Richmond Churchill Limited Partnership

319-327 Richmond Rd, 380 Winona Ave, & 381 Churchill Ave

Transportation Impact Assessment

CGH TRANSPORTATION

319-327 Richmond Road, 380 Winona Avenue, & 381 Churchill Avenue

Transportation Impact Assessment

Step 1 Screening Report

Step 2 Scoping Report

Step 3 Forecasting Report

Step 4 Analysis Report

Prepared for:

Richmond Churchill Limited Partnership
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Prepared by:

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December 2020

PN: 2019-03

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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.

2 Existing and Planned Conditions

2.1 Proposed Development

The proposed development, located at 381 Churchill Avenue, 380 Winona Avenue, 319, 325, and 327 Richmond Road, is currently zoned as part Traditional Mainstreet (TM H15), part General Mixed Use (GM1), and part Residential Fourth Density (R4). The existing land uses include a car garage and maintenance shop, two small retail stores and a residential apartment with six units. TOD principles apply to the proposed development Study Area.

The proposed development is a nine-storey building with 184 apartment units, 18685 square feet of retail space, 131 vehicle parking spots, and 98 bicycle parking spaces. The site is proposed to have two accesses; one of which is a full movement access on Churchill Avenue approximately 65 metres north of the Churchill Avenue / Richmond Road intersection (measured from access centreline to intersection centre). The second access is located on Winona Avenue approximately 50 metres north of the Winona Avenue / Richmond Road intersection (measured from access centreline to intersection centre) and is a loading entrance with access solely to loading aisles. The anticipated full build-out and occupancy horizon is 2022. Figure 1 illustrates the Study Area context. Figure 2 illustrates the proposed site plan of the development.

Figure 1: Area Context Plan

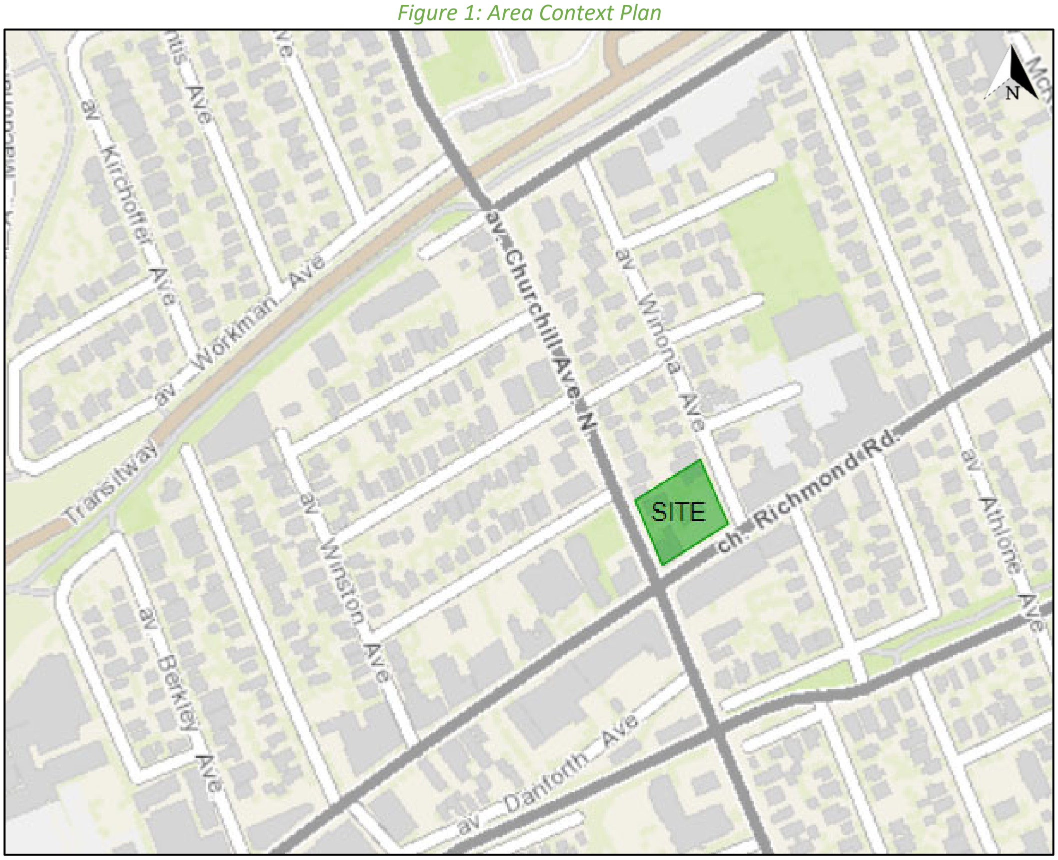
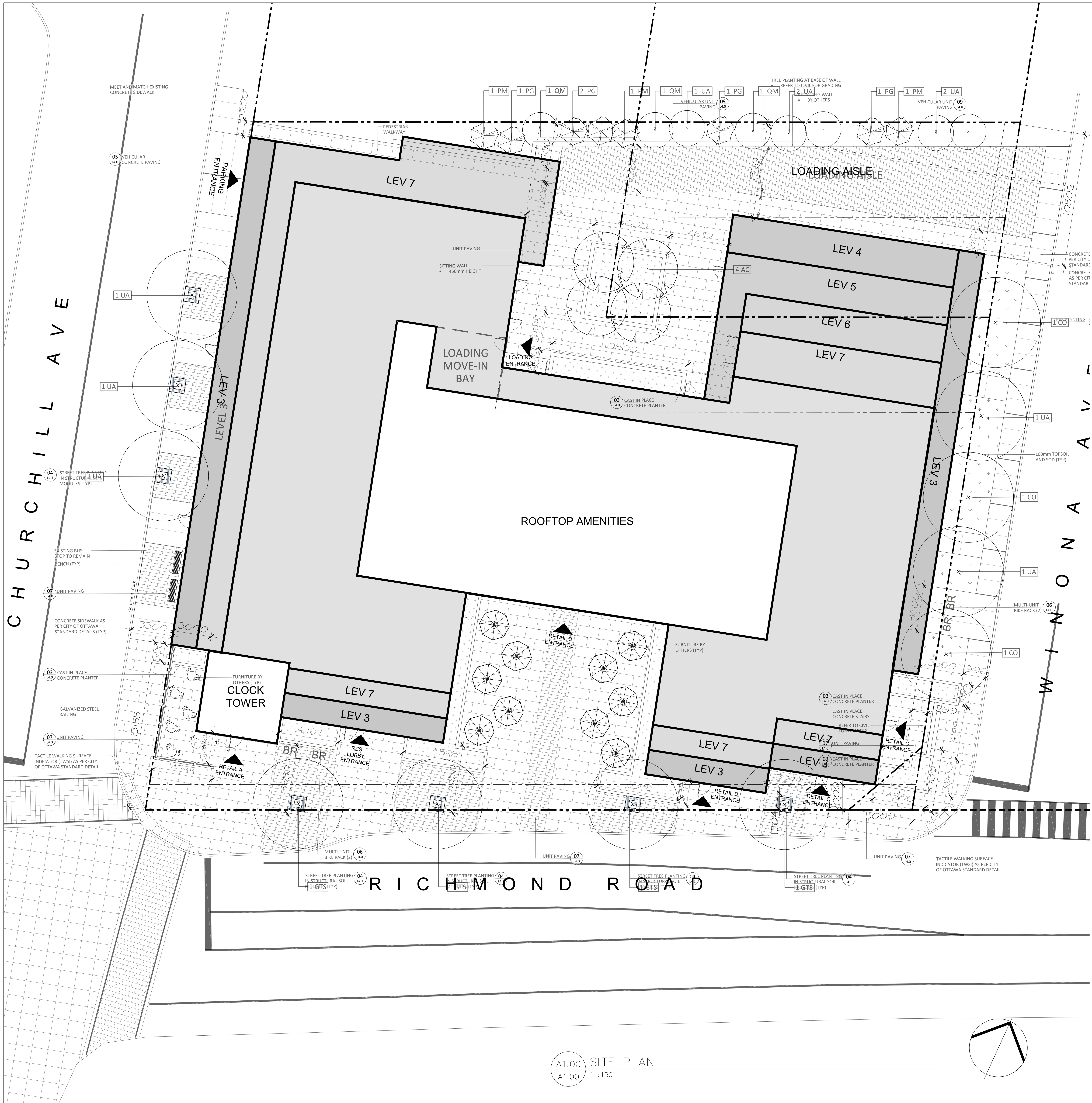


Figure 2: Proposed Site Plan



ZONING NOTES:

CURRENT ZONING: **TM H(15) - Traditional Main Street**
GM1 - General Mixed Use Zone
R4 - Residential Fourth Density

*There are three separate zones on the property, we will be applying for a re-zoning to create one zone for the entire property.

LEGAL DESCRIPTION
LOTS 327 TO 319 (INCLUSIVE) AND
LOTS 380-381 (INCLUSIVE)
REGISTERED PLAN XXXXXX
CITY OF OTTAWA

LOT AREA : 3,270 m^2
LOT WIDTH : 60.4 m
LOT DEPTH : 54.2 m

DEVELOPMENT STATS PHASE I	REQUIRED	PROPOSED
LOT OF AREA 'A'	MIN 450 m^2	3,270 m^2
TOTAL UNITS		184
SETBACK ALONG RICHMOND	Varies (As per existing zones)	1.3 m
SETBACK ALONG CHURCHILL	Varies (As per existing zones)	0 m
SETBACK ALONG WINONA	Varies (As per existing zones)	1.2 m
MAXIMUM HEIGHT	Varies (As per existing zones)	31 m
NUMBER OF STOREYS		9
BUILDING GFA		2,132 m^2
ZONING GFA (as per city zoning def.)		TBD

PARKING REQUIREMENTS PHASE

1. REQUIRED PARKING

LAND USE	REQUIRED	PROVIDED VEHICLE PARKING
RESIDENTIAL	77 PARKING SPACES MINIMUM (184 –12 = 172 * 0.5 = 86...all underground so 10% reduction = 8.6 spaces -> 9 space reduction = 77)	114 RESIDENTIAL PARKING SPACES PROVIDED FOR 184 UNITS * LOCATED IN UNDERGROUND PARKING GARAGE
RETAIL	Retail A - 472.6m^2: No parking required for retail store	0
	Retail B - 567.8m^2: Restaurant: 28 spaces; OR Retail: 7 spaces	0
	Retail C - 435.1m^2: No parking required for retail store	0
VISITOR	17 VISITOR PARKING SPACES REQUIRED (184 –12 = 172 * 0.1 = 17 spaces...no reduction for underground)	17 VISITOR PARKING SPACES PROVIDED FOR 184 UNITS * LOCATED IN UNDERGROUND PARKING GARAGE
TOTAL PARKING PROVIDED		131 TOTAL PARKING PARKING SPACES

2. BICYCLE PARKING

REQUIRED BICYCLE PARKING SPACES
RESIDENTIAL (0.5 SPACE/UNIT - 92 SPACES REQUIRED)
COMMERCIAL (1 / 250 SQ.M. COMMERCIAL GLFA - 6 EXTERIOR SPACES)

PROVIDED BICYCLE PARKING SPACES
RESIDENTIAL 92 SPACES
COMMERCIAL 6 EXTERIOR SPACES

3. AMENITY SPACE REQUIREMENTS

REQUIRED AMENITY SPACE 6 m^2 REQUIRED PER UNIT
184 UNITS X 6 SQ.M. = 1,104 SQ.M. TOTAL AMENITY REQUIRED
REQUIRED AMENITY SPACE TO BE COMMON - 552 SQ.M.
PROVIDED COMMON AMENITY SPACE - 690 SQ.M.

PROVIDED AMENITY SPACE BREAKDOWN:
-GROUND FLOOR COMMON AMENITY - 0 m^2 (INTERIOR)
-TOP FLOOR COMMON AMENITY - 690 M^2 (EXTERIOR)
-PRIVATE BALCONY AMENITY - 1,696 m^2
TOTAL AMENITY SPACE PROVIDED 2,386 m^2

LOCATION PLAN

PROJECT TEAM

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INTERRENT REIT

no.	date	revision
1	20201218	ISSUED FOR REZONING

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

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E: mail@hobinarc.com
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HOBIN ARCHITECTURE

PROJECT/LOCATION:
327 RICHMOND

DRAWING TITLE:
SITE PLAN

DRAWN BY:	DATE:	SCALE:
RL	2020-12-18	1:150

ONTARIO ASSOCIATION OF ARCHITECTS
BARRY J. HOBIN
LICENCE
3049

PROJECT:
1919

DRAWING NO.:
SP-1

REVISION NO.:

D07-12-19-0186

DWG 18064

2.2 Existing Conditions

2.2.1 Area Road Network

Richmond Road: Richmond Road is a City of Ottawa arterial road with a two-lane cross-section with parking lanes on both sides. Richmond Road has curbs and gutters within the Study Area. The posted speed limit is 50 km/h. The existing right-of-way is 20.0 metres, including sidewalks on both sides of the road. Richmond Road is designated as a trucking route.

Scott Street: Scott Street is a City of Ottawa arterial road with a two-lane cross-section and a posted speed limit of 50 km/h. Within the Study Area, Scott Street has gravel shoulders to the west of Churchill Avenue. To the east of Churchill Avenue and within the Study Area, Scott Street has a curb and gutter on the south side and a gravel shoulder on the north side. Bike lanes are provided on both sides of the roadway, parking is permitted on the gravel shoulder. The City Official Plan reserves a 26.0 metre right-of-way, including an existing sidewalk on the south side of the roadway. Scott Street is designated as a trucking route east of Churchill Avenue.

Churchill Avenue: Churchill Avenue is a City of Ottawa major collector road south of Richmond Road and an arterial road between Richmond Road and Scott Street with a two-lane cross-section and a posted speed of 50 km/h. Churchill Avenue has curbs and gutters within the Study Area. Parking lanes are provided north of Danforth Avenue and cycle tracks are provided south of Byron Avenue. The existing right-of-way is 20.0 metres, including existing sidewalks on both sides. Churchill Avenue is designated as a trucking route south of Scott Street.

Byron Avenue: Byron Avenue is a City of Ottawa collector road with a two-lane cross-section and an unposted speed limit of 50 km/h. Byron Avenue has curbs and gutters within the Study Area. The existing right-of-way is 20.0 metres with existing sidewalks on both sides, reducing to 15.0 metres to the east of Athlone Avenue with a sidewalk on only one side.

Roosevelt Avenue: Roosevelt Avenue is a City of Ottawa local road with a two-lane cross-section. To the north of Richmond Road there is a sidewalk on the east side, and to the south there are sidewalks on both sides. South of Richmond Road and within the Study Area, Roosevelt Avenue has curbs and gutters. To the north of Richmond Road and within the Study Area, Roosevelt Avenue has a curb and gutter on the east side and a grass shoulder on the west side. It has an unposted speed limit of 50 km/h. The existing right-of-way is 20.0 metres.

Athlone Avenue: Athlone Avenue is a City of Ottawa local road with a two-lane cross-section. To the north of Richmond Road there is a curb, gutter, and sidewalk on the west side and a dirt shoulder to the east. South of Richmond Road there are no sidewalks and only grass shoulders. To the north of Richmond Road, the measured right-of-way is approximately 12 metres and is approximately 9 metres to the south of Richmond Road. It has an unposted speed limit of 50 km/h.

Winona Avenue: Winona Avenue is a City of Ottawa local road with a two-lane urban cross-section, including pedestrian asphalt pathways, curbs and gutters on both sides of the roadway. It has a posted speed limit of 40 km/h. The measured right-of-way is approximately 12.5 metres.

2.2.2 Existing Intersections

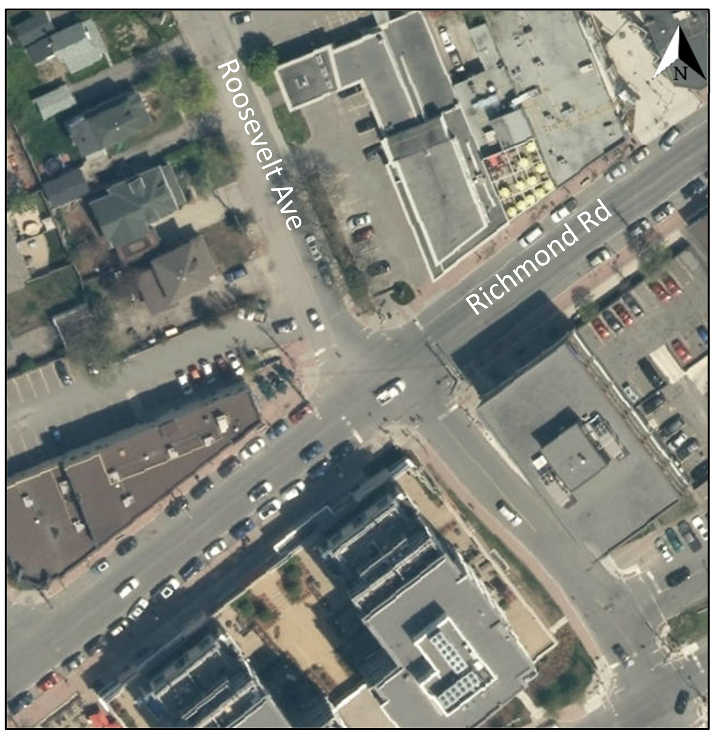
A description and accompanying aerial photograph of the existing intersections within the Study Area can be found below.

Richmond Road / Churchill Avenue

The intersection of Richmond Road and Churchill Avenue is a signalized intersection. The north and south approaches consist of shared left/ through and through /right lanes, and the east and west approaches are made up of an auxiliary left-turn lane and a shared through/right-turn lane. No turn restrictions were noted.

Richmond Road / Roosevelt Avenue

The intersection of Richmond Road and Roosevelt Avenue is a signalized intersection. All approaches consist of single shared all movement lanes and parking lanes are provided along Richmond Road. No turn restrictions were noted.



Richmond Road / Athlone Avenue

The intersection of Richmond Road and Athlone Avenue is an intersection pedestrian signal; consisting of a half-signal for pedestrian crossing of Richmond Road and stop-control for the minor approaches of Athlone Avenue. All approaches consist of single shared all movement lanes and parking lanes are provided along Richmond Road. No turn restrictions were noted.

Byron Avenue / Churchill Avenue

The intersection of Byron Avenue and Churchill Avenue is a signalized intersection. The eastbound and westbound approaches consist of single shared all movement lanes and the northbound and southbound approaches consist of an auxiliary left-turn lane and a shared through/right-turn lane. No turn restrictions were noted. Trucks are not permitted east of the intersection along Byron Avenue.

Scott Street / Churchill Avenue

The intersection of Scott Street and Churchill Avenue is an unsignalized intersection. All approaches consist of single shared all movement lanes. The east leg of the intersection, Scott Street, provides bike lanes. No turn restrictions were noted.

2.2.3 Existing Driveways

Existing driveways are located along Churchill Avenue, Winona Avenue, and Richmond Road to the east of the proposed site. The driveway accesses are both residential and commercial/retail accesses along Churchill Avenue and Winona Avenue and commercial/retail along Richmond Road.

Additionally, none of the driveways would provide access to significant traffic generators and would therefore have no impact on this TIA.

2.2.4 Cycling and Pedestrian Facilities

Sidewalks are provided along both sides of the major roadways and one side of the local roads in the Study Area. The cycling network consists of bike lanes on Scott Street and a small section of Byron Avenue, cycle tracks along Churchill Avenue south of Byron Avenue, and suggested bike routes along Richmond Road, Roosevelt Avenue and Byron Avenue. Major pathways systems are provided along the Confederation LRT Line, Sir John A Parkway, and Byron Linear Tramway Park. Figure 3 illustrates the pedestrian facilities in the Study Area and Figure 4 illustrates the cycling facilities.

Figure 3: Study Area Pedestrian Facilities

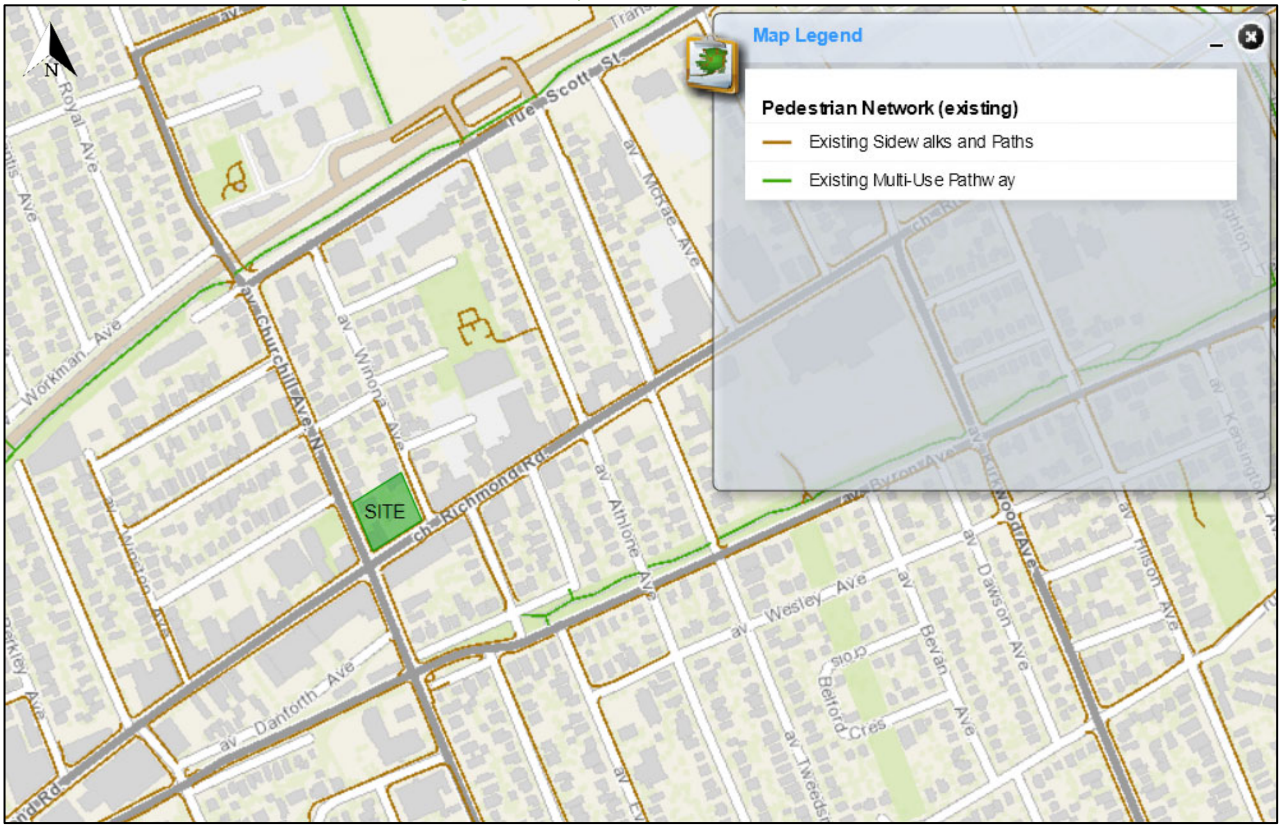
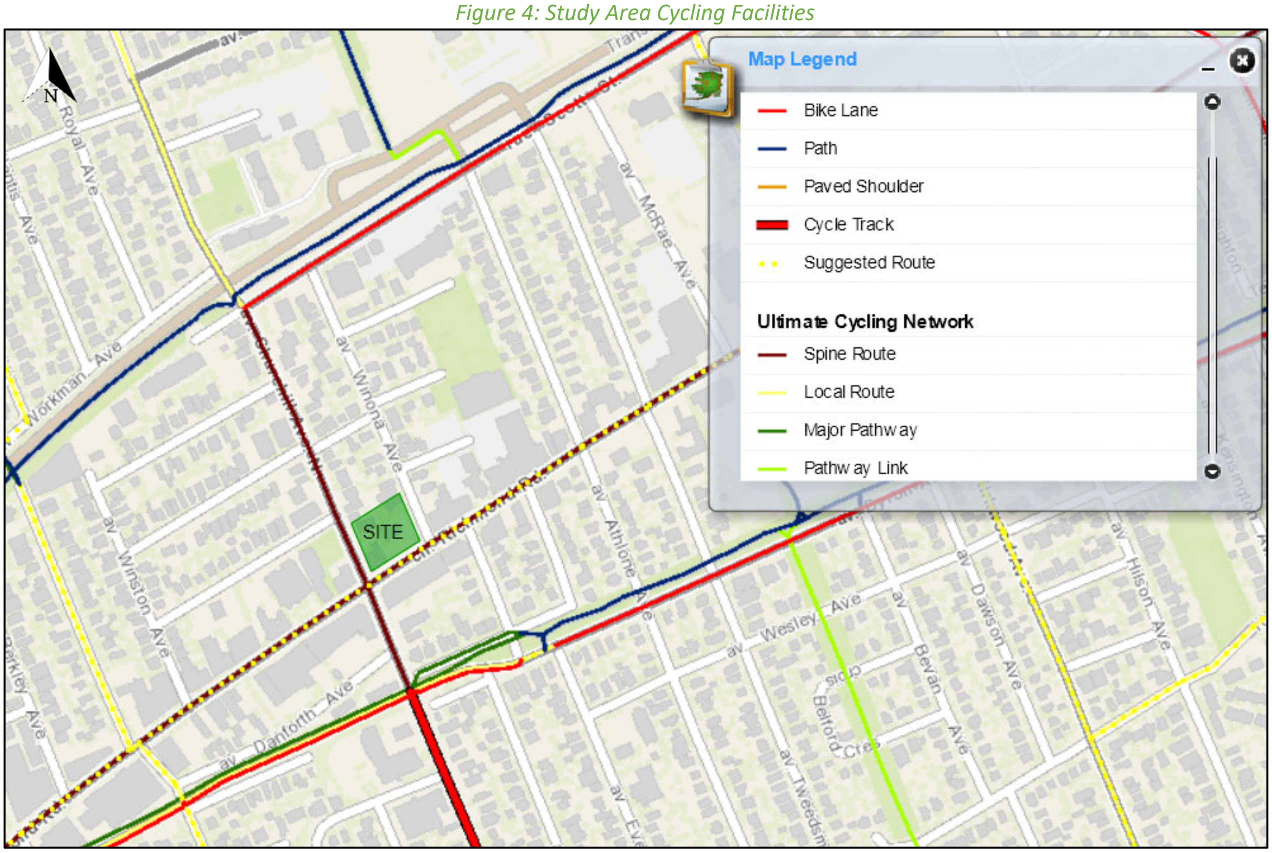


Figure 4: Study Area Cycling Facilities



2.2.5 Existing Transit

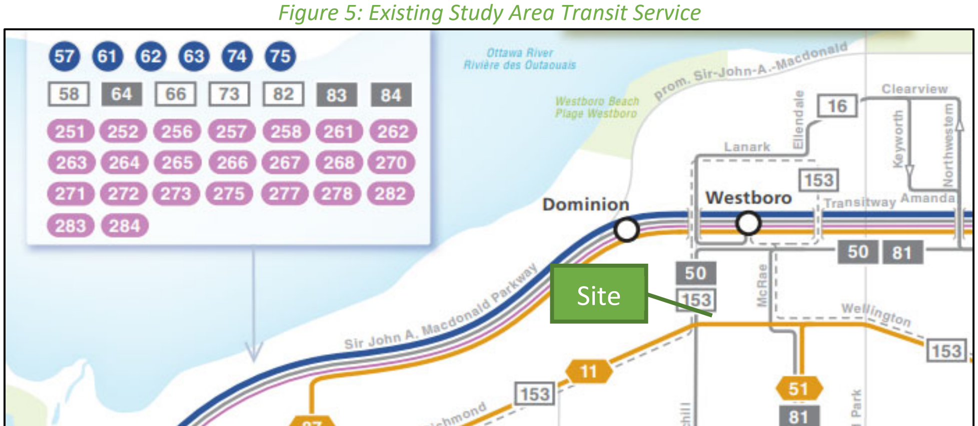
Within the Study Area, Routes #50 and #153 share four stops north of Richmond Road along Churchill Avenue with two of those stops directly beside the development site. Route #50 also has two stops south of Richmond Road just south of Byron Avenue. Routes #153 and #11 share three stops on Richmond Road to the west of Churchill Avenue and Route #11 has an additional three stops to the east of Churchill Avenue with one of those stops being directly south of the site. Within the Study Area, #16 has two stops north of Churchill Avenue and Scott Street. The frequencies of these routes within the proximity of the proposed site (as of April 24, 2020) are:

- Route #11— every 15 minutes from AM to PM weekday peak hours and mid-day weekend peak hours, and 30 minutes in the off-peak times
- Route #16 – every 30 minutes in the peak direction, and 30-60 minutes in the off-peak direction, off-peak times and weekends.
- Route #50— every 60 minutes from 8:00 to 10:00 AM and every 30 minutes onward for both weekdays and Saturdays with no operation on Sundays
- Route #153— every two hours from approximately 11AM to 6PM with no operation on Sundays

Additionally, the Dominion and Westboro Rapid Route stations are located approximately 550m northwest and 450m northeast from the development site, respectively. Both stations are part of the Transitway and are future locations of LRT stations.

Figure 5 illustrates the transit system map and summarizes the route information for Dominion and Westboro stations. Figure 6 illustrates the transit stops in the Study Area.

Figure 5: Existing Study Area Transit Service



AM Connexion Routes*
Circuits* Connexion le matin

LIMITED SERVICE **UNTIL** TUNNEY'S PASTURE STATION

Service from the west is **off-only** at the following stations: Moodie, Pinecrest, Queensway, Lincoln Fields, Dominion and Westboro.

Service from the southwest is **off-only** at the following stations: Baseline, Iris, Queensway, Lincoln Fields, Dominion and Westboro.

*Except Routes 258, 282 and 284 which offer full service.

SERVICE LIMITÉ **JUSQU'À** LA STATION TUNNEY'S PASTURE

Les circuits en provenance de l'ouest offrent le service de **débarquement, seulement,** aux stations suivantes : Moodie, Pinecrest, Queensway, Lincoln Fields, Dominion et Westboro.

Les circuits en provenance du sud-ouest offrent le service de **débarquement, seulement,** aux stations suivantes : Baseline, Iris, Queensway, Lincoln Fields, Dominion et Westboro.

*Sauf les circuits 258, 282 et 284 qui offrent un service complet.

PM Connexion Routes
Circuits Connexion en après-midi

LIMITED SERVICE **AFTER** TUNNEY'S PASTURE STATION

No service from Westboro Station to Pinecrest Station Routes 251, 252, 256, 257, 261, 262, 263, 264, 265, 266, 267 and 268

No service from Westboro Station to Baseline Station Routes 270, 271, 272, 273, 275, 277, 278

No service from Westboro Station to Dominion Station Route 283

SERVICE LIMITÉ **APRÈS** LA STATION TUNNEY'S PASTURE

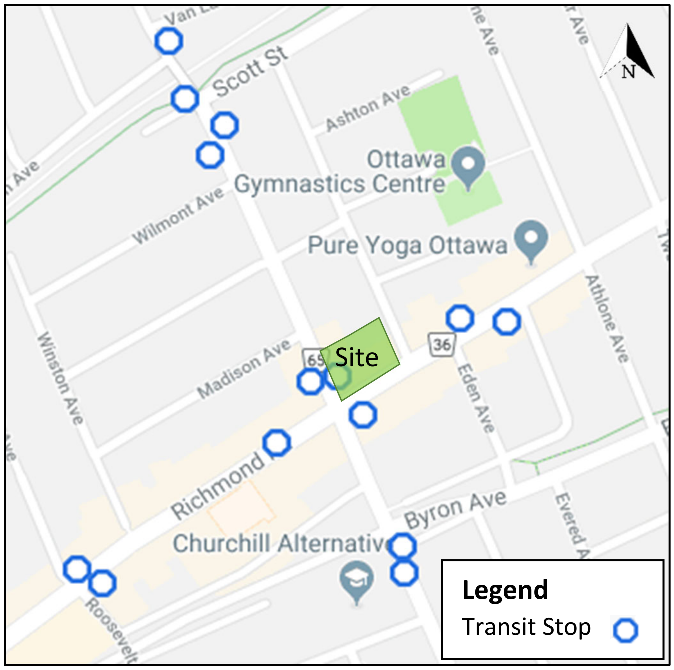
Pas de service de la station Westboro à la station Pinecrest Circuits 251, 252, 256, 257, 261, 262, 263, 264, 265, 266, 267 et 268

Pas de service de la station Westboro à la station Baseline Circuits 270, 271, 272, 273, 275, 277, 278

Pas de service de la station Westboro à la station Dominion Circuit 283

Accessed: April 24, 2020

Figure 6: Existing Study Area Transit Stops



Accessed: April 24, 2020

2.2.6 Existing Area Traffic Management Measures

Existing traffic management measures within the Study Area are primarily focused on truck traffic. Measures within the subject site include:

- Truck turning restriction at Churchill Avenue and Richmond Road – no WBL turn between 11PM-6AM
- No truck access on Roosevelt Avenue south of Richmond Road
- No truck access on Athlone Avenue north of Richmond Road

In 2011, a Richmond Road / Westboro Transportation Management Plan was completed and contains recommendations to be implemented over 15 years, to encourage a shift to more sustainable modes of transportation in the area. Recommendations that have been implemented in the Study Area since the plan's publication are:

- Pedestrian countdown signals at Roosevelt Avenue and Richmond Road
- Cycling lanes along Scott Street to the east of Churchill Avenue
- Six additional bus stops north of Richmond Road along Churchill Avenue

2.2.7 Existing Peak Hour Travel Demand

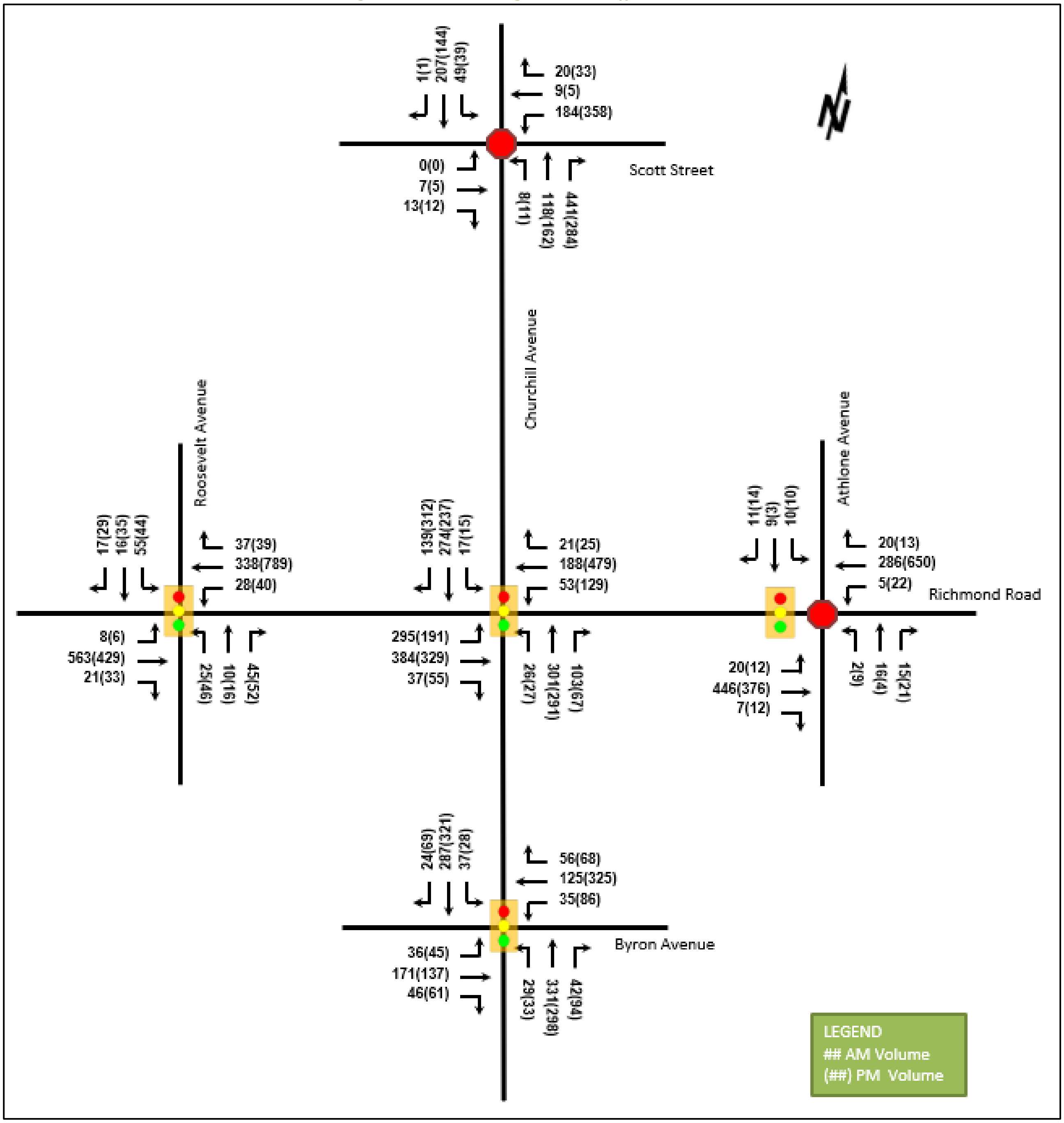
Existing turning movement counts were provided by the City of Ottawa for all existing Study Area intersections except for Churchill Avenue and Scott Street. Counts for this intersection were provided by Traffic Specialists instead. Table 1 summarizes the intersection count dates and data sources.

Table 1: Intersection Count Date

Intersection	Count Date	Data Source
Richmond Road and Churchill Avenue	Wednesday, November 22, 2017	City of Ottawa
Richmond Road and Roosevelt Avenue	Friday, June 12, 2015	City of Ottawa
Richmond Road and Athlone Avenue	Thursday, April 20, 2017	City of Ottawa
Churchill Avenue and Scott Street	Thursday, March 21, 2019	Traffic Specialists
Churchill Avenue and Byron Avenue	Thursday, August 25, 2016	City of Ottawa

Figure 7 illustrates the 2019 existing horizon traffic volumes. As suggested by City of Ottawa staff, an annual background growth of 0% will be used in order to produce a consistent horizon year. Using the AM and PM peak period intersection growth rate maps as provided by the City of Ottawa, a net 0% growth rate is confirmed within the Study Area. Detailed turning movement count data and signal timing plans are included in Appendix B.

Figure 7: 2019 Existing Horizon Traffic Volumes



2.2.8 Collision Analysis

Collision data has been acquired from the City of Ottawa for five years (2013-2017) prior to the commencement of this TIA for the surrounding Study Area road network. Specific attention is directed to the five primary intersections within the Study Area as well as the segment of Richmond Road between Winston Avenue and Churchill Avenue as a result of the large number of collisions on this segment. Figure 8 illustrates the intersections and segments analyzed, and Table 2 summarizes the total collisions for the intersections of interest. Collision data is included in Appendix C.

Figure 8: Study Area Representation of Collision Locations

Table 2: Summary of Collision Locations

Intersections / Segments	Number	%
	86	100%
Churchill Ave @ Scott St	3	3.49%
Churchill Ave @ Richmond Rd	33	38.37%
Churchill Ave @ Byron Ave	8	9.30%
Roosevelt Ave @ Richmond Rd	4	4.65%
Athlone Ave @ Richmond Rd	6	6.98%
Richmond Rd btwn Winston Ave and Churchill Ave	32	37.21%

Overall, no fatal collisions were documented in the Study Area and a total of eight collisions were noted involving pedestrians or cyclists. Two of these collisions involved cyclists, one occurring at the intersection of Athlone Avenue and Richmond Road and the other occurring at the intersection of Byron Avenue and Churchill Avenue. Five of the pedestrian collisions occurred at Churchill Avenue and Richmond Road and the other pedestrian collision occurred at Roosevelt Avenue and Richmond Road.

Table 3, Table 4, Table 5, Table 6, Table 7, and Table 8 summarize the collision types and conditions of the five intersections and one segment of interest within the Study Area on an individual basis.

Churchill Avenue and Scott Street experienced three collisions between 2013-2017. All three collisions resulted in property damage only, however each collision falls under a different impact type (Angle, SMV Unattended Vehicle and SMV Other). Weather/road conditions are considered a contributing factor for 33.33% of collisions at this intersection.

Table 3: Churchill Avenue at Scott Street Collision Summary

		Number	%
Total Collisions		**3**	**100%**
Classification	Property Damage Only	3	100.00%
Initial Impact Type	Angle	1	33.33%
	SMV Unattended Vehicle	1	33.33%
	SMV Other	1	33.33%
Road Surface Condition	Dry	2	66.66%
	Ice	1	33.33%
Pedestrian Involved		0	0.00%
Cyclists Involved		0	0.00%

Churchill Avenue and Richmond Road experienced 33 collisions between 2013-2017. Of these collisions, 27 resulted in property damage only and six resulted in non-fatal injuries. The impact types are varied, however the rear end, angle and sideswipe collision initial impact categories contained the largest proportions of the collisions at this intersection with 30.31%, 21.21% and 18.18% of all collisions respectively. Weather/road conditions are considered a contributing factor for 27.27% of collisions at this intersection.

Table 4: Churchill Ave @ Richmond Rd Collision Summary

		Number	%
Total Collisions		**33**	**100%**
Classification	Non-Fatal Injury	6	18.18%
	Property Damage Only	27	81.82%
Initial Impact Type	Angle	7	21.21%
	Rear end	10	30.31%
	Sideswipe	6	18.18%
	Turning Movement	2	6.06%
	SMV Unattended Vehicle	4	12.12%
	SMV Other	4	12.12%
Road Surface Condition	Dry	24	72.73%
	Wet	5	15.15%
	Loose Snow	2	6.06%
	Slush	1	3.03%
	Ice	1	3.03%
Pedestrian Involved		5	15.15%
Cyclists Involved		0	0.00%

Churchill Avenue and Byron Avenue experienced eight collisions between 2013-2017, all of which resulted in property damage only. The impact types of the collisions fall under the rear end, angle, turning movement and other categories with three, two, two, and one collision respectively. Weather/road conditions are considered a contributing factor for 62.50% of collisions at this intersection.

Table 5: Churchill Ave @ Byron Ave Collision Summary

		Number	%
Total Collisions		**8**	**100%**
Classification	Property Damage Only	8	100.00%
Initial Impact Type	Angle	2	25.00%
	Rear end	3	37.50%
	Turning Movement	2	25.00%
	Other	1	12.5%
Road Surface Condition	Dry	3	37.50%
	Wet	3	37.50%
	Ice	1	12.50%
	Loose sand or gravel	1	12.50%
Pedestrian Involved		0	0.00%
Cyclists Involved		1	12.50%

Roosevelt Avenue and Richmond Road experienced six collisions between 2014-2017. Three of these collisions resulted in non-fatal injuries and the other three in property damage only. The collisions have been classified as belonging to the angle, rear end, turning movement, SMV unattended vehicle and SMV other impact type categories with the turning movement classification having two collisions and the rest of the classifications having one. Weather/road conditions are considered a contributing factor for 33.33% of collisions at this intersection.

Table 6: Roosevelt Ave @ Richmond Rd Collision Summary

		Number	%
Total Collisions		**6**	**100%**
Classification	Non-Fatal Injury	3	50.00%
	Property Damage Only	3	50.00%
Initial Impact Type	Angle	1	16.67%
	Rear end	1	16.67%
	Turning Movement	2	33.32%
	SMV Unattended Vehicle	1	16.67%
	SMV Other	1	16.67%
Road Surface Condition	Dry	4	66.66%
	Wet	1	16.67%
	Ice	1	16.67%
Pedestrian Involved		1	16.67%
Cyclists Involved		0	0.00%

Athlone Avenue and Richmond Road has experienced six collisions between 2013-2017. Five of these collisions resulted in property damage only and one in non-fatal injuries. The impact types are split evenly between the rear end and angle categories. Weather/road conditions are considered a contributing factor for 16.67% of collisions at this intersection.

Table 7: Athlone Ave @ Richmond Rd Collision Summary

		Number	%
Total Collisions		**6**	**100%**
Classification	Non-Fatal Injury	1	16.66%
	Property Damage Only	5	83.33%
Initial Impact Type	Angle	3	50.00%
	Rear end	3	50.00%
Road Surface Condition	Dry	5	83.33%
	Loose Snow	1	16.67%
Pedestrian Involved		0	0.00%
Cyclists Involved		1	16.66%

Richmond Road between Winston Avenue and Churchill Avenue has experienced 32 collisions between 2013-2017. Thirty of these collisions resulted in property damage only and two in non-fatal injuries. The impact types primarily fall into the angle, sideswipe, and SMV unattended vehicle categories at 12.50%, 21.88% and 43.74% of the total collisions respectively. Weather/road conditions are considered a contributing factor for 28.12% of collisions at this intersection.

Table 8: Richmond Road btwn Winston Ave and Churchill Ave

		Number	%
Total Collisions		**32**	**100%**
Classification	Non-Fatal Injury	2	6.25%
	Property Damage Only	30	93.75%
Initial Impact Type	Angle	4	12.50%
	Rear end	3	9.38%
	Sideswipe	7	21.88%
	Turning Movement	3	9.38%
	SMV Unattended Vehicle	14	43.74%
	Other	1	3.12%
Road Surface Condition	Dry	23	71.88%
	Wet	7	21.88%
	Slush	1	3.12%
	Ice	1	3.12%
Pedestrian Involved		0	0.00%
Cyclists Involved		1	0.00%

2.3 Planned Conditions

2.3.1 Changes to the Area Transportation Network

The proposed development is subject to the Richmond Road / Westboro Transportation Implementation Plan as well as TOD principles, both of which promote a shift towards sustainable modes of transportation in the area. These plans are expressed as elements of the Ottawa Pedestrian Plan and the Ottawa Transportation Master Plan.

The City of Ottawa Transportation Plan indicates both Scott Street and Richmond Road within the Study Area will be part of the primary urban cycling network as spine routes. Scott Street is also shown to be part of the cross-town bikeway and Byron Avenue is indicated to be part of the primary urban cycling network as a major pathway. The 2031 Affordable Network indicates a future isolated measure transit priority corridor along Richmond Road through the Study Area and future light rail infrastructure to the north of the Study Area with stops at what are currently the Dominion and Westboro Transitway stations. The Westboro and Dominion LRT Stations are expected to be completed by 2025.

The Ottawa Pedestrian Plan does not require specific plans or changes with respect to pedestrian infrastructure to be implemented in the Study Area.

City of Ottawa staff have indicated that road, sewer and water work is planned for Winona Avenue between Scott Street and north of Richmond Road, with construction planned to begin in 2022. Sidewalks and traffic calming measures, to lower the operating speed to 30km/h, are part of these plans. City staff have been contacted to coordinate with the project however no further information has been provided and it has been indicated that drawings will not be available until summer 2021. Therefore, coordination with this project is not possible at this time and cannot be pursued.

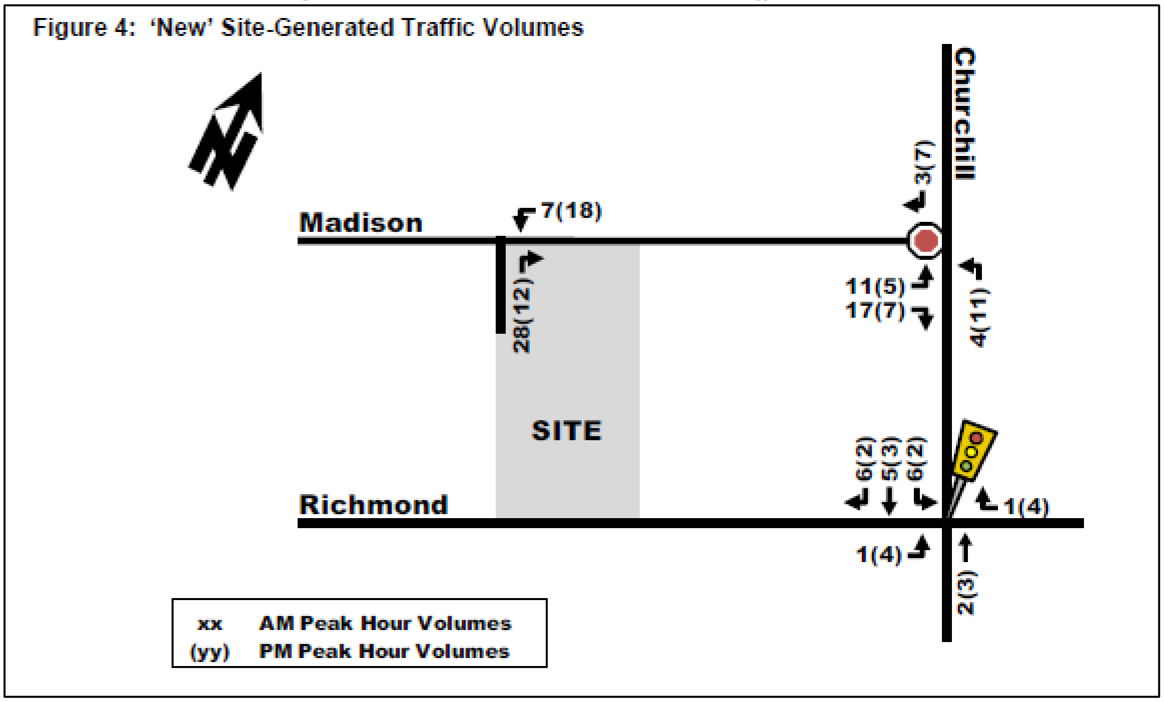
Additionally, City of Ottawa staff have indicated that the intersection of Churchill Avenue and Scott Street is to be converted into a signalized intersection as part of the planned transit detour on Scott Street. This intersection will be fully protected for cyclists and will have a new auxiliary westbound left-turn lane and a new auxiliary northbound right-turn lane. These changes to the intersection are indicated to occur at some time in 2022. As the exact timing in 2022 is unclear, the changes to the intersection of Scott Street and Churchill Avenue are assumed to occur after the proposed development’s build out in 2022 and will be considered at the 2027 future analysis horizon. The intersection geometry will be based on the Scott Street Bus Detour plans shown in Appendix D.

2.3.2 Other Study Area Developments

At the time of this report, a few development applications were available for the adjacent properties as listed on the City’s Development Application Search tool:

- 404 Eden – 13 unit, four-storey low rise residential unit with underground parking made up of nine vehicle parking spaces and nine bicycle parking spaces. The anticipated trip generation is expected to be minimal and therefore have a negligible impact on the surrounding area.
- 348/350 Winona – The City of Ottawa has received Zoning Bylaw Amendment and Site Plan Control applications to facilitate the establishment of a fourth unit in the basement of the two triplexes located at 348 and 350 Winona Avenue. Trip generation is expected to have negligible impacts on the surrounding area.
- 371 Richmond Road– 100-unit, nine storey residential unit. The existing surface parking is to be maintained and provides approximately 30 to 35 vehicle parking spaces. An additional 31 vehicle parking spaces are proposed. No completion date is identified and as such, it is assumed to be built-out by 2022 in order to produce a conservative analysis. The anticipated trip generation from this site can be seen in Figure 9 and is an excerpt from a Transportation Brief for 371 Richmond Road prepared by Parsons in 2014.

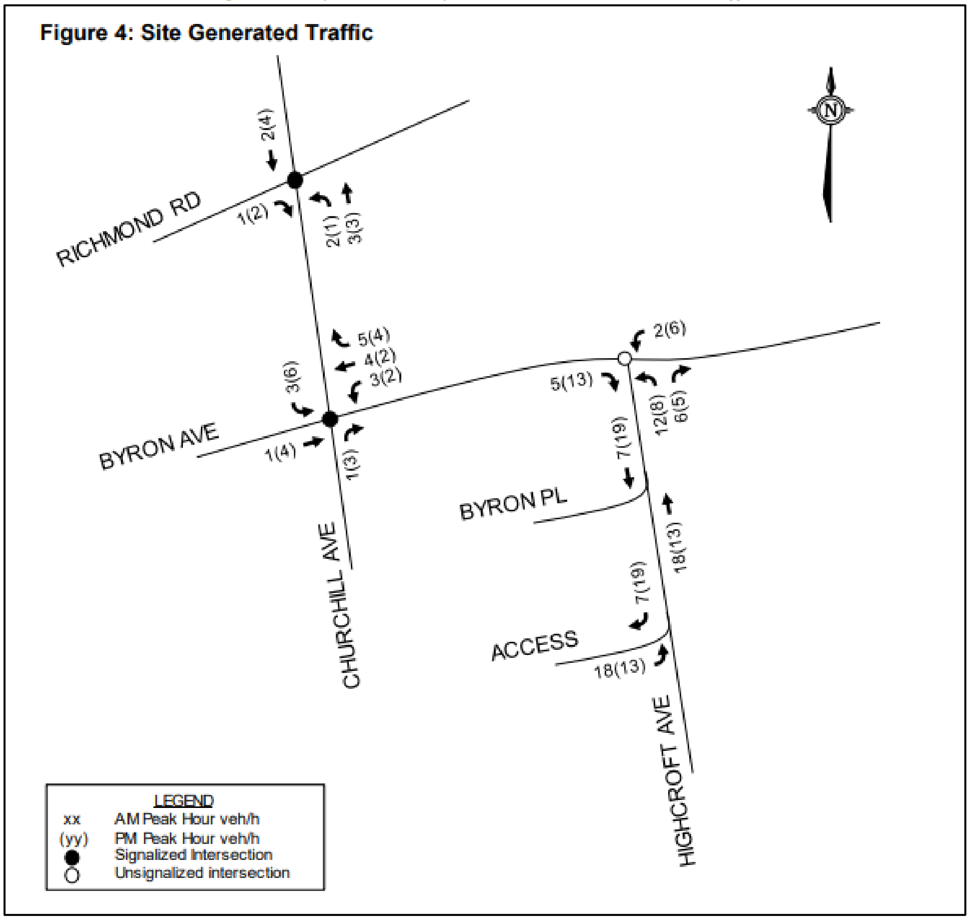
Figure 9: 371 Richmond Road Site-Generated Traffic Volumes



Source: 371 Richmond Road-Transportation Brief. July 2014

- 386 Richmond Road - Eight dwelling unit residential apartment with approximately 200 square metres of retail space. This development is proposed to have no vehicle access and therefore is transit and active mode only. The anticipated trip generation is expected to have a negligible impact on the surrounding area.
- 348 Whitby Avenue/ 364 Churchill Avenue – Expansion of the Westboro Animal Hospital at 364 Churchill Avenue and replacement of the existing dwelling at 348 Whitby Avenue with parking for the Animal hospital. The anticipated trip generation is expected to have a negligible impact on the surrounding area.
- 433-435 Churchill Avenue and 468-472 Byron Place – A six-storey mixed-use development with 76 apartment units, 321 square metres of retail space, 65 indoor vehicle parking spaces, and 45 indoor bicycle parking spaces. Full build-out is expected in 2020. The anticipated trip generation can be seen in Figure 10 and is an excerpt from the 2019 Byron Place Apartments Transportation Impact Assessment prepared by Novatech.

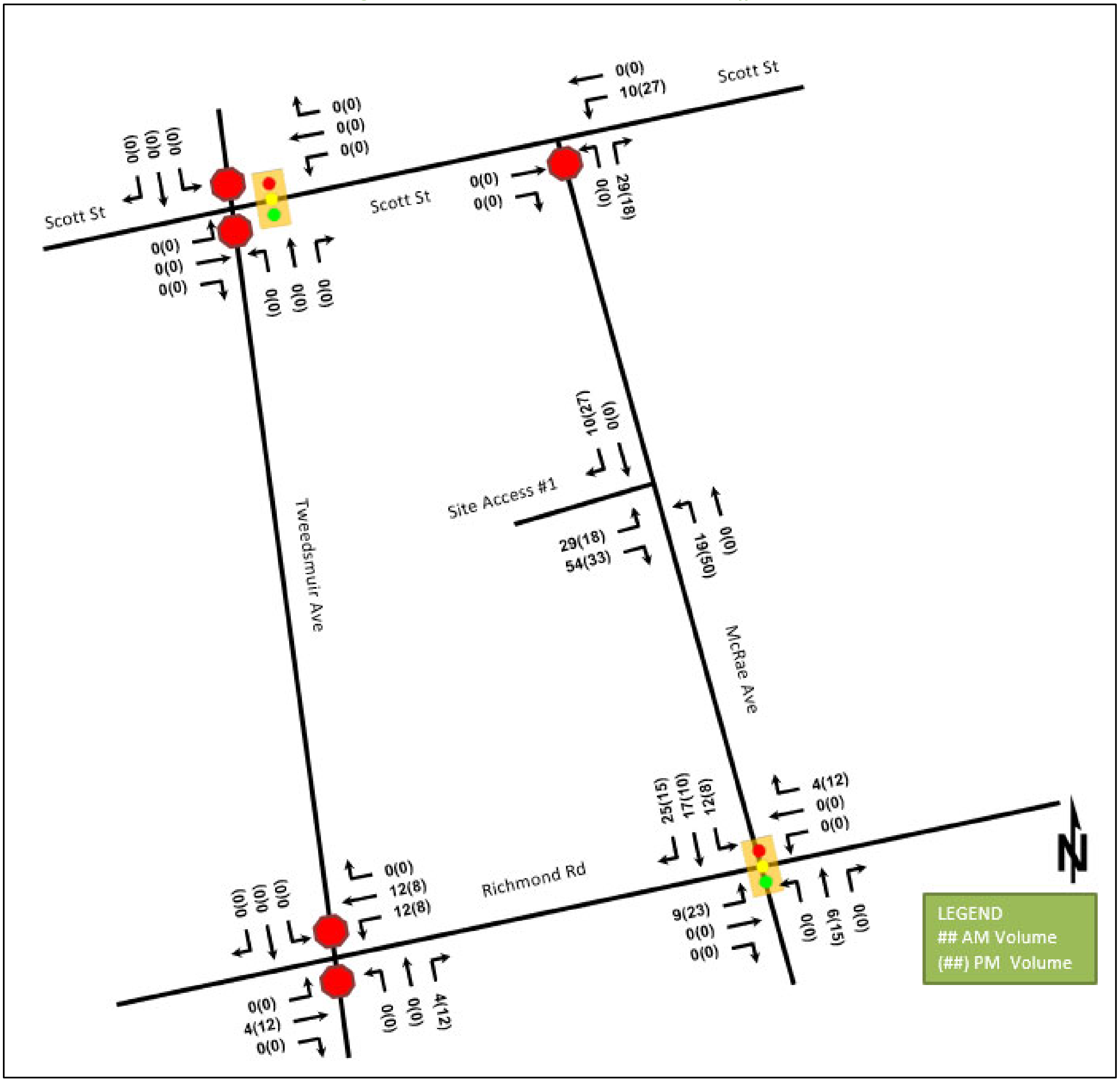
Figure 10: Byron Place Apartments Site Generated Traffic



Source: Byron Place Apartments Transportation Impact Assessment. April 2019

- 320 McRae - The proposed development is made up of a four-storey commercial / residential tower, a commercial / residential tower with both a 26-storey and a six-storey component. The development is expected to have 882 square metres of commercial space, a total of 318 residential units, 181 parking spaces and 163 bicycle parking spaces. 320 McRae is projected to have a similar timeline as the proposed development, however given the uncertainties in a development application, it is unknown if full build-out of this development will occur in 2022. As such, the impact of the site traffic generated by 320 McRae will be considered in the 2027 future horizon only. The anticipated trip generation can be seen in Figure 11 and is an excerpt from the 320 McRae Transportation Impact Study prepared by CGH Transportation.

Figure 11: 320 McRae Avenue Site Generated Traffic



Source: 320 McRae Transportation Impact Study. March 2020

3 Study Area and Time Periods

3.1 Study Area

The Study Area will include the intersections of Scott Street and Churchill Avenue, Richmond Road and Churchill Avenue, Byron Avenue and Churchill Avenue, Roosevelt Avenue and Richmond Road, and Athlone Avenue and Richmond Road. Churchill Avenue, Richmond Road and Winona Avenue are noted as the boundary roads for the site.

3.2 Time Periods

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

3.3 Horizon Years

The anticipated build-out year is 2022. As a result, the full build-out plus five years horizon year is 2027.

4 Exemption Review

Table 9 summarizes the exemptions for this TIA.

Table 9: Exemption Review

Module	Element	Explanation	Exempt/Required
Design Review Component			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	Required
	4.2.3 New Street Networks	Only required for plans of subdivision	Exempt
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	Required
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	To be examined further once the parking plan and land uses are finalized.
Network Impact Component			
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 Trip Generation and Mode Shares

This TIA has been prepared using the vehicle and person trip rates for the residential components using the TRANS Trip Generation Study Report (2009) and the vehicle trip rates for the retail components using the ITE Trip Generation Manual (10^{th} Edition). To estimate person trip generation for the retail components, a factor of 1.28 has been applied to the ITE rates. Table 10 summarizes the person trip rates for the proposed land uses.

Table 10: Trip Generation Person Trip Rates

Dwelling Type	Land Use Code	Peak Hour	Vehicle Trip Rate	Person Trip Rates
Mid-rise Apartments	223 (TRANS)	AM	0.24	0.65
		PM	0.28	0.70
Shopping Centre	820	AM	0.94	1.2
		PM	3.81	4.88

Using the above Person Trip rates, the total person trip generation has been estimated. Table 11 below illustrates the total person trip generation by dwelling type.

Table 11: Total Person Trip Generation

Land Use	Units / GFA	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Mid-Rise Apartments	184 units	29	91	120	80	49	129
Shopping Centre	18, 685 sq.ft	14	8	22	44	47	91
	Total Person Trips	**43**	**99**	**142**	**124**	**96**	**220**

Using the most recent National Capital Region Origin-Destination (OD Survey), the existing mode shares for Ottawa West have been summarized in Table 12. As the site is located within a TOD area, the mode share assumptions for developments in proximity to transit stations is included and will be used to generate the site trips for the proposed mixed-use building.

Table 12: Mode Share

Travel Mode	Ottawa West	TOD Mode Share
Auto Driver	50%	15%
Auto Passenger	15%	5%
Transit	20%	65%
Cycling	5%	5%
Walking	10%	10%
Total	100%	100%

Internal capture rates from the ITE Trip Generation Handbook 3^{rd} Edition have been assigned to the development for the retail components for mixed-use developments. The retail portion of this development is the smaller of the two land uses. Therefore, the residential land use is treated as the anchor for this development and is not reduced based on the multi-use capture rate. The smaller portion of the development, the retail portion, has been reduced to reflect residents of the site utilizing the on-site retail instead of leaving the site and/or as a pass-by trip on the way to an ultimate destination (ie. work). The rates summarized in Table 13 represent the percentage of trips to/from the retail uses based on the residential component. Table 14 shows the resulting reduction in retail generated trips using the internal capture rates displayed in Table 13.

Table 13: Internal Capture Rates

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

Table 14: Internal Capture Volumes

Land Use	AM		PM	
	In	Out	In	Out
Retail Person Generated Site Volumes	8	22	47	91
Internal Capture Rates	17%	14%	10%	26%
Internal Capture	-2	-1	-4	-12

Using the total person trips calculated in Table 11 and the internal capture volume reductions shown in Table 14, the net new person trips have been calculated and are shown in Table 15.

Table 15: Net New Person Trips

Travel Mode	Mode Share	In	Out	Total	In	Out	Total
Total Person Trips		**43**	**99**	**142**	**124**	**96**	**220**
Internal Capture		-2	-1	-3	-4	-12	-16
Net New Total Person Trips		41	98	139	120	84	204

Using the above mode shares and person trip rates, the net new person trips by mode have been projected. Table 16 summarizes the resulting trip generation by mode.

Table 16: Trip Generation by Mode

Travel Mode	Mode Share	In	Out	Total	In	Out	Total
Auto Driver	15%	6	15	21	18	12	30
Auto Passenger	5%	2	5	7	6	4	10
Transit	65%	27	63	90	78	56	134
Non-Auto Modes	5%	2	5	7	6	4	10
Walking	10%	4	10	14	12	8	20
Total	100%	41	98	139	120	84	204

As shown above, 21 AM and 30 PM new peak hour two-way vehicle trips are projected as a result of the proposed development.

5.2 Trip Distribution

To understand the travel patterns of the subject development, the OD survey has been reviewed to determine the existing travel patterns that will be applied to the new vehicle trips. Table 17 below summarizes the distribution for Ottawa West.

Table 17: OD Survey Existing Mode Share - Ottawa West

To/From	% of Trips
North	15%
South	35%
East	35%
West	15%
Total	100%

5.3 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. No trips have been assigned to the loading access on Winona Avenue as this access will be used only during off-peak hours. Figure 12 illustrates the new site traffic assignment by percentage and Figure 13 illustrates the new site generated volumes.

Figure 12: New Site Generation Assignment (%)

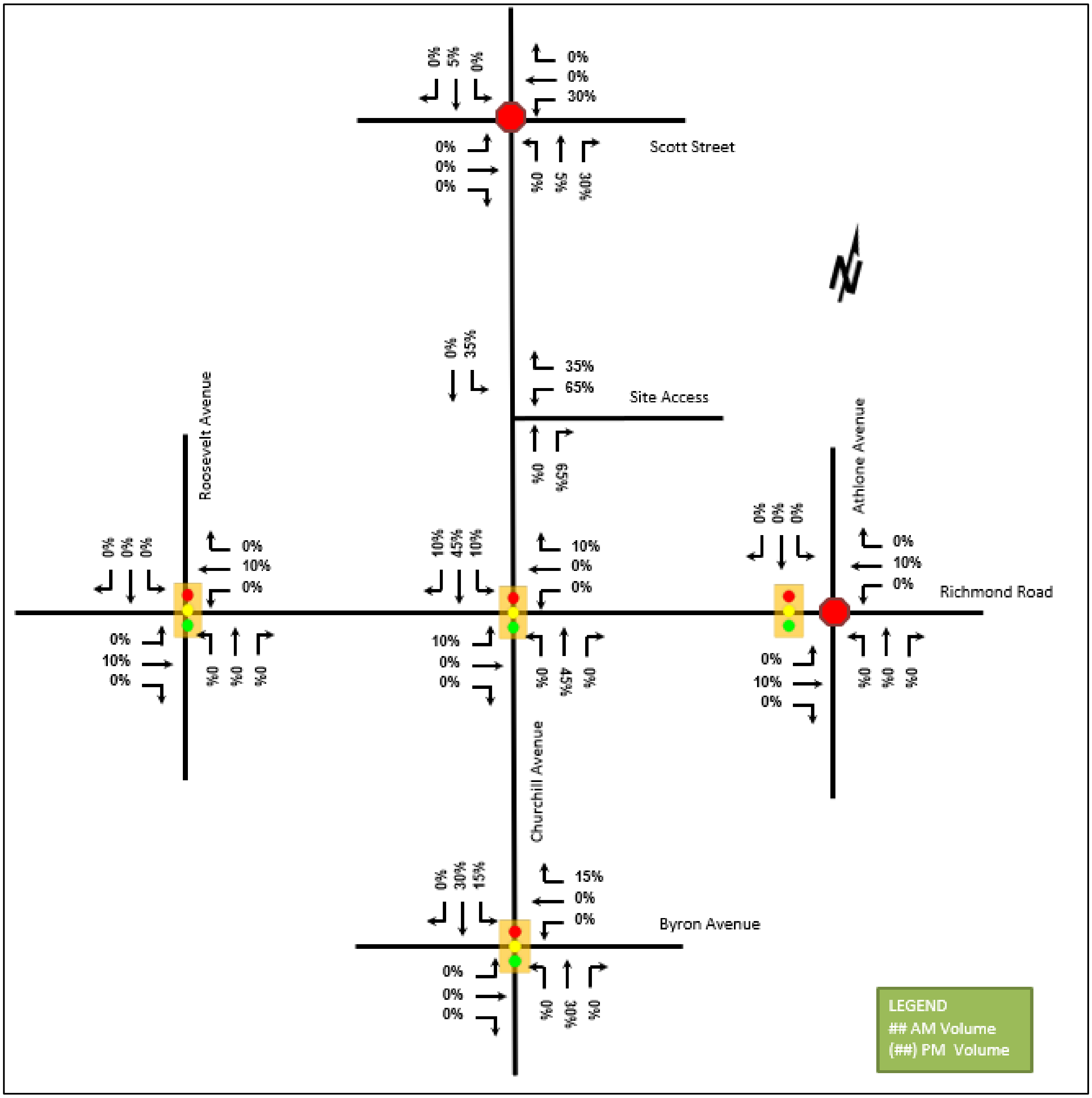
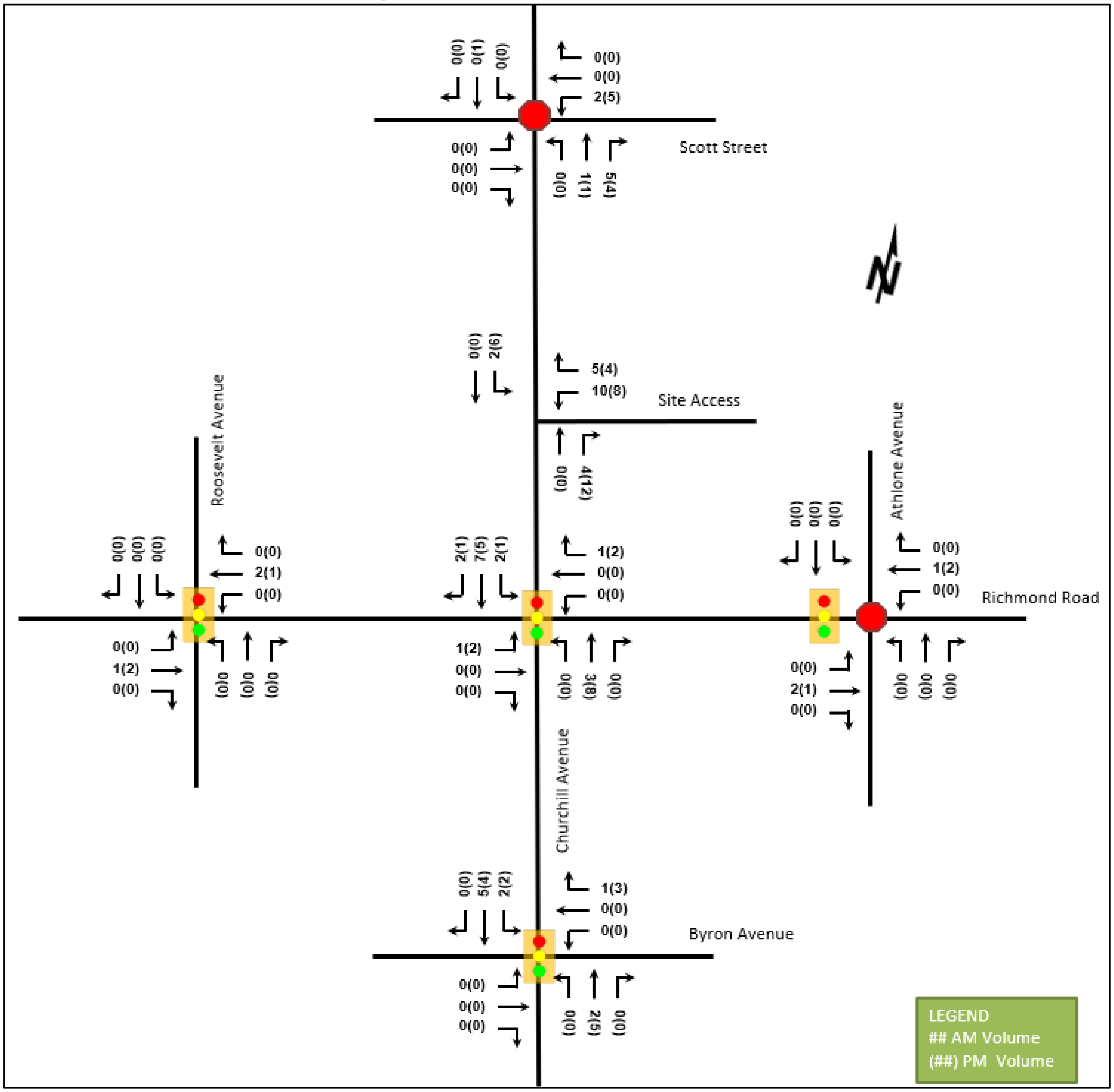


Figure 13: New Site Generation Auto Volumes



6 Background Network Travel Demands

6.1 Transportation Network Plans

The transportation network plans were discussed in Section 2.3.1. Both TOD policies and the opening of the Westboro LRT station and Dominion LRT station have been accounted for within the modal share assumptions. No road improvements are noted for this area with the exception of future road sewer, and water work along Winona Avenue.

The additional connectivity provided by future bicycle spine routes along Scott Street as part of the crosstown bikeway will improve the active mode network but is not anticipated to significantly impact the modal shares used in the future trip generation.

6.2 Background Growth and Other Developments

As stated in 2.2.7, using the AM and PM peak period intersection growth rate maps provided by the City of Ottawa, a net 0% growth rate can be seen within the Study Area and as a result, an annual background growth of 0% has been used.

The background developments explicitly considered in the background conditions include the 320 McRae Avenue development, the 371 Churchill development, and the Byron Place development. All of these developments are discussed in Section 2.3.2.

Figure 14 illustrates the 2022 background volumes and Figure 15 illustrates the 2027 background volumes

Figure 14: Background 2022 Volumes

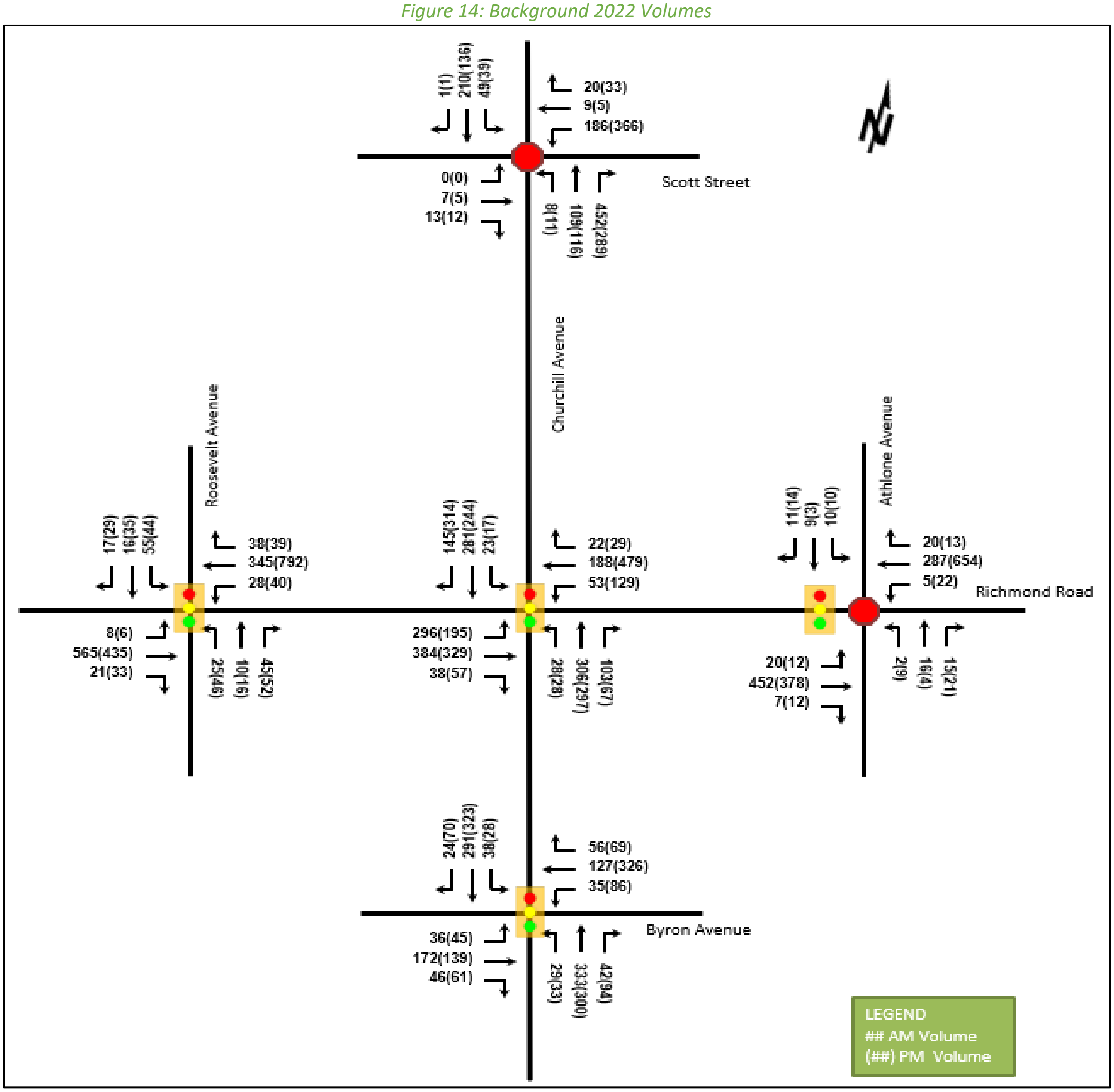
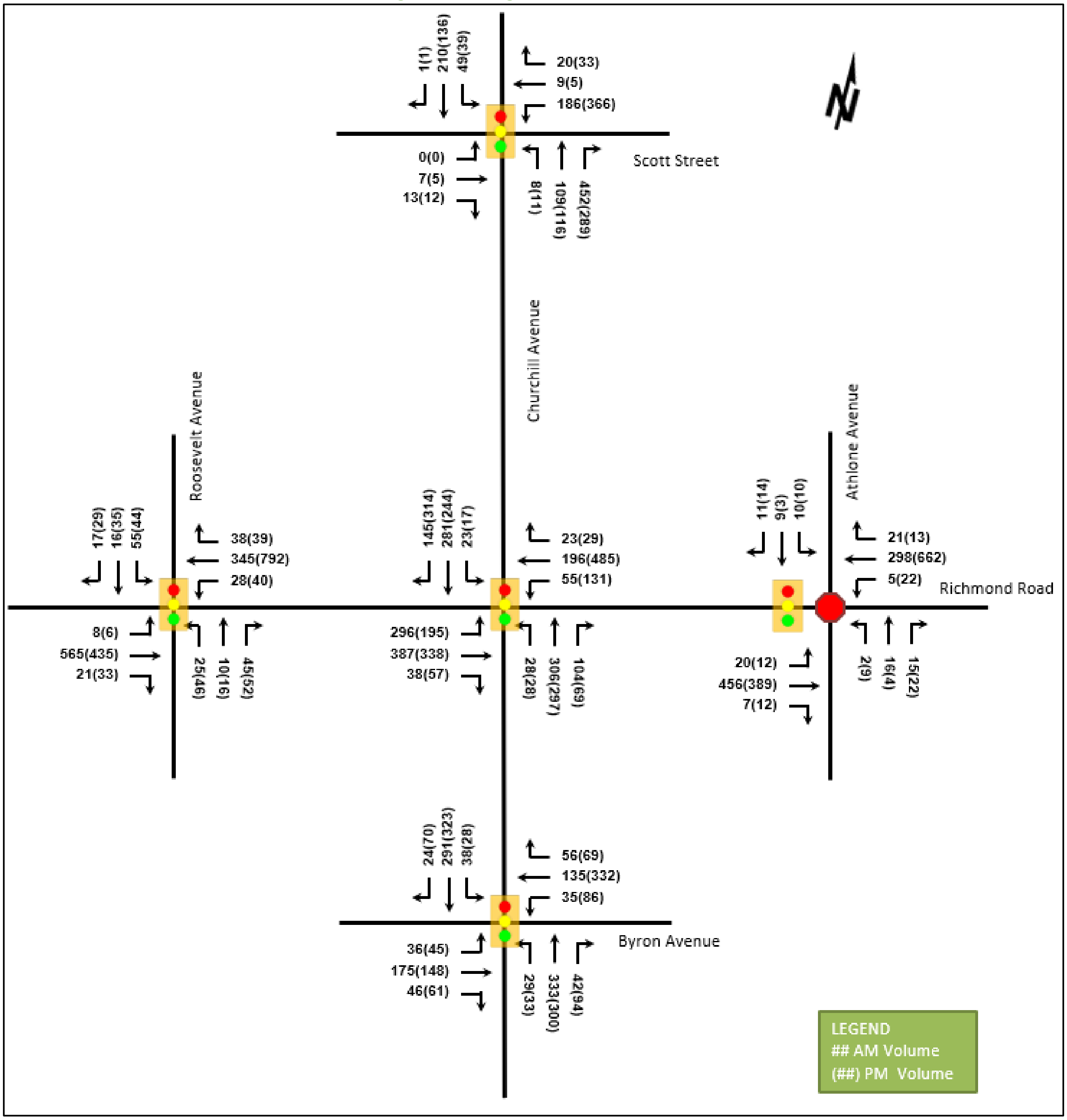


Figure 15: Background 2027 Volumes



7 Demand Rationalization

As documented in Section 16.2.1, the existing intersections within the Study Area are operating well and have additional capacity. Changes in traffic volumes between existing and future conditions will come from 320 McRae Avenue, 371 Richmond Road, the Byron Place development and the proposed development within this report.

The trip generation of this development is consistent with expected TOD modal shares as can be seen in Section 5.1. These TOD mode shares will be supported by the TDM measures recommended in Section 8.1 and Section 12 below. While the proposed development is not directly adjacent to the Westboro LRT Station or the Dominion

LRT Station, the urban arterial mainstreet context promotes transit, pedestrian, and cycling connections between the development and these LRT stations. As such, the TOD modal shares are anticipated to be achieved and no adjustments are required. However, in the event that the TOD mode shares are not fully realized, it can be seen that in Section 16.2, additional capacity at the Study Area intersections is available to accommodate this.

The future total 2022 volumes are illustrated in Figure 16 and the future total 2027 volumes are illustrated in Figure 17.

Figure 16: Future Total 2022 Volumes

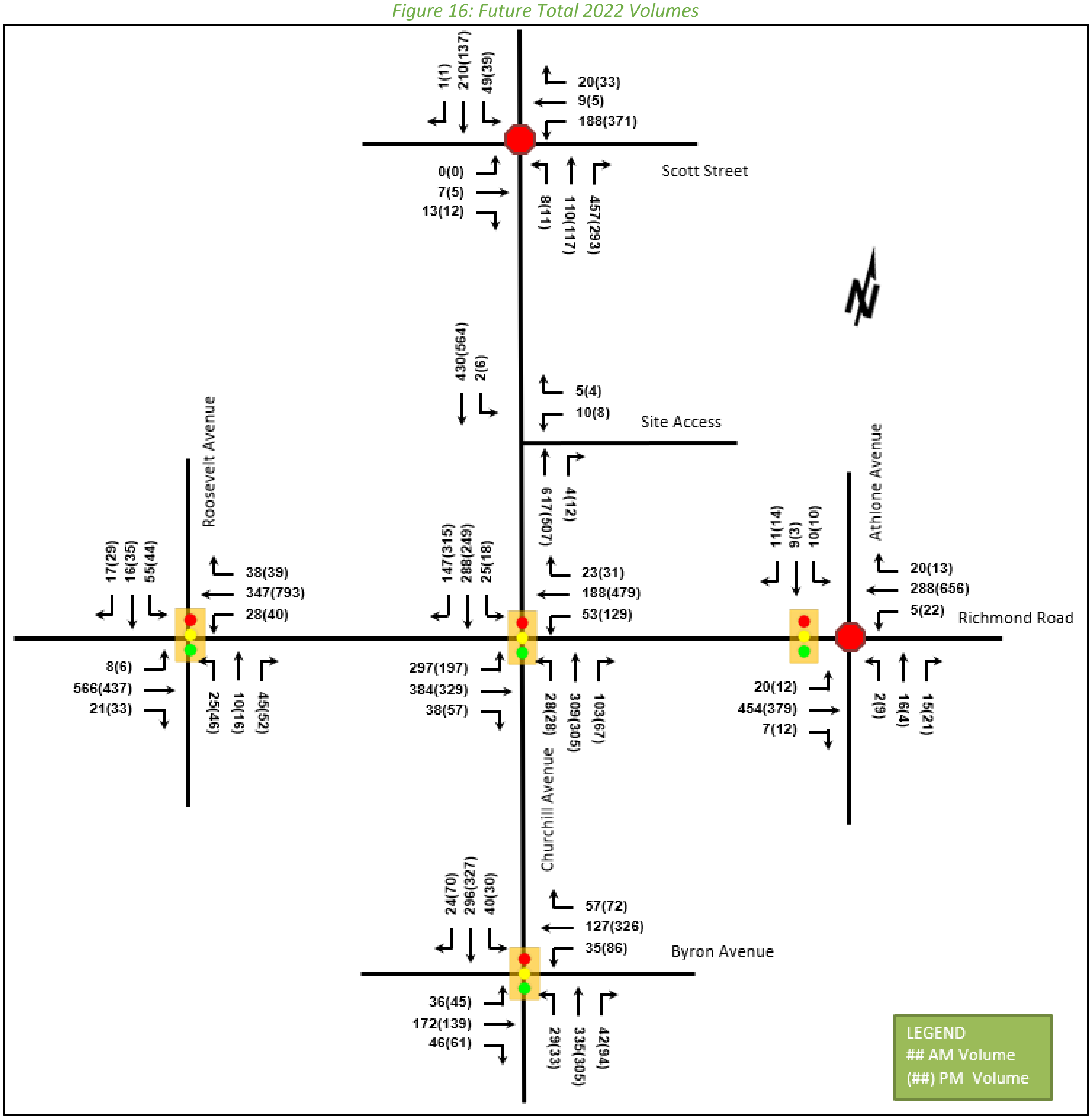
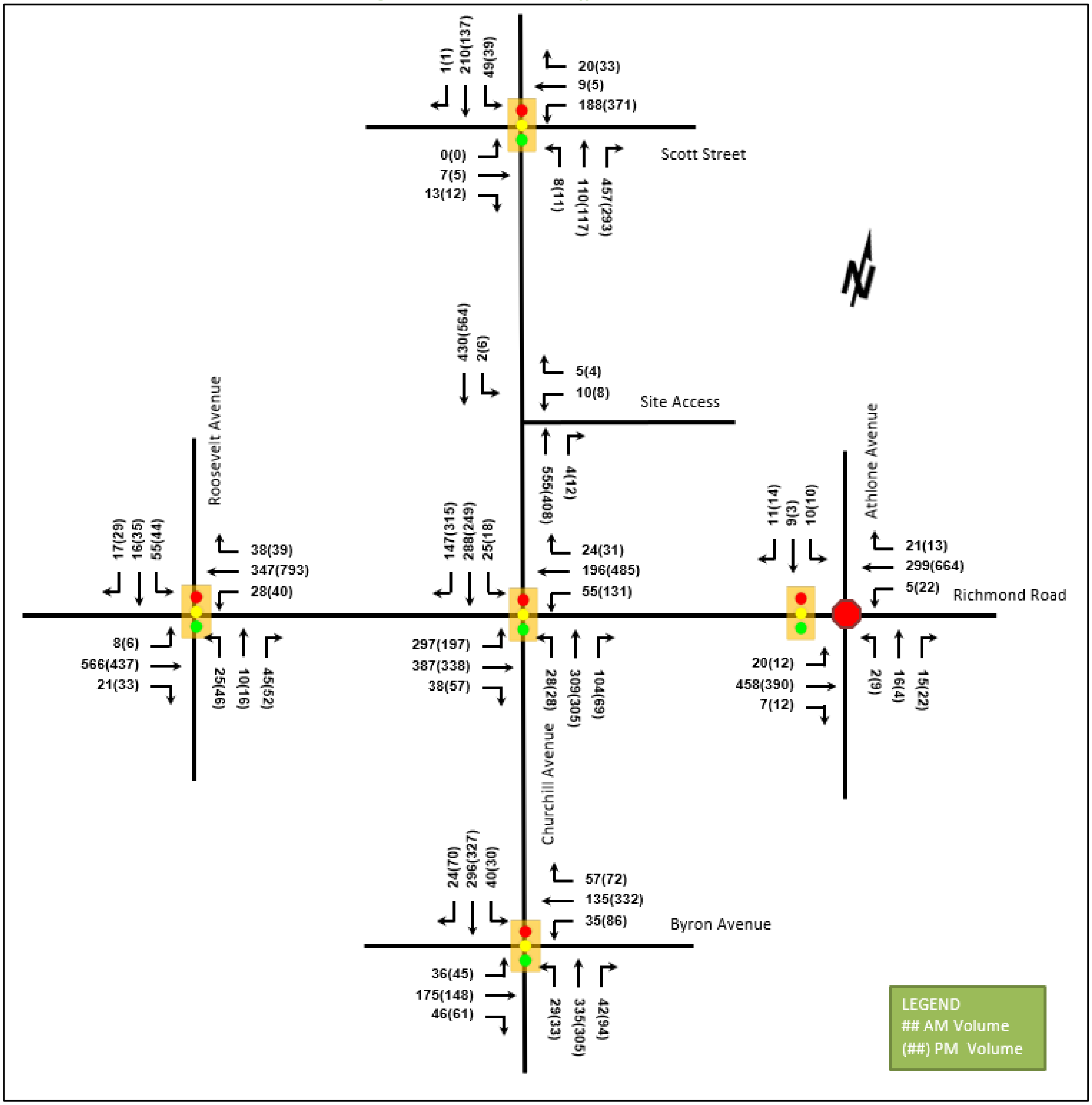


Figure 17: Future Total Traffic 2027 Volumes



8 Development Design

8.1 Design for Sustainable Modes

The proposed development is a nine-storey apartment building with ground floor retail space. Underground parking is provided for automobiles. A ground floor bike storage area is provided for residential bicycle parking spaces. Exterior retail bicycle parking spaces are provided on the south side of the site between the entrance to the Retail A block and the residential lobby entrance as well as on the east side of the building. These exterior bicycle parking spaces are visible from Winona Avenue and Richmond Road.

The proposed development fronts directly onto pedestrian facilities provided on Richmond Road, Churchill Avenue, and Winona Avenue. These pedestrian facilities provide access to the surrounding Study Area, the many existing transit stops adjacent to and surrounding the proposed development, and the future Dominion and Westboro LRT Stations approximately 550m northwest and 450m northeast, respectively.

Additionally, facilities that are supportive of sustainable modes in the City of Ottawa's TDM-supportive Development Design and Infrastructure Checklist, which are required for zoning and standard site design, will be implemented. The following additional measures will also be implemented:

- Locate building close to the street, and do not locate parking areas between the street and building entrances.
- Locate building entrances in order to minimize walking distances to sidewalks and transit facilities.
- Locate building doors and entrances to ensure visibility of pedestrians from the building.
- Provide safe, direct, and attractive walking routes from the building entrances to nearby transit stops.
- Ensure that walking routes to transit stops are secure, visible, and lighted wherever possible.
- Provide wayfinding signage for site access and egress.
- Provide lighting, landscaping, and benches along walking and cycling routes between building entrances and streets, sidewalks and trails.
- Provide a permanent bike repair station for resident/private use only.
- Separate short-term and long-term parking areas using signage or physical barriers.

TDM Checklists for both residential and non-residential land uses can be found in Appendix E.

8.2 Circulation and Access

The site access on Churchill Avenue will accommodate passenger vehicles accessing the underground parking facilities. The other site access, located on Winona Avenue, is a loading entrance only and will be designated for loading vehicle and garbage truck use only. Turning templates for the loading access can be found in Appendix F.

8.3 New Street Networks

This TIA is exempt from this Module (see Table 9).

9 Parking

9.1 Parking Supply

The parking requirements and provisions for the proposed development are summarized in Table 18.

Table 18: Parking Provisions

<table>
<tr><th>Land Use</th><th>Parking Rate</th><th>Parking Required</th><th>Parking Provided</th></tr>
<tr><td rowspan="2">Residential</td><td>0.5 spaces/unit after 12 units</td><td>86</td><td rowspan="5">131</td></tr>
<tr><td>-10% (Section 101(6)(c) of Zoning By-law)</td><td>-9</td></tr>
<tr><td>Visitor</td><td>0.1 spaces / unit excluding the first 12 units</td><td>17</td></tr>
<tr><td>Commercial</td><td>1.25 spaces/100m^2 for units with GFA > 500 m^2</td><td>0</td></tr>
<tr><td colspan="2">Total Vehicle Parking</td><td>94</td></tr>
<tr><td>Residential (bicycle)</td><td>0.5 spaces/dwelling unit</td><td>92</td><td rowspan="3">98</td></tr>
<tr><td>Commercial (bicycle)</td><td>1 space/250m^2 GFA</td><td>6</td></tr>
<tr><td colspan="2">Total Bicycle Parking</td><td>98</td></tr>
</table>

Despite the assumption that the Westboro and Dominion LRT Stations will be completed and that the surrounding area is operating as a TOD area, the proposed development's parking provisions have been applied based on the existing area zoning. As such, minimum residential and retail parking rates have been considered in comparison to a TOD area where no minimum automobile parking space requirements apply, with the exception of residential visitor parking.

Based on the City of Ottawa Zoning By-laws, a total of 77 residential automobile parking spaces are required as a minimum, and 17 residential visitor vehicle parking spaces are required.

An 85% efficiency rate has been assumed for the overall retail GFA values indicated on the site plan, to be used for parking requirement calculations. As such vehicle commercial parking requirements are determined using a GFA of 472.6 m^2, 567.8m^2, and 435.1m^2, for Retail A, Retail B, and Retail C, respectively. No commercial vehicle parking is required for Retail A or Retail C as vehicle parking spaces are not required for commercial / retail uses with a GFA less than 500 m^2. A reduction of parking to zero spaces for Retail B is being sought given the site context (within 600 metres to the future Westboro and Dominion LRT Stations, access to frequent transit service on Richmond Road, walkable/pedestrian-oriented neighbourhood) and the TDM measures discussed in Sections 8.1, and 12.

As can be seen in Table 18, the required parking space provisions for automobile parking are met in excess of 37 spaces.

A total of 92 residential bicycle parking spaces and 6 commercial bicycle parking spaces are required. As can be seen in Table 18, the required parking space provisions for bicycle parking have been met. It is noted that of the 98 bicycle parking spaces provided, the six commercial spaces will be exterior spaces and the 92 residential spaces will be located within the ground floor bike storage area.

9.2 Spillover Parking

Parking demand is not considered an issue as a result of the application of TOD principles as well as low vehicle traffic demand. Additionally, as reducing parking forms a key part of TDM strategy this module is not applicable in this TIA.

10 Boundary Street Design

Churchill Avenue, Richmond Road and Winona Avenue are noted as the boundary roads for the site in both the 2022 and 2027 future horizons. None of the boundary roads are considered Complete Streets and no plans currently exist to upgrade them to a Complete Street. While road, sewer, and water work is anticipated along Winona Avenue in three to five years, detailed plans on resulting changes to the roadway are not yet available and as such, existing conditions have been assumed in future horizons for the purpose of this analysis.

The Segment Multi-Modal Level of Service (MMLOS) is broken down into the Pedestrian Level of Service (PLOS), Bicycle Level of Service (BLOS), Transit Level of Service (TLOS) and Truck Level of Service (TkLOS) and are all recorded in Table 19. The MMLOS Worksheets can be found in Appendix G.

Table 19:Boundary Street MMLOS

Road Segment	Horizon	MMLOS							
		PLOS		BLOS		TLOS		TkLOS	
		Actual	Target	Actual	Target	Actual	Target	Actual	Target
Richmond Road	Existing 2022 2027	**D**	A	**E**	C	**F**	D	**F**	D
Churchill Avenue	Existing 2022 2027	**D**	A	**E**	B	E	N/A	B	D
Winona Avenue	Existing 2022 2027	**B**	A	D	D	N/A	N/A	N/A	N/A

As the Study Area is considered to be a TOD area for all horizons and no changes to the boundary road segments are planned within the study horizons, the existing and future horizons are the same.

The road segment of Richmond Road will not meet its pedestrian LOS target due to small boulevard widths and high vehicle operating speeds and will not meet its bicycle LOS targets due to mixed traffic conditions. Richmond Road will not meet its transit LOS target due to mixed traffic conditions, multiple driveway locations, and on-street parking. Richmond Road will not meet its target truck LOS due to low truck lane widths.

The road segment of Churchill Avenue will not meet its pedestrian LOS target due to small boulevard widths and high vehicle operating speeds and will not meet its bicycle LOS targets due to mixed traffic conditions. Richmond Road will meet its target truck LOS. As Churchill Avenue is not subject to any transit priority measures, no transit target LOS is available.

The road segment of Winona Avenue will not meet its pedestrian LOS target due to small boulevard widths but will meet its bicycle LOS targets. As Winona Avenue is not part of a truck route, no truck LOS has been evaluated. Additionally, as Winona Avenue is not subject to any transit priority measures, no transit target LOS is available.

Future network plans mentioned in both Section 2.3.1 and Section 6.1 are anticipated to increase connectivity and improve the active mode network within the Study Area. These changes have the potential to improve the MMLOS of the boundary streets.

11 Access Intersection Design

11.1 Location and Design of Access

The site is proposed to have two accesses; one of which is a full movement access on Churchill Avenue approximately 65 metres north of the Churchill Avenue / Richmond Road intersection (measured from access centreline to intersection centre). The second access is located on Winona Avenue approximately 50 metres north of the Winona Avenue / Richmond Road intersection (measured from access centreline to intersection centre) and is a loading entrance only with access solely to loading aisles

City of Ottawa staff have requested further information regarding the access width, clear throat length, access grade, and location of any parking gates. A summary of the requested information is shown in Table 20. The access width has been measured at the property line and the clear throat length has been measured beginning at the property line.

Table 20: Requested Access Design Parameter Information

Design Parameter	Churchill Avenue Access	Winona Avenue Access
Access Width	6.3m	7.0m
Clear Throat Length	24.3m	35.0m
Access Grade	10%-15%	-
Parking Gate	Yes – approx. 7.6m from property line	-

Further details on the access ramp are shown in the ramp profile in Appendix H.

11.2 Intersection Control

Based on the projected volumes, Site Access #1 will have stop-control on the minor approach for both future total horizons. No further traffic control is warranted to address operational issues. The signalization warrant for Site Access #1 in the 2027 future total scenario can be found in Appendix I.

11.3 Intersection Design

Left-turn lane warrants for unsignalized intersections were examined at Site Access #1 for both 2022 and 2027 total future horizons using the MTO Geometric Design Standards for Ontario Highways, Section E. A southbound left-turn lane was found to be warranted for both future total horizons. The left-turn lane warrant nomographs can be found in Appendix J.

The southbound left-turn volumes in the 2027 future total horizon are considered to be minimal at 2 vehicles in the AM peak period and 6 vehicles in the PM peak period. Additionally, a low left-turn % of <1% in the AM peak period and 1% in the PM peak period are shown in the left-turn warrant and as such, the left-turn can be assumed to be warranted as a result of the high opposing and advancing volumes. Given the low left-turn volumes, the constrained space, and proximity to nearby intersections, engineering judgment has been used to determine that a left-lane will not be required at Site Access #1.

12 Transportation Demand Management

Transportation Demand Management measures are implemented to encourage the use of non-auto modes of travel. This is aimed at reducing the reliance on single occupant auto trips in the City of Ottawa. The proposed development adheres to the City's TDM principles by facilitating connections to adjacent pedestrian, cycling, and transit facilities. As the proposed development is in a designated Transit-Oriented Development (TOD) zone, a TOD mode share has been used for all study horizons.

The following measures, consistent with the TDM Checklists for both non-residential and residential land uses included in Appendix E, will be implemented to ensure that the travel mode shares meet the TOD targets.

- Designate an internal coordinator, or contract with an external coordinator.
- Provide online links to local area maps with walking/cycling access routes, if available, on the building website.
- Provide online links to OC Transpo information on the building website.
- Offer PRESTO cards preloaded with one monthly transit pass on first round of resident move-in. For reference, the current (December 2020) OC Transpo monthly transit pass is $119.50.
- Unbundle parking cost from monthly rent.
- Provide a multimodal travel option information package to new residents.

13 Neighbourhood Traffic Management

This TIA is exempt from this Module (see Table 9).

14 Transit

In Section 5.1 the trip generation by mode was estimated, including the number of transit trips that will be generated by the proposed development. Table 21 summarizes the transit trip generation for both future horizon years of 2022 and 2027.

Table 21: Trip Generation by Transit Mode

Travel Mode	Mode Share	AM Peak Period			PM Peak Period		
		In	Out	Total	In	Out	Total
	65%	27	63	90	78	56	134

The Westboro LRT Station and the Dominion LRT Station are expected to provide adequate transit capacity to support the increase in travel demand by the proposed development.

15 Review of Network Concept

This TIA is exempt from this Module (see Table 9).

16 Intersection Design

16.1 Intersection Control

The intersection method of control will remain consistent with existing methods of control for all Study Area intersections at both future horizons. The exception to this is the intersection of Scott Street and Churchill Avenue, as it will be signalized following the proposed development's buildout. As such, this intersection will be analyzed as a signalized intersection in the 2027 future horizons.

16.2 Intersection Design

To understand the intersection design, an MMLOS analysis of existing, 2022 future horizon, and 2027 future horizon demands is required. The existing and future segment MMLOS has been discussed in Section 10. The following sections will discuss the vehicle LOS at Study Area intersections which is based on the HCM criteria for average delay at unsignalized intersections. At signalized intersections, the level of service for individual movements is based on the V/C ratio as required by the City of Ottawa and HCM 2000 v/c calculations for the overall intersection. Heavy Vehicle Percentages (HV%) have been calculated for each movement based on the intersection counts discussed in Section 2.2.7. These HV% calculations have been included in Appendix K.

As part of the Step 2 review process, comments were received from the City of Ottawa's Transportation Project Manager. The first comment regarding the intersection of Richmond Road and Churchill Avenue requested the lane configuration for the northbound and southbound movements be adjusted to reflect observed conditions. These changes have been made and the northbound and southbound approaches both consist of a shared left-turn / through lane and a shared through / right-turn lane. Another comment expressed a safety concern regarding existing queues extending past the site access, however with the new lane configuration implemented this is no longer valid as the queues have been reduced for all horizons. Additionally, in congested situations during the peak periods, a significant number of collisions are not expected due to the slower vehicle speeds and therefore the comment regarding concern over the left out/left in movements at the site access are not applicable. Step 2 comments from the City of Ottawa can be found in Appendix L.

As part of the Step 3 review process, comments were received from the City of Ottawa's Transportation Project Manager. Further correspondence with City of Ottawa staff regarding these comments has indicated that at the intersection of Richmond Road and Churchill Avenue, it is not necessary to model the advanced pedestrian walk phase in the east-west directions as the timing card notes that "For the east-west direction, there is a straight through green arrow displayed during the 5 second advanced walk interval. After this 5 seconds, the green arrow changes to a green ball." In order to maintain a conservative analysis, an east-west advanced pedestrian walk phase has been modelled below. This shortens the eastbound through split time by five seconds. Should this movement breakdown in future scenarios, the east-west advanced pedestrian walk phase will not be modelled. Discussion with the City of Ottawa regarding the intersection signal timing from the Step 3 review process can be found in Appendix M.

The intersection of Richmond Road and Athlone Avenue is made up of a two-way stop-controlled intersection with stop control of the north and south legs and a signalized pedestrian crossing directly to the west on Richmond Road. The limitations of Synchro are such that the intersection is required to be modelled as two intersections as close to one another as is allowable in Synchro. This approach was confirmed by the City of Ottawa for another similar situation at the intersection of Scott Street and Tweedsmuir Avenue.

This will be followed by a discussion of the intersection MMLOS for other modes.

16.2.1 Existing Conditions

The existing intersection volumes have been analyzed to establish a baseline condition and determine the impact of the subject development on the Study Area road network. Table 22 summarizes the operational analysis of the 2019 existing conditions. Appendix N contains the 2019 Existing Conditions Synchro sheets.

Table 22: Existing Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Churchill Avenue & Richmond Road ***Signalized***	EBL	A	15	0.60	46	B	20	0.67	#29
	EBT/R	A	14	0.57	77	A	13	0.53	63
	WBL	A	24	0.24	17	A	25	0.48	35
	WBT/R	A	25	0.49	50	E	46	0.91	#155
	NBL/T/R	C	24	0.72	26	B	27	0.71	m35
	SBL/T/R	B	26	0.69	39	C	22	0.77	47
	Overall	**C**	**21**	**0.71**	**-**	**D**	**27**	**0.85**	**-**
Roosevelt Avenue & Richmond Road ***Signalized***	EBL/T/R	B	12	0.65	#114	A	9	0.48	70
	WBL/T/R	A	9	0.46	54	E	17	0.91	#253
	NBL/T/R	A	23	0.28	15	A	31	0.41	28
	SBL/T/R	A	23	0.27	21	A	30	0.37	30
	Overall	**B**	**12**	**0.65**	**-**	**E**	**16**	**0.93**	**-**
Athlone Avenue & Richmond Road ***Unsignalized***	EBL/T/R	A	8	0.02	<1	A	9	0.02	<1
	WBL/T/R	A	9	0.01	<1	A	8	0.02	1
	NBL/T/R	C	19	0.12	3	C	20	0.14	4
	SBL/T/R	C	19	0.12	3	C	24	0.14	4
Richmond Road & Pedestrian Crossing ***Signalized***	EBT	A	13	0.60	66	A	12	0.51	52
	WBT	A	10	0.38	36	D	25	0.86	#139
	Overall	**A**	**12**	**0.40**	**-**	**A**	**20**	**0.56**	**-**
Churchill Avenue & Scott Street ***Unsignalized***	EBL/T/R	A	10	0.04	1	A	10	0.04	1
	WBL/T/R	B	14	0.42	16	C	25	0.75	49
	NBL/T/R	D	27	0.83	72	C	24	0.77	54
	SBL/T/R	B	14	0.46	18	B	13	0.37	13
Churchill Avenue & Byron Avenue ***Signalized***	EBL/T/R	B	30	0.68	55	A	21	0.53	51
	WBL/T/R	A	29	0.59	45	D	36	0.86	#144
	NBL	A	6	0.05	7	A	15	0.08	10
	NBT/R	A	10	0.44	65	A	21	0.60	87
	SBL	A	2	0.08	m3	A	7	0.10	m5
	SBT/R	A	1	0.37	24	A	4	0.60	m63
	Overall	**A**	**15**	**0.54**	**-**	**C**	**21**	**0.77**	**-**
Notes:	Saturation flow rate of 1800 veh/h/lane								
	PHF = 0.90								
	# indicates the volume for the 95th percentile cycle exceeds capacity								
	m indicates the volume for the 95th percentile queue is metered by an upstream signal								

The existing Study Area intersections operate satisfactorily during the peak hours with a few exceptions:

At the intersection of Churchill Avenue and Richmond Road, the 95th percentile cycle exceeds capacity for the eastbound left-turn and the westbound shares through / right movements in the PM peak. The V/C ratios for these movements are less than one and can therefore be assumed that in practice the 95th percentile queues will rarely be exceeded. The northbound shared left / through / right movements in the PM peak are shown to be metered by an upstream signal.

At the intersection of Roosevelt Avenue and Richmond Road, the 95th percentile cycle exceeds capacity for the eastbound shared left-turn / through / right-turn movements during the AM peak and the westbound shared left-turn / through / right-turn movements during the PM. Given the V/C <1.0, it can be assumed that in practice the 95th percentile queue will rarely be exceeded.

At the pedestrian crossing on Richmond Road, the 95th percentile cycle exceeds capacity for the westbound through movements during the PM peak. Given the V/C <1.0, it can be assumed that in practice the 95th percentile queue will rarely be exceeded.

At the intersection of Churchill Avenue and Byron Avenue, the 95th percentile cycle exceeds capacity for the westbound shared left-turn / through / right-turn movements during the PM peak, however given the V/C <1.0, it can be assumed that in practice the 95th percentile queue will rarely be exceeded. Additionally, the southbound left-turn movement in the AM peak, and the southbound left-turn and the southbound shared through / right-turn movements in the PM peak are shown to be metered by an upstream signal.

16.2.2 2022 Future Background

The 2022 future background intersection volumes and other development traffic has been analyzed to allow a comparison between the future volumes with and without the proposed development. Table 23 summarizes the operational analysis of 2022 future background conditions. Appendix O contains the 2022 Future Background Synchro sheets.

Table 23: 2022 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Churchill Avenue & Richmond Road ***Signalized***	EBL	A	12	0.52	39	A	13	0.53	25
	EBT/R	A	12	0.51	63	A	11	0.46	55
	WBL	A	22	0.20	15	A	22	0.40	31
	WBT/R	A	23	0.43	45	C	33	0.79	#134
	NBL/T/R	B	24	0.68	21	C	28	0.71	m28
	SBL/T/R	B	26	0.68	38	C	21	0.75	41
	Overall	**B**	**20**	**0.63**	**-**	**C**	**23**	**0.77**	**-**
Roosevelt Avenue & Richmond Road ***Signalized***	EBL/T/R	A	11	0.59	80	A	8	0.44	57
	WBL/T/R	A	8	0.42	44	D	15	0.82	#216
	NBL/T/R	A	23	0.25	14	A	30	0.37	24
	SBL/T/R	A	23	0.24	20	A	30	0.34	27
	Overall	**A**	**12**	**0.59**	**-**	**D**	**15**	**0.84**	**-**
Athlone Avenue & Richmond Road ***Unsignalized***	EBL/T/R	A	8	0.02	<1	A	9	0.01	<1
	WBL/T/R	A	9	0.01	<1	A	8	0.02	<1
	NBL/T/R	C	17	0.10	2	C	18	0.11	3
	SBL/T/R	C	17	0.09	2	C	21	0.11	3
Richmond Road & Pedestrian Crossing ***Signalized***	EBT	A	12	0.55	57	A	11	0.46	45
	WBT	A	9	0.34	32	C	20	0.78	#109
	Overall	**A**	**11**	**0.36**	**-**	**A**	**16**	**0.51**	**-**
Churchill Avenue & Scott Street ***Unsignalized***	EBL/T/R	A	10	0.04	1	A	9	0.03	1
	WBL/T/R	B	13	0.37	13	C	18	0.64	34
	NBL/T/R	C	19	0.73	49	C	15	0.59	30
	SBL/T/R	B	12	0.40	14	B	12	0.30	9
Churchill Avenue & Byron Avenue ***Signalized***	EBL/T/R	B	30	0.64	51	A	23	0.50	45
	WBL/T/R	A	29	0.56	42	D	35	0.84	#121
	NBL	A	6	0.04	6	A	11	0.06	9
	NBT/R	A	8	0.39	54	A	17	0.51	76
	SBL	A	1	0.07	m3	A	3	0.07	m5
	SBT/R	A	1	0.33	21	A	2	0.51	m58
	Overall	**A**	**14**	**0.49**	**-**	**B**	**19**	**0.69**	**-**
Notes:	Saturation flow rate of 1800 veh/h/lane								
	PHF = 1.00								
	# indicates the volume for the 95th percentile cycle exceeds capacity								
	m indicates the volume for the 95th percentile queue is metered by an upstream signal								

With the addition of background growth to reflect the 2022 horizon, the existing intersections are anticipated to operate with similar operational characteristics to the existing conditions, and well within the City of Ottawa operational thresholds.

16.2.3 2027 Future Background

The 2027 future background intersection volumes and other development traffic has been analyzed to allow comparison between the future volumes with and without the proposed development.

The intersection of Scott Street and Churchill Avenue has been signalized. Yellow Times, All-red Times, and Flash Don't Walk Times were calculated using the methodology provided in OTM Book 12-Traffic Signals. An overall cycle length of 80 seconds in the AM peak period and 90 seconds in the PM peak period has been used to match the cycle length of Richmond Road and Churchill Avenue to the south. Intersection geometry is based on the Scott

Street Bus Detour plans shown in Appendix D. A storage length of 30 metres and a taper length of 15 metres have been assumed for the northbound right-turn for analysis purposes as these are not shown.

Table 24 summarizes the operational analysis of 2027 future background conditions. Appendix P contains the 2027 Future Background Synchro sheets.

Table 24: 2027 Future Background Intersection Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Churchill Avenue & Richmond Road ***Signalized***	EBL	A	12	0.53	39	A	13	0.53	25
	EBT/R	A	12	0.51	63	A	11	0.47	57
	WBL	A	22	0.21	15	A	22	0.41	32
	WBT/R	A	23	0.45	47	C	33	0.80	#136
	NBL/T/R	B	24	0.69	22	C	28	0.71	m28
	SBL/T/R	B	26	0.68	38	C	21	0.75	41
	Overall	**B**	**20**	**0.64**	**-**	**C**	**23**	**0.77**	**-**
Roosevelt Avenue & Richmond Road ***Signalized***	EBL/T/R	A	11	0.59	80	A	8	0.44	57
	WBL/T/R	A	8	0.42	44	D	14	0.82	#216
	NBL/T/R	A	23	0.25	14	A	30	0.37	24
	SBL/T/R	A	23	0.24	20	A	30	0.34	27
	Overall	**B**	**12**	**0.59**	**-**	**D**	**15**	**0.84**	**-**
Athlone Avenue & Richmond Road ***Unsignalized***	EBL/T/R	A	8	0.02	<1	A	9	0.01	<1
	WBL/T/R	A	9	0.01	<1	A	8	0.02	<1
	NBL/T/R	C	17	0.10	3	C	18	0.11	3
	SBL/T/R	C	18	0.09	2	C	21	0.11	3
Richmond Road & Pedestrian Crossing ***Signalized***	EBT	A	12	0.55	57	A	11	0.46	45
	WBT	A	9	0.34	32	C	20	0.78	#109
	Overall	**A**	**11**	**0.36**	**-**	**A**	**16**	**0.51**	**-**
Churchill Avenue & Scott Street ***Signalized***	EBL/T/R	A	20	0.07	5	A	13	0.03	3
	WBL	A	26	0.52	40	B	21	0.68	70
	WBT/R	A	20	0.10	6	A	14	0.09	5
	NBL/T	A	6	0.12	17	A	11	0.16	27
	NBR	A	12	0.59	13	A	15	0.49	16
	SBL/T/R	A	8	0.30	35	A	11	0.25	37
	Overall	**A**	**13**	**0.45**	**-**	**A**	**16**	**0.54**	**-**
Churchill Avenue & Byron Avenue ***Signalized***	EBL/T/R	B	30	0.65	51	A	22	0.51	47
	WBL/T/R	A	29	0.58	44	D	35	0.84	#124
	NBL	A	6	0.04	6	A	12	0.06	9
	NBT/R	A	8	0.39	54	A	17	0.51	76
	SBL	A	1	0.07	m3	A	3	0.07	m5
	SBT/R	A	1	0.33	22	A	2	0.51	m58
	Overall	**A**	**14**	**0.49**	**-**	**B**	**19**	**0.70**	**-**
Notes:	Saturation flow rate of 1800 veh/h/lane								
	PHF = 1.00								
	# indicates the volume for the 95th percentile cycle exceeds capacity								
	m indicates the volume for the 95th percentile queue is metered by an upstream signal								

With the addition of background growth to reflect the 2027 horizon, the existing intersections are anticipated to operate with similar operational characteristics to the 2022 future background conditions and the 2019 existing conditions, and well within the City of Ottawa operational thresholds. The signalized intersection of Churchill Avenue and Scott Street will operate well with low V/C ratios, delays, and queues.

16.2.4 2022 Future Total

The 2022 total future intersection volumes, including the site generated traffic and other development traffic, have been analyzed to understand the impact of the subject development on the Study Area intersections. Table 25 summarizes the operational analysis of the 2022 future total conditions. Appendix Q contains the 2022 Future Total Synchro Sheets.

Table 25: 2022 Future Total Intersection Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Churchill Avenue & Richmond Road ***Signalized***	EBL	A	12	0.52	39	A	14	0.54	25
	EBT/R	A	12	0.51	63	A	11	0.46	55
	WBL	A	22	0.20	15	A	22	0.40	31
	WBT/R	A	23	0.43	45	C	33	0.80	#134
	NBL/T/R	B	24	0.69	21	C	28	0.71	m29
	SBL/T/R	B	27	0.69	39	C	22	0.76	42
	Overall	**C**	**20**	**0.64**	**-**	**C**	**23**	**0.77**	**-**
Roosevelt Avenue & Richmond Road ***Signalized***	EBL/T/R	A	11	0.59	80	A	8	0.44	58
	WBL/T/R	A	8	0.43	45	D	15	0.82	#216
	NBL/T/R	A	23	0.25	14	A	30	0.37	24
	SBL/T/R	A	23	0.24	20	A	30	0.34	27
	Overall	**A**	**12**	**0.59**	**-**	**D**	**15**	**0.84**	**-**
Athlone Avenue & Richmond Road ***Unsignalized***	EBL/T/R	A	8	0.02	<1	A	9	0.01	<1
	WBL/T/R	A	9	0.01	<1	A	8	0.02	<1
	NBL/T/R	C	17	0.10	2	C	18	0.11	3
	SBL/T/R	C	17	0.09	2	C	21	0.11	3
Richmond Road & Pedestrian Crossing ***Signalized***	EBT	A	12	0.55	57	A	8	0.35	45
	WBT	A	9	0.35	32	A	12	0.59	#109
	Overall	**A**	**11**	**0.36**	**-**	**A**	**11**	**0.51**	**-**
Churchill Avenue & Scott Street ***Unsignalized***	EBL/T/R	A	10	0.04	1	A	9	0.03	1
	WBL/T/R	B	13	0.37	13	C	19	0.65	36
	NBL/T/R	C	20	0.74	52	C	16	0.60	30
	SBL/T/R	B	12	0.40	14	B	12	0.30	9
	EBL/T/R	B	30	0.64	51	A	22	0.50	45

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Churchill Avenue & Byron Avenue ***Signalized***	WBL/T/R	A	29	0.56	42	D	35	0.84	#122
	NBL	A	6	0.04	6	A	11	0.06	9
	NBT/R	A	8	0.39	54	A	17	0.52	77
	SBL	A	1	0.07	m3	A	3	0.08	m5
	SBT/R	A	1	0.33	21	A	2	0.51	m57
	Overall	**B**	**14**	**0.49**	**-**	**B**	**19**	**0.70**	**-**
Churchill Avenue & Site Access #1 ***Unsignalized***	WBL/R	C	15	0.04	1	B	15	0.04	1
	NBT/R	-	-	-	-	-	-	-	-
	SBL/T	A	9	0.00	0	A	9	0.01	<1
Notes:	Saturation flow rate of 1800 veh/h/lane								
	PHF = 1.00								
	# indicates the volume for the 95th percentile cycle exceeds capacity								
	m indicates the volume for the 95th percentile queue is metered by an upstream signal								

With the addition of site generated traffic, the existing intersections are anticipated to operate with similar operational characteristics as the 2022 future background conditions, and well within the City of Ottawa operational thresholds. The intersection of Site Access #1 and Churchill Avenue operates well with no identified operational issues.

16.2.5 2027 Future Total

The 2027 total future intersection volumes, including the site generated traffic and other development traffic, have been analyzed to understand the impact of the subject development on the Study Area intersections.

The intersection of Scott Street and Churchill Avenue has been signalized. Yellow Times, All-red Times, and Flash Don't Walk Times were calculated using the methodology provided in OTM Book 12-Traffic Signals. An overall cycle length of 80 seconds in the AM peak period and 90 seconds in the PM peak period has been used to match the cycle length of Richmond Road and Churchill Avenue to the south. The westbound left-turn movement will operate as a protected and permissive turn during the PM peak period. Phasing splits were optimized using the "Optimize Splits" Synchro function as well as by using manual optimization. Intersection geometry is based on the Scott Street Bus Detour plans shown in Appendix D. A storage length of 30 metres and a taper length of 15 metres have been assumed for the northbound right-turn for analysis purposes as these are not shown.

Table 26 summarizes the operational analysis of the 2027 future total conditions. Appendix R contains the 2027 Future Total Synchro Sheets.

Table 26: 2027 Future Total Intersection Operational Analysis

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	Delay	V/C	Q (95th)	LOS	Delay	V/C	Q (95th)
Churchill Avenue & Richmond Road ***Signalized***	EBL	A	12	0.53	39	A	14	0.55	25
	EBT/R	A	12	0.51	64	A	12	0.48	57
	WBL	A	22	0.21	15	A	22	0.41	32
	WBT/R	A	23	0.45	47	D	34	0.81	#136
	NBL/T/R	B	24	0.69	22	C	28	0.71	m29
	SBL/T/R	B	27	0.69	39	C	22	0.76	42
	Overall	**B**	**20**	**0.64**	**-**	**C**	**23**	**0.78**	**-**
Roosevelt Avenue & Richmond Road ***Signalized***	EBL/T/R	A	11	0.59	80	A	8	0.44	58
	WBL/T/R	A	8	0.43	45	D	14	0.82	#216
	NBL/T/R	A	23	0.25	14	A	30	0.37	24
	SBL/T/R	A	23	0.24	20	A	30	0.34	27
	Overall	**A**	**12**	**0.59**	**-**	**D**	**15**	**0.84**	**-**
Athlone Avenue & Richmond Road ***Unsignalized***	EBL/T/R	A	8	0.02	<1	A	9	0.01	<1
	WBL/T/R	A	9	0.01	<1	A	8	0.02	<1
	NBL/T/R	C	17	0.10	3	C	18	0.11	3
	SBL/T/R	C	18	0.10	2	C	21	0.11	3
Richmond Road & Pedestrian Crossing ***Signalized***	EBT	A	12	0.55	57	A	11	0.46	45
	WBT	A	9	0.35	32	C	20	0.78	#110
	Overall	**A**	**11**	**0.36**	**-**	**A**	**16**	**0.51**	**-**
Churchill Avenue & Scott Street ***Signalized***	EBL/T/R	A	20	0.07	5	A	27	0.08	6
	WBT/R	A	26	0.52	41	B	18	0.60	59
	WBL	A	20	0.10	6	A	12	0.07	5
	NBL/T	A	6	0.12	17	A	15	0.19	26
	NBR	A	12	0.59	13	A	22	0.57	15
	SBL/T/R	A	8	0.30	36	A	17	0.30	35
	Overall	**A**	**13**	**0.46**	**-**	**A**	**19**	**0.51**	**-**
Churchill Avenue & Byron Avenue ***Signalized***	EBL/T/R	B	30	0.65	51	A	22	0.51	47
	WBL/T/R	A	29	0.58	44	D	35	0.84	#125
	NBL	A	6	0.04	6	A	12	0.06	9
	NBT/R	A	9	0.39	55	A	17	0.52	77
	SBL	A	1	0.07	m3	A	3	0.08	m5
	SBT/R	A	1	0.33	21	A	2	0.52	m58
	Overall	**A**	**14**	**0.49**	**-**	**B**	**19**	**0.70**	**-**
Churchill Avenue & Site Access #1 ***Unsignalized***	WBL/R	C	15	0.04	1	B	13	0.03	1
	NBT/R	-	-	-	-	-	-	-	-
	SBL/T	A	9	0.00	0	A	8	0.01	<1
Notes:	Saturation flow rate of 1800 veh/h/lane								
	PHF = 1.00								
	# indicates the volume for the 95th percentile cycle exceeds capacity								
	m indicates the volume for the 95th percentile queue is metered by an upstream signal								

With the addition of site generated traffic, the existing intersections are anticipated to operate with similar operational characteristics as the 2027 future background conditions, and well within the City of Ottawa operational thresholds. The intersection of Site Access #1 and Churchill Avenue operates well with no identified operational issues.

16.2.6 Intersection MMLOS

Intersection MMLOS is only undertaken at signalized intersections. The five signalized intersections considered in this study are Churchill Avenue at Richmond Road, Richmond Road at Roosevelt Avenue, Richmond Road at a pedestrian crossing, Churchill Avenue at Byron Avenue, and Churchill Avenue at Scott Street (2027 only).

Table 27 summarizes the MMLOS analysis for these five signalized intersections in the Study Area. As no changes to the intersections are anticipated, the pedestrian, bicycle and truck LOS was analyzed in one row as the existing and future horizons will be the same. The transit and auto LOS will differ based on the horizon and as such, they have been evaluated for the existing, 2022 future total and 2027 future total horizons. The analysis is based on the policy area within 600m of a rapid transit station. The MMLOS worksheets have been provided in Appendix G.

Table 27: Study Area Intersection MMLOS Analysis—All Horizons

Intersection	Horizon	Pedestrian LOS		Bicycle LOS		Transit LOS		Truck LOS		Auto LOS	
		PLOS	Target	BLOS	Target	TLOS	Target	TrLOS	Target	ALOS	Target
Churchill Ave & Richmond Rd	Existing	D	A	F	B	D(F)	D	F	D	B(D)	E
	2022					D(E)				B(C)	
	2027					D(E)				B(C)	
Roosevelt Ave & Richmond Rd	Existing	D		F	C	D(F)		E		A(E)	
	2022					D(E)				A(C)	
	2027					D(E)				A(C)	
Richmond Rd & Pedestrian Crossing	Existing	C		F	C	C(C)		E		A(B)	
	2022					C(C)				A(B)	
	2027					C(C)				A(B)	
Churchill Ave & Byron Ave	Existing	C		F	B	E(F)		E		B(D)	
	2022					E(F)				B(D)	
	2027					E(F)				B(D)	
Churchill Ave & Scott St	2027	C		A	B	E(D)		E		B(B)	

The pedestrian and cycling LOS targets are not met at the network intersections due to crossing distances, permissive left and right-turns, and lack of cycling facilities in the Study Area. The transit LOS generally fails to meet the targets at some intersections due to the intersection delays. Truck LOS is not met at any intersection due to the low number of receiving lanes. Auto LOS targets are met.

Due to restrictions on obtaining property from adjacent developments to implement cycling facilities within the Study Area road network, as well as restrictions on adjusting the signal timing of Study Area intersections, the changes required to improve the MMLOS are not considered feasible. As such, no mitigation measures or alterations to the intersections are recommended as a result of this analysis.

17 Conclusions

This Transportation Impact Assessment has documented the existing and future transportation conditions, for all travel modes, in the Study Area. The following conclusions can be offered based on the foregoing:

A. The proposed development, located at 381 Churchill Avenue, 380 Winona Avenue, 319, 325, and 327 Richmond Road, is a nine-storey building with 184 apartment units, 18685 square feet of retail space, 131 vehicle parking spots, and 98 bicycle parking spaces.
B. The site is proposed to have two accesses; one of which is a full movement access on Churchill Avenue approximately 65 metres north of the Churchill Avenue / Richmond Road intersection. The second access is located on Winona Avenue approximately 50 metres north of the Winona Avenue / Richmond Road intersection and is a loading entrance.
C. Sections of the proposed development are within 600 metres of the future Westboro and Dominion LRT Stations and as such is zoned as a Transit Oriented Development (TOD) Zone.
D. The existing Study Area is currently served by bus routes #11, 16, 50, and 153.
E. The previous five years of collision history at the existing Study Area intersections has been reviewed. No patterns emerged that indicated that mitigation measures or further monitoring was required.
F. Using the TRANS Study the residential trip generation rates were identified and using the ITE Trip Generation Manual, the retail trip rates were identified. TOD mode shares were used to determine the trip generation by mode in a manner that accounts for the proximity of the Westboro and Dominion LRT stations. It was found that the proposed development can be anticipated to generate 138 AM and 204 PM peak hour two-way person trips.
G. Minimum vehicle parking space requirements are met with an excess of 37 spaces and bicycle parking space requirements are met exactly
H. It was found that the road segments of Richmond Road, Churchill Road and Winona Avenue do not meet the majority of their MMLOS targets. As future changes to the road network are anticipated to improve the MMLOS of these segments, no resulting improvements to the three boundary roads are recommended.
I. Both signalization warrant and left-turn lane warrants were evaluated at the Site Access (Site Access #1). Signalization was not warranted however a left-turn lane was warranted. Upon further evaluation of the warrant and the surrounding context of the access, a left-turn was not deemed to be required.
J. The Study Area intersections operate satisfactorily during the peak hours in the existing conditions operational analysis.
K. The Study Area intersections operate satisfactorily during the peak hours in the 2022 future background operational analysis.
L. The Study Area intersections operate satisfactorily during the peak hours in the 2022 future total operational analysis with similar operational characteristics as the 2022 future background conditions.
M. The Study Area intersections operate satisfactorily during the peak hours in the 2027 future background operational analysis.
N. The Study Area intersections operate satisfactorily during the peak hours in the 2027 future total operational analysis with similar operational characteristics as the 2027 future background conditions
O. The PLOS, BLOS, TLOS, and TkLOS were evaluated at all five signalized Study Area intersections. In most cases, the MMLOS targets were not met. No intersection alterations or mitigation measures are suggested as changes to these intersections are not feasible due to restrictions on obtaining property from adjacent developments, as well as restrictions on adjusting the signal timing of Study Area intersections.

The proposed development will function within the Study Area Road Network. It is recommended that, from a transportation perspective, the proposed development application process proceed.

Prepared By:

Reviewed By:

LICENSED PROFESSIONAL ENGINEER
M. B. CROCKFORD
100152912
December 18, 2020
PROVINCE OF ONTARIO

Robin Marinac, E.I.T.
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Appendix A

TIA Screening Form and PM Certification Form

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 licensed[1] or registered[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering √ or transportation planning □.

[1,2] **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.**

City Of Ottawa
Infrastructure Services and Community Sustainability
Planning and Growth Management
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

Ville d'Ottawa
Services d 'infrastructure et Viabilité des collectivités
Urbanisme et Gestion de la croissance
110, avenue Laurier Ouest
Ottawa (Ontario) K1P 1J1
Tél. : 613-580-2424
Télécopieur: 613-560-6006

Dated at ___Newmarket__________ this __28__ day of ________June________, 2019.
(City)

Name: ____________Mark Crockford_______________________________
(Please Print)

Professional Title: __________Professional Engineer_____________________________

____
Signature of Individual certifier that s/he meets the above four criteria

Office Contact Information (Please Print)
Address: 628 Haines Road
City / Postal Code: Newmarket / L3Y 6V5
Telephone / Extension: (905) 251-4070
E-Mail Address: Mark.Crockford@CGHTransportation.com

CGH TRANSPORTATION

13 Markham Avenue
Ottawa ON K2G 3Z1

City of Ottawa 2017 TIA Guidelines
Step 1 - Screening Form

Date:	18-Dec-20
Project Number:	`2019-03
Project Reference:	CLV Richmond-Churchill

1.1 Description of Proposed Development	
Municipal Address	381 Churchill Ave, 380 Winona Avenuw, 319/325/327 Richmond Road
Description of Location	PLAN 37 PT LOT 1, 2, 3, 4 AND 28
Land Use Classification	Traditional Mainstreet, Residential Fourth Density, & General Mixed Use Zoning
Development Size	184 apartment units, 1,698m^2 commercial, 131 parking spaces, 98 bike parking
Accesses	Two: Access on Churchill (approximately 65m north of Churchill /Richmond Interesection). Access on Winona Avenue for loading purposes only (approximately 50m north of Winona / Richmond Intersection)
Phase of Development	Single Phase
Buildout Year	2022
TIA Requirement	Full TIA Required

1.2 Trip Generation Trigger		
Land Use Type	Townhomes or apartments	
Development Size	184	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 Bicycle Networks?	Yes
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?	Yes
Location Trigger	Yes

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 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, or within 150 m of intersection in urban/ suburban conditions)?	Yes
Is the proposed driveway within auxiliary lanes of an intersection?	No
Does the proposed driveway make use of an existing median break that serves an existing site?	No
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	No
Does the development include a drive-thru facility?	No
Safety Trigger	Yes

Appendix B

Traffic Data

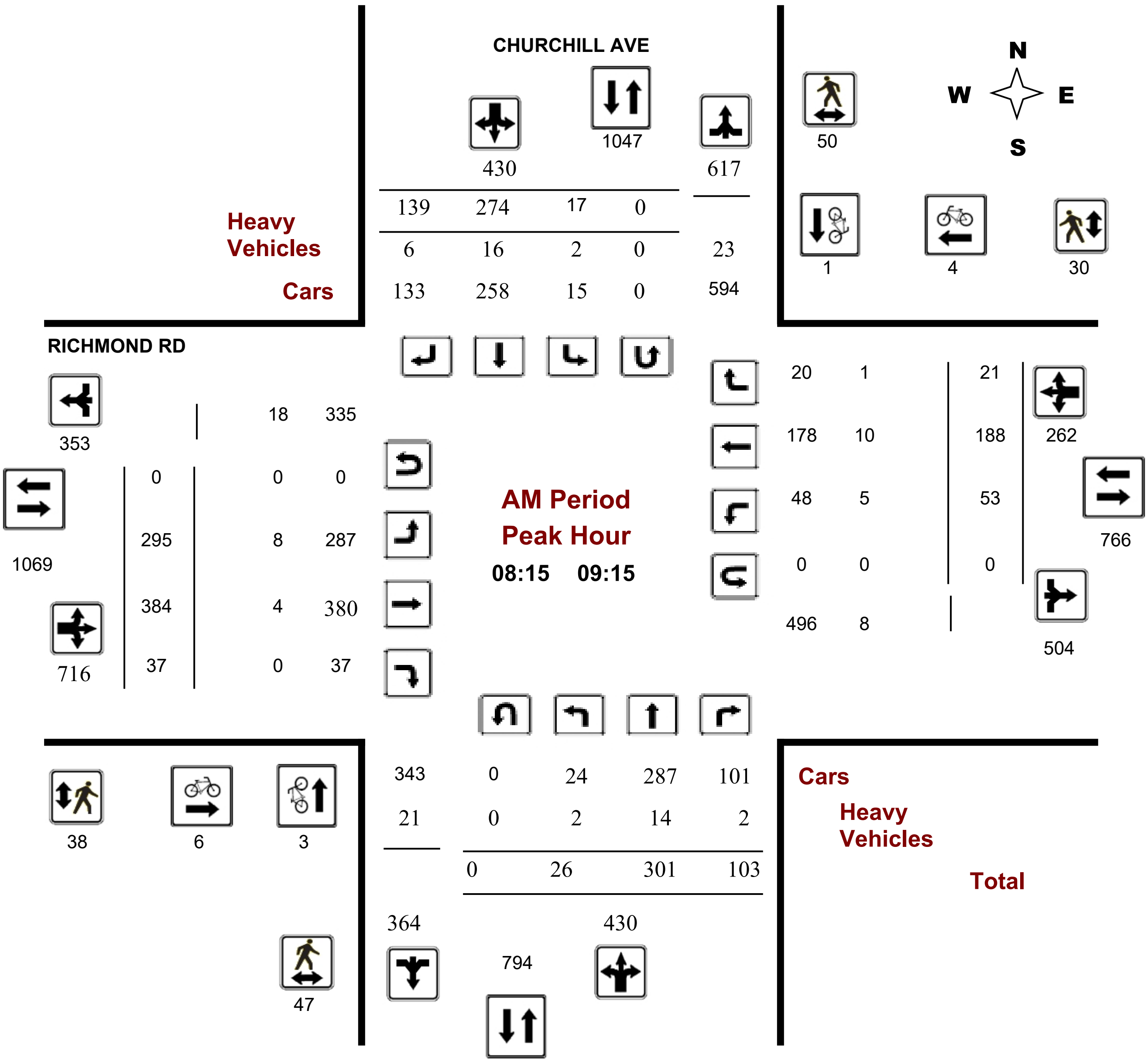
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37319

Start Time: 07:00 **Device:** Miovision



Comments

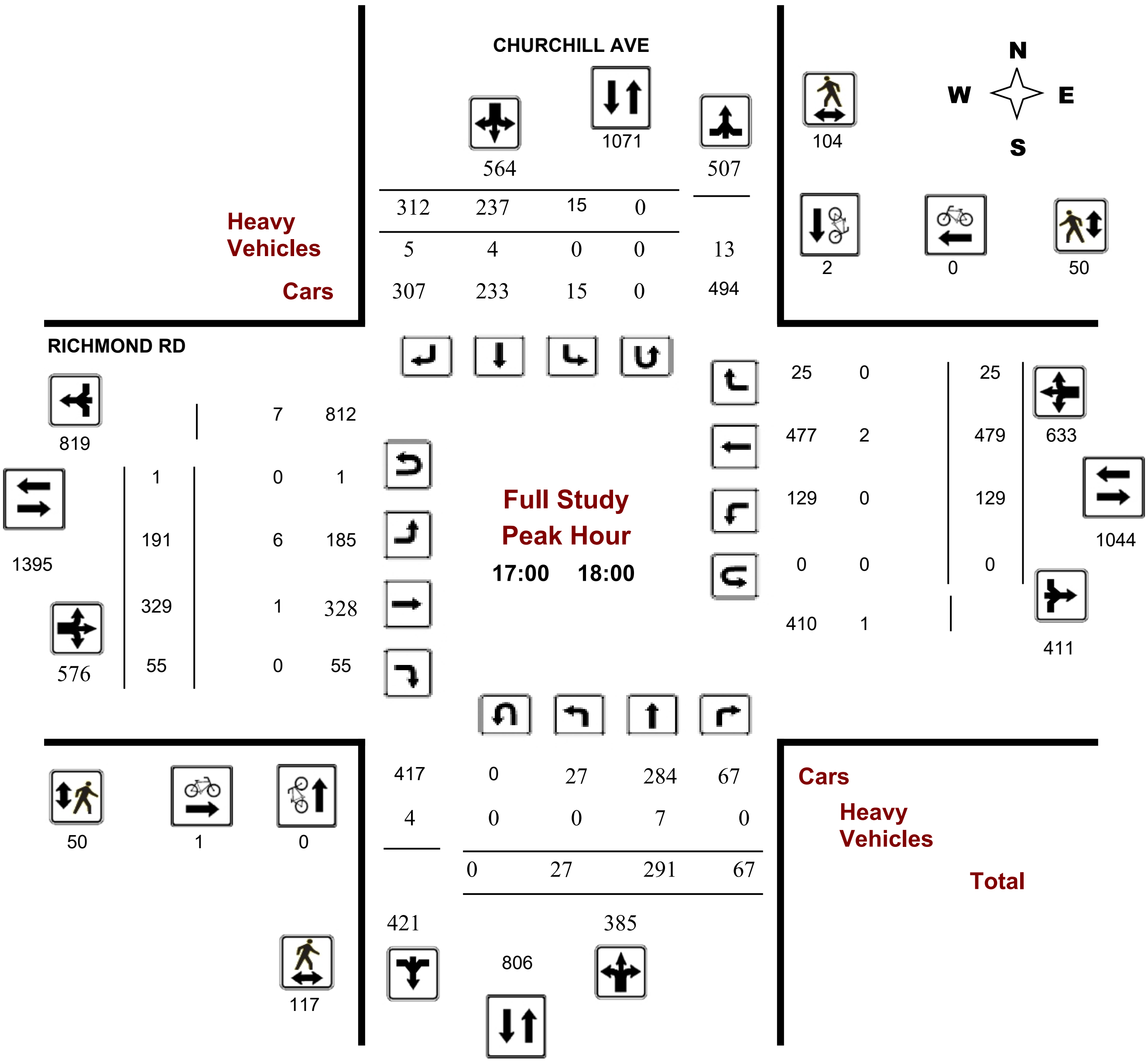
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37319

Start Time: 07:00 **Device:** Miovision



Comments

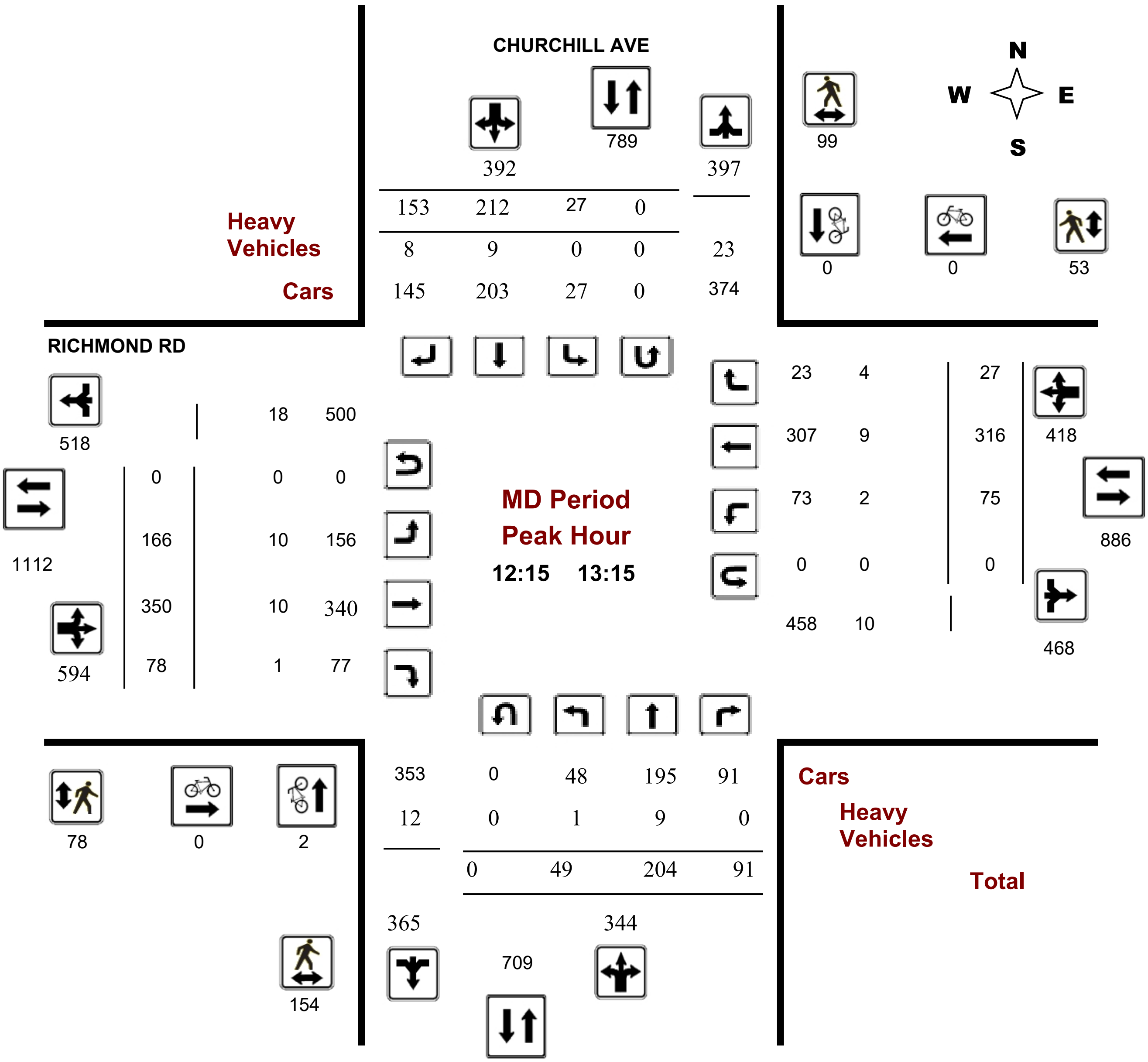
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37319

Start Time: 07:00 **Device:** Miovision



Comments

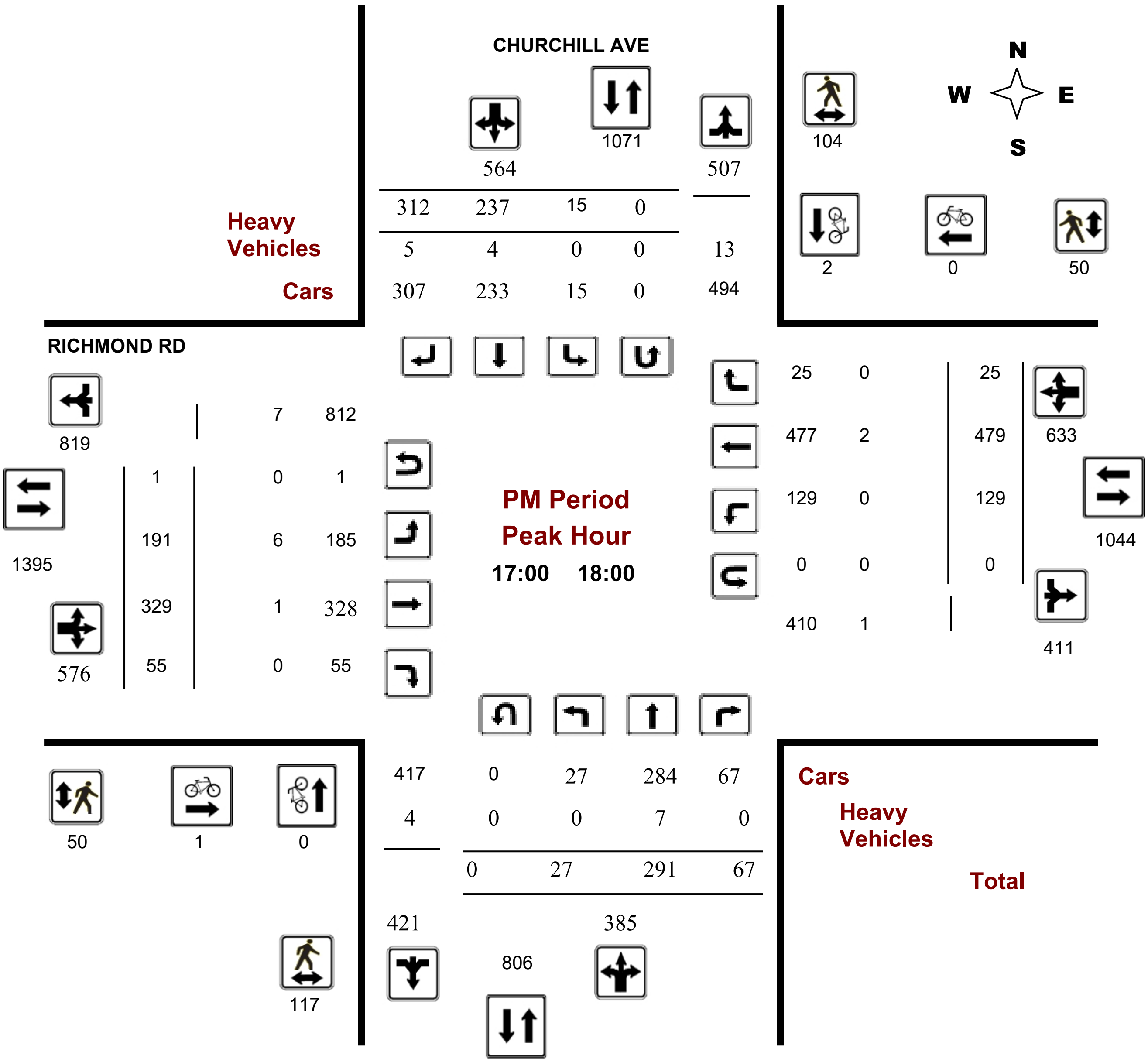
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017 **WO No:** 37319

Start Time: 07:00 **Device:** Miovision



Comments

Transportation Services - Traffic Services

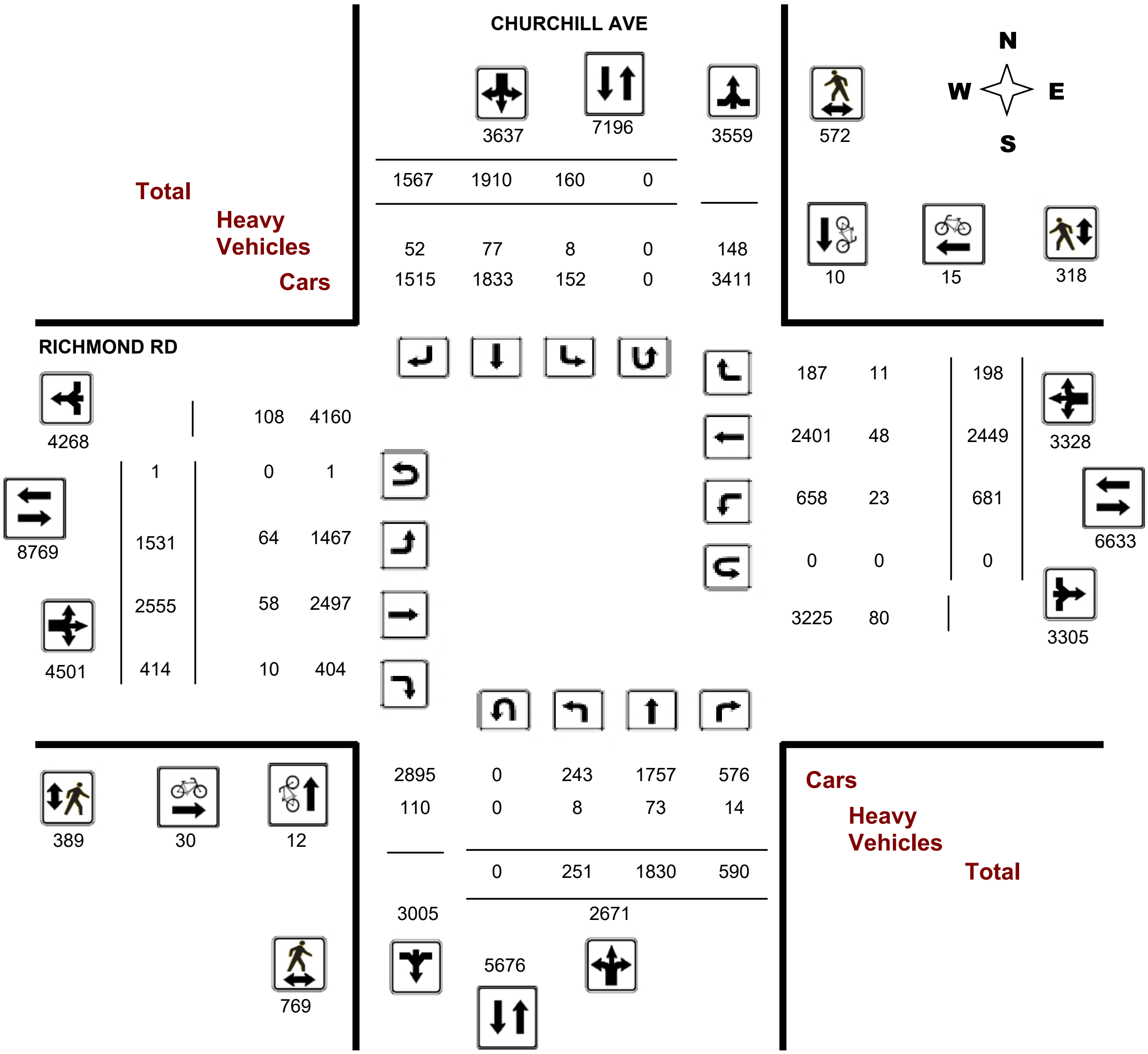
Turning Movement Count - Full Study Diagram

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017

WO#: 37319

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
37319

Turning Movement Count - Full Study Summary Report

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 1 Westbound: 0

AADT Factor
.90

Full Study

	CHURCHILL AVE									RICHMOND RD									
	Northbound				Southbound					Eastbound				Westbound					
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	20	142	44	**206**	19	254	104	**377**	**583**	244	328	32	**604**	49	112	19	**180**	**784**	**1367**
08:00 09:00	29	290	81	**400**	17	283	131	**431**	**831**	312	401	34	**747**	56	173	30	**259**	**1006**	**1837**
09:00 10:00	31	227	81	**339**	10	226	127	**363**	**702**	174	321	38	**533**	63	194	21	**278**	**811**	**1513**
11:30 12:30	43	206	92	**341**	36	220	158	**414**	**755**	146	294	75	**515**	60	349	33	**442**	**957**	**1712**
12:30 13:30	49	195	92	**336**	21	199	144	**364**	**700**	154	354	87	**595**	72	298	25	**395**	**990**	**1690**
15:00 16:00	27	208	69	**304**	25	247	282	**554**	**858**	159	256	47	**462**	114	370	22	**506**	**968**	**1826**
16:00 17:00	25	271	64	**360**	17	244	309	**570**	**930**	151	272	46	**469**	138	474	23	**635**	**1104**	**2034**
17:00 18:00	27	291	67	**385**	15	237	312	**564**	**949**	191	329	55	**575**	129	479	25	**633**	**1208**	**2157**
Sub Total	251	1830	590	**2671**	160	1910	1567	**3637**	**6308**	1531	2555	414	**4500**	681	2449	198	**3328**	**7828**	**14136**
U Turns				**0**				**0**	**0**				**1**				**0**	**1**	**1**
Total	251	1830	590	**2671**	160	1910	1567	**3637**	**6308**	1531	2555	414	**4501**	681	2449	198	**3328**	**7829**	**14137**
EQ 12Hr	349	2544	820	**3713**	222	2655	2178	**5055**	**8768**	2128	3551	575	**6256**	947	3404	275	**4626**	**10882**	**19650**
AVG 12Hr	314	2289	738	**3341**	200	2389	1960	**4550**	**7891**	1915	3196	518	**5631**	852	3064	248	**4163**	**9794**	**17685**
AVG 24Hr	411	2999	967	**4377**	262	3130	2568	**5960**	**10337**	2509	4187	678	**7376**	1116	4013	324	**5454**	**12830**	**23167**

EQ 12Hr Note: These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**

AVG 12Hr Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **.90**

AVG 24Hr Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. **1.31**

Comments:

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

Transportation Services - Traffic Services

W.O. 37319

Turning Movement Count - 15 Minute Summary Report

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 1 Westbound: 0

	CHURCHILL AVE									RICHMOND RD									
	Northbound				Southbound					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	2	26	5	**33**	3	44	17	**64**	**97**	48	83	12	**143**	8	27	3	**38**	**181**	**278**
07:15 07:30	3	35	9	**47**	5	62	22	**89**	**136**	53	76	4	**133**	13	26	8	**47**	**180**	**316**
07:30 07:45	6	39	9	**54**	4	80	33	**117**	**171**	68	76	8	**152**	14	28	2	**44**	**196**	**367**
07:45 08:00	9	42	21	**72**	7	68	32	**107**	**179**	75	93	8	**176**	14	31	6	**51**	**227**	**406**
08:00 08:15	7	66	5	**78**	3	78	21	**102**	**180**	69	114	6	**189**	20	48	12	**80**	**269**	**449**
08:15 08:30	7	68	23	**98**	7	52	33	**92**	**190**	91	81	12	**184**	11	40	9	**60**	**244**	**434**
08:30 08:45	6	79	26	**111**	4	90	44	**138**	**249**	85	90	6	**181**	17	36	4	**57**	**238**	**487**
08:45 09:00	9	77	27	**113**	3	63	33	**99**	**212**	67	116	10	**193**	8	49	5	**62**	**255**	**467**
09:00 09:15	4	77	27	**108**	3	69	29	**101**	**209**	52	97	9	**158**	17	63	3	**83**	**241**	**450**
09:15 09:30	8	53	19	**80**	3	62	32	**97**	**177**	53	85	9	**147**	14	43	8	**65**	**212**	**389**
09:30 09:45	8	51	17	**76**	3	47	29	**79**	**155**	45	66	12	**123**	17	45	7	**69**	**192**	**347**
09:45 10:00	11	46	18	**75**	1	48	37	**86**	**161**	24	73	8	**105**	15	43	3	**61**	**166**	**327**
11:30 11:45	11	51	18	**80**	7	58	39	**104**	**184**	29	80	17	**126**	13	81	9	**103**	**229**	**413**
11:45 12:00	10	54	24	**88**	7	49	43	**99**	**187**	37	70	17	**124**	15	96	7	**118**	**242**	**429**
12:00 12:15	11	46	24	**81**	11	51	34	**96**	**177**	36	51	24	**111**	14	83	8	**105**	**216**	**393**
12:15 12:30	11	55	26	**92**	11	62	42	**115**	**207**	44	93	17	**154**	18	89	9	**116**	**270**	**477**
12:30 12:45	17	51	18	**86**	6	63	42	**111**	**197**	39	84	16	**139**	19	83	6	**108**	**247**	**444**
12:45 13:00	10	44	26	**80**	6	49	35	**90**	**170**	45	84	28	**157**	20	62	9	**91**	**248**	**418**
13:00 13:15	11	54	21	**86**	4	38	34	**76**	**162**	38	89	17	**144**	18	82	3	**103**	**247**	**409**
13:15 13:30	11	46	27	**84**	5	49	33	**87**	**171**	32	97	26	**155**	15	71	7	**93**	**248**	**419**
15:00 15:15	11	36	17	**64**	6	63	62	**131**	**195**	40	64	14	**118**	20	75	8	**103**	**221**	**416**
15:15 15:30	10	56	16	**82**	6	66	70	**142**	**224**	34	67	13	**114**	30	97	0	**127**	**241**	**465**
15:30 15:45	3	60	17	**80**	7	58	72	**137**	**217**	42	56	10	**108**	34	96	7	**137**	**245**	**462**
15:45 16:00	3	56	19	**78**	6	60	78	**144**	**222**	43	69	10	**122**	30	102	7	**139**	**261**	**483**
16:00 16:15	8	54	15	**77**	4	59	90	**153**	**230**	42	62	8	**112**	32	111	9	**152**	**264**	**494**
16:15 16:30	5	71	16	**92**	1	67	66	**134**	**226**	39	73	11	**123**	33	113	3	**149**	**272**	**498**
16:30 16:45	4	73	13	**90**	10	55	71	**136**	**226**	30	70	14	**114**	35	124	8	**167**	**281**	**507**
16:45 17:00	8	73	20	**101**	2	63	82	**147**	**248**	40	67	13	**120**	38	126	3	**167**	**287**	**535**
17:00 17:15	6	73	21	**100**	4	54	83	**141**	**241**	37	61	8	**106**	36	115	7	**158**	**264**	**505**
17:15 17:30	7	62	23	**92**	3	58	74	**135**	**227**	48	87	16	**151**	20	127	6	**153**	**304**	**531**
17:30 17:45	9	74	13	**96**	2	64	78	**144**	**240**	50	80	15	**145**	41	116	6	**163**	**308**	**548**
17:45 18:00	5	82	10	**97**	6	61	77	**144**	**241**	56	101	16	**174**	32	121	6	**159**	**333**	**574**
TOTAL:	251	1830	590	**2671**	160	1910	1567	**3637**	**6308**	1531	2555	414	**4501**	681	2449	198	**3328**	**7829**	**14137**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
37319

CHURCHILL AVE @ RICHMOND RD

Count Date: Wednesday, November 22, 2017 **Start Time:** 07:00

	CHURCHILL AVE			RICHMOND RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	2	2	**4**	3	5	**8**	**12**
08:00 09:00	3	0	**3**	8	4	**12**	**15**
09:00 10:00	1	3	**4**	2	0	**2**	**6**
11:30 12:30	1	0	**1**	0	2	**2**	**3**
12:30 13:30	2	0	**2**	3	0	**3**	**5**
15:00 16:00	1	1	**2**	3	3	**6**	**8**
16:00 17:00	2	2	**4**	10	1	**11**	**15**
17:00 18:00	0	2	**2**	1	0	**1**	**3**
Total	12	10	**22**	30	15	**45**	**67**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

W.O.
37319

Turning Movement Count - Heavy Vehicle Report

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017

	CHURCHILL AVE									RICHMOND RD									
	Northbound				Southbound					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 08:00	0	8	1	**9**	2	11	7	**20**	**29**	7	10	1	**18**	3	3	1	**7**	**25**	**54**
08:00 09:00	1	13	3	**17**	2	12	4	**18**	**35**	8	7	0	**15**	5	11	1	**17**	**32**	**67**
09:00 10:00	2	10	5	**17**	0	13	7	**20**	**37**	7	14	1	**22**	5	5	2	**12**	**34**	**71**
11:30 12:30	1	10	2	**13**	2	7	8	**17**	**30**	9	8	4	**21**	4	8	2	**14**	**35**	**65**
12:30 13:30	2	12	0	**14**	1	8	8	**17**	**31**	10	11	3	**24**	2	9	4	**15**	**39**	**70**
15:00 16:00	2	7	0	**9**	1	9	6	**16**	**25**	12	5	1	**18**	2	5	0	**7**	**25**	**50**
16:00 17:00	0	6	3	**9**	0	13	7	**20**	**29**	5	2	0	**7**	2	5	1	**8**	**15**	**44**
17:00 18:00	0	7	0	**7**	0	4	5	**9**	**16**	6	1	0	**7**	0	2	0	**2**	**9**	**25**
Sub Total	8	73	14	**95**	8	77	52	**137**	**232**	64	58	10	**132**	23	48	11	**82**	**214**	**446**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	8	73	14	**0**	8	77	52	**137**	**232**	64	58	10	**132**	23	48	11	**82**	**214**	**446**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
37319

Turning Movement Count - Pedestrian Volume Report

CHURCHILL AVE @ RICHMOND RD

Count Date: Wednesday, November 22, 2017 **Start Time:** 07:00

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	4	5	**9**	3	2	**5**	**14**
07:15 07:30	2	6	**8**	2	4	**6**	**14**
07:30 07:45	7	12	**19**	9	6	**15**	**34**
07:45 08:00	9	10	**19**	11	7	**18**	**37**
07:00 08:00	22	33	**55**	25	19	**44**	**99**
08:00 08:15	8	8	**16**	12	8	**20**	**36**
08:15 08:30	7	9	**16**	6	8	**14**	**30**
08:30 08:45	16	20	**36**	12	9	**21**	**57**
08:45 09:00	15	15	**30**	15	8	**23**	**53**
08:00 09:00	46	52	**98**	45	33	**78**	**176**
09:00 09:15	9	6	**15**	5	5	**10**	**25**
09:15 09:30	15	9	**24**	5	6	**11**	**35**
09:30 09:45	23	8	**31**	3	5	**8**	**39**
09:45 10:00	19	12	**31**	12	9	**21**	**52**
09:00 10:00	66	35	**101**	25	25	**50**	**151**
11:30 11:45	22	31	**53**	20	14	**34**	**87**
11:45 12:00	37	17	**54**	10	8	**18**	**72**
12:00 12:15	42	16	**58**	14	21	**35**	**93**
12:15 12:30	32	32	**64**	22	14	**36**	**100**
11:30 12:30	133	96	**229**	66	57	**123**	**352**
12:30 12:45	32	23	**55**	26	7	**33**	**88**
12:45 13:00	52	22	**74**	14	16	**30**	**104**
13:00 13:15	38	22	**60**	16	16	**32**	**92**
13:15 13:30	40	14	**54**	18	15	**33**	**87**
12:30 13:30	162	81	**243**	74	54	**128**	**371**
15:00 15:15	27	25	**52**	17	8	**25**	**77**
15:15 15:30	19	14	**33**	11	5	**16**	**49**
15:30 15:45	34	36	**70**	16	12	**28**	**98**
15:45 16:00	37	23	**60**	16	9	**25**	**85**
15:00 16:00	117	98	**215**	60	34	**94**	**309**
16:00 16:15	27	14	**41**	11	12	**23**	**64**
16:15 16:30	27	20	**47**	11	13	**24**	**71**
16:30 16:45	25	14	**39**	10	10	**20**	**59**
16:45 17:00	27	25	**52**	12	11	**23**	**75**
16:00 17:00	106	73	**179**	44	46	**90**	**269**
17:00 17:15	28	29	**57**	16	9	**25**	**82**
17:15 17:30	31	31	**62**	16	13	**29**	**91**
17:30 17:45	32	20	**52**	12	18	**30**	**82**
17:45 18:00	26	24	**50**	6	10	**16**	**66**
17:00 18:00	117	104	**221**	50	50	**100**	**321**
Total	769	572	**1341**	389	318	**707**	**2048**

Comment:

Work Order
37319

Turning Movement Count - 15 Min U-Turn Total Report

CHURCHILL AVE @ RICHMOND RD

Survey Date: Wednesday, November 22, 2017

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	1	0	1
Total		0	0	1	0	1

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

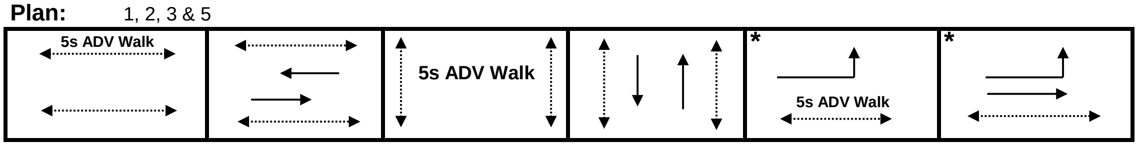
Intersection:	**Main:** Richmond		**Side:**	Churchill N
Controller:	**MS-3200**		**TSD:**	**5229**
Author:	Yassine Bennani		**Date:**	15-Mar-2019

Existing Timing Plans†

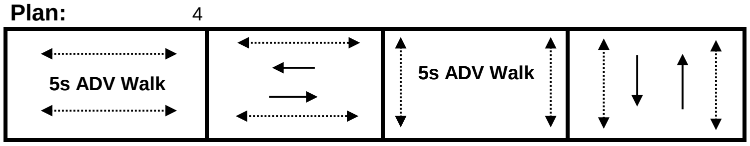
	Plan					**Ped Minimum Time**		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	***Walk***	***DW***	***A+R***
Cycle	80	75	90	65	75			
Offset	43	16	0	29	16			
EB Thru	45	43	60	33	43	14	11	3.3+2.8
WB Thru	31	31	45	33	31	14	11	3.3+2.8
NB Thru	35	32	30	32	32	7	11	3.6+2.6
SB Thru	35	32	30	32	32	7	11	3.6+2.6
EB Left	14	12	15	-	12	-	-	3.3+2.8

Phasing Sequence‡

Plan: 1, 2, 3 & 5



Plan: 4



Notes: 1) For the east-west direction, there is a straight thru green arrow displayed during the 5 second advanced walk interval. After this 5 seconds, the green arrow changes to a green ball.

Schedule

Weekday

Time	Plan
0:15	4
6:30	1
9:30	2
15:00	3
18:30	2
22:30	4

Saturday

Time	Plan
0:15	4
6:30	2
9:00	5
18:30	2
22:30	4

Sunday

Time	Plan
0:15	4
6:30	2
9:00	5
18:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·········► Pedestrian signal

Cost is $56.50 ($50 + HST)

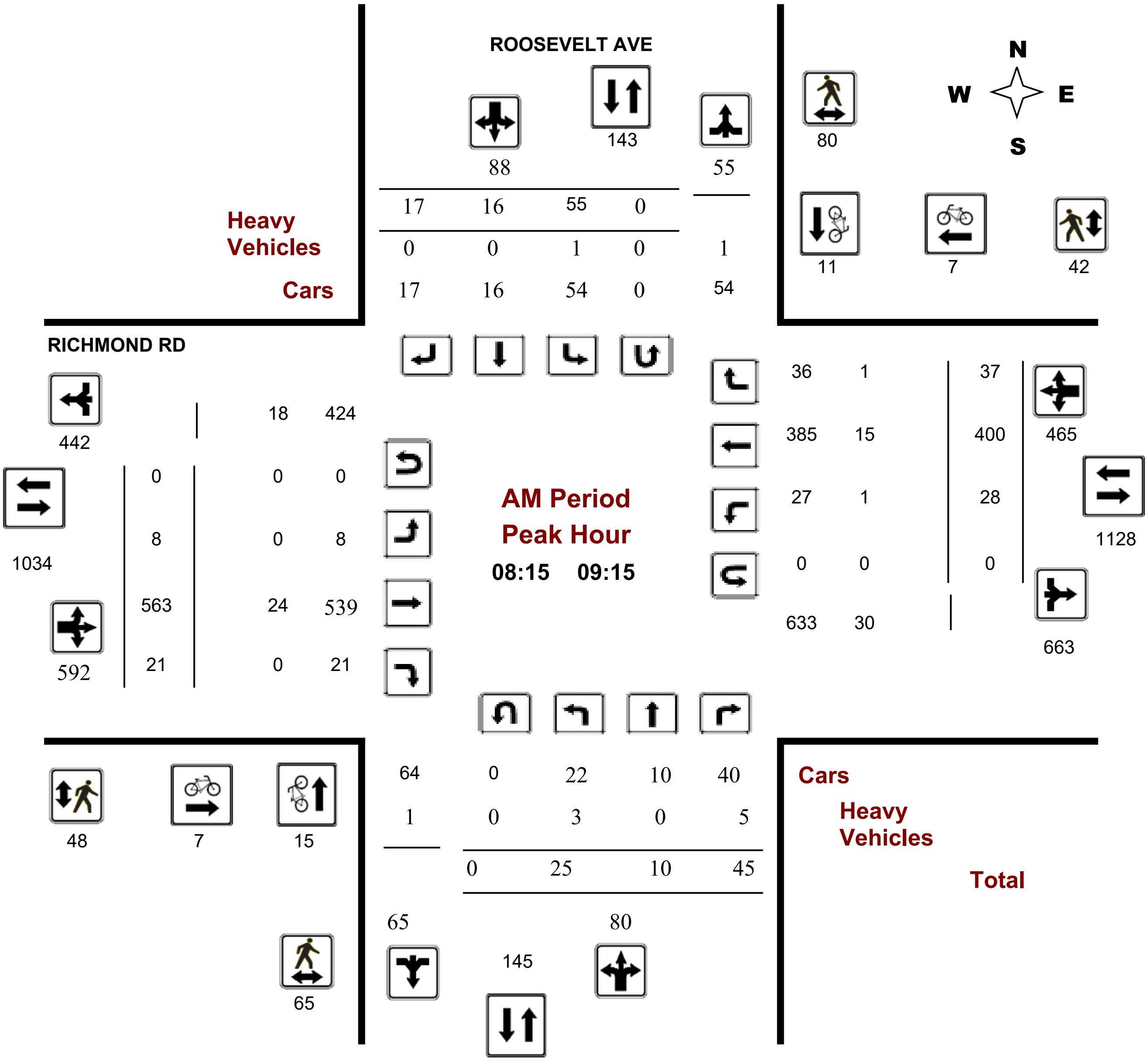
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015 **WO No:** 34683

Start Time: 07:00 **Device:** Jamar Technologies, Inc



Comments

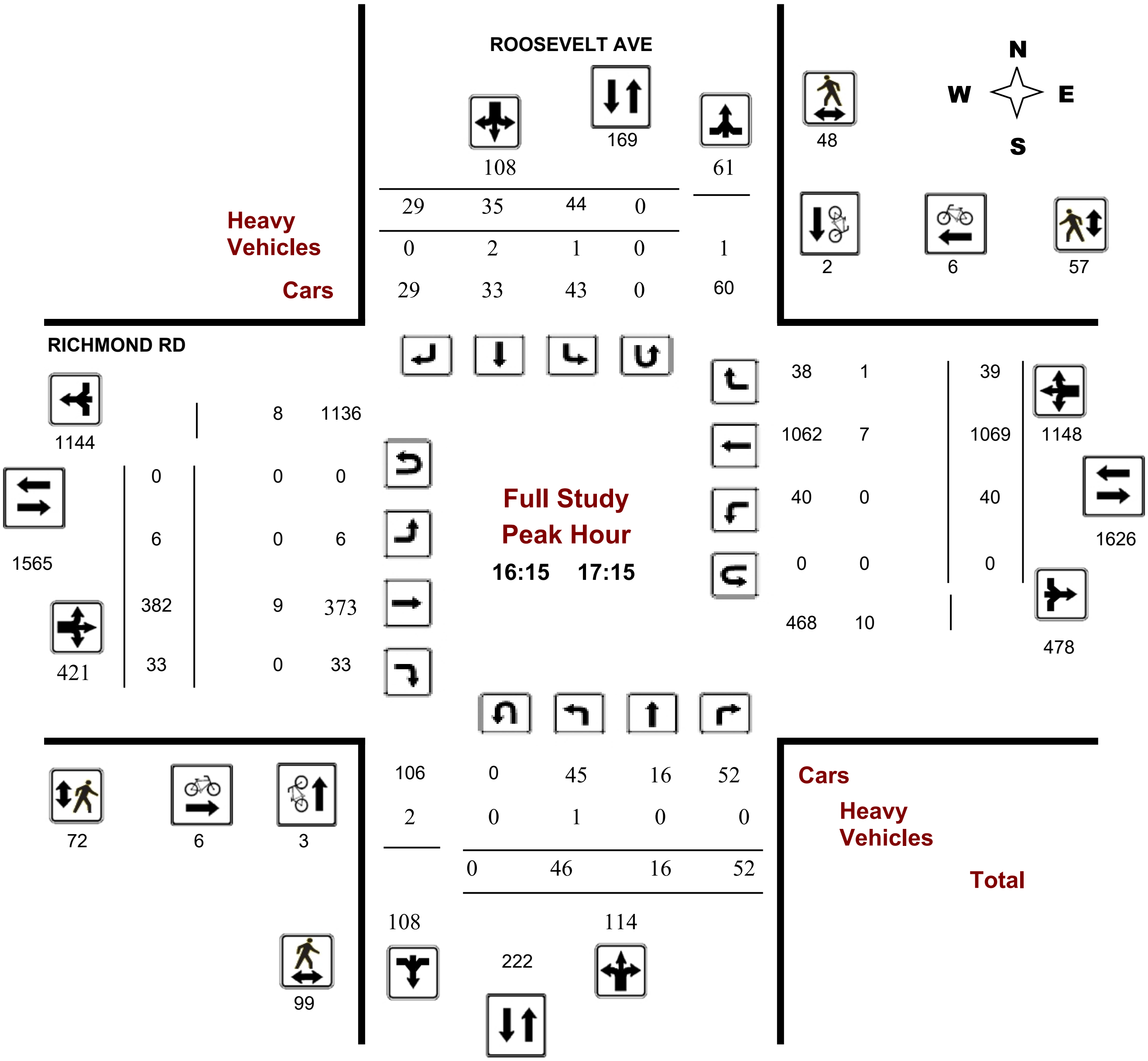
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015
Start Time: 07:00

WO No: 34683
Device: Jamar Technologies, Inc



Comments

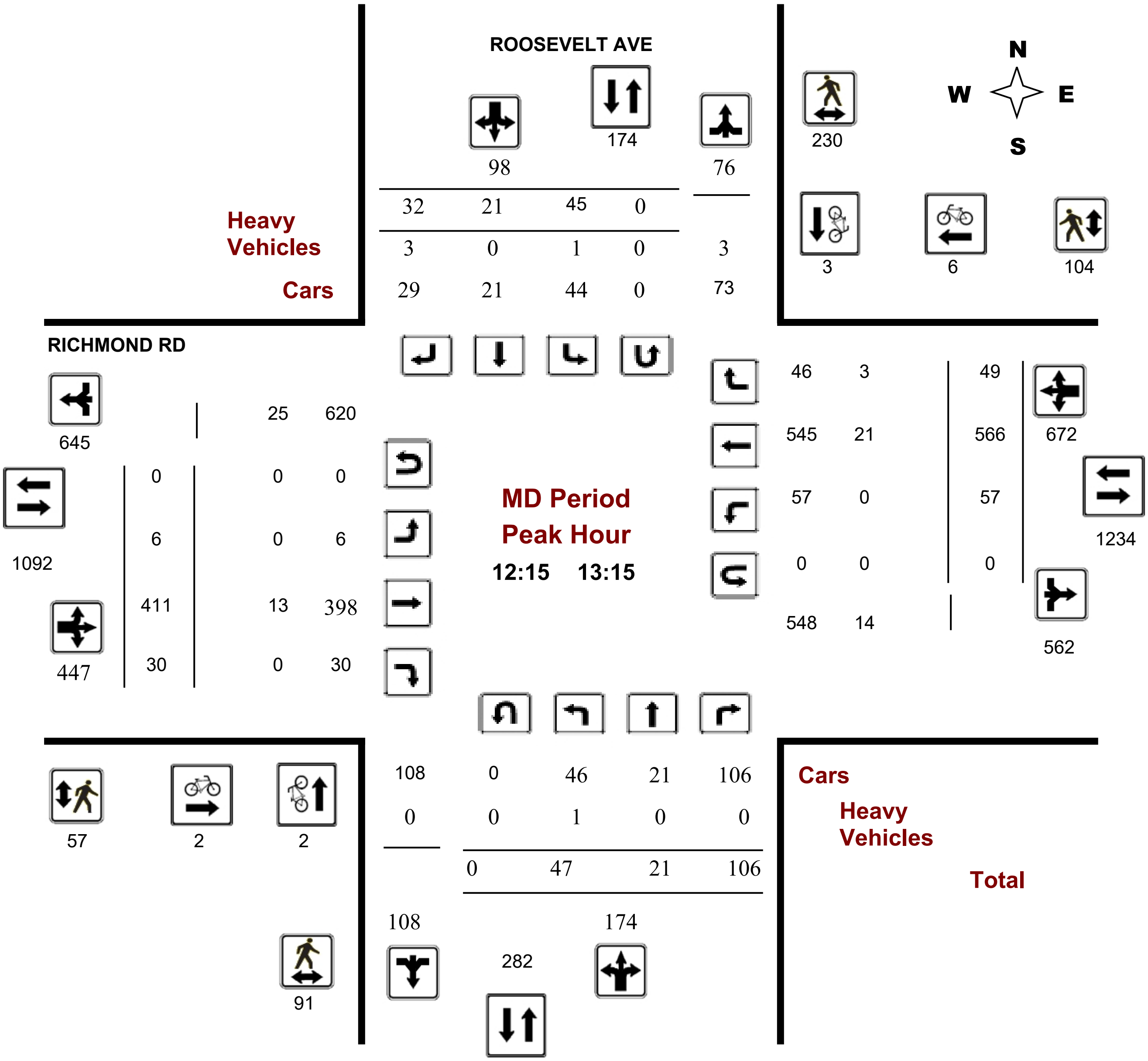
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015 **WO No:** 34683

Start Time: 07:00 **Device:** Jamar Technologies, Inc



Comments

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

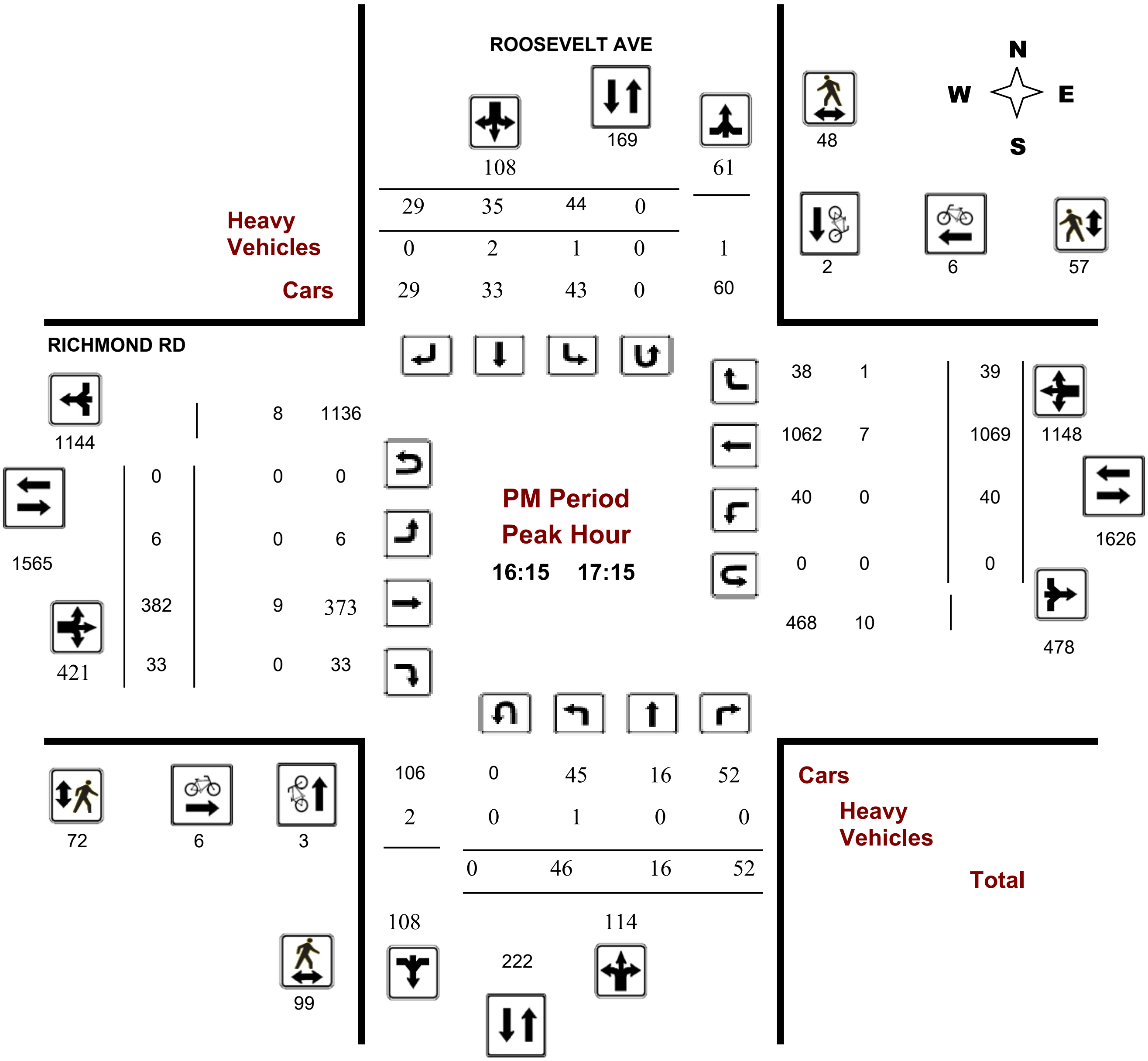
ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015

Start Time: 07:00

WO No: 34683

Device: Jamar Technologies, Inc



Comments

Transportation Services - Traffic Services

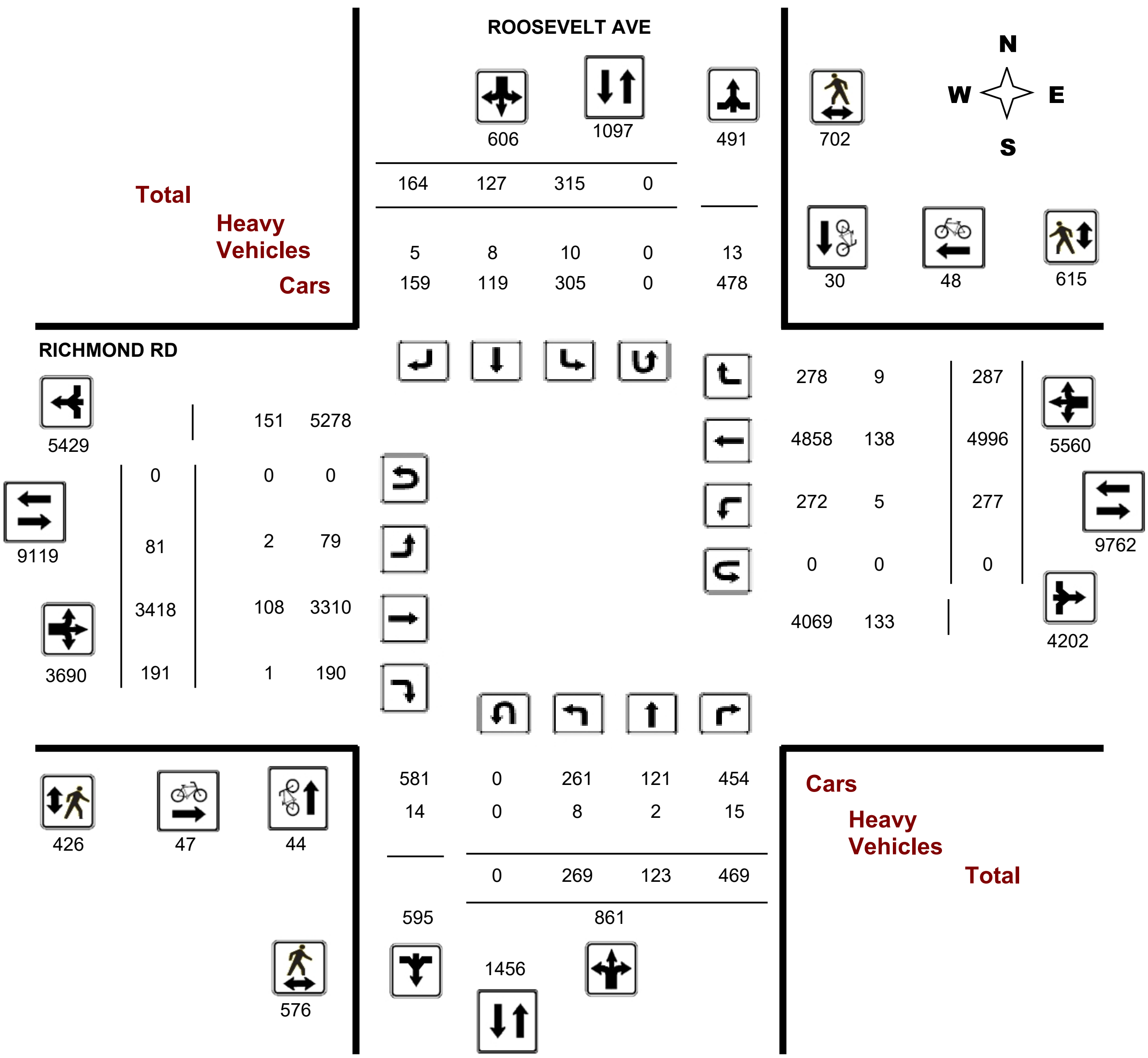
Turning Movement Count - Full Study Diagram

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015

WO#: 34683

Device: Jamar Technologies, Inc



Comments

Transportation Services - Traffic Services

Work Order
34683

Turning Movement Count - Full Study Summary Report

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 0 Westbound: 0

AADT Factor
.80

Full Study

	ROOSEVELT AVE									RICHMOND RD									
	Northbound				Southbound					Eastbound				Westbound					
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	18	8	32	**58**	17	6	10	**33**	**91**	7	514	21	**542**	13	247	12	**272**	**814**	**905**
08:00 09:00	24	10	43	**77**	58	11	17	**86**	**163**	12	546	23	**581**	23	407	49	**479**	**1060**	**1223**
09:00 10:00	18	7	43	**68**	41	11	18	**70**	**138**	12	422	18	**452**	44	378	30	**452**	**904**	**1042**
11:30 12:30	25	23	78	**126**	69	12	24	**105**	**231**	5	357	32	**394**	48	533	50	**631**	**1025**	**1256**
12:30 13:30	53	21	103	**177**	33	24	34	**91**	**268**	5	417	26	**448**	50	558	45	**653**	**1101**	**1369**
15:00 16:00	44	21	62	**127**	25	18	18	**61**	**188**	25	429	17	**471**	41	964	30	**1035**	**1506**	**1694**
16:00 17:00	47	18	48	**113**	43	35	27	**105**	**218**	6	384	29	**419**	35	1022	36	**1093**	**1512**	**1730**
17:00 18:00	40	15	60	**115**	29	10	16	**55**	**170**	9	349	25	**383**	23	887	35	**945**	**1328**	**1498**
Sub Total	269	123	469	**861**	315	127	164	**606**	**1467**	81	3418	191	**3690**	277	4996	287	**5560**	**9250**	**10717**
U Turns				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	269	123	469	**861**	315	127	164	**606**	**1467**	81	3418	191	**3690**	277	4996	287	**5560**	**9250**	**10717**
EQ 12Hr	374	171	652	**1197**	438	177	228	**842**	**2039**	113	4751	265	**5129**	385	6944	399	**7728**	**12857**	**14896**
AVG 12Hr	299	137	522	**957**	350	141	182	**674**	**1631**	90	3801	212	**4103**	308	5556	319	**6183**	**10286**	**11917**
AVG 24Hr	392	179	683	**1254**	459	185	239	**883**	**2137**	118	4979	278	**5375**	404	7278	418	**8099**	**13474**	**15611**

Note: These values are calculated by multiplying the totals by the appropriate expansion factor. **1.39**

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor. **.80**

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor. **1.31**

Comments:

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

Transportation Services - Traffic Services

W.O. 34683

Turning Movement Count - 15 Minute Summary Report

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

	ROOSEVELT AVE									RICHMOND RD									
	Northbound				Southbound					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	3	1	4	**8**	1	2	2	**5**	**13**	2	105	2	**109**	1	60	2	**63**	**172**	**185**
07:15 07:30	3	0	13	**16**	8	2	1	**11**	**27**	0	128	3	**131**	2	65	2	**69**	**200**	**227**
07:30 07:45	7	2	6	**15**	3	2	3	**8**	**23**	2	134	7	**143**	2	58	5	**65**	**208**	**231**
07:45 08:00	5	5	9	**19**	5	0	4	**9**	**28**	3	147	9	**159**	8	64	3	**75**	**234**	**262**
08:00 08:15	8	1	11	**20**	8	0	5	**13**	**33**	6	115	7	**128**	4	99	15	**118**	**246**	**279**
08:15 08:30	4	2	16	**22**	20	6	7	**33**	**55**	2	153	5	**160**	6	93	17	**116**	**276**	**331**
08:30 08:45	3	5	2	**10**	21	2	2	**25**	**35**	3	143	5	**151**	8	97	10	**115**	**266**	**301**
08:45 09:00	9	2	14	**25**	9	3	3	**15**	**40**	1	135	6	**142**	5	118	7	**130**	**272**	**312**
09:00 09:15	9	1	13	**23**	5	5	5	**15**	**38**	2	132	5	**139**	9	92	3	**104**	**243**	**281**
09:15 09:30	4	0	10	**14**	17	1	2	**20**	**34**	1	101	4	**106**	12	92	4	**108**	**214**	**248**
09:30 09:45	2	2	9	**13**	12	2	4	**18**	**31**	1	98	4	**103**	7	86	11	**104**	**207**	**238**
09:45 10:00	3	4	11	**18**	7	3	7	**17**	**35**	8	91	5	**104**	16	108	12	**136**	**240**	**275**
11:30 11:45	7	5	21	**33**	19	5	3	**27**	**60**	1	98	4	**103**	10	118	7	**135**	**238**	**298**
11:45 12:00	7	10	18	**35**	19	2	14	**35**	**70**	0	93	16	**109**	9	143	17	**169**	**278**	**348**
12:00 12:15	4	4	20	**28**	15	2	2	**19**	**47**	3	78	4	**85**	9	146	13	**168**	**253**	**300**
12:15 12:30	7	4	19	**30**	16	3	5	**24**	**54**	1	88	8	**97**	20	126	13	**159**	**256**	**310**
12:30 12:45	10	7	34	**51**	8	7	7	**22**	**73**	2	102	8	**112**	10	127	11	**148**	**260**	**333**
12:45 13:00	10	6	29	**45**	13	10	13	**36**	**81**	0	105	9	**114**	17	160	17	**194**	**308**	**389**
13:00 13:15	20	4	24	**48**	8	1	7	**16**	**64**	3	116	5	**124**	10	153	8	**171**	**295**	**359**
13:15 13:30	13	4	16	**33**	4	6	7	**17**	**50**	0	94	4	**98**	13	118	9	**140**	**238**	**288**
15:00 15:15	16	4	12	**32**	5	2	8	**15**	**47**	1	106	6	**113**	7	265	8	**280**	**393**	**440**
15:15 15:30	6	4	12	**22**	6	3	1	**10**	**32**	4	94	4	**102**	17	217	11	**245**	**347**	**379**
15:30 15:45	14	10	24	**48**	10	9	3	**22**	**70**	19	130	6	**155**	5	246	3	**254**	**409**	**479**
15:45 16:00	8	3	14	**25**	4	4	6	**14**	**39**	1	99	1	**101**	12	236	8	**256**	**357**	**396**
16:00 16:15	10	5	12	**27**	9	5	3	**17**	**44**	1	88	3	**92**	5	244	11	**260**	**352**	**396**
16:15 16:30	14	5	9	**28**	10	16	9	**35**	**63**	4	97	12	**113**	13	265	6	**284**	**397**	**460**
16:30 16:45	16	5	15	**36**	14	11	7	**32**	**68**	1	110	6	**117**	9	252	10	**271**	**388**	**456**
16:45 17:00	7	3	12	**22**	10	3	8	**21**	**43**	0	89	8	**97**	8	261	9	**278**	**375**	**418**
17:00 17:15	9	3	16	**28**	10	5	5	**20**	**48**	1	86	7	**94**	10	291	14	**315**	**409**	**457**
17:15 17:30	11	2	10	**23**	8	1	4	**13**	**36**	3	73	6	**82**	3	215	8	**226**	**308**	**344**
17:30 17:45	10	0	17	**27**	9	2	7	**18**	**45**	1	111	6	**118**	8	291	6	**305**	**423**	**468**
17:45 18:00	10	10	17	**37**	2	2	0	**4**	**41**	4	79	6	**89**	2	90	7	**99**	**188**	**229**
TOTAL:	269	123	469	**861**	315	127	164	**606**	**1467**	81	3418	191	**3690**	277	4996	287	**5560**	**9250**	**10717**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
34683

ROOSEVELT AVE @ RICHMOND RD

Count Date: Friday, June 12, 2015 **Start Time:** 07:00

	ROOSEVELT AVE			RICHMOND RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	6	1	**7**	18	4	**22**	**29**
08:00 09:00	17	13	**30**	8	9	**17**	**47**
09:00 10:00	4	1	**5**	3	5	**8**	**13**
11:30 12:30	2	0	**2**	2	5	**7**	**9**
12:30 13:30	2	3	**5**	4	7	**11**	**16**
15:00 16:00	7	4	**11**	3	4	**7**	**18**
16:00 17:00	4	2	**6**	6	5	**11**	**17**
17:00 18:00	2	6	**8**	3	9	**12**	**20**
Total	44	30	**74**	47	48	**95**	**169**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

W.O.
34683

Turning Movement Count - Heavy Vehicle Report

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015

		ROOSEVELT AVE									RICHMOND RD									
		Northbound				Southbound					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	08:00	0	2	4	**6**	0	1	0	**1**	**7**	0	12	0	**12**	2	25	0	**27**	**39**	**46**
08:00	09:00	3	0	7	**10**	3	0	0	**3**	**13**	1	29	0	**30**	1	20	3	**24**	**54**	**67**
09:00	10:00	0	0	3	**3**	1	2	2	**5**	**8**	0	15	0	**15**	1	16	1	**18**	**33**	**41**
11:30	12:30	1	0	0	**1**	2	0	1	**3**	**4**	1	10	1	**12**	1	21	1	**23**	**35**	**39**
12:30	13:30	1	0	0	**1**	1	2	2	**5**	**6**	0	18	0	**18**	0	21	2	**23**	**41**	**47**
15:00	16:00	2	0	0	**2**	1	1	0	**2**	**4**	0	11	0	**11**	0	16	0	**16**	**27**	**31**
16:00	17:00	1	0	1	**2**	2	2	0	**4**	**6**	0	7	0	**7**	0	9	2	**11**	**18**	**24**
17:00	18:00	0	0	0	**0**	0	0	0	**0**	**0**	0	6	0	**6**	0	10	0	**10**	**16**	**16**
Sub Total		8	2	15	**25**	10	8	5	**23**	**48**	2	108	1	**111**	5	138	9	**152**	**263**	**311**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		8	2	15	**0**	10	8	5	**23**	**48**	2	108	1	**111**	5	138	9	**152**	**263**	**311**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
34683

Turning Movement Count - Pedestrian Volume Report

ROOSEVELT AVE @ RICHMOND RD

Count Date: Friday, June 12, 2015 **Start Time:** 07:00

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	8	7	**15**	5	2	**7**	**22**
07:15 07:30	10	11	**21**	7	7	**14**	**35**
07:30 07:45	4	8	**12**	7	2	**9**	**21**
07:45 08:00	6	2	**8**	3	2	**5**	**13**
07:00 08:00	28	28	**56**	22	13	**35**	**91**
08:00 08:15	18	14	**32**	21	7	**28**	**60**
08:15 08:30	11	19	**30**	5	8	**13**	**43**
08:30 08:45	22	18	**40**	22	14	**36**	**76**
08:45 09:00	22	30	**52**	17	10	**27**	**79**
08:00 09:00	73	81	**154**	65	39	**104**	**258**
09:00 09:15	10	13	**23**	4	10	**14**	**37**
09:15 09:30	18	6	**24**	11	14	**25**	**49**
09:30 09:45	12	24	**36**	18	7	**25**	**61**
09:45 10:00	13	15	**28**	11	40	**51**	**79**
09:00 10:00	53	58	**111**	44	71	**115**	**226**
11:30 11:45	25	16	**41**	23	15	**38**	**79**
11:45 12:00	37	61	**98**	11	120	**131**	**229**
12:00 12:15	9	24	**33**	6	41	**47**	**80**
12:15 12:30	20	62	**82**	14	16	**30**	**112**
11:30 12:30	91	163	**254**	54	192	**246**	**500**
12:30 12:45	18	74	**92**	7	30	**37**	**129**
12:45 13:00	30	62	**92**	16	37	**53**	**145**
13:00 13:15	23	32	**55**	20	21	**41**	**96**
13:15 13:30	16	10	**26**	12	10	**22**	**48**
12:30 13:30	87	178	**265**	55	98	**153**	**418**
15:00 15:15	22	17	**39**	7	6	**13**	**52**
15:15 15:30	27	14	**41**	19	10	**29**	**70**
15:30 15:45	24	55	**79**	15	6	**21**	**100**
15:45 16:00	20	20	**40**	10	11	**21**	**61**
15:00 16:00	93	106	**199**	51	33	**84**	**283**
16:00 16:15	20	15	**35**	22	44	**66**	**101**
16:15 16:30	26	24	**50**	24	21	**45**	**95**
16:30 16:45	31	14	**45**	14	22	**36**	**81**
16:45 17:00	30	3	**33**	12	7	**19**	**52**
16:00 17:00	107	56	**163**	72	94	**166**	**329**
17:00 17:15	12	7	**19**	22	7	**29**	**48**
17:15 17:30	12	10	**22**	12	32	**44**	**66**
17:30 17:45	7	13	**20**	16	34	**50**	**70**
17:45 18:00	13	2	**15**	13	2	**15**	**30**
17:00 18:00	44	32	**76**	63	75	**138**	**214**
Total	576	702	**1278**	426	615	**1041**	**2319**

Comment:

Turning Movement Count - 15 Min U-Turn Total Report

ROOSEVELT AVE @ RICHMOND RD

Survey Date: Friday, June 12, 2015

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
Total		0	0	0	0	0

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

Intersection: **Main:** Richmond **Side:** Roosevelt

Controller: **MS-3200** **TSD:** 5231

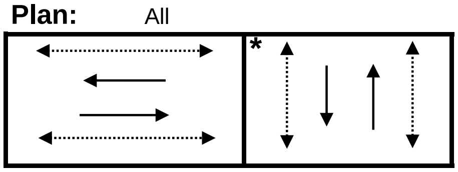
Author: Yassine Bennani **Date:** 15-Mar-2019

Existing Timing Plans†

	Plan						Ped Minimum Time		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	**Evening** 12	***Walk***	***DW***	***A+R***
Cycle	70	65	85	60	65	70			
Offset	27	4	78	X	4	X			
EB Thru	45	40	60	35	40	45	18	8	3.3+2.1
WB Thru	45	40	60	35	40	45	18	8	3.3+2.1
NB Thru	25	25	25	25	25	25	9	10	3.3+2.3
SB Thru	25	25	25	25	25	25	9	10	3.3+2.3

Phasing Sequence‡

Plan: All



Schedule

Weekday

Time	Plan
0:15	4
6:30	1
9:30	2
15:00	3
18:30	2
20:00	12
23:00	4

Saturday

Time	Plan
0:15	4
9:10	5
18:30	2
20:00	12
23:30	4

Sunday

Time	Plan
0:15	4
9:10	2
20:00	12
22:30	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄┈┈┈┈► Pedestrian signal

Cost is $56.50 ($50 + HST)

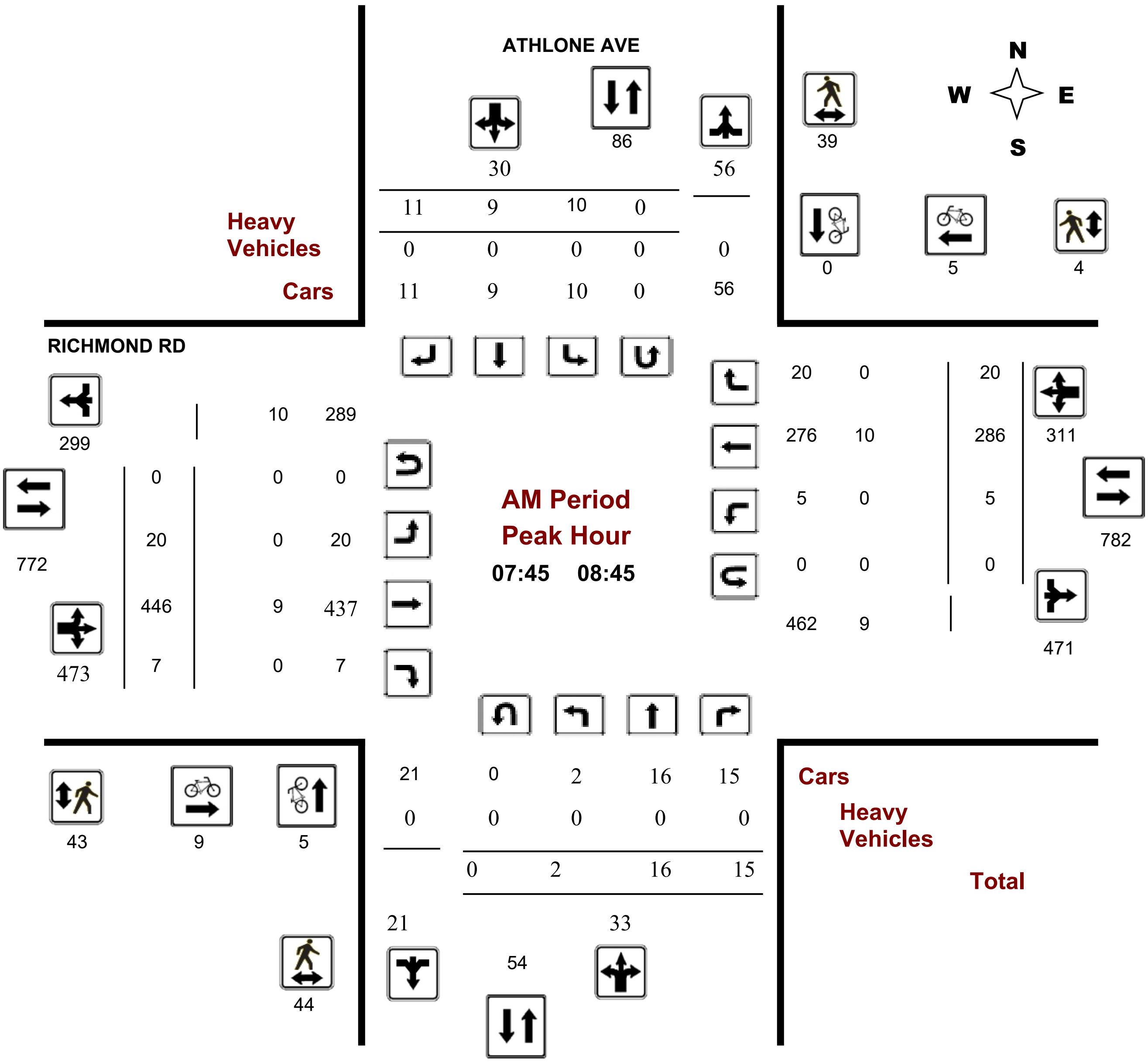
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017 **WO No:** 36951

Start Time: 07:00 **Device:** Miovision



Comments

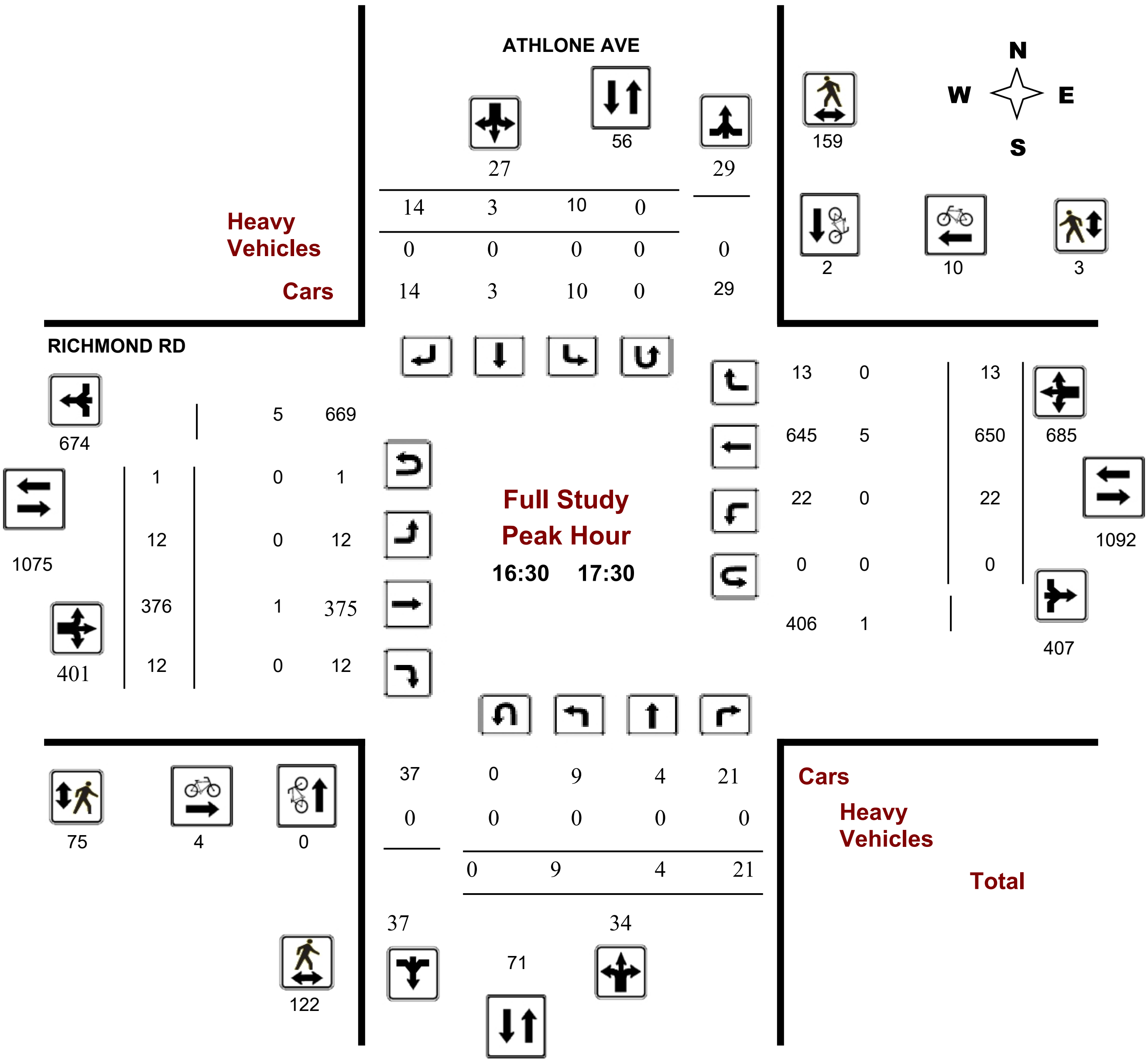
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017 **WO No:** 36951

Start Time: 07:00 **Device:** Miovision



Comments

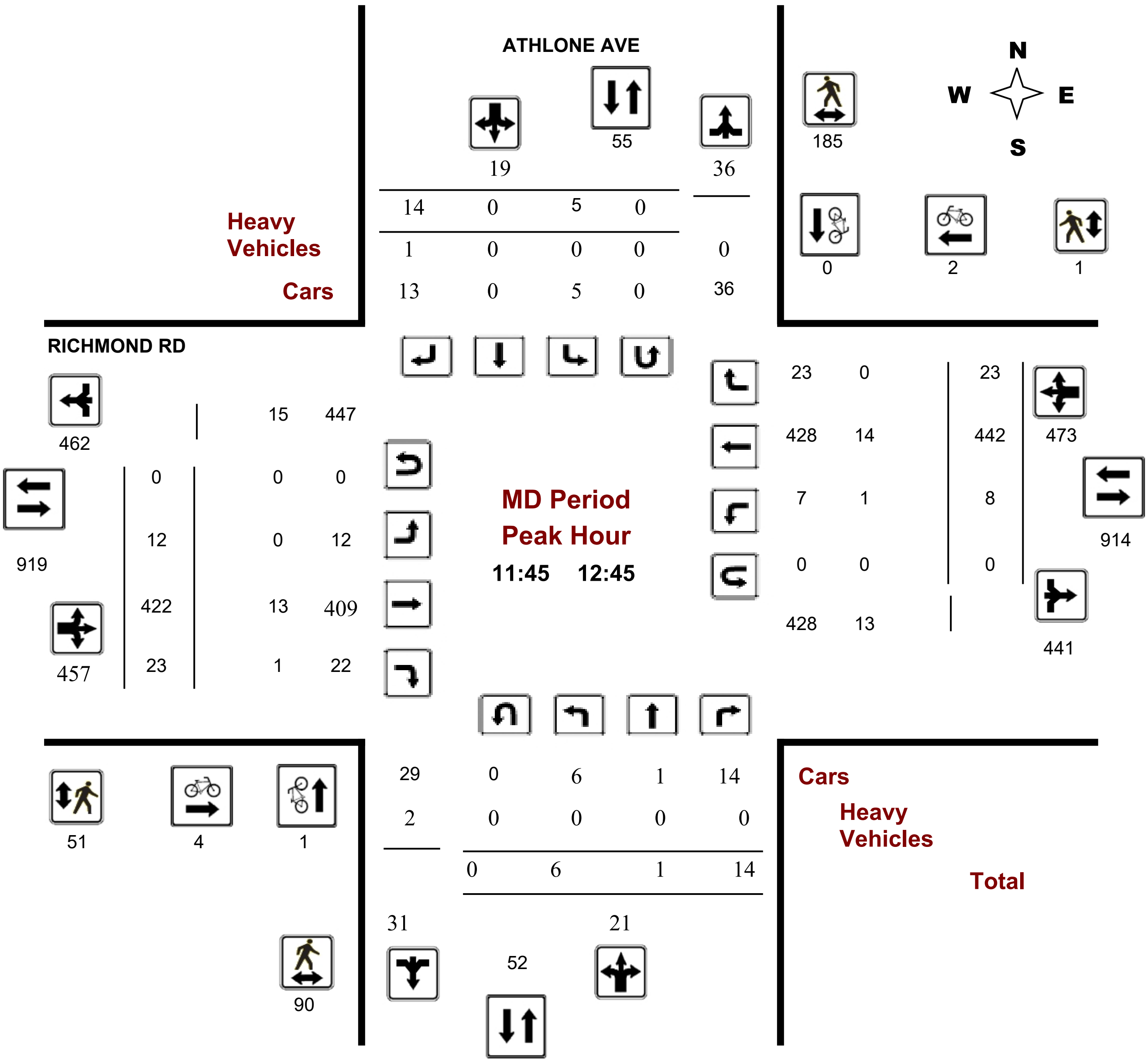
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017 **WO No:** 36951

Start Time: 07:00 **Device:** Miovision



Comments

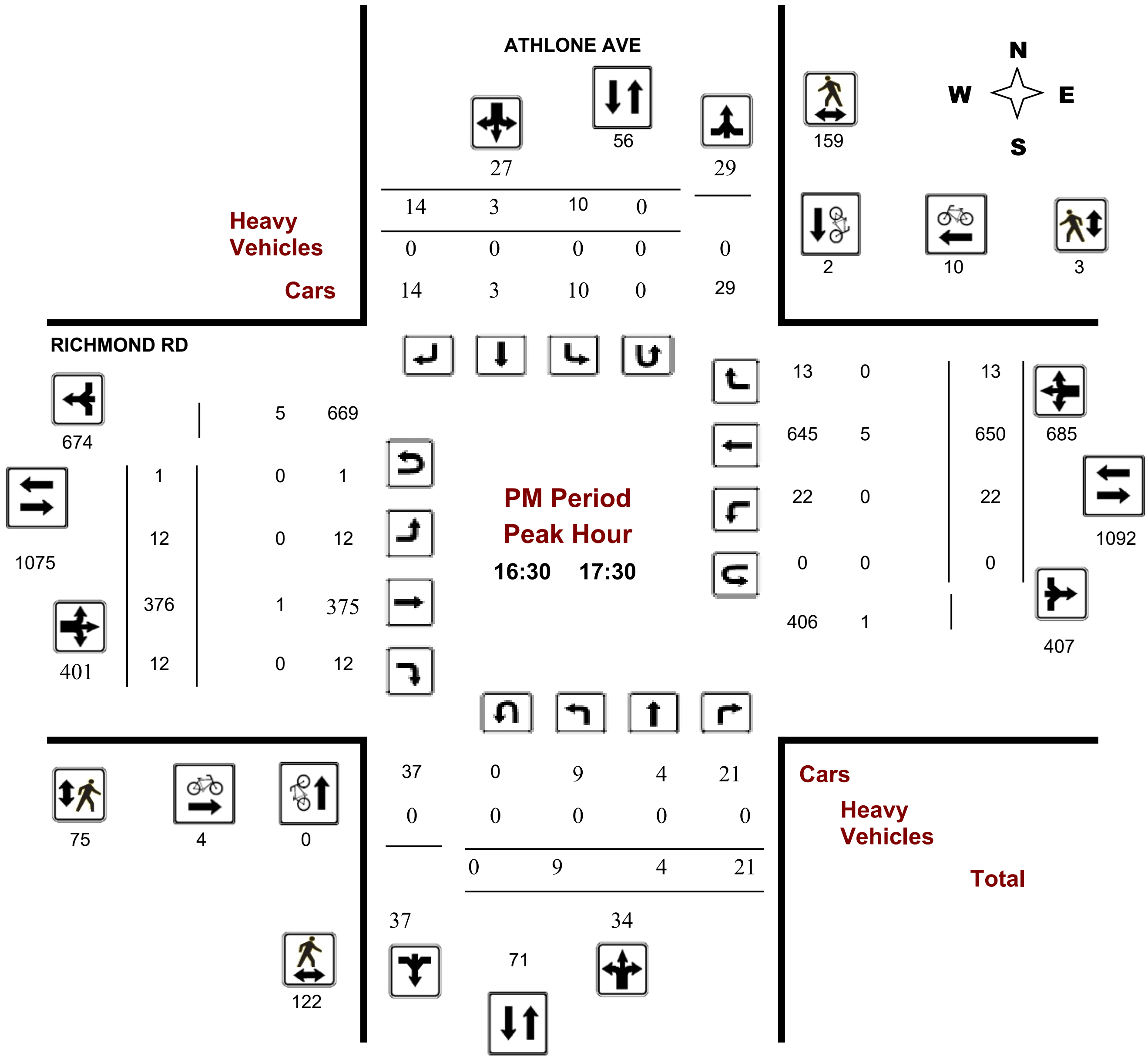
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017 **WO No:** 36951

Start Time: 07:00 **Device:** Miovision



Comments

Transportation Services - Traffic Services

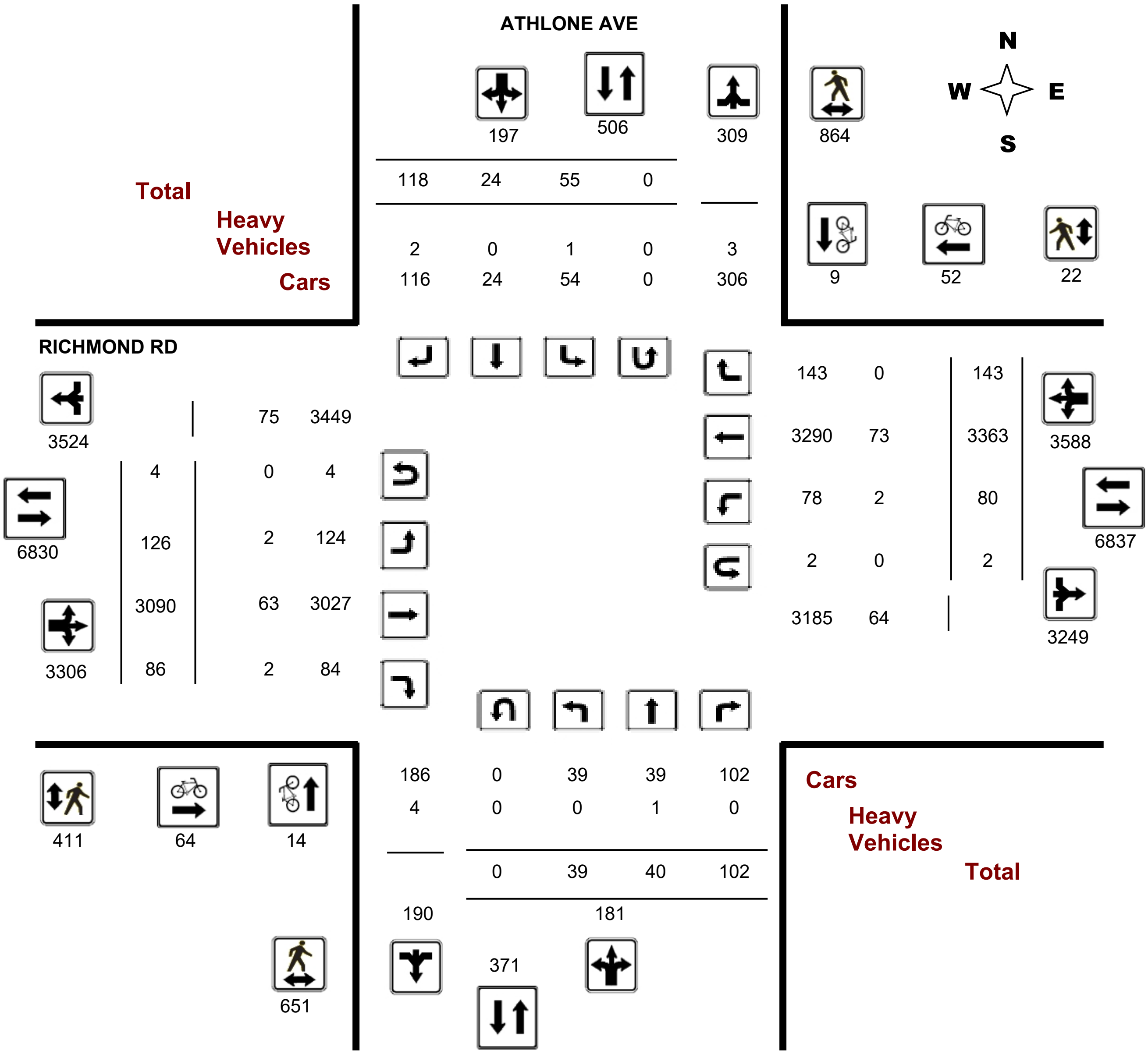
Turning Movement Count - Full Study Diagram

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

WO#: 36951

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
36951

Turning Movement Count - Full Study Summary Report

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 4 Westbound: 2

AADT Factor
.90

Full Study

	ATHLONE AVE									RICHMOND RD									
	Northbound				Southbound					Eastbound				Westbound					
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	1	5	4	**10**	4	3	7	**14**	**24**	14	395	6	**415**	0	219	9	**228**	**643**	**667**
08:00 09:00	2	14	15	**31**	9	9	9	**27**	**58**	17	408	9	**434**	6	287	17	**310**	**744**	**802**
09:00 10:00	6	8	7	**21**	5	2	20	**27**	**48**	14	363	6	**383**	7	294	17	**318**	**701**	**749**
11:30 12:30	5	2	9	**16**	6	0	12	**18**	**34**	15	423	22	**460**	6	423	21	**450**	**910**	**944**
12:30 13:30	3	0	24	**27**	6	2	17	**25**	**52**	15	424	10	**449**	10	431	21	**462**	**911**	**963**
15:00 16:00	5	2	13	**20**	9	1	16	**26**	**46**	14	351	9	**374**	8	520	10	**538**	**912**	**958**
16:00 17:00	5	3	14	**22**	8	5	14	**27**	**49**	10	350	8	**368**	23	615	21	**659**	**1027**	**1076**
17:00 18:00	12	6	16	**34**	8	2	23	**33**	**67**	27	376	16	**419**	20	574	27	**621**	**1040**	**1107**
Sub Total	39	40	102	**181**	55	24	118	**197**	**378**	126	3090	86	**3302**	80	3363	143	**3586**	**6888**	**7266**
U Turns				**0**				**0**	**0**				**4**				**2**	**6**	**6**
Total	39	40	102	**181**	55	24	118	**197**	**378**	126	3090	86	**3306**	80	3363	143	**3588**	**6894**	**7272**
EQ 12Hr	54	56	142	**252**	76	33	164	**274**	**526**	175	4295	120	**4595**	111	4675	199	**4987**	**9582**	**10108**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.														**1.39**					
AVG 12Hr	49	50	128	**226**	69	30	148	**246**	**472**	158	3866	108	**4136**	100	4207	179	**4489**	**8625**	**9097**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.														**.90**					
AVG 24Hr	64	66	167	**297**	90	39	193	**323**	**620**	206	5064	141	**5418**	131	5511	234	**5880**	**11298**	**11918**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.														**1.31**					

Comments:

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

Turning Movement Count - 15 Minute Summary Report

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 4 Westbound: 2

	ATHLONE AVE									RICHMOND RD									
	Northbound				Southbound					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	0	0	**0**	1	0	1	**2**	**2**	0	78	3	**81**	0	47	1	**48**	**129**	**131**
07:15 07:30	1	0	1	**2**	0	1	0	**1**	**3**	3	88	0	**91**	0	48	2	**50**	**141**	**144**
07:30 07:45	0	2	1	**3**	1	1	1	**3**	**6**	6	97	2	**105**	0	46	1	**47**	**152**	**158**
07:45 08:00	0	3	2	**5**	2	1	5	**8**	**13**	5	132	1	**138**	0	78	5	**83**	**221**	**234**
08:00 08:15	0	6	4	**10**	1	2	2	**5**	**15**	9	105	0	**114**	3	62	3	**68**	**182**	**197**
08:15 08:30	0	5	5	**10**	4	2	2	**8**	**18**	3	100	0	**103**	1	63	6	**70**	**173**	**191**
08:30 08:45	2	2	4	**8**	3	4	2	**9**	**17**	3	109	6	**118**	1	83	6	**90**	**208**	**225**
08:45 09:00	0	1	2	**3**	1	1	3	**5**	**8**	2	94	3	**100**	1	79	2	**82**	**182**	**190**
09:00 09:15	3	2	2	**7**	2	1	8	**11**	**18**	4	100	1	**106**	1	57	1	**59**	**165**	**183**
09:15 09:30	0	3	0	**3**	2	1	4	**7**	**10**	5	90	1	**96**	3	85	6	**94**	**190**	**200**
09:30 09:45	0	3	3	**6**	1	0	3	**4**	**10**	4	88	3	**95**	2	76	0	**79**	**174**	**184**
09:45 10:00	3	0	2	**5**	0	0	5	**5**	**10**	1	85	1	**87**	1	76	10	**87**	**174**	**184**
11:30 11:45	0	1	1	**2**	2	0	1	**3**	**5**	3	100	3	**106**	0	93	3	**96**	**202**	**207**
11:45 12:00	2	0	1	**3**	2	0	3	**5**	**8**	7	113	4	**124**	5	112	4	**121**	**245**	**253**
12:00 12:15	1	0	3	**4**	2	0	4	**6**	**10**	2	113	11	**126**	0	110	6	**116**	**242**	**252**
12:15 12:30	2	1	4	**7**	0	0	4	**4**	**11**	3	97	4	**104**	1	108	8	**117**	**221**	**232**
12:30 12:45	1	0	6	**7**	1	0	3	**4**	**11**	0	99	4	**103**	2	112	5	**119**	**222**	**233**
12:45 13:00	0	0	5	**5**	1	1	4	**6**	**11**	4	97	4	**105**	5	96	2	**103**	**208**	**219**
13:00 13:15	1	0	5	**6**	1	0	6	**7**	**13**	7	107	1	**115**	2	111	8	**122**	**237**	**250**
13:15 13:30	1	0	8	**9**	3	1	4	**8**	**17**	4	121	1	**126**	1	112	6	**119**	**245**	**262**
15:00 15:15	0	0	4	**4**	1	0	3	**4**	**8**	5	92	3	**101**	1	117	1	**119**	**220**	**228**
15:15 15:30	1	0	0	**1**	4	0	2	**6**	**7**	4	96	2	**102**	0	116	1	**117**	**219**	**226**
15:30 15:45	1	2	3	**6**	1	0	5	**6**	**12**	5	86	1	**92**	5	145	5	**155**	**247**	**259**
15:45 16:00	3	0	6	**9**	3	1	6	**10**	**19**	0	77	3	**80**	2	142	3	**147**	**227**	**246**
16:00 16:15	2	0	5	**7**	0	0	4	**4**	**11**	2	81	1	**84**	7	137	6	**150**	**234**	**245**
16:15 16:30	2	1	1	**4**	2	2	3	**7**	**11**	2	84	2	**88**	6	144	7	**157**	**245**	**256**
16:30 16:45	1	2	5	**8**	4	2	5	**11**	**19**	4	102	2	**108**	5	158	7	**170**	**278**	**297**
16:45 17:00	0	0	3	**3**	2	1	2	**5**	**8**	2	83	3	**88**	5	176	1	**182**	**270**	**278**
17:00 17:15	3	0	5	**8**	2	0	2	**4**	**12**	3	107	3	**114**	4	171	2	**177**	**291**	**303**
17:15 17:30	5	2	8	**15**	2	0	5	**7**	**22**	3	84	4	**91**	8	145	3	**156**	**247**	**269**
17:30 17:45	3	2	1	**6**	0	1	10	**11**	**17**	16	92	6	**114**	5	140	10	**155**	**269**	**286**
17:45 18:00	1	2	2	**5**	4	1	6	**11**	**16**	5	93	3	**101**	3	118	12	**133**	**234**	**250**
TOTAL:	39	40	102	**181**	55	24	118	**197**	**378**	126	3090	86	**3306**	80	3363	143	**3588**	**6894**	**7272**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36951

ATHLONE AVE @ RICHMOND RD

Count Date: Thursday, April 20, 2017 **Start Time:** 07:00

	ATHLONE AVE			RICHMOND RD			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	2	2	**4**	13	5	**18**	**22**
08:00 09:00	3	1	**4**	9	6	**15**	**19**
09:00 10:00	1	1	**2**	6	5	**11**	**13**
11:30 12:30	0	0	**0**	4	5	**9**	**9**
12:30 13:30	1	0	**1**	3	0	**3**	**4**
15:00 16:00	6	0	**6**	6	4	**10**	**16**
16:00 17:00	1	2	**3**	14	7	**21**	**24**
17:00 18:00	0	3	**3**	9	20	**29**	**32**
Total	14	9	**23**	64	52	**116**	**139**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

W.O.
36951

Turning Movement Count - Heavy Vehicle Report

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

	ATHLONE AVE									RICHMOND RD									
	Northbound				Southbound					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 08:00	0	0	0	**0**	0	0	0	**0**	**0**	0	12	0	**12**	0	9	0	**9**	**21**	**21**
08:00 09:00	0	0	0	**0**	0	0	0	**0**	**0**	0	9	0	**9**	0	9	0	**9**	**18**	**18**
09:00 10:00	0	1	0	**1**	0	0	0	**0**	**1**	0	11	0	**11**	0	10	0	**10**	**21**	**22**
11:30 12:30	0	0	0	**0**	0	0	1	**1**	**1**	0	16	1	**17**	1	13	0	**14**	**31**	**32**
12:30 13:30	0	0	0	**0**	0	0	1	**1**	**1**	2	8	0	**10**	0	17	0	**17**	**27**	**28**
15:00 16:00	0	0	0	**0**	1	0	0	**1**	**1**	0	5	0	**5**	1	7	0	**8**	**13**	**14**
16:00 17:00	0	0	0	**0**	0	0	0	**0**	**0**	0	0	0	**0**	0	4	0	**4**	**4**	**4**
17:00 18:00	0	0	0	**0**	0	0	0	**0**	**0**	0	2	1	**3**	0	4	0	**4**	**7**	**7**
Sub Total	0	1	0	**1**	1	0	2	**3**	**4**	2	63	2	**67**	2	73	0	**75**	**142**	**146**
U-Turns (Heavy Vehicles)				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	0	1	0	**0**	1	0	2	**3**	**4**	2	63	2	**67**	2	73	0	**75**	**142**	**146**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
36951

Turning Movement Count - Pedestrian Volume Report

ATHLONE AVE @ RICHMOND RD

Count Date: Thursday, April 20, 2017 **Start Time:** 07:00

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	7	1	**8**	9	0	**9**	**17**
07:15 07:30	6	5	**11**	6	2	**8**	**19**
07:30 07:45	5	8	**13**	3	0	**3**	**16**
07:45 08:00	12	10	**22**	11	2	**13**	**35**
07:00 08:00	30	24	**54**	29	4	**33**	**87**
08:00 08:15	10	7	**17**	6	1	**7**	**24**
08:15 08:30	14	14	**28**	16	0	**16**	**44**
08:30 08:45	8	8	**16**	10	1	**11**	**27**
08:45 09:00	11	15	**26**	14	0	**14**	**40**
08:00 09:00	43	44	**87**	46	2	**48**	**135**
09:00 09:15	15	12	**27**	7	0	**7**	**34**
09:15 09:30	8	20	**28**	7	0	**7**	**35**
09:30 09:45	12	13	**25**	7	1	**8**	**33**
09:45 10:00	9	24	**33**	7	1	**8**	**41**
09:00 10:00	44	69	**113**	28	2	**30**	**143**
11:30 11:45	30	38	**68**	15	1	**16**	**84**
11:45 12:00	21	33	**54**	9	0	**9**	**63**
12:00 12:15	21	47	**68**	14	1	**15**	**83**
12:15 12:30	26	61	**87**	11	0	**11**	**98**
11:30 12:30	98	179	**277**	49	2	**51**	**328**
12:30 12:45	22	44	**66**	17	0	**17**	**83**
12:45 13:00	31	37	**68**	21	1	**22**	**90**
13:00 13:15	21	38	**59**	10	0	**10**	**69**
13:15 13:30	31	31	**62**	9	0	**9**	**71**
12:30 13:30	105	150	**255**	57	1	**58**	**313**
15:00 15:15	14	25	**39**	10	0	**10**	**49**
15:15 15:30	36	28	**64**	15	0	**15**	**79**
15:30 15:45	22	31	**53**	14	1	**15**	**68**
15:45 16:00	20	27	**47**	16	2	**18**	**65**
15:00 16:00	92	111	**203**	55	3	**58**	**261**
16:00 16:15	31	33	**64**	14	0	**14**	**78**
16:15 16:30	26	35	**61**	15	5	**20**	**81**
16:30 16:45	28	45	**73**	19	1	**20**	**93**
16:45 17:00	31	45	**76**	26	1	**27**	**103**
16:00 17:00	116	158	**274**	74	7	**81**	**355**
17:00 17:15	39	47	**86**	14	0	**14**	**100**
17:15 17:30	24	22	**46**	16	1	**17**	**63**
17:30 17:45	27	34	**61**	28	0	**28**	**89**
17:45 18:00	33	26	**59**	15	0	**15**	**74**
17:00 18:00	123	129	**252**	73	1	**74**	**326**
Total	651	864	**1515**	411	22	**433**	**1948**

Comment:

Ottawa

Transportation Services - Traffic Services

Work Order
36951

Turning Movement Count - 15 Min U-Turn Total Report

ATHLONE AVE @ RICHMOND RD

Survey Date: Thursday, April 20, 2017

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	1	0	1
09:00	09:15	0	0	1	0	1
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	1	1
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	1	1
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	1	0	1
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	1	0	1
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
Total		0	0	4	2	6

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

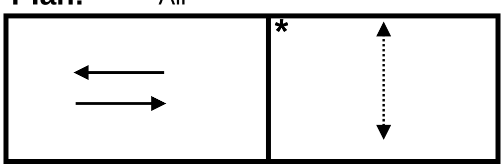
Intersection:	**Main:** Richmond		**Side:**	Athlone
Controller:	**ATC-3**		**TSD:**	6523
Author:	Yassine Bennani		**Date:**	15-Mar-2019

Existing Timing Plans†

	Plan					**Ped Minimum Time**		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	***Walk***	***DW***	***A+R***
Cycle	65	65	65	65	65			
Offset	X	X	X	X	X			
EB Thru	42	42	42	42	42	-	-	3.3+2.7
WB Thru	42	42	42	42	42	-	-	3.3+2.7
NS Ped	23	23	23	23	23	7	12	3.0+1.0

Phasing Sequence‡

Plan: All



Schedule

Weekday

Time	Plan
0:15	4
6:30	1
9:30	2
15:00	3
18:30	2
22:30	4

Saturday

Time	Plan
0:15	4
6:30	2
9:00	5
18:30	2
22:30	4

Sunday

Time	Plan
0:15	4
6:30	2
9:00	5
18:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◀┈┈┈┈▶ Pedestrian signal

Cost is $56.50 ($50 + HST)

ACCURATE TRUSTED TRAFFIC DATA

Turning Movement Count
Summary Report
AADT and Expansion Factors

Automobiles, Taxis, Light Trucks, Vans, SUV's, Motorcycles, Heavy Trucks, Buses, and School Buses

Churchill Avenue North & Scott Street — Ottawa, ON

Survey Date:	Thursday, 21 March 2019			**Start Time:**	0700	**AADT Factor:** 1.0
Weather AM:	Overcast 0° C	**Survey Duration:**	6 Hrs.	**Survey Hours:**	0700-1000 & 1500-1800	
Weather PM:	Overcast +5° C			**Surveyor(s):**	Carmody	

	Scott St. Eastbound					Scott St. Westbound						Churchill Ave. (N) Northbound					Churchill Ave. (N) Southbound						
Time Period	LT	ST	RT	UT	E/B Tot	LT	ST	RT	UT	W/B Tot	Street Total	LT	ST	RT	UT	N/B Tot	LT	ST	RT	UT	S/B Tot	Street Total	Grand Total
0700-0800	0	5	10	0	15	133	7	14	0	154	169	9	74	293	0	376	48	183	0	0	231	607	776
0800-0900	0	7	13	0	20	184	9	20	0	213	233	8	106	396	0	510	49	207	1	0	257	767	1000
0900-1000	1	6	17	0	24	197	5	19	0	221	245	11	61	172	0	244	35	139	1	0	175	419	664
1500-1600	1	6	13	0	20	305	6	35	0	346	366	12	103	190	0	305	41	144	0	0	185	490	856
1600-1700	0	2	4	0	6	333	6	36	0	375	381	9	127	194	0	330	36	104	3	0	143	473	854
1700-1800	1	13	9	0	23	305	7	29	0	341	364	18	123	210	0	351	30	102	1	0	133	484	848
Totals	3	39	66	0	108	1457	40	153	0	1650	1758	67	594	1455	0	2116	239	879	6	0	1124	3240	4998

Equivalent 12 & 24-hour Vehicle Volumes Including the Annual Average Daily Traffic (AADT) Factor Applicable to the Day and Month of the Turning Movement Count

Expansion factors are applied exclusively to standard weekday 8-hour turning movement counts conducted during the hours of 0700h - 1000h, 1130h - 1330h and 1500h - 1800h

Equivalent 12-hour vehicle volumes. These volumes are calculated by multiplying the 8-hour totals by the 8 ➡12 expansion factor of 1.39

Equ. 12 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Average daily 12-hour vehicle volumes. These volumes are calculated by multiplying the equivalent 12-hour totals by the AADT factor of: 1.0

AADT 12-hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

24-Hour AADT. These volumes are calculated by multiplying the average daily 12-hour vehicle volumes by the 12 ➡24 expansion factor of 1.31

AADT 24 Hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

AADT and expansion factors provided by the City of Ottawa

AM Peak Hour Factor ➡ 0.91

Highest Hourly Vehicle Volume Between 0700h & 1000h

AM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
0800-0900	0	7	13	0	20	184	9	20	0	213	233	8	106	396	0	510	49	207	1	0	257	767	1000

PM Peak Hour Factor ➡ 0.93

Highest Hourly Vehicle Volume Between 1500h & 1800h

PM Peak Hr	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	LT	ST	RT	UT	TOT	LT	ST	RT	UT	TOT	S.TOT	G.TOT
1515-1615	0	5	12	0	17	332	5	33	0	370	387	11	113	199	0	323	39	133	1	0	173	496	883

Comments:
The majority of the cyclists ignore the stop signs.

Notes:
1. Includes all vehicle types except bicycles, electric bicycles, and electric scooters.
2.When expansion and AADT factors are applied, the results will differ slightly due to rounding.

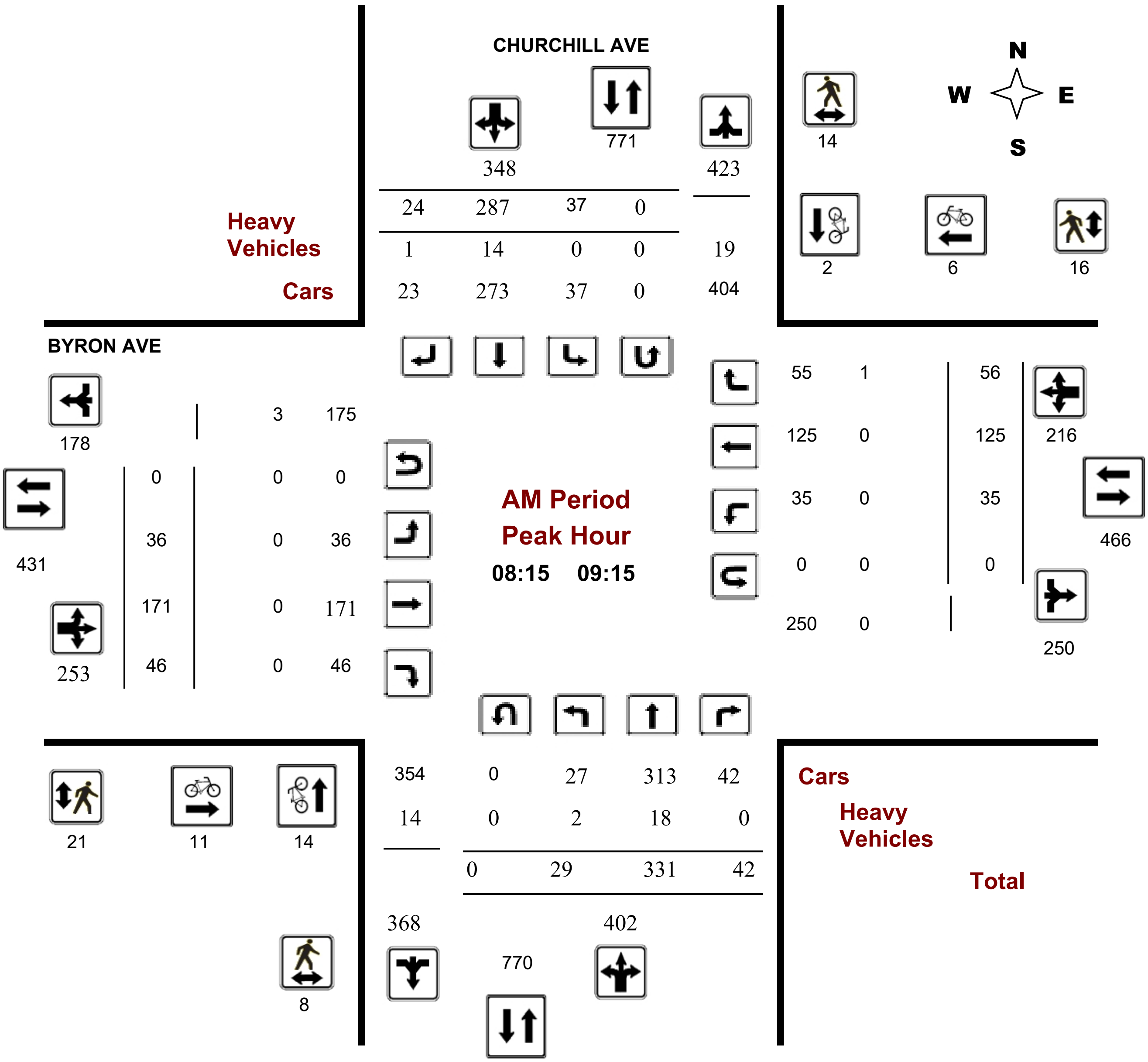
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36253

Start Time: 07:00 **Device:** Miovision



Comments

Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

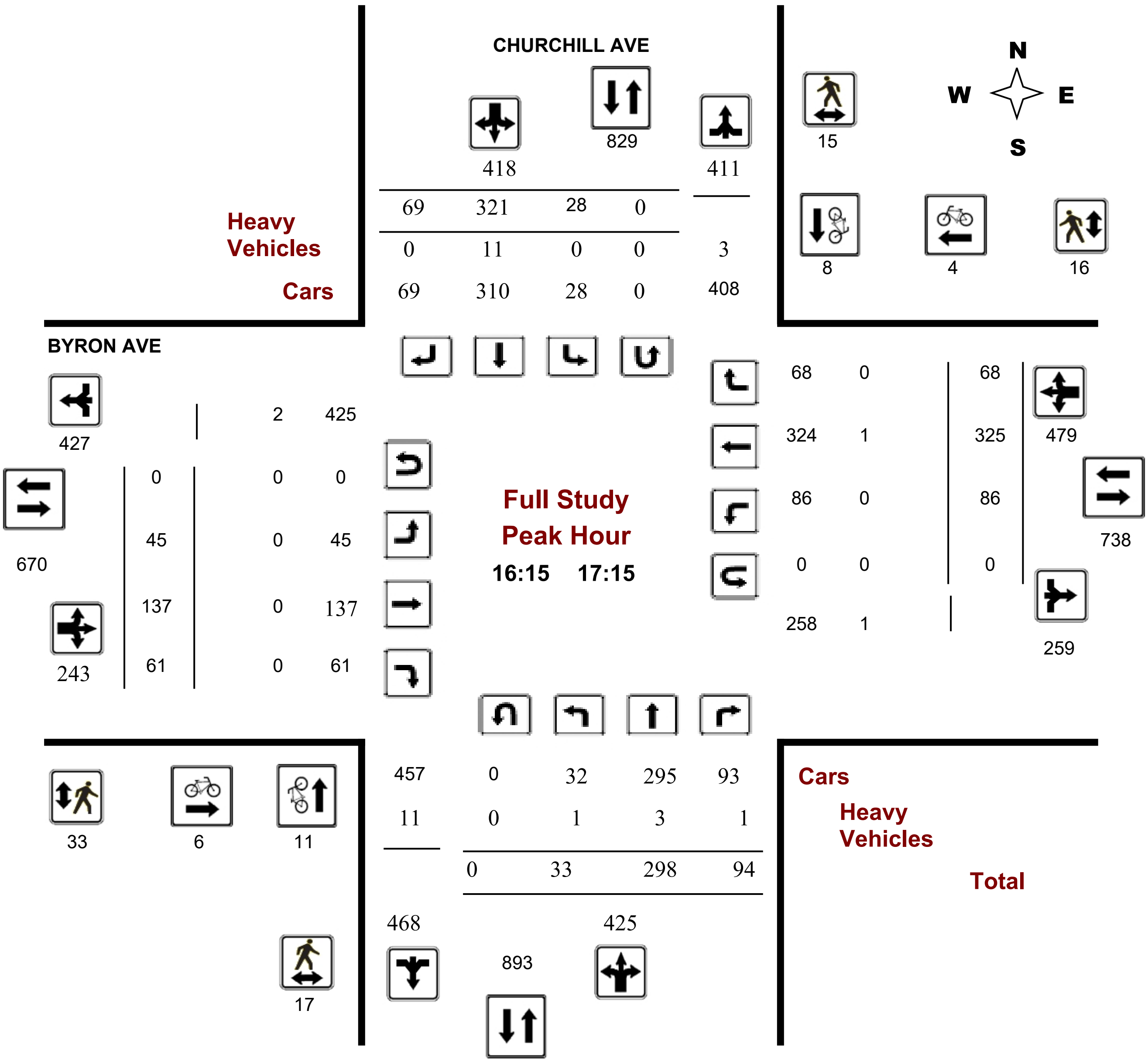
BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016

Start Time: 07:00

WO No: 36253

Device: Miovision



Comments

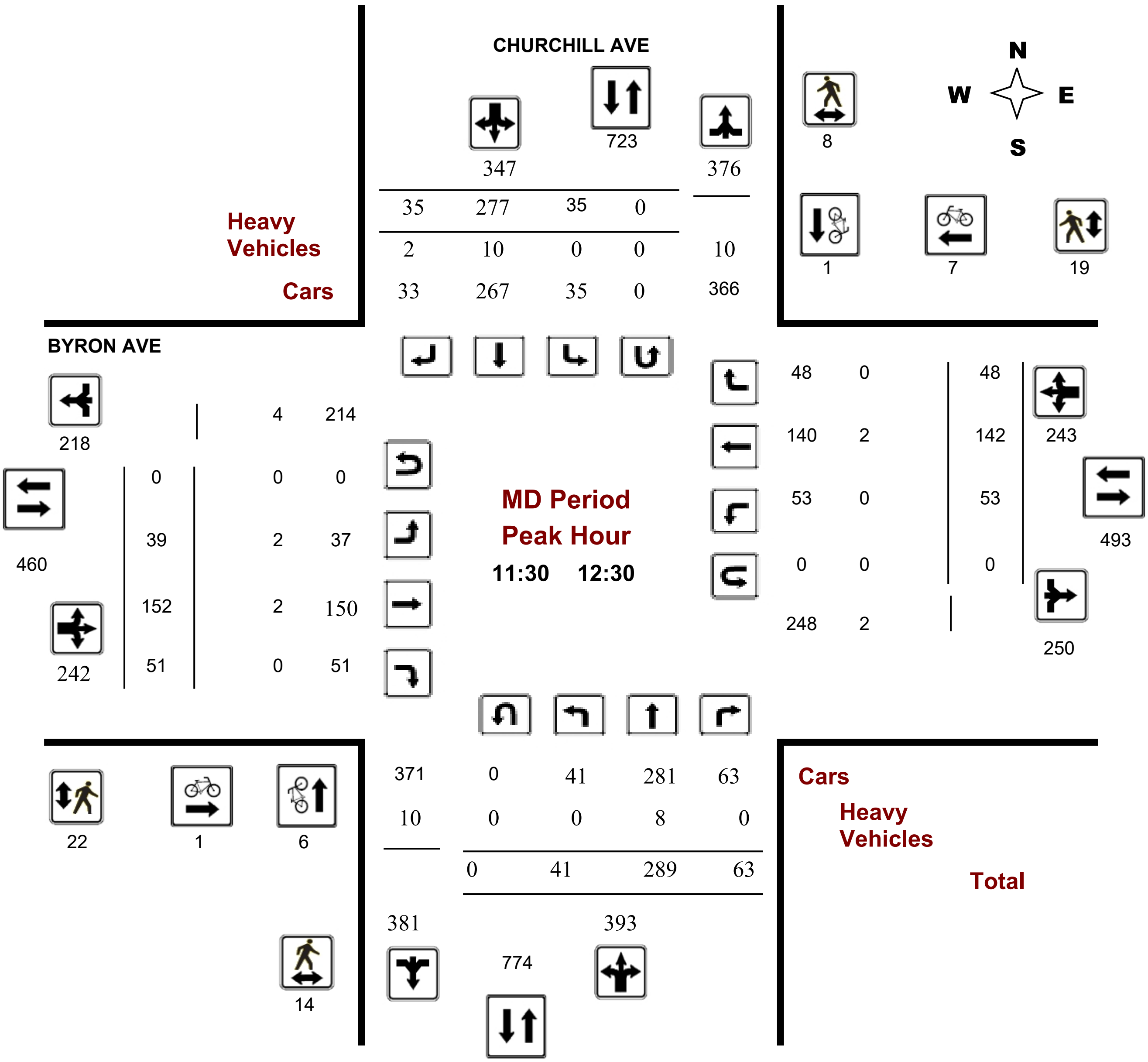
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36253

Start Time: 07:00 **Device:** Miovision



Comments

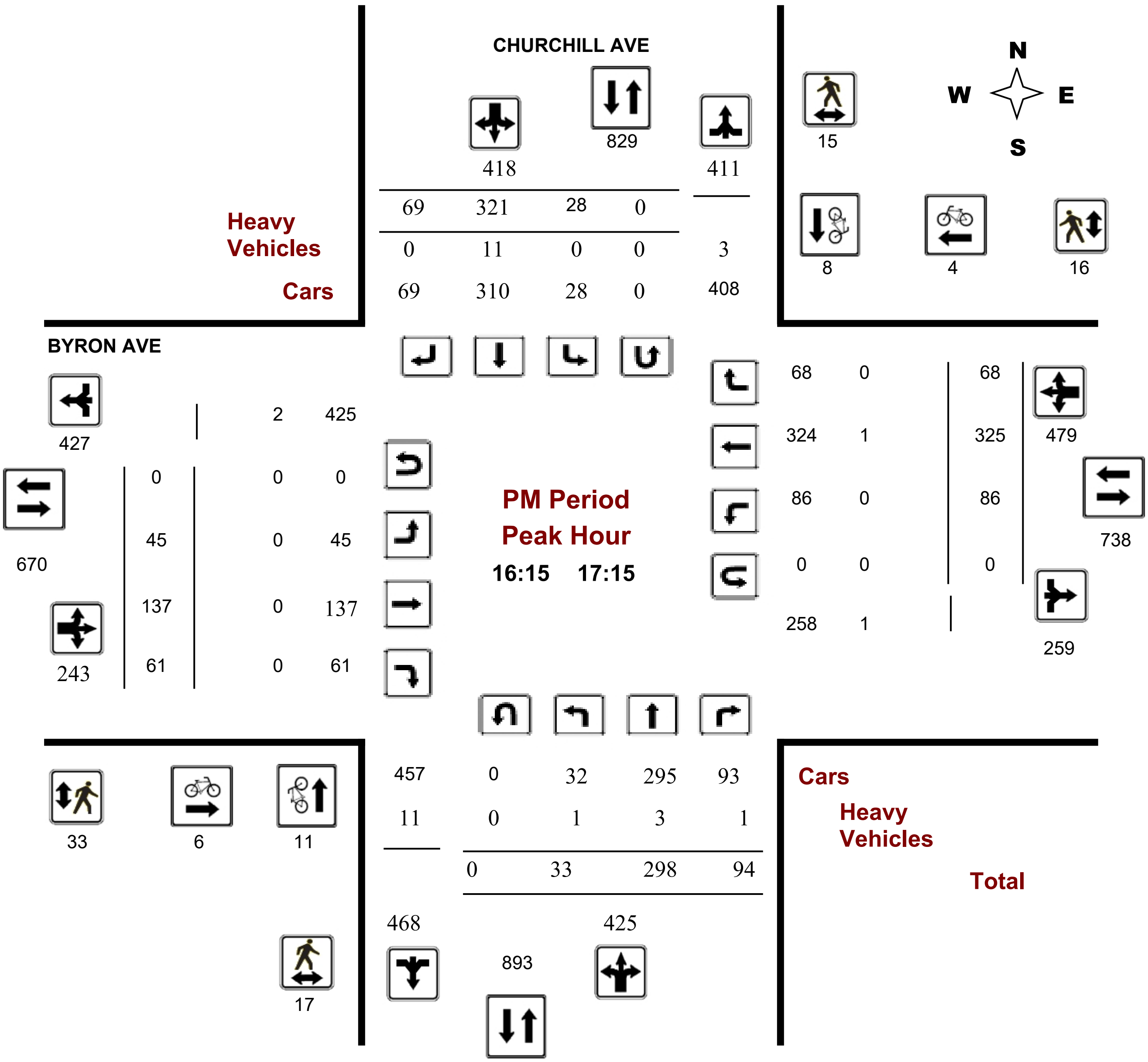
Transportation Services - Traffic Services

Turning Movement Count - Peak Hour Diagram

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016 **WO No:** 36253

Start Time: 07:00 **Device:** Miovision



Comments

Transportation Services - Traffic Services

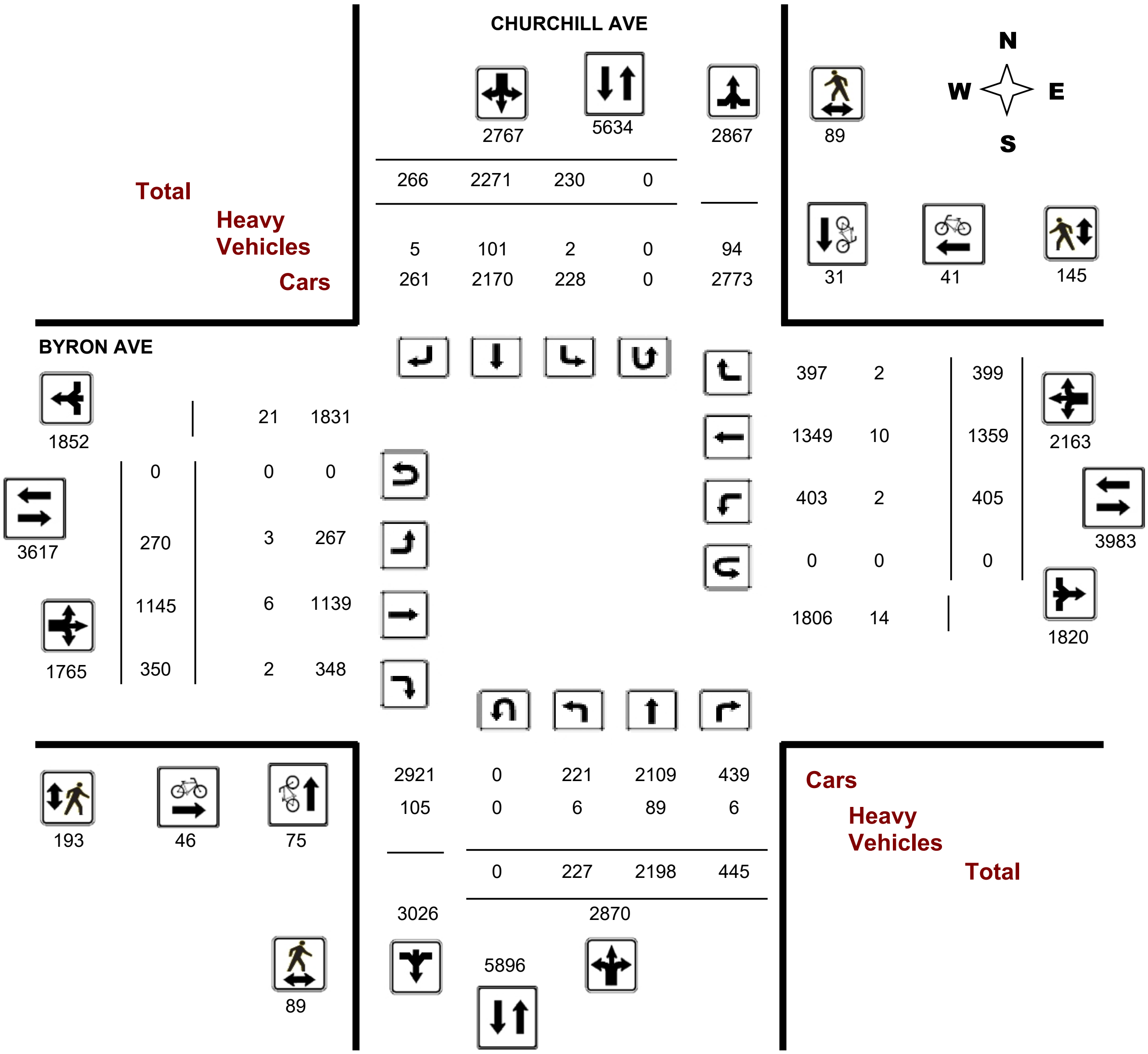
Turning Movement Count - Full Study Diagram

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016

WO#: 36253

Device: Miovision



Comments

Transportation Services - Traffic Services

Work Order
36253

Turning Movement Count - Full Study Summary Report

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0
Eastbound: 0 Westbound: 0

AADT Factor
.90

Full Study

	CHURCHILL AVE									BYRON AVE									
	Northbound				Southbound					Eastbound				Westbound					
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	16	199	19	**234**	27	230	6	**263**	**497**	25	85	19	**129**	30	54	27	**111**	**240**	**737**
08:00 09:00	31	330	47	**408**	38	292	20	**350**	**758**	47	154	42	**243**	35	100	55	**190**	**433**	**1191**
09:00 10:00	20	276	47	**343**	26	207	14	**247**	**590**	23	148	43	**214**	32	116	59	**207**	**421**	**1011**
11:30 12:30	41	289	63	**393**	35	277	35	**347**	**740**	39	152	51	**242**	53	142	48	**243**	**485**	**1225**
12:30 13:30	30	272	62	**364**	19	294	33	**346**	**710**	40	145	53	**238**	32	149	45	**226**	**464**	**1174**
15:00 16:00	26	257	44	**327**	31	322	36	**389**	**716**	27	171	49	**247**	58	208	45	**311**	**558**	**1274**
16:00 17:00	28	303	98	**429**	30	337	64	**431**	**860**	41	143	50	**234**	83	305	59	**447**	**681**	**1541**
17:00 18:00	35	272	65	**372**	24	312	58	**394**	**766**	28	147	43	**218**	82	285	61	**428**	**646**	**1412**
Sub Total	227	2198	445	**2870**	230	2271	266	**2767**	**5637**	270	1145	350	**1765**	405	1359	399	**2163**	**3928**	**9565**
U Turns				**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total	227	2198	445	**2870**	230	2271	266	**2767**	**5637**	270	1145	350	**1765**	405	1359	399	**2163**	**3928**	**9565**
EQ 12Hr	316	3055	619	**3989**	320	3157	370	**3846**	**7835**	375	1592	486	**2453**	563	1889	555	**3007**	**5460**	**13295**
Note: These values are calculated by multiplying the totals by the appropriate expansion factor.													**1.39**						
AVG 12Hr	284	2750	557	**3590**	288	2841	333	**3462**	**7052**	338	1432	438	**2208**	507	1700	499	**2706**	**4914**	**11966**
Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.													**.90**						
AVG 24Hr	372	3602	729	**4703**	377	3722	436	**4535**	**9238**	442	1876	574	**2892**	664	2227	654	**3545**	**6437**	**15675**
Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.													**1.31**						

Comments:

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

Transportation Services - Traffic Services

W.O. 36253

Turning Movement Count - 15 Minute Summary Report

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016

Total Observed U-Turns

Northbound: 0 Southbound: 0

Eastbound: 0 Westbound: 0

	CHURCHILL AVE									BYRON AVE									
	Northbound				Southbound					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	4	38	2	**44**	6	41	4	**51**	**95**	0	15	4	**19**	3	9	3	**15**	**34**	**129**
07:15 07:30	5	54	5	**64**	8	49	0	**57**	**121**	2	14	4	**20**	8	12	6	**26**	**46**	**167**
07:30 07:45	2	52	6	**60**	7	65	2	**74**	**134**	7	21	5	**33**	13	17	10	**40**	**73**	**207**
07:45 08:00	5	55	6	**66**	6	75	0	**81**	**147**	16	35	6	**57**	6	16	8	**30**	**87**	**234**
08:00 08:15	7	73	14	**94**	6	60	0	**66**	**160**	14	29	10	**53**	8	13	9	**30**	**83**	**243**
08:15 08:30	11	76	8	**95**	10	69	4	**83**	**178**	14	46	10	**70**	5	16	10	**31**	**101**	**279**
08:30 08:45	6	86	10	**102**	10	89	8	**107**	**209**	10	30	9	**49**	9	28	15	**52**	**101**	**310**
08:45 09:00	7	95	15	**117**	12	74	8	**94**	**211**	9	49	13	**71**	13	43	21	**77**	**148**	**359**
09:00 09:15	5	74	9	**88**	5	55	4	**64**	**152**	3	46	14	**63**	8	38	10	**56**	**119**	**271**
09:15 09:30	5	64	15	**84**	6	54	1	**61**	**145**	6	35	7	**48**	8	20	11	**39**	**87**	**232**
09:30 09:45	7	77	4	**88**	10	46	4	**60**	**148**	6	34	9	**49**	12	30	22	**64**	**113**	**261**
09:45 10:00	3	61	19	**83**	5	52	5	**62**	**145**	8	33	13	**54**	4	28	16	**48**	**102**	**247**
11:30 11:45	10	74	14	**98**	12	77	7	**96**	**194**	11	27	13	**51**	13	32	11	**56**	**107**	**301**
11:45 12:00	11	90	16	**117**	7	62	6	**75**	**192**	7	43	12	**62**	9	38	10	**57**	**119**	**311**
12:00 12:15	7	62	14	**83**	10	75	12	**97**	**180**	9	35	15	**59**	18	39	12	**69**	**128**	**308**
12:15 12:30	13	63	19	**95**	6	63	10	**79**	**174**	12	47	11	**70**	13	33	15	**61**	**131**	**305**
12:30 12:45	10	72	13	**95**	5	61	7	**73**	**168**	14	39	16	**69**	7	36	9	**52**	**121**	**289**
12:45 13:00	6	65	15	**86**	4	71	7	**82**	**168**	11	27	12	**50**	6	33	8	**47**	**97**	**265**
13:00 13:15	9	77	16	**102**	4	71	8	**83**	**185**	9	45	14	**68**	11	46	18	**75**	**143**	**328**
13:15 13:30	5	58	18	**81**	6	91	11	**108**	**189**	6	34	11	**51**	8	34	10	**52**	**103**	**292**
15:00 15:15	6	61	14	**81**	9	69	9	**87**	**168**	6	44	12	**62**	10	42	12	**64**	**126**	**294**
15:15 15:30	7	56	10	**73**	7	102	9	**118**	**191**	7	30	12	**49**	15	46	7	**68**	**117**	**308**
15:30 15:45	5	69	9	**83**	9	80	8	**97**	**180**	7	42	14	**63**	18	62	12	**92**	**155**	**335**
15:45 16:00	8	71	11	**90**	6	71	10	**87**	**177**	7	55	11	**73**	15	58	14	**87**	**160**	**337**
16:00 16:15	7	77	22	**106**	10	86	10	**106**	**212**	6	40	8	**54**	24	56	14	**94**	**148**	**360**
16:15 16:30	4	84	28	**116**	8	84	17	**109**	**225**	18	34	14	**66**	18	74	21	**113**	**179**	**404**
16:30 16:45	12	72	28	**112**	6	75	20	**101**	**213**	6	38	18	**62**	25	96	13	**134**	**196**	**409**
16:45 17:00	5	70	20	**95**	6	92	17	**115**	**210**	11	31	10	**52**	16	79	11	**106**	**158**	**368**
17:00 17:15	12	72	18	**102**	8	70	15	**93**	**195**	10	34	19	**63**	27	76	23	**126**	**189**	**384**
17:15 17:30	8	68	15	**91**	5	85	12	**102**	**193**	5	48	6	**59**	26	86	18	**130**	**189**	**382**
17:30 17:45	7	65	23	**95**	6	77	10	**93**	**188**	5	32	6	**43**	15	63	8	**86**	**129**	**317**
17:45 18:00	8	67	9	**84**	5	80	21	**106**	**190**	8	33	12	**53**	14	60	12	**86**	**139**	**329**
TOTAL:	227	2198	445	**2870**	230	2271	266	**2767**	**5637**	270	1145	350	**1765**	405	1359	399	**2163**	**3928**	**9565**

Note: U-Turns are included in Totals.

Comment:

Transportation Services - Traffic Services

Turning Movement Count - Cyclist Volume Report

Work Order
36253

BYRON AVE @ CHURCHILL AVE

Count Date: Thursday, August 25, 2016 **Start Time:** 07:00

	CHURCHILL AVE			BYRON AVE			
Time Period	Northbound	Southbound	**Street Total**	Eastbound	Westbound	**Street Total**	**Grand Total**
07:00 08:00	17	5	**22**	7	3	**10**	**32**
08:00 09:00	11	2	**13**	11	6	**17**	**30**
09:00 10:00	15	1	**16**	8	4	**12**	**28**
11:30 12:30	6	1	**7**	1	7	**8**	**15**
12:30 13:30	3	1	**4**	6	5	**11**	**15**
15:00 16:00	3	0	**3**	0	6	**6**	**9**
16:00 17:00	8	12	**20**	3	6	**9**	**29**
17:00 18:00	12	9	**21**	10	4	**14**	**35**
Total	75	31	**106**	46	41	**87**	**193**

Comment:

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

W.O.
36253

Turning Movement Count - Heavy Vehicle Report

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016

		CHURCHILL AVE									BYRON AVE									
		Northbound				Southbound					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	08:00	0	17	1	**18**	1	14	0	**15**	**33**	0	0	0	**0**	0	3	1	**4**	**4**	**37**
08:00	09:00	2	14	0	**16**	0	14	1	**15**	**31**	0	0	0	**0**	0	0	0	**0**	**0**	**31**
09:00	10:00	1	24	2	**27**	0	16	0	**16**	**43**	0	2	1	**3**	0	0	1	**1**	**4**	**47**
11:30	12:30	0	8	0	**8**	0	10	2	**12**	**20**	2	2	0	**4**	0	2	0	**2**	**6**	**26**
12:30	13:30	0	8	2	**10**	1	8	1	**10**	**20**	1	0	1	**2**	2	1	0	**3**	**5**	**25**
15:00	16:00	1	6	0	**7**	0	17	1	**18**	**25**	0	1	0	**1**	0	3	0	**3**	**4**	**29**
16:00	17:00	2	6	1	**9**	0	12	0	**12**	**21**	0	1	0	**1**	0	1	0	**1**	**2**	**23**
17:00	18:00	0	6	0	**6**	0	10	0	**10**	**16**	0	0	0	**0**	0	0	0	**0**	**0**	**16**
Sub Total		6	89	6	**101**	2	101	5	**108**	**209**	3	6	2	**11**	2	10	2	**14**	**25**	**234**
U-Turns (Heavy Vehicles)					**0**				**0**	**0**				**0**				**0**	**0**	**0**
Total		6	89	6	**0**	2	101	5	**108**	**209**	3	6	2	**11**	2	10	2	**14**	**25**	**234**

Heavy Vehicles include Buses, Single-Unit Trucks and Articulated Trucks. Further, they ARE included in the Turning Movement Count Summary.

Transportation Services - Traffic Services

Work Order
36253

Turning Movement Count - Pedestrian Volume Report

BYRON AVE @ CHURCHILL AVE

Count Date: Thursday, August 25, 2016 **Start Time:** 07:00

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	7	1	**8**	2	5	**7**	**15**
07:15 07:30	3	2	**5**	3	2	**5**	**10**
07:30 07:45	1	6	**7**	3	4	**7**	**14**
07:45 08:00	5	0	**5**	8	1	**9**	**14**
07:00 08:00	16	9	**25**	16	12	**28**	**53**
08:00 08:15	0	1	**1**	3	2	**5**	**6**
08:15 08:30	2	3	**5**	5	5	**10**	**15**
08:30 08:45	2	6	**8**	3	3	**6**	**14**
08:45 09:00	3	4	**7**	10	7	**17**	**24**
08:00 09:00	7	14	**21**	21	17	**38**	**59**
09:00 09:15	1	1	**2**	3	1	**4**	**6**
09:15 09:30	2	1	**3**	3	7	**10**	**13**
09:30 09:45	3	1	**4**	10	3	**13**	**17**
09:45 10:00	1	2	**3**	7	4	**11**	**14**
09:00 10:00	7	5	**12**	23	15	**38**	**50**
11:30 11:45	5	4	**9**	5	6	**11**	**20**
11:45 12:00	3	1	**4**	3	3	**6**	**10**
12:00 12:15	4	2	**6**	9	7	**16**	**22**
12:15 12:30	2	1	**3**	5	3	**8**	**11**
11:30 12:30	14	8	**22**	22	19	**41**	**63**
12:30 12:45	1	3	**4**	9	15	**24**	**28**
12:45 13:00	2	10	**12**	8	10	**18**	**30**
13:00 13:15	0	0	**0**	5	2	**7**	**7**
13:15 13:30	2	2	**4**	6	7	**13**	**17**
12:30 13:30	5	15	**20**	28	34	**62**	**82**
15:00 15:15	3	1	**4**	4	3	**7**	**11**
15:15 15:30	5	5	**10**	7	8	**15**	**25**
15:30 15:45	2	3	**5**	9	6	**15**	**20**
15:45 16:00	2	2	**4**	2	1	**3**	**7**
15:00 16:00	12	11	**23**	22	18	**40**	**63**
16:00 16:15	2	4	**6**	3	4	**7**	**13**
16:15 16:30	2	0	**2**	4	1	**5**	**7**
16:30 16:45	7	0	**7**	10	1	**11**	**18**
16:45 17:00	4	7	**11**	7	5	**12**	**23**
16:00 17:00	15	11	**26**	24	11	**35**	**61**
17:00 17:15	4	8	**12**	12	9	**21**	**33**
17:15 17:30	4	1	**5**	7	5	**12**	**17**
17:30 17:45	3	1	**4**	5	3	**8**	**12**
17:45 18:00	2	6	**8**	13	2	**15**	**23**
17:00 18:00	13	16	**29**	37	19	**56**	**85**
Total	89	89	**178**	193	145	**338**	**516**

Comment:

Turning Movement Count - 15 Min U-Turn Total Report

BYRON AVE @ CHURCHILL AVE

Survey Date: Thursday, August 25, 2016

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
Total		0	0	0	0	0

Traffic Signal Timing

City of Ottawa, Transportation Services Department

Traffic Signal Operations Unit

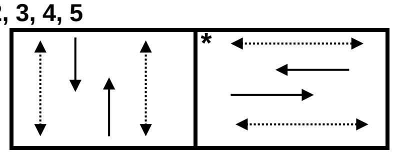
Intersection:	**Main:**	Churchill	**Side:**	Byron
Controller:	**ATC-3**		**TSD:**	**5634**
Author:	Yassine Bennani		**Date:**	15-Mar-2019

Existing Timing Plans†

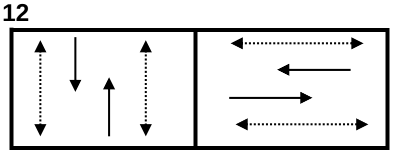
	Plan							Ped Minimum Time		
	AM Peak 1	**Off Peak** 2	**PM Peak** 3	**Night** 4	**Weekend** 5	**AM School** 11	**PM School** 12	***Walk***	***DW***	***A+R***
Cycle	80	75	90	60	75	80	75			
Offset	74	45	40	X	45	74	45			
NB Thru	42	40	45	32	40	42	40	10	9	3.3+2.1
SB Thru	42	40	45	32	40	42	40	10	9	3.3+2.1
EB Thru	38	35	45	28	35	38	35	10	15	3.3+2.3
WB Thru	38	35	45	28	35	38	35	10	15	3.3+2.3

Phasing Sequence‡

Plan: 1, 2, 3, 4, 5



Plan: 11, 12



Schedule

Weekday

Time	Plan
0:15	4
6:30	1
7:45	11
8:15	1
9:30	2
14:15	12
15:00	3
18:30	2
22:30	4

Saturday

Time	Plan
0:15	4
6:30	2
9:00	5
18:30	2
22:30	4

Sunday

Time	Plan
0:15	4
6:30	2
9:00	5
18:00	2
22:30	4

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

(fp): Fully Protected Left Turn

◄·········► Pedestrian signal

Cost is $56.50 ($50 + HST)

Appendix C

Collision Data

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-12-08	2013	11:10:00 AM	CHURCHILL AVE @ SCOTT ST	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	02 - Angle	01 - Dry
2016-02-18	2016	7:15:00 AM	CHURCHILL AVE @ SCOTT ST	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	07 - SMV other	06 - Ice
2017-02-10	2017	12:00:00 AM	CHURCHILL AVE @ SCOTT ST	01 - Clear	00 - Unknown	02 - Stop sign	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2015-11-17	2015	7:50:00 PM	CHURCHILL AVE N btwn DANFORTH AVE & BYRON AVE	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-01-28	2013	12:40:00 PM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	03 - Snow	01 - Daylight	10 - No control	03 - P.D. only	01 - Approaching	04 - Slush
2013-08-24	2013	11:00:00 AM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	01 - Clear	00 - Unknown	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2014-11-21	2014	4:22:00 PM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	01 - Clear	05 - Dusk	10 - No control	02 - Non-fatal injury	03 - Rear end	01 - Dry
2016-12-16	2016	3:45:00 PM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	07 - SMV other	01 - Dry
2016-02-11	2016	3:37:00 PM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2016-01-04	2016	11:23:00 AM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	03 - Loose snow
2017-06-29	2017	4:39:00 PM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	02 - Wet
2017-04-13	2017	3:00:00 PM	CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2016-11-28	2016	1:59:00 PM	CHURCHILL AVE N btwn SCOTT ST & WILMONT AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	07 - SMV other	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2014-04-11	2014	5:14:00 PM	CHURCHILL AVE N btwn WHITBY AVE & MADISON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	01 - Approaching	01 - Dry
2015-03-09	2015	5:30:00 PM	CHURCHILL AVE N btwn WHITBY AVE & MADISON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2015-04-04	2015	6:26:00 PM	CHURCHILL AVE N btwn WHITBY AVE & MADISON AVE	01 - Clear	05 - Dusk	10 - No control	03 - P.D. only	05 - Turning movement	01 - Dry
2016-02-24	2016	4:09:00 PM	CHURCHILL AVE N btwn WHITBY AVE & MADISON AVE	04 - Freezing Rain	01 - Daylight	10 - No control	03 - P.D. only	05 - Turning movement	04 - Slush
2017-12-20	2017	10:00:00 AM	CHURCHILL AVE N btwn WHITBY AVE & MADISON AVE	03 - Snow	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	05 - Packed snow

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-11-12	2013	4:30:00 PM	CHURCHILL AVE N btwn WILMONT AVE & WHITBY AVE	01 - Clear	05 - Dusk	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2015-02-05	2015	3:15:00 PM	CHURCHILL AVE N btwn WILMONT AVE & WHITBY AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-02-08	2013	12:00:00 PM	CHURCHILL AVE @ MADISON AVE	03 - Snow	01 - Daylight	02 - Stop sign	03 - P.D. only	03 - Rear end	05 - Packed snow
2014-11-17	2014	7:25:00 AM	CHURCHILL AVE @ MADISON AVE	03 - Snow	01 - Daylight	02 - Stop sign	02 - Non-fatal injury	07 - SMV other	04 - Slush
2016-10-25	2016	6:16:00 PM	CHURCHILL AVE @ MADISON AVE	01 - Clear	07 - Dark	02 - Stop sign	03 - P.D. only	02 - Angle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-01-17	2013	4:33:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2013-02-16	2013	10:33:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	01 - Dry
2013-04-06	2013	11:44:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2013-06-13	2013	1:00:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2013-06-13	2013	2:30:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2013-06-17	2013	6:52:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2013-07-28	2013	12:50:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2013-08-28	2013	3:34:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2013-09-24	2013	11:51:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-05-01	2014	7:54:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	01 - Dry
2014-02-26	2014	2:52:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2014-06-13	2014	6:47:00 AM	CHURCHILL AVE @ RICHMOND RD	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	02 - Wet
2014-10-06	2014	12:46:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2014-10-20	2014	9:40:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-01-25	2015	2:02:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	03 - Rear end	01 - Dry
2015-01-16	2015	10:39:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	04 - Slush
2015-06-18	2015	9:14:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-02-26	2015	5:03:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	02 - Wet
2015-01-31	2015	8:21:00 PM	CHURCHILL AVE @ RICHMOND RD	03 - Snow	07 - Dark	01 - Traffic signal	03 - P.D. only	05 - Turning movement	03 - Loose snow
2015-04-11	2015	12:34:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-07-24	2015	2:25:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2015-11-19	2015	10:56:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	02 - Wet
2015-10-03	2015	11:00:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2016-06-02	2016	2:22:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	01 - Dry
2016-12-31	2016	12:01:00 PM	CHURCHILL AVE @ RICHMOND RD	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	03 - Loose snow
2016-06-17	2016	5:29:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	03 - Dawn	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry

2016-01-04	2016	12:08:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	02 - Wet
2016-08-07	2016	12:12:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2016-08-13	2016	12:00:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	00 - Unknown	01 - Traffic signal	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2016-12-09	2016	8:40:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	06 - Ice
2017-09-06	2017	12:00:00 AM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	00 - Unknown	01 - Traffic signal	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2017-09-26	2017	7:08:00 PM	CHURCHILL AVE @ RICHMOND RD	01 - Clear	05 - Dusk	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry
2017-01-28	2017	3:02:00 PM	CHURCHILL AVE @ RICHMOND RD	03 - Snow	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	03 - Rear end	02 - Wet

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2015-02-10	2015	4:04:00 PM	CHURCHILL AVE @ WHITBY AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	05 - Turning movement	02 - Wet
2016-06-21	2016	12:10:00 PM	CHURCHILL AVE @ WHITBY AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	02 - Angle	01 - Dry
2017-06-09	2017	4:00:00 PM	CHURCHILL AVE @ WHITBY AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	05 - Turning movement	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2017-04-26	2017	17:20	CHURCHILL AVE @ WILMONT AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	04 - Sideswipe	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2016-02-18	2016	12:00:00 PM	EDEN AVE @ RICHMOND RD	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	04 - Sideswipe	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-01-24	2013	5:45:00 PM	EDGEWOOD AVE @ RICHMOND RD	01 - Clear	07 - Dark	02 - Stop sign	03 - P.D. only	05 - Turning movement	06 - Ice
2014-02-08	2014	1:04:00 PM	EDGEWOOD AVE @ RICHMOND RD	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	02 - Angle	02 - Wet

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2016-10-21	2016	8:43:00 PM	RICHMOND RD @ WINONA AVE	02 - Rain	07 - Dark	02 - Stop sign	03 - P.D. only	99 - Other	02 - Wet
2016-12-13	2016	12:15:00 PM	RICHMOND RD @ WINONA AVE	01 - Clear	01 - Daylight	02 - Stop sign	03 - P.D. only	04 - Sideswipe	01 - Dry
2017-05-24	2017	5:18:00 PM	RICHMOND RD @ WINONA AVE	01 - Clear	01 - Daylight	02 - Stop sign	02 - Non-fatal injury	02 - Angle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-01-10	2013	6:00:00 PM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2013-02-12	2013	7:00:00 PM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	02 - Rain	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2013-05-31	2013	5:53:00 PM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2013-10-17	2013	12:20:00 PM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2014-12-19	2014	9:30:00 AM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	05 - Packed snow
2015-04-12	2015	1:18:00 PM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2015-12-10	2015	11:46:00 AM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-06-22	2016	11:30:00 AM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2016-02-29	2016	12:27:00 PM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2016-07-18	2016	3:05:00 PM	RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	02 - Angle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-10-27	2013	4:55:00 PM	RICHMOND RD btwn EDEN AVE & EDGEWOOD AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-12-16	2014	11:40:00 AM	RICHMOND RD btwn EDEN AVE & EDGEWOOD AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2016-06-25	2016	11:20:00 AM	RICHMOND RD btwn EDEN AVE & EDGEWOOD AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-06-10	2013	5:50:00 PM	RICHMOND RD btwn EDGEWOOD AVE & ATHLONE AVE	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2014-10-24	2014	7:50:00 PM	RICHMOND RD btwn EDGEWOOD AVE & ATHLONE AVE	01 - Clear	07 - Dark	10 - No control	02 - Non-fatal injury	04 - Sideswipe	01 - Dry
2014-03-05	2014	12:00:00 PM	RICHMOND RD btwn EDGEWOOD AVE & ATHLONE AVE	03 - Snow	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	03 - Loose snow
2015-08-18	2015	11:44:00 AM	RICHMOND RD btwn EDGEWOOD AVE & ATHLONE AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2017-11-27	2017	11:15:00 AM	RICHMOND RD btwn EDGEWOOD AVE & ATHLONE AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	02 - Angle	01 - Dry
2017-04-13	2017	10:30:00 AM	RICHMOND RD btwn EDGEWOOD AVE & ATHLONE AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2015-11-03	2015	4:00:00 PM	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2015-08-04	2015	1:30:00 PM	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2015-12-31	2015	9:47:00 AM	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	01 - Approaching	02 - Wet
2016-12-31	2016	4:20:00 PM	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	03 - Snow	05 - Dusk	10 - No control	03 - P.D. only	07 - SMV other	03 - Loose snow
2017-03-29	2017	12:00:00 AM	RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE	01 - Clear	00 - Unknown	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-02-07	2013	11:53:00 PM	RICHMOND RD btwn WINONA AVE & EDEN AVE	03 - Snow	07 - Dark	10 - No control	03 - P.D. only	01 - Approaching	03 - Loose snow
2013-04-10	2013	3:00:00 PM	RICHMOND RD btwn WINONA AVE & EDEN AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

2015-04-30	2015	3:46:00 PM	RICHMOND RD btwn WINONA AVE & EDEN AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-06-26	2013	6:00:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2013-07-10	2013	7:10:00 AM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2013-07-30	2013	4:37:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	05 - Turning movement	01 - Dry
2013-08-23	2013	7:30:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	02 - Angle	01 - Dry
2013-08-24	2013	1:45:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2013-08-31	2013	1:57:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2014-07-08	2014	1:15:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-02-06	2014	2:44:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2014-03-03	2014	11:00:00 AM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-03-28	2014	5:16:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2014-04-09	2014	4:30:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2014-11-16	2014	1:18:00 AM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2014-12-21	2014	4:07:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	05 - Dusk	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2014-12-12	2014	2:20:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	05 - Turning movement	01 - Dry
2015-04-28	2015	10:10:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2015-01-10	2015	9:30:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	03 - Snow	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	04 - Slush
2015-09-11	2015	12:00:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	03 - Rear end	01 - Dry
2016-12-02	2016	1:00:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	02 - Angle	01 - Dry
2016-08-19	2016	3:45:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	02 - Rain	01 - Daylight	10 - No control	03 - P.D. only	02 - Angle	02 - Wet
2016-02-15	2016	10:35:00 AM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2016-01-28	2016	12:16:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	03 - Snow	01 - Daylight	10 - No control	03 - P.D. only	99 - Other	02 - Wet
2016-02-18	2016	5:12:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	02 - Rain	05 - Dusk	10 - No control	03 - P.D. only	04 - Sideswipe	02 - Wet
2016-02-26	2016	1:30:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	06 - Ice
2016-12-14	2016	7:16:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2016-11-25	2016	2:45:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	02 - Wet
2017-04-27	2017	8:51:00 AM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	02 - Angle	01 - Dry
2017-08-23	2017	12:30:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2017-08-21	2017	3:23:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2017-10-06	2017	4:39:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	04 - Sideswipe	01 - Dry
2017-10-19	2017	11:35:00 AM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2017-01-04	2017	7:38:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	05 - Turning movement	02 - Wet
2017-02-25	2017	12:35:00 PM	RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N	03 - Snow	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-12-25	2013	12:25:00 PM	ROOSEVELT AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	06 - Ice
2014-02-08	2014	6:48:00 PM	RICHMOND RD btwn ROOSEVELT AVE & ROOSEVELT AVE	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2014-06-29	2014	10:07:00 AM	ROOSEVELT AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	07 - SMV other	01 - Dry
2014-11-27	2014	10:09:00 AM	RICHMOND RD btwn ROOSEVELT AVE & ROOSEVELT AVE	01 - Clear	01 - Daylight	10 - No control	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2015-11-07	2015	6:34:00 PM	ROOSEVELT AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	02 - Non-fatal injury	05 - Turning movement	01 - Dry
2016-04-09	2016	10:57:00 AM	ROOSEVELT AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-03-01	2013	9:33:00 AM	SCOTT ST btwn CHURCHILL AVE N & END	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	02 - Wet
2013-10-27	2013	3:50:00 AM	SCOTT ST btwn CHURCHILL AVE N & END	01 - Clear	07 - Dark	10 - No control	03 - P.D. only	07 - SMV other	01 - Dry
2013-12-01	2013	2:43:00 AM	SCOTT ST btwn CHURCHILL AVE N & END	03 - Snow	07 - Dark	10 - No control	03 - P.D. only	07 - SMV other	03 - Loose snow

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-11-29	2013	5:28:00 PM	ATHLONE AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2014-08-29	2014	6:22:00 PM	ATHLONE AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	02 - Non-fatal injury	03 - Rear end	01 - Dry
2014-12-10	2014	5:57:00 PM	ATHLONE AVE @ RICHMOND RD	03 - Snow	07 - Dark	01 - Traffic signal	03 - P.D. only	03 - Rear end	03 - Loose snow
2015-03-28	2015	11:02:00 AM	ATHLONE AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2015-09-16	2015	3:32:00 PM	ATHLONE AVE @ RICHMOND RD	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	01 - Dry
2015-11-20	2015	5:57:00 PM	ATHLONE AVE @ RICHMOND RD	01 - Clear	07 - Dark	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-03-14	2013	10:22:00 AM	ATHLONE AVE btwn RICHMOND RD & BYRON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry
2013-06-21	2013	9:00:00 AM	ATHLONE AVE btwn RICHMOND RD & BYRON AVE	01 - Clear	01 - Daylight	10 - No control	03 - P.D. only	06 - SMV unattended vehicle	01 - Dry

Accident Date	Accident Year	Accident Time	Location	Environment Condition	Light	Traffic Control	Classification Of Accident	Initial Impact Type	Road Surface Condition
2013-06-11	2013	1:50:00 PM	BYRON AVE @ CHURCHILL AVE	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	02 - Wet
2014-07-25	2014	3:29:00 PM	BYRON AVE @ CHURCHILL AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	99 - Other	08 - Loose sand or gravel
2014-10-02	2014	10:57:00 AM	BYRON AVE @ CHURCHILL AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2015-01-29	2015	4:00:00 PM	BYRON AVE @ CHURCHILL AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	02 - Angle	06 - Ice
2015-06-09	2015	10:04:00 AM	BYRON AVE @ CHURCHILL AVE	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	02 - Wet

2016-03-26	2016	12:30:00 PM	BYRON AVE @ CHURCHILL AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	03 - Rear end	01 - Dry
2016-06-11	2016	9:49:00 AM	BYRON AVE @ CHURCHILL AVE	02 - Rain	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	02 - Wet
2017-09-12	2017	2:43:00 PM	BYRON AVE @ CHURCHILL AVE	01 - Clear	01 - Daylight	01 - Traffic signal	03 - P.D. only	05 - Turning movement	01 - Dry

LOCATION & GEOID	TOTAL_COLLISIONS	TOTAL_CYCLIST_ COLLISIONS	TOTAL_PEDESTRIAN_ COLLISIONS
BYRON AVE @ CHURCHILL AVE (0006651)	8	1	0
CHURCHILL AVE N btwn DANFORTH AVE & BYRON AVE (__3ZA2FA)	1	0	0
CHURCHILL AVE N btwn RICHMOND RD & DANFORTH AVE (__3ZBOGA)	8	0	1
CHURCHILL AVE @ MADISON AVE (0006692)	3	0	1
CHURCHILL AVE @ RICHMOND RD (0002361)	33	0	5
CHURCHILL AVE @ SCOTT ST (0005132)	3	0	0
CHURCHILL AVE @ WHITBY AVE (0006688)	3	1	0
CHURCHILL AVE @ WILMONT AVE (0007103)	1	0	0
RICHMOND RD btwn CHURCHILL AVE N & WINONA AVE (__3ZA4OX)	10	0	0
RICHMOND RD btwn WINSTON AVE & CHURCHILL AVE N (__3ZA4OS)	32	0	0
SCOTT ST btwn CHURCHILL AVE N & END (__3ZA1BF)	3	0	0
ATHLONE AVE @ RICHMOND RD (0006293)	6	1	0
EDEN AVE @ RICHMOND RD (0006991)	1	0	0
EDGEWOOD AVE @ RICHMOND RD (0002305)	5	0	0
RICHMOND RD @ WINONA AVE (0006990)	4	1	0
RICHMOND RD btwn EDEN AVE & EDGEWOOD AVE (__3ZBN9U)	3	0	0
RICHMOND RD btwn EDGEWOOD AVE & ATHLONE AVE (__3ZA4O2)	7	1	0
RICHMOND RD btwn ROOSEVELT AVE & ROOSEVELT AVE (__3ZA26W)	2	0	0
RICHMOND RD btwn ROOSEVELT AVE & WINSTON AVE (__3ZA26V)	5	0	0
RICHMOND RD btwn WINONA AVE & EDEN AVE (__3ZA4OZ)	3	0	0
ROOSEVELT AVE @ RICHMOND RD (0006899)	4	0	1
CHURCHILL AVE N btwn SCOTT ST & WILMONT AVE (__3ZBN9T)	1	0	1
CHURCHILL AVE N btwn WILMONT AVE & WHITBY AVE (__3ZBODY)	2	0	0
CHURCHILL AVE N btwn WHITBY AVE & MADISON AVE (__3ZA4O1)	5	0	0

Appendix D

Scott Street Bus Detour

Ottawa

Transportation Sevice Department

SCOTT STREET

Transportation Planning Branch
Strategic Planning Unit

Checked By:

Compiled by:

Scale:

Date:

Drawing No.:

1

Appendix E

TDM Checklists

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

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-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	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
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-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)*	☑
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 on-road 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	☑
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-supportive design & infrastructure measures: *Non-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)*	☑
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)*	☑
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-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-supportive 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-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	☑
BASIC	1.1.2	Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	☑
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-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)*	☑
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 on-road 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	☑
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-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)*	☑
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)*	☑
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 multi-family 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, explanations 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	☑
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 versa)	☑

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 & destinations**	
BASIC		2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances	☑
		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**	
	3.1	**Transit information**	
BASIC	3.1.1	Display relevant transit schedules and route maps at entrances	☐
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**	
		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)	☐

			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)	☐
BASIC		6.1.2	Unbundle parking cost from lease rates at multi-tenant sites	☐
			Visitor travel	
BETTER		6.1.3	Charge for short-term parking (hourly)	☐

			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 & destinations**	
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)*	☐ Type text here
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	☑
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)*	☐
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☑

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	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	☐

Appendix F

Turning Templates

Notes:

REV:	DESCRIPTION:	BY:	DATE:
01	Revised Site Plan	AL	20/12/18

STATUS: -

CGH Transportation
13 Markham Ave
Ottawa, ON
K2G 3Z1
(343) 999-9117

CLIENT: Richmond Churchill Limited Partnership

ARCHITECT: Hobin Architecture

SITE: 327 Richmond Road

TITLE: Loading Aisle Turning Movements

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2020/12/18	AL	MC

PROJECT NO:	DRAWING NO:	REVISION:
2019-03	001	01

Notes:

REV:	DESCRIPTION:	BY:	DATE:
01	Revised Site Plan	AL	20/12/18

STATUS: -

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13 Markham Ave
Ottawa, ON
K2G 3Z1
(343) 999-9117

CLIENT: Richmond Churchill Limited Partnership

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TITLE: Loading Aisle Turning Movements

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2020/12/18	AL	MC

PROJECT NO:	DRAWING NO:	REVISION:
2019-03	002	01

Notes:

REV:	DESCRIPTION:	BY:	DATE:
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STATUS: -

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13 Markham Ave
Ottawa, ON
K2G 3Z1
(343) 999-9117

CLIENT: Richmond Churchill Limited Partnership

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SITE: 327 Richmond Road

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SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2020/12/18	AL	MC

PROJECT NO:	DRAWING NO:	REVISION:
2019-03	003	01

Notes:

REV:	DESCRIPTION:	BY:	DATE:
01	Revised Site Plan	AL	20/12/18

STATUS: -

CGH Transportation
13 Markham Ave
Ottawa, ON
K2G 3Z1
(343) 999-9117

CLIENT: Richmond Churchill Limited Partnership

ARCHITECT: Hobin Architecture

SITE: 327 Richmond Road

TITLE: Loading Aisle Turning Movements

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2020/12/18	AL	MC

PROJECT NO:	DRAWING NO:	REVISION:
2019-03	004	01

Appendix G

MMLOS Worksheets

Consultant	CGH Transportation	**Project**	2019-03
Scenario	All Horizons- AM & PM	**Date**	December 17, 2020
Comments			

SEGMENTS		**Segments**	Richmond Road 1	Churchill Avenue 2	Winona Avenue 3
Pedestrian	Sidewalk Width Boulevard Width	**-**	≥ 2 m < 0.5	≥ 2 m < 0.5	1.5 m < 0.5 m
	Avg Daily Curb Lane Traffic Volume		> 3000	> 3000	≤ 3000
	Operating Speed On-Street Parking		> 50 to 60 km/h yes	> 50 to 60 km/h yes	> 30 to 50 km/h yes
	Exposure to Traffic PLoS		**D**	**D**	**B**
	Effective Sidewalk Width				
	Pedestrian Volume				
	Crowding PLoS		**-**	**-**	**-**
	Level of Service		**-**	**-**	**-**
Bicycle	Type of Cycling Facility	**-**	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Number of Travel Lanes		2-3 lanes total	2-3 lanes total	2-3 lanes total
	Operating Speed		≥ 50 to 60 km/h	≥ 50 to 60 km/h	>40 to <50 km/h
	# of Lanes & Operating Speed LoS		**E**	**E**	**D**
	Bike Lane (+ Parking Lane) Width				
	Bike Lane Width LoS		**-**	**-**	**-**
	Bike Lane Blockages				
	Blockage LoS		**-**	**-**	**-**
	Median Refuge Width (no median = < 1.8 m)				
	No. of Lanes at Unsignalized Crossing				
	Sidestreet Operating Speed				
	Unsignalized Crossing - Lowest LoS		**-**	**-**	**-**
	Level of Service		**-**	**-**	**-**
Transit	Facility Type	**F**	Mixed Traffic	Mixed Traffic	
	Friction or Ratio Transit:Posted Speed		Vt/Vp ≤ 0.4	Vt/Vp ≤ 0.6	
	Level of Service		**F**	**E**	**-**
Truck	Truck Lane Width	**F**	≤ 3.0 m	> 3.7 m	
	Travel Lanes per Direction		1	1	
	Level of Service		**F**	**B**	**-**

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	**Project**	2019-03
Scenario	Existing AM	**Date**	December 17, 2020
Comments			

INTERSECTIONS

Richmond Rd & Churchill Ave

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	4	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	Yes	No	Yes	Yes
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	76	74	59	76
	Ped. Exposure to Traffic LoS	B	C	D	B
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	C	D	B
	Level of Service (overall)	D			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
	Level of Service (overall)	F			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 30 sec	≤ 20 sec
	Level of Service	D	D	D	C
	Level of Service (overall)	D			
Truck	Effective Corner Radius	10 - 15 m	< 10 m	< 10 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
	Level of Service	E	F	F	E
	Level of Service (overall)	F			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
	Level of Service	B			

Roosevelt Ave & Richmond Rd

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2	4	4
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	86	86	54	54
	Ped. Exposure to Traffic LoS	B	B	D	D
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	B	D	D
	Level of Service (overall)	D			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
	Level of Service (overall)	F			
Transit	Average Signal Delay	≤ 30 sec	≤ 20 sec	≤ 10 sec	≤ 20 sec
	Level of Service	D	C	B	C
	Level of Service (overall)	D			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	
	Number of Receiving Lanes on Departure from Intersection	1	1	1	
	Level of Service	E	E	E	-
	Level of Service (overall)	E			
Auto	Volume to Capacity Ratio	0.0 - 0.60			
	Level of Service	A			

Richmond Rd & Pedestrian Crossing

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2		3
	Median	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive		Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control		Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed		RTOR allowed
	Ped Signal Leading Interval?	No	No		Yes
	Right Turn Channel	No Channel	No Channel		No Channel
	Corner Radius	5-10m	5-10m		5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings		Std transverse markings
	PETSI Score	86	86		73
	Ped. Exposure to Traffic LoS	B	B	-	C
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	B	-	C
	Level of Service (overall)	C			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
	Level of Service (overall)	F			
Transit	Average Signal Delay			≤ 10 sec	≤ 20 sec
	Level of Service	-	-	B	C
	Level of Service (overall)	C			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m		10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1		1
	Level of Service	E	E	-	E
	Level of Service (overall)	E			
Auto	Volume to Capacity Ratio	0.0 - 0.60			
	Level of Service	A			

Churchill Ave & Byron Ave

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	0 - 2	0 - 2
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	5-10m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	70	71	85	85
	Ped. Exposure to Traffic LoS	C	C	B	B
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	C	C	B	B
	Level of Service (overall)	C			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
	Cyclist relative to RT motorists	F	F	F	Not Applicable
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	B
	Level of Service (overall)	F			
Transit	Average Signal Delay	≤ 10 sec	≤ 20 sec	≤ 40 sec	≤ 40 sec
	Level of Service	B	C	E	E
	Level of Service (overall)	E			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
	Level of Service	E	E	E	E
	Level of Service (overall)	E			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
	Level of Service	B			

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	**Project**	2019-03
Scenario	Existing PM	**Date**	December 17, 2020
Comments			

	INTERSECTIONS	Richmond Rd & Churchill Ave				Roosevelt Ave & Richmond Rd				Richmond Rd & Pedestrian Crossing				Churchill Ave & Byron Ave			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	4	3	0 - 2	0 - 2	4	4	0 - 2	0 - 2		3	3	3	0 - 2	0 - 2
	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	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive		Permissive	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	Yes	No	Yes	Yes	No	No	No	No	No	No		Yes	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel		No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m		5-10m	10-15m	5-10m	10-15m	10-15m
	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	76	74	59	76	86	86	54	54	86	86		73	70	71	85	85
	Ped. Exposure to Traffic LoS	B	C	D	B	B	B	D	D	B	B	-	C	C	C	B	B
	Cycle Length																
	Effective Walk Time																
	Average Pedestrian Delay																
	Pedestrian Delay LoS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Level of Service	B	C	D	B	B	B	D	D	B	B	-	C	C	C	B	B
		D				D				C				C			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
	Cyclist relative to RT motorists	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	Not Applicable
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	Level of Service	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	B
		F				F				F				F			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	> 40 sec	≤ 20 sec	> 40 sec	≤ 40 sec	> 40 sec	≤ 10 sec			≤ 20 sec	≤ 20 sec	≤ 30 sec	≤ 30 sec	> 40 sec	≤ 30 sec
	Level of Service	D	D	F	C	F	E	F	B	-	-	C	C	D	D	F	D
		F				F				C				F			
Truck	Effective Corner Radius	10 - 15 m	< 10 m	< 10 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m		10 - 15 m	10 - 15 m		10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1	1	1	1		1	1		1	1	1	1	1
	Level of Service	E	F	F	E	E	E	E	-	E	E	-	E	E	E	E	E
		F				E				E				E			
Auto	Volume to Capacity Ratio	0.81 - 0.90				0.91 - 1.00				0.61 - 0.70				0.81 - 0.90			
	Level of Service	D				E				B				D			

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	**Project**	2019-03
Scenario	2022 FT AM	**Date**	December 17, 2020
Comments			

	INTERSECTIONS	Richmond Rd & Churchill Ave				Roosevelt Ave & Richmond Rd				Richmond Rd & Pedestrian Crossing				Churchill Ave & Byron Ave			
	Crossing Side	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	4	3	0 - 2	0 - 2	4	4	0 - 2	0 - 2		3	3	3	0 - 2	0 - 2
	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	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive		Permissive	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control		Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed		RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	Yes	No	Yes	Yes	No	No	No	No	No	No		Yes	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel	No Channel		No Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m	5-10m		5-10m	10-15m	5-10m	10-15m	10-15m
	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings		Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	76	74	59	76	86	86	54	54	86	86		73	70	71	85	85
	Ped. Exposure to Traffic LoS	B	C	D	B	B	B	D	D	B	B	-	C	C	C	B	B
	Cycle Length																
	Effective Walk Time																
	Average Pedestrian Delay																
	Pedestrian Delay LoS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Level of Service	B	C	D	B	B	B	D	D	B	B	-	C	C	C	B	B
		D				D				C				C			
	Approach From	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	> 50 m	
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
	Cyclist relative to RT motorists	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	Not Applicable
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	Level of Service	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	B
		F				F				F				F			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 30 sec	≤ 20 sec	≤ 30 sec	≤ 20 sec	≤ 10 sec	≤ 10 sec			≤ 10 sec	≤ 20 sec	≤ 10 sec	≤ 10 sec	≤ 40 sec	≤ 40 sec
	Level of Service	D	D	D	C	D	C	B	B	-	-	B	C	B	B	E	E
		D				D				C				E			
Truck	Effective Corner Radius	10 - 15 m	< 10 m	< 10 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m		10 - 15 m	10 - 15 m		10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1	1	1	1		1	1		1	1	1	1	1
	Level of Service	E	F	F	E	E	E	E	-	E	E	-	E	E	E	E	E
		F				E				E				E			
Auto	Volume to Capacity Ratio	0.61 - 0.70				0.0 - 0.60				0.0 - 0.60				0.61 - 0.70			
	Level of Service	B				A				A				B			

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	**Project**	2019-03
Scenario	2022 FT PM	**Date**	December 17, 2020
Comments			

INTERSECTIONS: Richmond Rd & Churchill Ave

Mode	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	4	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	Yes	No	Yes	Yes
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	76	74	59	76
	Ped. Exposure to Traffic LoS	B	C	D	B
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	C	D	B
		D			
Bicycle	**Approach From**	NORTH	SOUTH	EAST	WEST
	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
		F			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 40 sec	≤ 20 sec
	Level of Service	D	D	E	C
		E			
Truck	Effective Corner Radius	10 - 15 m	< 10 m	< 10 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
	Level of Service	E	F	F	E
		F			
Auto	Volume to Capacity Ratio	0.71 - 0.80			
	Level of Service	C			

INTERSECTIONS: Roosevelt Ave & Richmond Rd

Mode	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2	4	4
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	86	86	54	54
	Ped. Exposure to Traffic LoS	B	B	D	D
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	B	D	D
		D			
Bicycle	**Approach From**	NORTH	SOUTH	EAST	WEST
	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
		F			
Transit	Average Signal Delay	≤ 40 sec	≤ 40 sec	≤ 30 sec	≤ 10 sec
	Level of Service	E	E	D	B
		E			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	
	Number of Receiving Lanes on Departure from Intersection	1	1	1	
	Level of Service	E	E	E	-
		E			
Auto	Volume to Capacity Ratio	0.71 - 0.80			
	Level of Service	C			

INTERSECTIONS: Richmond Rd & Pedestrian Crossing

Mode	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2		3
	Median	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive		Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control		Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed		RTOR allowed
	Ped Signal Leading Interval?	No	No		Yes
	Right Turn Channel	No Channel	No Channel		No Channel
	Corner Radius	5-10m	5-10m		5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings		Std transverse markings
	PETSI Score	86	86		73
	Ped. Exposure to Traffic LoS	B	B	-	C
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	B	-	C
		C			
Bicycle	**Approach From**	NORTH	SOUTH	EAST	WEST
	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
		F			
Transit	Average Signal Delay			≤ 20 sec	≤ 20 sec
	Level of Service	-	-	C	C
		C			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m		10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1		1
	Level of Service	E	E	-	E
		E			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
	Level of Service	B			

INTERSECTIONS: Churchill Ave & Byron Ave

Mode	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	0 - 2	0 - 2
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	5-10m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	70	71	85	85
	Ped. Exposure to Traffic LoS	C	C	B	B
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	C	C	B	B
		C			
Bicycle	**Approach From**	NORTH	SOUTH	EAST	WEST
	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
	Cyclist relative to RT motorists	F	F	F	Not Applicable
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	B
		F			
Transit	Average Signal Delay	≤ 20 sec	≤ 20 sec	> 40 sec	≤ 30 sec
	Level of Service	C	C	F	D
		F			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
	Level of Service	E	E	E	E
		E			
Auto	Volume to Capacity Ratio	0.81 - 0.90			
	Level of Service	D			

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	**Project**	2019-03
Scenario	2027 FT AM	**Date**	December 17, 2020
Comments			

INTERSECTIONS: Richmond Rd & Churchill Ave

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	4	3
Pedestrian	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
Pedestrian	Conflicting Left Turns	Protected/ Permissive	Permissive	Permissive	Permissive
Pedestrian	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
Pedestrian	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
Pedestrian	Ped Signal Leading Interval?	Yes	No	Yes	Yes
Pedestrian	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
Pedestrian	Corner Radius	5-10m	5-10m	5-10m	5-10m
Pedestrian	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
Pedestrian	**PETSI Score**	76	74	59	76
Pedestrian	**Ped. Exposure to Traffic LoS**	B	C	D	B
Pedestrian	Cycle Length				
Pedestrian	Effective Walk Time				
Pedestrian	**Average Pedestrian Delay**				
Pedestrian	**Pedestrian Delay LoS**	-	-	-	-
Pedestrian	**Level of Service**	B	C	D	B
Pedestrian	**Level of Service** (overall)	D			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
Bicycle	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
Bicycle	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
Bicycle	**Cyclist relative to RT motorists**	F	F	F	F
Bicycle	**Separated or Mixed Traffic**	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
Bicycle	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
Bicycle	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
Bicycle	**Left Turning Cyclist**	B	B	B	B
Bicycle	**Level of Service**	F	F	F	F
Bicycle	**Level of Service** (overall)	F			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 30 sec	≤ 20 sec
Transit	**Level of Service**	D	D	D	C
Transit	**Level of Service** (overall)	D			
Truck	Effective Corner Radius	10 - 15 m	< 10 m	< 10 m	10 - 15 m
Truck	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
Truck	**Level of Service**	E	F	F	E
Truck	**Level of Service** (overall)	F			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
Auto	**Level of Service**	B			

INTERSECTIONS: Roosevelt Ave & Richmond Rd

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2	4	4
Pedestrian	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
Pedestrian	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
Pedestrian	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
Pedestrian	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
Pedestrian	Ped Signal Leading Interval?	No	No	No	No
Pedestrian	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
Pedestrian	Corner Radius	5-10m	5-10m	5-10m	5-10m
Pedestrian	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
Pedestrian	**PETSI Score**	86	86	54	54
Pedestrian	**Ped. Exposure to Traffic LoS**	B	B	D	D
Pedestrian	Cycle Length				
Pedestrian	Effective Walk Time				
Pedestrian	**Average Pedestrian Delay**				
Pedestrian	**Pedestrian Delay LoS**	-	-	-	-
Pedestrian	**Level of Service**	B	B	D	D
Pedestrian	**Level of Service** (overall)	D			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
Bicycle	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
Bicycle	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
Bicycle	**Cyclist relative to RT motorists**	F	F	F	F
Bicycle	**Separated or Mixed Traffic**	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
Bicycle	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
Bicycle	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
Bicycle	**Left Turning Cyclist**	B	B	B	B
Bicycle	**Level of Service**	F	F	F	F
Bicycle	**Level of Service** (overall)	F			
Transit	Average Signal Delay	≤ 20 sec	≤ 30 sec	≤ 10 sec	≤ 20 sec
Transit	**Level of Service**	C	D	B	C
Transit	**Level of Service** (overall)	D			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	
Truck	Number of Receiving Lanes on Departure from Intersection	1	1	1	
Truck	**Level of Service**	E	E	E	-
Truck	**Level of Service** (overall)	E			
Auto	Volume to Capacity Ratio	0.0 - 0.60			
Auto	**Level of Service**	A			

INTERSECTIONS: Richmond Rd & Pedestrian Crossing

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2		3
Pedestrian	Median	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m
Pedestrian	Conflicting Left Turns	Permissive	Permissive		Permissive
Pedestrian	Conflicting Right Turns	Permissive or yield control	Permissive or yield control		Permissive or yield control
Pedestrian	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed		RTOR allowed
Pedestrian	Ped Signal Leading Interval?	No	No		Yes
Pedestrian	Right Turn Channel	No Channel	No Channel		No Channel
Pedestrian	Corner Radius	5-10m	5-10m		5-10m
Pedestrian	Crosswalk Type	Std transverse markings	Std transverse markings		Std transverse markings
Pedestrian	**PETSI Score**	86	86		73
Pedestrian	**Ped. Exposure to Traffic LoS**	B	B	-	C
Pedestrian	Cycle Length				
Pedestrian	Effective Walk Time				
Pedestrian	**Average Pedestrian Delay**				
Pedestrian	**Pedestrian Delay LoS**	-	-	-	-
Pedestrian	**Level of Service**	B	B	-	C
Pedestrian	**Level of Service** (overall)	C			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
Bicycle	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
Bicycle	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
Bicycle	**Cyclist relative to RT motorists**	F	F	F	F
Bicycle	**Separated or Mixed Traffic**	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
Bicycle	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
Bicycle	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
Bicycle	**Left Turning Cyclist**	B	B	B	B
Bicycle	**Level of Service**	F	F	F	F
Bicycle	**Level of Service** (overall)	F			
Transit	Average Signal Delay			≤ 10 sec	≤ 20 sec
Transit	**Level of Service**	-	-	B	C
Transit	**Level of Service** (overall)	C			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m		10 - 15 m
Truck	Number of Receiving Lanes on Departure from Intersection	1	1		1
Truck	**Level of Service**	E	E	-	E
Truck	**Level of Service** (overall)	E			
Auto	Volume to Capacity Ratio	0.0 - 0.60			
Auto	**Level of Service**	A			

INTERSECTIONS: Churchill Ave & Byron Ave

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	0 - 2	0 - 2
Pedestrian	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
Pedestrian	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
Pedestrian	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
Pedestrian	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
Pedestrian	Ped Signal Leading Interval?	No	No	No	No
Pedestrian	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
Pedestrian	Corner Radius	10-15m	5-10m	10-15m	10-15m
Pedestrian	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
Pedestrian	**PETSI Score**	70	71	85	85
Pedestrian	**Ped. Exposure to Traffic LoS**	C	C	B	B
Pedestrian	Cycle Length				
Pedestrian	Effective Walk Time				
Pedestrian	**Average Pedestrian Delay**				
Pedestrian	**Pedestrian Delay LoS**	-	-	-	-
Pedestrian	**Level of Service**	C	C	B	B
Pedestrian	**Level of Service** (overall)	C			
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
Bicycle	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	
Bicycle	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
Bicycle	**Cyclist relative to RT motorists**	F	F	F	Not Applicable
Bicycle	**Separated or Mixed Traffic**	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated
Bicycle	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
Bicycle	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
Bicycle	**Left Turning Cyclist**	B	B	B	B
Bicycle	**Level of Service**	F	F	F	B
Bicycle	**Level of Service** (overall)	F			
Transit	Average Signal Delay	≤ 10 sec	≤ 20 sec	≤ 40 sec	≤ 40 sec
Transit	**Level of Service**	B	C	E	E
Transit	**Level of Service** (overall)	E			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
Truck	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
Truck	**Level of Service**	E	E	E	E
Truck	**Level of Service** (overall)	E			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
Auto	**Level of Service**	B			

INTERSECTIONS: Churchill Ave & Scott St

Mode	Crossing Side / Approach From	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	3	3
Pedestrian	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
Pedestrian	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
Pedestrian	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
Pedestrian	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
Pedestrian	Ped Signal Leading Interval?	No	No	No	No
Pedestrian	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
Pedestrian	Corner Radius	10-15m	10-15m	10-15m	10-15m
Pedestrian	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
Pedestrian	**PETSI Score**	70	70	70	70
Pedestrian	**Ped. Exposure to Traffic LoS**	C	C	C	C
Pedestrian	Cycle Length				
Pedestrian	Effective Walk Time				
Pedestrian	**Average Pedestrian Delay**				
Pedestrian	**Pedestrian Delay LoS**	-	-	-	-
Pedestrian	**Level of Service**	C	C	C	C
Pedestrian	**Level of Service** (overall)	C			
Bicycle	Bicycle Lane Arrangement on Approach	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
Bicycle	Right Turn Lane Configuration	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Bicycle	Right Turning Speed	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Bicycle	**Cyclist relative to RT motorists**	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Bicycle	**Separated or Mixed Traffic**	Separated	Separated	Separated	Separated
Bicycle	Left Turn Approach	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box
Bicycle	Operating Speed	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h
Bicycle	**Left Turning Cyclist**	A	A	A	A
Bicycle	**Level of Service**	A	A	A	A
Bicycle	**Level of Service** (overall)	A			
Transit	Average Signal Delay	≤ 10 sec	≤ 10 sec	≤ 40 sec	≤ 20 sec
Transit	**Level of Service**	B	B	E	C
Transit	**Level of Service** (overall)	E			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
Truck	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
Truck	**Level of Service**	E	E	E	E
Truck	**Level of Service** (overall)	E			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
Auto	**Level of Service**	B			

Multi-Modal Level of Service - Intersections Form

Consultant	CGH Transportation	**Project**	2019-03
Scenario	2027 FT PM	**Date**	December 17, 2020
Comments			

INTERSECTIONS

Richmond Rd & Churchill Ave

	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	4	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Protected/ Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	Yes	No	Yes	Yes
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings	Zebra stripe hi-vis markings
	PETSI Score	76	74	59	76
	Ped. Exposure to Traffic LoS	B	C	D	B
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	C	D	B
		D			
	Approach From	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
		F			
Transit	Average Signal Delay	≤ 30 sec	≤ 30 sec	≤ 40 sec	≤ 20 sec
	Level of Service	D	D	E	C
		E			
Truck	Effective Corner Radius	10 - 15 m	< 10 m	< 10 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
	Level of Service	E	F	F	E
		F			
Auto	Volume to Capacity Ratio	0.71 - 0.80			
	Level of Service	C			

Roosevelt Ave & Richmond Rd

	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2	4	4
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	5-10m	5-10m	5-10m	5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	86	86	54	54
	Ped. Exposure to Traffic LoS	B	B	D	D
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	B	D	D
		D			
	Approach From	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
		F			
Transit	Average Signal Delay	≤ 30 sec	≤ 40 sec	≤ 20 sec	≤ 10 sec
	Level of Service	D	E	C	B
		E			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	
	Number of Receiving Lanes on Departure from Intersection	1	1	1	
	Level of Service	E	E	E	-
		E			
Auto	Volume to Capacity Ratio	0.71 - 0.80			
	Level of Service	C			

Richmond Rd & Pedestrian Crossing

	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	0 - 2	0 - 2		3
	Median	No Median - 2.4 m	No Median - 2.4 m		No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive		Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control		Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed		RTOR allowed
	Ped Signal Leading Interval?	No	No		Yes
	Right Turn Channel	No Channel	No Channel		No Channel
	Corner Radius	5-10m	5-10m		5-10m
	Crosswalk Type	Std transverse markings	Std transverse markings		Std transverse markings
	PETSI Score	86	86		73
	Ped. Exposure to Traffic LoS	B	B	-	C
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	B	B	-	C
		C			
	Approach From	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	> 50 m
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h
	Cyclist relative to RT motorists	F	F	F	F
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	F
		F			
Transit	Average Signal Delay			≤ 20 sec	≤ 20 sec
	Level of Service	-	-	C	C
		C			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m		10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1		1
	Level of Service	E	E	-	E
		E			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
	Level of Service	B			

Churchill Ave & Byron Ave

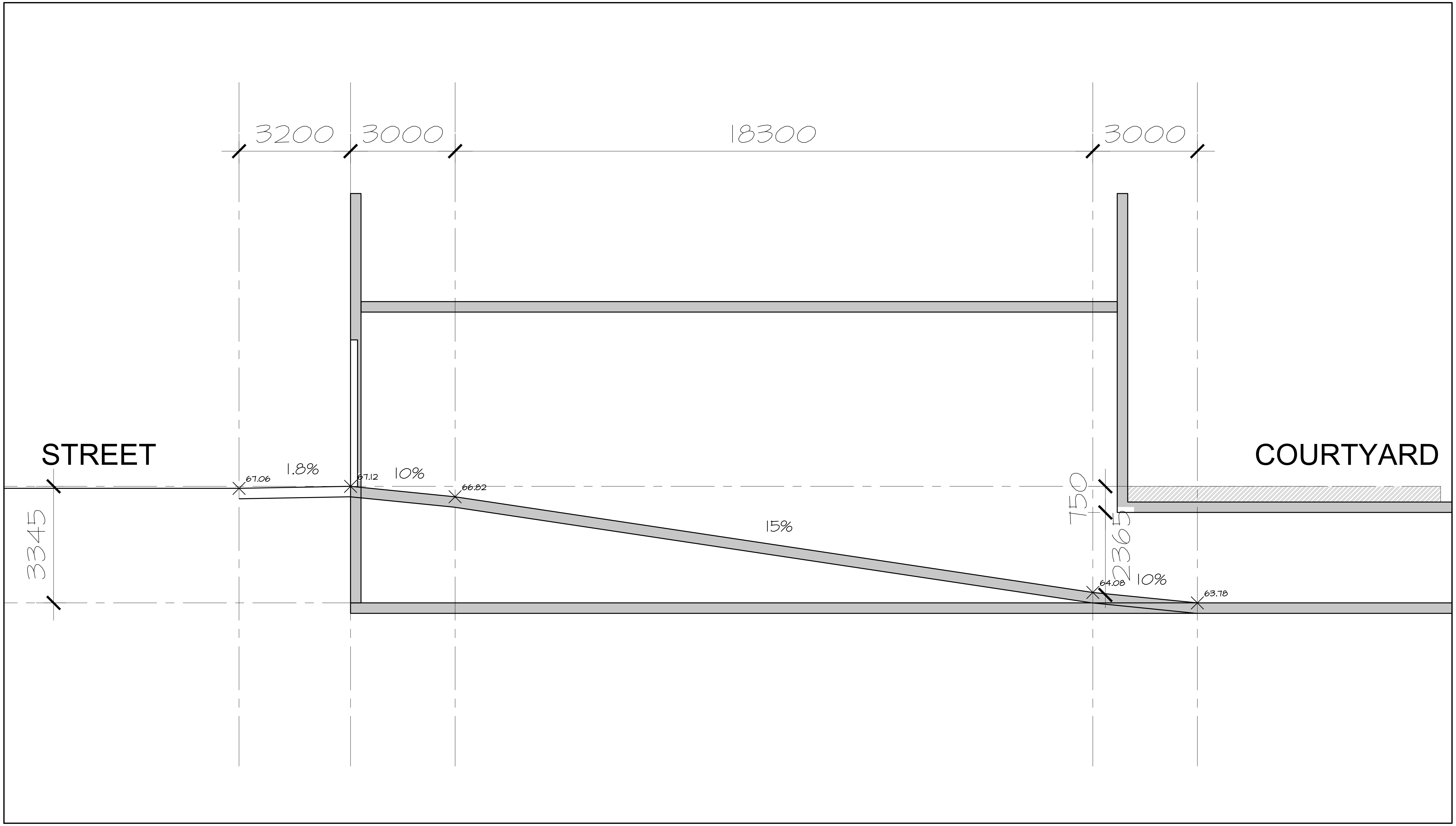
	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	0 - 2	0 - 2
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	5-10m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	70	71	85	85
	Ped. Exposure to Traffic LoS	C	C	B	B
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	C	C	B	B
		C			
	Approach From	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Mixed Traffic	Mixed Traffic	Mixed Traffic	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	> 50 m	> 50 m	> 50 m	
	Right Turning Speed	≤ 25 km/h	≤ 25 km/h	≤ 25 km/h	
	Cyclist relative to RT motorists	F	F	F	Not Applicable
	Separated or Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Separated
	Left Turn Approach	No lane crossed	No lane crossed	No lane crossed	No lane crossed
	Operating Speed	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h	> 40 to ≤ 50 km/h
	Left Turning Cyclist	B	B	B	B
	Level of Service	F	F	F	B
		F			
Transit	Average Signal Delay	≤ 20 sec	≤ 20 sec	> 40 sec	≤ 30 sec
	Level of Service	C	C	F	D
		F			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
	Level of Service	E	E	E	E
		E			
Auto	Volume to Capacity Ratio	0.81 - 0.90			
	Level of Service	D			

Churchill Ave & Scott St

	Crossing Side	NORTH	SOUTH	EAST	WEST
Pedestrian	Lanes	3	3	3	3
	Median	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m	No Median - 2.4 m
	Conflicting Left Turns	Permissive	Protected/ Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive or yield control	Permissive or yield control	Permissive or yield control	Permissive or yield control
	Right Turns on Red (RToR) ?	RTOR allowed	RTOR allowed	RTOR allowed	RTOR allowed
	Ped Signal Leading Interval?	No	No	No	No
	Right Turn Channel	No Channel	No Channel	No Channel	No Channel
	Corner Radius	10-15m	10-15m	10-15m	10-15m
	Crosswalk Type	Std transverse markings	Std transverse markings	Std transverse markings	Std transverse markings
	PETSI Score	70	70	70	70
	Ped. Exposure to Traffic LoS	C	C	C	C
	Cycle Length				
	Effective Walk Time				
	Average Pedestrian Delay				
	Pedestrian Delay LoS	-	-	-	-
	Level of Service	C	C	C	C
		C			
	Approach From	NORTH	SOUTH	EAST	WEST
Bicycle	Bicycle Lane Arrangement on Approach	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP	Curb Bike Lane, Cycletrack or MUP
	Right Turn Lane Configuration	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Right Turning Speed	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Cyclist relative to RT motorists	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Separated or Mixed Traffic	Separated	Separated	Separated	Separated
	Left Turn Approach	2-stage, LT box	2-stage, LT box	2-stage, LT box	2-stage, LT box
	Operating Speed	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h	> 50 to < 60 km/h
	Left Turning Cyclist	A	A	A	A
	Level of Service	A	A	A	A
		A			
Transit	Average Signal Delay	≤ 20 sec	≤ 10 sec	≤ 30 sec	≤ 20 sec
	Level of Service	C	B	D	C
		D			
Truck	Effective Corner Radius	10 - 15 m	10 - 15 m	10 - 15 m	10 - 15 m
	Number of Receiving Lanes on Departure from Intersection	1	1	1	1
	Level of Service	E	E	E	E
		E			
Auto	Volume to Capacity Ratio	0.61 - 0.70			
	Level of Service	B			

Appendix H

Access Ramp Profile



HOBIN

327 RICHMOND RD.

ACCESS RAMP

DECEMBER, 2020

SCALE 1:100

Appendix I

Signalization Warrants

Site Access #1 & Churchill Avenue
2026 FT

Justification #7

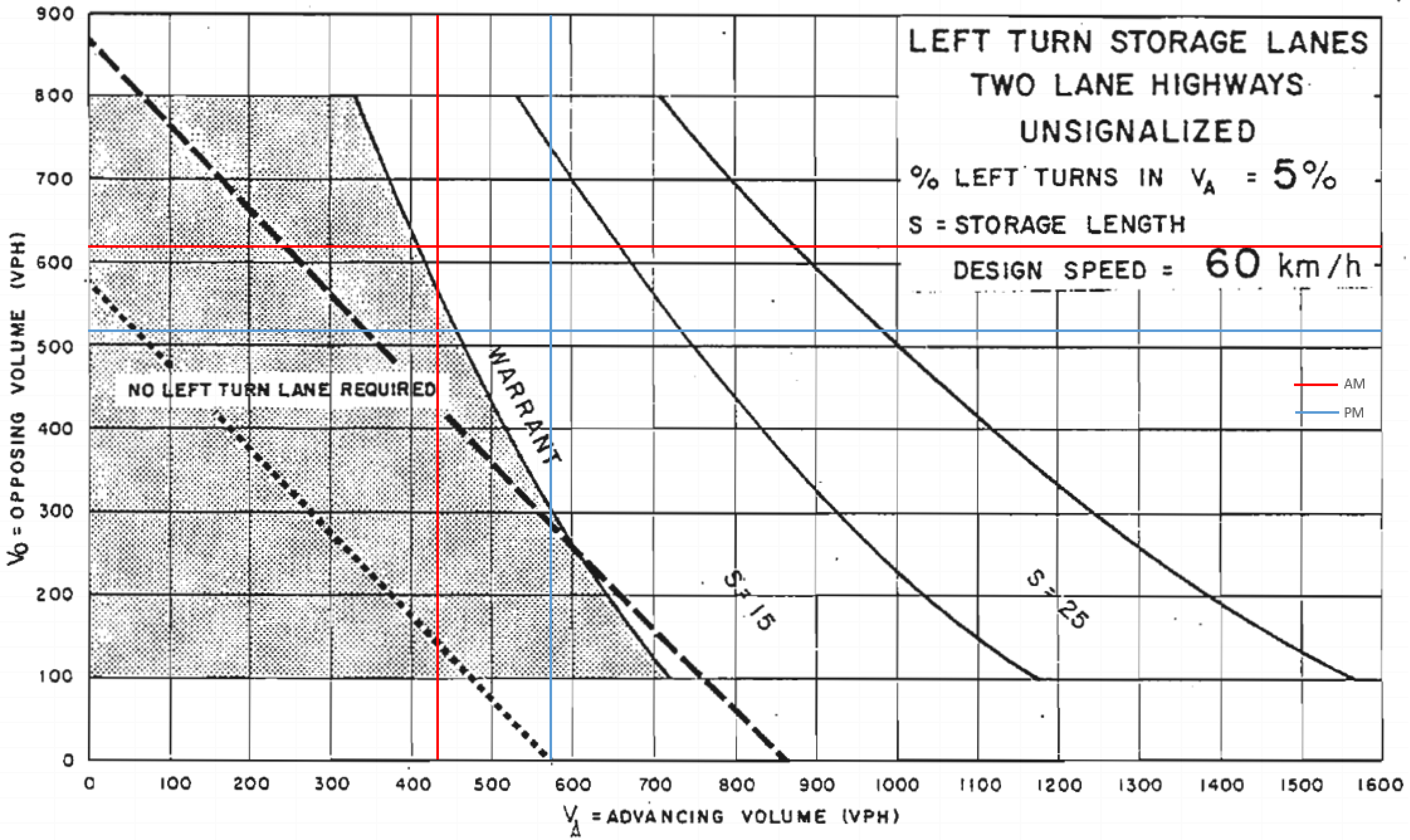
Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance			Signal
						Sectional		Entire %	
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	589	82%	6%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	11	6%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	581	81%	6%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	5	6%		

Notes
1. Refer to OTM Book 12, pg 88, Nov 2007
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4
4. T-intersection factor corrected, applies only to 1B

Appendix J

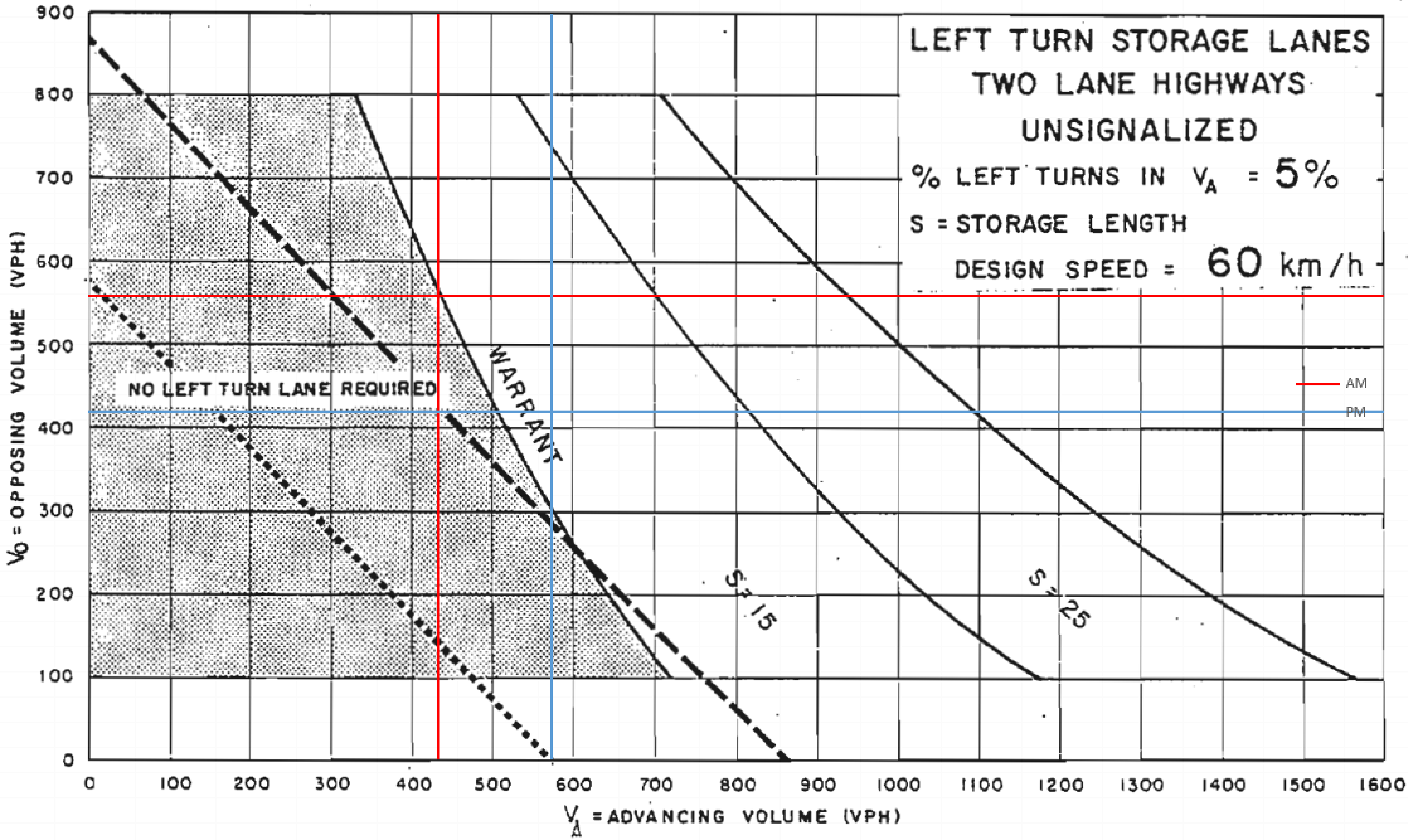
Left-turn Lane Warrants

Design Speed	Southbound Left										Yes					
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
2022 FT	AM	0	0	0	10	0	5	0	617	4	2	430	0	0.5%	432	621
	PM	0	0	0	9	0	5	0	507	12	7	564	0	1.2%	571	519



LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 5%
S = STORAGE LENGTH
DESIGN SPEED = 60 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S = 15
S = 25
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Design Speed	Southbound Left									Yes						
60 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
2027 FT	AM	0	0	0	10	0	5	0	555	4	2	430	0	0.5%	432	559
	PM	0	0	0	9	0	5	0	408	12	7	564	0	1.2%	571	420


LEFT TURN STORAGE LANES
TWO LANE HIGHWAYS
UNSIGNALIZED
% LEFT TURNS IN V_A = 5%
S = STORAGE LENGTH
DESIGN SPEED = 60 km/h
NO LEFT TURN LANE REQUIRED
WARRANT
S = 15
S = 25
AM
PM
V_O = OPPOSING VOLUME (VPH)
V_A = ADVANCING VOLUME (VPH)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Appendix K

HV% Calculations

[1] Richmond Road at Churchill Avenue												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	2	14	2	2	16	6	8	4	0	5	10	1
Total Volume	26	301	103	17	274	139	295	384	37	53	188	21
HV%	8%	5%	2%	12%	6%	4%	3%	1%	0%	9%	5%	5%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	7	0	0	4	5	6	1	0	0	2	0
Total Volume	27	291	67	15	237	312	191	329	55	129	479	25
HV%	0%	2%	0%	0%	2%	2%	3%	0%	0%	0%	0%	0%

[2] Richmond Road at Roosevelt												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	3	0	5	1	0	0	0	24	0	1	15	1
Total Volume	25	10	45	55	16	17	8	563	21	28	400	37
HV%	12%	0%	11%	2%	0%	0%	0%	4%	0%	4%	4%	3%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	1	0	0	1	2	0	0	9	0	0	7	1
Total Volume	46	16	52	44	35	29	6	382	33	40	1069	39
HV%	2%	0%	0%	2%	6%	0%	0%	2%	0%	0%	1%	3%

[3] Richmond Road at Athlone Avenue												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	0	0	0	0	0	0	9	0	0	10	0
Total Volume	2	16	15	10	9	11	20	446	7	5	286	20
HV%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	0	0	0	0	0	0	1	0	0	5	0
Total Volume	9	4	21	10	3	14	12	376	12	22	650	13
HV%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%

[4] Scott Street at Churchill Avenue												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	6	12	2	5	0	0	1	1	8	1	3
Total Volume	8	106	396	49	207	1		7	13	184	9	20
HV%	0%	6%	3%	4%	2%	0%	#DIV/0!	14%	8%	4%	11%	15%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	4	5	4	5	0	0	0	0	7	0	4
Total Volume	11	113	199	39	133	1		5	12	332	5	33
HV%	0%	4%	3%	10%	4%	0%	#DIV/0!	0%	0%	2%	0%	12%

[5] Byron Avenue at Churchill Avenue												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	2	18	0	0	14	1	0	0	0	0	0	0
Total Volume	29	331	42	37	287	24	36	171	46	35	125	56
HV%	7%	5%	0%	0%	5%	4%	0%	0%	0%	0%	0%	0%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	1	3	1	0	11	0	0	0	0	0	1	0
Total Volume	33	298	94	28	321	69	45	137	61	86	325	68
HV%	3%	1%	1%	0%	3%	0%	0%	0%	0%	0%	0%	0%

Appendix L

City of Ottawa Step 2 Comments - Email

Robin Marinac

From: Mark Crockford
Sent: April 16, 2020 9:47 AM
To: Robin Marinac
Subject: FW: 319-327 Richmond Road & 381 Churchill Ave - Scoping response

Mark Crockford, P.Eng.
CGH Transportation Inc.
P:905-251-4070
E:Mark.Crockford@CGHTransportation.com

From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: July 29, 2019 12:00 PM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Baldwin, Kimberley <Kimberley.Baldwin@ottawa.ca>
Subject: 319-327 Richmond Road & 381 Churchill Ave - Scoping response

Mark,

Please address the following comments;

319-327 Richmond Road & 381 Churchill Ave
TIA Scoping Report, Sent July 23, 20198

Transportation Engineering Services

435 Churchill Avenue should be included in section 2.3.2

If section 4.2.2 is to be exempt, please provide a split of how many parking spaces will be accessible to and/or reserved for the tenants and for the retail portions, respectively.

Traffic Signal Operations

Full movement access 65 m North of Churchill. Potential safety concerns with left out/left into site.

Richmond/Churchill, existing queues extends past proposed site access in the PM and PM peak periods. Safety concerns with full turning movements.

No southbound upstream signals for Richmond/Churchill.

Richmond & Churchill - north south approaches are shared left/through and shared right/through.

Athlone & Richmond is called an Intersection Pedestrian Signal.

Byron & Churchill - new eastbound and westbound bike facilities.

General

Both Churchill Avenue and Richmond Road are designated as an Arterial roads.

A 5.0 metres x 5.0 metres sight triangle would be required at the intersection of Richmond Road & Churchill Avenue and Richmond Road & Winona Avenue and are to be shown on all drawings. The sight triangle dimensions are to be measured from the protected ROW limits.

Please proceed with the TIA Step 3 – Forecasting report.

Thank you,

Wally Dubyk
Project Manager - Transportation Approvals
Development Review, Central & South Branches
613-580-2424 x13783

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: July 23, 2019 8:15 AM
To: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Cc: Robin Marinac <robin.marinac@cghtransportation.com>
Subject: RE: 319-327 Richmond Road & 381 Churchill Ave

Hi Wally,

Attached are the requested Synchro files for existing conditions.

Thanks,
Mark

Please note that I will be out of the office from Friday July 26 to Tuesday August 6 2019.

Mark Crockford, P.Eng.
CGH Transportation Inc.
P:905-251-4070
E:Mark.Crockford@CGHTransportation.com

Appendix M

City of Ottawa Step 3 Signal Comments - Email

Robin Marinac

From: Mark Crockford
Sent: May 20, 2020 1:24 PM
To: Robin Marinac
Subject: FW: 319-327 Richmond Rd - TIA Forecasting response

Mark Crockford, P.Eng.
CGH Transportation Inc.
P:905-251-4070
E:Mark.Crockford@CGHTransportation.com

From: Ha, Leng <Leng.Ha@ottawa.ca>
Sent: May 20, 2020 1:23 PM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: 319-327 Richmond Rd - TIA Forecasting response

Hi Mark,

My comments below.

Regards,

Leng

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: May 14, 2020 11:45 AM
To: Ha, Leng <Leng.Ha@ottawa.ca>
Cc: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Subject: RE: 319-327 Richmond Rd - TIA Forecasting response

Thanks Wally,

Leng, I hope you can give us a hand, we are just trying to get our Synchro right so we can avoid future comments on this. Are you able to provide us with Synchro files for the following intersections so that we can match the intersection configuration, timing, phasing, etc? We will put our own volumes in.

Any help you can offer would be greatly appreciated.

Thanks,
Mark

Mark Crockford, P.Eng.
CGH Transportation Inc.
P:905-251-4070
E:Mark.Crockford@CGHTransportation.com

From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: May 14, 2020 11:43 AM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: Ha, Leng <Leng.Ha@ottawa.ca>
Subject: RE: 319-327 Richmond Rd - TIA Forecasting response

Mark,

Please contact Leng - Ha, Leng <Leng.Ha@ottawa.ca>
for further information.

Wally Dubyk
Transportation Project Manager - Transportation Approvals
Development Review, Central & South Branches
613-580-2424 x13783

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: May 14, 2020 11:35 AM
To: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Cc: McCreight, Andrew <Andrew.McCreight@ottawa.ca>; Robin Marinac <robin.marinac@cghtransportation.com>
Subject: RE: 319-327 Richmond Rd - TIA Forecasting response

Thanks for the quick reply earlier as we have dug into these further we have a few other questions. Is it possible to have the signals group provide us with sample Synchro showing how these would be coded so that we can make sure we get this right on our next try? I don't mind connecting directly with them if you can let me know who would have provided the comments? We are hoping to get some more information on the following intersections:

Richmond at Churchill
- North-south is modeled correctly with the advance walk phase. For east-west movement, please model it with an actuated eastbound left turn phase if actuated, then on with the eastbound through phase. If not, actuated, then it's the standard eastbound/westbound through. We can accept that the advance walk for east-west pedestrian not be modeled since we provide an advance green straight through arrow.

Roosevelt at Richmond
- No changes required

Richmond at Athlone

- This should be modelled like Scott/Tweedsmuir (which was done for your submission for 320 McRae)

Thanks,
Mark

Mark Crockford, P.Eng.
CGH Transportation Inc.
P:905-251-4070
E:Mark.Crockford@CGHTransportation.com

From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: May 14, 2020 10:34 AM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: McCreight, Andrew <Andrew.McCreight@ottawa.ca>; Robin Marinac <robin.marinac@cghtransportation.com>
Subject: RE: 319-327 Richmond Rd - TIA Forecasting response

Mark,

Please find attached Traffic Growth maps.

The comment about not achieving the 85% modal share can be a written explanation and the assumption is that the mode share just applies to the development although typically background traffic can also be expected to shift to some degree as well. When reviewing Demand Rationalization, this issue of impact is discussed if area intersections become over capacity. TDM strategies are often needed as part of the development plan to support the development in achieving the target modal shares.

Wally Dubyk
Transportation Project Manager - Transportation Approvals
Development Review, Central & South Branches
613-580-2424 x13783

From: Mark Crockford <mark.crockford@cghtransportation.com>
Sent: May 14, 2020 7:31 AM
To: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Cc: McCreight, Andrew <Andrew.McCreight@ottawa.ca>; Robin Marinac <robin.marinac@cghtransportation.com>
Subject: RE: 319-327 Richmond Rd - TIA Forecasting response

Thanks for getting back to us with your comments.

Most of these seem straight forward, I just have a couple of quick questions.

With respect to the background growth, no problem implementing 0%, just for future reference, are there specific areas which we should apply this to? I would assume any TOD area would be logical, but would this apply to the whole urban core? In the absence of historical data do you have preferred rates for different roadways, areas, etc?

For the following comment:

Please explain impacts on the road network if TDM targets of 85% non-auto mode are not met in the future.

Is a written explanation of the anticipated impacts of not meeting the 85% non-auto mode share sufficient or is additional analysis being requested with a modified mode share? Assuming it is just a written explanation, I am assuming we are just examining the impact of the subject development not meeting the 85% non-auto mode share, not the entire area.

Thanks again and with those clarifications we will proceed with the Step 4 and integrate the comments into the report.

Mark

Mark Crockford, P.Eng.
CGH Transportation Inc.
P:905-251-4070
E:Mark.Crockford@CGHTransportation.com

From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: May 14, 2020 6:59 AM
To: Mark Crockford <mark.crockford@cghtransportation.com>
Cc: McCreight, Andrew <Andrew.McCreight@ottawa.ca>
Subject: 319-327 Richmond Rd - TIA Forecasting response

319-327 Richmond Road

TIA Forecasting Report, Received April 27, 2020

General

There are no additional ROW limits for Richmond Rd and Churchill Ave identified in the Official Plan.

Both Churchill Avenue and Richmond Road are arterial roadways and their intersection is signalized, a 5 m x 5 m sight triangle would be required.

A 5.0 metres x 5.0 metres sight triangle would be required at the intersection of Richmond Road and Winona Avenue and is to be shown on all drawings.

Road, sewer & water work along Winona Avenue is targeted 3 to 5 years.

Transportation Engineering

While relatively inconsequential, the shopping centre's generated trips are incorrect in Table 12 (22 AM, 91 PM).

Clarify Table 15. It is unclear how the internal capture rates have been applied to the person-trips generated by the development. Adjust associated trip generation figures, if necessary.

The background growth rate of 2% for the study area is not supported. This area is already experiencing a zero percent vehicle growth rate. Note that a 2% background growth of person-trips is possible with future development in the area but given the mode share shifts this is not translating to an equivalent vehicle growth rate.

Reconcile the demand rationalization module. The report does not illustrate that there are any existing failing intersections. If there is an expectation that future vehicular traffic would result in intersection failure without a shift to TOD mode shares this must be clearly expressed in the report. The vehicular demand (background traffic and site generated) expected to be rationalized by a shift to transit following revenue service of the Confederation Line Extension must be analyzed and supported by TDM measures. The transit mode share for a TOD area may be more difficult to achieve as the development moves further from the transit station.

Traffic Signal Operations

Richmond and Churchill:

This intersection can be properly modelled in Synchro.

Currently the intersection has not been modelled correctly. There is a traffic loop for the eastbound left turn movement and the advance walk for east/west is missing. The signal operates with pedestrian recalls for all directions with actuated eastbound left turn phase. Vehicle clearance times are not correct.

Richmond and Athlone:

Walk time should not be included for the east/west movements. No east-west pedestrian displays are provided.

This is an actuated pedestrian signal and should be modeled as a pedestrian signal.

Roosevelt and Richmond:

Operates with pedestrian recalls on main street.

Please explain impacts on the road network if TDM targets of 85% non-auto mode are not met in the future.

Ensure that changes are made to the document prior to submitting the Strategy report and that any unexpected results from revisions are discussed with staff before proceeding to the next step.

Thank you,

Appendix N

2019 Existing Conditions Synchro Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	295	384	37	53	188	21	26	301	103	17	274	139
Future Volume (vph)	295	384	37	53	188	21	26	301	103	17	274	139
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.99		0.96	0.99			0.98			0.97	
Frt		0.987			0.985			0.964			0.952	
Flt Protected	0.950			0.950				0.997			0.998	
Satd. Flow (prot)	1478	1384	0	1396	1339	0	0	2743	0	0	2647	0
Flt Permitted	0.475			0.495				0.895			0.920	
Satd. Flow (perm)	703	1384	0	700	1339	0	0	2457	0	0	2437	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			7			53			102	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			316.0	
Travel Time (s)		21.4			19.2			9.0			22.8	
Confl. Peds. (#/hr)	50		47	47		50	38		30	30		38
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	3%	2%	2%	9%	5%	5%	8%	5%	2%	13%	6%	4%
Parking (#/hr)		0			0							
Adj. Flow (vph)	328	427	41	59	209	23	29	334	114	19	304	154
Shared Lane Traffic (%)												
Lane Group Flow (vph)	328	468	0	59	232	0	0	477	0	0	477	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	36.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	14.0	40.0		31.0	31.0		30.0	30.0		30.0	30.0	
Total Split (%)	17.5%	50.0%		38.8%	38.8%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	7.9	33.9		24.9	24.9		23.8	23.8		23.8	23.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	47.4	47.4		27.8	27.8			20.3			20.3	
Actuated g/C Ratio	0.59	0.59		0.35	0.35			0.25			0.25	
v/c Ratio	0.60	0.57		0.24	0.49			0.72			0.69	
Control Delay	14.9	14.0		23.6	25.4			24.4			26.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	14.9	14.0		23.6	25.4			24.4			26.2	
LOS	B	B		C	C			C			C	
Approach Delay		14.4			25.0			24.4			26.2	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	22.7	37.4		6.5	27.3			26.5			27.5	
Queue Length 95th (m)	46.2	76.5		16.5	49.9			26.1			39.4	
Internal Link Dist (m)		273.0			242.4			101.1			292.0	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	546	822		243	470			775			802	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.60	0.57		0.24	0.49			0.62			0.59	

Intersection Summary

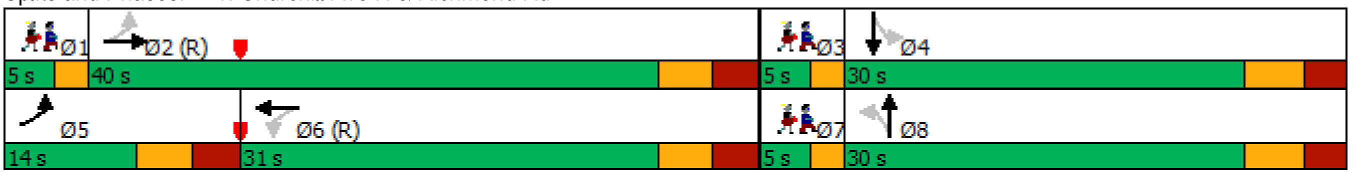
Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 21.0	Intersection LOS: C
Intersection Capacity Utilization 91.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Churchill Ave N & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	563	21	28	338	37	25	10	45	55	16	17
Future Volume (vph)	8	563	21	28	338	37	25	10	45	55	16	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			0.92			0.94	
Frt		0.995			0.988			0.924			0.974	
Flt Protected		0.999			0.997			0.985			0.970	
Satd. Flow (prot)	0	1374	0	0	1351	0	0	1252	0	0	1453	0
Flt Permitted		0.994			0.940			0.888			0.821	
Satd. Flow (perm)	0	1366	0	0	1271	0	0	1101	0	0	1178	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			50			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	80		65	65		80	48		42	42		48
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	4%	2%	4%	4%	3%	12%	2%	11%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	9	626	23	31	376	41	28	11	50	61	18	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	658	0	0	448	0	0	89	0	0	98	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		34.4	34.4		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.6	39.6		39.6	39.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		51.4			51.4			11.8			11.8	
Actuated g/C Ratio		0.73			0.73			0.17			0.17	
v/c Ratio		0.66			0.48			0.39			0.46	
Control Delay		11.9			7.9			18.4			28.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		11.9			7.9			18.4			28.8	
LOS		B			A			B			C	
Approach Delay		11.9			7.9			18.4			28.8	
Approach LOS		B			A			B			C	
Queue Length 50th (m)		41.0			21.7			4.6			9.9	
Queue Length 95th (m)		#114.1			53.8			15.0			21.2	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1003			936			341			338	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.66			0.48			0.26			0.29	

Intersection Summary

Area Type: CBD

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 12.3 Intersection LOS: B

Intersection Capacity Utilization 68.0% 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: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	563	21	28	338	37	25	10	45	55	16	17
Future Volume (veh/h)	8	563	21	28	338	37	25	10	45	55	16	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.94	0.99		0.94	0.91		0.89	0.91		0.89
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1559	1620	1620	1559	1620	1620	1470	1620	1620	1588	1620
Adj Flow Rate, veh/h	9	626	23	31	376	41	28	11	50	61	18	19
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	4	4	4	4	2	2	2	2	2	2
Cap, veh/h	56	921	34	86	795	83	125	54	143	240	67	54
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	6	1480	54	50	1278	134	258	247	648	712	305	245
Grp Volume(v), veh/h	658	0	0	448	0	0	89	0	0	98	0	0
Grp Sat Flow(s),veh/h/ln	1540	0	0	1461	0	0	1154	0	0	1262	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	19.6	0.0	0.0	11.0	0.0	0.0	4.2	0.0	0.0	3.9	0.0	0.0
Prop In Lane	0.01		0.03	0.07		0.09	0.31		0.56	0.62		0.19
Lane Grp Cap(c), veh/h	1011	0	0	964	0	0	322	0	0	362	0	0
V/C Ratio(X)	0.65	0.00	0.00	0.46	0.00	0.00	0.28	0.00	0.00	0.27	0.00	0.00
Avail Cap(c_a), veh/h	1011	0	0	964	0	0	385	0	0	429	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.86	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.7	0.0	0.0	7.1	0.0	0.0	22.9	0.0	0.0	22.8	0.0	0.0
Incr Delay (d2), s/veh	3.3	0.0	0.0	1.4	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.1	0.0	0.0	5.0	0.0	0.0	1.5	0.0	0.0	1.6	0.0	0.0
LnGrp Delay(d),s/veh	11.9	0.0	0.0	8.5	0.0	0.0	23.4	0.0	0.0	23.2	0.0	0.0
LnGrp LOS	B			A			C			C		
Approach Vol, veh/h		658			448			89			98	
Approach Delay, s/veh		11.9			8.5			23.4			23.2	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		49.0		21.0		49.0		21.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		19.4		* 40		19.4
Max Q Clear Time (g_c+I1), s		21.6		5.9		13.0		6.2
Green Ext Time (p_c), s		5.2		0.4		3.8		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	12.4
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	446	7	5	286	20	2	16	15	10	9	11
Future Volume (vph)	20	446	7	5	286	20	2	16	15	10	9	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998			0.991			0.938			0.951	
Flt Protected		0.998			0.999			0.997			0.984	
Satd. Flow (prot)	0	1408	0	0	1387	0	0	1469	0	0	1470	0
Flt Permitted		0.998			0.999			0.997			0.984	
Satd. Flow (perm)	0	1408	0	0	1387	0	0	1469	0	0	1470	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Confl. Peds. (#/hr)	39		44	44		39						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	22	496	8	6	318	22	2	18	17	11	10	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	526	0	0	346	0	0	37	0	0	33	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: CBD
Control Type: Unsignalized
Intersection Capacity Utilization 53.8% ICU Level of Service A
Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	446	7	5	286	20	2	16	15	10	9	11
Future Vol, veh/h	20	446	7	5	286	20	2	16	15	10	9	11
Conflicting Peds, #/hr	39	0	44	44	0	39	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	22	496	8	6	318	22	2	18	17	11	10	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	379	0	0	548	0	0	940	979	544	942	972	368
Stage 1	-	-	-	-	-	-	588	588	-	380	380	-
Stage 2	-	-	-	-	-	-	352	391	-	562	592	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1179	-	-	1021	-	-	244	250	539	243	252	677
Stage 1	-	-	-	-	-	-	495	496	-	642	614	-
Stage 2	-	-	-	-	-	-	665	607	-	512	494	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1143	-	-	986	-	-	218	226	521	209	228	657
Mov Cap-2 Maneuver	-	-	-	-	-	-	218	226	-	209	228	-
Stage 1	-	-	-	-	-	-	465	466	-	606	591	-
Stage 2	-	-	-	-	-	-	636	584	-	464	464	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	18.5	19.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	303	1143	-	-	986	-	-	288
HCM Lane V/C Ratio	0.121	0.019	-	-	0.006	-	-	0.116
HCM Control Delay (s)	18.5	8.2	0	-	8.7	0	-	19.1
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	0.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	13	184	9	20	8	118	441	49	207	1
Future Volume (vph)	0	7	13	184	9	20	8	118	441	49	207	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.914			0.987			0.895				
Flt Protected					0.959			0.999			0.991	
Satd. Flow (prot)	0	1329	0	0	1440	0	0	1244	0	0	1551	0
Flt Permitted					0.959			0.999			0.991	
Satd. Flow (perm)	0	1329	0	0	1440	0	0	1244	0	0	1551	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			316.0			99.4	
Travel Time (s)		5.3			8.0			22.8			7.2	
Confl. Peds. (#/hr)	41		7	7		41	38		10	10		38
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	14%	8%	4%	11%	15%	2%	6%	3%	4%	2%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	8	14	204	10	22	9	131	490	54	230	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	236	0	0	630	0	0	285	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 77.0% ICU Level of Service D

Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	20.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	7	13	184	9	20	8	118	441	49	207	1
Future Vol, veh/h	0	7	13	184	9	20	8	118	441	49	207	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	14	8	4	11	15	2	6	3	4	2	2
Mvmt Flow	0	8	14	204	10	22	9	131	490	54	230	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10	14	27.3	13.5
HCM LOS	A	B	D	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	0%	86%	19%
Vol Thru, %	21%	35%	4%	81%
Vol Right, %	78%	65%	9%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	567	20	213	257
LT Vol	8	0	184	49
Through Vol	118	7	9	207
RT Vol	441	13	20	1
Lane Flow Rate	630	22	237	286
Geometry Grp	1	1	1	1
Degree of Util (X)	0.836	0.041	0.418	0.453
Departure Headway (Hd)	4.779	6.649	6.365	5.711
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	756	534	563	628
Service Time	2.828	4.744	4.426	3.771
HCM Lane V/C Ratio	0.833	0.041	0.421	0.455
HCM Control Delay	27.3	10	14	13.5
HCM Lane LOS	D	A	B	B
HCM 95th-tile Q	9.5	0.1	2.1	2.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	171	46	35	125	56	29	331	42	37	287	24
Future Volume (vph)	36	171	46	35	125	56	29	331	42	37	287	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.98	0.99		0.98	1.00	
Frt		0.975			0.965			0.983			0.988	
Flt Protected		0.993			0.992		0.950			0.950		
Satd. Flow (prot)	0	1512	0	0	1494	0	1422	1496	0	1492	1501	0
Flt Permitted		0.920			0.888		0.529			0.476		
Satd. Flow (perm)	0	1399	0	0	1335	0	773	1496	0	736	1501	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			26			11			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	14		8	8		14	21		16	16		21
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	5%	2%	2%	5%	4%
Adj. Flow (vph)	40	190	51	39	139	62	32	368	47	41	319	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	281	0	0	240	0	32	415	0	41	346	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	38.0	38.0		38.0	38.0		42.0	42.0		42.0	42.0	
Total Split (%)	47.5%	47.5%		47.5%	47.5%		52.5%	52.5%		52.5%	52.5%	
Maximum Green (s)	32.4	32.4		32.4	32.4		36.6	36.6		36.6	36.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		20.6			20.6		48.4	48.4		48.4	48.4	
Actuated g/C Ratio		0.26			0.26		0.60	0.60		0.60	0.60	
v/c Ratio		0.76			0.66		0.07	0.46		0.09	0.38	
Control Delay		37.9			31.6		9.2	11.9		4.8	5.4	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		37.9			31.6		9.2	11.9		4.8	5.4	
LOS		D			C		A	B		A	A	
Approach Delay		37.9			31.6			11.7			5.3	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		36.9			28.9		1.8	30.2		1.6	14.3	
Queue Length 95th (m)		54.6			45.0		6.8	65.2		m3.4	23.7	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		576			556		467	909		445	910	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.49			0.43		0.07	0.46		0.09	0.38	

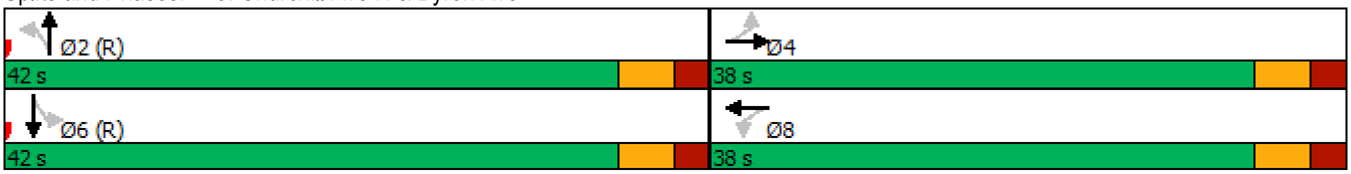
Intersection Summary		
Area Type:	CBD	
Cycle Length: 80		
Actuated Cycle Length: 80		
Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.76		
Intersection Signal Delay: 18.8		Intersection LOS: B

Intersection Capacity Utilization 62.4%   ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	171	46	35	125	56	29	331	42	37	287	24
Future Volume (veh/h)	36	171	46	35	125	56	29	331	42	37	287	24
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.98	0.99		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1514	1548	1620	1588	1544	1620
Adj Flow Rate, veh/h	40	190	51	39	139	62	32	368	47	41	319	27
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	7	5	5	2	5	5
Cap, veh/h	85	265	66	88	225	91	630	829	106	500	866	73
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	1.00	1.00	1.00
Sat Flow, veh/h	136	1080	270	147	919	371	875	1343	171	868	1402	119
Grp Volume(v), veh/h	281	0	0	240	0	0	32	0	415	41	0	346
Grp Sat Flow(s),veh/h/ln	1485	0	0	1437	0	0	875	0	1514	868	0	1521
Q Serve(g_s), s	2.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	11.6	1.0	0.0	0.0
Cycle Q Clear(g_c), s	13.8	0.0	0.0	11.8	0.0	0.0	1.2	0.0	11.6	12.5	0.0	0.0
Prop In Lane	0.14		0.18	0.16		0.26	1.00		0.11	1.00		0.08
Lane Grp Cap(c), veh/h	416	0	0	405	0	0	630	0	935	500	0	939
V/C Ratio(X)	0.68	0.00	0.00	0.59	0.00	0.00	0.05	0.00	0.44	0.08	0.00	0.37
Avail Cap(c_a), veh/h	644	0	0	626	0	0	630	0	935	500	0	939
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.73	0.00	0.73
Uniform Delay (d), s/veh	27.9	0.0	0.0	27.2	0.0	0.0	6.1	0.0	8.1	1.5	0.0	0.0
Incr Delay (d2), s/veh	1.9	0.0	0.0	1.4	0.0	0.0	0.2	0.0	1.5	0.2	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	0.0	5.0	0.0	0.0	0.3	0.0	5.1	0.3	0.0	0.2
LnGrp Delay(d),s/veh	29.9	0.0	0.0	28.5	0.0	0.0	6.2	0.0	9.6	1.7	0.0	0.8
LnGrp LOS	C			C			A		A	A		A
Approach Vol, veh/h		281			240			447			387	
Approach Delay, s/veh		29.9			28.5			9.4			0.9	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		54.8		25.2		54.8		25.2
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 37		32.4		* 37		32.4
Max Q Clear Time (g_c+I1), s		13.6		15.8		14.5		13.8
Green Ext Time (p_c), s		3.4		1.8		2.8		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

Notes

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	473	0	0	299	0	0	
Future Volume (vph)	473	0	0	299	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	13.6		
Travel Time (s)	19.2			1.4	1.0		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	526	0	0	332	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	526	0	0	332	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	11.0			11.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							43
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.60			0.38			
Control Delay	13.4			9.8			
Queue Delay	0.0			0.0			
Total Delay	13.4			9.8			
LOS	B			A			
Approach Delay	13.4			9.8			
Approach LOS	B			A			
Queue Length 50th (m)	38.4			20.4			
Queue Length 95th (m)	65.7			35.6			
Internal Link Dist (m)	242.4			0.1	0.1		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.60			0.38			

Intersection Summary

Area Type: CBD

Cycle Length: 65

Actuated Cycle Length: 65

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

Natural Cycle: 55

Control Type: Actuated-Coordinated

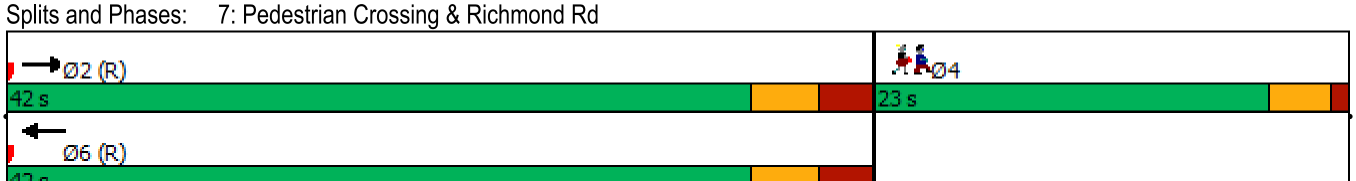
Maximum v/c Ratio: 0.60

Intersection Signal Delay: 12.0 Intersection LOS: B

Intersection Capacity Utilization 34.2% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	329	55	129	479	25	27	291	67	15	237	312
Future Volume (vph)	191	329	55	129	479	25	27	291	67	15	237	312
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.96	0.96		0.85	0.99			0.97			0.88	
Frt		0.979			0.992			0.974			0.917	
Flt Protected	0.950			0.950				0.996			0.999	
Satd. Flow (prot)	1478	1326	0	1492	1389	0	0	2820	0	0	2414	0
Flt Permitted	0.229			0.514				0.803			0.934	
Satd. Flow (perm)	340	1326	0	684	1389	0	0	2264	0	0	2253	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			4			25			313	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			316.0	
Travel Time (s)		21.4			19.2			9.0			22.8	
Confl. Peds. (#/hr)	99		154	154		99	78		53	53		78
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	212	366	61	143	532	28	30	323	74	17	263	347
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	427	0	143	560	0	0	427	0	0	627	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	31.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	15.0	55.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	16.7%	61.1%		50.0%	50.0%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	8.9	48.9		38.9	38.9		18.8	18.8		18.8	18.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	54.5	54.5		39.7	39.7			23.2			23.2	
Actuated g/C Ratio	0.61	0.61		0.44	0.44			0.26			0.26	
v/c Ratio	0.67	0.53		0.48	0.91			0.71			0.77	
Control Delay	20.3	13.0		24.9	45.9			27.4			22.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.1	
Total Delay	20.3	13.0		24.9	45.9			27.4			22.3	
LOS	C	B		C	D			C			C	
Approach Delay		15.4			41.6			27.4			22.3	
Approach LOS		B			D			C			C	
Queue Length 50th (m)	15.7	38.4		17.2	88.7			17.4			26.2	
Queue Length 95th (m)	#29.0	63.1		35.3	#154.5			m34.5			47.1	
Internal Link Dist (m)		273.0			242.4			101.1			292.0	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	318	808		301	614			602			813	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			5	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.67	0.53		0.48	0.91			0.71			0.78	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 27.1	Intersection LOS: C
Intersection Capacity Utilization 96.7%	ICU Level of Service F
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.

Splits and Phases: 1: Churchill Ave N & Richmond Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	429	33	40	789	39	46	16	52	44	35	29
Future Volume (vph)	6	429	33	40	789	39	46	16	52	44	35	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99			0.89			0.91	
Frt		0.990			0.994			0.938			0.964	
Flt Protected		0.999			0.998			0.980			0.980	
Satd. Flow (prot)	0	1380	0	0	1396	0	0	1348	0	0	1396	0
Flt Permitted		0.989			0.961			0.822			0.810	
Satd. Flow (perm)	0	1366	0	0	1340	0	0	1073	0	0	1107	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			6			46			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	48		99	99		48	72		57	57		72
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	6%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	7	477	37	44	877	43	51	18	58	49	39	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	521	0	0	964	0	0	127	0	0	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		33.5	33.5		24.6	24.6		24.6	24.6	
Total Split (s)	60.0	60.0		60.0	60.0		25.0	25.0		25.0	25.0	
Total Split (%)	70.6%	70.6%		70.6%	70.6%		29.4%	29.4%		29.4%	29.4%	
Maximum Green (s)	54.6	54.6		54.6	54.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		60.5			60.5			13.5			13.5	
Actuated g/C Ratio		0.71			0.71			0.16			0.16	
v/c Ratio		0.53			1.01			0.61			0.63	
Control Delay		8.8			46.9			33.7			41.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		8.8			46.9			33.7			41.6	
LOS		A			D			C			D	
Approach Delay		8.8			46.9			33.7			41.6	
Approach LOS		A			D			C			D	
Queue Length 50th (m)		30.7			127.8			12.3			15.4	
Queue Length 95th (m)		70.1			#253.0			27.5			29.9	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		975			956			280			268	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.53			1.01			0.45			0.45	

Intersection Summary

Area Type: CBD
Cycle Length: 85
Actuated Cycle Length: 85
Offset: 78 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 34.1 Intersection LOS: C
Intersection Capacity Utilization 104.3% ICU Level of Service G
Analysis Period (min) 15

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

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	429	33	40	789	39	46	16	52	44	35	29
Future Volume (veh/h)	6	429	33	40	789	39	46	16	52	44	35	29
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	0.98		0.93	0.87		0.82	0.87		0.82
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1620	1588	1620	1620	1568	1620
Adj Flow Rate, veh/h	7	477	37	44	877	43	51	18	58	49	39	32
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	6	6	6
Cap, veh/h	47	957	73	73	942	45	142	54	115	147	104	70
Arrive On Green	0.67	0.67	0.67	0.67	0.67	0.67	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	6	1438	110	42	1415	68	402	264	560	425	508	339
Grp Volume(v), veh/h	521	0	0	964	0	0	127	0	0	120	0	0
Grp Sat Flow(s),veh/h/ln	1554	0	0	1525	0	0	1225	0	0	1273	0	0
Q Serve(g_s), s	0.0	0.0	0.0	26.9	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.3	0.0	0.0	48.4	0.0	0.0	6.9	0.0	0.0	6.2	0.0	0.0
Prop In Lane	0.01		0.07	0.05		0.04	0.40		0.46	0.41		0.27
Lane Grp Cap(c), veh/h	1077	0	0	1060	0	0	310	0	0	320	0	0
V/C Ratio(X)	0.48	0.00	0.00	0.91	0.00	0.00	0.41	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1077	0	0	1060	0	0	337	0	0	348	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.29	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.1	0.0	0.0	12.6	0.0	0.0	29.6	0.0	0.0	29.4	0.0	0.0
Incr Delay (d2), s/veh	1.6	0.0	0.0	4.4	0.0	0.0	0.9	0.0	0.0	0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	0.0	0.0	21.4	0.0	0.0	2.7	0.0	0.0	2.5	0.0	0.0
LnGrp Delay(d),s/veh	8.7	0.0	0.0	17.0	0.0	0.0	30.5	0.0	0.0	30.1	0.0	0.0
LnGrp LOS	A			B			C			C		
Approach Vol, veh/h		521			964			127			120	
Approach Delay, s/veh		8.7			17.0			30.5			30.1	
Approach LOS		A			B			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		62.0		23.0		62.0		23.0				
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6				
Max Green Setting (Gmax), s		* 55		19.4		* 55		19.4				
Max Q Clear Time (g_c+I1), s		16.3		8.2		50.4		8.9				
Green Ext Time (p_c), s		4.8		0.5		2.8		0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			16.4									
HCM 2010 LOS			B									
Notes												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	376	12	22	650	13	9	4	21	10	3	14
Future Volume (vph)	12	376	12	22	650	13	9	4	21	10	3	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.998			0.916			0.928	
Flt Protected		0.999			0.998			0.987			0.982	
Satd. Flow (prot)	0	1406	0	0	1408	0	0	1420	0	0	1431	0
Flt Permitted		0.999			0.998			0.987			0.982	
Satd. Flow (perm)	0	1406	0	0	1408	0	0	1420	0	0	1431	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Parking (#/hr)		0			0							
Adj. Flow (vph)	13	418	13	24	722	14	10	4	23	11	3	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	444	0	0	760	0	0	37	0	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	CBD
Control Type: Unsignalized	
Intersection Capacity Utilization 62.2%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	376	12	22	650	13	9	4	21	10	3	14
Future Vol, veh/h	12	376	12	22	650	13	9	4	21	10	3	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	418	13	24	722	14	10	4	23	11	3	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	736	0	0	431	0	0	1238	1235	425	1241	1234	729
Stage 1	-	-	-	-	-	-	451	451	-	777	777	-
Stage 2	-	-	-	-	-	-	787	784	-	464	457	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	870	-	-	1129	-	-	152	176	629	152	177	423
Stage 1	-	-	-	-	-	-	588	571	-	390	407	-
Stage 2	-	-	-	-	-	-	385	404	-	578	568	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	870	-	-	1129	-	-	138	166	629	137	167	423
Mov Cap-2 Maneuver	-	-	-	-	-	-	138	166	-	137	167	-
Stage 1	-	-	-	-	-	-	576	560	-	382	392	-
Stage 2	-	-	-	-	-	-	354	389	-	541	557	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.3	20	24.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	277	870	-	-	1129	-	-	218
HCM Lane V/C Ratio	0.136	0.015	-	-	0.022	-	-	0.138
HCM Control Delay (s)	20	9.2	0	-	8.3	0	-	24.1
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.5	0	-	-	0.1	-	-	0.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	0	5	12	358	5	33	11	162	284	39	144	1
Future Volume (vph)	0	5	12	358	5	33	11	162	284	39	144	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.908			0.989			0.916			0.999	
Flt Protected					0.957			0.999			0.990	
Satd. Flow (prot)	0	1426	0	0	1474	0	0	1277	0	0	1505	0
Flt Permitted					0.957			0.999			0.990	
Satd. Flow (perm)	0	1426	0	0	1474	0	0	1277	0	0	1505	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			316.0			99.4	
Travel Time (s)		5.3			8.0			22.8			7.2	
Confl. Peds. (#/hr)	32		18	18		32	39		9	9		39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	2%	12%	2%	4%	3%	10%	4%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	6	13	398	6	37	12	180	316	43	160	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	19	0	0	441	0	0	508	0	0	204	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 73.4% ICU Level of Service D

Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	22.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	0	5	12	358	5	33	11	162	284	39	144	1
Future Vol, veh/h	0	5	12	358	5	33	11	162	284	39	144	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	12	2	4	3	10	4	2
Mvmt Flow	0	6	13	398	6	37	12	180	316	43	160	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10	24.7	24.1	13.3
HCM LOS	A	C	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	0%	90%	21%
Vol Thru, %	35%	29%	1%	78%
Vol Right, %	62%	71%	8%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	457	17	396	184
LT Vol	11	0	358	39
Through Vol	162	5	5	144
RT Vol	284	12	33	1
Lane Flow Rate	508	19	440	204
Geometry Grp	1	1	1	1
Degree of Util (X)	0.764	0.035	0.741	0.371
Departure Headway (Hd)	5.414	6.699	6.065	6.529
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	660	537	590	554
Service Time	3.507	4.713	4.153	4.532
HCM Lane V/C Ratio	0.77	0.035	0.746	0.368
HCM Control Delay	24.1	10	24.7	13.3
HCM Lane LOS	C	A	C	B
HCM 95th-tile Q	7.1	0.1	6.4	1.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	137	61	86	325	68	33	298	94	28	321	69
Future Volume (vph)	45	137	61	86	325	68	33	298	94	28	321	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.99	0.98	
Frt		0.966			0.981			0.964			0.973	
Flt Protected		0.991			0.991		0.950			0.950		
Satd. Flow (prot)	0	1485	0	0	1521	0	1478	1493	0	1492	1490	0
Flt Permitted		0.839			0.883		0.388			0.387		
Satd. Flow (perm)	0	1256	0	0	1351	0	585	1493	0	599	1490	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			12			22			15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	15		17	17		15	33		16	16		33
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	3%	2%
Adj. Flow (vph)	50	152	68	96	361	76	37	331	104	31	357	77
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	270	0	0	533	0	37	435	0	31	434	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	39.4	39.4		39.4	39.4		39.6	39.6		39.6	39.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		37.4			37.4		41.6	41.6		41.6	41.6	
Actuated g/C Ratio		0.42			0.42		0.46	0.46		0.46	0.46	
v/c Ratio		0.50			0.94		0.14	0.62		0.11	0.62	
Control Delay		20.9			51.0		16.8	22.7		14.0	20.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.6	
Total Delay		20.9			51.0		16.8	22.7		14.0	20.7	
LOS		C			D		B	C		B	C	
Approach Delay		20.9			51.0			22.3			20.2	
Approach LOS		C			D			C			C	
Queue Length 50th (m)		29.2			80.9		3.7	54.3		3.2	50.0	
Queue Length 95th (m)		51.0			#143.8		10.0	87.0		m4.9	m62.7	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		563			598		270	702		276	697	
Starvation Cap Reductn		0			0		0	0		0	70	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.48			0.89		0.14	0.62		0.11	0.69	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

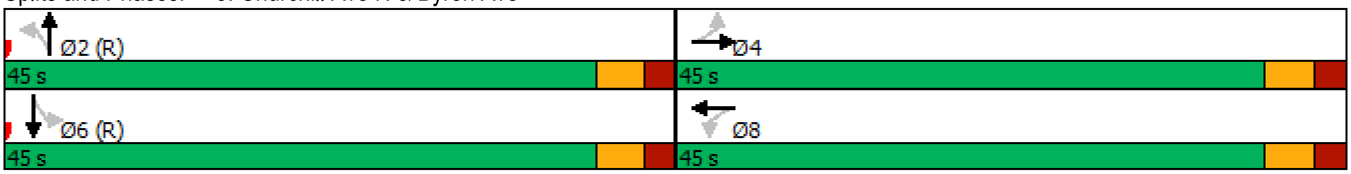
Maximum v/c Ratio: 0.94

Intersection Signal Delay: 30.3 Intersection LOS: C

Intersection Capacity Utilization 82.0%	ICU Level of Service E
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.

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	137	61	86	325	68	33	298	94	28	321	69
Future Volume (veh/h)	45	137	61	86	325	68	33	298	94	28	321	69
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	0.99		0.99	0.98		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1573	1588	1620	1588	1576	1620
Adj Flow Rate, veh/h	50	152	68	96	361	76	37	331	104	31	357	77
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	3	2	2	2	3	3
Cap, veh/h	107	289	118	131	405	81	452	548	172	307	595	128
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.48	0.48	0.48	0.95	0.95	0.95
Sat Flow, veh/h	149	722	293	209	1012	203	834	1148	361	855	1248	269
Grp Volume(v), veh/h	270	0	0	533	0	0	37	0	435	31	0	434
Grp Sat Flow(s),veh/h/ln	1165	0	0	1424	0	0	834	0	1509	855	0	1517
Q Serve(g_s), s	0.0	0.0	0.0	18.4	0.0	0.0	2.3	0.0	19.1	1.7	0.0	2.7
Cycle Q Clear(g_c), s	13.8	0.0	0.0	32.2	0.0	0.0	5.1	0.0	19.1	20.7	0.0	2.7
Prop In Lane	0.19		0.25	0.18		0.14	1.00		0.24	1.00		0.18
Lane Grp Cap(c), veh/h	514	0	0	618	0	0	452	0	720	307	0	724
V/C Ratio(X)	0.53	0.00	0.00	0.86	0.00	0.00	0.08	0.00	0.60	0.10	0.00	0.60
Avail Cap(c_a), veh/h	563	0	0	670	0	0	452	0	720	307	0	724
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.63	0.00	0.63
Uniform Delay (d), s/veh	19.9	0.0	0.0	25.7	0.0	0.0	14.4	0.0	17.3	6.4	0.0	1.1
Incr Delay (d2), s/veh	0.8	0.0	0.0	10.6	0.0	0.0	0.4	0.0	3.7	0.4	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	0.0	0.0	14.4	0.0	0.0	0.6	0.0	8.6	0.4	0.0	1.2
LnGrp Delay(d),s/veh	20.7	0.0	0.0	36.3	0.0	0.0	14.8	0.0	21.0	6.8	0.0	3.4
LnGrp LOS	C			D			B		C	A		A
Approach Vol, veh/h		270			533			472			465	
Approach Delay, s/veh		20.7			36.3			20.5			3.7	
Approach LOS		C			D			C			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		48.3		41.7		48.3		41.7
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		39.4		* 40		39.4
Max Q Clear Time (g_c+I1), s		21.1		15.8		22.7		34.2
Green Ext Time (p_c), s		3.4		2.1		3.2		1.8

Intersection Summary		
HCM 2010 Ctrl Delay		20.9
HCM 2010 LOS		C

Notes

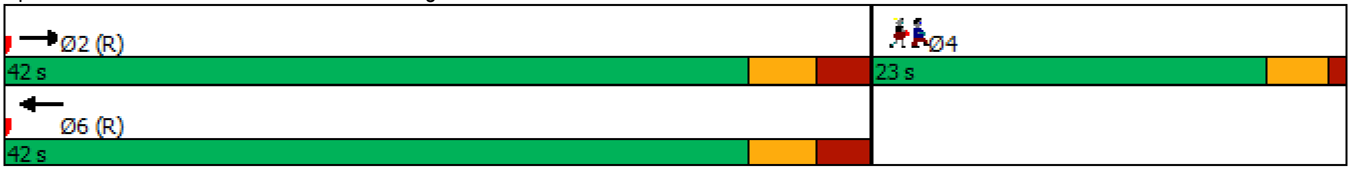
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	400	0	0	673	0	0	
Future Volume (vph)	400	0	0	673	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	33.7		
Travel Time (s)	19.2			1.4	2.4		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	444	0	0	748	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	444	0	0	748	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	24.0			24.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							51
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.51			0.86			
Control Delay	11.6			25.2			
Queue Delay	0.0			0.0			
Total Delay	11.6			25.2			
LOS	B			C			
Approach Delay	11.6			25.2			
Approach LOS	B			C			
Queue Length 50th (m)	30.1			69.4			
Queue Length 95th (m)	51.5			#139.2			
Internal Link Dist (m)	242.4			0.1	9.7		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.51			0.86			

Intersection Summary

Area Type: CBD
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 20.2 Intersection LOS: C
Intersection Capacity Utilization 46.5% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Appendix O

2022 Future Background Synchro Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	296	384	38	53	188	22	28	306	103	23	281	145
Future Volume (vph)	296	384	38	53	188	22	28	306	103	23	281	145
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.99		0.96	0.99			0.98			0.97	
Frt		0.986			0.984			0.965			0.952	
Flt Protected	0.950			0.950				0.997			0.997	
Satd. Flow (prot)	1478	1382	0	1396	1337	0	0	2746	0	0	2642	0
Flt Permitted	0.507			0.516				0.895			0.910	
Satd. Flow (perm)	748	1382	0	727	1337	0	0	2459	0	0	2407	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			8			52			102	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			316.0	
Travel Time (s)		21.4			19.2			9.0			22.8	
Confl. Peds. (#/hr)	50		47	47		50	38		30	30		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	9%	5%	5%	8%	5%	2%	13%	6%	4%
Parking (#/hr)		0			0							
Adj. Flow (vph)	296	384	38	53	188	22	28	306	103	23	281	145
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	422	0	53	210	0	0	437	0	0	449	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	36.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	14.0	40.0		31.0	31.0		30.0	30.0		30.0	30.0	
Total Split (%)	17.5%	50.0%		38.8%	38.8%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	7.9	33.9		24.9	24.9		23.8	23.8		23.8	23.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	48.1	48.1		29.3	29.3			19.6			19.6	
Actuated g/C Ratio	0.60	0.60		0.37	0.37			0.24			0.24	
v/c Ratio	0.52	0.51		0.20	0.43			0.68			0.68	
Control Delay	12.2	12.1		22.0	23.0			23.5			26.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.2	12.1		22.0	23.0			23.5			26.2	
LOS	B	B		C	C			C			C	
Approach Delay		12.1			22.8			23.5			26.2	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	19.0	30.5		5.3	22.1			29.5			25.6	
Queue Length 95th (m)	39.1	62.7		14.9	44.7			21.4			37.7	
Internal Link Dist (m)		273.0			242.4			101.1			292.0	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	566	834		266	494			768			787	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.52	0.51		0.20	0.43			0.57			0.57	

Intersection Summary

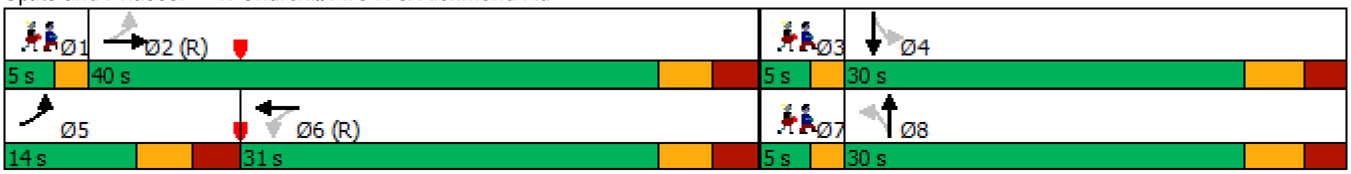
Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.68

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 92.3%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Churchill Ave N & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	565	21	28	345	38	25	10	45	55	16	17
Future Volume (vph)	8	565	21	28	345	38	25	10	45	55	16	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			0.92			0.94	
Frt		0.995			0.988			0.924			0.974	
Flt Protected		0.999			0.997			0.985			0.970	
Satd. Flow (prot)	0	1374	0	0	1351	0	0	1252	0	0	1453	0
Flt Permitted		0.995			0.948			0.889			0.808	
Satd. Flow (perm)	0	1368	0	0	1282	0	0	1102	0	0	1158	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			45			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	80		65	65		80	48		42	42		48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	2%	4%	4%	3%	12%	2%	11%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	8	565	21	28	345	38	25	10	45	55	16	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	594	0	0	411	0	0	80	0	0	88	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		34.4	34.4		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.6	39.6		39.6	39.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		51.8			51.8			11.4			11.4	
Actuated g/C Ratio		0.74			0.74			0.16			0.16	
v/c Ratio		0.59			0.43			0.37			0.44	
Control Delay		9.4			6.9			18.6			28.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		9.4			6.9			18.6			28.6	
LOS		A			A			B			C	
Approach Delay		9.4			6.9			18.6			28.6	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		33.0			18.4			4.1			8.6	
Queue Length 95th (m)		79.5			44.2			14.2			19.6	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1013			952			337			333	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.59			0.43			0.24			0.26	

Intersection Summary		
Area Type:	CBD	
Cycle Length: 70		
Actuated Cycle Length: 70		
Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.59		
Intersection Signal Delay: 10.6		Intersection LOS: B
Intersection Capacity Utilization 68.5%		ICU Level of Service C
Analysis Period (min) 15		

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	565	21	28	345	38	25	10	45	55	16	17
Future Volume (veh/h)	8	565	21	28	345	38	25	10	45	55	16	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.94	0.99		0.94	0.91		0.89	0.91		0.89
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1559	1620	1620	1559	1620	1620	1470	1620	1620	1588	1620
Adj Flow Rate, veh/h	8	565	21	28	345	38	25	10	45	55	16	17
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	4	4	4	4	4	4	2	2	2	2	2	2
Cap, veh/h	56	922	34	85	799	85	124	55	143	240	66	53
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	6	1480	54	49	1283	136	256	249	650	711	301	242
Grp Volume(v), veh/h	594	0	0	411	0	0	80	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	1540	0	0	1467	0	0	1155	0	0	1255	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	16.5	0.0	0.0	9.8	0.0	0.0	3.7	0.0	0.0	3.5	0.0	0.0
Prop In Lane	0.01		0.04	0.07		0.09	0.31		0.56	0.62		0.19
Lane Grp Cap(c), veh/h	1012	0	0	969	0	0	321	0	0	359	0	0
V/C Ratio(X)	0.59	0.00	0.00	0.42	0.00	0.00	0.25	0.00	0.00	0.24	0.00	0.00
Avail Cap(c_a), veh/h	1012	0	0	969	0	0	386	0	0	427	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.91	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	0.0	0.0	6.8	0.0	0.0	22.8	0.0	0.0	22.7	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.0	0.0	1.2	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	0.0	4.3	0.0	0.0	1.3	0.0	0.0	1.5	0.0	0.0
LnGrp Delay(d),s/veh	10.6	0.0	0.0	8.0	0.0	0.0	23.2	0.0	0.0	23.0	0.0	0.0
LnGrp LOS	B			A			C			C		
Approach Vol, veh/h		594			411			80			88	
Approach Delay, s/veh		10.6			8.0			23.2			23.0	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		49.0		21.0		49.0		21.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		19.4		* 40		19.4
Max Q Clear Time (g_c+I1), s		18.5		5.5		11.8		5.7
Green Ext Time (p_c), s		4.8		0.4		3.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	452	7	5	287	20	2	16	15	10	9	11
Future Volume (vph)	20	452	7	5	287	20	2	16	15	10	9	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998			0.991			0.939			0.950	
Flt Protected		0.998			0.999			0.997			0.984	
Satd. Flow (prot)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Flt Permitted		0.998			0.999			0.997			0.984	
Satd. Flow (perm)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Confl. Peds. (#/hr)	39		44	44		39						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	20	452	7	5	287	20	2	16	15	10	9	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	479	0	0	312	0	0	33	0	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: CBD	
Control Type: Unsignalized	
Intersection Capacity Utilization 54.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	452	7	5	287	20	2	16	15	10	9	11
Future Vol, veh/h	20	452	7	5	287	20	2	16	15	10	9	11
Conflicting Peds, #/hr	39	0	44	44	0	39	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	20	452	7	5	287	20	2	16	15	10	9	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	346	0	0	503	0	0	857	896	500	857	889	336
Stage 1	-	-	-	-	-	-	540	540	-	346	346	-
Stage 2	-	-	-	-	-	-	317	356	-	511	543	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1213	-	-	1061	-	-	277	280	571	277	282	706
Stage 1	-	-	-	-	-	-	526	521	-	670	635	-
Stage 2	-	-	-	-	-	-	694	629	-	545	520	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1176	-	-	1025	-	-	251	255	552	243	257	685
Mov Cap-2 Maneuver	-	-	-	-	-	-	251	255	-	243	257	-
Stage 1	-	-	-	-	-	-	497	492	-	634	612	-
Stage 2	-	-	-	-	-	-	669	606	-	501	491	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	16.8	17.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	337	1176	-	-	1025	-	-	325
HCM Lane V/C Ratio	0.098	0.017	-	-	0.005	-	-	0.092
HCM Control Delay (s)	16.8	8.1	0	-	8.5	0	-	17.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	13	186	9	20	8	109	452	49	210	1
Future Volume (vph)	0	7	13	186	9	20	8	109	452	49	210	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.912			0.987			0.893			0.999	
Flt Protected					0.959			0.999			0.991	
Satd. Flow (prot)	0	1327	0	0	1440	0	0	1242	0	0	1549	0
Flt Permitted					0.959			0.999			0.991	
Satd. Flow (perm)	0	1327	0	0	1440	0	0	1242	0	0	1549	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			316.0			99.4	
Travel Time (s)		5.3			8.0			22.8			7.2	
Confl. Peds. (#/hr)	41		7	7		41	38		10	10		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	8%	4%	11%	15%	2%	6%	3%	4%	2%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	7	13	186	9	20	8	109	452	49	210	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	215	0	0	569	0	0	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary		
Area Type:	CBD	
Control Type: Unsignalized		
Intersection Capacity Utilization 77.3%		ICU Level of Service D
Analysis Period (min) 15		

Intersection	
Intersection Delay, s/veh	16
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	7	13	186	9	20	8	109	452	49	210	1
Future Vol, veh/h	0	7	13	186	9	20	8	109	452	49	210	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	14	8	4	11	15	2	6	3	4	2	2
Mvmt Flow	0	7	13	186	9	20	8	109	452	49	210	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.6	12.6	19.2	12.1
HCM LOS	A	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	0%	87%	19%
Vol Thru, %	19%	35%	4%	81%
Vol Right, %	79%	65%	9%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	569	20	215	260
LT Vol	8	0	186	49
Through Vol	109	7	9	210
RT Vol	452	13	20	1
Lane Flow Rate	569	20	215	260
Geometry Grp	1	1	1	1
Degree of Util (X)	0.732	0.035	0.364	0.396
Departure Headway (Hd)	4.632	6.262	6.103	5.478
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	785	568	587	655
Service Time	2.632	4.338	4.156	3.524
HCM Lane V/C Ratio	0.725	0.035	0.366	0.397
HCM Control Delay	19.2	9.6	12.6	12.1
HCM Lane LOS	C	A	B	B
HCM 95th-tile Q	6.5	0.1	1.7	1.9

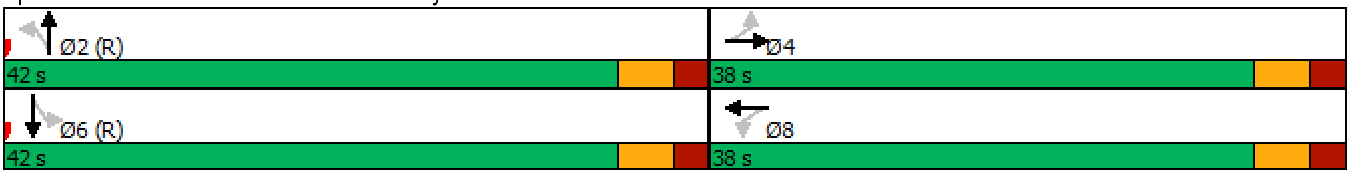
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	172	46	35	127	56	29	333	42	38	291	24
Future Volume (vph)	36	172	46	35	127	56	29	333	42	38	291	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.98	1.00	
Frt		0.976			0.965			0.983			0.989	
Flt Protected		0.993			0.992		0.950			0.950		
Satd. Flow (prot)	0	1513	0	0	1494	0	1422	1496	0	1492	1503	0
Flt Permitted		0.926			0.897		0.558			0.512		
Satd. Flow (perm)	0	1409	0	0	1349	0	814	1496	0	791	1503	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			26			10			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	14		8	8		14	21		16	16		21
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	5%	2%	2%	5%	4%
Adj. Flow (vph)	36	172	46	35	127	56	29	333	42	38	291	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	254	0	0	218	0	29	375	0	38	315	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	38.0	38.0		38.0	38.0		42.0	42.0		42.0	42.0	
Total Split (%)	47.5%	47.5%		47.5%	47.5%		52.5%	52.5%		52.5%	52.5%	
Maximum Green (s)	32.4	32.4		32.4	32.4		36.6	36.6		36.6	36.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		19.0			19.0		50.0	50.0		50.0	50.0	
Actuated g/C Ratio		0.24			0.24		0.62	0.62		0.62	0.62	
v/c Ratio		0.73			0.64		0.06	0.40		0.08	0.33	
Control Delay		38.0			31.9		8.3	10.2		4.4	4.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		38.0			31.9		8.3	10.2		4.4	4.9	
LOS		D			C		A	B		A	A	
Approach Delay		38.0			31.9			10.0			4.8	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		33.3			26.2		1.5	24.5		1.4	12.1	
Queue Length 95th (m)		50.6			42.0		5.9	54.0		m3.2	21.2	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		580			561		509	939		494	942	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.44			0.39		0.06	0.40		0.08	0.33	

Intersection Summary	
Area Type:	CBD
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 18.2	Intersection LOS: B

Intersection Capacity Utilization 62.7% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	172	46	35	127	56	29	333	42	38	291	24
Future Volume (veh/h)	36	172	46	35	127	56	29	333	42	38	291	24
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.98	0.99		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1514	1548	1620	1588	1544	1620
Adj Flow Rate, veh/h	36	172	46	35	127	56	29	333	42	38	291	24
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	7	5	5	2	5	5
Cap, veh/h	82	251	62	85	216	86	659	851	107	550	889	73
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.63	0.63	0.63	1.00	1.00	1.00
Sat Flow, veh/h	133	1093	271	145	942	375	900	1345	170	899	1405	116
Grp Volume(v), veh/h	254	0	0	218	0	0	29	0	375	38	0	315
Grp Sat Flow(s),veh/h/ln	1497	0	0	1462	0	0	900	0	1515	899	0	1521
Q Serve(g_s), s	1.8	0.0	0.0	0.0	0.0	0.0	1.0	0.0	9.7	0.7	0.0	0.0
Cycle Q Clear(g_c), s	12.3	0.0	0.0	10.5	0.0	0.0	1.0	0.0	9.7	10.4	0.0	0.0
Prop In Lane	0.14		0.18	0.16		0.26	1.00		0.11	1.00		0.08
Lane Grp Cap(c), veh/h	395	0	0	388	0	0	659	0	958	550	0	963
V/C Ratio(X)	0.64	0.00	0.00	0.56	0.00	0.00	0.04	0.00	0.39	0.07	0.00	0.33
Avail Cap(c_a), veh/h	647	0	0	632	0	0	659	0	958	550	0	963
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.74	0.00	0.74
Uniform Delay (d), s/veh	28.4	0.0	0.0	27.7	0.0	0.0	5.6	0.0	7.2	1.0	0.0	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.0	1.3	0.0	0.0	0.1	0.0	1.2	0.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.0	0.0	4.5	0.0	0.0	0.3	0.0	4.3	0.2	0.0	0.2
LnGrp Delay(d),s/veh	30.2	0.0	0.0	29.0	0.0	0.0	5.7	0.0	8.4	1.2	0.0	0.7
LnGrp LOS	C			C			A		A	A		A
Approach Vol, veh/h		254			218			404			353	
Approach Delay, s/veh		30.2			29.0			8.2			0.7	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		56.0		24.0		56.0		24.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 37		32.4		* 37		32.4
Max Q Clear Time (g_c+I1), s		11.7		14.3		12.4		12.5
Green Ext Time (p_c), s		3.1		1.6		2.6		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

Notes

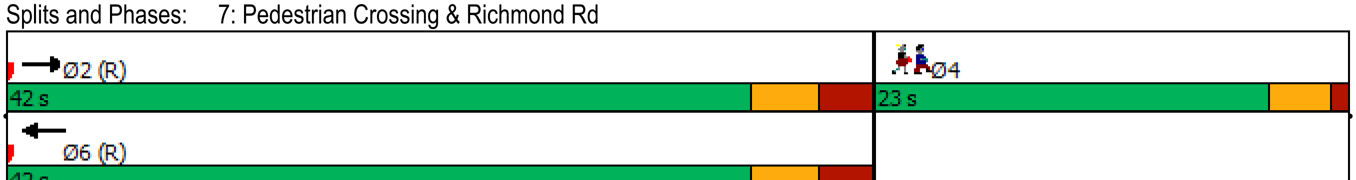
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	479	0	0	300	0	0	
Future Volume (vph)	479	0	0	300	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	13.6		
Travel Time (s)	19.2			1.4	1.0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	479	0	0	300	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	479	0	0	300	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	11.0			11.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							43
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.55			0.34			
Control Delay	12.3			9.4			
Queue Delay	0.0			0.0			
Total Delay	12.3			9.4			
LOS	B			A			
Approach Delay	12.3			9.4			
Approach LOS	B			A			
Queue Length 50th (m)	33.5			18.0			
Queue Length 95th (m)	57.1			31.8			
Internal Link Dist (m)	242.4			0.1	0.1		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.55			0.34			

Intersection Summary

Area Type: CBD
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 34.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	329	57	129	479	29	28	297	67	17	244	314
Future Volume (vph)	195	329	57	129	479	29	28	297	67	17	244	314
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.96		0.84	0.99			0.97			0.88	
Frt		0.978			0.991			0.974			0.918	
Flt Protected	0.950			0.950				0.996			0.999	
Satd. Flow (prot)	1478	1323	0	1492	1385	0	0	2821	0	0	2421	0
Flt Permitted	0.286			0.533				0.810			0.933	
Satd. Flow (perm)	421	1323	0	701	1385	0	0	2283	0	0	2257	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			4			24			305	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			316.0	
Travel Time (s)		21.4			19.2			9.0			22.8	
Confl. Peds. (#/hr)	99		154	154		99	78		53	53		78
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	195	329	57	129	479	29	28	297	67	17	244	314
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	386	0	129	508	0	0	392	0	0	575	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	31.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	15.0	55.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	16.7%	61.1%		50.0%	50.0%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	8.9	48.9		38.9	38.9		18.8	18.8		18.8	18.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	56.5	56.5		41.5	41.5			21.2			21.2	
Actuated g/C Ratio	0.63	0.63		0.46	0.46			0.24			0.24	
v/c Ratio	0.53	0.46		0.40	0.79			0.71			0.75	
Control Delay	13.2	11.1		21.9	32.7			28.2			21.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	13.2	11.1		21.9	32.7			28.2			21.2	
LOS	B	B		C	C			C			C	
Approach Delay		11.8			30.5			28.2			21.2	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	13.2	30.5		14.9	74.7			16.6			22.4	
Queue Length 95th (m)	24.6	54.5		31.0	#133.7			m28.4			40.5	
Internal Link Dist (m)		273.0			242.4			101.1			292.0	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	372	836		323	640			560			768	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.52	0.46		0.40	0.79			0.70			0.75	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 22.7	Intersection LOS: C
Intersection Capacity Utilization 98.5%	ICU Level of Service F
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.

Splits and Phases: 1: Churchill Ave N & Richmond Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	435	33	40	792	39	46	16	52	44	35	29
Future Volume (vph)	6	435	33	40	792	39	46	16	52	44	35	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99			0.88			0.91	
Frt		0.991			0.994			0.938			0.964	
Flt Protected		0.999			0.998			0.980			0.980	
Satd. Flow (prot)	0	1382	0	0	1396	0	0	1348	0	0	1395	0
Flt Permitted		0.991			0.965			0.835			0.824	
Satd. Flow (perm)	0	1371	0	0	1345	0	0	1088	0	0	1124	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			6			46			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	48		99	99		48	72		57	57		72
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	6%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	6	435	33	40	792	39	46	16	52	44	35	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	474	0	0	871	0	0	114	0	0	108	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		33.5	33.5		24.6	24.6		24.6	24.6	
Total Split (s)	60.0	60.0		60.0	60.0		25.0	25.0		25.0	25.0	
Total Split (%)	70.6%	70.6%		70.6%	70.6%		29.4%	29.4%		29.4%	29.4%	
Maximum Green (s)	54.6	54.6		54.6	54.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		65.2			65.2			13.0			13.0	
Actuated g/C Ratio		0.77			0.77			0.15			0.15	
v/c Ratio		0.45			0.84			0.56			0.57	
Control Delay		7.0			20.5			30.9			38.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		7.0			20.5			30.9			38.8	
LOS		A			C			C			D	
Approach Delay		7.0			20.5			30.9			38.8	
Approach LOS		A			C			C			D	
Queue Length 50th (m)		25.3			87.7			10.3			13.5	
Queue Length 95th (m)		57.4			#215.5			24.4			27.2	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1054			1033			283			271	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.45			0.84			0.40			0.40	

Intersection Summary	
Area Type: CBD	
Cycle Length: 85	
Actuated Cycle Length: 85	
Offset: 78 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay: 18.4	Intersection LOS: B
Intersection Capacity Utilization 104.6%	ICU Level of Service G
Analysis Period (min) 15	

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

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	435	33	40	792	39	46	16	52	44	35	29
Future Volume (veh/h)	6	435	33	40	792	39	46	16	52	44	35	29
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	0.98		0.93	0.86		0.82	0.87		0.82
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1620	1588	1620	1620	1568	1620
Adj Flow Rate, veh/h	6	435	33	40	792	39	46	16	52	44	35	29
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	6	6	6
Cap, veh/h	46	957	72	72	945	46	141	53	113	146	103	70
Arrive On Green	0.67	0.67	0.67	0.67	0.67	0.67	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	5	1438	108	41	1420	68	399	260	552	421	505	340
Grp Volume(v), veh/h	474	0	0	871	0	0	114	0	0	108	0	0
Grp Sat Flow(s),veh/h/ln	1551	0	0	1530	0	0	1211	0	0	1266	0	0
Q Serve(g_s), s	0.0	0.0	0.0	14.1	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.4	0.0	0.0	36.8	0.0	0.0	6.2	0.0	0.0	5.5	0.0	0.0
Prop In Lane	0.01		0.07	0.05		0.04	0.40		0.46	0.41		0.27
Lane Grp Cap(c), veh/h	1075	0	0	1063	0	0	307	0	0	319	0	0
V/C Ratio(X)	0.44	0.00	0.00	0.82	0.00	0.00	0.37	0.00	0.00	0.34	0.00	0.00
Avail Cap(c_a), veh/h	1075	0	0	1063	0	0	334	0	0	347	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.51	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.8	0.0	0.0	10.7	0.0	0.0	29.3	0.0	0.0	29.1	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	3.8	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	0.0	16.6	0.0	0.0	2.4	0.0	0.0	2.2	0.0	0.0
LnGrp Delay(d),s/veh	8.1	0.0	0.0	14.5	0.0	0.0	30.1	0.0	0.0	29.7	0.0	0.0
LnGrp LOS	A			B			C			C		
Approach Vol, veh/h		474			871			114			108	
Approach Delay, s/veh		8.1			14.5			30.1			29.7	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		62.0		23.0		62.0		23.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 55		19.4		* 55		19.4
Max Q Clear Time (g_c+I1), s		14.4		7.5		38.8		8.2
Green Ext Time (p_c), s		4.2		0.5		7.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	378	12	22	654	13	9	4	21	10	3	14
Future Volume (vph)	12	378	12	22	654	13	9	4	21	10	3	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997			0.917			0.930	
Flt Protected		0.999			0.998			0.987			0.982	
Satd. Flow (prot)	0	1406	0	0	1406	0	0	1422	0	0	1434	0
Flt Permitted		0.999			0.998			0.987			0.982	
Satd. Flow (perm)	0	1406	0	0	1406	0	0	1422	0	0	1434	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking (#/hr)		0			0							
Adj. Flow (vph)	12	378	12	22	654	13	9	4	21	10	3	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	402	0	0	689	0	0	34	0	0	27	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 62.5% ICU Level of Service B

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	378	12	22	654	13	9	4	21	10	3	14
Future Vol, veh/h	12	378	12	22	654	13	9	4	21	10	3	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	378	12	22	654	13	9	4	21	10	3	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	667	0	0	390	0	0	1121	1119	384	1126	1119	661
Stage 1	-	-	-	-	-	-	408	408	-	705	705	-
Stage 2	-	-	-	-	-	-	713	711	-	421	414	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	923	-	-	1169	-	-	183	207	664	182	207	462
Stage 1	-	-	-	-	-	-	620	597	-	427	439	-
Stage 2	-	-	-	-	-	-	423	436	-	610	593	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	923	-	-	1169	-	-	169	197	664	167	197	462
Mov Cap-2 Maneuver	-	-	-	-	-	-	169	197	-	167	197	-
Stage 1	-	-	-	-	-	-	609	587	-	420	426	-
Stage 2	-	-	-	-	-	-	395	423	-	577	583	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.3	17.5	20.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	323	923	-	-	1169	-	-	256
HCM Lane V/C Ratio	0.105	0.013	-	-	0.019	-	-	0.105
HCM Control Delay (s)	17.5	9	0	-	8.1	0	-	20.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	5	12	366	5	33	11	116	289	39	136	1
Future Volume (vph)	0	5	12	366	5	33	11	116	289	39	136	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.905			0.989			0.906			0.999	
Flt Protected					0.957			0.999			0.989	
Satd. Flow (prot)	0	1421	0	0	1475	0	0	1264	0	0	1503	0
Flt Permitted					0.957			0.999			0.989	
Satd. Flow (perm)	0	1421	0	0	1475	0	0	1264	0	0	1503	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			316.0			99.4	
Travel Time (s)		5.3			8.0			22.8			7.2	
Confl. Peds. (#/hr)	32		18	18		32	39		9	9		39
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	12%	2%	4%	3%	10%	4%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	5	12	366	5	33	11	116	289	39	136	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	0	0	404	0	0	416	0	0	176	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type: CBD	
Control Type: Unsignalized	
Intersection Capacity Utilization 72.6%	ICU Level of Service C
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	15.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	0	5	12	366	5	33	11	116	289	39	136	1
Future Vol, veh/h	0	5	12	366	5	33	11	116	289	39	136	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	12	2	4	3	10	4	2
Mvmt Flow	0	5	12	366	5	33	11	116	289	39	136	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.2	18.2	15.2	11.6
HCM LOS	A	C	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	0%	91%	22%
Vol Thru, %	28%	29%	1%	77%
Vol Right, %	69%	71%	8%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	416	17	404	176
LT Vol	11	0	366	39
Through Vol	116	5	5	136
RT Vol	289	12	33	1
Lane Flow Rate	416	17	404	176
Geometry Grp	1	1	1	1
Degree of Util (X)	0.588	0.028	0.637	0.294
Departure Headway (Hd)	5.092	5.911	5.673	6.014
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	707	601	634	595
Service Time	3.143	3.992	3.717	4.077
HCM Lane V/C Ratio	0.588	0.028	0.637	0.296
HCM Control Delay	15.2	9.2	18.2	11.6
HCM Lane LOS	C	A	C	B
HCM 95th-tile Q	3.9	0.1	4.5	1.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	139	61	86	326	69	33	300	94	28	323	70
Future Volume (vph)	45	139	61	86	326	69	33	300	94	28	323	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.98	0.98	
Frt		0.966			0.981			0.964			0.973	
Flt Protected		0.991			0.991		0.950			0.950		
Satd. Flow (prot)	0	1485	0	0	1521	0	1478	1493	0	1492	1490	0
Flt Permitted		0.854			0.893		0.440			0.439		
Satd. Flow (perm)	0	1278	0	0	1366	0	660	1493	0	678	1490	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			12			22			15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	15		17	17		15	33		16	16		33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	3%	2%
Adj. Flow (vph)	45	139	61	86	326	69	33	300	94	28	323	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	245	0	0	481	0	33	394	0	28	393	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	39.4	39.4		39.4	39.4		39.6	39.6		39.6	39.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		35.0			35.0		44.0	44.0		44.0	44.0	
Actuated g/C Ratio		0.39			0.39		0.49	0.49		0.49	0.49	
v/c Ratio		0.48			0.89		0.10	0.53		0.08	0.53	
Control Delay		21.0			45.1		15.6	19.5		13.7	18.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.5	
Total Delay		21.0			45.1		15.6	19.5		13.7	18.6	
LOS		C			D		B	B		B	B	
Approach Delay		21.0			45.1			19.2			18.2	
Approach LOS		C			D			B			B	
Queue Length 50th (m)		26.6			71.3		3.1	44.7		2.7	44.1	
Queue Length 95th (m)		44.9			#120.9		9.0	75.9		m4.8	m58.0	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		572			604		322	740		331	735	
Starvation Cap Reductn		0			0		0	0		0	93	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.43			0.80		0.10	0.53		0.08	0.61	

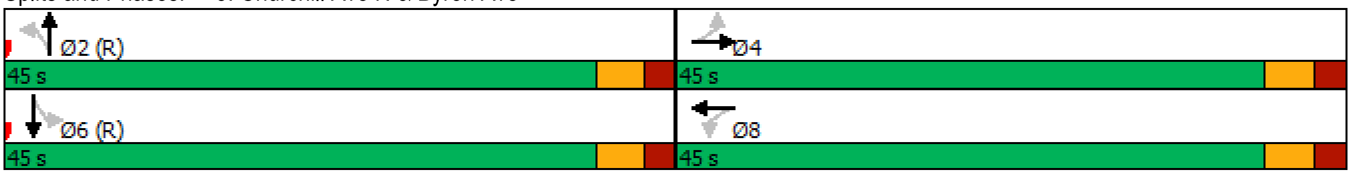
Intersection Summary	
Area Type:	CBD
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 27.1	Intersection LOS: C

Intersection Capacity Utilization 82.2%	ICU Level of Service E
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.

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	139	61	86	326	69	33	300	94	28	323	70
Future Volume (veh/h)	45	139	61	86	326	69	33	300	94	28	323	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	0.99		0.99	0.98		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1573	1588	1620	1588	1576	1620
Adj Flow Rate, veh/h	45	139	61	86	326	69	33	300	94	28	323	70
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	3	2	2	2	3	3
Cap, veh/h	102	278	110	122	376	76	523	590	185	381	639	139
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.51	0.51	0.51	1.00	1.00	1.00
Sat Flow, veh/h	151	761	302	206	1030	207	863	1150	360	885	1247	270
Grp Volume(v), veh/h	245	0	0	481	0	0	33	0	394	28	0	393
Grp Sat Flow(s),veh/h/ln	1214	0	0	1444	0	0	863	0	1511	885	0	1517
Q Serve(g_s), s	0.0	0.0	0.0	16.0	0.0	0.0	1.7	0.0	15.5	1.0	0.0	0.0
Cycle Q Clear(g_c), s	12.4	0.0	0.0	28.4	0.0	0.0	1.7	0.0	15.5	16.5	0.0	0.0
Prop In Lane	0.18		0.25	0.18		0.14	1.00		0.24	1.00		0.18
Lane Grp Cap(c), veh/h	491	0	0	574	0	0	523	0	774	381	0	778
V/C Ratio(X)	0.50	0.00	0.00	0.84	0.00	0.00	0.06	0.00	0.51	0.07	0.00	0.51
Avail Cap(c_a), veh/h	587	0	0	677	0	0	523	0	774	381	0	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.67	0.00	0.67
Uniform Delay (d), s/veh	21.7	0.0	0.0	27.0	0.0	0.0	11.1	0.0	14.5	2.8	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	8.0	0.0	0.0	0.2	0.0	2.4	0.2	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	0.0	12.6	0.0	0.0	0.4	0.0	7.0	0.3	0.0	0.3
LnGrp Delay(d),s/veh	22.5	0.0	0.0	34.9	0.0	0.0	11.3	0.0	16.8	3.0	0.0	1.6
LnGrp LOS	C			C			B		B	A		A
Approach Vol, veh/h		245			481			427			421	
Approach Delay, s/veh		22.5			34.9			16.4			1.7	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		51.5		38.5		51.5		38.5
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		39.4		* 40		39.4
Max Q Clear Time (g_c+I1), s		17.5		14.4		18.5		30.4
Green Ext Time (p_c), s		3.2		1.9		3.1		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	19.1
HCM 2010 LOS	B

Notes

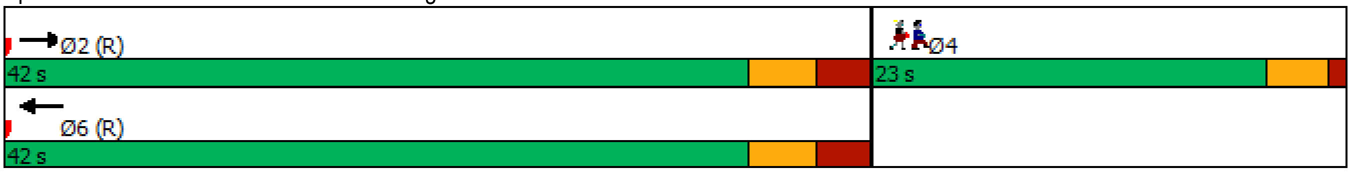
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	402	0	0	677	0	0	
Future Volume (vph)	402	0	0	677	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	33.7		
Travel Time (s)	19.2			1.4	2.4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	402	0	0	677	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	402	0	0	677	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	24.0			24.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							51
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.46			0.78			
Control Delay	10.9			19.6			
Queue Delay	0.0			0.0			
Total Delay	10.9			19.6			
LOS	B			B			
Approach Delay	10.9			19.6			
Approach LOS	B			B			
Queue Length 50th (m)	26.3			57.8			
Queue Length 95th (m)	44.9			#108.7			
Internal Link Dist (m)	242.4			0.1	9.7		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.46			0.78			

Intersection Summary

Area Type: CBD
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 16.3 Intersection LOS: B
Intersection Capacity Utilization 46.8% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Appendix P

2027 Future Background Synchro Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	296	387	38	55	196	23	28	306	104	23	281	145
Future Volume (vph)	296	387	38	55	196	23	28	306	104	23	281	145
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.99		0.96	0.99			0.98			0.97	
Frt		0.987			0.984			0.964			0.952	
Flt Protected	0.950			0.950				0.997			0.997	
Satd. Flow (prot)	1478	1383	0	1396	1337	0	0	2743	0	0	2642	0
Flt Permitted	0.497			0.515				0.895			0.910	
Satd. Flow (perm)	734	1383	0	725	1337	0	0	2456	0	0	2407	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			8			52			102	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			75.7	
Travel Time (s)		21.4			19.2			9.0			5.5	
Confl. Peds. (#/hr)	50		47	47		50	38		30	30		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	9%	5%	5%	8%	5%	2%	13%	6%	4%
Parking (#/hr)		0			0							
Adj. Flow (vph)	296	387	38	55	196	23	28	306	104	23	281	145
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	425	0	55	219	0	0	438	0	0	449	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	36.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	14.0	40.0		31.0	31.0		30.0	30.0		30.0	30.0	
Total Split (%)	17.5%	50.0%		38.8%	38.8%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	7.9	33.9		24.9	24.9		23.8	23.8		23.8	23.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	48.1	48.1		29.2	29.2			19.6			19.6	
Actuated g/C Ratio	0.60	0.60		0.36	0.36			0.24			0.24	
v/c Ratio	0.53	0.51		0.21	0.45			0.69			0.68	
Control Delay	12.3	12.2		22.2	23.4			23.7			26.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.3	12.2		22.2	23.4			23.7			26.2	
LOS	B	B		C	C			C			C	
Approach Delay		12.2			23.2			23.7			26.2	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	19.0	30.8		5.5	23.3			29.2			25.6	
Queue Length 95th (m)	39.1	63.2		15.4	46.8			21.8			37.7	
Internal Link Dist (m)		273.0			242.4			101.1			51.7	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	561	835		264	492			767			787	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.53	0.51		0.21	0.45			0.57			0.57	

Intersection Summary

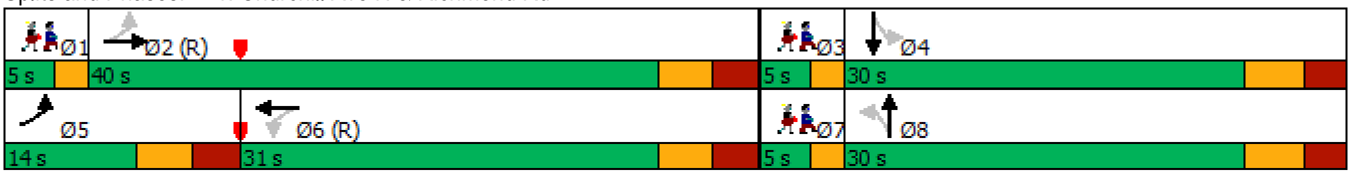
Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 19.8	Intersection LOS: B
Intersection Capacity Utilization 92.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Churchill Ave N & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	565	21	28	345	38	25	10	45	55	16	17
Future Volume (vph)	8	565	21	28	345	38	25	10	45	55	16	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			0.92			0.94	
Frt		0.995			0.988			0.924			0.974	
Flt Protected		0.999			0.997			0.985			0.970	
Satd. Flow (prot)	0	1374	0	0	1351	0	0	1252	0	0	1453	0
Flt Permitted		0.995			0.948			0.889			0.808	
Satd. Flow (perm)	0	1368	0	0	1282	0	0	1102	0	0	1158	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			45			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	80		65	65		80	48		42	42		48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	2%	4%	4%	3%	12%	2%	11%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	8	565	21	28	345	38	25	10	45	55	16	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	594	0	0	411	0	0	80	0	0	88	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		34.4	34.4		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.6	39.6		39.6	39.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		51.8			51.8			11.4			11.4	
Actuated g/C Ratio		0.74			0.74			0.16			0.16	
v/c Ratio		0.59			0.43			0.37			0.44	
Control Delay		9.4			6.9			18.6			28.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		9.4			6.9			18.6			28.6	
LOS		A			A			B			C	
Approach Delay		9.4			6.9			18.6			28.6	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		33.0			18.4			4.1			8.6	
Queue Length 95th (m)		79.5			44.2			14.2			19.6	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1013			952			337			333	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.59			0.43			0.24			0.26	

Intersection Summary

Area Type: CBD

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 10.6 Intersection LOS: B

Intersection Capacity Utilization 68.5% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	565	21	28	345	38	25	10	45	55	16	17
Future Volume (veh/h)	8	565	21	28	345	38	25	10	45	55	16	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.94	0.99		0.94	0.91		0.89	0.91		0.89
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1559	1620	1620	1559	1620	1620	1470	1620	1620	1588	1620
Adj Flow Rate, veh/h	8	565	21	28	345	38	25	10	45	55	16	17
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	4	2	4	4	3	12	2	11	2	2	2
Cap, veh/h	56	922	34	85	799	85	124	55	143	240	66	53
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	6	1480	54	49	1283	136	256	249	650	711	301	242
Grp Volume(v), veh/h	594	0	0	411	0	0	80	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	1540	0	0	1467	0	0	1155	0	0	1255	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	16.5	0.0	0.0	9.8	0.0	0.0	3.7	0.0	0.0	3.5	0.0	0.0
Prop In Lane	0.01		0.04	0.07		0.09	0.31		0.56	0.62		0.19
Lane Grp Cap(c), veh/h	1012	0	0	969	0	0	321	0	0	359	0	0
V/C Ratio(X)	0.59	0.00	0.00	0.42	0.00	0.00	0.25	0.00	0.00	0.24	0.00	0.00
Avail Cap(c_a), veh/h	1012	0	0	969	0	0	386	0	0	427	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.90	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	0.0	0.0	6.8	0.0	0.0	22.8	0.0	0.0	22.7	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.0	0.0	1.2	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	0.0	4.3	0.0	0.0	1.3	0.0	0.0	1.5	0.0	0.0
LnGrp Delay(d),s/veh	10.6	0.0	0.0	8.0	0.0	0.0	23.2	0.0	0.0	23.0	0.0	0.0
LnGrp LOS	B			A			C			C		
Approach Vol, veh/h		594			411			80			88	
Approach Delay, s/veh		10.6			8.0			23.2			23.0	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		49.0		21.0		49.0		21.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		19.4		* 40		19.4
Max Q Clear Time (g_c+I1), s		18.5		5.5		11.8		5.7
Green Ext Time (p_c), s		4.8		0.4		3.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	456	7	5	298	21	2	16	15	10	9	11
Future Volume (vph)	20	456	7	5	298	21	2	16	15	10	9	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998			0.991			0.939			0.950	
Flt Protected		0.998			0.999			0.997			0.984	
Satd. Flow (prot)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Flt Permitted		0.998			0.999			0.997			0.984	
Satd. Flow (perm)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Confl. Peds. (#/hr)	39		44	44		39						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	20	456	7	5	298	21	2	16	15	10	9	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	483	0	0	324	0	0	33	0	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: CBD	
Control Type: Unsignalized	
Intersection Capacity Utilization 54.6%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	456	7	5	298	21	2	16	15	10	9	11
Future Vol, veh/h	20	456	7	5	298	21	2	16	15	10	9	11
Conflicting Peds, #/hr	39	0	44	44	0	39	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	20	456	7	5	298	21	2	16	15	10	9	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	358	0	0	507	0	0	873	912	504	873	905	348
Stage 1	-	-	-	-	-	-	544	544	-	358	358	-
Stage 2	-	-	-	-	-	-	329	368	-	515	547	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1201	-	-	1058	-	-	271	274	568	271	276	695
Stage 1	-	-	-	-	-	-	523	519	-	660	628	-
Stage 2	-	-	-	-	-	-	684	621	-	543	517	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1165	-	-	1022	-	-	245	249	549	238	251	674
Mov Cap-2 Maneuver	-	-	-	-	-	-	245	249	-	238	251	-
Stage 1	-	-	-	-	-	-	494	490	-	625	605	-
Stage 2	-	-	-	-	-	-	659	599	-	499	488	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	17.1	17.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	331	1165	-	-	1022	-	-	318
HCM Lane V/C Ratio	0.1	0.017	-	-	0.005	-	-	0.094
HCM Control Delay (s)	17.1	8.1	0	-	8.5	0	-	17.5
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	13	186	9	20	8	109	452	49	210	1
Future Volume (vph)	0	7	13	186	9	20	8	109	452	49	210	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	75.0		0.0	0.0		30.0	0.0		0.0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (m)	15.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98		0.98	0.92			1.00	0.96		1.00	
Frt		0.912			0.897				0.850		0.999	
Flt Protected				0.950				0.997			0.991	
Satd. Flow (prot)	0	1297	0	1463	1168	0	0	1360	1322	0	1549	0
Flt Permitted				0.744				0.981			0.934	
Satd. Flow (perm)	0	1297	0	1129	1168	0	0	1333	1267	0	1454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			20				452			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			240.3			99.4	
Travel Time (s)		5.3			8.0			17.3			7.2	
Confl. Peds. (#/hr)	41		7	7		41	38		10	10		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	8%	4%	11%	15%	2%	6%	3%	4%	2%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	7	13	186	9	20	8	109	452	49	210	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	186	29	0	0	117	452	0	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

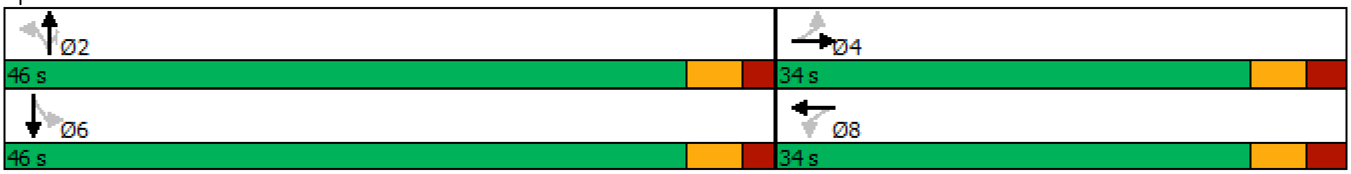
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type		NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	23.8	23.8		23.8	23.8		23.4	23.4	23.4	23.4	23.4	
Total Split (s)	34.0	34.0		34.0	34.0		46.0	46.0	46.0	46.0	46.0	
Total Split (%)	42.5%	42.5%		42.5%	42.5%		57.5%	57.5%	57.5%	57.5%	57.5%	
Maximum Green (s)	28.2	28.2		28.2	28.2		40.6	40.6	40.6	40.6	40.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.1	2.1	2.1	2.1	2.1	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.8		5.8	5.8			5.4	5.4		5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		16.9		16.9	16.9			44.2	44.2		44.2	
Actuated g/C Ratio		0.23		0.23	0.23			0.61	0.61		0.61	
v/c Ratio		0.06		0.71	0.10			0.14	0.48		0.29	
Control Delay		12.4		39.2	11.5			8.1	2.9		9.1	
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay		12.4		39.2	11.5			8.1	2.9		9.1	
LOS		B		D	B			A	A		A	
Approach Delay		12.4			35.5			4.0			9.1	
Approach LOS		B			D			A			A	
Queue Length 50th (m)		0.7		21.6	0.9			5.8	0.0		14.3	
Queue Length 95th (m)		5.0		40.4	6.1			16.6	12.7		35.3	
Internal Link Dist (m)		49.0			86.8			216.3			75.4	
Turn Bay Length (m)				75.0					30.0			
Base Capacity (vph)		514		441	468			814	950		888	
Starvation Cap Reductn		0		0	0			0	0		0	
Spillback Cap Reductn		0		0	0			0	0		0	
Storage Cap Reductn		0		0	0			0	0		0	
Reduced v/c Ratio		0.04		0.42	0.06			0.14	0.48		0.29	

Intersection Summary

Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 72.4
Natural Cycle: 50
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 11.7 Intersection LOS: B

Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Churchill Ave N & Scott St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	7	13	186	9	20	8	109	452	49	210	1
Future Volume (veh/h)	0	7	13	186	9	20	8	109	452	49	210	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.91	0.92		0.91	0.98		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1471	1620	1558	1424	1620	1620	1532	1573	1620	1582	1620
Adj Flow Rate, veh/h	0	7	13	186	9	20	8	109	452	49	210	1
Adj No. of Lanes	0	1	0	1	1	0	0	1	1	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	14	8	4	11	15	2	6	3	4	2	2
Cap, veh/h	0	104	192	360	88	196	86	869	772	179	695	3
Arrive On Green	0.00	0.24	0.24	0.24	0.24	0.24	0.60	0.60	0.60	0.60	0.60	0.60
Sat Flow, veh/h	0	434	806	1124	369	820	49	1456	1294	195	1164	5
Grp Volume(v), veh/h	0	0	20	186	0	29	117	0	452	260	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1240	1124	0	1189	1506	0	1294	1364	0	0
Q Serve(g_s), s	0.0	0.0	0.8	10.4	0.0	1.3	0.0	0.0	14.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.8	11.3	0.0	1.3	2.3	0.0	14.7	5.4	0.0	0.0
Prop In Lane	0.00		0.65	1.00		0.69	0.07		1.00	0.19		0.00
Lane Grp Cap(c), veh/h	0	0	296	360	0	284	955	0	772	877	0	0
V/C Ratio(X)	0.00	0.00	0.07	0.52	0.00	0.10	0.12	0.00	0.59	0.30	0.00	0.00
Avail Cap(c_a), veh/h	0	0	514	558	0	493	955	0	772	877	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	20.0	24.4	0.0	20.2	6.0	0.0	8.5	6.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.1	1.1	0.0	0.2	0.3	0.0	3.2	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	3.3	0.0	0.4	1.0	0.0	5.8	2.5	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	20.1	25.6	0.0	20.4	6.3	0.0	11.7	7.5	0.0	0.0
LnGrp LOS			C	C		C	A		B	A		
Approach Vol, veh/h		20			215			569			260	
Approach Delay, s/veh		20.1			24.9			10.6			7.5	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		46.0		22.0		46.0		22.0
Change Period (Y+Rc), s		* 5.4		* 5.8		* 5.4		* 5.8
Max Green Setting (Gmax), s		* 41		* 28		* 41		* 28
Max Q Clear Time (g_c+I1), s		16.7		2.8		7.4		13.3
Green Ext Time (p_c), s		3.4		0.1		2.2		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.9
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	175	46	35	135	56	29	333	42	38	291	24
Future Volume (vph)	36	175	46	35	135	56	29	333	42	38	291	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.98	1.00	
Frt		0.976			0.967			0.983			0.989	
Flt Protected		0.993			0.992		0.950			0.950		
Satd. Flow (prot)	0	1513	0	0	1497	0	1422	1496	0	1492	1503	0
Flt Permitted		0.924			0.901		0.558			0.511		
Satd. Flow (perm)	0	1406	0	0	1358	0	814	1496	0	789	1503	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			25			10			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	14		8	8		14	21		16	16		21
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	5%	2%	2%	5%	4%
Adj. Flow (vph)	36	175	46	35	135	56	29	333	42	38	291	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	257	0	0	226	0	29	375	0	38	315	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	38.0	38.0		38.0	38.0		42.0	42.0		42.0	42.0	
Total Split (%)	47.5%	47.5%		47.5%	47.5%		52.5%	52.5%		52.5%	52.5%	
Maximum Green (s)	32.4	32.4		32.4	32.4		36.6	36.6		36.6	36.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		19.2			19.2		49.8	49.8		49.8	49.8	
Actuated g/C Ratio		0.24			0.24		0.62	0.62		0.62	0.62	
v/c Ratio		0.74			0.66		0.06	0.40		0.08	0.34	
Control Delay		38.2			32.5		8.4	10.3		4.5	5.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		38.2			32.5		8.4	10.3		4.5	5.0	
LOS		D			C		A	B		A	A	
Approach Delay		38.2			32.5			10.2			4.9	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		33.9			27.5		1.6	24.7		1.5	12.3	
Queue Length 95th (m)		51.2			43.5		5.9	54.5		m3.2	21.6	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		578			564		506	935		491	938	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.44			0.40		0.06	0.40		0.08	0.34	

Intersection Summary

Area Type: CBD

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

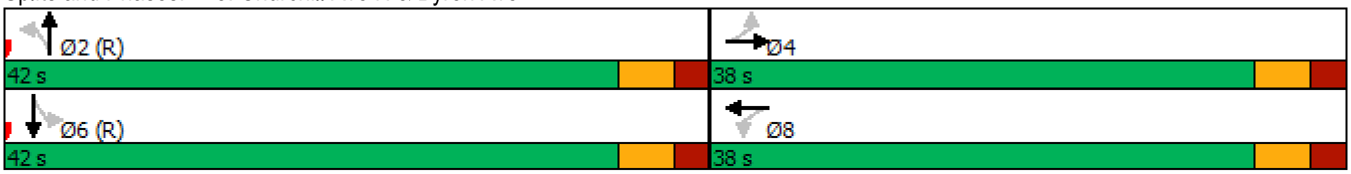
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 18.6 Intersection LOS: B

Intersection Capacity Utilization 63.0%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	175	46	35	135	56	29	333	42	38	291	24
Future Volume (veh/h)	36	175	46	35	135	56	29	333	42	38	291	24
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.98	0.99		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1514	1548	1620	1588	1544	1620
Adj Flow Rate, veh/h	36	175	46	35	135	56	29	333	42	38	291	24
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	7	5	2	2	5	4
Cap, veh/h	82	254	62	84	223	84	658	849	107	548	887	73
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.63	0.63	0.63	1.00	1.00	1.00
Sat Flow, veh/h	131	1097	268	140	962	363	900	1345	170	899	1405	116
Grp Volume(v), veh/h	257	0	0	226	0	0	29	0	375	38	0	315
Grp Sat Flow(s),veh/h/ln	1496	0	0	1464	0	0	900	0	1514	899	0	1521
Q Serve(g_s), s	1.5	0.0	0.0	0.0	0.0	0.0	1.0	0.0	9.7	0.7	0.0	0.0
Cycle Q Clear(g_c), s	12.4	0.0	0.0	10.9	0.0	0.0	1.0	0.0	9.7	10.4	0.0	0.0
Prop In Lane	0.14		0.18	0.15		0.25	1.00		0.11	1.00		0.08
Lane Grp Cap(c), veh/h	398	0	0	391	0	0	658	0	956	548	0	960
V/C Ratio(X)	0.65	0.00	0.00	0.58	0.00	0.00	0.04	0.00	0.39	0.07	0.00	0.33
Avail Cap(c_a), veh/h	646	0	0	634	0	0	658	0	956	548	0	960
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.74	0.00	0.74
Uniform Delay (d), s/veh	28.4	0.0	0.0	27.8	0.0	0.0	5.6	0.0	7.2	1.0	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	0.0	1.4	0.0	0.0	0.1	0.0	1.2	0.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	4.7	0.0	0.0	0.3	0.0	4.4	0.2	0.0	0.2
LnGrp Delay(d),s/veh	30.2	0.0	0.0	29.1	0.0	0.0	5.8	0.0	8.4	1.2	0.0	0.7
LnGrp LOS	C			C			A		A	A		A
Approach Vol, veh/h		257			226			404			353	
Approach Delay, s/veh		30.2			29.1			8.3			0.7	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		55.9		24.1		55.9		24.1
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 37		32.4		* 37		32.4
Max Q Clear Time (g_c+I1), s		11.7		14.4		12.4		12.9
Green Ext Time (p_c), s		3.1		1.7		2.6		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.5
HCM 2010 LOS	B

Notes

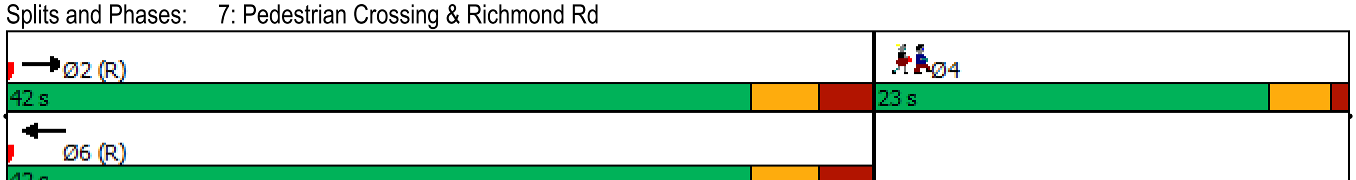
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	479	0	0	300	0	0	
Future Volume (vph)	479	0	0	300	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	13.6		
Travel Time (s)	19.2			1.4	1.0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	479	0	0	300	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	479	0	0	300	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	11.0			11.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							43
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.55			0.34			
Control Delay	12.3			9.4			
Queue Delay	0.0			0.0			
Total Delay	12.3			9.4			
LOS	B			A			
Approach Delay	12.3			9.4			
Approach LOS	B			A			
Queue Length 50th (m)	33.5			18.0			
Queue Length 95th (m)	57.1			31.8			
Internal Link Dist (m)	242.4			0.1	0.1		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.55			0.34			

Intersection Summary

Area Type: CBD
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 34.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Appendix Q

2022 Future Total Synchro Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	297	384	38	53	188	22	28	309	103	25	288	147
Future Volume (vph)	297	384	38	53	188	22	28	309	103	25	288	147
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.99		0.96	0.99			0.98			0.97	
Frt		0.986			0.984			0.965			0.952	
Flt Protected	0.950			0.950				0.997			0.997	
Satd. Flow (prot)	1478	1382	0	1396	1337	0	0	2747	0	0	2642	0
Flt Permitted	0.508			0.516				0.894			0.906	
Satd. Flow (perm)	750	1382	0	727	1337	0	0	2456	0	0	2397	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			8			51			99	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			63.4	
Travel Time (s)		21.4			19.2			9.0			4.6	
Confl. Peds. (#/hr)	50		47	47		50	38		30	30		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	9%	5%	5%	8%	5%	2%	13%	6%	4%
Parking (#/hr)		0			0							
Adj. Flow (vph)	297	384	38	53	188	22	28	309	103	25	288	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	297	422	0	53	210	0	0	440	0	0	460	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	36.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	14.0	40.0		31.0	31.0		30.0	30.0		30.0	30.0	
Total Split (%)	17.5%	50.0%		38.8%	38.8%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	7.9	33.9		24.9	24.9		23.8	23.8		23.8	23.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	48.1	48.1		29.3	29.3			19.6			19.6	
Actuated g/C Ratio	0.60	0.60		0.37	0.37			0.24			0.24	
v/c Ratio	0.52	0.51		0.20	0.43			0.69			0.69	
Control Delay	12.3	12.2		22.0	23.0			23.7			27.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.3	12.2		22.0	23.0			23.7			27.1	
LOS	B	B		C	C			C			C	
Approach Delay		12.2			22.8			23.7			27.1	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	19.1	30.5		5.3	22.1			30.2			27.0	
Queue Length 95th (m)	39.4	63.1		14.9	44.7			21.3			39.0	
Internal Link Dist (m)		273.0			242.4			101.1			39.4	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	566	833		265	494			766			782	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.52	0.51		0.20	0.43			0.57			0.59	

Intersection Summary

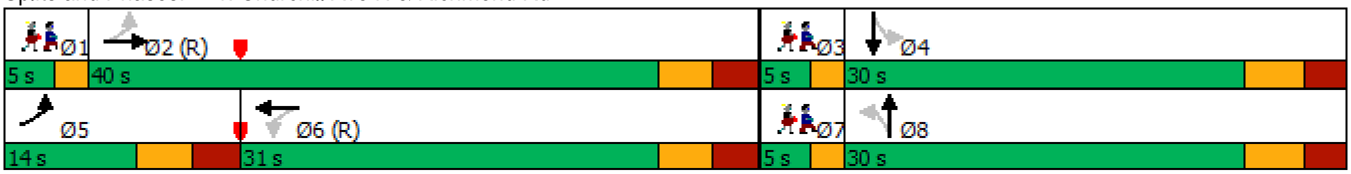
Area Type: CBD
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 43 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 20.0	Intersection LOS: C
Intersection Capacity Utilization 92.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Churchill Ave N & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	566	21	28	347	38	25	10	45	55	16	17
Future Volume (vph)	8	566	21	28	347	38	25	10	45	55	16	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			0.92			0.94	
Frt		0.995			0.988			0.924			0.974	
Flt Protected		0.999			0.997			0.985			0.970	
Satd. Flow (prot)	0	1374	0	0	1351	0	0	1252	0	0	1453	0
Flt Permitted		0.995			0.948			0.889			0.808	
Satd. Flow (perm)	0	1368	0	0	1282	0	0	1102	0	0	1158	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			45			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	80		65	65		80	48		42	42		48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	2%	4%	4%	3%	12%	2%	11%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	8	566	21	28	347	38	25	10	45	55	16	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	595	0	0	413	0	0	80	0	0	88	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		34.4	34.4		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.6	39.6		39.6	39.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		51.8			51.8			11.4			11.4	
Actuated g/C Ratio		0.74			0.74			0.16			0.16	
v/c Ratio		0.59			0.43			0.37			0.44	
Control Delay		9.4			6.9			18.6			28.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		9.4			6.9			18.6			28.6	
LOS		A			A			B			C	
Approach Delay		9.4			6.9			18.6			28.6	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		33.1			18.5			4.1			8.6	
Queue Length 95th (m)		79.8			44.7			14.2			19.6	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1013			952			337			333	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.59			0.43			0.24			0.26	

Intersection Summary

Area Type: CBD
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 10.6 Intersection LOS: B
Intersection Capacity Utilization 68.6% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	566	21	28	347	38	25	10	45	55	16	17
Future Volume (veh/h)	8	566	21	28	347	38	25	10	45	55	16	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.94	0.99		0.94	0.91		0.89	0.91		0.89
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1559	1620	1620	1559	1620	1620	1470	1620	1620	1588	1620
Adj Flow Rate, veh/h	8	566	21	28	347	38	25	10	45	55	16	17
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	4	4	4	4	4	4	2	2	2	2	2	2
Cap, veh/h	56	922	34	85	800	84	124	55	143	240	66	53
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	6	1480	54	49	1284	135	256	249	650	711	301	242
Grp Volume(v), veh/h	595	0	0	413	0	0	80	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	1540	0	0	1468	0	0	1155	0	0	1255	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	16.5	0.0	0.0	9.8	0.0	0.0	3.7	0.0	0.0	3.5	0.0	0.0
Prop In Lane	0.01		0.04	0.07		0.09	0.31		0.56	0.62		0.19
Lane Grp Cap(c), veh/h	1012	0	0	970	0	0	321	0	0	359	0	0
V/C Ratio(X)	0.59	0.00	0.00	0.43	0.00	0.00	0.25	0.00	0.00	0.24	0.00	0.00
Avail Cap(c_a), veh/h	1012	0	0	970	0	0	386	0	0	427	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.91	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	0.0	0.0	6.8	0.0	0.0	22.8	0.0	0.0	22.7	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.0	0.0	1.2	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	0.0	4.4	0.0	0.0	1.3	0.0	0.0	1.5	0.0	0.0
LnGrp Delay(d),s/veh	10.6	0.0	0.0	8.1	0.0	0.0	23.2	0.0	0.0	23.0	0.0	0.0
LnGrp LOS	B			A			C			C		
Approach Vol, veh/h		595			413			80			88	
Approach Delay, s/veh		10.6			8.1			23.2			23.0	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		49.0		21.0		49.0		21.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		19.4		* 40		19.4
Max Q Clear Time (g_c+I1), s		18.5		5.5		11.8		5.7
Green Ext Time (p_c), s		4.8		0.4		3.5		0.3

Intersection Summary			
HCM 2010 Ctrl Delay			11.5
HCM 2010 LOS			B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	454	7	5	288	20	2	16	15	10	9	11
Future Volume (vph)	20	454	7	5	288	20	2	16	15	10	9	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998			0.991			0.939			0.950	
Flt Protected		0.998			0.999			0.997			0.984	
Satd. Flow (prot)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Flt Permitted		0.998			0.999			0.997			0.984	
Satd. Flow (perm)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Confl. Peds. (#/hr)	39		44	44		39						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	20	454	7	5	288	20	2	16	15	10	9	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	481	0	0	313	0	0	33	0	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 54.3% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	454	7	5	288	20	2	16	15	10	9	11
Future Vol, veh/h	20	454	7	5	288	20	2	16	15	10	9	11
Conflicting Peds, #/hr	39	0	44	44	0	39	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	20	454	7	5	288	20	2	16	15	10	9	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	347	0	0	505	0	0	860	899	502	860	892	337
Stage 1	-	-	-	-	-	-	542	542	-	347	347	-
Stage 2	-	-	-	-	-	-	318	357	-	513	545	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1212	-	-	1060	-	-	276	279	569	276	281	705
Stage 1	-	-	-	-	-	-	525	520	-	669	635	-
Stage 2	-	-	-	-	-	-	693	628	-	544	519	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1175	-	-	1024	-	-	250	254	550	242	256	684
Mov Cap-2 Maneuver	-	-	-	-	-	-	250	254	-	242	256	-
Stage 1	-	-	-	-	-	-	496	491	-	634	612	-
Stage 2	-	-	-	-	-	-	668	605	-	500	490	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	16.9	17.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	336	1175	-	-	1024	-	-	324
HCM Lane V/C Ratio	0.098	0.017	-	-	0.005	-	-	0.093
HCM Control Delay (s)	16.9	8.1	0	-	8.5	0	-	17.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	13	188	9	20	8	110	457	49	210	1
Future Volume (vph)	0	7	13	188	9	20	8	110	457	49	210	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.912			0.988			0.893			0.999	
Flt Protected					0.958			0.999			0.991	
Satd. Flow (prot)	0	1327	0	0	1440	0	0	1242	0	0	1549	0
Flt Permitted					0.958			0.999			0.991	
Satd. Flow (perm)	0	1327	0	0	1440	0	0	1242	0	0	1549	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			252.6			99.4	
Travel Time (s)		5.3			8.0			18.2			7.2	
Confl. Peds. (#/hr)	41		7	7		41	38		10	10		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	8%	4%	11%	15%	2%	6%	3%	4%	2%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	7	13	188	9	20	8	110	457	49	210	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	217	0	0	575	0	0	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type: CBD	
Control Type: Unsignalized	
Intersection Capacity Utilization 77.6%	ICU Level of Service D
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	16.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	0	7	13	188	9	20	8	110	457	49	210	1
Future Vol, veh/h	0	7	13	188	9	20	8	110	457	49	210	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	14	8	4	11	15	2	6	3	4	2	2
Mvmt Flow	0	7	13	188	9	20	8	110	457	49	210	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.6	12.7	19.7	12.1
HCM LOS	A	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	0%	87%	19%
Vol Thru, %	19%	35%	4%	81%
Vol Right, %	79%	65%	9%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	575	20	217	260
LT Vol	8	0	188	49
Through Vol	110	7	9	210
RT Vol	457	13	20	1
Lane Flow Rate	575	20	217	260
Geometry Grp	1	1	1	1
Degree of Util (X)	0.742	0.035	0.369	0.397
Departure Headway (Hd)	4.643	6.288	6.121	5.496
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	782	566	586	653
Service Time	2.643	4.368	4.175	3.546
HCM Lane V/C Ratio	0.735	0.035	0.37	0.398
HCM Control Delay	19.7	9.6	12.7	12.1
HCM Lane LOS	C	A	B	B
HCM 95th-tile Q	6.8	0.1	1.7	1.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	172	46	35	127	57	29	335	42	40	296	24
Future Volume (vph)	36	172	46	35	127	57	29	335	42	40	296	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.98	1.00	
Frt		0.976			0.965			0.983			0.989	
Flt Protected		0.993			0.992		0.950			0.950		
Satd. Flow (prot)	0	1513	0	0	1494	0	1422	1496	0	1492	1503	0
Flt Permitted		0.926			0.898		0.554			0.510		
Satd. Flow (perm)	0	1409	0	0	1350	0	808	1496	0	788	1503	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			27			10			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	14		8	8		14	21		16	16		21
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	5%	2%	2%	5%	4%
Adj. Flow (vph)	36	172	46	35	127	57	29	335	42	40	296	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	254	0	0	219	0	29	377	0	40	320	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	38.0	38.0		38.0	38.0		42.0	42.0		42.0	42.0	
Total Split (%)	47.5%	47.5%		47.5%	47.5%		52.5%	52.5%		52.5%	52.5%	
Maximum Green (s)	32.4	32.4		32.4	32.4		36.6	36.6		36.6	36.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		19.0			19.0		50.0	50.0		50.0	50.0	
Actuated g/C Ratio		0.24			0.24		0.62	0.62		0.62	0.62	
v/c Ratio		0.73			0.64		0.06	0.40		0.08	0.34	
Control Delay		38.0			31.8		8.3	10.2		4.3	4.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		38.0			31.8		8.3	10.2		4.3	4.8	
LOS		D			C		A	B		A	A	
Approach Delay		38.0			31.8			10.1			4.7	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		33.3			26.2		1.5	24.7		1.5	12.0	
Queue Length 95th (m)		50.6			42.0		5.9	54.2		m3.2	20.9	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		580			562		505	939		492	942	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.44			0.39		0.06	0.40		0.08	0.34	

Intersection Summary

Area Type: CBD

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

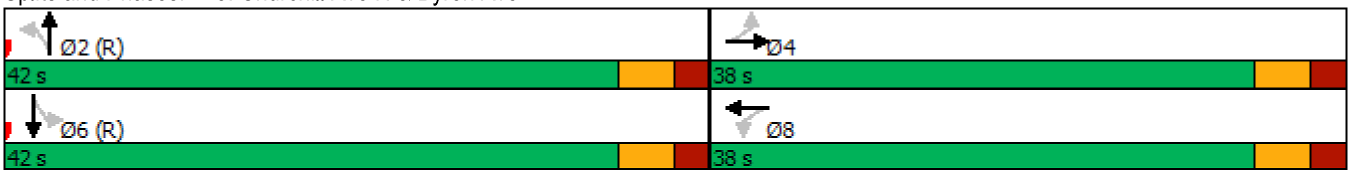
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 18.1 Intersection LOS: B

Intersection Capacity Utilization 62.8%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	172	46	35	127	57	29	335	42	40	296	24
Future Volume (veh/h)	36	172	46	35	127	57	29	335	42	40	296	24
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.98	0.99		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1514	1548	1620	1588	1544	1620
Adj Flow Rate, veh/h	36	172	46	35	127	57	29	335	42	40	296	24
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	7	5	5	2	5	5
Cap, veh/h	82	251	62	85	215	87	657	852	107	549	891	72
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.63	0.63	0.63	1.00	1.00	1.00
Sat Flow, veh/h	133	1093	271	144	937	380	896	1346	169	897	1407	114
Grp Volume(v), veh/h	254	0	0	219	0	0	29	0	377	40	0	320
Grp Sat Flow(s),veh/h/ln	1497	0	0	1461	0	0	896	0	1515	897	0	1522
Q Serve(g_s), s	1.7	0.0	0.0	0.0	0.0	0.0	1.0	0.0	9.7	0.7	0.0	0.0
Cycle Q Clear(g_c), s	12.3	0.0	0.0	10.6	0.0	0.0	1.0	0.0	9.7	10.5	0.0	0.0
Prop In Lane	0.14		0.18	0.16		0.26	1.00		0.11	1.00		0.08
Lane Grp Cap(c), veh/h	395	0	0	388	0	0	657	0	958	549	0	963
V/C Ratio(X)	0.64	0.00	0.00	0.56	0.00	0.00	0.04	0.00	0.39	0.07	0.00	0.33
Avail Cap(c_a), veh/h	646	0	0	632	0	0	657	0	958	549	0	963
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.72	0.00	0.72
Uniform Delay (d), s/veh	28.4	0.0	0.0	27.8	0.0	0.0	5.6	0.0	7.2	1.0	0.0	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.0	1.3	0.0	0.0	0.1	0.0	1.2	0.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.0	0.0	4.5	0.0	0.0	0.3	0.0	4.3	0.2	0.0	0.2
LnGrp Delay(d),s/veh	30.2	0.0	0.0	29.1	0.0	0.0	5.7	0.0	8.4	1.2	0.0	0.7
LnGrp LOS	C			C			A		A	A		A
Approach Vol, veh/h		254			219			406			360	
Approach Delay, s/veh		30.2			29.1			8.2			0.7	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		56.0		24.0		56.0		24.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 37		32.4		* 37		32.4
Max Q Clear Time (g_c+I1), s		11.7		14.3		12.5		12.6
Green Ext Time (p_c), s		3.1		1.6		2.6		1.4

Intersection Summary		
HCM 2010 Ctrl Delay		14.2
HCM 2010 LOS		B

Notes

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	5	617	4	2	430
Future Volume (vph)	10	5	617	4	2	430
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt	0.955		0.999			
Flt Protected	0.968					
Satd. Flow (prot)	1452	0	1569	0	0	2984
Flt Permitted	0.968					
Satd. Flow (perm)	1452	0	1569	0	0	2984
Link Speed (k/h)	30		50			50
Link Distance (m)	87.9		63.4			252.6
Travel Time (s)	10.5		4.6			18.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	5	617	4	2	430
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	621	0	0	432
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.5		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type: CBD	
Control Type: Unsignalized	
Intersection Capacity Utilization 48.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	5	617	4	2	430
Future Vol, veh/h	10	5	617	4	2	430
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	5	617	4	2	430

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	838	619	0	0	621	0
Stage 1	619	-	-	-	-	-
Stage 2	219	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	320	488	-	-	958	-
Stage 1	536	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	319	488	-	-	958	-
Mov Cap-2 Maneuver	319	-	-	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	795	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	361	958	-
HCM Lane V/C Ratio	-	-	0.042	0.002	-
HCM Control Delay (s)	-	-	15.4	8.8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

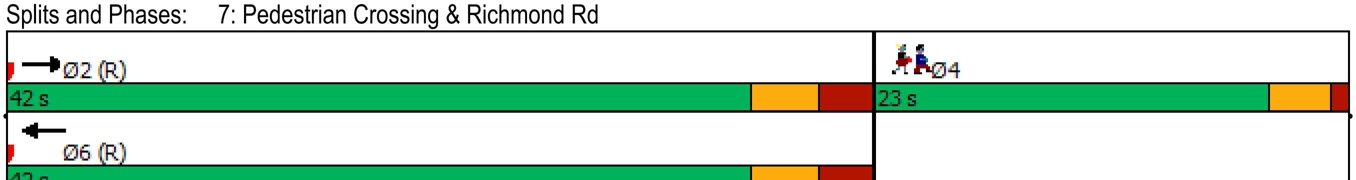
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	481	0	0	301	0	0	
Future Volume (vph)	481	0	0	301	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	13.6		
Travel Time (s)	19.2			1.4	1.0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	481	0	0	301	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	481	0	0	301	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	11.0			11.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							43
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.55			0.35			
Control Delay	12.4			9.4			
Queue Delay	0.0			0.0			
Total Delay	12.4			9.4			
LOS	B			A			
Approach Delay	12.4			9.4			
Approach LOS	B			A			
Queue Length 50th (m)	33.7			18.1			
Queue Length 95th (m)	57.4			31.8			
Internal Link Dist (m)	242.4			0.1	0.1		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.55			0.35			

Intersection Summary

Area Type: CBD
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 11.2 — Intersection LOS: B
Intersection Capacity Utilization 34.7% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	329	57	129	479	29	28	306	67	18	250	315
Future Volume (vph)	197	329	57	129	479	29	28	306	67	18	250	315
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.96		0.84	0.99			0.97			0.88	
Frt		0.978			0.991			0.975			0.919	
Flt Protected	0.950			0.950				0.997			0.998	
Satd. Flow (prot)	1478	1323	0	1492	1385	0	0	2828	0	0	2425	0
Flt Permitted	0.283			0.533				0.812			0.931	
Satd. Flow (perm)	417	1323	0	701	1385	0	0	2293	0	0	2257	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			4			24			301	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			63.4	
Travel Time (s)		21.4			19.2			9.0			4.6	
Confl. Peds. (#/hr)	99		154	154		99	78		53	53		78
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	197	329	57	129	479	29	28	306	67	18	250	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	197	386	0	129	508	0	0	401	0	0	583	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	31.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	15.0	55.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	16.7%	61.1%		50.0%	50.0%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	8.9	48.9		38.9	38.9		18.8	18.8		18.8	18.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	56.2	56.2		41.2	41.2			21.5			21.5	
Actuated g/C Ratio	0.62	0.62		0.46	0.46			0.24			0.24	
v/c Ratio	0.54	0.46		0.40	0.80			0.71			0.76	
Control Delay	13.6	11.3		22.1	33.3			28.3			21.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	13.6	11.3		22.1	33.3			28.3			21.8	
LOS	B	B		C	C			C			C	
Approach Delay		12.1			31.1			28.3			21.8	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	13.7	31.3		15.1	75.7			16.9			23.4	
Queue Length 95th (m)	24.9	54.5		31.0	#133.7			m29.2			42.1	
Internal Link Dist (m)		273.0			242.4			101.1			39.4	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	369	831		320	635			570			771	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.53	0.46		0.40	0.80			0.70			0.76	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 23.1	Intersection LOS: C
Intersection Capacity Utilization 99.5%	ICU Level of Service F
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.

Splits and Phases: 1: Churchill Ave N & Richmond Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	437	33	40	793	39	46	16	52	44	35	29
Future Volume (vph)	6	437	33	40	793	39	46	16	52	44	35	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99			0.88			0.91	
Frt		0.991			0.994			0.938			0.964	
Flt Protected		0.999			0.998			0.980			0.980	
Satd. Flow (prot)	0	1382	0	0	1396	0	0	1348	0	0	1395	0
Flt Permitted		0.991			0.965			0.835			0.824	
Satd. Flow (perm)	0	1371	0	0	1345	0	0	1088	0	0	1124	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			6			46			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	48		99	99		48	72		57	57		72
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	6%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	6	437	33	40	793	39	46	16	52	44	35	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	476	0	0	872	0	0	114	0	0	108	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		33.5	33.5		24.6	24.6		24.6	24.6	
Total Split (s)	60.0	60.0		60.0	60.0		25.0	25.0		25.0	25.0	
Total Split (%)	70.6%	70.6%		70.6%	70.6%		29.4%	29.4%		29.4%	29.4%	
Maximum Green (s)	54.6	54.6		54.6	54.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		65.2			65.2			13.0			13.0	
Actuated g/C Ratio		0.77			0.77			0.15			0.15	
v/c Ratio		0.45			0.84			0.56			0.57	
Control Delay		7.0			20.6			30.9			38.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		7.0			20.6			30.9			38.8	
LOS		A			C			C			D	
Approach Delay		7.0			20.6			30.9			38.8	
Approach LOS		A			C			C			D	
Queue Length 50th (m)		25.4			88.0			10.3			13.5	
Queue Length 95th (m)		57.9			#215.8			24.4			27.2	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1054			1033			283			271	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.45			0.84			0.40			0.40	

Intersection Summary

Area Type: CBD
Cycle Length: 85
Actuated Cycle Length: 85
Offset: 78 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 18.5 Intersection LOS: B
Intersection Capacity Utilization 104.7% ICU Level of Service G
Analysis Period (min) 15

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

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	437	33	40	793	39	46	16	52	44	35	29
Future Volume (veh/h)	6	437	33	40	793	39	46	16	52	44	35	29
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	0.98		0.93	0.86		0.82	0.87		0.82
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1620	1588	1620	1620	1568	1620
Adj Flow Rate, veh/h	6	437	33	40	793	39	46	16	52	44	35	29
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	6	6	6
Cap, veh/h	46	958	72	72	945	46	141	53	113	146	103	70
Arrive On Green	0.67	0.67	0.67	0.67	0.67	0.67	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	5	1438	108	41	1420	68	399	260	552	421	505	340
Grp Volume(v), veh/h	476	0	0	872	0	0	114	0	0	108	0	0
Grp Sat Flow(s),veh/h/ln	1551	0	0	1529	0	0	1211	0	0	1266	0	0
Q Serve(g_s), s	0.0	0.0	0.0	14.2	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.5	0.0	0.0	36.9	0.0	0.0	6.2	0.0	0.0	5.5	0.0	0.0
Prop In Lane	0.01		0.07	0.05		0.04	0.40		0.46	0.41		0.27
Lane Grp Cap(c), veh/h	1075	0	0	1063	0	0	307	0	0	319	0	0
V/C Ratio(X)	0.44	0.00	0.00	0.82	0.00	0.00	0.37	0.00	0.00	0.34	0.00	0.00
Avail Cap(c_a), veh/h	1075	0	0	1063	0	0	334	0	0	347	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.50	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.8	0.0	0.0	10.8	0.0	0.0	29.3	0.0	0.0	29.1	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	3.7	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	0.0	16.6	0.0	0.0	2.4	0.0	0.0	2.2	0.0	0.0
LnGrp Delay(d),s/veh	8.2	0.0	0.0	14.5	0.0	0.0	30.1	0.0	0.0	29.7	0.0	0.0
LnGrp LOS	A			B			C			C		
Approach Vol, veh/h		476			872			114			108	
Approach Delay, s/veh		8.2			14.5			30.1			29.7	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		62.0		23.0		62.0		23.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 55		19.4		* 55		19.4
Max Q Clear Time (g_c+I1), s		14.5		7.5		38.9		8.2
Green Ext Time (p_c), s		4.2		0.5		7.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	379	12	22	656	13	9	4	21	10	3	14
Future Volume (vph)	12	379	12	22	656	13	9	4	21	10	3	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997			0.917			0.930	
Flt Protected		0.999			0.998			0.987			0.982	
Satd. Flow (prot)	0	1406	0	0	1406	0	0	1422	0	0	1434	0
Flt Permitted		0.999			0.998			0.987			0.982	
Satd. Flow (perm)	0	1406	0	0	1406	0	0	1422	0	0	1434	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking (#/hr)		0			0							
Adj. Flow (vph)	12	379	12	22	656	13	9	4	21	10	3	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	403	0	0	691	0	0	34	0	0	27	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 62.6% ICU Level of Service B

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	379	12	22	656	13	9	4	21	10	3	14
Future Vol, veh/h	12	379	12	22	656	13	9	4	21	10	3	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	379	12	22	656	13	9	4	21	10	3	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	669	0	0	391	0	0	1124	1122	385	1129	1122	663
Stage 1	-	-	-	-	-	-	409	409	-	707	707	-
Stage 2	-	-	-	-	-	-	715	713	-	422	415	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	921	-	-	1168	-	-	183	206	663	181	206	461
Stage 1	-	-	-	-	-	-	619	596	-	426	438	-
Stage 2	-	-	-	-	-	-	422	435	-	609	592	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	921	-	-	1168	-	-	169	197	663	167	197	461
Mov Cap-2 Maneuver	-	-	-	-	-	-	169	197	-	167	197	-
Stage 1	-	-	-	-	-	-	608	586	-	419	425	-
Stage 2	-	-	-	-	-	-	394	422	-	576	582	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.3	17.5	20.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	323	921	-	-	1168	-	-	256
HCM Lane V/C Ratio	0.105	0.013	-	-	0.019	-	-	0.105
HCM Control Delay (s)	17.5	9	0	-	8.1	0	-	20.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	5	12	372	5	33	11	117	293	39	137	1
Future Volume (vph)	0	5	12	372	5	33	11	117	293	39	137	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.905			0.989			0.906			0.999	
Flt Protected					0.957			0.999			0.989	
Satd. Flow (prot)	0	1421	0	0	1475	0	0	1264	0	0	1503	0
Flt Permitted					0.957			0.999			0.989	
Satd. Flow (perm)	0	1421	0	0	1475	0	0	1264	0	0	1503	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			252.6			99.4	
Travel Time (s)		5.3			8.0			18.2			7.2	
Confl. Peds. (#/hr)	32		18	18		32	39		9	9		39
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	12%	2%	4%	3%	10%	4%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	5	12	372	5	33	11	117	293	39	137	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	0	0	410	0	0	421	0	0	177	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	CBD
Control Type: Unsignalized	
Intersection Capacity Utilization 73.2%	ICU Level of Service D
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	16.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	0	5	12	372	5	33	11	117	293	39	137	1
Future Vol, veh/h	0	5	12	372	5	33	11	117	293	39	137	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	12	2	4	3	10	4	2
Mvmt Flow	0	5	12	372	5	33	11	117	293	39	137	1
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.2	18.7	15.6	11.7
HCM LOS	A	C	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	0%	91%	22%
Vol Thru, %	28%	29%	1%	77%
Vol Right, %	70%	71%	8%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	421	17	410	177
LT Vol	11	0	372	39
Through Vol	117	5	5	137
RT Vol	293	12	33	1
Lane Flow Rate	421	17	410	177
Geometry Grp	1	1	1	1
Degree of Util (X)	0.598	0.028	0.648	0.297
Departure Headway (Hd)	5.117	5.952	5.694	6.049
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	703	597	631	591
Service Time	3.168	4.036	3.74	4.112
HCM Lane V/C Ratio	0.599	0.028	0.65	0.299
HCM Control Delay	15.6	9.2	18.7	11.7
HCM Lane LOS	C	A	C	B
HCM 95th-tile Q	4	0.1	4.7	1.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	139	61	86	326	72	33	306	94	30	327	70
Future Volume (vph)	45	139	61	86	326	72	33	306	94	30	327	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.98	0.98	
Frt		0.966			0.980			0.965			0.974	
Flt Protected		0.991			0.991		0.950			0.950		
Satd. Flow (prot)	0	1485	0	0	1519	0	1478	1495	0	1492	1492	0
Flt Permitted		0.854			0.894		0.435			0.433		
Satd. Flow (perm)	0	1278	0	0	1366	0	653	1495	0	669	1492	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			12			22			15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	15		17	17		15	33		16	16		33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	3%	2%
Adj. Flow (vph)	45	139	61	86	326	72	33	306	94	30	327	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	245	0	0	484	0	33	400	0	30	397	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	39.4	39.4		39.4	39.4		39.6	39.6		39.6	39.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		35.2			35.2		43.8	43.8		43.8	43.8	
Actuated g/C Ratio		0.39			0.39		0.49	0.49		0.49	0.49	
v/c Ratio		0.48			0.90		0.10	0.54		0.09	0.54	
Control Delay		20.9			45.3		15.7	19.8		13.5	17.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.5	
Total Delay		20.9			45.3		15.7	19.8		13.5	18.3	
LOS		C			D		B	B		B	B	
Approach Delay		20.9			45.3			19.5			18.0	
Approach LOS		C			D			B			B	
Queue Length 50th (m)		26.5			71.7		3.1	45.8		2.9	44.0	
Queue Length 95th (m)		44.9			#122.4		9.0	77.3		m5.0	m57.2	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		572			604		318	739		325	734	
Starvation Cap Reductn		0			0		0	0		0	87	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.43			0.80		0.10	0.54		0.09	0.61	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

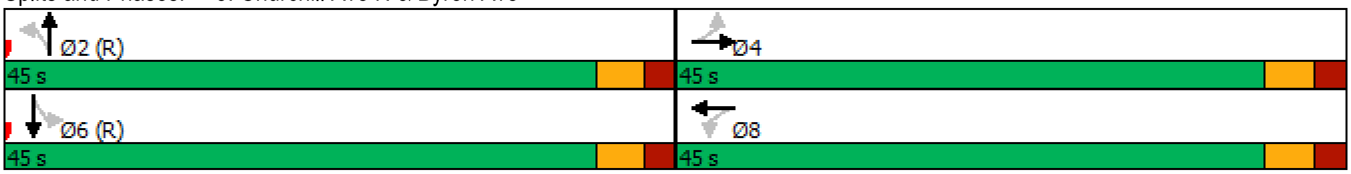
Maximum v/c Ratio: 0.90

Intersection Signal Delay: 27.2 Intersection LOS: C

Intersection Capacity Utilization 82.5%	ICU Level of Service E
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.

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	139	61	86	326	72	33	306	94	30	327	70
Future Volume (veh/h)	45	139	61	86	326	72	33	306	94	30	327	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	0.99		0.99	0.98		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1573	1588	1620	1588	1576	1620
Adj Flow Rate, veh/h	45	139	61	86	326	72	33	306	94	30	327	70
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	3	2	2	2	3	3
Cap, veh/h	103	279	111	122	376	79	519	591	181	375	639	137
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.51	0.51	0.51	1.00	1.00	1.00
Sat Flow, veh/h	150	759	302	205	1024	215	860	1156	355	880	1250	268
Grp Volume(v), veh/h	245	0	0	484	0	0	33	0	400	30	0	397
Grp Sat Flow(s),veh/h/ln	1211	0	0	1444	0	0	860	0	1512	880	0	1518
Q Serve(g_s), s	0.0	0.0	0.0	16.2	0.0	0.0	1.8	0.0	15.8	1.1	0.0	0.0
Cycle Q Clear(g_c), s	12.4	0.0	0.0	28.6	0.0	0.0	1.8	0.0	15.8	17.0	0.0	0.0
Prop In Lane	0.18		0.25	0.18		0.15	1.00		0.23	1.00		0.18
Lane Grp Cap(c), veh/h	492	0	0	577	0	0	519	0	772	375	0	775
V/C Ratio(X)	0.50	0.00	0.00	0.84	0.00	0.00	0.06	0.00	0.52	0.08	0.00	0.51
Avail Cap(c_a), veh/h	586	0	0	677	0	0	519	0	772	375	0	775
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.66	0.00	0.66
Uniform Delay (d), s/veh	21.6	0.0	0.0	26.9	0.0	0.0	11.2	0.0	14.6	2.9	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	8.1	0.0	0.0	0.2	0.0	2.5	0.3	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	0.0	0.0	12.7	0.0	0.0	0.4	0.0	7.1	0.3	0.0	0.3
LnGrp Delay(d),s/veh	22.4	0.0	0.0	35.0	0.0	0.0	11.4	0.0	17.1	3.2	0.0	1.6
LnGrp LOS	C			C			B		B	A		A
Approach Vol, veh/h		245			484			433			427	
Approach Delay, s/veh		22.4			35.0			16.7			1.7	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		51.4		38.6		51.4		38.6
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		39.4		* 40		39.4
Max Q Clear Time (g_c+I1), s		17.8		14.4		19.0		30.6
Green Ext Time (p_c), s		3.3		1.9		3.1		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	19.1
HCM 2010 LOS	B

Notes

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	9	5	507	12	7	564
Future Volume (vph)	9	5	507	12	7	564
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt	0.952		0.997			
Flt Protected	0.969					0.999
Satd. Flow (prot)	1449	0	1566	0	0	2981
Flt Permitted	0.969					0.999
Satd. Flow (perm)	1449	0	1566	0	0	2981
Link Speed (k/h)	30		50			50
Link Distance (m)	80.5		63.4			252.6
Travel Time (s)	9.7		4.6			18.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	9	5	507	12	7	564
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	0	519	0	0	571
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.5		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 42.1% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	5	507	12	7	564
Future Vol, veh/h	9	5	507	12	7	564
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	5	507	12	7	564

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	809	513	0	0	519	0
Stage 1	513	-	-	-	-	-
Stage 2	296	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	334	560	-	-	1045	-
Stage 1	600	-	-	-	-	-
Stage 2	729	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	331	560	-	-	1045	-
Mov Cap-2 Maneuver	331	-	-	-	-	-
Stage 1	600	-	-	-	-	-
Stage 2	722	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.6	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	388	1045	-
HCM Lane V/C Ratio	-	-	0.036	0.007	-
HCM Control Delay (s)	-	-	14.6	8.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	403	0	0	679	0	0	
Future Volume (vph)	403	0	0	679	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	33.7		
Travel Time (s)	19.2			1.4	2.4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	403	0	0	679	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	403	0	0	679	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	24.0			24.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							51
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.46			0.78			
Control Delay	10.9			19.7			
Queue Delay	0.0			0.0			
Total Delay	10.9			19.7			
LOS	B			B			
Approach Delay	10.9			19.7			
Approach LOS	B			B			
Queue Length 50th (m)	26.4			58.1			
Queue Length 95th (m)	45.2			#109.8			
Internal Link Dist (m)	242.4			0.1	9.7		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.46			0.78			

Intersection Summary

Area Type: CBD

Cycle Length: 65

Actuated Cycle Length: 65

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

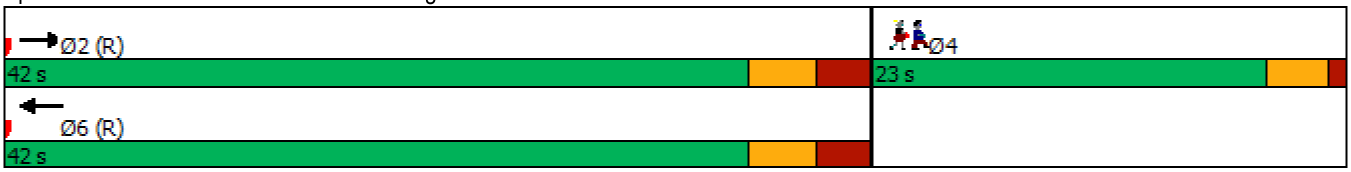
Intersection Signal Delay: 16.4 Intersection LOS: B

Intersection Capacity Utilization 46.9% ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Appendix R

2027 Future Total Synchro Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	297	387	38	55	196	23	28	309	104	25	288	147
Future Volume (vph)	297	387	38	55	196	23	28	309	104	25	288	147
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.99		0.96	0.99			0.98			0.97	
Frt		0.987			0.984			0.965			0.952	
Flt Protected	0.950			0.950				0.997			0.997	
Satd. Flow (prot)	1478	1383	0	1396	1337	0	0	2746	0	0	2642	0
Flt Permitted	0.497			0.515				0.894			0.906	
Satd. Flow (perm)	734	1383	0	725	1337	0	0	2456	0	0	2397	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			8			52			99	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			63.4	
Travel Time (s)		21.4			19.2			9.0			4.6	
Confl. Peds. (#/hr)	50		47	47		50	38		30	30		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	9%	5%	5%	8%	5%	2%	13%	6%	4%
Parking (#/hr)		0			0							
Adj. Flow (vph)	297	387	38	55	196	23	28	309	104	25	288	147
Shared Lane Traffic (%)												
Lane Group Flow (vph)	297	425	0	55	219	0	0	441	0	0	460	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	30.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	36.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	14.0	40.0		31.0	31.0		30.0	30.0		30.0	30.0	
Total Split (%)	17.5%	50.0%		38.8%	38.8%		37.5%	37.5%		37.5%	37.5%	
Maximum Green (s)	7.9	33.9		24.9	24.9		23.8	23.8		23.8	23.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	48.1	48.1		29.2	29.2			19.6			19.6	
Actuated g/C Ratio	0.60	0.60		0.36	0.36			0.24			0.24	
v/c Ratio	0.53	0.51		0.21	0.45			0.69			0.69	
Control Delay	12.4	12.2		22.2	23.4			23.6			27.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	12.4	12.2		22.2	23.4			23.6			27.1	
LOS	B	B		C	C			C			C	
Approach Delay		12.3			23.2			23.6			27.1	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	19.1	30.8		5.5	23.3			29.3			27.0	
Queue Length 95th (m)	39.4	63.5		15.4	46.8			21.7			39.0	
Internal Link Dist (m)		273.0			242.4			101.1			39.4	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	559	834		264	492			767			782	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.53	0.51		0.21	0.45			0.57			0.59	

Intersection Summary

Area Type: CBD

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 43 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

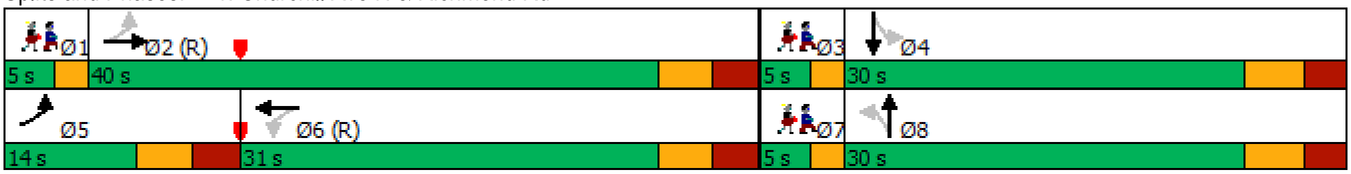
Maximum v/c Ratio: 0.69

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 20.1	Intersection LOS: C
Intersection Capacity Utilization 92.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Churchill Ave N & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	566	21	28	347	38	25	10	45	55	16	17
Future Volume (vph)	8	566	21	28	347	38	25	10	45	55	16	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99			0.92			0.94	
Frt		0.995			0.988			0.924			0.974	
Flt Protected		0.999			0.997			0.985			0.970	
Satd. Flow (prot)	0	1374	0	0	1351	0	0	1252	0	0	1453	0
Flt Permitted		0.995			0.948			0.889			0.808	
Satd. Flow (perm)	0	1368	0	0	1282	0	0	1102	0	0	1158	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			12			45			17	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	80		65	65		80	48		42	42		48
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	4%	2%	4%	4%	3%	12%	2%	11%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	8	566	21	28	347	38	25	10	45	55	16	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	595	0	0	413	0	0	80	0	0	88	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		34.4	34.4		24.6	24.6		24.6	24.6	
Total Split (s)	45.0	45.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	64.3%	64.3%		64.3%	64.3%		35.7%	35.7%		35.7%	35.7%	
Maximum Green (s)	39.6	39.6		39.6	39.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		51.8			51.8			11.4			11.4	
Actuated g/C Ratio		0.74			0.74			0.16			0.16	
v/c Ratio		0.59			0.43			0.37			0.44	
Control Delay		9.4			6.9			18.6			28.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		9.4			6.9			18.6			28.6	
LOS		A			A			B			C	
Approach Delay		9.4			6.9			18.6			28.6	
Approach LOS		A			A			B			C	
Queue Length 50th (m)		33.1			18.5			4.1			8.6	
Queue Length 95th (m)		79.8			44.7			14.2			19.6	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1013			952			337			333	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.59			0.43			0.24			0.26	

Intersection Summary

Area Type: CBD

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 27 (39%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 10.6   Intersection LOS: B

Intersection Capacity Utilization 68.6%   ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	566	21	28	347	38	25	10	45	55	16	17
Future Volume (veh/h)	8	566	21	28	347	38	25	10	45	55	16	17
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.94	0.99		0.94	0.91		0.89	0.91		0.89
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1559	1620	1620	1559	1620	1620	1470	1620	1620	1588	1620
Adj Flow Rate, veh/h	8	566	21	28	347	38	25	10	45	55	16	17
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	4	2	4	4	3	12	2	11	2	2	2
Cap, veh/h	56	922	34	85	800	84	124	55	143	240	66	53
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	6	1480	54	49	1284	135	256	249	650	711	301	242
Grp Volume(v), veh/h	595	0	0	413	0	0	80	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	1540	0	0	1468	0	0	1155	0	0	1255	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	16.5	0.0	0.0	9.8	0.0	0.0	3.7	0.0	0.0	3.5	0.0	0.0
Prop In Lane	0.01		0.04	0.07		0.09	0.31		0.56	0.62		0.19
Lane Grp Cap(c), veh/h	1012	0	0	970	0	0	321	0	0	359	0	0
V/C Ratio(X)	0.59	0.00	0.00	0.43	0.00	0.00	0.25	0.00	0.00	0.24	0.00	0.00
Avail Cap(c_a), veh/h	1012	0	0	970	0	0	386	0	0	427	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.90	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	0.0	0.0	6.8	0.0	0.0	22.8	0.0	0.0	22.7	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.0	0.0	1.2	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	0.0	4.3	0.0	0.0	1.3	0.0	0.0	1.5	0.0	0.0
LnGrp Delay(d),s/veh	10.6	0.0	0.0	8.0	0.0	0.0	23.2	0.0	0.0	23.0	0.0	0.0
LnGrp LOS	B			A			C			C		
Approach Vol, veh/h		595			413			80			88	
Approach Delay, s/veh		10.6			8.0			23.2			23.0	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		49.0		21.0		49.0		21.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 40		19.4		* 40		19.4
Max Q Clear Time (g_c+I1), s		18.5		5.5		11.8		5.7
Green Ext Time (p_c), s		4.8		0.4		3.5		0.3

Intersection Summary			
HCM 2010 Ctrl Delay			11.5
HCM 2010 LOS			B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	458	7	5	299	21	2	16	15	10	9	11
Future Volume (vph)	20	458	7	5	299	21	2	16	15	10	9	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998			0.991			0.939			0.950	
Flt Protected		0.998			0.999			0.997			0.984	
Satd. Flow (prot)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Flt Permitted		0.998			0.999			0.997			0.984	
Satd. Flow (perm)	0	1408	0	0	1387	0	0	1470	0	0	1468	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Confl. Peds. (#/hr)	39		44	44		39						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	20	458	7	5	299	21	2	16	15	10	9	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	485	0	0	325	0	0	33	0	0	30	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 54.7% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	458	7	5	299	21	2	16	15	10	9	11
Future Vol, veh/h	20	458	7	5	299	21	2	16	15	10	9	11
Conflicting Peds, #/hr	39	0	44	44	0	39	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	20	458	7	5	299	21	2	16	15	10	9	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	359	0	0	509	0	0	876	915	506	876	908	349
Stage 1	-	-	-	-	-	-	546	546	-	359	359	-
Stage 2	-	-	-	-	-	-	330	369	-	517	549	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1200	-	-	1056	-	-	269	273	566	269	275	694
Stage 1	-	-	-	-	-	-	522	518	-	659	627	-
Stage 2	-	-	-	-	-	-	683	621	-	541	516	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1164	-	-	1020	-	-	243	248	547	236	250	673
Mov Cap-2 Maneuver	-	-	-	-	-	-	243	248	-	236	250	-
Stage 1	-	-	-	-	-	-	493	489	-	624	604	-
Stage 2	-	-	-	-	-	-	658	599	-	497	487	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	17.2	17.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	329	1164	-	-	1020	-	-	317
HCM Lane V/C Ratio	0.1	0.017	-	-	0.005	-	-	0.095
HCM Control Delay (s)	17.2	8.1	0	-	8.5	0	-	17.5
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0	-	-	0.3

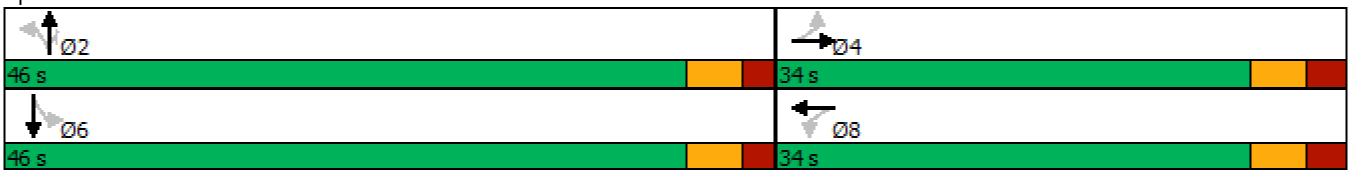
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	13	188	9	20	8	110	457	49	210	1
Future Volume (vph)	0	7	13	188	9	20	8	110	457	49	210	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	75.0		0.0	0.0		30.0	0.0		0.0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (m)	15.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98		0.98	0.92			1.00	0.96		1.00	
Frt		0.912			0.897				0.850		0.999	
Flt Protected				0.950				0.997			0.991	
Satd. Flow (prot)	0	1297	0	1463	1168	0	0	1360	1322	0	1549	0
Flt Permitted				0.744				0.981			0.934	
Satd. Flow (perm)	0	1297	0	1129	1168	0	0	1333	1267	0	1454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			20				457			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			234.1			99.4	
Travel Time (s)		5.3			8.0			16.9			7.2	
Confl. Peds. (#/hr)	41		7	7		41	38		10	10		38
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	8%	4%	11%	15%	2%	6%	3%	4%	2%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	7	13	188	9	20	8	110	457	49	210	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	188	29	0	0	118	457	0	260	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type		NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.8	27.8		27.8	27.8		31.4	31.4	31.4	31.4	31.4	
Total Split (s)	34.0	34.0		34.0	34.0		46.0	46.0	46.0	46.0	46.0	
Total Split (%)	42.5%	42.5%		42.5%	42.5%		57.5%	57.5%	57.5%	57.5%	57.5%	
Maximum Green (s)	28.2	28.2		28.2	28.2		40.6	40.6	40.6	40.6	40.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5		2.5	2.5		2.1	2.1	2.1	2.1	2.1	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.8		5.8	5.8			5.4	5.4		5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		17.0		17.0	17.0			44.2	44.2		44.2	
Actuated g/C Ratio		0.23		0.23	0.23			0.61	0.61		0.61	
v/c Ratio		0.06		0.71	0.10			0.15	0.48		0.29	
Control Delay		12.3		39.3	11.4			8.1	2.9		9.1	
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay		12.3		39.3	11.4			8.1	2.9		9.1	
LOS		B		D	B			A	A		A	
Approach Delay		12.3			35.6			4.0			9.1	
Approach LOS		B			D			A			A	
Queue Length 50th (m)		0.7		21.8	0.9			5.9	0.0		14.4	
Queue Length 95th (m)		5.0		41.0	6.1			16.8	12.8		35.6	
Internal Link Dist (m)		49.0			86.8			210.1			75.4	
Turn Bay Length (m)				75.0					30.0			
Base Capacity (vph)		513		440	468			813	950		886	
Starvation Cap Reductn		0		0	0			0	0		0	
Spillback Cap Reductn		0		0	0			0	0		0	
Storage Cap Reductn		0		0	0			0	0		0	
Reduced v/c Ratio		0.04		0.43	0.06			0.15	0.48		0.29	

Intersection Summary	
Area Type: CBD	
Cycle Length: 80	
Actuated Cycle Length: 72.5	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 11.8	Intersection LOS: B

Intersection Capacity Utilization 74.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 4: Churchill Ave N & Scott St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	7	13	188	9	20	8	110	457	49	210	1
Future Volume (veh/h)	0	7	13	188	9	20	8	110	457	49	210	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.91	0.92		0.91	0.98		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1471	1620	1558	1424	1620	1620	1532	1573	1620	1582	1620
Adj Flow Rate, veh/h	0	7	13	188	9	20	8	110	457	49	210	1
Adj No. of Lanes	0	1	0	1	1	0	0	1	1	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	14	8	4	11	15	2	6	3	4	2	2
Cap, veh/h	0	104	193	361	88	196	85	869	772	179	693	3
Arrive On Green	0.00	0.24	0.24	0.24	0.24	0.24	0.60	0.60	0.60	0.60	0.60	0.60
Sat Flow, veh/h	0	434	806	1125	369	820	49	1457	1294	194	1163	5
Grp Volume(v), veh/h	0	0	20	188	0	29	118	0	457	260	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1240	1125	0	1189	1506	0	1294	1362	0	0
Q Serve(g_s), s	0.0	0.0	0.8	10.6	0.0	1.3	0.0	0.0	15.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.8	11.4	0.0	1.3	2.3	0.0	15.0	5.4	0.0	0.0
Prop In Lane	0.00		0.65	1.00		0.69	0.07		1.00	0.19		0.00
Lane Grp Cap(c), veh/h	0	0	297	361	0	285	954	0	772	875	0	0
V/C Ratio(X)	0.00	0.00	0.07	0.52	0.00	0.10	0.12	0.00	0.59	0.30	0.00	0.00
Avail Cap(c_a), veh/h	0	0	514	557	0	492	954	0	772	875	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	20.0	24.4	0.0	20.2	6.0	0.0	8.6	6.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.1	1.2	0.0	0.2	0.3	0.0	3.3	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	3.4	0.0	0.4	1.0	0.0	6.0	2.5	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	20.1	25.6	0.0	20.3	6.3	0.0	11.9	7.5	0.0	0.0
LnGrp LOS			C	C		C	A		B	A		
Approach Vol, veh/h		20			217			575			260	
Approach Delay, s/veh		20.1			24.9			10.8			7.5	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		46.0		22.1		46.0		22.1
Change Period (Y+Rc), s		* 5.4		* 5.8		* 5.4		* 5.8
Max Green Setting (Gmax), s		* 41		* 28		* 41		* 28
Max Q Clear Time (g_c+I1), s		17.0		2.8		7.4		13.4
Green Ext Time (p_c), s		3.5		0.1		2.2		1.0

Intersection Summary			
HCM 2010 Ctrl Delay			13.0
HCM 2010 LOS			B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	175	46	35	135	57	29	335	42	40	296	24
Future Volume (vph)	36	175	46	35	135	57	29	335	42	40	296	24
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.98	1.00	
Frt		0.976			0.966			0.983			0.989	
Flt Protected		0.993			0.992		0.950			0.950		
Satd. Flow (prot)	0	1513	0	0	1496	0	1422	1496	0	1492	1503	0
Flt Permitted		0.924			0.901		0.554			0.510		
Satd. Flow (perm)	0	1406	0	0	1357	0	808	1496	0	788	1503	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			25			10			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	14		8	8		14	21		16	16		21
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	5%	2%	2%	5%	4%
Adj. Flow (vph)	36	175	46	35	135	57	29	335	42	40	296	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	257	0	0	227	0	29	377	0	40	320	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	38.0	38.0		38.0	38.0		42.0	42.0		42.0	42.0	
Total Split (%)	47.5%	47.5%		47.5%	47.5%		52.5%	52.5%		52.5%	52.5%	
Maximum Green (s)	32.4	32.4		32.4	32.4		36.6	36.6		36.6	36.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		19.2			19.2		49.8	49.8		49.8	49.8	
Actuated g/C Ratio		0.24			0.24		0.62	0.62		0.62	0.62	
v/c Ratio		0.74			0.66		0.06	0.40		0.08	0.34	
Control Delay		38.2			32.7		8.4	10.3		4.4	4.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		38.2			32.7		8.4	10.3		4.4	4.9	
LOS		D			C		A	B		A	A	
Approach Delay		38.2			32.7			10.2			4.8	
Approach LOS		D			C			B			A	
Queue Length 50th (m)		33.9			27.7		1.6	25.0		1.5	12.2	
Queue Length 95th (m)		51.2			43.7		6.0	54.7		m3.2	21.2	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		578			564		502	935		490	938	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.44			0.40		0.06	0.40		0.08	0.34	

Intersection Summary

Area Type: CBD

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 74 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

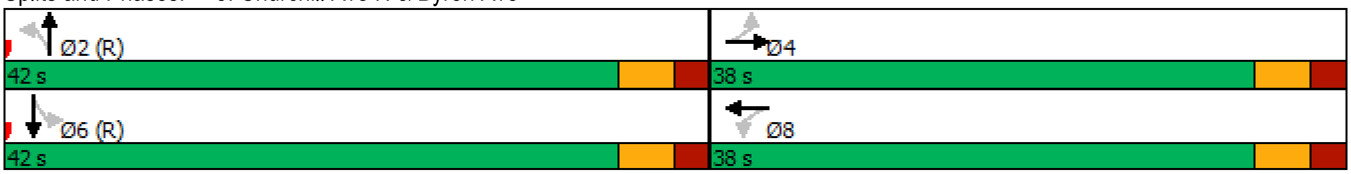
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 18.5 Intersection LOS: B

Intersection Capacity Utilization 63.2%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	175	46	35	135	57	29	335	42	40	296	24
Future Volume (veh/h)	36	175	46	35	135	57	29	335	42	40	296	24
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.98	0.99		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1514	1548	1620	1588	1544	1620
Adj Flow Rate, veh/h	36	175	46	35	135	57	29	335	42	40	296	24
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	7	5	2	2	5	4
Cap, veh/h	82	254	62	84	222	85	655	849	106	547	888	72
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.63	0.63	0.63	1.00	1.00	1.00
Sat Flow, veh/h	131	1097	268	139	957	368	896	1346	169	898	1407	114
Grp Volume(v), veh/h	257	0	0	227	0	0	29	0	377	40	0	320
Grp Sat Flow(s),veh/h/ln	1495	0	0	1464	0	0	896	0	1515	898	0	1522
Q Serve(g_s), s	1.5	0.0	0.0	0.0	0.0	0.0	1.0	0.0	9.8	0.7	0.0	0.0
Cycle Q Clear(g_c), s	12.5	0.0	0.0	11.0	0.0	0.0	1.0	0.0	9.8	10.5	0.0	0.0
Prop In Lane	0.14		0.18	0.15		0.25	1.00		0.11	1.00		0.08
Lane Grp Cap(c), veh/h	398	0	0	391	0	0	655	0	956	547	0	960
V/C Ratio(X)	0.65	0.00	0.00	0.58	0.00	0.00	0.04	0.00	0.39	0.07	0.00	0.33
Avail Cap(c_a), veh/h	646	0	0	634	0	0	655	0	956	547	0	960
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.72	0.00	0.72
Uniform Delay (d), s/veh	28.4	0.0	0.0	27.8	0.0	0.0	5.6	0.0	7.3	1.0	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	0.0	1.4	0.0	0.0	0.1	0.0	1.2	0.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	4.7	0.0	0.0	0.3	0.0	4.4	0.2	0.0	0.2
LnGrp Delay(d),s/veh	30.2	0.0	0.0	29.2	0.0	0.0	5.8	0.0	8.5	1.2	0.0	0.7
LnGrp LOS	C			C			A		A	A		A
Approach Vol, veh/h		257			227			406			360	
Approach Delay, s/veh		30.2			29.2			8.3			0.7	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		55.9		24.1		55.9		24.1
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 37		32.4		* 37		32.4
Max Q Clear Time (g_c+I1), s		11.8		14.5		12.5		13.0
Green Ext Time (p_c), s		3.1		1.7		2.6		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.4
HCM 2010 LOS	B

Notes

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	5	555	4	2	430
Future Volume (vph)	10	5	555	4	2	430
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt	0.955		0.999			
Flt Protected	0.968					
Satd. Flow (prot)	1452	0	1569	0	0	2984
Flt Permitted	0.968					
Satd. Flow (perm)	1452	0	1569	0	0	2984
Link Speed (k/h)	30		50			50
Link Distance (m)	87.9		63.4			18.5
Travel Time (s)	10.5		4.6			1.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	5	555	4	2	430
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	0	559	0	0	432
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.5		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: CBD

Control Type: Unsignalized

Intersection Capacity Utilization 44.5% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	5	555	4	2	430
Future Vol, veh/h	10	5	555	4	2	430
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	5	555	4	2	430

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	776	557	0	0	559	0
Stage 1	557	-	-	-	-	-
Stage 2	219	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	350	529	-	-	1010	-
Stage 1	573	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	349	529	-	-	1010	-
Mov Cap-2 Maneuver	349	-	-	-	-	-
Stage 1	573	-	-	-	-	-
Stage 2	795	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	394	1010	-
HCM Lane V/C Ratio	-	-	0.038	0.002	-
HCM Control Delay (s)	-	-	14.5	8.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

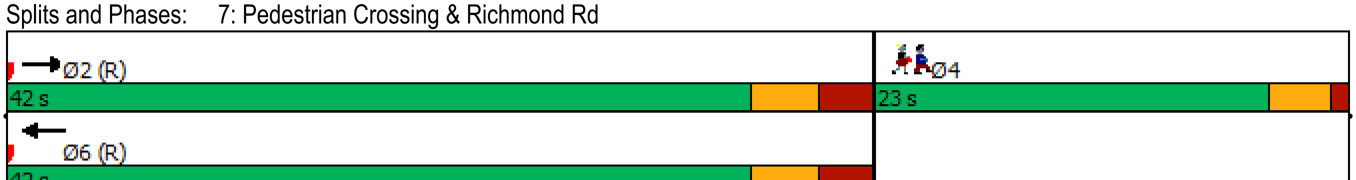
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	481	0	0	301	0	0	
Future Volume (vph)	481	0	0	301	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	13.6		
Travel Time (s)	19.2			1.4	1.0		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	481	0	0	301	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	481	0	0	301	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	11.0			11.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							43
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.55			0.35			
Control Delay	12.4			9.4			
Queue Delay	0.0			0.0			
Total Delay	12.4			9.4			
LOS	B			A			
Approach Delay	12.4			9.4			
Approach LOS	B			A			
Queue Length 50th (m)	33.7			18.1			
Queue Length 95th (m)	57.4			31.8			
Internal Link Dist (m)	242.4			0.1	0.1		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.55			0.35			

Intersection Summary

Area Type: CBD
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 11.2 Intersection LOS: B
Intersection Capacity Utilization 34.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	338	57	131	485	29	28	306	69	18	250	315
Future Volume (vph)	197	338	57	131	485	29	28	306	69	18	250	315
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	45.0		0.0	25.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	35.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.95	0.96		0.84	0.99			0.97			0.88	
Frt		0.978			0.992			0.974			0.919	
Flt Protected	0.950			0.950				0.997			0.998	
Satd. Flow (prot)	1478	1324	0	1492	1387	0	0	2823	0	0	2425	0
Flt Permitted	0.278			0.529				0.814			0.931	
Satd. Flow (perm)	410	1324	0	698	1387	0	0	2295	0	0	2257	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			4			24			301	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		297.0			266.4			125.1			63.4	
Travel Time (s)		21.4			19.2			9.0			4.6	
Confl. Peds. (#/hr)	99		154	154		99	78		53	53		78
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	197	338	57	131	485	29	28	306	69	18	250	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	197	395	0	131	514	0	0	403	0	0	583	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	Ø1	Ø3	Ø7
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (m)			
Storage Lanes			
Taper Length (m)			
Lane Util. Factor			
Ped Bike Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (k/h)			
Link Distance (m)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Parking (#/hr)			
Adj. Flow (vph)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Enter Blocked Intersection			
Lane Alignment			
Median Width(m)			
Link Offset(m)			
Crosswalk Width(m)			
Two way Left Turn Lane			
Headway Factor			
Turning Speed (k/h)			
Number of Detectors			
Detector Template			
Leading Detector (m)			
Trailing Detector (m)			
Detector 1 Position(m)			
Detector 1 Size(m)			
Detector 1 Type			
Detector 1 Channel			
Detector 1 Extend (s)			
Detector 1 Queue (s)			
Detector 1 Delay (s)			
Detector 2 Position(m)			
Detector 2 Size(m)			
Detector 2 Type			
Detector 2 Channel			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.1	31.1		31.1	31.1		24.2	24.2		24.2	24.2	
Total Split (s)	15.0	55.0		45.0	45.0		25.0	25.0		25.0	25.0	
Total Split (%)	16.7%	61.1%		50.0%	50.0%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	8.9	48.9		38.9	38.9		18.8	18.8		18.8	18.8	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.6	3.6		3.6	3.6	
All-Red Time (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.1		6.1	6.1			6.2			6.2	
Lead/Lag	Lead	Lag		Lag	Lag		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		C-Max	C-Max		Ped	Ped		Ped	Ped	
Walk Time (s)		14.0		14.0	14.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0		0	0		0	0	
Act Effct Green (s)	56.1	56.1		41.1	41.1			21.6			21.6	
Actuated g/C Ratio	0.62	0.62		0.46	0.46			0.24			0.24	
v/c Ratio	0.55	0.48		0.41	0.81			0.71			0.76	
Control Delay	13.9	11.5		22.4	33.9			28.1			21.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	13.9	11.5		22.4	33.9			28.1			21.8	
LOS	B	B		C	C			C			C	
Approach Delay		12.3			31.6			28.1			21.8	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	13.8	32.6		15.4	77.1			16.9			23.3	
Queue Length 95th (m)	24.9	56.5		31.7	#136.1			m29.4			42.1	
Internal Link Dist (m)		273.0			242.4			101.1			39.4	
Turn Bay Length (m)	45.0			25.0								
Base Capacity (vph)	365	831		319	636			572			773	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.54	0.48		0.41	0.81			0.70			0.75	

Intersection Summary	
Area Type:	CBD
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	

Lane Group	Ø1	Ø3	Ø7
Detector 2 Extend (s)			
Turn Type			
Protected Phases	1	3	7
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	3.0	3.0	3.0
Minimum Split (s)	5.0	5.0	5.0
Total Split (s)	5.0	5.0	5.0
Total Split (%)	6%	6%	6%
Maximum Green (s)	3.0	3.0	3.0
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
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Recall Mode	None	None	None
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
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

Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 99.9%	ICU Level of Service F
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.

Splits and Phases: 1: Churchill Ave N & Richmond Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	437	33	40	793	39	46	16	52	44	35	29
Future Volume (vph)	6	437	33	40	793	39	46	16	52	44	35	29
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99			0.88			0.91	
Frt		0.991			0.994			0.938			0.964	
Flt Protected		0.999			0.998			0.980			0.980	
Satd. Flow (prot)	0	1382	0	0	1396	0	0	1348	0	0	1395	0
Flt Permitted		0.991			0.965			0.835			0.824	
Satd. Flow (perm)	0	1371	0	0	1345	0	0	1088	0	0	1124	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			6			46			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		156.8			297.0			82.3			100.6	
Travel Time (s)		11.3			21.4			5.9			7.2	
Confl. Peds. (#/hr)	48		99	99		48	72		57	57		72
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	6%	2%
Parking (#/hr)		0			0							
Adj. Flow (vph)	6	437	33	40	793	39	46	16	52	44	35	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	476	0	0	872	0	0	114	0	0	108	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	34.4	34.4		33.5	33.5		24.6	24.6		24.6	24.6	
Total Split (s)	60.0	60.0		60.0	60.0		25.0	25.0		25.0	25.0	
Total Split (%)	70.6%	70.6%		70.6%	70.6%		29.4%	29.4%		29.4%	29.4%	
Maximum Green (s)	54.6	54.6		54.6	54.6		19.4	19.4		19.4	19.4	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.3	2.3		2.3	2.3	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.4			5.4			5.6			5.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	18.0	18.0		18.0	18.0		9.0	9.0		9.0	9.0	
Flash Dont Walk (s)	8.0	8.0		8.0	8.0		10.0	10.0		10.0	10.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		65.2			65.2			13.0			13.0	
Actuated g/C Ratio		0.77			0.77			0.15			0.15	
v/c Ratio		0.45			0.84			0.56			0.57	
Control Delay		7.0			20.6			30.9			38.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		7.0			20.6			30.9			38.8	
LOS		A			C			C			D	
Approach Delay		7.0			20.6			30.9			38.8	
Approach LOS		A			C			C			D	
Queue Length 50th (m)		25.4			88.0			10.3			13.5	
Queue Length 95th (m)		57.9			#215.8			24.4			27.2	
Internal Link Dist (m)		132.8			273.0			58.3			76.6	
Turn Bay Length (m)												
Base Capacity (vph)		1054			1033			283			271	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.45			0.84			0.40			0.40	

Intersection Summary

Area Type: CBD
Cycle Length: 85
Actuated Cycle Length: 85
Offset: 78 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 18.5 Intersection LOS: B
Intersection Capacity Utilization 104.7% ICU Level of Service G
Analysis Period (min) 15

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

Splits and Phases: 2: Roosevelt Ave & Richmond Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	437	33	40	793	39	46	16	52	44	35	29
Future Volume (veh/h)	6	437	33	40	793	39	46	16	52	44	35	29
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	0.98		0.93	0.86		0.82	0.87		0.82
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1620	1588	1620	1620	1568	1620
Adj Flow Rate, veh/h	6	437	33	40	793	39	46	16	52	44	35	29
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	3	2	2	2	2	6	2
Cap, veh/h	46	958	72	72	945	46	141	53	113	146	103	70
Arrive On Green	0.67	0.67	0.67	0.67	0.67	0.67	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	5	1438	108	41	1420	68	399	260	552	421	505	340
Grp Volume(v), veh/h	476	0	0	872	0	0	114	0	0	108	0	0
Grp Sat Flow(s),veh/h/ln	1551	0	0	1529	0	0	1211	0	0	1266	0	0
Q Serve(g_s), s	0.0	0.0	0.0	14.2	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.5	0.0	0.0	36.9	0.0	0.0	6.2	0.0	0.0	5.5	0.0	0.0
Prop In Lane	0.01		0.07	0.05		0.04	0.40		0.46	0.41		0.27
Lane Grp Cap(c), veh/h	1075	0	0	1063	0	0	307	0	0	319	0	0
V/C Ratio(X)	0.44	0.00	0.00	0.82	0.00	0.00	0.37	0.00	0.00	0.34	0.00	0.00
Avail Cap(c_a), veh/h	1075	0	0	1063	0	0	334	0	0	347	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.49	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.8	0.0	0.0	10.8	0.0	0.0	29.3	0.0	0.0	29.1	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	3.6	0.0	0.0	0.7	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	0.0	16.6	0.0	0.0	2.4	0.0	0.0	2.2	0.0	0.0
LnGrp Delay(d),s/veh	8.2	0.0	0.0	14.4	0.0	0.0	30.1	0.0	0.0	29.7	0.0	0.0
LnGrp LOS	A			B			C			C		
Approach Vol, veh/h		476			872			114			108	
Approach Delay, s/veh		8.2			14.4			30.1			29.7	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		62.0		23.0		62.0		23.0
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6
Max Green Setting (Gmax), s		* 55		19.4		* 55		19.4
Max Q Clear Time (g_c+I1), s		14.5		7.5		38.9		8.2
Green Ext Time (p_c), s		4.2		0.5		7.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	390	12	22	664	13	9	4	22	10	3	14
Future Volume (vph)	12	390	12	22	664	13	9	4	22	10	3	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.997			0.915			0.930	
Flt Protected		0.999			0.998			0.987			0.982	
Satd. Flow (prot)	0	1406	0	0	1406	0	0	1418	0	0	1434	0
Flt Permitted		0.999			0.998			0.987			0.982	
Satd. Flow (perm)	0	1406	0	0	1406	0	0	1418	0	0	1434	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		19.5			116.6			133.7			141.3	
Travel Time (s)		1.4			8.4			9.6			10.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parking (#/hr)		0			0							
Adj. Flow (vph)	12	390	12	22	664	13	9	4	22	10	3	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	414	0	0	699	0	0	35	0	0	27	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.41	1.24	1.24	1.41	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: CBD	
Control Type: Unsignalized	
Intersection Capacity Utilization 63.3%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	390	12	22	664	13	9	4	22	10	3	14
Future Vol, veh/h	12	390	12	22	664	13	9	4	22	10	3	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	390	12	22	664	13	9	4	22	10	3	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	677	0	0	402	0	0	1143	1141	396	1148	1141	671
Stage 1	-	-	-	-	-	-	420	420	-	715	715	-
Stage 2	-	-	-	-	-	-	723	721	-	433	426	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	915	-	-	1157	-	-	177	201	653	176	201	456
Stage 1	-	-	-	-	-	-	611	589	-	422	434	-
Stage 2	-	-	-	-	-	-	417	432	-	601	586	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	915	-	-	1157	-	-	163	192	653	161	192	456
Mov Cap-2 Maneuver	-	-	-	-	-	-	163	192	-	161	192	-
Stage 1	-	-	-	-	-	-	601	579	-	415	421	-
Stage 2	-	-	-	-	-	-	389	419	-	567	576	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.3	17.7	21.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	319	915	-	-	1157	-	-	249
HCM Lane V/C Ratio	0.11	0.013	-	-	0.019	-	-	0.108
HCM Control Delay (s)	17.7	9	0	-	8.2	0	-	21.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0.4

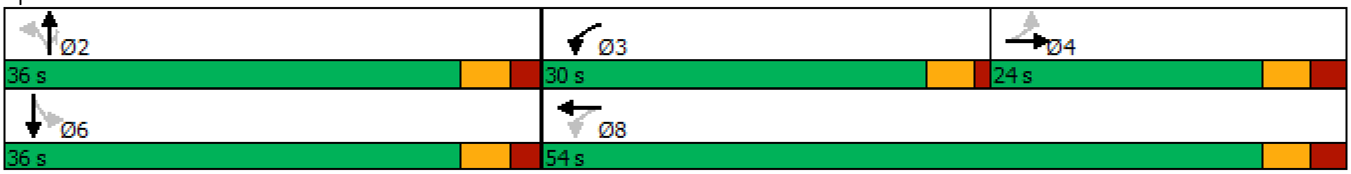
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	5	12	372	5	33	11	117	293	39	137	1
Future Volume (vph)	0	5	12	372	5	33	11	117	293	39	137	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	75.0		0.0	0.0		30.0	0.0		0.0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (m)	15.0			30.0			15.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.95		0.96	0.91			0.99	0.96		1.00	
Frt		0.905			0.870				0.850		0.999	
Flt Protected				0.950				0.996			0.989	
Satd. Flow (prot)	0	1357	0	1492	1152	0	0	1383	1322	0	1502	0
Flt Permitted				0.690				0.976			0.924	
Satd. Flow (perm)	0	1357	0	1042	1152	0	0	1348	1266	0	1397	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			33				293			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		73.0			110.8			234.1			99.4	
Travel Time (s)		5.3			8.0			16.9			7.2	
Confl. Peds. (#/hr)	32		18	18		32	39		9	9		39
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	12%	2%	4%	3%	10%	4%	2%
Parking (#/hr)								0				
Adj. Flow (vph)	0	5	12	372	5	33	11	117	293	39	137	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	0	372	38	0	0	128	293	0	177	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.41	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type		NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	23.8	23.8		14.3	23.8		23.4	23.4	23.4	23.4	23.4	
Total Split (s)	24.0	24.0		30.0	54.0		36.0	36.0	36.0	36.0	36.0	
Total Split (%)	26.7%	26.7%		33.3%	60.0%		40.0%	40.0%	40.0%	40.0%	40.0%	
Maximum Green (s)	18.2	18.2		25.7	48.2		30.6	30.6	30.6	30.6	30.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.5	2.5		1.0	2.5		2.1	2.1	2.1	2.1	2.1	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.8		4.3	5.8			5.4	5.4		5.4	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)		10.2		21.2	19.6			31.3	31.3		31.3	
Actuated g/C Ratio		0.16		0.34	0.31			0.50	0.50		0.50	
v/c Ratio		0.07		0.76	0.10			0.19	0.38		0.25	
Control Delay		18.9		28.1	6.2			12.7	3.7		13.1	
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay		18.9		28.1	6.2			12.7	3.7		13.1	
LOS		B		C	A			B	A		B	
Approach Delay		18.9			26.1			6.5			13.1	
Approach LOS		B			C			A			B	
Queue Length 50th (m)		0.5		35.9	0.4			6.7	0.0		9.6	
Queue Length 95th (m)		6.3		58.6	5.0			25.9	14.9		34.9	
Internal Link Dist (m)		49.0			86.8			210.1			75.4	
Turn Bay Length (m)				75.0					30.0			
Base Capacity (vph)		413		668	916			676	781		701	
Starvation Cap Reductn		0		0	0			0	0		0	
Spillback Cap Reductn		0		0	0			0	0		0	
Storage Cap Reductn		0		0	0			0	0		0	
Reduced v/c Ratio		0.04		0.56	0.04			0.19	0.38		0.25	

Intersection Summary	
Area Type: CBD	
Cycle Length: 90	
Actuated Cycle Length: 62.4	
Natural Cycle: 65	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 15.6	Intersection LOS: B

Intersection Capacity Utilization 62.4% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 4: Churchill Ave N & Scott St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	5	12	372	5	33	11	117	293	39	137	1
Future Volume (veh/h)	0	5	12	372	5	33	11	117	293	39	137	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.90	0.93		0.96	0.97		0.95	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1588	1464	1620	1620	1560	1573	1620	1538	1620
Adj Flow Rate, veh/h	0	5	12	372	5	33	11	117	293	39	137	1
Adj No. of Lanes	0	1	0	1	1	0	0	1	1	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	12	2	4	3	10	4	2
Cap, veh/h	0	63	151	620	73	481	76	591	512	146	450	3
Arrive On Green	0.00	0.16	0.16	0.23	0.45	0.45	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	0	385	923	1513	162	1067	62	1470	1272	220	1120	8
Grp Volume(v), veh/h	0	0	17	372	0	38	128	0	293	177	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1307	1513	0	1229	1532	0	1272	1348	0	0
Q Serve(g_s), s	0.0	0.0	0.8	14.4	0.0	1.3	0.0	0.0	13.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.8	14.4	0.0	1.3	4.1	0.0	13.6	5.9	0.0	0.0
Prop In Lane	0.00		0.71	1.00		0.87	0.09		1.00	0.22		0.01
Lane Grp Cap(c), veh/h	0	0	213	620	0	554	668	0	512	600	0	0
V/C Ratio(X)	0.00	0.00	0.08	0.60	0.00	0.07	0.19	0.00	0.57	0.30	0.00	0.00
Avail Cap(c_a), veh/h	0	0	313	782	0	779	668	0	512	600	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	27.0	17.0	0.0	11.9	14.8	0.0	17.7	15.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	0.9	0.0	0.1	0.6	0.0	4.6	1.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	6.1	0.0	0.5	1.9	0.0	5.4	2.7	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	27.1	18.0	0.0	11.9	15.4	0.0	22.3	16.6	0.0	0.0
LnGrp LOS			C	B		B	B		C	B		
Approach Vol, veh/h		17			410			421			177	
Approach Delay, s/veh		27.1			17.4			20.2			16.6	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6		8
Phs Duration (G+Y+Rc), s		36.0	21.9	18.2		36.0		40.1
Change Period (Y+Rc), s		* 5.4	* 4.3	* 5.8		* 5.4		* 5.8
Max Green Setting (Gmax), s		* 31	* 26	* 18		* 31		* 48
Max Q Clear Time (g_c+I1), s		15.6	16.4	2.8		7.9		3.3
Green Ext Time (p_c), s		2.1	1.2	0.0		1.2		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

Notes

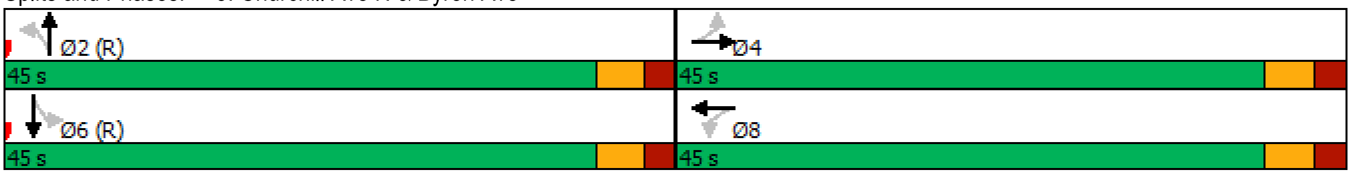
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	148	61	86	332	72	33	306	94	30	327	70
Future Volume (vph)	45	148	61	86	332	72	33	306	94	30	327	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	15.0			15.0			25.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.99		0.97	0.99		0.98	0.98	
Frt		0.968			0.980			0.965			0.974	
Flt Protected		0.991			0.991		0.950			0.950		
Satd. Flow (prot)	0	1489	0	0	1519	0	1478	1495	0	1492	1492	0
Flt Permitted		0.858			0.893		0.434			0.432		
Satd. Flow (perm)	0	1287	0	0	1364	0	652	1495	0	667	1492	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			12			22			15	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		154.1			199.5			136.6			125.1	
Travel Time (s)		11.1			14.4			9.8			9.0	
Confl. Peds. (#/hr)	15		17	17		15	33		16	16		33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	3%	2%
Adj. Flow (vph)	45	148	61	86	332	72	33	306	94	30	327	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	254	0	0	490	0	33	400	0	30	397	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.6	30.6		30.6	30.6		26.4	26.4		26.4	26.4	
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	39.4	39.4		39.4	39.4		39.6	39.6		39.6	39.6	
Yellow Time (s)	3.3	3.3		3.3	3.3		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.3	2.3		2.3	2.3		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.4	5.4		5.4	5.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		35.4			35.4		43.6	43.6		43.6	43.6	
Actuated g/C Ratio		0.39			0.39		0.48	0.48		0.48	0.48	
v/c Ratio		0.49			0.90		0.10	0.54		0.09	0.54	
Control Delay		21.3			46.0		15.8	19.9		13.6	18.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.5	
Total Delay		21.3			46.0		15.8	19.9		13.6	18.5	
LOS		C			D		B	B		B	B	
Approach Delay		21.3			46.0			19.6			18.1	
Approach LOS		C			D			B			B	
Queue Length 50th (m)		27.8			72.6		3.2	46.2		2.9	44.5	
Queue Length 95th (m)		47.1			#124.8		9.0	77.3		m5.1	m57.6	
Internal Link Dist (m)		130.1			175.5			112.6			101.1	
Turn Bay Length (m)							15.0			25.0		
Base Capacity (vph)		575			603		315	735		322	730	
Starvation Cap Reductn		0			0		0	0		0	85	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.44			0.81		0.10	0.54		0.09	0.62	

Intersection Summary	
Area Type: CBD	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 40 (44%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 27.5	Intersection LOS: C

Intersection Capacity Utilization 83.3%   ICU Level of Service E
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.

Splits and Phases: 5: Churchill Ave N & Byron Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	148	61	86	332	72	33	306	94	30	327	70
Future Volume (veh/h)	45	148	61	86	332	72	33	306	94	30	327	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	0.99		0.99	0.98		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1620	1588	1620	1620	1588	1620	1573	1588	1620	1588	1576	1620
Adj Flow Rate, veh/h	45	148	61	86	332	72	33	306	94	30	327	70
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	3	2	2	2	3	2
Cap, veh/h	101	291	109	122	381	79	516	586	180	370	633	136
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.51	0.51	0.51	1.00	1.00	1.00
Sat Flow, veh/h	145	783	293	202	1028	212	860	1156	355	880	1250	268
Grp Volume(v), veh/h	254	0	0	490	0	0	33	0	400	30	0	397
Grp Sat Flow(s),veh/h/ln	1221	0	0	1441	0	0	860	0	1511	880	0	1518
Q Serve(g_s), s	0.0	0.0	0.0	16.3	0.0	0.0	1.8	0.0	16.0	1.2	0.0	0.0
Cycle Q Clear(g_c), s	12.8	0.0	0.0	29.0	0.0	0.0	1.8	0.0	16.0	17.1	0.0	0.0
Prop In Lane	0.18		0.24	0.18		0.15	1.00		0.23	1.00		0.18
Lane Grp Cap(c), veh/h	500	0	0	582	0	0	516	0	766	370	0	769
V/C Ratio(X)	0.51	0.00	0.00	0.84	0.00	0.00	0.06	0.00	0.52	0.08	0.00	0.52
Avail Cap(c_a), veh/h	589	0	0	676	0	0	516	0	766	370	0	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.66	0.00	0.66
Uniform Delay (d), s/veh	21.5	0.0	0.0	26.7	0.0	0.0	11.4	0.0	14.9	3.0	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	8.4	0.0	0.0	0.2	0.0	2.5	0.3	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	0.0	12.9	0.0	0.0	0.5	0.0	7.2	0.3	0.0	0.3
LnGrp Delay(d),s/veh	22.3	0.0	0.0	35.1	0.0	0.0	11.6	0.0	17.4	3.3	0.0	1.6
LnGrp LOS	C			D			B		B	A		A
Approach Vol, veh/h		254			490			433			427	
Approach Delay, s/veh		22.3			35.1			17.0			1.7	
Approach LOS		C			D			B			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		51.0		39.0		51.0		39.0				
Change Period (Y+Rc), s		* 5.4		5.6		* 5.4		5.6				
Max Green Setting (Gmax), s		* 40		39.4		* 40		39.4				
Max Q Clear Time (g_c+I1), s		18.0		14.8		19.1		31.0				
Green Ext Time (p_c), s		3.3		1.9		3.1		2.4				
Intersection Summary												
HCM 2010 Ctrl Delay			19.3									
HCM 2010 LOS			B									
Notes												

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	9	5	408	12	7	564
Future Volume (vph)	9	5	408	12	7	564
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt	0.952		0.996			
Flt Protected	0.969					0.999
Satd. Flow (prot)	1449	0	1564	0	0	2981
Flt Permitted	0.969					0.999
Satd. Flow (perm)	1449	0	1564	0	0	2981
Link Speed (k/h)	30		50			50
Link Distance (m)	80.5		63.4			18.5
Travel Time (s)	9.7		4.6			1.3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	9	5	408	12	7	564
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	0	420	0	0	571
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.5		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type: CBD	
Control Type: Unsignalized	
Intersection Capacity Utilization 36.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	5	408	12	7	564
Future Vol, veh/h	9	5	408	12	7	564
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	5	408	12	7	564

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	710	414	0	0	420	0
Stage 1	414	-	-	-	-	-
Stage 2	296	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	384	637	-	-	1137	-
Stage 1	666	-	-	-	-	-
Stage 2	729	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	381	637	-	-	1137	-
Mov Cap-2 Maneuver	381	-	-	-	-	-
Stage 1	666	-	-	-	-	-
Stage 2	722	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.4	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	445	1137	-
HCM Lane V/C Ratio	-	-	0.031	0.006	-
HCM Control Delay (s)	-	-	13.4	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations							
Traffic Volume (vph)	403	0	0	679	0	0	
Future Volume (vph)	403	0	0	679	0	0	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt							
Flt Protected							
Satd. Flow (prot)	1571	0	0	1571	0	0	
Flt Permitted							
Satd. Flow (perm)	1571	0	0	1571	0	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)							
Link Speed (k/h)	50			50	50		
Link Distance (m)	266.4			19.5	33.7		
Travel Time (s)	19.2			1.4	2.4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	403	0	0	679	0	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	403	0	0	679	0	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(m)	3.5			3.5	0.0		
Link Offset(m)	0.0			0.0	0.0		
Crosswalk Width(m)	3.0			3.0	3.0		
Two way Left Turn Lane							
Headway Factor	1.24	1.24	1.24	1.24	1.24	1.24	
Turning Speed (k/h)		15	25		25	15	
Number of Detectors	2			2			
Detector Template	Thru			Thru			
Leading Detector (m)	10.0			10.0			
Trailing Detector (m)	0.0			0.0			
Detector 1 Position(m)	0.0			0.0			
Detector 1 Size(m)	0.6			0.6			
Detector 1 Type	Cl+Ex			Cl+Ex			
Detector 1 Channel							
Detector 1 Extend (s)	0.0			0.0			
Detector 1 Queue (s)	0.0			0.0			
Detector 1 Delay (s)	0.0			0.0			
Detector 2 Position(m)	9.4			9.4			
Detector 2 Size(m)	0.6			0.6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			
Turn Type	NA			NA			
Protected Phases	2			6			4
Permitted Phases							
Detector Phase	2			6			
Switch Phase							
Minimum Initial (s)	5.0			5.0			5.0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Minimum Split (s)	24.0			24.0			23.0
Total Split (s)	42.0			42.0			23.0
Total Split (%)	64.6%			64.6%			35%
Maximum Green (s)	36.0			36.0			19.0
Yellow Time (s)	3.3			3.3			3.0
All-Red Time (s)	2.7			2.7			1.0
Lost Time Adjust (s)	0.0			0.0			
Total Lost Time (s)	6.0			6.0			
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0			3.0			3.0
Recall Mode	C-Max			C-Max			Ped
Walk Time (s)							7.0
Flash Dont Walk (s)							12.0
Pedestrian Calls (#/hr)							51
Act Effct Green (s)	36.0			36.0			
Actuated g/C Ratio	0.55			0.55			
v/c Ratio	0.46			0.78			
Control Delay	10.9			19.7			
Queue Delay	0.0			0.0			
Total Delay	10.9			19.7			
LOS	B			B			
Approach Delay	10.9			19.7			
Approach LOS	B			B			
Queue Length 50th (m)	26.4			58.1			
Queue Length 95th (m)	45.2			#109.8			
Internal Link Dist (m)	242.4			0.1	9.7		
Turn Bay Length (m)							
Base Capacity (vph)	870			870			
Starvation Cap Reductn	0			0			
Spillback Cap Reductn	0			0			
Storage Cap Reductn	0			0			
Reduced v/c Ratio	0.46			0.78			

Intersection Summary

Area Type: CBD
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 16.4 Intersection LOS: B
Intersection Capacity Utilization 46.9% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Pedestrian Crossing & Richmond Rd