (vph)	0	0	0	226	220	0	0	0	0	0	258	128
Future Volume (vph)	0	0	0	226	220	0	0	0	0	0	258	128
Satd. Flow (prot)	0	0	0	0	4645	0	0	0	0	0	1745	1483
Flt Permitted					0.975							
Satd. Flow (perm)	0	0	0	0	4611	0	0	0	0	0	1745	1454
Satd. Flow (RTOR)					226							128
ane Group Flow (vph)	0	0	0	0	446	0	0	0	0	0	258	128
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Detector Phase				6	6						4	4
Switch Phase												
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				40.0	40.0						35.0	35.0
Total Split (%)				53.3%	53.3%						46.7%	46.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)				1.0	0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
_ead/Lag					0.2						0.0	0.0
_ead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)				O Max	34.8						29.7	29.7
Actuated g/C Ratio					0.46						0.40	0.40
//c Ratio					0.20						0.37	0.20
Control Delay					10.5						18.1	3.9
Queue Delay					0.0						0.0	0.0
Total Delay					10.5						18.1	3.9
_OS					В						В	J.,
Approach Delay					10.5						13.4	
Approach LOS					10.5 B						13.4 B	
Queue Length 50th (m)					17.6						25.1	0.0
Queue Length 95th (m)					26.4						42.7	9.2
nternal Link Dist (m)		117.8			157.8			120.4			277.6	9.2
Turn Bay Length (m)		111.0			107.0			120.4			211.0	
					2260						691	653
Base Capacity (vph)					2260						091	000
Starvation Cap Reductn					0						0	(
Spillback Cap Reductn					0						0	(
Storage Cap Reductn					-						-	
Reduced v/c Ratio					0.20						0.37	0.20
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 48 (64%), Referenced	d to phase	2: and 6:	WBTL, S	tart of Gr	een							
Natural Cycle: 55												
Control Type: Actuated-Coor	dinated											

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Lanes, Volumes, Timings 1: HWY 417 OR/Lyon & Catherine

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2024 Future Total 05-16-2024



	<i>></i>	\rightarrow	*	1	•	*	1	†	1	-	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations					↑ ↑	7		ተተቡ				
Traffic Volume (vph)	0	0	0	0	394	539	54	1373	0	0	0	
Future Volume (vph)	0	0	0	0	394	539	54	1373	0	0	0	
Satd, Flow (prot)	0	0	0	0	2917	1350	0	4755	0	0	0	
Flt Permitted								0.998				
Satd. Flow (perm)	0	0	0	0	2917	1262	0	4750	0	0	0	
Satd. Flow (RTOR)								70				
Lane Group Flow (vph)	0	0	0	0	642	291	0	1427	0	0	0	
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases						6	8					
Detector Phase					6	6	8	8				
Switch Phase												
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
Total Split (s)					32.0	32.0	38.0	38.0				
Total Split (%)					42.7%	42.7%	50.7%	50.7%				
Yellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
Lost Time Adjust (s)					0.0	0.0	2.0	0.0				
Total Lost Time (s)					5.8	5.8		5.8				
Lead/Lag					Lag	Lag		0.0				
Lead-Lag Optimize?					9	3						
Recall Mode					C-Max	C-Max	Max	Max				
Act Effct Green (s)					26.2	26.2		32.2				
Actuated g/C Ratio					0.35	0.35		0.43				
v/c Ratio					0.63	0.66		0.69				
Control Delay					26.2	30.0		18.5				
Queue Delay					0.0	0.0		0.0				
Total Delay					26.2	30.0		18.5				
LOS					C	С		В				
Approach Delay					27.4			18.5				
Approach LOS					С			В				
Queue Length 50th (m)					43.7	40.0		54.6				
Queue Length 95th (m)					m60.7	m56.8		69.8				
Internal Link Dist (m)		157.8			130.6			47.0			56.6	
Turn Bay Length (m)												
Base Capacity (vph)					1019	440		2079				
Starvation Cap Reductn					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn					0	0		0				
Reduced v/c Ratio					0.63	0.66		0.69				
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75	l to phase	2: and Gi	MDT Cta	rt of Cro	on							
Offset: 15 (20%), Referenced	i to priase	2. and 6.	vvoi, ota	ii t di Gre	en							
Natural Cycle: 60 Control Type: Actuated-Coor	P ()											

Lane Group	Ø5
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	5.0
Total Split (s)	5.0
Total Split (%)	7%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	
Recall Mode	Max
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

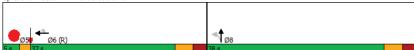
Lanes, Volumes, Timings 2: Kent & Catherine

2024 Future Total 05-16-2024

Maximum v/c Ratio: 0.69
Intersection Signal Delay: 22.0
Intersection Capacity Utilization 65.7%
ICU Level of Service C
Analysis Period (min) 15

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

Splits and Phases: 2: Kent & Catherine



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Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Total 05-16-2024

	۶	→	←	4	/	4			
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4		
Lane Configurations		^							
Traffic Volume (vph)	0	757	0	0	0	0			
Future Volume (vph)	0	757	0	0	0	0			
Satd. Flow (prot)	0	3316	0	0	0	0			
Flt Permitted									
Satd. Flow (perm)	0	3316	0	0	0	0			
Satd. Flow (RTOR)									
Lane Group Flow (vph)	0	757	0	0	0	0			
Turn Type		NA							
Protected Phases		2					4		
Permitted Phases									
Detector Phase		2							
Switch Phase									
Minimum Initial (s)		10.0					10.0		
Minimum Split (s)		36.0					21.0		
Total Split (s)		36.0					21.0		
Fotal Split (%)		63.2%					37%		
Yellow Time (s)		3.3					3.0		
All-Red Time (s)		1.7					1.0		
Lost Time Adjust (s)		0.0					1.0		
Total Lost Time (s)		5.0							
Lead/Lag		0.0							
Lead-Lag Optimize?									
Recall Mode		Min					None		
Act Effct Green (s)		32.7					NOTIC		
Actuated g/C Ratio		0.63							
//c Ratio		0.36							
Control Delay		7.5							
Queue Delay		0.0							
Total Delay		7.5							
LOS		7.5 A							
Approach Delay		7.5							
		7.5 A							
Approach LOS		21.8							
Queue Length 50th (m)		31.6							
Queue Length 95th (m)			17C A		31.3				
nternal Link Dist (m)		270.2	176.4		31.3				
Turn Bay Length (m)		2162							
Base Capacity (vph)									
Starvation Cap Reductn		0							
Spillback Cap Reductn		0							
Storage Cap Reductn		0							
Reduced v/c Ratio		0.35							
ntersection Summary									
Cycle Length: 57									
Actuated Cycle Length: 51.6									
Natural Cycle: 60									
Control Type: Semi Act-Uncoord	d								
Maximum v/c Ratio: 0.36									

Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Total 05-16-2024

Intersection Signal Delay: 7.5 Intersection LOS: A Intersection Capacity Utilization 26.3% ICU Level of Service A Analysis Period (min) 15



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Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Total 05-16-2024

	•	→	\rightarrow	•	←	•	1	†	1	1	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4143			414			↑ ↑	
Traffic Volume (vph)	0	0	0	160	582	189	278	627	0	0	385	110
Future Volume (vph)	0	0	0	160	582	189	278	627	0	0	385	110
Satd. Flow (prot)	0	0	0	0	4481	0	0	3266	0	0	3011	C
Flt Permitted					0.991			0.646				
Satd. Flow (perm)	0	0	0	0	4429	0	0	2070	0	0	3011	C
Satd. Flow (RTOR)					81						47	
Lane Group Flow (vph)	0	0	0	0	931	0	0	905	0	0	495	C
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				25.0	25.0		15.0	40.0			25.0	
Total Split (%)				33.3%	33.3%		20.0%	53.3%			33.3%	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.6			5.4			5.4	
Lead/Lag				Lag	Lag						Lag	
Lead-Lag Optimize?				Yes	Yes						Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					19.4			34.6			19.6	
Actuated g/C Ratio					0.26			0.46			0.26	
v/c Ratio					0.77			0.82			0.60	
Control Delay					28.6			12.3			25.5	
Queue Delay					0.0			0.0			0.1	
Total Delay					28.6			12.3			25.6	
LOS					С			В			С	
Approach Delay					28.6			12.3			25.6	
Approach LOS					С			В			С	
Queue Length 50th (m)					40.8			10.7			29.0	
Queue Length 95th (m)					54.9			m29.3			43.9	
Internal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1205			1108			821	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			27	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.77			0.82			0.62	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75	d &a wha	O.NIDT!		T Chart	6 Orear							
Offset: 70 (93%), Reference	a to phase	Z:NR1F 8	and 6:SB	i, Start c	ir Green							
Natural Cycle: 70	adia ata d											
Control Type: Actuated-Coo	rumated											

Control Type: Actuated-Coordinated

Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Total 05-16-2024

Lane Group	Ø7	Ø9	Ø13
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	7	9	13
Permitted Phases	1	J	10
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
	5.0	5.0	5.0
Total Split (s)	5.0 7%	5.0 7%	5.0 7%
Total Split (%)			
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		Lead
Lead-Lag Optimize?	Yes		Yes
Recall Mode	Max	Max	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Cummers			
Intersection Summary			

Synchro 10 Light Report Page 9 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Total 05-16-2024

Maximum v/c Ratio: 0.82 Intersection Signal Delay: 21.6

Intersection LOS: C

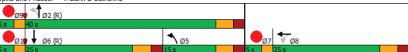
ICU Level of Service D

Intersection Capacity Utilization 79.7% ICU

Analysis Period (min) 15

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

Splits and Phases: 4: Bank & Catherine



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Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Total 05-16-2024

	•	\rightarrow	*	1	-	•	1	1	1	-	¥	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		414	7					↑ 1>		ሻ	†	
Traffic Volume (vph)	87	536	84	0	0	0	0	834	162	192	395	0
Future Volume (vph)	87	536	84	0	0	0	0	834	162	192	395	0
Satd. Flow (prot)	0	3292	1483	0	0	0	0	3137	0	1658	1745	0
Flt Permitted		0.993								0.179		
Satd. Flow (perm)	0	3285	1334	0	0	0	0	3137	0	304	1745	0
Satd. Flow (RTOR)			134					32				
Lane Group Flow (vph)	0	623	84	0	0	0	0	996	0	192	395	0
Turn Type	Perm	NA	Perm					NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4							6		
Detector Phase	4	4	4					2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					10.0		5.0	10.0	
Minimum Split (s)	26.2	26.2	26.2					23.1		11.1	23.1	
Total Split (s)	29.0	29.0	29.0					31.0		15.0	46.0	
Total Split (%)	38.7%	38.7%	38.7%					41.3%		20.0%	61.3%	
Yellow Time (s)	3.3	3.3	3.3					3.0		3.0	3.0	
All-Red Time (s)	2.9	2.9	2.9					3.1		3.1	3.1	
Lost Time Adjust (s)		0.0	0.0					0.0		0.0	0.0	
Total Lost Time (s)		6.2	6.2					6.1		6.1	6.1	
Lead/Lag								Lead		Lag		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					C-Max		None	C-Max	
Act Effct Green (s)		19.3	19.3					28.4		43.4	43.4	
Actuated g/C Ratio		0.26	0.26					0.38		0.58	0.58	
v/c Ratio		0.74	0.19					0.83		0.57	0.39	
Control Delay		30.9	2.3					29.0		24.8	8.0	
Queue Delay		0.0	0.0					0.0		0.0	1.1	
Total Delay		30.9	2.3					29.0		24.8	9.2	
LOS		С	Α					С		С	Α	
Approach Delay		27.5						29.0			14.3	
Approach LOS		С						С			В	
Queue Length 50th (m)		41.8	0.0					64.5		12.0	19.7	
Queue Length 95th (m)		55.7	3.5					#107.6		m33.4	m27.6	
Internal Link Dist (m)		176.4			219.4			129.7			80.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		998	498					1207		336	1009	
Starvation Cap Reductn		0	0					0		0	385	
Spillback Cap Reductn		0	0					0		0	0	
Storage Cap Reductn		0	0					0		0	0	
Reduced v/c Ratio		0.62	0.17					0.83		0.57	0.63	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 1 (1%), Referenced	to phase 2	:NBT and	6:SBTL,	Start of G	Green							

Natural Cycle: 70

Control Type: Actuated-Coordinated

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 11

Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Total 05-16-2024

Maximum v/c Ratio: 0.83
Intersection Signal Delay: 24.8
Intersection Capacity Utilization 79.1%
ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2024 Future Total 05-16-2024

	→	-	•	•	—	•	4	†	1	-	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					ተተቡ						↑	7
Traffic Volume (vph)	0	0	0	221	499	0	0	0	0	0	392	264
Future Volume (vph)	0	0	0	221	499	0	0	0	0	0	392	264
Satd. Flow (prot)	0	0	0	0	4693	0	0	0	0	0	1745	1483
Flt Permitted					0.985							
Satd. Flow (perm)	0	0	0	0	4657	0	0	0	0	0	1745	1443
Satd. Flow (RTOR)					154							98
Lane Group Flow (vph)	0	0	0	0	720	0	0	0	0	0	392	264
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Detector Phase				6	6						4	4
Switch Phase												
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				28.0	28.0						47.0	47.0
Total Split (%)				37.3%	37.3%						62.7%	62.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)					0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)					22.8						41.7	41.7
Actuated g/C Ratio					0.30						0.56	0.56
v/c Ratio					0.47						0.40	0.31
Control Delay					16.0						11.1	6.6
Queue Delay					0.0						0.0	0.0
Total Delay					16.0						11.1	6.6
LOS					В						В	Α
Approach Delay					16.0						9.3	
Approach LOS					В						Α	
Queue Length 50th (m)					9.3						29.2	10.8
Queue Length 95th (m)					11.9						47.0	22.8
Internal Link Dist (m)		117.8			157.8			120.4			277.6	
Turn Bay Length (m)												
Base Capacity (vph)					1522						970	845
Starvation Cap Reductn					0						0	0
Spillback Cap Reductn					0						0	0
Storage Cap Reductn					0						0	0
Reduced v/c Ratio					0.47						0.40	0.31
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 24 (32%), Reference	ed to phase	2: and 6:	WBTL, S	Start of G	reen							
Natural Cycle: 55												
Control Type: Actuated-Coo	rdinated											
-												

30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report Page 1

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2024 Future Total 05-16-2024

Maximum v/c Ratio: 0.47
Intersection Signal Delay: 12.8
Intersection Capacity Utilization 50.1%
ICU Level of Service A
Analysis Period (min) 15



BT NBR SBL SBT	NBT	NBL	WBR	WBT	WBL	EBR	EBT	EBL	Lane Group
A	ተተኩ		7	† }					ane Configurations
	742	25	317	651	0	0	0	0	Traffic Volume (vph)
42 0 0 0	742	25	317	651	0	0	0	0	Future Volume (vph)
55 0 0 0	4755	0	1350	3143	0	0	0	0	Satd, Flow (prot)
98	0.998								Flt Permitted
52 0 0 0	4752	0	1247	3143	0	0	0	0	Satd. Flow (perm)
70	70								Satd. Flow (RTOR)
67 0 0 0	767	0	285	683	0	0	0	0	Lane Group Flow (vph)
NA.	NA	Perm	Perm	NA					Turn Type
8	8			6					Protected Phases
	_	8	6	_					Permitted Phases
8	8	8	6	6					Detector Phase
	-	-	-	-					Switch Phase
0.0	10.0	10.0	10.0	10.0					Minimum Initial (s)
	17.8	17.8	27.8	27.8					Minimum Split (s)
	32.0	32.0	38.0	38.0					Total Split (s)
	42.7%	42.7%	50.7%	50.7%					Total Split (%)
	3.3	3.3	3.3	3.3					Yellow Time (s)
	2.5	2.5	2.5	2.5					All-Red Time (s)
	0.0	2.5	0.0	0.0					Lost Time Adjust (s)
•••	5.8		5.8	5.8					Total Lost Time (s)
1.0	5.0								Lead/Lag
			Lag	Lag					Lead/Lag Optimize?
0.4	Max	Max	C-Max	C-Max					Recall Mode
••••	26.2	IVIAX	32.2	32.2					Act Effct Green (s)
	0.35		0.43	0.43					
									Actuated g/C Ratio
	0.45		0.53	0.51					v/c Ratio
	18.0		16.7	14.4					Control Delay
	0.0		0.0	0.0					Queue Delay
	18.0		16.7	14.4					Total Delay
В			В	В					LOS
	18.0			15.0					Approach Delay
В				В					Approach LOS
	27.1		25.1	30.1					Queue Length 50th (m)
	37.2		m37.4	m41.5					Queue Length 95th (m)
3.8 56.6	43.8			130.6			157.8		Internal Link Dist (m)
									Turn Bay Length (m)
	1705		535	1349					Base Capacity (vph)
0			0	0					Starvation Cap Reductn
0	0								Spillback Cap Reductn
0			0	0					Storage Cap Reductn
45	0.45		0.53	0.51					Reduced v/c Ratio
									Intersection Summary
									Cycle Length: 75
								5	Actuated Cycle Length: 75
				en	rt of Gre	WBT, Sta	2: and 6:		
						, , ,			
	(0 0 0.53		rt of Gre	WBT, Sta	2: and 6:	ced to phase	Spillback Cap Reductn Storage Cap Reductn Reduced v/c Ratio Intersection Summary Cycle Length: 75 Actuated Cycle Length: 75 Offset: 12 (16%), Reference Natural Cycle: 55 Control Type: Actuated-Coo

Lane Group	Ø5		
Lane Configurations			
Traffic Volume (vph)			
uture Volume (vph)			
Satd. Flow (prot)			
It Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			J
Lane Group Flow (vph)			l
Turn Type			
Protected Phases	5		
Permitted Phases	ŭ		
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0		
Minimum Split (s)	5.0		
Total Split (s)	5.0		
Total Split (%)	7%		
Yellow Time (s)	2.0	 	
	0.0		
All-Red Time (s)	0.0		
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		
Lead-Lag Optimize?			
Recall Mode	Max		
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

Lanes, Volumes, Timings 2: Kent & Catherine

2024 Future Total 05-16-2024

Maximum v/c Ratio: 0.53
Intersection Signal Delay: 16.4
Intersection LOS: B
Intersection Capacity Utilization 50.6%
ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Kent & Catherine



30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report

Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Total 05-16-2024

	۶	→	←	•	1	4			
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4		
Lane Configurations		^							
Traffic Volume (vph)	0	779	0	0	0	0			
uture Volume (vph)	0	779	0	0	0	0			
Satd. Flow (prot)	0	3316	0	0	0	0			
Flt Permitted									
Satd. Flow (perm)	0	3316	0	0	0	0			
Satd. Flow (RTOR)									
Lane Group Flow (vph)	0	779	0	0	0	0			
Turn Type		NA							
Protected Phases		2					4		
Permitted Phases							•		
Detector Phase		2							
Switch Phase		_							
Minimum Initial (s)		10.0					10.0		
Minimum Split (s)		36.0					21.0		
Total Split (s)		36.0					21.0		
Total Split (%)		63.2%					37%		
Yellow Time (s)		3.3					3.0		
All-Red Time (s)		1.7					1.0		
Lost Time Adjust (s)		0.0					1.0		
Total Lost Time (s)		5.0							
Lead/Lag		3.0							
Lead-Lag Optimize?									
Recall Mode		Min					None		
Act Effct Green (s)		34.7					NONE		
Actuated g/C Ratio		0.83							
//c Ratio		0.03							
Control Delay		4.3							
Queue Delay		0.0							
Fotal Delay		4.3							
OS		4.5 A							
		4.3							
Approach Delay									
Approach LOS		A							
Queue Length 50th (m)		0.0							
Queue Length 95th (m)		32.5	470.4		00.7				
nternal Link Dist (m)		270.2	176.4		23.7				
Furn Bay Length (m)		0740							
Base Capacity (vph)		2740							
Starvation Cap Reductn		0							
Spillback Cap Reductn		0							
Storage Cap Reductn		0							
Reduced v/c Ratio		0.28							
ntersection Summary									
Cycle Length: 57									
Actuated Cycle Length: 42									
Natural Cycle: 60									
Control Type: Semi Act-Uncoon	d								
Maximum v/c Ratio: 0.28									

Lanes, Volumes, Timings 3: Chamberlain & Kent

2024 Future Total 05-16-2024

Intersection Signal Delay: 4.3
Intersection Capacity Utilization 26.9% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



Synchro 10 Light Report Page 7 30-48 Chamberlain PM PEAK HOUR

Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Total 05-16-2024

	۶	→	*	1	—	*	4	†	1	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
ane Configurations					414			414			↑ ↑	
Fraffic Volume (vph)	0	0	0	257	553	157	203	340	0	0	643	12
uture Volume (vph)	0	0	0	257	553	157	203	340	0	0	643	12
Satd. Flow (prot)	0	0	0	0	4536	0	0	3256	0	0	3077	
It Permitted					0.987			0.544				
Satd. Flow (perm)	0	0	0	0	4474	0	0	1765	0	0	3077	
Satd. Flow (RTOR)					51						29	
ane Group Flow (vph)	0	0	0	0	967	0	0	543	0	0	763	
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
/linimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				24.0	24.0		14.0	41.0			27.0	
otal Split (%)				32.0%	32.0%		18.7%	54.7%			36.0%	
'ellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
ost Time Adjust (s)					0.0			0.0			0.0	
otal Lost Time (s)					5.6			5.4			5.4	
.ead/Lag				Lag	Lag						Lag	
ead-Lag Optimize?											Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					18.4			35.6			21.6	
Actuated g/C Ratio					0.25			0.47			0.29	
/c Ratio					0.85			0.54			0.84	
Control Delay					34.4			12.2			34.5	
Queue Delay					0.0			0.0			2.9	
Total Delay					34.4			12.2			37.4	
.OS					С			В			D	
Approach Delay					34.4			12.2			37.4	
Approach LOS					С			В			D	
Queue Length 50th (m)					45.4			15.2			51.2	
Queue Length 95th (m)					#66.1			19.2			#80.1	
nternal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1136			1008			906	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					1			0			71	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.85			0.54			0.91	
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 50 (67%), Reference	d to phase	2:NBTL a	and 6:SE	T, Start o	of Green							
latural Cycle: 70												
Control Type: Actuated-Coor	rdinated											

Synchro 10 Light Report Page 8 30-48 Chamberlain PM PEAK HOUR

Lanes, Volumes, Timings 4: Bank & Catherine

Lane Group	Ø7	Ø9	Ø13
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	7	9	13
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	7%	7%	7%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		Lead
Lead-Lag Optimize?			Yes
Recall Mode	Max	Max	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

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Lanes, Volumes, Timings 4: Bank & Catherine

2024 Future Total

05-16-2024

2024 Future Total 05-16-2024

Maximum v/c Ratio: 0.85
Intersection Signal Delay: 30.1 Intersection LOS: C
Intersection Capacity Utilization 76.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bank & Catherine



Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Total 05-16-2024

	•	\rightarrow	*	1	—	•	1	1	1	-	Į.	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations		414	7					† }			414	
Traffic Volume (vph)	57	592	121	0	0	0	0	476	91	175	720	
Future Volume (vph)	57	592	121	0	0	0	0	476	91	175	720	
Satd. Flow (prot)	0	3302	1483	0	0	0	0	3106	0	0	3283	
Flt Permitted		0.996									0.714	
Satd. Flow (perm)	0	3299	1345	0	0	0	0	3106	0	0	2323	
Satd. Flow (RTOR)			134					31				
Lane Group Flow (vph)	0	649	121	0	0	0	0	567	0	0	895	
Turn Type	Perm	NA	Perm					NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4							6		
Detector Phase	4	4	4					2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					10.0		5.0	10.0	
Minimum Split (s)	26.2	26.2	26.2					23.1		11.1	23.1	
Total Split (s)	31.0	31.0	31.0					30.0		14.0	44.0	
Total Split (%)	41.3%	41.3%	41.3%					40.0%		18.7%	58.7%	
Yellow Time (s)	3.3	3.3	3.3					3.0		3.0	3.0	
All-Red Time (s)	2.9	2.9	2.9					3.1		3.1	3.1	
Lost Time Adjust (s)		0.0	0.0					0.0			0.0	
Total Lost Time (s)		6.2	6.2					6.1			6.1	
Lead/Lag								Lead		Lag		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					C-Max		None	C-Max	
Act Effct Green (s)		20.6	20.6					42.1			42.1	
Actuated g/C Ratio		0.27	0.27					0.56			0.56	
v/c Ratio		0.72	0.26					0.32			0.69	
Control Delay		29.1	4.7					9.5			13.3	
Queue Delay		0.0	0.0					0.0			3.0	
Total Delay		29.1	4.7					9.5			16.3	
LOS		С	Α					Α			В	
Approach Delay		25.3						9.5			16.3	
Approach LOS		С						Α			В	
Queue Length 50th (m)		43.5	0.0					19.3			71.3	
Queue Length 95th (m)		55.7	8.7					32.7			m88.0	
Internal Link Dist (m)		176.4			219.4			129.7			80.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1090	534					1758			1305	
Starvation Cap Reductn		0	0					0			297	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.60	0.23					0.32			0.89	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75		ONDT	I C-ODT	041								
Offset: 60 (80%), Reference	ed to phase	S Z:NR I a	ind 6:5811	_, Start o	Green							
Natural Cycle: 65												

Natural Cycle: 65

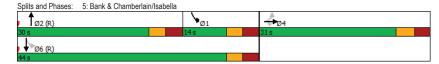
Control Type: Actuated-Coordinated

30-48 Chamberlain PM PEAK HOUR Synchro 10 Light Report Page 11 Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2024 Future Total 05-16-2024

Maximum v/c Ratio: 0.72 Intersection Signal Delay: 17.7 Intersection LOS: B Intersection Capacity Utilization 82.2%

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal. ICU Level of Service E



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Appendix I

2029 Future Total Conditions



Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

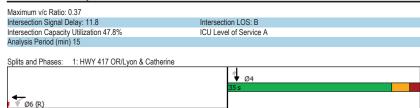
2029 Future Total 05-16-2024

	•	→	\rightarrow	1	←	*		†	-	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					414						1	7
Traffic Volume (vph)	0	0	0	226	220	0	0	0	0	0	258	131
Future Volume (vph)	0	0	0	226	220	0	0	0	0	0	258	131
Satd. Flow (prot)	0	0	0	0	4645	0	0	0	0	0	1745	1483
Flt Permitted					0.975							
Satd. Flow (perm)	0	0	0	0	4611	0	0	0	0	0	1745	1454
Satd. Flow (RTOR)					226							131
Lane Group Flow (vph)	0	0	0	0	446	0	0	0	0	0	258	131
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								2
Detector Phase				6	6						4	4
Switch Phase												
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				40.0	40.0						35.0	35.0
Total Split (%)				53.3%	53.3%						46.7%	46.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)				1.0	0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
Lead/Lag					0.2						0.0	0.0
Lead-Lag Optimize?												
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)				O Max	34.8						29.7	29.7
Actuated g/C Ratio					0.46						0.40	0.40
v/c Ratio					0.20						0.37	0.20
Control Delay					10.5						18.1	3.9
Queue Delay					0.0						0.0	0.0
Total Delay					10.5						18.1	3.9
LOS					В						В	J.C
Approach Delay					10.5						13.3	
Approach LOS					10.5 B						13.3 B	
Queue Length 50th (m)					17.3						25.1	0.0
Queue Length 95th (m)					26.4						42.7	9.3
Internal Link Dist (m)		117.8			157.8			120.4			277.6	9.0
Turn Bay Length (m)		111.0			107.0			120.4			211.0	
					2260						691	654
Base Capacity (vph)					2260						091	004
Starvation Cap Reductn					0						0	
Spillback Cap Reductn					0						0	(
Storage Cap Reductn					-						-	
Reduced v/c Ratio					0.20						0.37	0.20
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 48 (64%), Reference	ed to phase	2: and 6:	wbtl, S	tart of G	reen							
Natural Cycle: 55												
Control Type: Actuated-Coo	rdinated											

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 1

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2029 Future Total 05-16-2024



	•	→	7	•	+	*	4	†	1	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑ ↑	7		4412				
Traffic Volume (vph)	0	0	0	0	394	539	54	1408	0	0	0	0
Future Volume (vph)	0	0	0	0	394	539	54	1408	0	0	0	0
Satd. Flow (prot)	0	0	0	0	2917	1350	0	4755	0	0	0	0
Flt Permitted								0.998				
Satd. Flow (perm)	0	0	0	0	2917	1262	0	4750	0	0	0	0
Satd, Flow (RTOR)								70				
Lane Group Flow (vph)	0	0	0	0	642	291	0	1462	0	0	0	0
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases						6	8					
Detector Phase					6	6	8	8				
Switch Phase					•	•	0	0				
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
Total Split (s)					32.0	32.0	38.0	38.0				
Total Split (%)					42.7%	42.7%	50.7%	50.7%				
Yellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
Lost Time Adjust (s)					0.0	0.0	2.5	0.0				
Total Lost Time (s)					5.8	5.8		5.8				
								5.0				
Lead/Lag					Lag	Lag						
Lead-Lag Optimize? Recall Mode					C-Max	C-Max	Mari	Marri				
							Max	Max				
Act Effct Green (s)					26.2	26.2 0.35		32.2 0.43				
Actuated g/C Ratio					0.35							
v/c Ratio					0.63	0.66		0.70				
Control Delay					26.1	29.9		18.8				
Queue Delay					0.0	0.0		0.0				
Total Delay					26.1	29.9		18.8				
LOS					С	С		В				
Approach Delay					27.3			18.8				
Approach LOS					С			В				
Queue Length 50th (m)					43.1	39.6		56.7				
Queue Length 95th (m)					m60.7	m56.7		72.3				
Internal Link Dist (m)		157.8			130.6			47.0			56.6	
Turn Bay Length (m)												
Base Capacity (vph)					1019	440		2079				
Starvation Cap Reductn					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn					0	0		0				
Reduced v/c Ratio					0.63	0.66		0.70				
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 15 (20%), Reference	d to phase	2: and 6:	WBT, Sta	art of Gre	en							
Natural Cycle: 60												
Control Type: Actuated-Coo	rdinated											

Lane Group	พว
Lane Configurations	
Fraffic Volume (vph)	
Future Volume (vph)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	5
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	5.0
Total Split (s)	5.0
Total Split (%)	7%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	
Recall Mode	Max
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (m)	
Queue Length 95th (m)	
Internal Link Dist (m)	
Turn Bay Length (m)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductin	
Reduced v/c Ratio	
Reduced V/c Ratio	

Lanes, Volumes, Timings 2: Kent & Catherine

2029 Future Total 05-16-2024

Maximum v/c Ratio: 0.70
Intersection Signal Delay: 22.1
Intersection Capacity Utilization 66.4%
ICU Level of Service C
Analysis Period (min) 15

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

Splits and Phases: 2: Kent & Catherine

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Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Total 05-16-2024

	ၨ	→	←	•	-	4			
ane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4		
ane Configurations		^							_
Fraffic Volume (vph)	0	814	0	0	0	0			
Future Volume (vph)	0	814	0	0	0	0			
Satd. Flow (prot)	0	3316	0	0	0	0			
It Permitted									
Satd, Flow (perm)	0	3316	0	0	0	0			
Satd. Flow (RTOR)									
ane Group Flow (vph)	0	814	0	0	0	0			
Turn Type		NA							
Protected Phases		2					4		
Permitted Phases							•		
Detector Phase		2							
Switch Phase		=							
Minimum Initial (s)		10.0					10.0		
Minimum Split (s)		36.0					21.0		
Fotal Split (s)		36.0					21.0		
Fotal Split (%)		63.2%					37%		
fellow Time (s)		3.3					3.0		
All-Red Time (s)		1.7					1.0		
ost Time Adjust (s)		0.0					1.0		
Total Lost Time (s)		5.0							
Lead/Lag		3.0							
Lead-Lag Optimize?									
Recall Mode		Min					None		
Act Effct Green (s)		34.0					NONE		
Actuated g/C Ratio		0.64							
/c Ratio		0.38							
Control Delay		7.5							
Queue Delay		0.0							
Total Delay		7.5							
OS		7.5 A							
Approach Delay		7.5							
Approach LOS		7.5 A							
		24.0							
Queue Length 50th (m)		34.2							
Queue Length 95th (m)			470 4		24.2				
nternal Link Dist (m)		270.2	176.4		31.3				
Furn Bay Length (m)		0404							
Base Capacity (vph)		2161							
Starvation Cap Reductn		0							
Spillback Cap Reductn		0							
Storage Cap Reductn		0							
Reduced v/c Ratio		0.38							
ntersection Summary									
Cycle Length: 57									
Actuated Cycle Length: 52.8									
Natural Cycle: 60									
Control Type: Semi Act-Uncoor	d								
Maximum v/c Ratio: 0.38									

Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Total 05-16-2024

Intersection Signal Delay: 7.5
Intersection Capacity Utilization 27.9% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



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Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Total 05-16-2024

	≯	-	\rightarrow	•	←	*	1	†	1	1	↓	1
ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SE
ane Configurations					414			414			↑ ↑	
raffic Volume (vph)	0	0	0	160	582	189	278	627	0	0	405	- 1
uture Volume (vph)	0	0	0	160	582	189	278	627	0	0	405	1
Satd. Flow (prot)	0	0	0	0	4481	0	0	3266	0	0	3022	
It Permitted					0.991			0.637				
Satd. Flow (perm)	0	0	0	0	4429	0	0	2045	0	0	3022	
Satd. Flow (RTOR)					81						44	
ane Group Flow (vph)	0	0	0	0	931	0	0	905	0	0	515	
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				25.0	25.0		15.0	40.0			25.0	
Γotal Split (%)				33.3%	33.3%		20.0%	53.3%			33.3%	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
ost Time Adjust (s)					0.0			0.0			0.0	
otal Lost Time (s)					5.6			5.4			5.4	
_ead/Lag				Lag	Lag						Lag	
_ead-Lag Optimize?				Yes	Yes						Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					19.4			34.6			19.6	
Actuated g/C Ratio					0.26			0.46			0.26	
//c Ratio					0.77			0.82			0.63	
Control Delay					28.6			12.2			26.2	
Queue Delay					0.0			0.0			0.2	
Total Delay					28.6			12.2			26.4	
.OS					С			В			С	
Approach Delay					28.6			12.2			26.4	
Approach LOS					С			В			С	
Queue Length 50th (m)					40.8			10.7			30.8	
Queue Length 95th (m)					54.9			m24.6			46.2	
nternal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1205			1099			822	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					0			0			29	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.77			0.82			0.65	
ntersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75			105	= 0:								
Offset: 70 (93%), Referenced	to phase	2:NBTL a	and 6:SB	I, Start c	f Green							
Natural Cycle: 70 Control Type: Actuated-Coord												

Control Type: Actuated-Coordinated

Synchro 10 Light Report Page 8 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Total 05-16-2024

Lane Group	Ø7	Ø9	Ø13
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	7	9	13
Permitted Phases	'	- 0	10
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	7%	7%	7%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)			
Lead/Lag	اممما		Lood
	Lead Yes		Lead Yes
Lead-Lag Optimize? Recall Mode		May	
	Max	Max	Max
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Cummer:			
Intersection Summary			

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Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Total 05-16-2024

Maximum v/c Ratio: 0.82 Intersection Signal Delay: 21.8

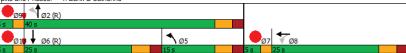
Intersection LOS: C ICU Level of Service D

Intersection Capacity Utilization 80.3% ICU

Analysis Period (min) 15

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

Splits and Phases: 4: Bank & Catherine



Synchro 10 Light Report Page 10 30-48 Chamberlain AM Peak Hour

Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Total 05-16-2024

	•	-	-	*	1	4	
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4
Lane Configurations	*	^					
Traffic Volume (vph)	494	814	0	0	0	0	
Future Volume (vph)	494	814	0	0	0	0	
Satd, Flow (prot)	1658	3316	0	0	0	0	
Flt Permitted	0.950		-	-	-	•	
Satd. Flow (perm)	1658	3316	0	0	0	0	
Satd. Flow (RTOR)	494						
Lane Group Flow (vph)	494	814	0	0	0	0	
Turn Type	Perm	NA					
Protected Phases		2					4
Permitted Phases	2						
Detector Phase	2	2					
Switch Phase							
Minimum Initial (s)	10.0	10.0					10.0
Minimum Split (s)	36.0	36.0					21.0
Total Split (s)	36.0	36.0					21.0
Total Split (%)	63.2%	63.2%					37%
Yellow Time (s)	3.3	3.3					3.0
All-Red Time (s)	1.7	1.7					1.0
Lost Time Adjust (s)	0.0	0.0					
Total Lost Time (s)	5.0	5.0					
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Min	Min					None
Act Effct Green (s)	36.2	36.2					
Actuated g/C Ratio	0.66	0.66					
v/c Ratio	0.39	0.37					
Control Delay	1.7	7.1					
Queue Delay	0.0	0.0					
Total Delay	1.7	7.1					
LOS	Α	Α					
Approach Delay		5.1					
Approach LOS		Α					
Queue Length 50th (m)	0.0	24.0					
Queue Length 95th (m)	9.1	33.6					
Internal Link Dist (m)		270.2	176.4		31.3		
Turn Bay Length (m)							
Base Capacity (vph)	1264	2196					
Starvation Cap Reductn	0	0					
Spillback Cap Reductn	0	0					
Storage Cap Reductn	0	0					
Reduced v/c Ratio	0.39	0.37					
Intersection Summary							
Cycle Length: 57							
Actuated Cycle Length: 55							
Natural Cycle: 60							
Control Type: Semi Act-Unc	oord						
Maximum v/c Ratio: 0.39							

30-48 Chamberlain AM Peak Hour Synchro 10 Light Report Page 1

Lanes, Volumes, Timings
3: Chamberlain & Kent

Intersection LOS: A
Intersection Capacity Utilization 33.1%

Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent

Lanes, Volumes, Timings
1: HWY 417 OR/Lyon & Catherine

2029 Future Total 05-16-2024

	•	→	7	1	←	*	4	†	-	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					414						^	7
Traffic Volume (vph)	0	0	0	247	558	0	0	0	0	0	438	270
Future Volume (vph)	0	0	0	247	558	0	0	0	0	0	438	270
Satd. Flow (prot)	0	0	0	0	4693	0	0	0	0	0	1745	1483
Flt Permitted					0.985							
Satd. Flow (perm)	0	0	0	0	4657	0	0	0	0	0	1745	1443
Satd. Flow (RTOR)					153							75
Lane Group Flow (vph)	0	0	0	0	805	0	0	0	0	0	438	270
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								
Detector Phase				6	6						4	4
Switch Phase				0	U						-	
Minimum Initial (s)				10.0	10.0						10.0	10.0
Minimum Split (s)				26.2	26.2						28.3	28.3
Total Split (s)				28.0	28.0						47.0	47.0
Total Split (%)				37.3%	37.3%						62.7%	62.7%
Yellow Time (s)				3.3	3.3						3.3	3.3
All-Red Time (s)				1.9	1.9						2.0	2.0
Lost Time Adjust (s)				1.9	0.0						0.0	0.0
Total Lost Time (s)					5.2						5.3	5.3
					5.2						5.3	5.0
Lead/Lag												
Lead-Lag Optimize?				O M	O M						Mari	Mari
Recall Mode				C-Max	C-Max						Max	Max
Act Effct Green (s)					22.8						41.7	41.7
Actuated g/C Ratio					0.30						0.56	0.56
v/c Ratio					0.53						0.45	0.32
Control Delay					16.6						11.8	7.6
Queue Delay					0.0						0.0	0.0
Total Delay					16.6						11.8	7.6
LOS					В						В	A
Approach Delay					16.6						10.2	
Approach LOS					В						В	
Queue Length 50th (m)					9.4						33.7	13.0
Queue Length 95th (m)					15.1						53.9	25.8
Internal Link Dist (m)		117.8			157.8			120.4			277.6	
Turn Bay Length (m)												
Base Capacity (vph)					1522						970	835
Starvation Cap Reductn					0						0	(
Spillback Cap Reductn					0						0	(
Storage Cap Reductn					0						0	(
Reduced v/c Ratio					0.53						0.45	0.32
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 24 (32%), Reference	d to phase	2: and 6:	WBTL, S	tart of G	reen							
Natural Cycle: 55												
Control Type: Actuated-Cool	rdinated											

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Lanes, Volumes, Timings 1: HWY 417 OR/Lyon & Catherine 2029 Future Total 05-16-2024

Maximum v/c Ratio: 0.53
Intersection Signal Delay: 13.6
Intersection Capacity Utilization 54.2%
ICU Level of Service A
Analysis Period (min) 15



	<i>></i>	\rightarrow	*	1	-	•	1	†	1	-	↓	4
ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBI
ane Configurations					↑ ₽	7		ተተቡ				
Traffic Volume (vph)	0	0	0	0	702	341	25	761	0	0	0	
Future Volume (vph)	0	0	0	0	702	341	25	761	0	0	0	
Satd. Flow (prot)	0	0	0	0	3143	1350	0	4755	0	0	0	
Flt Permitted								0.998				
Satd. Flow (perm)	0	0	0	0	3143	1247	0	4752	0	0	0	
Satd. Flow (RTOR)								70				
Lane Group Flow (vph)	0	0	0	0	736	307	0	786	0	0	0	
Turn Type					NA	Perm	Perm	NA				
Protected Phases					6			8				
Permitted Phases						6	8					
Detector Phase					6	6	8	8				
Switch Phase												
Minimum Initial (s)					10.0	10.0	10.0	10.0				
Minimum Split (s)					27.8	27.8	17.8	17.8				
Total Split (s)					38.0	38.0	32.0	32.0				
Total Split (%)					50.7%	50.7%	42.7%	42.7%				
Yellow Time (s)					3.3	3.3	3.3	3.3				
All-Red Time (s)					2.5	2.5	2.5	2.5				
Lost Time Adjust (s)					0.0	0.0	2.0	0.0				
Total Lost Time (s)					5.8	5.8		5.8				
Lead/Lag					Lag	Lag		0.0				
Lead-Lag Optimize?					Lug	Lug						
Recall Mode					C-Max	C-Max	Max	Max				
Act Effct Green (s)					32.2	32.2	WIGA	26.2				
Actuated g/C Ratio					0.43	0.43		0.35				
v/c Ratio					0.55	0.57		0.46				
Control Delay					15.5	17.8		18.2				
Queue Delay					0.0	0.0		0.0				
Total Delay					15.5	17.8		18.2				
LOS					В	В.		В				
Approach Delay					16.2			18.2				
Approach LOS					В			В				
Queue Length 50th (m)					35.3	29.5		28.0				
Queue Length 95th (m)					m40.7	m37.1		38.3				
Internal Link Dist (m)		157.8			130.6	11107.1		43.8			56.6	
Turn Bay Length (m)		107.0			100.0			40.0			30.0	
Base Capacity (vph)					1349	535		1705				
Starvation Cap Reductn					0	0		0				
Spillback Cap Reductn					0	0		0				
Storage Cap Reductn					0	0		0				
Reduced v/c Ratio					0.55	0.57		0.46	_			
Neuroeu V/C Nalio					0.55	0.57		0.40				
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 12 (16%), Referenced	d to phase	2: and 6:	WBT, Sta	rt of Gre	en							
Natural Cycle: 55												

Lane Group	Ø5		
Lane Configurations			
Traffic Volume (vph)			
uture Volume (vph)			
Satd. Flow (prot)			
It Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			J
Lane Group Flow (vph)			l
Turn Type			
Protected Phases	5		
Permitted Phases	ŭ		
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0		
Minimum Split (s)	5.0		
Total Split (s)	5.0		
Total Split (%)	7%		
Yellow Time (s)	2.0	 	
	0.0		
All-Red Time (s)	0.0		
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lead		
Lead-Lag Optimize?			
Recall Mode	Max		
Act Effct Green (s)			
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			

Lanes, Volumes, Timings 2: Kent & Catherine

2029 Future Total 05-16-2024

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 17.0
Intersection Capacity Utilization 52.8%
ICU Level of Service A

Analysis Period (min) 15

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



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Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Total 05-16-2024

	۶	→	←	4	/	4			
ane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4		
ane Configurations		^							
raffic Volume (vph)	0	779	0	0	0	0			
uture Volume (vph)	0	779	0	0	0	0			
Satd. Flow (prot)	0	3316	0	0	0	0			
It Permitted	-		-	-	•	-			
Satd. Flow (perm)	0	3316	0	0	0	0			
Satd. Flow (RTOR)	-		-	-	-	-			
ane Group Flow (vph)	0	779	0	0	0	0			
urn Type	-	NA	-	-	-	-			
Protected Phases		2					4		
Permitted Phases		_					7		
etector Phase		2							
Switch Phase		_							
Minimum Initial (s)		10.0					10.0		
Minimum Split (s)		36.0					21.0		
		36.0					21.0		
otal Split (s) otal Split (%)		63.2%					37%		
'ellow Time (s)		3.3					3.0		
		1.7					1.0		
III-Red Time (s)		0.0					1.0		
ost Time Adjust (s)		5.0							
otal Lost Time (s)		5.0							
ead/Lag									
ead-Lag Optimize?		Min					Mana		
							None		
act Effet Green (s)		34.7							
ctuated g/C Ratio		0.83							
/c Ratio		0.28							
Control Delay		4.3							
Queue Delay		0.0							
otal Delay		4.3							
OS		A							
pproach Delay		4.3							
pproach LOS		Α							
Queue Length 50th (m)		0.0							
Queue Length 95th (m)		32.5							
nternal Link Dist (m)		270.2	176.4		23.7				
urn Bay Length (m)									
Base Capacity (vph)		2740							
Starvation Cap Reductn		0							
Spillback Cap Reductn		0							
Storage Cap Reductn		0							
Reduced v/c Ratio		0.28							
ntersection Summary									
Cycle Length: 57									
actuated Cycle Length: 42									
latural Cycle: 60									
	٨								
Control Type: Semi Act-Uncoor	u								

Lanes, Volumes, Timings 3: Chamberlain & Kent

2029 Future Total 05-16-2024

Intersection Signal Delay: 4.3
Intersection Capacity Utilization 26.9% Intersection LOS: A ICU Level of Service A Analysis Period (min) 15

Splits and Phases: 3: Chamberlain & Kent



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Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Total 05-16-2024

	•	→	•	•	←	*	\triangleleft	†	1	1	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					4143			414			† î>	
Traffic Volume (vph)	0	0	0	287	618	175	218	357	0	0	643	130
Future Volume (vph)	0	0	0	287	618	175	218	357	0	0	643	130
Satd. Flow (prot)	0	0	0	0	4536	0	0	3253	0	0	3063	C
Flt Permitted					0.987			0.545				
Satd. Flow (perm)	0	0	0	0	4474	0	0	1769	0	0	3063	0
Satd. Flow (RTOR)					50						32	
Lane Group Flow (vph)	0	0	0	0	1080	0	0	575	0	0	773	0
Turn Type				Perm	NA		pm+pt	NA			NA	
Protected Phases					8		5	2			6	
Permitted Phases				8			2					
Detector Phase				8	8		5	2			6	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0			10.0	
Minimum Split (s)				23.6	23.6		10.4	21.4			21.4	
Total Split (s)				24.0	24.0		14.0	41.0			27.0	
Total Split (%)				32.0%	32.0%		18.7%	54.7%			36.0%	
Yellow Time (s)				3.3	3.3		3.3	3.3			3.3	
All-Red Time (s)				2.3	2.3		2.1	2.1			2.1	
Lost Time Adjust (s)					0.0			0.0			0.0	
Total Lost Time (s)					5.6			5.4			5.4	
Lead/Lag				Lag	Lag						Lag	
Lead-Lag Optimize?											Yes	
Recall Mode				Max	Max		Max	C-Max			C-Max	
Act Effct Green (s)					18.4			35.6			21.6	
Actuated g/C Ratio					0.25			0.47			0.29	
v/c Ratio					0.95			0.57			0.86	
Control Delay					45.4			12.6			35.4	
Queue Delay					0.1			0.0			3.7	
Total Delay					45.5			12.6			39.1	
LOS					D			В			D	
Approach Delay					45.5			12.6			39.1	
Approach LOS					D			В			D	
Queue Length 50th (m)					52.8			16.1			51.8	
Queue Length 95th (m)					#79.9			20.3			#81.8	
Internal Link Dist (m)		130.6			383.3			80.8			138.4	
Turn Bay Length (m)												
Base Capacity (vph)					1135			1009			904	
Starvation Cap Reductn					0			0			0	
Spillback Cap Reductn					1			0			73	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.95			0.57			0.93	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75	d &a wha	O.NIDT!	and 6.00	T Ctort	6 Orear							
Offset: 50 (67%), Reference	d to phase	2:NBTL	and 6:SB	I, Start o	of Green							
Natural Cycle: 70	adia ata d											
Control Type: Actuated-Coo	rumated											

Control Type: Actuated-Coordinated

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Lanes, Volumes, Timings 4: Bank & Catherine 2029 Future Total 05-16-2024

Lane Group	Ø7	Ø9	Ø13
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Satd. Flow (RTOR)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	7	9	13
Permitted Phases			.5
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	7%	7%	7%
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)			
Lead/Lag	Lead		Lead
Lead-Lag Optimize?	Leau		Yes
Recall Mode	Max	Max	Max
Act Effct Green (s)	IVIdX	IVIAX	IVIAX
Actuated g/C Ratio			
v/c Ratio			
Control Delay			
Queue Delay			
Total Delay			
LOS			
Approach Delay			
Approach LOS			
Queue Length 50th (m)			
Queue Length 95th (m)			
Internal Link Dist (m)			
Turn Bay Length (m)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			
Intersection Summary			_
intersection Summary			

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Lanes, Volumes, Timings 4: Bank & Catherine

2029 Future Total 05-16-2024

Maximum v/c Ratio: 0.95
Intersection Signal Delay: 35.7 Intersection LOS: D
Intersection Capacity Utilization 80.7% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Bank & Catherine



Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella

Control Type: Actuated-Coordinated

2029 Future Total 05-16-2024

	•	\rightarrow	*	1	←	•	1	†	1	-	. ↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SB
ane Configurations		414	7					† }			414	
Traffic Volume (vph)	57	592	121	0	0	0	0	500	91	175	720	
Future Volume (vph)	57	592	121	0	0	0	0	500	91	175	720	
Satd, Flow (prot)	0	3302	1483	0	0	0	0	3115	0	0	3283	
Flt Permitted		0.996									0.705	
Satd. Flow (perm)	0	3299	1345	0	0	0	0	3115	0	0	2296	
Satd. Flow (RTOR)			134					29				
ane Group Flow (vph)	0	649	121	0	0	0	0	591	0	0	895	
Turn Type	Perm	NA	Perm					NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4		4							6		
Detector Phase	4	4	4					2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0					10.0		5.0	10.0	
Minimum Split (s)	26.2	26.2	26.2					23.1		11.1	23.1	
Total Split (s)	31.0	31.0	31.0					30.0		14.0	44.0	
Total Split (%)	41.3%	41.3%	41.3%					40.0%		18.7%	58.7%	
Yellow Time (s)	3.3	3.3	3.3					3.0		3.0	3.0	
All-Red Time (s)	2.9	2.9	2.9					3.1		3.1	3.1	
Lost Time Adjust (s)	2.0	0.0	0.0					0.0		0.1	0.0	
Total Lost Time (s)		6.2	6.2					6.1			6.1	
Lead/Lag								Lead		Lag	• • • • • • • • • • • • • • • • • • • •	
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None	None					C-Max		None	C-Max	
Act Effct Green (s)		20.6	20.6					42.1			42.1	
Actuated g/C Ratio		0.27	0.27					0.56			0.56	
v/c Ratio		0.72	0.26					0.34			0.69	
Control Delay		29.1	4.7					9.6			13.8	
Queue Delay		0.0	0.0					0.0			3.0	
Total Delay		29.1	4.7					9.6			16.7	
LOS		С	A					A			В	
Approach Delay		25.3	- '					9.6			16.7	
Approach LOS		С						A			В	
Queue Length 50th (m)		43.5	0.0					20.4			71.6	
Queue Length 95th (m)		55.7	8.7					34.4			m84.2	
Internal Link Dist (m)		176.4			219.4			129.7			80.8	
Turn Bay Length (m)			30.0									
Base Capacity (vph)		1090	534					1762			1290	
Starvation Cap Reductn		0	0					0			281	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.60	0.23					0.34			0.89	
Intersection Summary												
Cycle Length: 75												
Actuated Cycle Length: 75												
Offset: 60 (80%), Reference	ed to phase	e 2:NBT a	ind 6:SBT	L, Start o	f Green							
Natural Cycle: 65												
Control Type: Actuated Co.	ordinated											

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Lanes, Volumes, Timings 5: Bank & Chamberlain/Isabella 2029 Future Total 05-16-2024

Maximum v/c Ratio: 0.72
Intersection Signal Delay: 17.8
Intersection LOS: B
Intersection Capacity Utilization 82.9%
ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

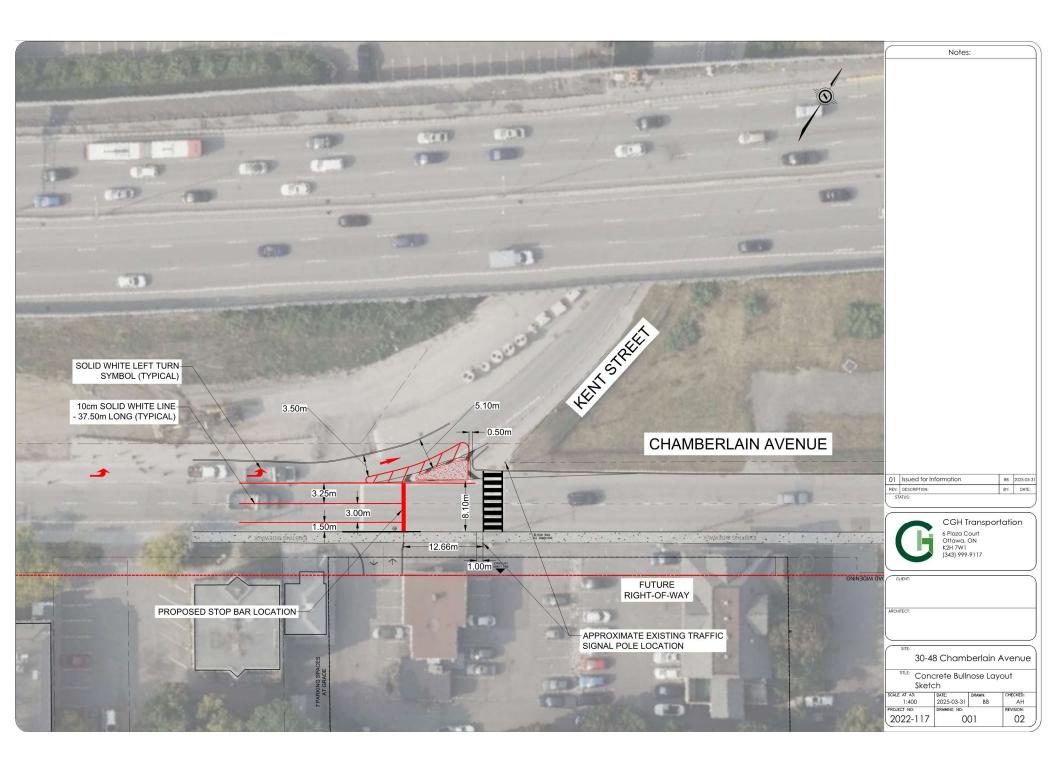
Splits and Phases: 5: Bank & Chamberlain/Isabella

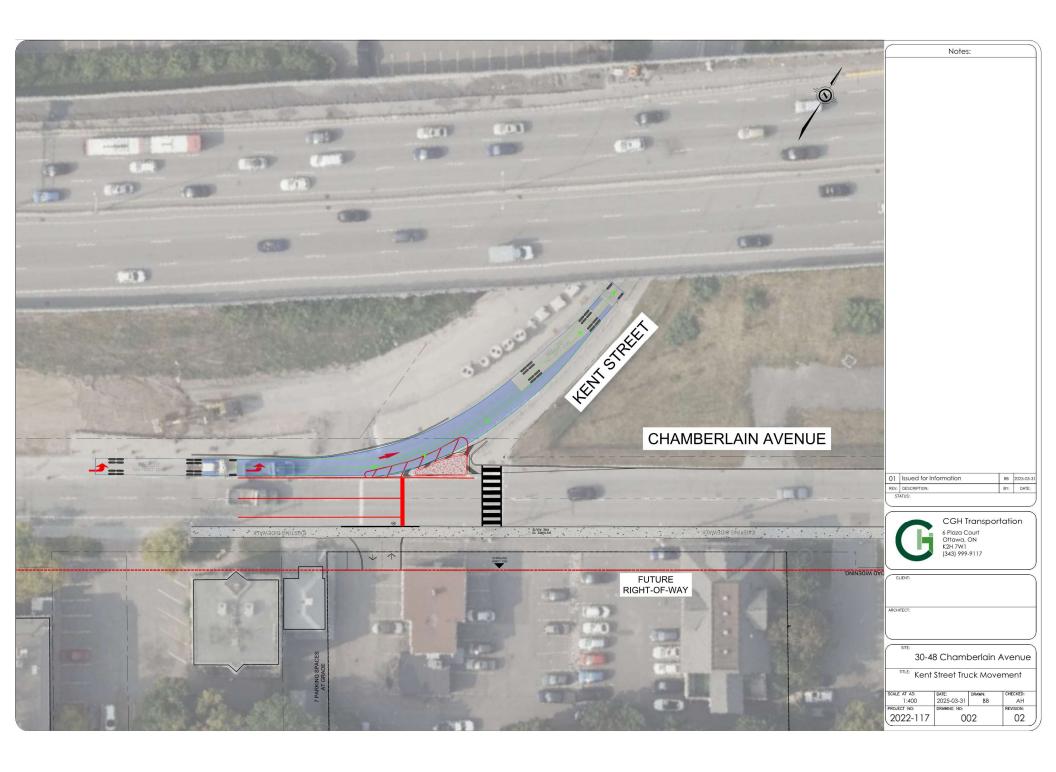


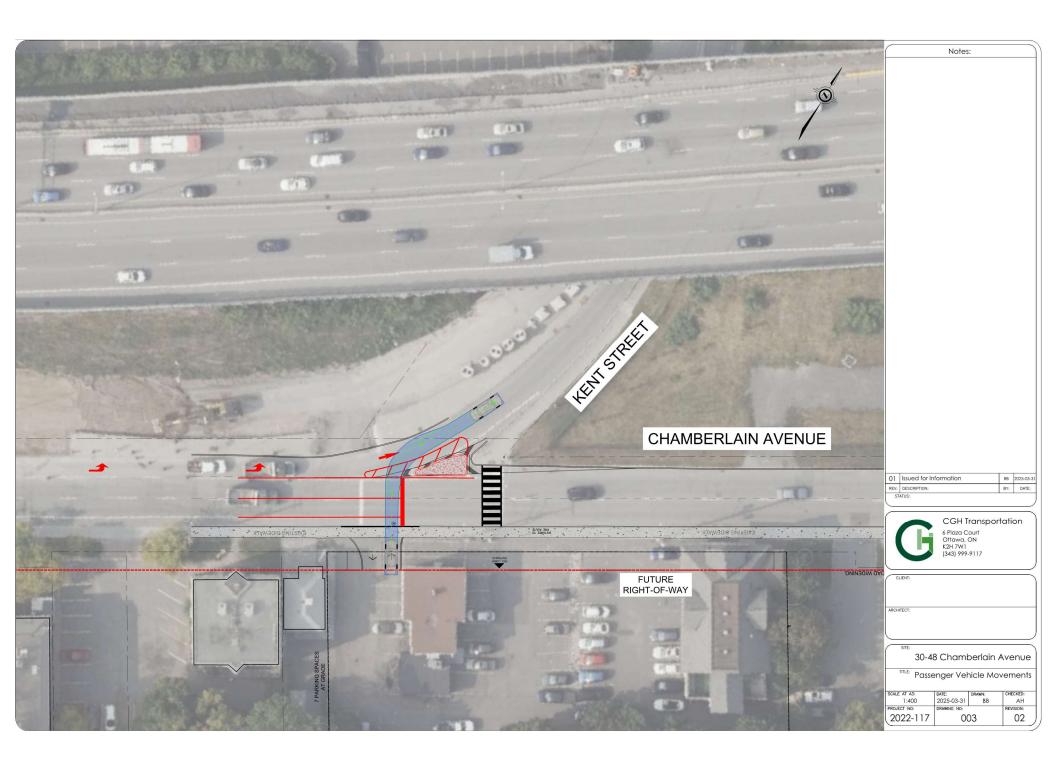
Appendix J

Chamberlain Avenue Concrete Median Sketch





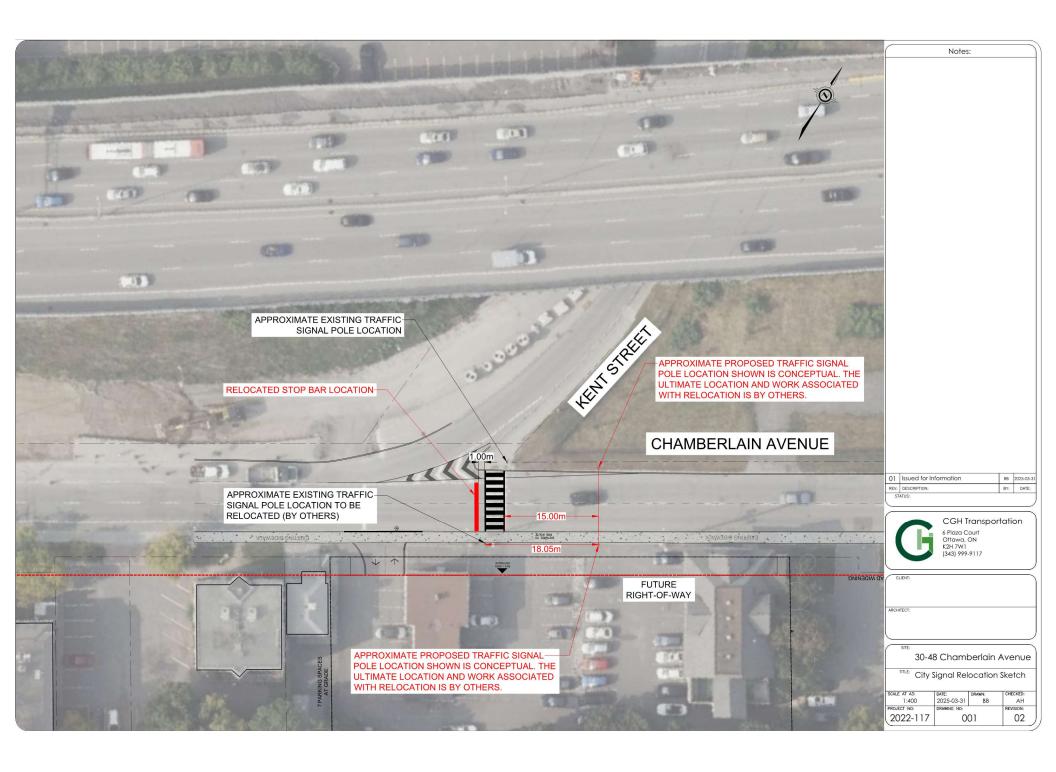




Appendix K

Chamberlain Avenue Midblock Pedestrian Signal Pole Relocation Sketch





Appendix L

TDM Checklist



TDM Measures Checklist:

Non-Residential Developments (office, institutional, retail or industrial)

	Legend
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance
*	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

	TDM	measures: Non-residential developments	Check if proposed & add descriptions
	1.	TDM PROGRAM MANAGEMENT	
	1.1	Program coordinator	
BASIC	★ 1.1.1	Designate an internal coordinator, or contract with an external coordinator	
	1.2	Travel surveys	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	
	2.	WALKING AND CYCLING	
	2.1	Information on walking/cycling routes & destin	ations
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances	abla
	2.2	Bicycle skills training	
		Commuter travel	
BETTER	★ 2.2.1	Offer on-site cycling courses for commuters, or subsidize off-site courses	
	2.3	Valet bike parking	
		Visitor travel	
BETTER	2.3.1	Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	

		TDM	measures: Non-residential developments	Check if proposed & add descriptions
		3.	TRANSIT	
ı		3.1	Transit information	
	BASIC	3.1.1	Display relevant transit schedules and route maps at entrances	abla
	BASIC	3.1.2	Provide online links to OC Transpo and STO information	
	BETTER	3.1.3	Provide real-time arrival information display at entrances	
		3.2	Transit fare incentives	
			Commuter travel	
	BETTER	3.2.1	Offer preloaded PRESTO cards to encourage commuters to use transit	
	BETTER *	3.2.2	Subsidize or reimburse monthly transit pass purchases by employees	
			Visitor travel	
	BETTER	3.2.3	Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	
		3.3	Enhanced public transit service	
ı			Commuter travel	
	BETTER	3.3.1	Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	
			Visitor travel	
	BETTER	3.3.2	Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	
		3.4	Private transit service	
			Commuter travel	
	BETTER	3.4.1	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	
			Visitor travel	
	BETTER	3.4.2	Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	

Visitor travel

6.1.3 Charge for short-term parking (hourly)

	TDM	measures: Non-residential developments	Check if proposed & add descriptions
	4.	RIDESHARING	
	4.1	Ridematching service	
		Commuter travel	
BASIC	★ 4.1.1	Provide a dedicated ridematching portal at OttawaRideMatch.com	
	4.2	Carpool parking price incentives	
		Commuter travel	
BETTER	4.2.1	Provide discounts on parking costs for registered carpools	
	4.3	Vanpool service	
		Commuter travel	
BETTER	4.3.1	Provide a vanpooling service for long-distance commuters	
	5.	CARSHARING & BIKESHARING	
	5.1	Bikeshare stations & memberships	
BETTER	5.1.1	Contract with provider to install on-site bikeshare station for use by commuters and visitors	
		Commuter travel	
BETTER	5.1.2	Provide employees with bikeshare memberships for local business travel	
	5.2	Carshare vehicles & memberships	
		Commuter travel	
BETTER	5.2.1	Contract with provider to install on-site carshare vehicles and promote their use by tenants	
BETTER	5.2.2	Provide employees with carshare memberships for local business travel	
	6.	PARKING	
	6.1	Priced parking	
		Commuter travel	. ,
BASIC	★ 6.1.1	Charge for long-term parking (daily, weekly, monthly)	\square
BASIC	6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	

	TDM	measures: Non-residential developments	Check if proposed & add descriptions
	7.	TDM MARKETING & COMMUNICATIONS	
	7.1	Multimodal travel information	
		Commuter travel	
BASIC ★	7.1.1	Provide a multimodal travel option information package to new/relocating employees and students	▽
		Visitor travel	
BETTER ★	7.1.2	Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	
	7.2	Personalized trip planning	
		Commuter travel	
BETTER ★	7.2.1	Offer personalized trip planning to new/relocating employees	
	7.3	Promotions	
		Commuter travel	
BETTER	7.3.1	Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	
	8.	OTHER INCENTIVES & AMENITIES	
	8.1	Emergency ride home	
	_	Commuter travel	
BETTER ★	8.1.1	Provide emergency ride home service to non-driving commuters	
	8.2	Alternative work arrangements	
		Commuter travel	
BASIC ★	8.2.1	Encourage flexible work hours	
BETTER	8.2.2	Encourage compressed workweeks	
BETTER ★	8.2.3	Encourage telework	
	8.3	Local business travel options	
		Commuter travel	
BASIC ★	8.3.1	Provide local business travel options that minimize the need for employees to bring a personal car to work	
	8.4	Commuter incentives	
		Commuter travel	
BETTER	8.4.1	Offer employees a taxable, mode-neutral commuting allowance	
	8.5	On-site amenities	
		Commuter travel	
BETTER	8.5.1	Provide on-site amenities/services to minimize mid-day or mid-commute errands	

TDM Measures Checklist:

Residential Developments (multi-family, condominium or subdivision)

	Legend
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance
*	The measure is one of the most dependably effective tools to encourage the use of sustainable modes

	TDM	measures: Residential developments	Check if proposed & add descriptions
	1.	TDM PROGRAM MANAGEMENT	
	1.1	Program coordinator	
BASIC *	1.1.1	Designate an internal coordinator, or contract with an external coordinator	
	1.2	Travel surveys	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	
	2.	WALKING AND CYCLING	
	2.1	Information on walking/cycling routes & des	tinations
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances (multi-family, condominium)	
	2.2	Bicycle skills training	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	

	TDM	measures: Residential developments	Check if proposed & add descriptions
	3.	TRANSIT	
	3.1	Transit information	
BASIC	3.1.1	Display relevant transit schedules and route maps at entrances (multi-family, condominium)	▽
BETTER	3.1.2	Provide real-time arrival information display at entrances (multi-family, condominium)	
	3.2	Transit fare incentives	
BASIC *	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	abla
BETTER	3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	
	3.3	Enhanced public transit service	
BETTER *	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels (subdivision)	
	3.4	Private transit service	
BETTER	3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	
	4.	CARSHARING & BIKESHARING	
	4.1	Bikeshare stations & memberships	
BETTER	4.1.1	Contract with provider to install on-site bikeshare station (multi-family)	
BETTER	4.1.2	Provide residents with bikeshare memberships, either free or subsidized (multi-family)	
	4.2	Carshare vehicles & memberships	
BETTER	4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	
BETTER	4.2.2	Provide residents with carshare memberships, either free or subsidized	
	5.	PARKING	
	5.1	Priced parking	
BASIC *	5.1.1	Unbundle parking cost from purchase price (condominium)	Ø.
BASIC	5.1.2	Unbundle parking cost from monthly rent (multi-family)	abla

TDM measures: Residential developments

Check if proposed & add descriptions

abla

6. TDM MARKETING & COMMUNICATIONS

- 6.1 Multimodal travel information
- ★ 6.1.1 Provide a multimodal travel option information package to new residents
- 6.2 Personalized trip planning
- BETTER ★ 6.2.1 Offer personalized trip planning to new residents

TDM-Supportive Development Design and Infrastructure Checklist: Non-Residential Developments (office, institutional, retail or industrial)

> Legend The Official Plan or Zoning By-law provides related guidance that must be followed The measure is generally feasible and effective, and in most cases would benefit the development and its users The measure could maximize support for users of sustainable modes, and optimize development performance

	TDM-s	supportive design & infrastructure measures: Non-residential developments	Check if completed & add descriptions, explanations or plan/drawing references
	1.	WALKING & CYCLING: ROUTES	
	1.1	Building location & access points	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	Ø
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	Ø
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	
	1.2	Facilities for walking & cycling	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations (see Official Plan policy 4.3.3)	
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible (see Official Plan policy 4.3.12)	

	TDM-s	supportive design & infrastructure measures: Non-residential developments	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks (see Official Plan policy 4.3.10)	abla
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps (see Official Plan policy 4.3.10)	⊄
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and onroad cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians (see Official Plan policy 4.3.11)	
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	\square
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	
	1.3	Amenities for walking & cycling	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	

	TDM-s	supportive design & infrastructure measures: Non-residential developments	add descriptions, explanations or plan/drawing references
	2.	WALKING & CYCLING: END-OF-TRIP FACILI	TIES
	2.1	Bicycle parking	
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see Official Plan policy 4.3.6)	✓
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see Zoning By-law Section 111)	√
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see Zoning By-law Section 111)	Ø
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	
BETTER	2.1.5	Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	
	2.2	Secure bicycle parking	
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see Zoning By-law Section 111)	
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	
	2.3	Shower & change facilities	
BASIC	2.3.1	Provide shower and change facilities for the use of active commuters	
BETTER	2.3.2	In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	
	2.4	Bicycle repair station	
BETTER	2.4.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	

	TDM-s	supportive design & infrastructure measures: Non-residential developments	Check if completed & add descriptions, explanations or plan/drawing references
	3.	TRANSIT	
	3.1	Customer amenities	
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops	
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter	
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	
	4.	RIDESHARING	
	4.1	Pick-up & drop-off facilities	
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	
	4.2	Carpool parking	
BASIC	4.2.1	Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	
BETTER	4.2.2	At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	
	5.	CARSHARING & BIKESHARING	
	5.1	Carshare parking spaces	
BETTER	5.1.1	Provide carshare parking spaces in permitted non- residential zones, occupying either required or provided parking spaces (see Zoning By-law Section 94)	
	5.2	Bikeshare station location	
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	

	TDM-s	upportive design & infrastructure measures: Non-residential developments	Check if completed & add descriptions, explanations or plan/drawing references				
	6.	PARKING					
	6.1	Number of parking spaces					
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	⊄				
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking					
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (see Zoning By-law Section 104)					
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (see Zoning By-law Section 111)					
	6.2	Separate long-term & short-term parking areas					
BETTER	6.2.1	Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)					
	7.	OTHER					
	7.1	On-site amenities to minimize off-site trips					
BETTER	7.1.1	Provide on-site amenities to minimize mid-day or mid-commute errands					

TDM-Supportive Development Design and Infrastructure Checklist: Residential Developments (multi-family or condominium)

	Legend
REQUIRED	The Official Plan or Zoning By-law provides related guidance that must be followed
BASIC	The measure is generally feasible and effective, and in most cases would benefit the development and its users
BETTER	The measure could maximize support for users of sustainable modes, and optimize development performance

	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanations or plan/drawing references
	1.	WALKING & CYCLING: ROUTES	
	1.1	Building location & access points	
BASIC	1.1.1	Locate building close to the street, and do not locate parking areas between the street and building entrances	Ø
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	Ø
BASIC	1.1.3	Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	
	1.2	Facilities for walking & cycling	
REQUIRED	1.2.1	Provide convenient, direct access to stations or major stops along rapid transit routes within 600 metres; minimize walking distances from buildings to rapid transit; provide pedestrian-friendly, weather-protected (where possible) environment between rapid transit accesses and building entrances; ensure quality linkages from sidewalks through building entrances to integrated stops/stations (see Official Plan policy 4.3.3)	
REQUIRED	1.2.2	Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible (see Official Plan policy 4.3.12)	

	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3	Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks (see Official Plan policy 4.3.10)	abla
REQUIRED	1.2.4	Make sidewalks and open space areas easily accessible through features such as gradual grade transition, depressed curbs at street corners and convenient access to extra-wide parking spaces and ramps (see Official Plan policy 4.3.10)	⊄
REQUIRED	1.2.5	Include adequately spaced inter-block/street cycling and pedestrian connections to facilitate travel by active transportation. Provide links to the existing or planned network of public sidewalks, multi-use pathways and onroad cycle routes. Where public sidewalks and multi-use pathways intersect with roads, consider providing traffic control devices to give priority to cyclists and pedestrians (see Official Plan policy 4.3.11)	
BASIC	1.2.6	Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	Ø
BASIC	1.2.7	Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	
BASIC	1.2.8	Design roads used for access or circulation by cyclists using a target operating speed of no more than 30 km/h, or provide a separated cycling facility	
	1.3	Amenities for walking & cycling	
BASIC	1.3.1	Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	
BASIC	1.3.2	Provide wayfinding signage for site access (where required, e.g. when multiple buildings or entrances exist) and egress (where warranted, such as when directions to reach transit stops/stations, trails or other common destinations are not obvious)	

	TDM-s	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanations or plan/drawing references									
	2.	WALKING & CYCLING: END-OF-TRIP FACILITIES										
	2.1	Bicycle parking										
REQUIRED	2.1.1	Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible (see Official Plan policy 4.3.6)	abla									
REQUIRED	2.1.2	Provide the number of bicycle parking spaces specified for various land uses in different parts of Ottawa; provide convenient access to main entrances or well-used areas (see Zoning By-law Section 111)	✓									
REQUIRED	2.1.3	Ensure that bicycle parking spaces and access aisles meet minimum dimensions; that no more than 50% of spaces are vertical spaces; and that parking racks are securely anchored (see Zoning By-law Section 111)	abla									
BASIC	2.1.4	Provide bicycle parking spaces equivalent to the expected number of resident-owned bicycles, plus the expected peak number of visitor cyclists										
	2.2	Secure bicycle parking										
REQUIRED	2.2.1	Where more than 50 bicycle parking spaces are provided for a single residential building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers (see Zoning By-law Section 111)										
BETTER	2.2.2	Provide secure bicycle parking spaces equivalent to at least the number of units at condominiums or multifamily residential developments										
	2.3	Bicycle repair station										
BETTER	2.3.1	Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)										
	3.	TRANSIT										
	3.1	Customer amenities										
BASIC	3.1.1	Provide shelters, lighting and benches at any on-site transit stops										
BASIC	3.1.2	Where the site abuts an off-site transit stop and insufficient space exists for a transit shelter in the public right-of-way, protect land for a shelter and/or install a shelter										
BETTER	3.1.3	Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building										

	TDM-	supportive design & infrastructure measures: Residential developments	Check if completed & add descriptions, explanation or plan/drawing references				
	4.	RIDESHARING					
	4.1	Pick-up & drop-off facilities					
BASIC	4.1.1	Provide a designated area for carpool drivers (plus taxis and ride-hailing services) to drop off or pick up passengers without using fire lanes or other no-stopping zones	♥				
	5.	CARSHARING & BIKESHARING					
	5.1	Carshare parking spaces					
BETTER	5.1.1	Provide up to three carshare parking spaces in an R3, R4 or R5 Zone for specified residential uses (see Zoning By-law Section 94)					
	5.2	Bikeshare station location					
BETTER	5.2.1	Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection					
	6.	PARKING					
	6.1	Number of parking spaces					
REQUIRED	6.1.1	Do not provide more parking than permitted by zoning, nor less than required by zoning, unless a variance is being applied for	Ø				
BASIC	6.1.2	Provide parking for long-term and short-term users that is consistent with mode share targets, considering the potential for visitors to use off-site public parking					
BASIC	6.1.3	Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly (see Zoning By-law Section 104)					
BETTER	6.1.4	Reduce the minimum number of parking spaces required by zoning by one space for each 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other facilities for cyclists in conjunction with bicycle parking (see Zoning By-law Section 111)					
	6.2	Separate long-term & short-term parking areas					
BETTER	6.2.1	Provide separate areas for short-term and long-term parking (using signage or physical barriers) to permit access controls and simplify enforcement (i.e. to discourage residents from parking in visitor spaces, and vice verse)					

Appendix M

MMLOS Analysis



Multi-Modal Level of Service - Segments Form

Consultant
Scenario
Comments

GH Transportation	Project
resent/Future	Date

2022-117	
2023-04-28	

		•	Chamberlain Chamberlain						
SEGMENTS		Street A	EB (Existing)	EB (Future)					
	Sidewalk Width Boulevard Width		1.8 m < 0.5 m	≥ 2 m 0.5 - 2 m					
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000					
rian	Operating Speed On-Street Parking		> 50 to 60 km/h no	> 50 to 60 km/h no					
Pedestrian	Exposure to Traffic PLoS	F	F	D	-				
	Effective Sidewalk Width	_	1.5 m	3.0 m					
	Pedestrian Volume		250 ped/hr	250 ped/hr					
	Crowding PLoS		В	Α	-				
	Level of Service		F	D	-				
	Type of Cycling Facility		Mixed Traffic	Physically Separated					
	Number of Travel Lanes		2-3 lanes total						
	Operating Speed		≥ 50 to 60 km/h						
	# of Lanes & Operating Speed LoS		Е	-	-				
Bicycle	Bike Lane (+ Parking Lane) Width	E							
Č	Bike Lane Width LoS		-	-	-				
ä	Bike Lane Blockages								
	Blockage LoS Median Refuge Width (no median = < 1.8 m)		- 1 9 m refuge	-	-				
	No. of Lanes at Unsignalized Crossing		< 1.8 m refuge ≤ 3 lanes						
	Sidestreet Operating Speed		≤ 40 km/h						
	Unsignalized Crossing - Lowest LoS		Α	A	-				
	Level of Service		E	Α	-				
it	Facility Type		Mixed Traffic	Mixed Traffic					
Transit	Friction or Ratio Transit:Posted Speed	D	Vt/Vp ≥ 0.8	Vt/Vp ≥ 0.8					
	Level of Service	_	D	D	-				
Truck	Truck Lane Width		> 3.7 m	> 3.7 m					
	Travel Lanes per Direction	Α	> 1	> 1					
Τr	Level of Service	A	Α	Α	-				
Auto	Level of Service	Not Applicable							

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	Project	2022-117
Scenario	Existing	Date	2023-04-28
Comments			

Unlocked Rows for Replicating

Conficing Left Turne No left turn i Prohib Permissive or yield control Conficing Right Turne Conficing Right Turne on Red (RTGR)? Right Turn son Right Turn Son Red (RTGR)? Right Turn Son Right Turn Son Red (RTGR)? Right							l				Unlocked Rows	s ioi Replicatili	y					
Second S		INTERSECTIONS		Lyon/Ram	p/Catherine			Kent/C	atherine			Bank/0	atherine			Bank/Chamb	erlain/Isabella	
Michael Mich		Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Conticuting seaf Turns			0 - 2	3	4	· ·	5	4	3	3	-	4	3	4	4	4	3	3
March Control Contro		Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m
Page Teach Control		Conflicting Left Turns	No left turn / Prohib.	Permissive	No left turn / Prohib.	Permissive	No left turn / Prohib.	Permissive	No left turn / Prohib.	Protected/ Permissive	Permissive	No left turn / Prohib.	Protected/ Permissive	No left turn / Prohib.				
Ped Styrat Leading Interval? No No No No No No No N		Conflicting Right Turns		No right turn	No right turn			No right turn	No right turn	No right turn		No right turn	No right turn		No right turn	No right turn		No right turn
Page Turn Cleared No Cleared No Figit Turn No Figit		Right Turns on Red (RToR)?	RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR allowed
PETS Score		Ped Signal Leading Interval?	No	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	No
FETS Score	jan	Right Turn Channel	No Channel	No Right Turn	No Right Turn	No Right Turn	No Channel	No Right Turn	No Right Turn	No Right Turn	No Channel	No Right Turn	No Right Turn	No Channel	No Right Turn	No Right Turn	No Channel	Smart Channel
FETSI Score	št	Corner Radius		-	-	-		-	-	-		-	_	3-5m	-	-		5-10m
FETS Score	쁏	Crosswalk Type																Std transverse markings
Pedic Exposure for Traffic LoS Cyrol Length Fedicite Valls Time Fedicite Valls T	ď	PETSI Score																90
Cycle Length Felicitive Max Time Felic																		A
Care		•	^	ь	В	A	D	ь .	A	A	C	·	A	·	C	В	·	А
Average Pedestrian Delay LoS																		
A B B B A D B B A C C C B C C B C C B C C B C C C B C																		
Level of Service B		Pedestrian Delay LoS				-	-				-	-	-	-	-	-		-
Approach From North South EAST WEST North South EAST EAST WEST North South EAST			Α	В	В	Α	D	В	Α	Α	С	С	Α	С	С	В	С	Α
Right Turn Lane Configuration Popular Cyclist relative to RT motorists Popular Cyclist Popular C		Level of Service										С						
Right Turn Lane Configuration Popular Cyclist relative to RT motorists Popular Cyclist Popular C		Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Right Turning Speed									Mixed Traffic									Mixed Traffic
Cyclist relative to RT motorists		Right Turn Lane Configuration							> 50 m									≤ 50 m
Cyclist relative to RT motorists	Bicycle	Right Turning Speed							>25 km/h									≤ 25 km/h
Operating Speed >50 to < 60 km/h >40 to ≤ 50 km/h Left Turning Cyclist - - - A - E - D A - Level of Service A F -					-	-	-		F	-	-	-	Α		Α	-		D
Operating Speed >50 to < 60 km/h >40 to ≤ 50 km/h Left Turning Cyclist - - - A - E - D A - Level of Service A F -		Separated or Mixed Traffic	•		-	•	-		Mixed Traffic	•	-	-	•	-	-	-		Mixed Traffic
Level of Service		Left Turn Approach																
Level of Service -																		
Level of Service A F E D Average Signal Delay ≤ 20 sec ≤ 30 sec ≤ 40 sec ≤ 50 sec ≤ 40 sec </td <td></td> <td>Left Turning Cyclist</td> <td></td> <td>•</td> <td>•</td> <td>•</td> <td>-</td> <td>•</td> <td></td> <td>•</td> <td>Α</td> <td>•</td> <td></td> <td>•</td> <td></td> <td>Α</td> <td>•</td> <td>Α</td>		Left Turning Cyclist		•	•	•	-	•		•	Α	•		•		Α	•	Α
Average Signal Delay Average Signal Delay Level of Service Average Signal Delay B Average Signal Delay Average Signal Delay B Av			-	-	-	•	-	-	F	•	-	-	E	-	D	-	-	D
Level of Service C D - F D E - D E - E - C E		Level of Service			A				F				E				D	
	#	Average Signal Delay									> 40 sec							≤ 40 sec
	Trans			-	С	-	-	-	D	-	F	D	E	-	D	E	-	E
Effective Corner Radius < 10 m < 10 m < 10 m 10 - 15 m		Level of Service			С			ı	D				F				E	
	중	Effective Corner Radius							< 10 m		< 10 m		< 10 m			10 - 15 m		< 10 m
Number of Receiving Lanes on Departure from Intersection ≥2 ≥2 ≥2 ≥2 ≥2									≥ 2		≥ 2		≥ 2			≥ 2		≥ 2
From Intersection	2		-	-	-	-	-	-	D	-	D	-	D	-	-	В	-	D
Level of Service - D D D		Level of Service			-				D				D				D	
Volume to Capacity Ratio 0.0 - 0.60 0.61 - 0.70 0.81 - 0.90 0.81 - 0.90	9	Volume to Capacity Ratio		0.0	- 0.60			0.61	- 0.70			0.81	- 0.90			0.81	- 0.90	
Level of Service A B D D	Auto	Level of Service			A				В				D				D	

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	Project	2022-117
Scenario	Future	Date	2023-04-28
Comments			

						1											
	INTERSECTIONS	Lyon/Ramp/Catherine			Kent/Catherine				Bank/Catherine			Bank/Chamberlain/Isabella					
	Crossing Side		SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
	Lanes	0 - 2	3	3	3	3	4	4	0 - 2	4	4	3	3	4	4	0 - 2	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m
	Conflicting Left Turns	No left turn / Prohib.	Permissive	No left turn / Prohib.	No left turn / Prohib.	No left turn / Prohib.	No left turn / Prohib.	No left turn / Prohib.	Permissive	No left turn / Prohib.	Permissive	No left turn / Prohib.	Protected/ Permissive	Permissive	No left turn / Prohib.	Protected/ Permissive	No left turn / Prohib.
	Conflicting Right Turns	Permissive or yield control	No right turn	No right turn	Permissive or yield control	Permissive or yield control	No right turn	No right turn	No right turn	Permissive or yield control	No right turn	No right turn	Permissive or yield control	No right turn	No right turn	Permissive or yield control	No right turn
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR prohibited	RTOR allowed	RTOR prohibited	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	No
Pedestrian	Right Turn Channel	No Channel	No Right Turn	No Right Turn	No Right Turn	No Channel	No Right Turn	No Right Turn	No Right Turn	No Channel	No Right Turn	No Right Turn	No Channel	No Right Turn	No Right Turn	No Channel	Smart Channel
str	Corner Radius	0-3m	No Right Turn	No Right Turn	No Right Turn	3-5m	No Right Turn	No Right Turn	No Right Turn	3-5m	No Right Turn	No Right Turn	3-5m	No Right Turn	No Right Turn	5-10m	5-10m
용	Crosswalk Type	Zebra stripe hi-vis	Zebra stripe hi-vis	Std transverse	Std transverse	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis	Zebra stripe hi-vis
a a	**	markings	markings	markings	markings	markings	markings	markings	markings	markings	markings	markings	markings	markings	markings	markings	markings
	PETSI Score	99	91	96	91	88	84	82	106	68	76	98	80	74	79	92	93
	Ped. Exposure to Traffic LoS	Α	Α	Α	A	В	В	В	Α	С	В	A	В	С	В	A	Α
	Cycle Length Effective Walk Time																
	Average Pedestrian Delay																
	Pedestrian Delay LoS	-			-	-	-	-				-	-	-	-	-	_
		Α	Α	A	A	В	В	В	Α	С	В	Α	В	С	В	Α	Α
	Level of Service	Α		A	_ ^	B			C C			C					
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
	Districts I are American an American							Mixed Traffic									Curb Bike Lane,
	Bicycle Lane Arrangement on Approach																Cycletrack or MUP
	Right Turn Lane Configuration							> 50 m									Not Applicable
	Right Turning Speed							>25 km/h									Not Applicable
Φ	Cyclist relative to RT motorists	-	-	-	-	-	-	F	-	-		Α	•	Α	-	•	Not Applicable
<u> </u>	Separated or Mixed Traffic	-	-	•	-	-	-	Mixed Traffic	-	-		-	-	-	•	•	Separated
Bicycle	Left Turn Approach											One lane crossed		No lane crossed			2-stage, LT box
	Operating Speed											> 50 to < 60 km/h		> 40 to ≤ 50 km/h			> 50 to < 60 km/h
	Left Turning Cyclist	-		-	•	-	-	A	-	Α	•	E	-	B	Α	•	A
		-	-	-	-	-	-	F	-	-	-	E	-	В	•	-	Α
	Level of Service			-			1	F				E			i	3	
Transit	Average Signal Delay			≤ 20 sec				≤ 30 sec		≤ 40 sec	≤ 20 sec	> 40 sec		≤ 20 sec	≤ 20 sec		≤ 40 sec
		-	-	С	-	-	-	D	-	E	С	F	-	С	С	-	E
	Level of Service		(С				D				F			-	<u> </u>	
	Effective Corner Radius							< 10 m		< 10 m		< 10 m			10 - 15 m		< 10 m
	Number of Receiving Lanes on Departure from Intersection							≥ 2		≥ 2		≥ 2			≥ 2		≥ 2
		-	-	-	-	-	-	D	-	D	-	D	-	-	В	-	D
	Level of Service			-				D				D			ı)	
ಲ	Volume to Capacity Ratio	0.0 - 0.60			0.61 - 0.70			0.71 - 0.80			0.71 - 0.80						
Auto	Level of Service	Α				В			С			С					