

TRANSPORTATION ASSESSMENT

**BOLTON NORTH HILL
OPTION 1 & OPTION 2 LANDS**

**TOWN OF CALEDON
REGION OF PEEL**

**PREPARED FOR:
BOLTON NORTH HILL
LANDOWNERS GROUP INC.**

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Revision Number	Date	Comments
Rev. 0	December 2021	Option 1/2 Assessment Submission

1.0 Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by Bolton North Hill Landowners Group to undertake a Transportation Assessment in support of a Local Official Plan Amendment (LOPA) for the Bolton North Hill Secondary Plan Option 1 and 2 Lands (the Site) in the Town of Caledon, Region of Peel. The Site consists of approximately 175.3 ha (433 acres) in total and is located generally north of the intersection of Regional Road 50 and Columbia Way.

The purpose of a Transportation Assessment is to evaluate the transportation-related impacts arising from development and to determine if mitigation measures are required on the boundary road network to support the development into the future.

The boundary road network is operating at overall acceptable levels of service with reserve capacity under 2017 existing traffic volumes.

Future planned roadway improvements have been reviewed per Transportation Master Plans and Capital Works programs and no improvements were identified within the study area. Additional background roadway improvements were established under future background conditions. These included:

- Signal timing adjustments along Highway 50 at Bolton Heights Drive and King Street;
- Road widening in both directions on Caledon-King Townline from King Street to Columbia Way and Highway 50 from Emil Kolb Parkway to Castlederg Road.
- Road widening on Highway 50 from Bolton Heights Drive to north of King Street in the southbound direction.

Following the outlined roadway improvements, the boundary road network is expected to operate at overall acceptable levels of service under 2031 future background conditions. There is reserve capacity following future background traffic growth, with the exception of Highway 50 and King Street during the p.m. peak hour. However, this is not uncommon for downtown core areas where improvements are not practical due to available right-of-way and condensed signal spacing.

Therefore, given that the future background traffic growth is constant over a 14-year horizon, the traffic operations on the boundary road network are expected to be overall acceptable under 2031 future background conditions.

The Option 1/2 lands are expected to generate approximately 1,731 and 2,370 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

Analysis of potential roadway improvements on the boundary road network was conducted under future total conditions. Identified improvements include:

- Signal timing adjustments at Highway 50 and King Street;
- Parking restriction on Highway 50 north of King Street to provide two through lanes during the p.m. peak period;
- Exclusive left-turn lanes on Columbia Way at Westchester Boulevard (westbound) and Mount Hope Road (eastbound);
- Exclusive right-turn lane at Highway 50 and Columbia Way (northbound);

- Road widening in both direction on Emil Kolb Parkway from King Street to Highway 50 and Highway 50 from Emil Kolb Parkway to Columbia Way;
- Road widening for an additional lane in the southbound direction on Highway 50 from Columbia Way to Bolton Heights Drive.

Analysis of potential roadway improvements at the future access points was conducted under future total conditions. Identified improvements include:

- The addition of an east leg to the existing roundabout at Highway 50 and Emil Kolb Parkway, as well as an additional internal lane at the north and west legs;
- Signalization of the new intersections of Emil Kolb Parkway and Street A/Street B, Highway 50 and Street D/Street E and Highway 50 and Street F;
- An exclusive northbound left-turn lane on Emil Kolb Parkway at Duffy's Lane.

A second access is required for the parcel in the southwest quadrant of Emil Kolb Parkway and Highway 50, as the area contains over 100 units. The far east road in the parcel has been modelled as a right-in-right-out (RIRO) access, referenced as Street C, though not illustrated on the current concept plan.

The boundary road network is expected to operate at overall acceptable levels of service under 2031 future total conditions with minor control delays nor volume-to-capacity ratios exceeding 1.00. These results are attributed to the implementation of the required roadway improvements.

The exception is the intersection of Highway 50 and King Street East/West during the weekday p.m. peak hour, which is expected to operate with several movements operating above capacity. These operations are common at high-volume intersections during peak hours located in downtown core areas with limited right-of-way and limited opportunities for geometric improvements.

Therefore, the implementation of the recommended roadway improvements under 2031 future total conditions is expected to result in overall acceptable traffic operations on the boundary road network.

A 32.03-ha parcel, located at the southern limit of the Option 1 Lands, has been subject to Regional Official Plan Amendment 30 (ROPA 30), which was approved by the Local Planning Appeal Tribunal (LPAT) on November 30, 2020. This LPAT approval brings the 32.03-ha portion of Option 1 Lands into the Bolton Rural Service Centre Settlement Area Boundary. While the portion of the Site that is within ROPA 30 may proceed now, the balance of the lands would require the approval of the 2051 urban boundary expansion through the current Regional SABE process. A sensitivity analysis was undertaken for the buildout within the ROPA 30 Settlement Boundary.

The ROPA 30 lands are expected to generate approximately 376 and 477 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

All trips were distributed through Access A (referred to within the entire development as Street G). It should be noted that a secondary access will be required based on the number of units and will likely connect within Parcel 7 on the Concept Plan.

Analysis of potential roadway improvements on the boundary road network was conducted under the ROPA 30 future total conditions. Identified improvements include:

- Signal timing adjustments at Highway 50 and King Street;
- Parking restriction on Highway 50 north of King Street to provide two through lanes during the p.m. peak period;
- Road widening for an additional through lane in the eastbound direction on Emil Kolb Parkway from King Street to Highway 50;
- Road widening for an additional through lane in the northbound direction on Highway 50 from Emil Kolb Parkway to Columbia Way;
- Signalization of Highway 50 at Access A;
- A southbound left-turn lane on Highway 50 at Access A.

It should be noted that the road widenings considered for network improvements as part of the build-out of the ROPA 30 lands are just below the capacity threshold under future background conditions. Thus, while the need for additional lanes has been identified as improvements resulting from the Total Traffic scenario, i.e., with the ROPA 30 lands, the warrant is primarily triggered based on the contribution of future background traffic volumes.

The boundary road network is expected to operate at overall acceptable levels of service under 2031 ROPA 30 future total conditions with minor control delays nor volume-to-capacity ratios exceeding 1.00. These results are attributed to the implementation of the required roadway improvements.

The intersection of Highway 50 and King Street East/West during the weekday p.m. peak hour, is expected to continue operating at LOS "D" with several movements operating above capacity, but under a volume-to-capacity ratio of 1.00. These operations are common at high-volume arterial-to-arterial intersections during peak hours located in downtown core areas with limited right-of-way and limited opportunities for geometric improvements.

With the implementation of the recommended roadway improvements, the Option 1/2 scenario lands are expected to result in overall acceptable traffic operations on the boundary road network.

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2.0 Introduction

2.1 Background and Purpose

C.F. Crozier & Associates Inc. (Crozier) was retained by Bolton North Hill Landowners Group to undertake a Transportation Assessment in support of a Local Official Plan Amendment (LOPA) for the Bolton North Hill Secondary Plan Option 1 and 2 Lands (the Site) in the Town of Caledon, Region of Peel. The Site consists of approximately 175.3 ha (433 acres) in total and is located generally north of the intersection of Regional Road 50 and Columbia Way.

This assessment was undertaken to review the Concept Plan (Bousfields, December 20, 2021) for the site and the lands within the established ROPA No. 30 settlement boundary area. **Figure 1** illustrates the Concept Plan.

The purpose of a Transportation Assessment is to evaluate the transportation-related impacts arising from the development and to determine if mitigation measures are required on the boundary road network to support the development into the future.

2.2 Background Studies

Paradigm Transportation Solutions Ltd. completed the "Bolton Residential Expansion Evaluation of Alternative Growth Areas Transportation" (June 2014) for the Town of Caledon analyzing the transportation-related impacts arising from residential expansion Options 1 and 3. This study will herein be referred to as the Paradigm Study.

CIMA+ completed the "Intersection Analysis for Bolton Residential Expansion Areas" (April 2016) for the Region of Peel to analyze intersection operations and recommend intersection improvements on Regional Roads for the residential expansion options. This study will herein be referred to as the CIMA+ Study.

A previous Transportation Assessment was completed by Crozier in October 2020 for the LPAT Case No. PL170058. The study reviewed all six Bolton Residential Expansion Options as well as three rounding out areas and additional employment lands. **Appendix A** illustrates the original Bolton Residential Expansion areas.

2.3 Study Area

Option 1 Lands are approximately 171 ha and are located north of Regional Road 50 and Columbia Way, extending west to the north and south of Emil Kolb Parkway and west of Duffy's Lane. Option 2 Lands are approximately 4.3 ha and are bound by Columbia Way to the south and Mount Hope Road to the west.

A 32.03-ha parcel, located at the southern limit of the Option 1 Lands, has been subject to Regional Official Plan Amendment 30 (ROPA 30), which was approved by the Local Planning Appeal Tribunal (LPAT) on November 30, 2020. This LPAT approval brings the 32.03-ha portion of Option 1 Lands into the Bolton Rural Service Centre Settlement Area Boundary. While the portion of the Site that is within ROPA 30 may proceed now, the balance of the lands would require the approval of the 2051 urban boundary expansion through the current Regional SABE process.

The remainder of Option 1/2 Lands are currently designated as "Rural Area" per the Region of Peel Official Plan and "Agricultural Area" in the Town of Caledon's Official Plan. To permit development of these lands for the proposed urban uses, Option 1/2 Lands will need to be brought into the Bolton Rural Service Centre Settlement Area Boundary. This review is currently underway at the Region of Peel through the Region's 2051 Municipal Comprehensive Review (MCR) of the Region's Official Plan. Further, a local Official Plan Amendment is required to assign urban land use designations to all the Option 1 and 2 Lands.

2.4 Option 1 & Option 2 Development Yields

The following residential unit counts by landowner were established based on the Concept Plan (Bousfields, December 2021). Non-participating areas included in the Option 1/2 lands have also been considered and included. **Table 1** summarizes the unit counts for various land uses.

Table 1: Residential Development Yields (Option 1/2)

Owner	Single-Detached	Townhouses	Apartments ¹
Pacific (1)	129	78	-
Polsinelli	-	119	6
Pacific (3)	-	120	79
Country Homes	339	411	138
Oakbank Estates Inc.	233	406	120
Marhome Ventures	172	194	-
Georgian Humbervale	-	266	74
Cold Creek Developments	-	127	-
Remaining Developments East	7	196	215
Remaining Developments West	675	422	-
Total	1,554	2,165	417

Note 1: Apartment units are assigned per landowner at 80 units per hectare.

A total of 1.4 ha has been designated commercial within the Option 1 lands. Additionally, there are two school blocks proposed in lands owned by Pacific (1), Country Homes and Oakbanks Estates Inc.

3.0 Existing Conditions

3.1 Study Intersections

The following existing intersections have been analyzed as part of the Transportation Assessment:

- King Street and Emil Kolb Parkway
- Highway 50 and Emil Kolb Parkway
- Highway 50 and Columbia Way
- Highway 50 and Cross Country Boulevard/Bolton Heights Road
- Highway 50 and King Street East/West
- Columbia Way and Kingsview Drive
- Columbia Way and Westchester Boulevard
- Columbia Way and Mount Hope Road
- Columbia Way and Caledon King Townline

3.2 Boundary Road Network

The boundary road network at the site frontage is described in **Table 2**.

Table 2: Boundary Road Network

Roadway (Jurisdiction)	Feature				
	Direction	Classification	Speed Limit	Surrounding Uses	Number of Lanes
Highway 50 (Regional)	Two-way (North-South)	Arterial	60 km/h north of Mayfield Rd	Rural north of Columbia Way Urban south of Columbia Way	Four ¹ Three ² Two ³
Emil Kolb Parkway – Bolton Arterial Road Bypass (Regional)	Two-way (North-South)	Arterial	70 km/h	Rural	Two
King Street (Regional)	Two-way (East-West)	Arterial	50 km/h within the core area 60 km/h just outside core area	Urban east of Coleraine Drive Rural west of Coleraine Drive	Two
Columbia Way (Town)	Two-way (East-West)	Local	40 km/h east of Highway 50 60 km/h east of the school	Urban to the south Rural to the north	Two
Caledon King Townline (Town)	Two-way (North-South)	Local	60 km/h	Rural	Two

Note 1: South of Centennial Dr
Note 2: South of Bolton Heights Rd
Note 3: North of Bolton Heights Rd

On-street parking is currently permitted on Highway 50 within the downtown core area.

The segment of Highway 50 from Healey Road to Emil Kolb Parkway is designated as a “No Heavy Trucks” route. This designation is to prevent heavy truck traffic from travelling through the downtown core of Bolton. Heavy truck traffic on Highway 50 is required to bypass the downtown core by using Coleraine Drive and Emil Kolb Parkway (the bypass for the downtown core).

Figure 2 illustrates the existing boundary road network, including lane configurations, storage lengths, and intersection control.

3.3 Transit Operations

GO Transit operates bus Route 38 "Bolton-Malton" in Bolton, running from a north terminus at the intersection of Highway 50 and Columbia Way to Malton GO station. Through Bolton the bus operates along Highway 50 with a number of stops, including the Park 'n Ride commuter lot at the intersection of Highway 50 and Mayfield Road.

As of November 2019, the Town of Caledon in conjunction with a private operator, implemented a local bus route that loops the employment areas and residential areas generally bound by Coleraine Drive, King Street and Highway 50. The route provides connection to the intersection of Highway 50 and Highway 7 to the south in Brampton, allowing connection to Brampton Transit.

Table 3 outlines the existing transit routes, direction, days of operation, number of buses, and the location of bus stops in the study area.

Table 3: Existing Transit Services

Route	Direction	Span	Days of Operation	# Of busses	Bus Stops in Study Area
Route 38 (Bolton – Malton)	Two-way (North/South)	Highway 50 And Columbia Way to Malton GO Station	Weekdays (10:00 a.m. to 7:00 p.m.)	6 Southbound Busses between 6 a.m. to early afternoon. 7 northbound Busses from Malton GO station – Spread thought the day	Highway 50 and Columbia Way Highway 50 and Bolton Heights Highway 50 and Hickman Street
Bolton Line	One-way loop	Highway 50 and King Street to Highway 50 and Highway 7	Weekdays (6:00 a.m. – 9:30 a.m. and 3:00 p.m. - 6:30 p.m.)	2 Busses running at a time, with a 30- minute headway	Highway 50 and Willow Street (p.m.) King Street and Ann Street (a.m.)

The boundary road network in **Figure 2** illustrates the existing bus stop locations in the study area. **Appendix B** contains relevant transit information.

3.4 Active Transportation Network

Bolton has a network of active transportation facilities, composed of hiking trails, bike routes, paved and unpaved multi-use trails and footpaths. Concrete sidewalks connect residential areas to commercial and employment areas.

The existing active transportation facilities on the boundary road network are described in **Table 4**.

Table 4: Active Transportation Network

Roadway	Facilities	Span
Highway 50	Paved sidewalk on both sides of the roadway	North of Columbia Way –no sidewalk
		North of the downtown core to Columbia Way – sidewalk on one side alternating
		Downtown core – sidewalks on both sides of the roadway
King Street	Paved Sidewalk on both east and west Sides	Mixture of Grass and Paved boulevards, some sections no boulevard
	Signed Bike Trail	From Evans Ridge to Caledon King Townline From Humber Lea Road to Old King Road
Columbia Way	Paved sidewalk on south side of the roadway	Highway 50 to Forest Gate Avenue (with sections of grass boulevard and behind guardrail)
Kingsway Drive	Paved sidewalk on both sides of roadway	Columbia Way to Taylorwood Avenue, sidewalk on at least one side to Hathaway Court
Westchester Boulevard	Paved sidewalk on both sides of roadway	Columbia Way to Egan Crescent
Mount Hope Road	Paved sidewalk on east side of roadway	Columbia Way to Guardhouse Drive
Bolton Heights Road	Paved sidewalk on both sides of roadway	Highway 50 to Kingsview Drive
Hickman Street	Signed Bike Trail	From Deer Valley Drive to Highway 50
Humber Valley Heritage Trail	Multi-use trail	Spanning from Emil Kolb Parkway to Albion Vaughn Road with a network of side trails

As outlined above, these roadway segments in the immediate study area feature active transportation facilities.

There are extensive hiking trail and conservation facilities in the north part of Bolton. The Humber Valley Heritage Trail starts near the intersection of Caledon King Townline and King Street and crosses northwest, through the Bolton Resource Management Tract to the Northwest of the study area. This trail offers a Main trail and other side trails.

The Bolton Camp is located off Caledon-King Townline and just north of King Street, offers 15 km of hiking trails. This conservation area also has side trails branching from the Humber Valley Heritage Trail.

Bolton Heights Road has dedicated east/west bike lanes within the study area.

The boundary road network in **Figure 2** illustrates the existing pedestrian and cycling facilities in the study area. **Appendix B** contains relevant active transportation information, including visual representations of the trail system.

3.5 Traffic Data

Turning movement counts (TMCs) for the boundary road network were conducted by Spectrum Traffic Inc. staff in August 2017 between 6:00a.m.-10:00a.m., and 3:00p.m.-7.00p.m. Regional staff provided updated signal timing cards for the study intersections.

Table 5 outlines the TMC count dates and signal timing plan preparation date for each study intersection.

Table 5: Summary of Traffic Data

Intersection	Signal Timing Plan Date	TMC Count Date
King Street and Emil Kolb Parkway	N/A (roundabout)	Tuesday August 22, 2017
Highway 50 and Emil Kolb Parkway	N/A (roundabout)	
Highway 50 and Columbia Way	September 11, 2017	
Highway 50 and Cross Country Boulevard / Bolton Heights Road	September 11, 2017	
Highway 50 and King Street East/West	September 14, 2017	
Columbia Way and Kingsview Drive	N/A (Stop-controlled)	Tuesday August 15, 2017
Columbia Way and Westchester Boulevard	N/A (Stop-controlled)	
Columbia Way and Mount Hope Road	N/A (Stop-controlled)	
Columbia Way and Caledon King Townline	N/A (Stop-controlled)	

The traffic count data and signal timing plans are contained in **Appendix C. Figure 3** illustrates the 2017 existing traffic volumes.

3.6 Traffic Modelling

3.6.1. Signalized and Unsignalized Intersections

The results for signalized intersection operations were derived from Synchro. The results for unsignalized intersection operations were derived from Synchro using HCM2000 methodology. 95th percentile queue lengths were derived from Synchro. The Level of Service (LOS) definitions for signalized and unsignalized intersections are included in **Appendix D**.

The boundary road network was modelled in Synchro 11 in conformance with the modelling guidelines per the Region of Peel's "Regional Guidelines for Using Synchro Version 7.73 Rev 8" for all intersections. **Table 6** summarizes the Synchro modelling parameters set out by the Region's guidelines.

Table 6: Region of Peel Synchro Modelling Parameters

Parameter	Value
Ideal (base) saturation flow rate	1,900 veh/hr/lane
Lost Time	Default value of 0.0 seconds
Peak Hour Factor	1.00 for all intersection movements
Lane width	3.7 metres for through and shared through/turn lanes 3.5 metres for exclusive turn lanes

The Region's guidelines set out thresholds for critical volume-to-capacity ratios for through/shared through movements, and for exclusive turning movements, with thresholds of 0.90 and 1.00 for a through/shared through and exclusive turning movement, respectively. Thus, the intersections on the boundary road network were analyzed with these critical volume-to-capacity thresholds.

3.6.2. Roundabout Intersections

Modelling analysis for the existing roundabout intersections of King Street and Emil Kolb Parkway, and Highway 50 and Emil Kolb Parkway was conducted using Junctions 8 (ARCADY) roundabout analysis software. Roundabout geometrics were estimated from the existing roundabouts at the intersections.

3.7 Intersection Operations

The existing intersection operations at the study intersections were analyzed using the existing traffic volumes illustrated in **Figure 3**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 7 outlines the 2017 existing traffic operations.

Table 7: 2017 Existing Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Critical v/c ratio ²	95 th Percentile Queue Length > Storage Length
King Street and Emil Kolb Parkway	Roundabout	A.M.	A	1.87s	0.17(N Leg)	None
		P.M.	A	1.90s	0.29(S Leg)	None
Highway 50 and Emil Kolb Parkway	Roundabout	A.M.	A	1.89s	0.28(N Leg)	None
		P.M.	A	2.24s	0.32(S Leg)	None
Highway 50 and Columbia Way	Signal	A.M.	B	10.3s	0.59 (WBL)	None
		P.M.	A	6.1s	0.42 (WBL)	None
Highway 50 and Bolton Heights Road	Signal	A.M.	B	12.4s	0.39 (SBT)	None
		P.M.	A	6.8s	0.26 (NBT)	None
Highway 50 and King Street East/West	Signal	A.M.	C	20.3s	0.57 (EBT)	None
		P.M.	C	31.5s	0.85 (NBLT)	None
Columbia Way and Kingsview Drive	Signal	A.M.	A	7.1s	0.35 (NB)	None
		P.M.	A	3.8s	0.29 (NB)	None
Columbia Way and Westchester Boulevard	Stop (Minor Street)	A.M.	B	10.0s (NB)	0.14 (NB)	None
		P.M.	B	12.0s (NB)	0.15 (NB)	None
Columbia Way and Mount Hope Road	Stop (Minor Street)	A.M.	A	10.0s (NB)	0.05 (NB)	None
		P.M.	B	13.0s (NB)	0.08 (SB)	None
Columbia Way and Caledon King Townline	Stop (Minor Street)	A.M.	B	15.0s (EB)	0.35 (EB)	None
		P.M.	B	11.7s (EB)	0.13 (EB)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU).
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.90 for a through/shared movement and greater than 1.00 for an exclusive turning movement are outlined and highlighted.

The boundary road network is currently operating at overall acceptable levels of service with minor control delays, no critical movements nor 95th percentile queue lengths that exceed the available storage. These operations indicate that the boundary road network is overall operating at acceptable levels of service with reserve capacity for future background traffic growth.

4.0 Future Background Conditions

4.1 Horizon Years

The BRES was prepared with a target horizon year of 2031. Therefore, the 2031 horizon year was analyzed as consistent with the Paradigm and CIMA+ studies.

4.2 Growth Rate

The Paradigm Study applied a growth rate of 2% to forecast 2031 future background traffic volumes on the boundary road network, justifying the 2% growth rate from a screenline analysis along Mayfield Road in comparing the Region of Peel model base year and future year forecasts which resulted in a 36% increase in existing traffic over an 18-year period. It is noted that the projected 2% growth rate in the Paradigm Study is based on linear traffic growth over the 18-year period. A 36% increase in traffic volumes over an 18-year period equates to a compounded growth rate of approximately 1.72% compounded annually.

The CIMA+ Study used the large-scale transportation model EMME projections for future traffic volumes as opposed to a growth rate.

Per the Bolton Transportation Master Plan Study prepared by MMM Group Limited in August 2015, the population of Bolton is expected to increase from 34,791 people (2011) to 45,283 people (2031). This equates to a growth rate of approximately 1.32% compounded annually. Employment is expected to increase from 21,257 jobs (2011) to 32,713 jobs (2031). This equates to a growth rate of approximately 2.17% compounded annually.

Per the Town of Caledon's Transportation Master Plan (Final Report, October 2017), the population of Caledon is expected to increase from 87,000 people (2011) to 108,000 people (2031). This equates to a growth rate of approximately 1.09% compounded annually. Employment is expected to increase from 40,000 jobs (2011) to 46,000 jobs (2031). This equates to a growth rate of approximately 0.7% compounded annually.

Based on the analysis above, a growth rate of 2% compounded annually was applied to all movements on the boundary road network under 2017 existing conditions to forecast 2031 future background traffic volumes. **Figure 4** illustrates the 2031 future background traffic volumes.

4.3 Roadway Improvements

4.3.1. Future Planned Roadway Improvements

Transportations Master Plans and other roadway improvement documents were referenced to identify all roadway improvements within the study area. Region of York, Region of Peel and Town of Caledon documentation was referenced to identify roadway improvements within the study area. The study area outlined in this report was not identified for any planned background improvements based on the previous documents.

4.3.2. Additional Roadway Improvements

Additional improvements are required on the boundary road network under 2031 future background conditions to improve traffic operations.

A screening of the road network under 2031 future background conditions was conducted to identify any required future background road widenings or other intersection improvements. This analysis was conducted using the same methodology outlined in **Section 6.0**, which details the methodology used for the analysis under future total conditions.

The analysis of the 2031 future background conditions has identified required improvements as outlined in **Table 8**.

Table 8: Additional Future Background Roadway Improvements

Roadway	Segment or Intersection	Improvement Type	Improvement
Highway 50	Bolton Heights Drive	Signal timing adjustment	Optimization of splits in the a.m. and p.m. peak hours
Highway 50	King Street	Signal timing adjustment	Optimization of splits in the p.m. peak hours
Caledon-King Townline	King Street to Columbia Way	Road widening	Additional through lane in both directions
Highway 50	Emil Kolb Parkway to Castlederg Sideroad	Road Widening	Additional through lane in both directions
Highway 50	Bolton Heights Drive to King Street	Road Widening	Additional lane in the southbound direction

Figure 5 illustrates the planned and additional future background roadway improvements.

4.4 Intersection Operations

The background roadway improvements identified in **Section 4.3** were modelled under 2031 future background and total conditions.

The future background intersection operations at the study intersections were analyzed using the 2031 future background traffic volumes illustrated in **Figure 4**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 9 outlines the 2031 future background traffic operations.

Table 9: 2031 Future Background Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Critical v/c ratio ²	95 th Percentile Queue Length > Storage Length
King Street and Emil Kolb Parkway	Round-about	A.M.	A	2.07s	0.23(N Leg)	None
		P.M.	A	2.23s	0.40(S Leg)	None
Highway 50 and Emil Kolb Parkway	Round-about	A.M.	A	2.15s	0.37(N Leg)	None
		P.M.	A	2.93s	0.47(S Leg)	None
Highway 50 and Columbia Way	Signal	A.M.	B	11.7s	0.66 (WBL)	None
		P.M.	A	7.3s	0.50 (WBL)	None
Highway 50 and Bolton Heights Road	Signal	A.M.	B	13.4s	0.55 (SBT)	None
		P.M.	A	7.7s	0.36 (NBT)	None
Highway 50 and King Street East/West	Signal	A.M.	C	23.9s	0.68 (EBT)	57.8m> 30m(WBL)
		P.M.	E	62.9s	1.13 (WBL) 1.09 (NBLT) 1.03 (EBT)	121.1m>30.0m (WBL) 34.2m>30.0m(EBL)
Columbia Way and Kingsview Drive	Signal	A.M.	A	7.2s	0.41 (NB)	None
		P.M.	A	4.4s	0.36 (NB)	None
Columbia Way and Westchester Boulevard	Stop (Minor Street)	A.M.	B	10.8s (NB)	0.21 (NB)	None
		P.M.	B	14.2 (NB)	0.24 (NB)	None
Columbia Way and Mount Hope Road	Stop (Minor Street)	A.M.	B	10.6s (NB)	0.07 (NB)	None
		P.M.	C	15.7s (NB)	0.12 (SB)	None
Columbia Way and Caledon King Townline	Stop (Minor Street)	A.M.	C	23.5s (EB)	0.58 (EB)	None
		P.M.	B	14.9s (EB)	0.23 (EB)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU).
The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.90 for a through/shared movement and greater than 1.00 for an exclusive turning movement are outlined and highlighted.

The boundary road network is expected to operate at overall acceptable levels of service under 2031 future background conditions, with the exception of the intersection of Highway 50 and King Street East/West is expected to operate at LOS "E" during the weekday p.m. peak hour with several movements operating above capacity. Additionally, under both peak hours the extended 95th percentile queue lengths are exceeding the designated storage lengths.

These operations are not uncommon at high-volume arterial roadway intersections in urban areas, and a movement operating at or slightly above a critical volume-to-capacity ratio or with an extended 95th percentile queue length does not necessarily indicate the need for additional lanes or major roadway improvements especially if the overall intersection is operating at acceptable levels of service. In some areas, additional lanes or other major roadway improvements are not practical such as in downtown core areas with limited right-of-way and interruptions to traffic such as condensed signal spacing.

Given that the future background traffic growth is constant over a 14-year period, the traffic operations on the boundary road network are expected to be acceptable under 2031 future background conditions.

5.0 Option 1/2 Traffic Forecasts

The build-out of the Site will result in additional vehicles on the boundary road network that would otherwise not exist and will also result in additional turning movements at the study intersections.

5.1 Trip Generation

Trip generation for the Site was forecasted using published data from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. The ITE Trip Generation Manual is a compendium of industry collected trip generation data across North America for a variety of land uses and is used industry wide as a source for trip generation forecasts.

The following Land Use Categories (LUCs) were applied to the residential areas:

- LUC 210: "Single-Family Detached Housing" was applied to the residential single-detached and semi-detached dwellings;
- LUC 220: "Multifamily Housing (Low-Rise)" was applied to the residential townhouse dwellings;
- LUC 221: "Multifamily Housing (Mid-Rise)" was applied to the residential apartment dwellings;

Based on the description of the commercial lands within Site provided by the project team, it is believed that the lands will not be destination commercial and will serve the internal community and pass-by traffic, thus not generating separate trips. Independent transportation assessments for the lands and their future site accesses can be completed during a future site plan application phases.

It should be noted that the proposed school blocks are intended to serve the proposed development, with trips remaining internal. Additionally, the use of the schools (elementary vs. secondary) has not been established at this time. As such, the school blocks and any associated land use categories have not been analysed. Independent transportation assessments for the lands and their future site accesses can be completed during a future site plan application phase.

Appendix F contains relevant ITE excerpts. **Table 10** outlines the total trip generation forecasts for the Option 1/2 scenario lands.

Table 10: Trip Generation Option 1/2

Land Use Category (Units/GFA)	Peak Hour	Inbound	Outbound	Total
LUC 210: "Single-family Detached Housing" (1554 units)	Weekday A.M.	235	669	904
	Weekday P.M.	825	485	1310
LUC 220: "Multifamily Housing (Low-Rise)" (2165 units)	Weekday A.M.	157	498	655
	Weekday P.M.	565	332	897
LUC 221: "Multifamily housing (Mid-Rise)" (417 units)	Weekday A.M.	40	132	172
	Weekday P.M.	99	64	163
Total	Weekday A.M.	432	1,299	1,731
	Weekday P.M.	1,489	881	2,370

The Option 1/2 lands are expected to generate approximately 1,731 and 2,370 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

5.2 Trips External to Bolton

5.2.1. Trip Distribution (External to Bolton)

The external trips generated were distributed to the boundary road network based on outbound and inbound travel pattern estimates to and from Bolton during the weekday a.m. peak period in the "Transportation Assessment for the Bolton Residential Expansion Regional Official Plan Amendment" (prepared by Region of Peel, June 8, 2016). The travel patterns from the study were derived from 2011 Transportation Tomorrow Survey (TTS) data. TTS is a comprehensive survey of transportation characteristics of households in the Greater Toronto Area (GTA) and surrounding areas.

2016 TTS data was reviewed to validate the assumed trip distribution from the Bolton study. The results from the 2016 TTS data yielded a similar trip distribution to the assumed trip distribution from the Bolton study; therefore, the trip distribution from the Bolton study was assumed.

It was estimated that approximately 63% of the outbound trips from Bolton during the weekday a.m. peak period would travel to destinations external from Bolton and that approximately 57% of the inbound trips to Bolton during the weekday a.m. peak period would originate from areas external to Bolton.

Therefore, 63% of the weekday a.m. outbound trips generated assigned to the external destinations and 57% of the weekday a.m. inbound trips generated were assigned from the external destinations.

Appendix G contains a detailed trip distribution and assignment analysis.

The weekday p.m. peak hour inbound trip distribution was based on the weekday a.m. outbound trip distribution, and the weekday p.m. peak hour outbound trip distribution was based on the weekday a.m. inbound trip distribution. This approach would result in the same trip distribution being applied to the critical inbound and outbound travel patterns for each land use during peak period. For example, the critical peak period for outbound residential trips is the weekday a.m. peak hour and the critical peak period for inbound residential trips is the weekday p.m. peak hour.

5.2.2. Trip Assignment (External to Bolton)

Trips were assumed to travel to and from their origin and destination points based on the most convenient route and the future roadway network, as described in **Section 5.2.1**. For example, trips travelling to and from Brampton from the Option 1/2 lands are expected to do so via Emil Kolb Parkway and King Street.

Appendix G contains a detailed trip distribution and assignment analysis.

5.3 Trips Internal to Bolton

It was estimated that approximately 37% of the outbound trips from Bolton during the weekday a.m. peak period would travel to destinations within Bolton and that approximately 43% of the inbound trips to Bolton during the weekday a.m. peak period would originate from areas within Bolton.

5.3.1. Trip Distribution (Internal Option 1/2)

For mixed-use residential, it was assumed that a portion of the trips internal to Bolton would be internal to the immediate area and thus not use the surrounding roadway network.

2016 TTS data was used to determine an internal trip reduction for trips within the Option 1/2 lands. 2006 GTA zones 3192, 3193 and 3194 within Bolton are primarily residential with some employment and other "destinations" like schools and parks, and thus were considered to be ideal surrogate sites to compare to the Site for internal trip reductions. A minimum internal capture rate of 18% was identified from TTS results for auto trips exiting the surrogate zones in Bolton during the weekday a.m. peak period travelling to destinations within these surrogate zones, and for inbound auto trips to the surrogate zones in Bolton during the weekday a.m. peak period arriving from areas within these surrogate zones.

Therefore, an internal trip reduction of 18% was applied to trips internal to Bolton for the Option 1/2 lands.

5.3.2. Trip Distribution (Internal to Bolton)

Trips generated expected to remain internal to Bolton (but not internal to the Option 1/2 lands) were assigned to areas in Bolton based on existing outbound and inbound travel patterns to and from the surrogate 2006 GTA zones 3192, 3193 and 3194. 2006 TTS results were filtered to trips exiting the surrogate zones during the weekday a.m. peak period travelling to the 2006 GTA zones that consist of Bolton (3016, 3017, 3153, 3190, 3191, 3192, 3193 and 3194) to determine a trip distribution for outbound trips to areas within Bolton. Similarly, results were filtered to trips entering the surrogate zones during the weekday a.m. peak period arriving from the 2006 GTA zones that consist of Bolton to determine a trip distribution for inbound trips from areas within Bolton.

Appendix G contains a detailed trip distribution and assignment analysis.

Similar to the external trips to and from Bolton, the weekday p.m. peak hour inbound trip distribution was based on the weekday a.m. outbound trip distribution. This reflects 63% of trips external to Bolton, 18% internal to the Site and 19% internal to Bolton. Additionally, the weekday p.m. peak hour outbound trip distribution was based on the weekday a.m. inbound trip distribution. This reflects 57% of trips external to Bolton, 18% internal to the Site and 25% internal to Bolton.

5.3.3. Trip Assignment (Internal to Bolton)

Trips were assumed to travel to and from their origin and destination points based on the most convenient route and future roadway network as described in Section 4.3.

Appendix G contains a detailed trip distribution and assignment analysis. **Figure 6** illustrates the trip assignment for site generated traffic under the Option 1/2 expansion scenario.

5.4 Site Access Assumptions

Based on the Concept Plan (Bousfields, December 2021) the following access locations have been proposed, as outlined in **Table 11**.

Table 11: Option 1 Site Accesses

Street Name	Access Location	Intersection
Duffy's Lane	East-West internal roadway will intersect Duffy's Lane Duffy's Lane will act as an assess to Emil Kolb Parkway	3-leg
Street A	Southbound access to Emil Kolb Parkway, east of Duffy's Lane	4-leg
Street B	Northbound access to Emil Kolb Parkway, east of Duffy's Lane	4-leg
Street C	Northbound to Emil Kolb Parkway, west of Highway 50	RIRO
Street D	Eastbound to Highway 50, north of Emil Kolb Parkway	4-leg
Street E	Westbound to Highway 50, north of Emil Kolb Parkway	4 Leg
Street F	Westbound to Highway 50 and Emil Kolb Parkway	Roundabout
Street G	Westbound to Highway 50, north of Columbia Way	3-leg

The accesses were modelled under future total conditions. The following accesses were not modelled under future total conditions as either, their exact location onto the boundary road network is unknown, or the roadway volumes were not large enough to warrant an individual analysis. Instead, the volumes were added to the boundary road network based on the location of the land parcels.

- **“Option 1/2” (Option 1 Area)**
 - The location of the accesses to the apartment and commercial blocks will be determined during the site plan stage.
- **“Option 1/2” (Option 2 Area)**
 - A southbound access to Columbia Way, east of Mount Hope Road
 - A westbound access forming a three-way intersection with Mount Hope Road, north of Columbia Way.

6.0 Improvements Analysis Methodology

A roadway improvement analysis was conducted under future total conditions to determine additional works triggered by the development. Various intersection improvements and potential road widenings were analyzed.

6.1 Road Widening Analysis Methodology

The “Let's Move Peel Long Range Transportation Plan 2019” and the “Town of Caledon Transportation Master Plan” (October 2017) both used a link capacity maximum threshold of 0.9 for road widening analysis, meaning that if the midblock volumes on the roadway segment are greater than 90% of the roadway capacity (per hour per lane), then the need for a road widening is identified. However, neither document indicates typical link capacity thresholds for various roadway classifications within the Town of Caledon nor Region of Peel.

Therefore, link capacities were evaluated in comparable municipalities Region of Halton (west of Peel) and County of Simcoe (north of Peel) with set link capacities to determine link capacity thresholds (per hour per lane) for various roadway classifications to apply to this analysis.

Table 12 compares the link capacities in other municipalities and outlines the assumed link capacity for this analysis.

Table 12: Link Capacity Thresholds

Roadway Classification	Link Capacity (vehicles per hour per lane)		
	Region of Halton	County of Simcoe	Link Capacity Assumed
Collector	500-700 (Rural)	400-600	700
Major Arterial	800-900	900	900

The following collector roadways in Bolton were analyzed with a link capacity of 700 vehicles per hour per lane:

- Columbia Way
- Caledon-King Townline (north of King Street)

The following arterial roadways in Bolton were analyzed with a link capacity of 900 vehicles per hour per lane:

- King Street
- Highway 50
- Emil Kolb Parkway

A volume-to-capacity threshold of 0.9 was applied to the link capacity analysis to indicate road widening requirements (for example, if the mid-block volume on a collector roadway is 665 vehicles per hour per lane, then the volume-to-capacity for this roadway would be 0.95 which exceeds the 0.9 threshold).

Engineering judgement was used to determine if any segments are close to the capacity threshold and should be widened congruently with adjacent segments. As buildout of the Option 1/2 lands is likely to proceed after 2031, the segments are likely to reach capacity with the additional background growth.

Appendix H contains a detailed road widening analysis for the boundary road network under all scenarios.

6.2 Intersection Improvements Methodology

The boundary road network was analyzed to determine if intersection improvements are required to support site generated traffic volumes. Intersection improvements can range from major improvements such as signalization and auxiliary turn lane implementation or extensions, to minor improvements such as signal timing and phasing optimization.

6.2.1 Signal Timing Optimization

At signalized intersections with movements near or exceeding capacity, the signal timing splits were reviewed to determine if simply optimizing the signal timings, increasing the cycle length, or adding protected turn phases would improve operations for the critical movements and for the overall intersection. These improvements are minor and are easy to implement. Signal timing optimization

was reviewed at intersections where volume-to-capacity ratios exceed capacity.

6.2.2. Signal Warrant Analysis

Signal warrant analysis was conducted for the unsignalized intersections on the boundary road network under 2031 future total conditions. The analysis followed the procedures specified in Chapter 4 of the "Ontario Traffic Manual – Book 12", March 2012. Justification 7 was used to assess the need for signalization as 8-hour counts were not available at all intersections.

The average hour volume was determined using the following formula from OTM Book 12:

$$AHV = (amPHV + pmPHV) / 4$$

Where;

AHV = average hour volume

PHV = peak hour volume

Traffic signal requirements were analyzed under future total conditions. Engineering judgement was applied to the signal warrant analysis to determine if traffic signals are necessary at unsignalized intersections even if not triggered by the OTM warrant. For example, if the intersection is not technically warranted for traffic signals but is expected to experience heavy delays during the peak hours (i.e., LOS "F"), then traffic signals were considered at these locations to improve traffic operations.

Appendix I contains signal warrant analysis worksheets.

6.2.3. Turn Lane Analysis

Auxiliary left-turn lane warrant analysis was conducted at unsignalized intersections on the boundary road network impacted under 2031 future total conditions. The analysis was conducted using the Ministry of Transportation (MTO)'s "Design Supplement for TAC Geometric Design Guide for Canadian Roads – June 2017."

Tas per industry standard, the assumed design speed for turn lane analysis was set to 10 km/h greater than the posted speed limit. **Appendix J** contains left-turn lane warrant analysis worksheets.

Auxiliary turn lane analysis was conducted at signalized intersections on the boundary road network under 2031 future total conditions. The need for turn lane implementation or extensions to storage lengths was determined by impacts to traffic operations such as movement volume-to-capacity ratios, intersection delay and LOS, and 95th percentile queue lengths.

Engineering judgement was applied to turn lane analysis at signalized intersections. As discussed earlier, a movement operating at or slightly above a critical volume-to-capacity ratio or with an extended 95th percentile queue length does not necessarily indicate the need for additional lanes or major roadway improvements especially if the overall intersection is operating at acceptable levels of service. Additionally, turn lanes or other major roadway improvements are not practical at certain intersections for reasons such as geometric constraints.

For dual left-turn lane requirements, a left-turn volume threshold of approximately 400 vehicles per hour (the midpoint between the threshold of 300-500 vehicles per hour as identified in the

Transportation Association of Canada Geometric Design Guide for Canadian Roads – June 2017) was reviewed under future total conditions at signalized intersections.

For signalized intersections with currently shared through/left-turn lanes, a left-turn volume threshold of approximately 120 vehicles per hour was applied under future total conditions to determine if an exclusive left-turn lane should be provided. Additionally, where an exclusive left-turn lane is triggered at one approach of a four-legged intersection, an exclusive left-turn lane is also recommended at the opposite approach to maintain geometric alignment and consistency on the roadway at the intersection.

For signalized intersections with currently shared through/right-turn lanes, a right-turn volume threshold of approximately 200 vehicles per hour was applied under future total conditions to determine if an exclusive right-turn lane should be provided.

6.3 Required Roadway Improvements

The roadways on the boundary road network impacted by the Option 1/2 lands were analyzed using the methodology outlined in **Section 6.0** to determine roadway improvements triggered by 2031.

Table 13 and **Table 14** outline the required roadway improvements associated with the Option 1/2 lands. **Figure 7** illustrates the roadway improvements triggered by Option 1/2.

Table 13: Required Boundary Road Network Improvements

Roadway	Segment or Intersection	Improvement Type	Improvement
Emil Kolb Parkway	King Street to Highway 50	Road Widening	Additional through lane in both directions
Columbia Way	Westchester Boulevard	Intersection Improvement	Add exclusive 15m westbound left-turn lane
	Mount Hope Road	Intersection Improvement	Add exclusive 15m eastbound left-turn lane
Highway 50	Emil Kolb Parkway to Columbia Way	Road Widening	Additional through lane in both directions
	Columbia Way	Intersection Improvement	Add exclusive 15m northbound right-turn lane
	Columbia Way to Bolton Heights Drive	Road Widening	Additional through lane in southbound direction
	King Street	Signal Timing Adjustment	Optimize signal timing splits during weekday p.m. peak hour
	North of King Street	Parking Restriction	Restrict on-street parking on both sides of roadway during weekday p.m. peak period to provide two through lanes

Table 14: Required Access Roadway Improvements

Roadway	Segment or Intersection	Improvement Type	Improvement
Emil Kolb Parkway	Duffy's Lane	Intersection Improvement	Add exclusive 1.5m northbound left-turn lane
	Street A and Street B	Intersection Improvement	Signalization
Highway 50	Emil Kolb Parkway and Street F	Intersection Improvement	Add an east leg to the existing roundabout
	Emil Kolb Parkway	Intersection Improvement	Additional internal lane at north and west legs of roundabout
	Street D and Street E	Intersection Improvement	Signalization
	Street G	Intersection Improvement	Signalization

7.0 Future Total Conditions

7.1 Basis of Assessment

The site generated traffic volumes for the Option 1/2 lands illustrated in **Figure 6** were added to the 2031 future background traffic volumes illustrated in **Figure 4** to determine the future total traffic volumes. **Figure 8** outlines the 2031 future total traffic volumes under the Option 1/2 expansion scenario.

A layout of the future road network has been presented in **Figure 9**. It should be noted that a second access is required for the parcel in the southwest quadrant of Emil Kolb Parkway and Highway 50, as the area contains over 100 units. The far east road in the parcel has been modelled as a right-in-right-out (RIRO) access, referenced as Street C, though not illustrated on the concept plan.

7.2 Intersection Operations

The future total intersection operations at the study intersections were analyzed using the 2031 future total traffic volumes illustrated in **Figure 8**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 15 outlines the 2031 future total traffic operations under the Option 1/2 expansion scenario.

Table 15: 2031 Future Total Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Critical v/c ratio ²	95 th Percentile Queue Length > Storage Length
King Street and Emil Kolb Parkway	Round-about	A.M.	A	4.59s	0.58(W Leg)	None
		P.M.	A	4.91s	0.75(S Leg)	None
Highway 50 and Emil Kolb Parkway	Round-about	A.M.	A	2.76s	0.48(N Leg)	None
		P.M.	A	6.22s	0.70(S Leg)	None
Highway 50 and Columbia Way	Signal	A.M.	B	10.2s	0.62(WBL)	None
		P.M.	A	7.4s	0.52(WBL)	None
Highway 50 and Bolton Heights Road	Signal	A.M.	B	11.1s	0.34(SBT)	None
		P.M.	A	8.3s	0.43(NBT)	None
Highway 50 and King Street East/West	Signal	A.M.	C	25.4s	0.72(SBLTR)	57.4m > 30m(WBL)
		P.M.	E	57.6s	1.13(WBL) 1.06(EBT) 0.99(NBTLR)	34.7 m > 30m (EBL) 121.0m > 30.0m(WBL)
Columbia Way and Kingsview Drive	Signal	A.M.	A	7.2s	0.44(NBLR)	None
		P.M.	A	5.0s	0.40(NBLR)	None
Columbia Way and Westchester Boulevard	Stop (Minor Street)	A.M.	B	11.5s (NB)	0.23(NBLR)	None
		P.M.	C	16.4s (NB)	0.30(NBLTR)	None
Columbia Way and Mount Hope Road	Stop (Minor Street)	A.M.	B	11.2s (SB)	0.11(EBTR)	None
		P.M.	C	17.5s (NB)	0.14(SBLTR/EBTR)	None
Columbia Way and Caledon King Townline	Stop (Minor Street)	A.M.	D	31.9s (EB)	0.72(EBLR)	None
		P.M.	C	18.5s (EB)	0.43(NBL)	None
Emil Kolb Parkway and Duffy's Lane	Stop (Minor Street)	A.M.	C	21.1s (SB)	0.44(WBTR)	None
		P.M.	D	25.9s (SB)	0.42(EBT)	None
Emil Kolb Parkway and Street A/ Street B	Signal	A.M.	A	6.5s	0.42(SBLTR)	None
		P.M.	A	7.1s	0.61(EBLTR)	None
Emil Kolb Parkway and Street C	Stop (Minor Street)	A.M.	A	9.2s (NB)	0.25(WBT)	None
		P.M.	B	13.4s(NB)	0.47(EBT)	None
Highway 50 and Street D/ Street E	Signal	A.M.	A	5.2s	0.40(SBTLR)	None
		P.M.	A	7.4s	0.63(NRLTR)	None
Highway 50 and Street G	Signal	A.M.	A	3.7s	0.29(SBTL)	None
		P.M.	A	3.1s	0.33(NBTR)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU).

LOS of a stop-controlled intersection is based on the delay associated with the critical minor approach (HCM2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.90 for a through/shared movement and greater than 1.00 for an exclusive turning movement are outlined and highlighted.

The boundary road network is expected to operate at overall acceptable levels of service under 2031 future total conditions under the Option 1/2 expansion scenario with minor control delays nor volume-to-capacity ratios exceeding 1.00. These results are attributed to the implementation of the required roadway improvements.

The exception is the intersection of Highway 50 and King Street East/West during the weekday p.m. peak hour, which is expected to continue operating at LOS "E" with several movements operating above capacity. These operations are common at high-volume arterial-to-arterial intersections during peak hours located in downtown core areas with limited right-of-way and limited opportunities for geometric improvements.

8.0 ROPA 30 Sensitivity Analysis

A 32.03-ha parcel, located at the southern limit of the Option 1 Lands, has been subject to Regional Official Plan Amendment 30 (ROPA 30), which was approved by the Local Planning Appeal Tribunal (LPAT) on November 30, 2020. A sensitivity analysis was undertaken to review the trip generation, future total operations and required roadway improvements of the buildout within the ROPA 30 Settlement Boundary.

8.1 Trip Generation

Trip generation for the ROPA 30 area was forecasted using published data from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition.

The following Land Use Categories (LUCs) were applied to the residential areas:

- LUC 210: "Single-Family Detached Housing" was applied to the residential single-detached and semi-detached dwellings;
- LUC 220: "Multifamily Housing (Low-Rise)" was applied to the residential townhouse dwellings;
- LUC 221: "Multifamily Housing (Mid-Rise)" was applied to the residential apartment dwellings;

Appendix F contains relevant ITE excerpts. **Table 16** outlines the total trip generation forecasts for the ROPA 30 lands.

Table 16: Trip Generation ROPA 30 Lands

Land Use Category (Units/GFA)	Peak Hour	Inbound	Outbound	Total
LUC 210: "Single-family Detached Housing" (295 units)	Weekday A.M.	51	148	199
	Weekday P.M.	173	102	275
LUC 220: "Multifamily Housing (Low-Rise)" (627 units)	Weekday A.M.	22	69	91
	Weekday P.M.	72	43	115
LUC 221: "Multifamily housing (Mid-Rise)" (295 units)	Weekday A.M.	20	66	86
	Weekday P.M.	53	34	87
Total	Weekday A.M.	93	283	376
	Weekday P.M.	298	179	477

The ROPA 30 lands are expected to generate approximately 376 and 477 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

8.2 Trip Distribution

The trips generated by the ROPA 30 lands were distributed based on the methodology outlined in **Section 5.2** and **Section 5.3**. All trips were distributed through Access A (previously referred to as Street G). It should be noted that a secondary access will be required based on the number of units and will likely connect within Parcel 7 on the Concept Plan.

8.3 Basis of Assessment

The site generated traffic volumes of the ROPA 30 lands illustrated in **Figure 10** were added to the 2031 future background traffic volumes illustrated in **Figure 4** to determine the future total traffic volumes. **Figure 11** outlines the 2031 ROPA 30 future total traffic volumes.

8.4 Required Roadway Improvements

The roadways on the boundary road network impacted by the build-out of the ROPA 20 lands were analyzed using the methodology outlined in **Section 6.0** to determine any roadway improvements that would be required by 2031.

Table 17 outline the required roadway improvements associated with build-out of the ROPA 30 Lands.

Figure 12 illustrates the roadway improvements triggered by the ROPA 30 Lands.

Table 17: Required Network Improvements

Roadway	Segment or Intersection	Improvement Type	Improvement
Emil Kolb Parkway	King Street to Highway 50	Road widening	Additional through lane in the eastbound direction
Highway 50	Emil Kolb Parkway to Columbia Way	Road widening	Additional through lane in the northbound direction
	King Street	Signal timing adjustment	Optimize signal timing splits during weekday p.m. peak hour
	North of King Street	Parking restriction	Restrict on-street parking on both sides of roadway during weekday p.m. peak period to provide two through lanes
	Access A	Intersection Improvement	Signalization 25m southbound Left Turn Lane

It should be noted that the road widenings considered for network improvements as part of the build-out of the ROPA 30 lands are just below the capacity threshold under future background conditions. The additional volumes contribute to about 22% growth eastbound on Emil Kolb Parkway and 12% growth northbound on Highway 50 during peak volume periods. Thus, while the need for additional lanes has been identified as improvements resulting from the Total Traffic scenario, i.e., with the ROPA 30 lands, the warrant is primarily triggered based on the contribution of future background traffic volumes.

8.5 Intersection Operations

The ROPA 30 future total intersection operations were analyzed using the traffic volumes illustrated in **Figure 11**. Detailed capacity analysis worksheets are included in **Appendix E**.

Table 18 outlines the 2031 ROPA 30 future total traffic operations.

Table 18: 2031 ROPA 30 Future Total Traffic Operations

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Critical v/c ratio ²	95 th Percentile Queue Length > Storage Length
King Street and Emil Kolb Parkway	Round-about	A.M.	A	2.31s	0.30(N Leg)	None
		P.M.	A	2.53s	0.48 (S Leg)	None
Highway 50 and Emil Kolb Parkway	Round-about	A.M.	A	2.46s	0.42(N Leg)	None
		P.M.	A	3.56	0.53(S Leg)	None
Highway 50 and Columbia Way	Signal	A.M.	B	11.6s	0.66(WBL)	None
		P.M.	A	7.3s	0.50(WBL/NBT)	None
Highway 50 and Bolton Heights Road	Signal	A.M.	B	11.8s	0.52(SBT)	None
		P.M.	A	7.8s	0.37(NBT)	None
Highway 50 and King Street East/West	Signal	A.M.	C	28.3s	0.73(WBL)	None
		P.M.	D	49.0s	0.98(WBL) 0.97(NBTLR) 0.96(EBT)	32.8m>30.0m(EBL) 107.3m>30.0m(WBL)
Columbia Way and Kingsview Drive	Signal	A.M.	A	7.8s	0.45(NBLR)	None
		P.M.	A	4.5s	0.37(NBLR)	None
Columbia Way and Westchester Boulevard	Stop (Minor Street)	A.M.	B	10.9s(NB)	0.21(NBLR)	None
		P.M.	B	14.6s(NB)	0.25(NBLR)	None
Columbia Way and Mount Hope Road	Stop (Minor Street)	A.M.	B	10.7(NB)	0.07(NBLR/SBLR)	None
		P.M.	C	15.9s(NB)	0.13(SBLR)	None
Columbia Way and Caledon King Townline	Stop (Minor Street)	A.M.	C	21.5s(EB)	0.60(EBLF)	None
		P.M.	C	15.3s(EB)	0.43(NBT)	None
Highway 50 and Access A	Signal	A.M.	A	6.3s	0.61(WBLR)	None
		P.M.	A	6.3s	0.56(NBTR)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU).

LOS of a stop-controlled intersection is based on the delay associated with the critical minor approach (HCM2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.90 for a through/shared movement and greater than 1.00 for an exclusive turning movement are outlined and highlighted.

The boundary road network is expected to operate at overall acceptable levels of service under 2031 ROPA 30 future total conditions with minor control delays nor volume-to-capacity ratios exceeding 1.00. These results are attributed to the implementation of the required roadway improvements.

The intersection of Highway 50 and King Street East/West during the weekday p.m. peak hour, is expected to continue operating at LOS "D" with several movements operating above capacity. These operations are common at high-volume arterial-to-arterial intersections during peak hours

located in downtown core areas with limited right-of-way and limited opportunities for geometric improvements.

The implementation of the recommended roadway improvements outlined in **Section 8.4** under 2031 ROPA 30 future total conditions is expected to result in overall acceptable traffic operations on the boundary road network.

9.0 Conclusions

The analysis contained within this report has resulted in the following key findings:

- The boundary road network is operating overall at acceptable levels of service with reserve capacity under 2017 existing traffic volumes.
- Future planned roadway improvements have been reviewed per Transportation Master Plans and Capital Works programs and no improvements were identified within the study area. Additional background roadway improvements were established under future background conditions. These included:
 - Signal timing adjustments along Highway 50 at Bolton Heights Drive and King Street;
 - Road widening in both directions on Caledon-King Townline from King Street to Columbia Way and Highway 50 from Emil Kolb Parkway to Castlederg Road.
 - Road widening on Highway 50 from Bolton Heights Drive to north of King Street in the southbound direction.
- Following the outlined roadway improvements, the boundary road network is expected to operate at overall acceptable levels of service under 2031 future background conditions. There is reserve capacity following future background traffic growth, with the exception of Highway 50 and King Street during the p.m. peak hour. However, this is not uncommon for downtown core areas where improvements are not practical due to available right-of-way and condensed signal spacing.
- Therefore, given that the future background traffic growth is constant over a 14-year horizon, the traffic operations on the boundary road network are expected to be overall acceptable under 2031 future background conditions.
- The Option 1/2 lands are expected to generate approximately 1,731 and 2,370 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.
- Analysis of potential roadway improvements on the boundary road network was conducted under future total conditions. Identified improvements include:
 - Signal timing adjustments at Highway 50 and King Street;
 - Parking restriction on Highway 50 north of King Street to provide two through lanes during the p.m. peak period;

- Exclusive left-turn lanes on Columbia Way at Westchester Boulevard (westbound) and Mount Hope Road (eastbound);
 - Exclusive right-turn lane at Highway 50 and Columbia Way (northbound);
 - Road widening in both direction on Emil Kolb Parkway from King Street to Highway 50 and Highway 50 from Emil Kolb Parkway to Columbia Way;
 - Road widening for an additional lane in the southbound direction on Highway 50 from Columbia Way to Bolton Heights Drive.
- Analysis of potential roadway improvements at the future access points was conducted under future total conditions. Identified improvements include:
 - The addition of an east leg to the existing roundabout at Highway 50 and Emil Kolb Parkway, as well as an additional internal lane at the north and west legs;
 - Signalization of the new intersections of Emil Kolb Parkway and Street A/Street B, Highway 50 and Street D/Street E and Highway 50 and Street F;
 - An exclusive northbound left-turn lane on Emil Kolb Parkway at Duffy's Lane.
- The boundary road network is expected to operate at overall acceptable levels of service under 2031 future total conditions with minor control delays nor volume-to-capacity ratios exceeding 1.00. These results are attributed to the implementation of the required roadway improvements.
- The exception is the intersection of Highway 50 and King Street East/West during the weekday p.m. peak hour, which is expected to operate beyond capacity with several movements operating above capacity. These operations are common at high-volume arterial-to-arterial intersections during peak hours located in downtown core areas with limited right-of-way and limited opportunities for geometric improvements.
- Therefore, the implementation of the recommended roadway improvements under 2031 future total conditions is expected to result in overall acceptable traffic operations on the boundary road network.
- A portion of the overall Option 1/2 lands are within the approved Regional Official Plan Amendment (ROPA 30) Settlement Boundary and are expected to proceed within the 2031 horizon and prior to the rest of the proposed development. A sensitivity analysis was undertaken for the buildout within the ROPA 30 Settlement Boundary.
- The ROPA 30 lands are expected to generate approximately 376 and 477 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.
- Analysis of potential roadway improvements on the boundary road network was conducted under the ROPA 30 future total conditions. Identified improvements include:
 - Signal timing adjustments at Highway 50 and King Street;

- Parking restriction on Highway 50 north of King Street to provide two through lanes during the p.m. peak period;
 - Road widening for an additional through lane in the eastbound direction on Emil Kolb Parkway from King Street to Highway 50;
 - Road widening for an additional through lane in the northbound direction on Highway 50 from Emil Kolb Parkway to Columbia Way;
 - Signalization of Highway 50 at Access A;
 - A southbound left-turn lane on Highway 50 at Access A.
- It should be noted that the road widenings considered for network improvements as part of the build-out of the ROPA 30 lands are just below the capacity threshold under future background conditions. Thus, while the need for additional lanes has been identified as improvements resulting from the Total Traffic scenario, i.e., with the ROPA 30 lands, the warrant is primarily triggered based on the contribution of future background traffic volumes.
 - The boundary road network is expected to operate at overall acceptable levels of service under 2031 ROPA 30 future total conditions with minor control delays nor volume-to-capacity ratios exceeding 1.00. These results are attributed to the implementation of the required roadway improvements.
 - The intersection of Highway 50 and King Street East/West during the weekday p.m. peak hour, is expected to continue operating at LOS "D" with several movements operating above capacity, but under a volume-to-capacity ratio of 1.00. These operations are common at high-volume arterial-to-arterial intersections during peak hours located in downtown core areas with limited right-of-way and limited opportunities for geometric improvements.
 - With the implementation of the recommended roadway improvements, the Option 1/2 scenario lands are expected to result in overall acceptable traffic operations on the boundary road network


Respectfully submitted by,

C.F. CROZIER & ASSOCIATES INC.



Alexander J. W. Fleming, MBA, P.Eng.
Associate

C.F. CROZIER & ASSOCIATES INC.



Kerianne Hagan, EIT
Engineering Intern, Transportation

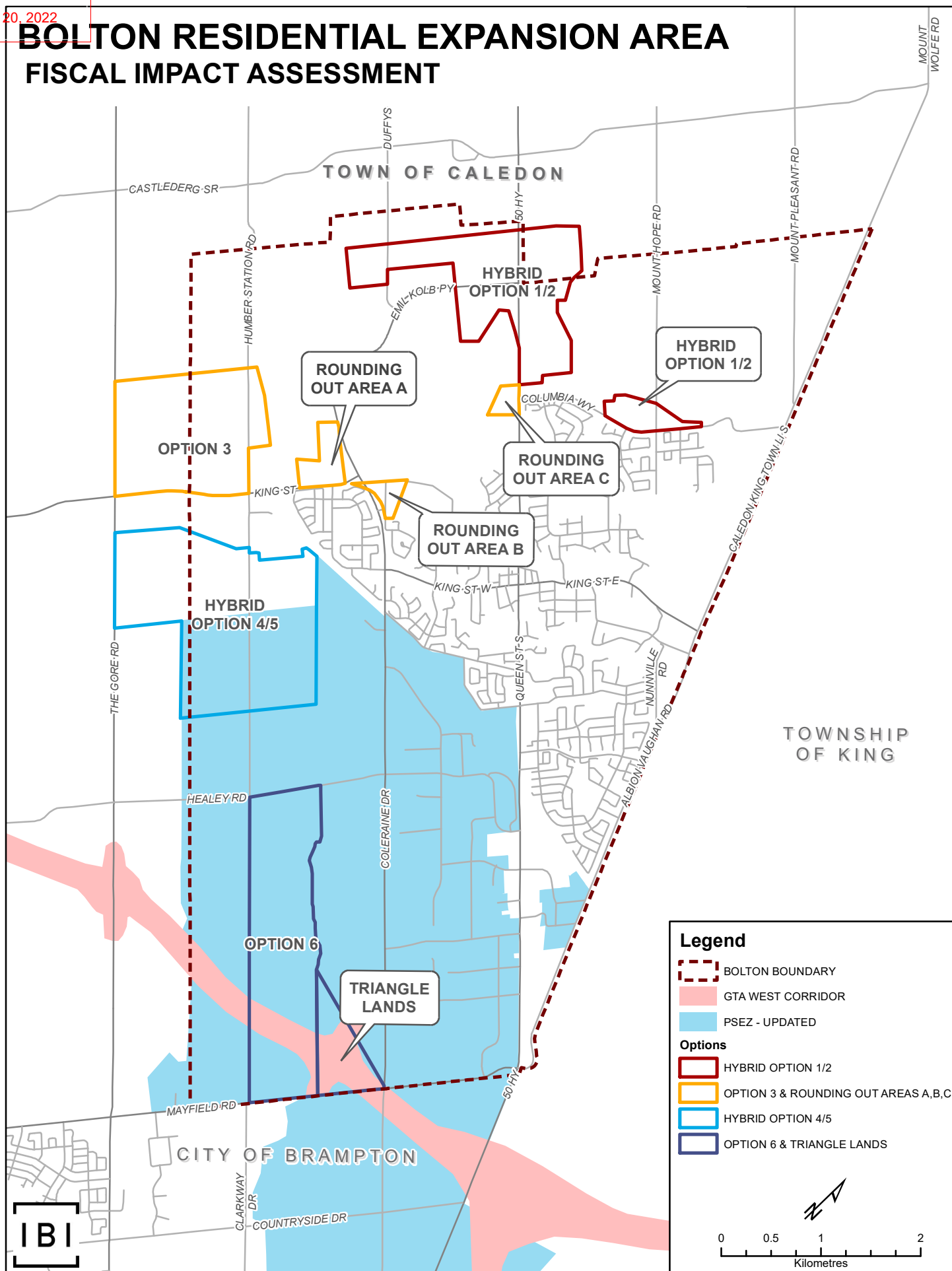
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APPENDIX A

Bolton Residential Expansion Areas

BOLTON RESIDENTIAL EXPANSION AREA FISCAL IMPACT ASSESSMENT



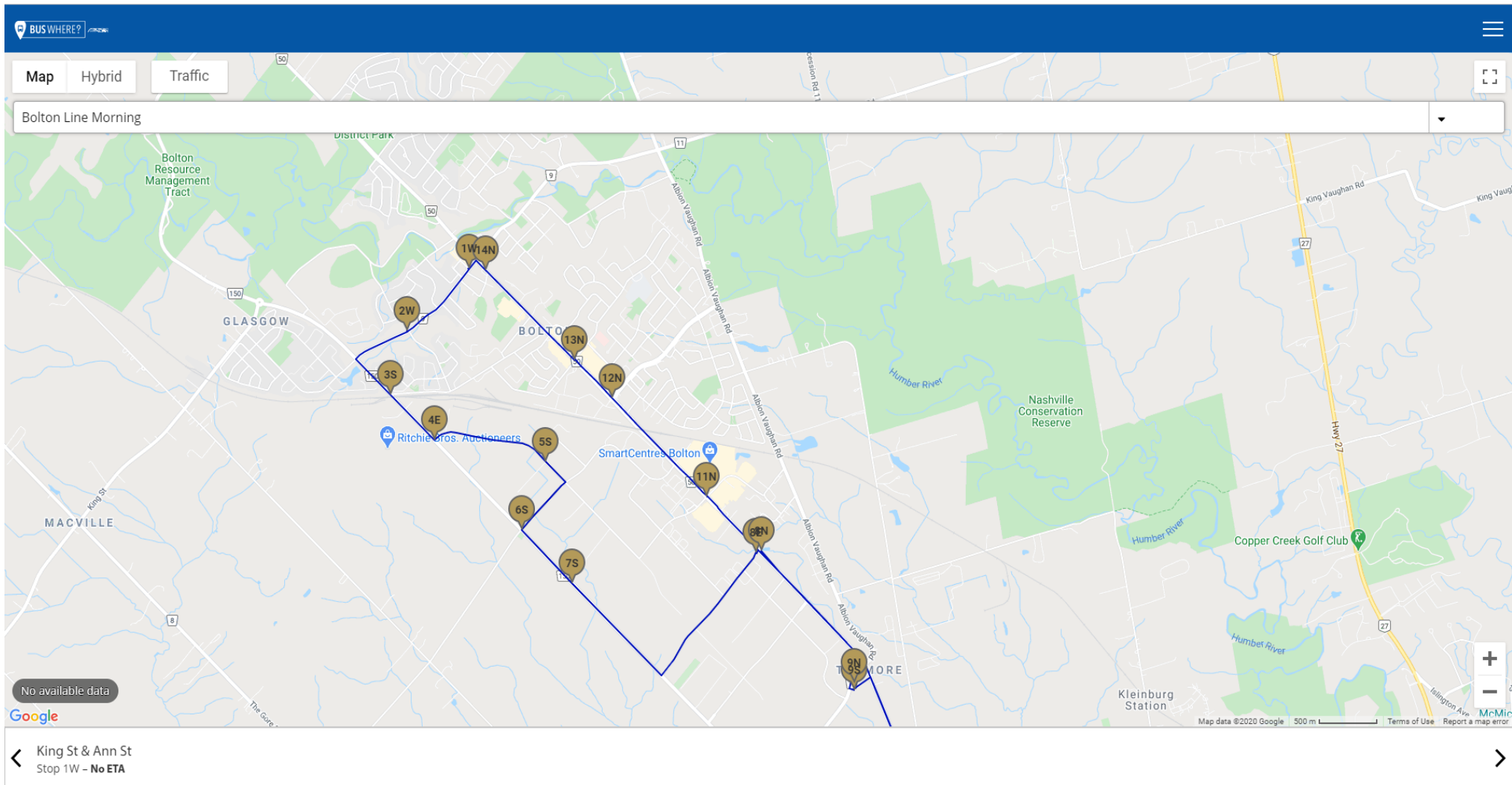
APPENDIX B

Transit & Active Transportation Information

MORNING ROUTE - 6 A.M. - 9:30 A.M.															
1W	2W	3S	4E	5S	6S	7S	8E	9S	10	9N	8N	11N	12N	13N	14N
King Street @ Ann Street (Westbound)	King Street @ Deer Valley Drive (Westbound)	Coleraine Drive @ Old Elwood Drive (Southbound)	Holland Drive @ Coleraine Drive (Eastbound)	Holland Drive @ Browning Court (Southbound)	Coleraine Drive @ Healy Road (Southbound)	12724 Coleraine Dr. (Southbound)	George Bolton Parkway @ Hwy 50 (Eastbound)	Hwy 50 @ Mayfield Road GO Parking Lot (Southbound)	Hwy 50 @ Hwy7 / Queen Street Brampton Transit (Zum Bus Stop)	Hwy 50 @ Mayfield Road GO Parking Lot (Northbound)	Hwy 50 @ George Bolton Parkway (Northbound)	Hwy 50 @ McEwan Drive (Northbound)	Hwy 50 @ Queensgate Boulevard (Northbound)	Hwy 50 @ Allan Drive (Northbound)	Hwy 50 @ Willow Street (Northbound)
6:00 AM	6:02 AM	6:03 AM	6:05 AM	6:06 AM	6:07 AM	6:09 AM	6:14 AM	6:17 AM	6:35 AM	6:50 AM	6:52 AM	6:53 AM	6:54 AM	6:55 AM	6:57 AM
6:30 AM	6:32 AM	6:33 AM	6:35 AM	6:36 AM	6:37 AM	6:39 AM	6:44 AM	6:47 AM	7:05 AM	7:20 AM	7:22 AM	7:23 AM	7:24 AM	7:25 AM	7:27 AM
7:00 AM	7:02 AM	7:03 AM	7:05 AM	7:06 AM	7:07 AM	7:09 AM	7:14 AM	7:17 AM	7:35 AM	7:50 AM	7:52 AM	7:53 AM	7:54 AM	7:55 AM	7:57 AM
7:30 AM	7:32 AM	7:33 AM	7:35 AM	7:36 AM	7:37 AM	7:39 AM	7:44 AM	7:47 AM	8:05 AM	8:20 AM	8:22 AM	8:23 AM	8:24 AM	8:25 AM	8:27 AM
8:00 AM	8:02 AM	8:03 AM	8:05 AM	8:06 AM	8:07 AM	8:09 AM	8:14 AM	8:17 AM	8:35 AM	8:50 AM	8:52 AM	8:53 AM	8:54 AM	8:55 AM	8:57 AM
8:30 AM	8:32 AM	8:33 AM	8:35 AM	8:36 AM	8:37 AM	8:39 AM	8:44 AM	8:47 AM	9:05 AM	9:20 AM	9:22 AM	9:23 AM	9:24 AM	9:25 AM	9:27 AM

AFTERNOON ROUTE - 3 P.M. - 6:30 P.M.															
1E	13S	12S	11S	8S	9S	10	9N	8W	7N	6N	5N	4W	3N	2E	
King Street @ Hwy 50 (Eastbound)	Hwy 50 @ Wilton Drive (Southbound)	Hwy 50 @ Queensgate Boulevard (Southbound)	Hwy 50 @ McEwan Drive (Southbound)	Hwy 50 @ George Bolton Parkway (Southbound)	Hwy 50 @ Mayfield Road GO Parking Lot (Southbound)	Hwy 50 @ Hwy7 / Queen Street Brampton Transit (Zum Bus Stop)	Hwy 50 @ Mayfield Road GO Parking Lot (Northbound)	George Bolton Parkway @ Hwy 50 (Westbound)	12724 Coleraine Dr. (Northbound)	Coleraine Drive @ Healy Road (Northbound)	Holland Drive @ Browning Court (Northbound)	Holland Drive @ Coleraine Drive (Westbound)	Coleraine Drive @ Old Elwood Drive (Northbound)	King Street @ Station Road (Eastbound)	
3:00 PM	3:03 PM	3:04 PM	3:06 PM	3:07 PM	3:10 PM	3:26 PM	3:41 PM	3:44 PM	3:48 PM	3:49 PM	3:51 PM	3:53 PM	3:54 PM	3:56 PM	
3:30 PM	3:33 PM	3:34 PM	3:36 PM	3:37 PM	3:40 PM	3:56 PM	4:11 PM	4:14 PM	4:18 PM	4:19 PM	4:21 PM	4:23 PM	4:24 PM	4:26 PM	
4:00 PM	4:03 PM	4:04 PM	4:06 PM	4:07 PM	4:10 PM	4:26 PM	4:41 PM	4:44 PM	4:48 PM	4:49 PM	4:51 PM	4:53 PM	4:54 PM	4:56 PM	
4:30 PM	4:33 PM	4:34 PM	4:36 PM	4:37 PM	4:40 PM	4:56 PM	5:11 PM	5:14 PM	5:18 PM	5:19 PM	5:21 PM	5:23 PM	5:24 PM	5:26 PM	
5:00 PM	5:03 PM	5:04 PM	5:06 PM	5:07 PM	5:10 PM	5:26 PM	5:41 PM	5:44 PM	5:48 PM	5:49 PM	5:51 PM	5:53 PM	5:54 PM	5:56 PM	
5:30 PM	5:33 PM	5:34 PM	5:36 PM	5:37 PM	5:40 PM	5:56 PM	6:11 PM	6:14 PM	6:18 PM	6:19 PM	6:21 PM	6:23 PM	6:24 PM	6:26 PM	

Note: bus arrival times may vary due to traffic conditions. Use the realtime bus location tracker at [caledon.ca/transit](https://www.caledon.ca/transit) for accurate arrival times.



38

Route number
Nombre d'itinéraire

Bolton/Malton



CONTACT US

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416-869-3200

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gotransit.com/schedules

@GOtransitBus
@GOtransitKT

See Something?
Say Something.
24/7 Transit Safety Dispatch:
1-877-297-0642

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Sign-up for email or
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alertes par courriel ou
message texte.
gotransit.com/OnTheGO

Bolton



GO Train and Bus Schedule/
Horaire des trains et des autobus GO

METROLINX

38 KT



Daily / Quotidiennement

Includes GO Bus route 38 / Inclut la route 38

Includes Kitchener GO Train
Inclut la train GO Kitchener

Effective / À partir de:

5 SEPTEMBER
SEPTEMBRE 2020



How to read our schedules

Step 1

Find the station or terminal you are departing from. Stops are listed across the top in the order they are served.

Step 2

The upper left corner tells you what day the schedule is for and the direction of travel.

Step 3

Look across the rows for available departure times.

Step 4

Not all trains or buses stop at every station. If you see → the train or bus will not stop at that station.

Comment lire nos horaires

Étape 1

Trouvez votre gare ou terminus de départ. La liste des arrêts est donnée en haut dans l'ordre dans lequel ils sont desservis.

Étape 2

Le coin supérieur gauche vous indique le jour pour lequel l'horaire est donné et la direction de circulation.

Étape 3

Regardez dans les rangées pour obtenir les heures de départ offertes.

Étape 4

Les trains ou les autobus ne s'arrêtent pas tous à chaque gare. Si vous voyez le symbole → le train ou l'autobus ne s'arrêtera pas à cette gare.

Legend/Légende

-  Train trips/Horaire des trains
-  Bus trips/Horaire des autobus
-  Separate bus/Autobus distinct
-  Trip does not serve this location. Trajet ne sert pas cette station.
-  Check below for connecting trips./ Vérifiez les trajets de correspondance ci-dessous.
-  GO Bus service is accessible to passengers using mobility devices at this location./ Service d'autobus GO accessible aux personnes utilisant des aides à la mobilité à cet endroit.
-  GO Train & GO Bus service is accessible to passengers using mobility devices at this location. Les services de trains et d'autobus GO sont accessibles aux utilisateurs d'un appareil d'aide à la mobilité à cet endroit.
-  Parking available./ Stationnement disponible.

Schedule times shown in 24-hour clock

Indications selon un système horaire de 24 heures

Midnight to noon 00 01 - 12 00 De minuit à midi: 00 01 - 12 00

Noon to midnight 12 01 - 24 00 De midi à minuit: 12 01 - 24 00



Notes

- h** Trip holds for connection./ Attentes des trajets pour les connexions.
- For the latest schedule information and updates, please visit gotransit.com/schedules.
- Pour consulter les horaires les plus récents et les mises à jour, veuillez visiter gotransit.com/schedules.

Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)										
SOUTHBOUND / EN DIRECTION SUD										
Route Number Numéro du trajet	Zone→	58 Caledon Dp Queen St. N. @ Columbia Way	58 Caledon Ar Queen St. S. @ Wilton Dr.	56 Brampton Dp Mayfield Rd. @ Hwy. 50	56 Brampton Ar Hwy. 50 @ Queen St. E.	31 Mississauga Ar Malton GO	Transfer - Correspondances Trips - Numéro du parcours	31 Mississauga Dp Malton GO	2 Toronto Ar Union Station	
38	38170	05 04	05 09	05 16	05 27	05 44	3702	05 59	06 28	
38	38220	05 59	06 04	06 11	06 24	06 44	3902	06 59	07 28	

Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)										
NORTHBOUND / EN DIRECTION NORD										
Route Number Numéro du trajet	Zone→	2 Toronto Dp Union Station	31 Mississauga Ar Malton GO	Transfer - Correspondances Trips - Numéro du parcours	31 Mississauga Dp Malton GO	56 Woodbridge Ar Hwy. 50 @ Hwy. 7	56 Brampton Dp Mayfield Rd. @ Hwy 50	58 Caledon Ar Queen St. S. @ Allan Dr.	58 Caledon Dp Hwy. 50 @ Columbia Way	
38	3923	15 34	16 02	38631	16 12h	16 30	16 45	16 52	17 02	
38	3927	17 34	18 02	38801	18 12h	18 30	18 45	18 52	19 02	

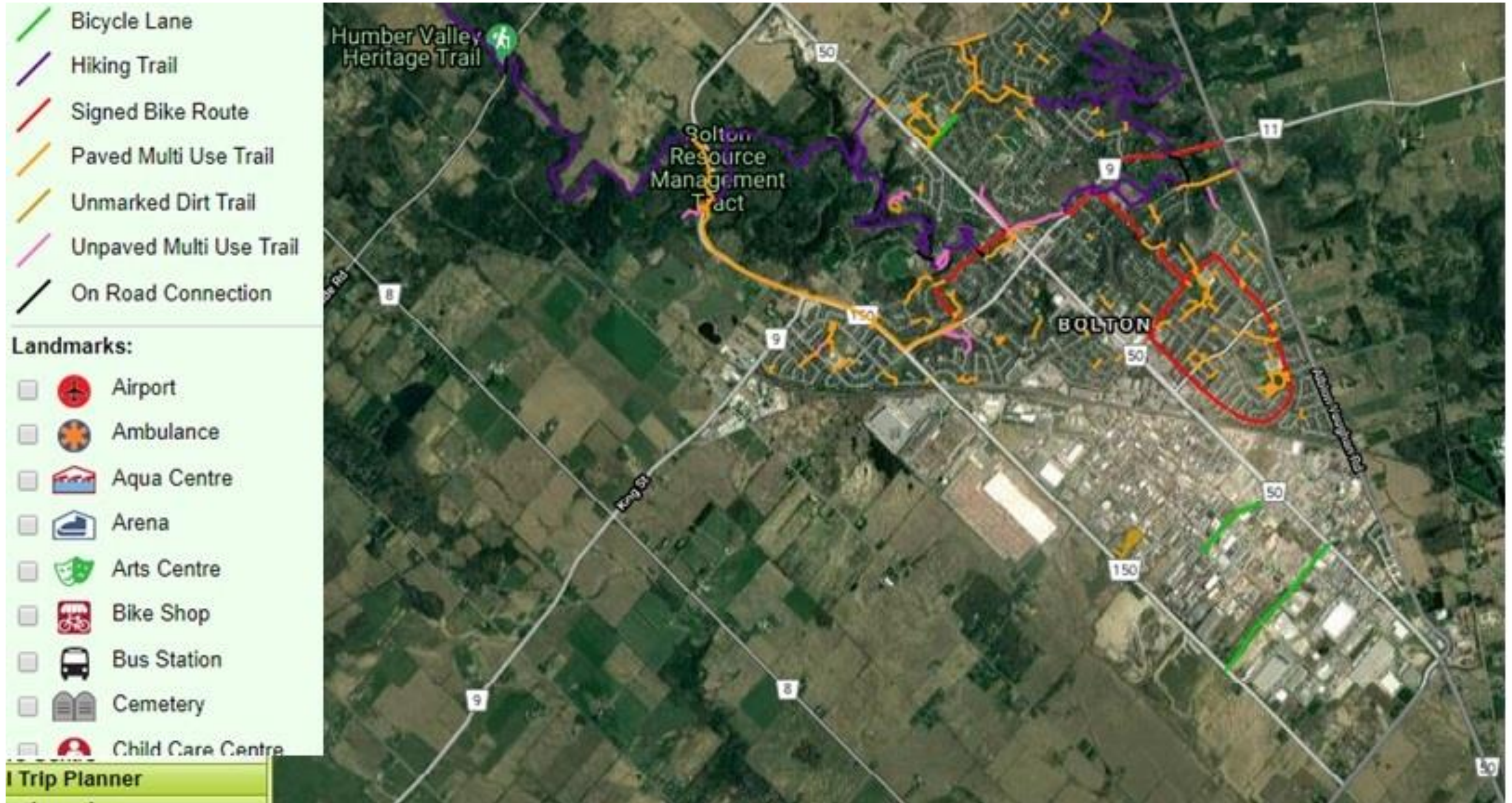
Bicycles

1. Bicycles are not allowed in Union Station or on-board trains during morning rush hour (6:30-9:30) and evening rush hour (15:30-18:30), Monday to Friday.
2. Foldable bicycles are allowed on-board trains at all times.

Vélos

1. Les vélos ne sont pas autorisés dans la gare Union ou à bord des trains du lundi au vendredi, pendant l'heure de pointe (6:30-9:30) et pendant l'heure de pointe du soir (15:30-18:30).
2. Les vélos pliables sont permis à bord des trains en tout temps.

EXISTING BOLTON TRAIL SYSTEM (APPENDIX B)



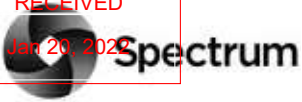
APPENDIX C

Traffic Data & Signal Timing Plans



Turning Movement Count (5 . COLUMBIA WAY & CALEDON KING TOWNLINE)

Start Time	N Approach CALEDON KING TOWNLINE						E Approach DUSTY ROAD						S Approach CALEDON KING TOWNLINE						W Approach COLUMBIA WAY						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total			
06:00:00	0	66	0	0	0	66	0	0	0	0	0	0	0	8	1	0	0	9	28	0	1	0	0	29	104		
06:15:00	0	98	0	0	0	98	0	0	0	0	0	0	0	26	2	0	0	28	37	0	9	0	0	46	172		
06:30:00	3	122	0	0	0	125	0	0	0	0	0	0	0	23	0	0	0	23	30	0	1	0	0	31	179		
06:45:00	2	117	0	0	0	119	0	0	0	0	0	0	0	25	3	0	0	28	43	0	5	0	0	48	195	650	
07:00:00	2	131	0	0	0	133	0	0	0	0	0	0	0	19	3	0	0	22	43	0	3	0	0	46	201	747	
07:15:00	1	92	0	0	0	93	0	0	0	0	0	0	0	27	3	0	0	30	40	0	4	0	0	44	167	742	
07:30:00	4	135	0	0	0	139	0	0	0	0	0	0	0	22	3	0	0	25	55	0	3	0	0	58	222	785	
07:45:00	3	141	0	0	0	144	0	0	0	0	0	0	0	23	7	0	0	30	45	0	5	0	0	50	224	814	
08:00:00	3	92	0	0	0	95	0	0	0	0	0	0	0	23	7	0	0	30	41	0	4	0	0	45	170	783	
08:15:00	2	93	0	0	0	95	0	0	0	0	0	0	0	30	8	0	0	38	44	0	5	0	0	49	182	798	
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08:45:00	3	81	0	0	0	84	0	0	0	0	0	0	0	28	9	0	0	37	34	0	9	0	0	43	164	688	
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09:15:00	1	63	0	0	0	64	0	0	0	0	0	0	0	32	4	0	0	36	31	0	2	0	0	33	133	578	
09:30:00	1	71	0	0	0	72	0	0	0	0	0	0	0	27	10	0	0	37	20	0	2	0	0	22	131	537	
09:45:00	3	50	0	0	0	53	0	0	0	0	0	0	0	38	12	0	0	50	26	0	0	0	0	26	129	502	
BREAK																											
15:00:00	2	33	0	0	0	35	0	0	0	0	0	0	0	46	20	0	0	66	17	0	7	0	0	24	125		
15:15:00	2	39	0	0	0	41	0	0	0	0	0	0	0	92	25	0	0	117	21	0	3	0	0	24	182		
15:30:00	2	32	0	0	0	34	0	0	0	0	0	0	0	80	23	0	0	103	14	0	3	0	0	17	154		
15:45:00	1	39	0	0	0	40	0	0	0	0	0	0	0	83	28	0	0	111	16	0	5	1	0	22	173	634	
16:00:00	9	30	0	0	0	39	0	0	0	0	0	0	0	105	23	0	0	128	16	0	6	0	0	22	189	698	
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17:30:00	12	45	0	0	0	57	0	0	0	0	0	0	0	141	38	0	0	179	24	0	2	0	0	26	262	973	
17:45:00	8	36	0	0	0	44	0	0	0	0	0	0	0	135	40	0	0	175	17	0	4	0	0	21	240	988	
18:00:00	5	32	0	0	0	37	0	0	0	0	0	0	0	97	41	0	0	138	19	0	8	0	0	27	202	948	
18:15:00	5	34	0	0	0	39	0	0	0	0	0	0	0	98	36	0	0	134	21	0	3	0	0	24	197	901	



18:30:00	1	27	0	0	0	28	0	0	0	0	0	0	0	66	30	0	0	96	23	0	4	0	0	27	151	790
18:45:00	7	31	0	0	0	38	0	0	0	0	0	0	0	71	33	0	0	104	14	0	2	0	0	16	158	708
Grand Total	114	2083	0	0	0	2197	0	0	0	0	0	0	0	2051	597	0	0	2648	865	0	121	1	0	987	5832	-
Approach%	5.2%	94.8%	0%	0%		-	0%	0%	0%	0%	-	0%	77.5%	22.5%	0%		-	87.6%	0%	12.3%	0.1%		-	-	-	
Totals %	2%	35.7%	0%	0%		37.7%	0%	0%	0%	0%	0%	0%	35.2%	10.2%	0%		45.4%	14.8%	0%	2.1%	0%		16.9%	-	-	
Heavy	1	24	0	0		-	0	0	0	0	-	0	34	10	0		-	17	0	2	0		-	-	-	
Heavy %	0.9%	1.2%	0%	0%		-	0%	0%	0%	0%	-	0%	1.7%	1.7%	0%		-	2%	0%	1.7%	0%		-	-	-	
Bicycles	1	4	0	0		-	0	0	0	0	-	0	5	0	0		-	0	0	0	0		-	-	-	
Bicycle %	0.9%	0.2%	0%	0%		-	0%	0%	0%	0%	-	0%	0.2%	0%	0%		-	0%	0%	0%	0%		-	-	-	



Peak Hour: 07:00 AM - 08:00 AM Weather: Partly Cloudy (15.8 °C)

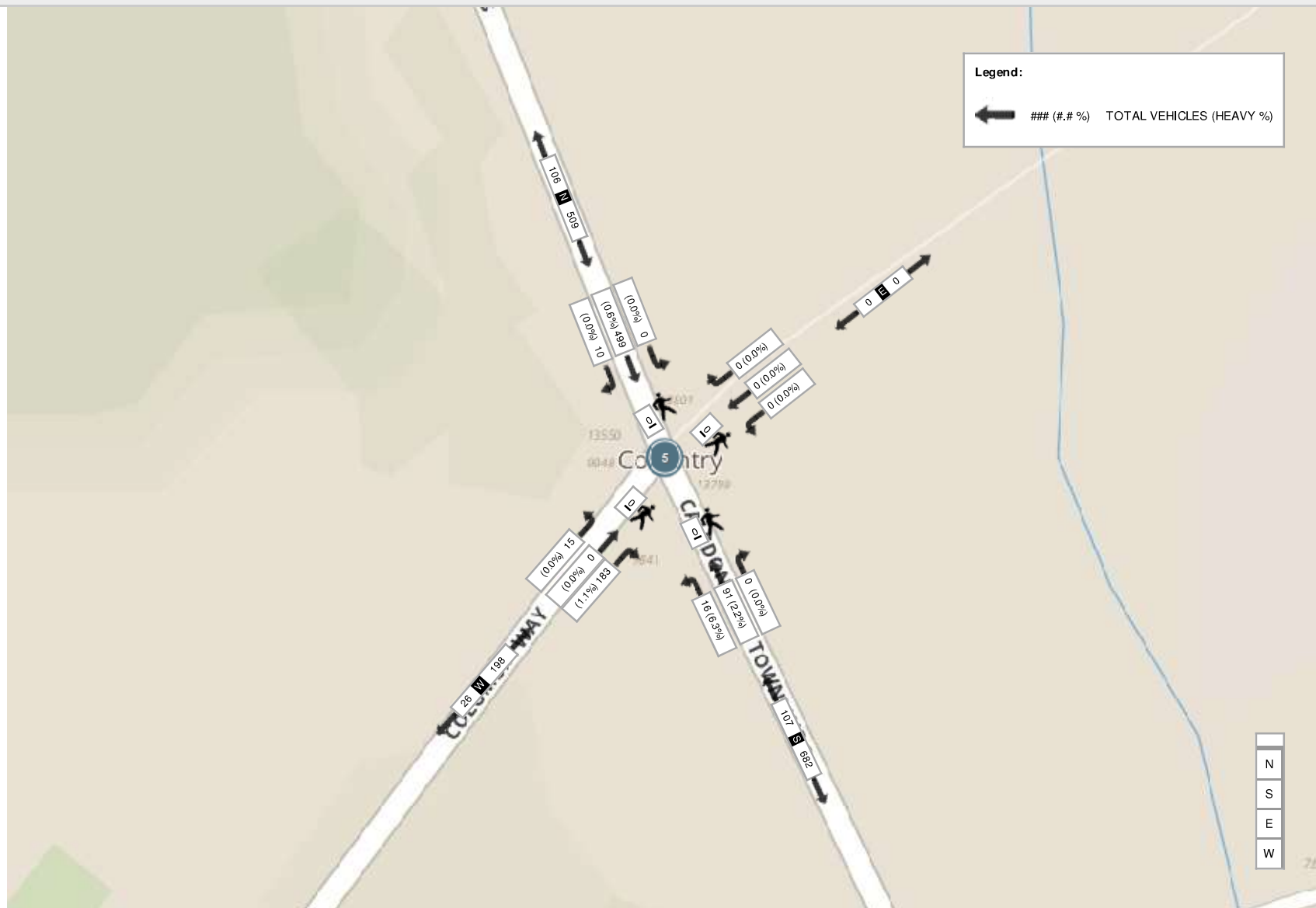
Start Time	N Approach CALEDON KING TOWNLINE						E Approach DUSTY ROAD						S Approach CALEDON KING TOWNLINE						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
07:00:00	2	131	0	0	0	133	0	0	0	0	0	0	0	19	3	0	0	22	43	0	3	0	0	46	201
07:15:00	1	92	0	0	0	93	0	0	0	0	0	0	0	27	3	0	0	30	40	0	4	0	0	44	167
07:30:00	4	135	0	0	0	139	0	0	0	0	0	0	0	22	3	0	0	25	55	0	3	0	0	58	222
07:45:00	3	141	0	0	0	144	0	0	0	0	0	0	0	23	7	0	0	30	45	0	5	0	0	50	224
Grand Total	10	499	0	0	0	509	0	0	0	0	0	0	0	91	16	0	0	107	183	0	15	0	0	198	814
Approach%	2%	98%	0%	0%		-	0%	0%	0%	0%		-	0%	85%	15%	0%		-	92.4%	0%	7.6%	0%		-	-
Totals %	1.2%	61.3%	0%	0%		62.5%	0%	0%	0%	0%		0%	0%	11.2%	2%	0%		13.1%	22.5%	0%	1.8%	0%		24.3%	-
PHF	0.63	0.88	0	0		0.88	0	0	0	0		0	0	0.84	0.57	0		0.89	0.83	0	0.75	0		0.85	-
Heavy	0	3	0	0		3	0	0	0	0		0	0	2	1	0		3	2	0	0	0		2	-
Heavy %	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	2.2%	6.3%	0%		2.8%	1.1%	0%	0%	0%		1%	-
Lights	10	496	0	0		506	0	0	0	0		0	0	89	15	0		104	181	0	15	0		196	-
Lights %	100%	99.4%	0%	0%		99.4%	0%	0%	0%	0%		0%	0%	97.8%	93.8%	0%		97.2%	98.9%	0%	100%	0%		99%	-
Single-Unit Trucks	0	2	0	0		2	0	0	0	0		0	0	1	1	0		2	2	0	0	0		2	-
Single-Unit Trucks %	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	1.1%	6.3%	0%		1.9%	1.1%	0%	0%	0%		1%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	1.1%	0%	0%		0.9%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-



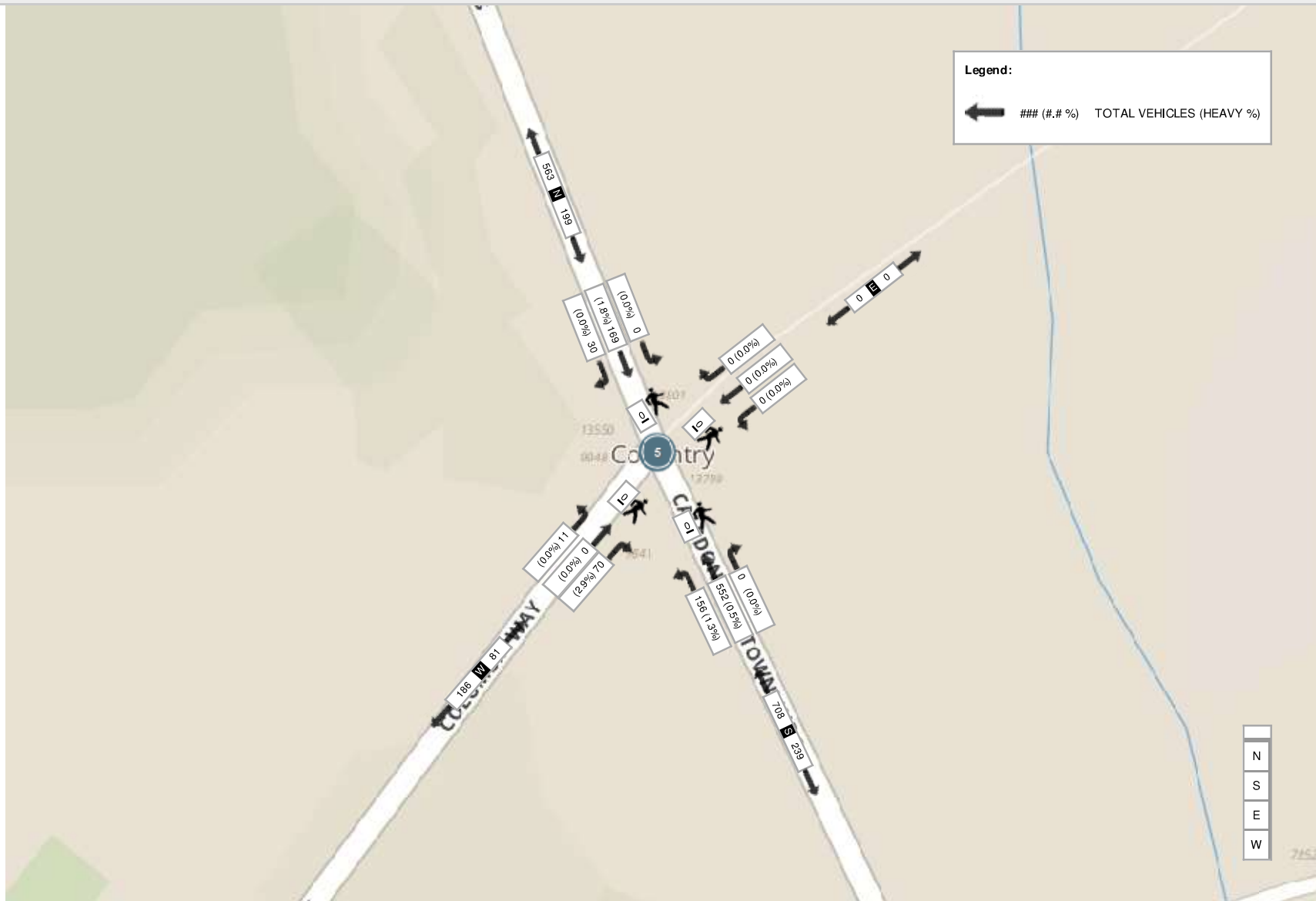
Peak Hour: 05:00 PM - 06:00 PM Weather: Partly Cloudy (25 °C)

Start Time	N Approach CALEDON KING TOWNLINE						E Approach DUSTY ROAD						S Approach CALEDON KING TOWNLINE						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
17:00:00	5	45	0	0	0	50	0	0	0	0	0	0	0	139	34	0	0	173	18	0	1	0	0	19	242
17:15:00	5	43	0	0	0	48	0	0	0	0	0	0	0	137	44	0	0	181	11	0	4	0	0	15	244
17:30:00	12	45	0	0	0	57	0	0	0	0	0	0	0	141	38	0	0	179	24	0	2	0	0	26	262
17:45:00	8	36	0	0	0	44	0	0	0	0	0	0	0	135	40	0	0	175	17	0	4	0	0	21	240
Grand Total	30	169	0	0	0	199	0	0	0	0	0	0	0	552	156	0	0	708	70	0	11	0	0	81	988
Approach%	15.1%	84.9%	0%	0%		-	0%	0%	0%	0%		-	0%	78%	22%	0%		-	86.4%	0%	13.6%	0%		-	-
Totals %	3%	17.1%	0%	0%		20.1%	0%	0%	0%	0%		0%	0%	55.9%	15.8%	0%		71.7%	7.1%	0%	1.1%	0%		8.2%	-
PHF	0.63	0.94	0	0		0.87	0	0	0	0		0	0	0.98	0.89	0		0.98	0.73	0	0.69	0		0.78	-
Heavy	0	3	0	0		3	0	0	0	0		0	0	3	2	0		5	2	0	0	0		2	-
Heavy %	0%	1.8%	0%	0%		1.5%	0%	0%	0%	0%		0%	0%	0.5%	1.3%	0%		0.7%	2.9%	0%	0%	0%		2.5%	-
Lights	30	166	0	0		196	0	0	0	0		0	0	549	154	0		703	68	0	11	0		79	-
Lights %	100%	98.2%	0%	0%		98.5%	0%	0%	0%	0%		0%	0%	99.5%	98.7%	0%		99.3%	97.1%	0%	100%	0%		97.5%	-
Single-Unit Trucks	0	2	0	0		2	0	0	0	0		0	0	3	2	0		5	2	0	0	0		2	-
Single-Unit Trucks %	0%	1.2%	0%	0%		1%	0%	0%	0%	0%		0%	0%	0.5%	1.3%	0%		0.7%	2.9%	0%	0%	0%		2.5%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0.6%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Bicycles on Road	0	4	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-	-	-	-	%		-

Peak Hour: 07:00 AM - 08:00 AM Weather: Partly Cloudy (15.8 °C)



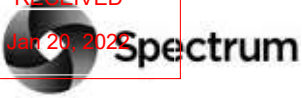
Peak Hour: 05:00 PM - 06:00 PM Weather: Partly Cloudy (25 °C)





Turning Movement Count (2 . COLUMBIA WAY & KINGSVIEW DR)

Start Time	E Approach COLUMBIA WAY					S Approach KINGSVIEW DR					W Approach COLUMBIA WAY					Int. Total (15 min)		Int. Total (1 hr)	
	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	U-Turn W:W	Peds W:	Approach Total				
06:00:00	32	1	0	0	33	8	5	0	0	13	4	4	0	0	8	54			
06:15:00	29	1	0	0	30	4	4	0	0	8	0	6	0	0	6	44			
06:30:00	31	4	0	0	35	5	5	0	1	10	1	2	0	0	3	48			
06:45:00	35	1	0	0	36	7	6	0	1	13	1	7	0	0	8	57		203	
07:00:00	43	2	0	0	45	9	12	0	0	21	1	6	0	0	7	73		222	
07:15:00	38	4	0	0	42	11	9	0	0	20	3	8	0	0	11	73		251	
07:30:00	49	5	0	0	54	7	7	0	1	14	9	9	0	0	18	86		289	
07:45:00	47	12	0	0	59	5	14	0	1	19	2	19	0	0	21	99		331	
08:00:00	26	5	0	0	31	8	12	0	1	20	5	19	0	0	24	75		333	
08:15:00	30	3	0	0	33	9	10	0	1	19	3	15	0	0	18	70		330	
08:30:00	48	5	0	0	53	7	5	0	0	12	5	19	0	0	24	89		333	
08:45:00	30	9	0	0	39	3	7	0	0	10	10	13	0	0	23	72		306	
09:00:00	21	5	0	0	26	2	14	0	0	16	8	21	0	0	29	71		302	
09:15:00	26	6	0	0	32	1	5	0	0	6	7	24	0	0	31	69		301	
09:30:00	24	3	0	0	27	2	7	0	0	9	7	15	0	0	22	58		270	
09:45:00	24	9	0	0	33	5	9	0	1	14	9	15	0	0	24	71		269	
BREAK																			
15:00:00	24	4	0	0	28	4	4	0	0	8	7	26	0	0	33	69			
15:15:00	24	13	0	0	37	6	7	0	2	13	11	52	0	2	63	113			
15:30:00	20	4	0	0	24	8	5	0	0	13	10	38	0	0	48	85			
15:45:00	22	9	0	0	31	4	6	0	0	10	7	35	0	0	42	83		350	
16:00:00	16	5	0	0	21	14	15	0	0	29	13	39	0	0	52	102		383	
16:15:00	27	7	0	0	34	12	11	0	0	23	20	42	0	0	62	119		389	
16:30:00	20	8	0	0	28	10	6	0	1	16	21	42	0	0	63	107		411	



16:45:00	28	12	1	0	41	7	7	0	0	14	21	51	0	0	72	127	455
17:00:00	26	15	0	0	41	6	6	0	0	12	16	65	0	0	81	134	487
17:15:00	25	13	0	0	38	12	4	0	1	16	22	57	0	0	79	133	501
17:30:00	23	14	0	0	37	9	5	0	3	14	11	68	0	0	79	130	524
17:45:00	37	11	0	0	48	11	8	0	0	19	27	61	0	0	88	155	552
18:00:00	32	15	0	0	47	7	4	0	0	11	23	60	0	0	83	141	559
18:15:00	45	13	0	0	58	10	9	0	0	19	16	38	0	0	54	131	557
18:30:00	20	13	0	0	33	7	6	0	0	13	11	41	0	0	52	98	525
18:45:00	39	13	0	0	52	8	8	0	0	16	15	33	0	0	48	116	486
Grand Total	961	244	1	0	1206	228	242	0	14	470	326	950	0	2	1276	2952	-
Approach%	79.7%	20.2%	0.1%		-	48.5%	51.5%	0%		-	25.5%	74.5%	0%		-	-	-
Totals %	32.6%	8.3%	0%		40.9%	7.7%	8.2%	0%		15.9%	11%	32.2%	0%		43.2%	-	-
Heavy	10	3	0		-	3	5	0		-	3	17	0		-	-	-
Heavy %	1%	1.2%	0%		-	1.3%	2.1%	0%		-	0.9%	1.8%	0%		-	-	-
Bicycles	0	3	0		-	4	0	0		-	0	0	0		-	-	-
Bicycle %	0%	1.2%	0%		-	1.8%	0%	0%		-	0%	0%	0%		-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather: Partly Cloudy (15.8 °C)

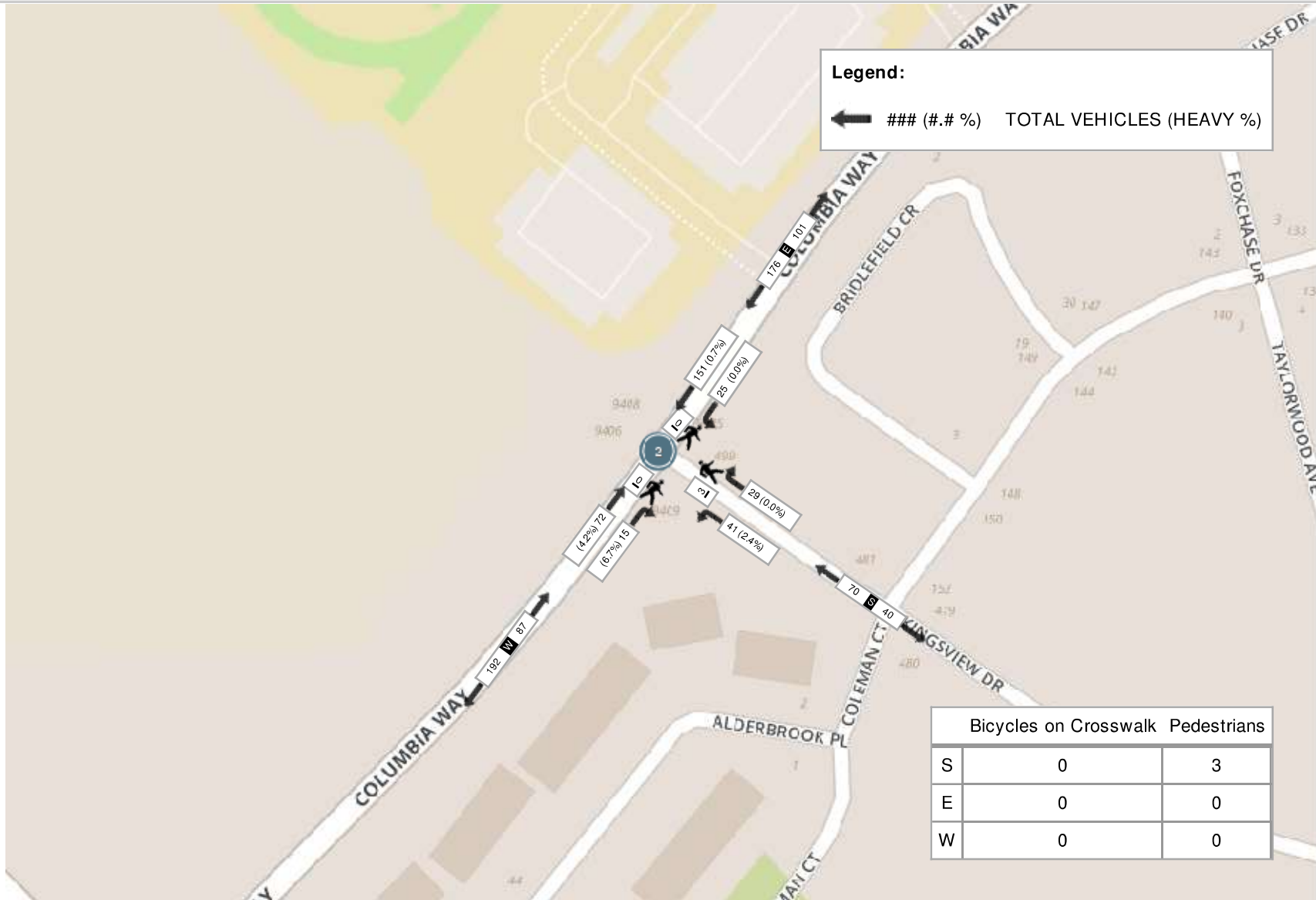
Start Time	E Approach COLUMBIA WAY					S Approach KINGSVIEW DR					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
07:45:00	47	12	0	0	59	5	14	0	1	19	2	19	0	0	21	99
08:00:00	26	5	0	0	31	8	12	0	1	20	5	19	0	0	24	75
08:15:00	30	3	0	0	33	9	10	0	1	19	3	15	0	0	18	70
08:30:00	48	5	0	0	53	7	5	0	0	12	5	19	0	0	24	89
Grand Total	151	25	0	0	176	29	41	0	3	70	15	72	0	0	87	333
Approach%	85.8%	14.2%	0%		-	41.4%	58.6%	0%		-	17.2%	82.8%	0%		-	-
Totals %	45.3%	7.5%	0%		52.9%	8.7%	12.3%	0%		21%	4.5%	21.6%	0%		26.1%	-
PHF	0.79	0.52	0		0.75	0.81	0.73	0		0.88	0.75	0.95	0		0.91	-
Heavy	1	0	0		1	0	1	0		1	1	3	0		4	-
Heavy %	0.7%	0%	0%		0.6%	0%	2.4%	0%		1.4%	6.7%	4.2%	0%		4.6%	-
Lights	150	25	0		175	29	40	0		69	14	69	0		83	-
Lights %	99.3%	100%	0%		99.4%	100%	97.6%	0%		98.6%	93.3%	95.8%	0%		95.4%	-
Single-Unit Trucks	1	0	0		1	0	1	0		1	0	2	0		2	-
Single-Unit Trucks %	0.7%	0%	0%		0.6%	0%	2.4%	0%		1.4%	0%	2.8%	0%		2.3%	-
Buses	0	0	0		0	0	0	0		0	0	1	0		1	-
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	1.4%	0%		1.1%	-
Articulated Trucks	0	0	0		0	0	0	0		0	1	0	0		1	-
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	6.7%	0%	0%		1.1%	-
Pedestrians	-	-	-	0	-	-	-	-	3	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-



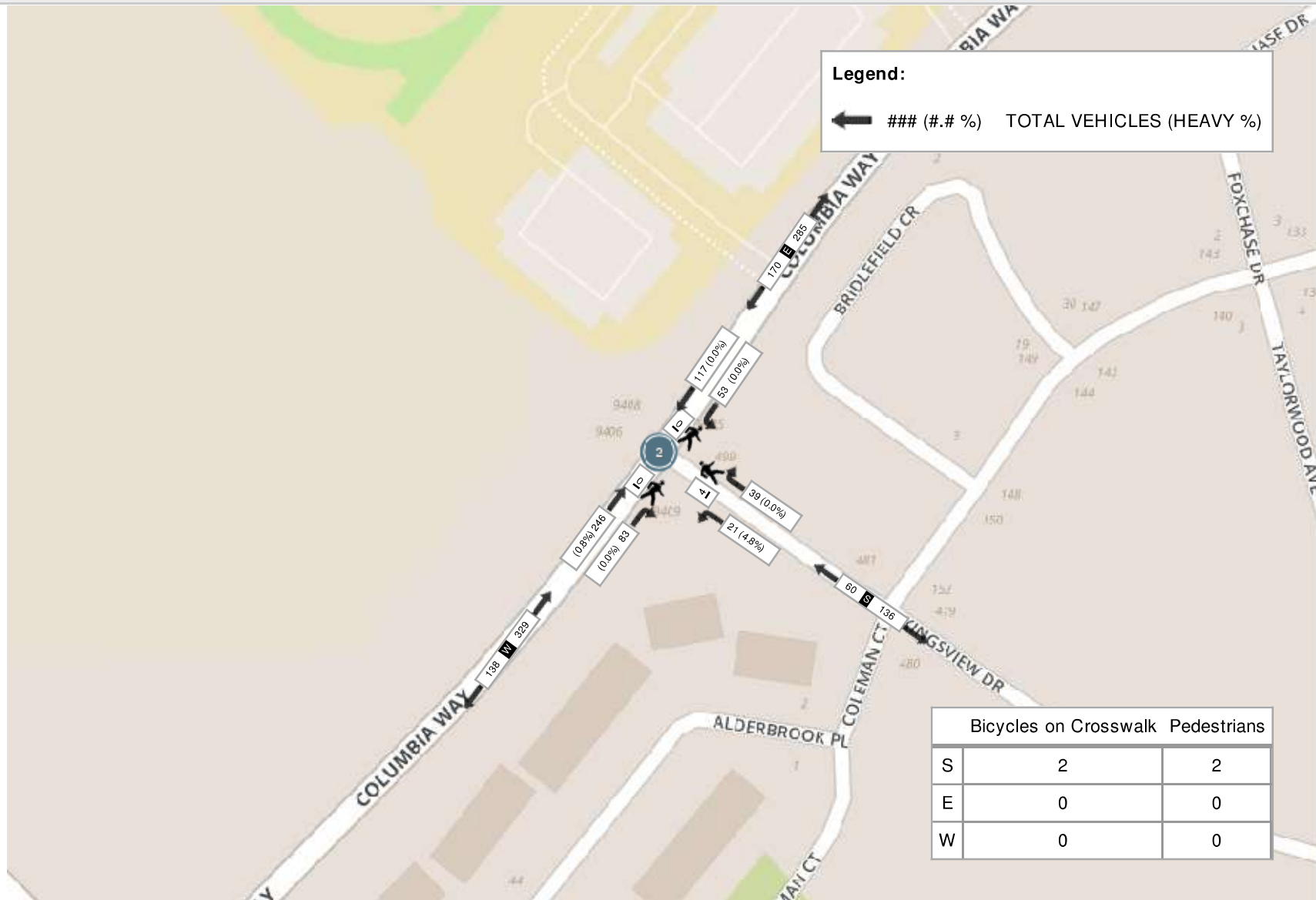
Peak Hour: 05:15 PM - 06:15 PM Weather: Partly Cloudy (25 °C)

Start Time	E Approach COLUMBIA WAY					S Approach KINGSVIEW DR					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
17:15:00	25	13	0	0	38	12	4	0	1	16	22	57	0	0	79	133
17:30:00	23	14	0	0	37	9	5	0	3	14	11	68	0	0	79	130
17:45:00	37	11	0	0	48	11	8	0	0	19	27	61	0	0	88	155
18:00:00	32	15	0	0	47	7	4	0	0	11	23	60	0	0	83	141
Grand Total	117	53	0	0	170	39	21	0	4	60	83	246	0	0	329	559
Approach%	68.8%	31.2%	0%		-	65%	35%	0%		-	25.2%	74.8%	0%		-	-
Totals %	20.9%	9.5%	0%		30.4%	7%	3.8%	0%		10.7%	14.8%	44%	0%		58.9%	-
PHF	0.79	0.88	0		0.89	0.81	0.66	0		0.79	0.77	0.9	0		0.93	-
Heavy	0	0	0		0	0	1	0		1	0	2	0		2	-
Heavy %	0%	0%	0%		0%	0%	4.8%	0%		1.7%	0%	0.8%	0%		0.6%	-
Lights	117	53	0		170	39	20	0		59	83	244	0		327	-
Lights %	100%	100%	0%		100%	100%	95.2%	0%		98.3%	100%	99.2%	0%		99.4%	-
Single-Unit Trucks	0	0	0		0	0	1	0		1	0	2	0		2	-
Single-Unit Trucks %	0%	0%	0%		0%	0%	4.8%	0%		1.7%	0%	0.8%	0%		0.6%	-
Buses	0	0	0		0	0	0	0		0	0	0	0		0	-
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	0	-	-	-	-	2	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	50%	-	-	-	-	0%	-	-
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	2	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	0%	-	-	-	-	50%	-	-	-	-	0%	-	-
Bicycles on Road	0	1	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Partly Cloudy (15.8 °C)



Peak Hour: 05:15 PM - 06:15 PM Weather: Partly Cloudy (25 °C)





Turning Movement Count (4 . COLUMBIA WAY & MT HOPE RD)

Start Time	N Approach MT HOPE RD						E Approach COLUMBIA WAY						S Approach MT HOPE RD						W Approach COLUMBIA WAY						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total			
06:00:00	4	0	0	0	0	4	0	10	0	0	0	10	6	0	4	0	0	10	0	10	2	0	0	12	36		
06:15:00	5	0	4	0	0	9	1	7	0	0	0	8	5	0	5	0	0	10	1	15	2	0	0	18	45		
06:30:00	7	1	3	0	0	11	0	17	0	0	0	17	5	0	3	0	1	8	1	8	3	0	0	12	48		
06:45:00	8	0	5	0	0	13	2	14	0	0	0	16	1	3	5	0	1	9	1	13	2	0	0	16	54	183	
07:00:00	6	1	0	0	0	7	0	16	1	0	0	17	7	0	6	0	0	13	1	14	4	0	0	19	56	203	
07:15:00	4	1	2	0	0	7	1	24	0	0	1	25	2	0	6	0	1	8	0	15	6	0	0	21	61	219	
07:30:00	5	1	6	0	0	12	1	24	1	0	0	26	4	0	4	0	2	8	2	24	5	0	0	31	77	248	
07:45:00	8	0	2	0	0	10	2	26	2	0	1	30	3	0	7	0	2	10	4	22	0	0	0	26	76	270	
08:00:00	3	2	6	0	0	11	1	12	4	0	0	17	5	1	4	0	3	10	5	23	3	0	1	31	69	283	
08:15:00	4	0	3	0	0	7	1	17	1	0	0	19	5	1	3	0	3	9	1	26	7	0	0	34	69	291	
08:30:00	6	0	8	0	0	14	2	16	0	0	0	18	5	0	6	0	1	11	1	26	4	0	0	31	74	288	
08:45:00	10	0	9	0	0	19	1	13	0	0	0	14	4	0	3	0	3	7	2	12	4	0	0	18	58	270	
09:00:00	3	0	3	0	0	6	2	13	0	0	0	15	4	0	4	0	1	8	0	13	7	0	1	20	49	250	
09:15:00	6	0	4	0	0	10	2	15	2	0	0	19	4	0	3	0	0	7	7	22	2	0	1	31	67	248	
09:30:00	4	0	3	0	0	7	0	14	0	0	1	14	4	1	3	0	0	8	2	16	2	0	0	20	49	223	
09:45:00	5	0	3	0	0	8	1	16	3	0	0	20	2	0	7	0	0	9	2	11	7	0	0	20	57	222	
BREAK																											
15:00:00	6	0	5	0	0	11	4	15	3	0	0	22	3	1	3	0	0	7	5	20	6	0	0	31	71		
15:15:00	12	1	3	0	0	16	0	21	1	0	0	22	0	0	2	0	3	2	4	31	10	0	0	45	85		
15:30:00	4	2	0	0	0	6	4	11	4	0	0	19	2	0	2	0	0	4	6	29	8	0	0	43	72		
15:45:00	7	1	2	0	0	10	1	17	4	0	0	22	7	1	4	0	3	12	5	22	5	0	0	32	76	304	
16:00:00	3	0	2	0	0	5	1	16	5	1	0	23	2	0	4	0	0	6	4	28	9	0	0	41	75	308	
16:15:00	3	2	3	0	0	8	3	25	1	0	0	29	4	1	1	0	0	6	11	24	9	0	0	44	87	310	
16:30:00	8	0	3	0	0	11	5	20	3	0	0	28	2	0	4	0	1	6	2	28	13	0	0	43	88	326	
16:45:00	15	0	2	0	0	17	1	26	5	0	0	32	0	0	1	0	6	1	4	21	14	1	0	40	90	340	
17:00:00	7	1	2	0	0	10	3	27	4	0	0	34	4	0	3	0	0	7	9	35	7	0	0	51	102	367	
17:15:00	9	1	2	0	0	12	6	23	5	0	0	34	3	1	4	0	1	8	9	27	13	0	0	49	103	383	
17:30:00	6	0	6	0	0	12	2	29	13	0	0	44	0	2	3	0	5	5	8	40	15	0	0	63	124	419	
17:45:00	7	0	2	0	0	9	1	34	5	0	0	40	2	0	10	0	4	12	10	32	12	0	0	54	115	444	
18:00:00	9	3	5	0	0	17	3	19	4	0	0	26	0	1	4	0	1	5	1	40	14	0	0	55	103	445	
18:15:00	13	1	4	0	0	18	4	39	7	0	0	50	3	1	6	0	3	10	9	23	13	0	0	45	123	465	

18:30:00	6	0	2	0	0	8	7	20	7	0	0	34	1	1	6	0	1	8	10	17	4	0	0	31	81	422
18:45:00	5	2	3	0	0	10	2	26	2	0	0	30	4	1	3	0	6	8	9	20	5	0	0	34	82	389
Grand Total	208	20	107	0	0	335	64	622	87	1	3	774	103	16	133	0	52	252	136	707	217	1	3	1061	2422	-
Approach%	62.1%	6%	31.9%	0%		-	8.3%	80.4%	11.2%	0.1%		-	40.9%	6.3%	52.8%	0%		-	12.8%	66.6%	20.5%	0.1%		-	-	-
Totals %	8.6%	0.8%	4.4%	0%		13.8%	2.6%	25.7%	3.6%	0%		32%	4.3%	0.7%	5.5%	0%		10.4%	5.6%	29.2%	9%	0%		43.8%	-	-
Heavy	1	0	5	0		-	2	6	5	0		-	1	1	3	0		-	5	13	2	0		-	-	-
Heavy %	0.5%	0%	4.7%	0%		-	3.1%	1%	5.7%	0%		-	1%	6.3%	2.3%	0%		-	3.7%	1.8%	0.9%	0%		-	-	-
Bicycles	4	4	1	0		-	1	0	1	0		-	0	9	0	0		-	0	0	4	0		-	-	-
Bicycle %	1.9%	20%	0.9%	0%		-	1.6%	0%	1.1%	0%		-	0%	56.3%	0%	0%		-	0%	0%	1.8%	0%		-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Partly Cloudy (15.8 °C)

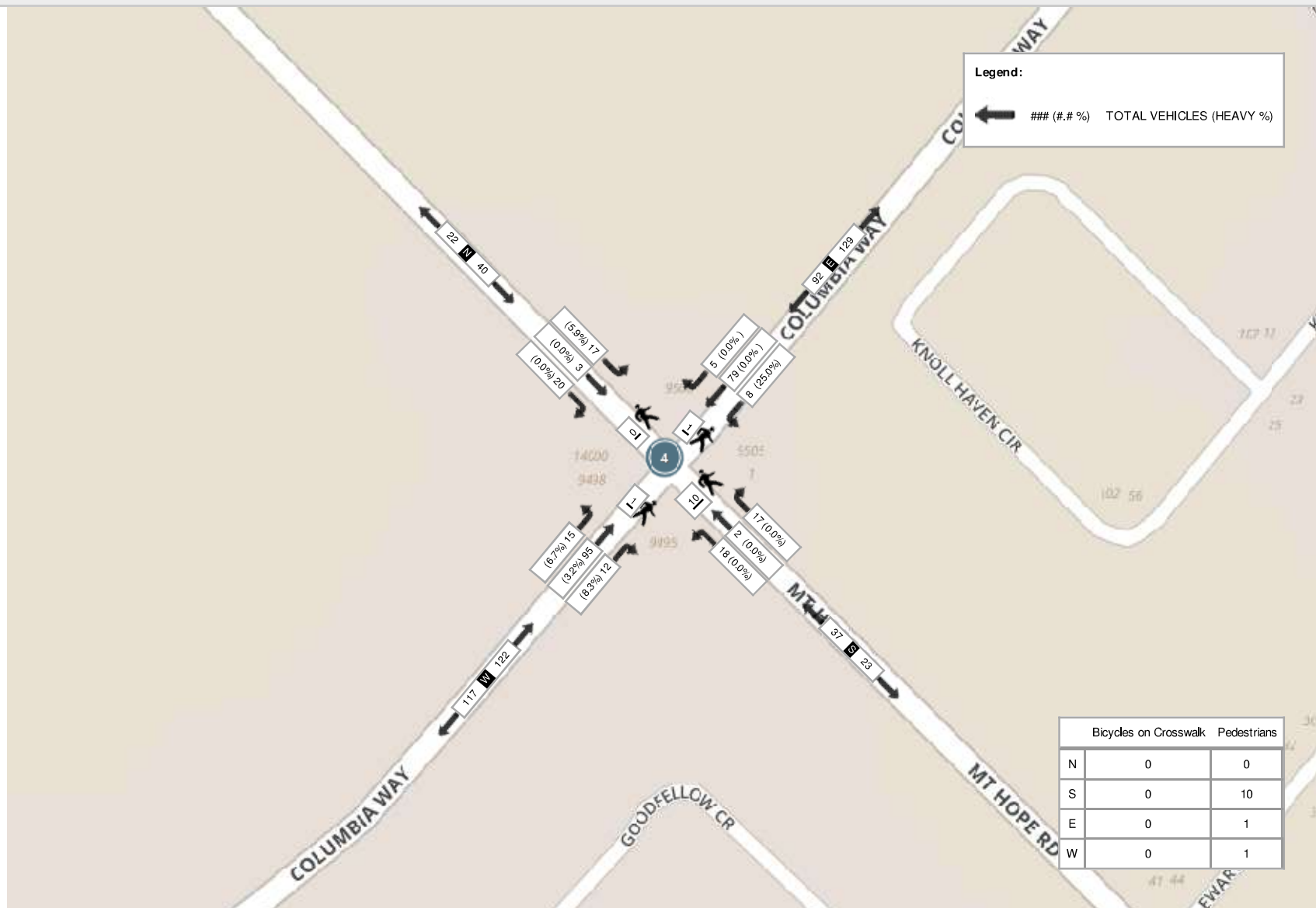
Start Time	N Approach MT HOPE RD						E Approach COLUMBIA WAY						S Approach MT HOPE RD						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
07:30:00	5	1	6	0	0	12	1	24	1	0	0	26	4	0	4	0	2	8	2	24	5	0	0	31	77
07:45:00	8	0	2	0	0	10	2	26	2	0	1	30	3	0	7	0	2	10	4	22	0	0	0	26	76
08:00:00	3	2	6	0	0	11	1	12	4	0	0	17	5	1	4	0	3	10	5	23	3	0	1	31	69
08:15:00	4	0	3	0	0	7	1	17	1	0	0	19	5	1	3	0	3	9	1	26	7	0	0	34	69
Grand Total	20	3	17	0	0	40	5	79	8	0	1	92	17	2	18	0	10	37	12	95	15	0	1	122	291
Approach%	50%	7.5%	42.5%	0%		-	5.4%	85.9%	8.7%	0%		-	45.9%	5.4%	48.6%	0%		-	9.8%	77.9%	12.3%	0%		-	-
Totals %	6.9%	1%	5.8%	0%		13.7%	1.7%	27.1%	2.7%	0%		31.6%	5.8%	0.7%	6.2%	0%		12.7%	4.1%	32.6%	5.2%	0%		41.9%	-
PHF	0.63	0.38	0.71	0		0.83	0.63	0.76	0.5	0		0.77	0.85	0.5	0.64	0		0.93	0.6	0.91	0.54	0		0.9	-
Heavy	0	0	1	0		1	0	0	2	0		2	0	0	0	0		0	1	3	1	0		5	-
Heavy %	0%	0%	5.9%	0%		2.5%	0%	0%	25%	0%		2.2%	0%	0%	0%	0%		0%	8.3%	3.2%	6.7%	0%		4.1%	-
Lights	20	3	16	0		39	5	79	6	0		90	17	2	18	0		37	11	92	14	0		117	-
Lights %	100%	100%	94.1%	0%		97.5%	100%	100%	75%	0%		97.8%	100%	100%	100%	0%		100%	91.7%	96.8%	93.3%	0%		95.9%	-
Single-Unit Trucks	0	0	1	0		1	0	0	1	0		1	0	0	0	0		0	1	3	0	0		4	-
Single-Unit Trucks %	0%	0%	5.9%	0%		2.5%	0%	0%	12.5%	0%		1.1%	0%	0%	0%	0%		0%	8.3%	3.2%	0%	0%		3.3%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	1	0		1	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	6.7%	0%		0.8%	-
Articulated Trucks	0	0	0	0		0	0	0	1	0		1	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	12.5%	0%		1.1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	10	-	-	-	-	-	1	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	8.3%		-	-	-	-	83.3%		-	-	-	-	8.3%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-



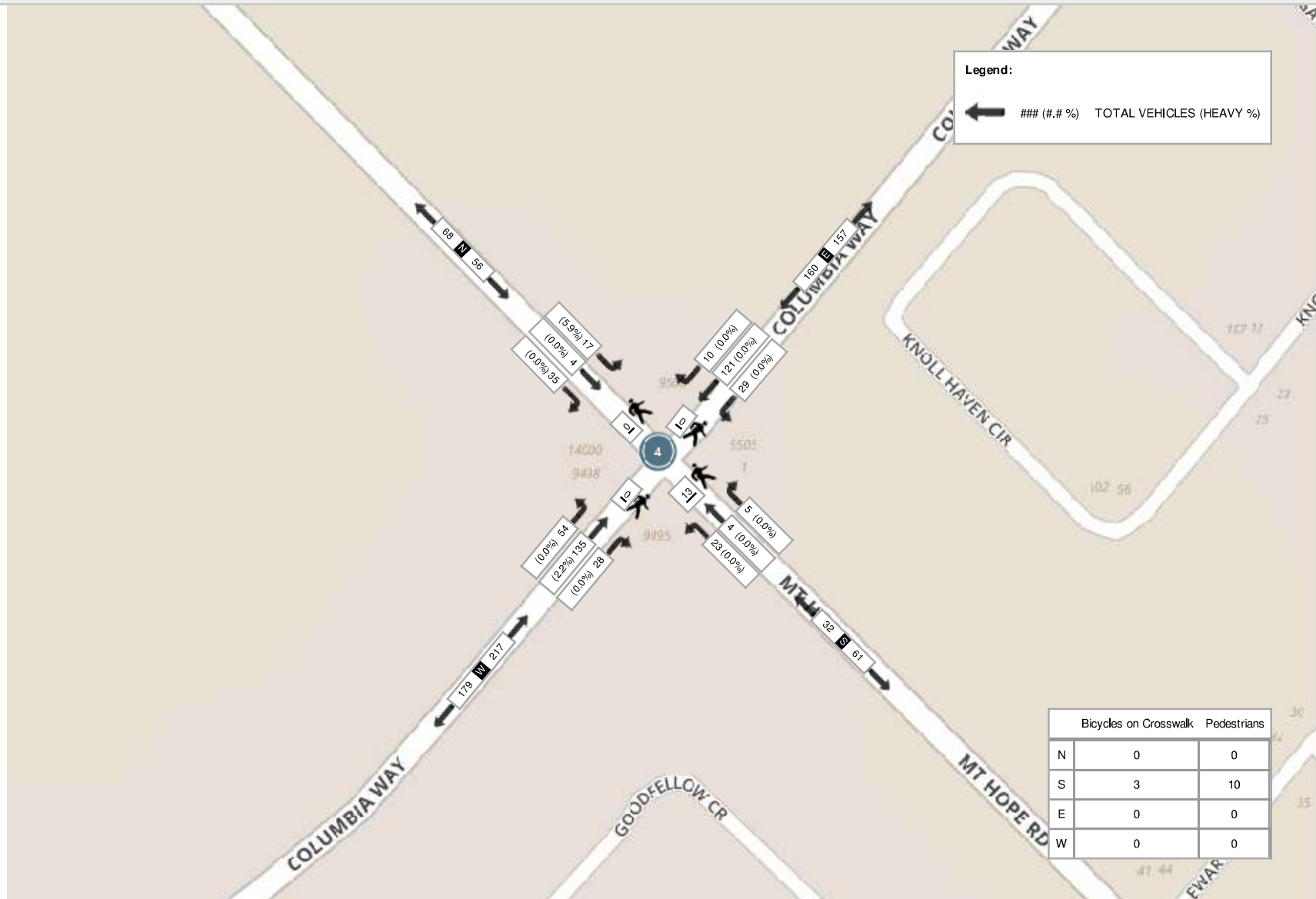
Peak Hour: 05:30 PM - 06:30 PM Weather: Partly Cloudy (25 °C)

Start Time	N Approach MT HOPE RD						E Approach COLUMBIA WAY						S Approach MT HOPE RD						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
17:30:00	6	0	6	0	0	12	2	29	13	0	0	44	0	2	3	0	5	5	8	40	15	0	0	63	124
17:45:00	7	0	2	0	0	9	1	34	5	0	0	40	2	0	10	0	4	12	10	32	12	0	0	54	115
18:00:00	9	3	5	0	0	17	3	19	4	0	0	26	0	1	4	0	1	5	1	40	14	0	0	55	103
18:15:00	13	1	4	0	0	18	4	39	7	0	0	50	3	1	6	0	3	10	9	23	13	0	0	45	123
Grand Total	35	4	17	0	0	56	10	121	29	0	0	160	5	4	23	0	13	32	28	135	54	0	0	217	465
Approach%	62.5%	7.1%	30.4%	0%		-	6.3%	75.6%	18.1%	0%		-	15.6%	12.5%	71.9%	0%		-	12.9%	62.2%	24.9%	0%		-	-
Totals %	7.5%	0.9%	3.7%	0%		12%	2.2%	26%	6.2%	0%		34.4%	1.1%	0.9%	4.9%	0%		6.9%	6%	29%	11.6%	0%		46.7%	-
PHF	0.67	0.33	0.71	0		0.78	0.63	0.78	0.56	0		0.8	0.42	0.5	0.58	0		0.67	0.7	0.84	0.9	0		0.86	-
Heavy	0	0	1	0		1	0	0	0	0		0	0	0	0	0		0	0	3	0	0		3	-
Heavy %	0%	0%	5.9%	0%		1.8%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	2.2%	0%	0%		1.4%	-
Lights	35	4	16	0		55	10	121	29	0		160	5	4	23	0		32	28	132	54	0		214	-
Lights %	100%	100%	94.1%	0%		98.2%	100%	100%	100%	0%		100%	100%	100%	100%	0%		100%	100%	97.8%	100%	0%		98.6%	-
Single-Unit Trucks	0	0	1	0		1	0	0	0	0		0	0	0	0	0		0	0	3	0	0		3	-
Single-Unit Trucks %	0%	0%	5.9%	0%		1.8%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	2.2%	0%	0%		1.4%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	10	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	76.9%		-	-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	23.1%		-	-	-	-	0%		-
Bicycles on Road	2	2	1	0	0	-	1	0	1	0	0	-	0	1	0	0	0	-	0	0	1	0	0	-	-
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Peak Hour: 07:30 AM - 08:30 AM Weather: Partly Cloudy (15.8 °C)



Peak Hour: 05:30 PM - 06:30 PM Weather: Partly Cloudy (25 °C)





Turning Movement Count (3 . COLUMBIA WAY & WESTCHESTER BLVD)

Start Time	E Approach COLUMBIA WAY					S Approach WESTCHESTER BLVD					W Approach COLUMBIA WAY					Int. Total (15 min)		Int. Total (1 hr)	
	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	U-Turn W:W	Peds W:	Approach Total				
06:00:00	16	1	0	0	17	5	14	0	0	19	2	9	0	0	11	47			
06:15:00	17	0	0	0	17	8	14	0	0	22	1	9	0	0	10	49			
06:30:00	30	0	0	0	30	7	10	0	1	17	2	5	0	0	7	54			
06:45:00	26	0	0	0	26	7	12	0	0	19	3	9	0	0	12	57		207	
07:00:00	29	1	0	0	30	6	13	0	0	19	3	13	0	0	16	65		225	
07:15:00	30	3	0	0	33	7	13	0	1	20	5	14	0	0	19	72		248	
07:30:00	31	1	0	0	32	17	18	0	1	35	2	13	0	0	15	82		276	
07:45:00	39	1	0	0	40	10	23	0	1	33	4	17	0	0	21	94		313	
08:00:00	18	1	0	0	19	10	12	0	2	22	5	22	0	0	27	68		316	
08:15:00	23	3	0	1	26	16	15	0	2	31	6	17	0	0	23	80		324	
08:30:00	25	2	0	0	27	13	22	0	2	35	7	19	0	0	26	88		330	
08:45:00	24	2	0	0	26	6	15	0	2	21	7	10	0	0	17	64		300	
09:00:00	16	4	1	0	21	10	7	0	1	17	10	12	0	0	22	60		292	
09:15:00	22	1	0	0	23	6	9	0	1	15	3	22	0	0	25	63		275	
09:30:00	17	5	0	1	22	8	11	0	2	19	3	13	0	0	16	57		244	
09:45:00	25	3	0	0	28	5	8	0	0	13	5	16	0	0	21	62		242	
BREAK																			
15:00:00	20	4	0	0	24	9	6	0	0	15	9	24	0	0	33	72			
15:15:00	27	7	0	0	34	3	11	0	1	14	16	40	0	0	56	104			
15:30:00	11	6	0	0	17	8	15	0	0	23	11	37	0	0	48	88			
15:45:00	21	7	0	0	28	3	8	0	3	11	15	26	0	0	41	80		344	
16:00:00	17	8	0	0	25	7	8	0	1	15	9	41	0	0	50	90		362	
16:15:00	21	6	0	0	27	5	6	0	0	11	20	35	0	0	55	93		351	
16:30:00	20	12	0	0	32	10	8	0	1	18	18	35	0	0	53	103		366	



16:45:00	31	13	0	0	44	3	12	0	5	15	20	37	0	0	57	116	402
17:00:00	30	6	0	0	36	6	11	0	1	17	28	44	0	0	72	125	437
17:15:00	25	12	0	0	37	5	8	0	1	13	27	41	0	0	68	118	462
17:30:00	25	16	0	0	41	7	18	0	2	25	25	55	0	0	80	146	505
17:45:00	39	11	0	0	50	6	9	0	1	15	20	50	0	0	70	135	524
18:00:00	28	6	0	0	34	11	21	0	1	32	21	44	0	0	65	131	530
18:15:00	42	15	0	0	57	8	12	0	0	20	11	37	0	0	48	125	537
18:30:00	22	8	0	0	30	8	13	0	1	21	20	26	0	0	46	97	488
18:45:00	33	3	0	0	36	5	16	1	5	22	12	29	0	0	41	99	452
Grand Total	800	168	1	2	969	245	398	1	39	644	350	821	0	0	1171	2784	-
Approach%	82.6%	17.3%	0.1%		-	38%	61.8%	0.2%		-	29.9%	70.1%	0%		-	-	-
Totals %	28.7%	6%	0%		34.8%	8.8%	14.3%	0%		23.1%	12.6%	29.5%	0%		42.1%	-	-
Heavy	9	3	0		-	6	3	0		-	5	15	0		-	-	-
Heavy %	1.1%	1.8%	0%		-	2.4%	0.8%	0%		-	1.4%	1.8%	0%		-	-	-
Bicycles	4	1	0		-	2	0	0		-	0	3	0		-	-	-
Bicycle %	0.5%	0.6%	0%		-	0.8%	0%	0%		-	0%	0.4%	0%		-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather: Partly Cloudy (15.8 °C)

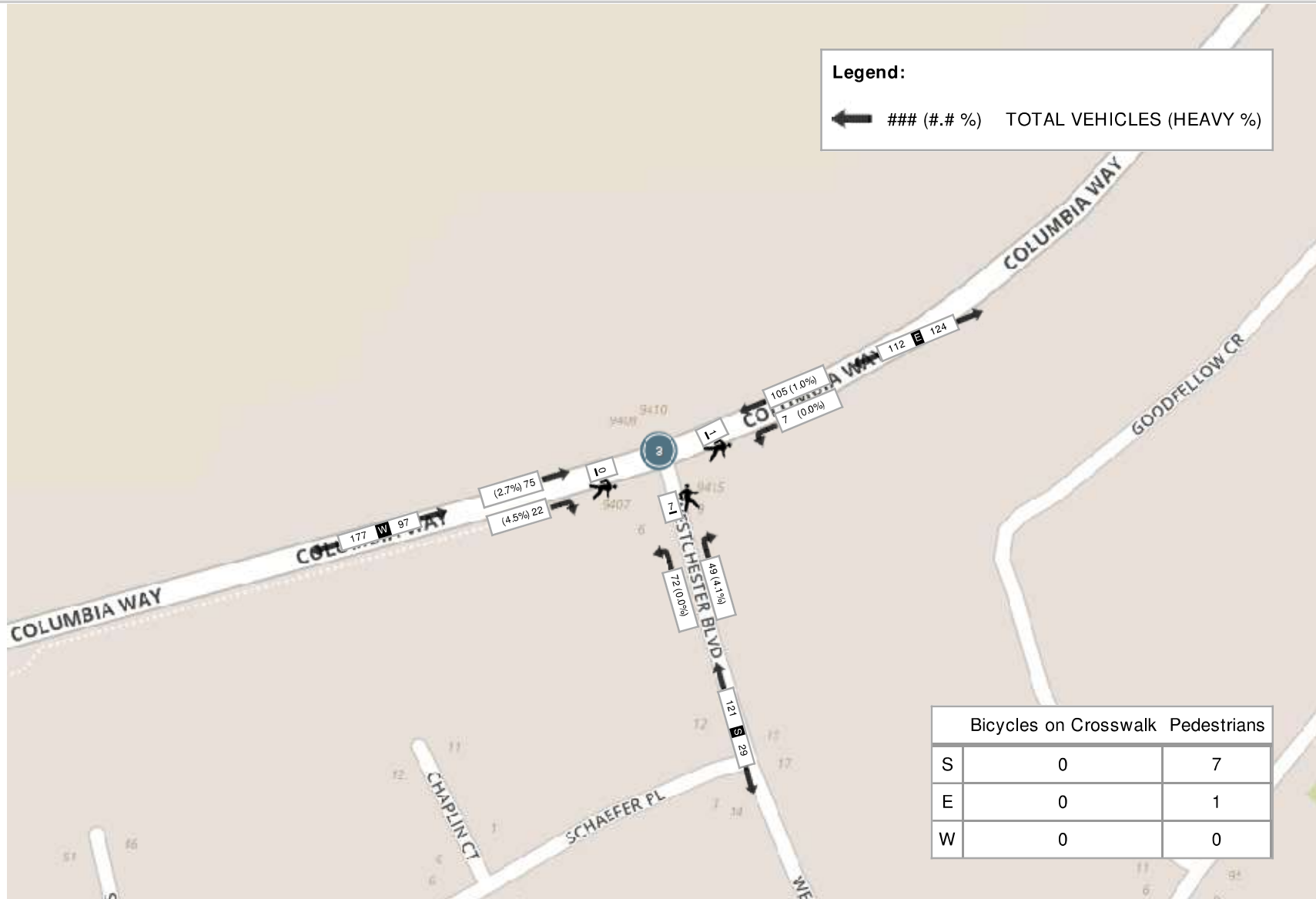
Start Time	E Approach COLUMBIA WAY					S Approach WESTCHESTER BLVD					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
07:45:00	39	1	0	0	40	10	23	0	1	33	4	17	0	0	21	94
08:00:00	18	1	0	0	19	10	12	0	2	22	5	22	0	0	27	68
08:15:00	23	3	0	1	26	16	15	0	2	31	6	17	0	0	23	80
08:30:00	25	2	0	0	27	13	22	0	2	35	7	19	0	0	26	88
Grand Total	105	7	0	1	112	49	72	0	7	121	22	75	0	0	97	330
Approach%	93.8%	6.3%	0%		-	40.5%	59.5%	0%		-	22.7%	77.3%	0%		-	-
Totals %	31.8%	2.1%	0%		33.9%	14.8%	21.8%	0%		36.7%	6.7%	22.7%	0%		29.4%	-
PHF	0.67	0.58	0		0.7	0.77	0.78	0		0.86	0.79	0.85	0		0.9	-
Heavy	1	0	0		1	2	0	0		2	1	2	0		3	-
Heavy %	1%	0%	0%		0.9%	4.1%	0%	0%		1.7%	4.5%	2.7%	0%		3.1%	-
Lights	104	7	0		111	47	72	0		119	21	73	0		94	-
Lights %	99%	100%	0%		99.1%	95.9%	100%	0%		98.3%	95.5%	97.3%	0%		96.9%	-
Single-Unit Trucks	1	0	0		1	0	0	0		0	0	2	0		2	-
Single-Unit Trucks %	1%	0%	0%		0.9%	0%	0%	0%		0%	0%	2.7%	0%		2.1%	-
Buses	0	0	0		0	2	0	0		2	1	0	0		1	-
Buses %	0%	0%	0%		0%	4.1%	0%	0%		1.7%	4.5%	0%	0%		1%	-
Articulated Trucks	0	0	0		0	0	0	0		0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	1	-	-	-	-	7	-	-	-	-	0	-	-
Pedestrians%	-	-	-	12.5%		-	-	-	87.5%		-	-	-	0%		-
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-
Bicycles on Road	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	0%		-	-	-	0%		-	-	-	0%		-



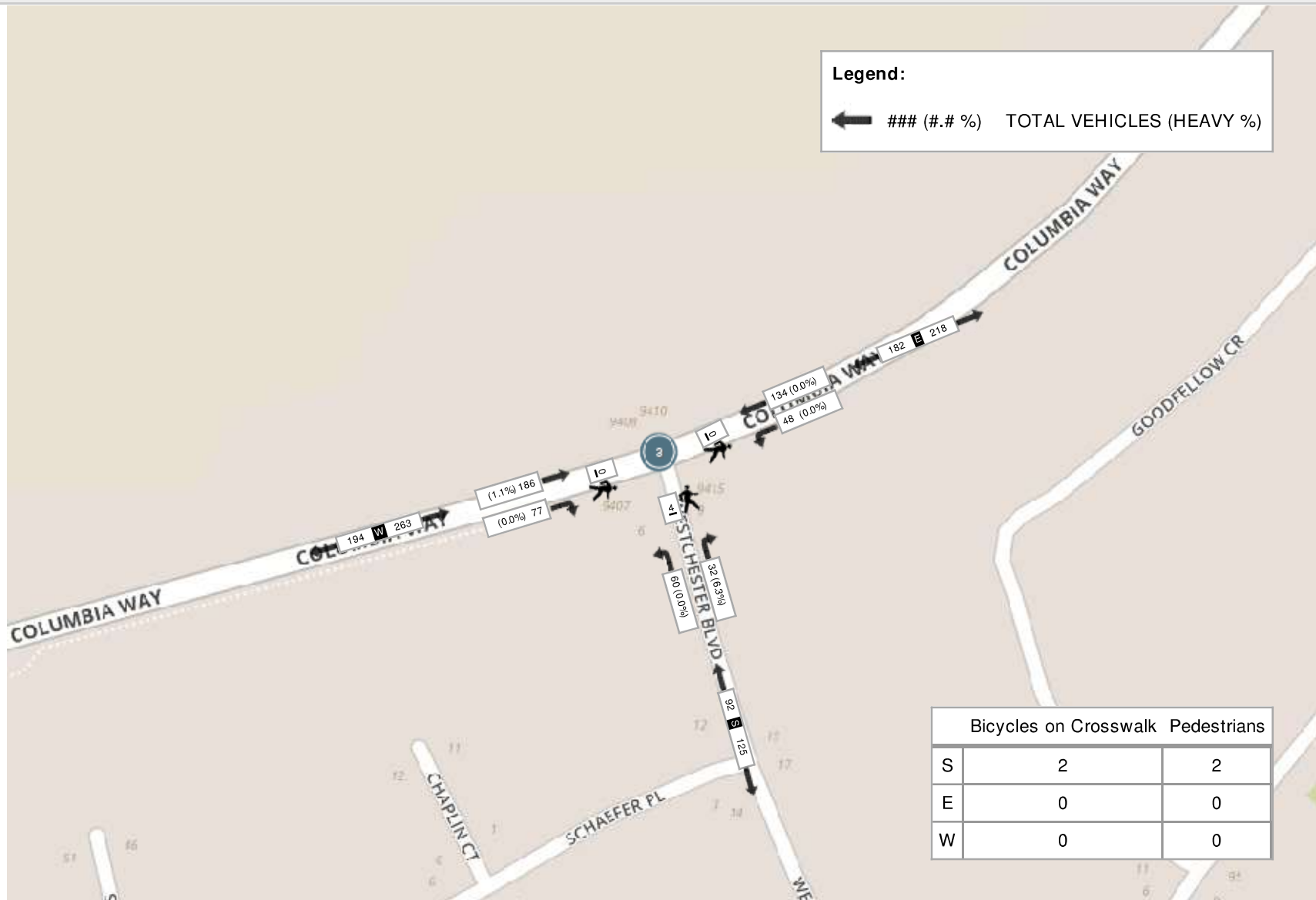
Peak Hour: 05:30 PM - 06:30 PM Weather: Partly Cloudy (25 °C)

Start Time	E Approach COLUMBIA WAY					S Approach WESTCHESTER BLVD					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	U-Turn	Peds	Approach Total	Right	Left	U-Turn	Peds	Approach Total	Right	Thru	U-Turn	Peds	Approach Total	
17:30:00	25	16	0	0	41	7	18	0	2	25	25	55	0	0	80	146
17:45:00	39	11	0	0	50	6	9	0	1	15	20	50	0	0	70	135
18:00:00	28	6	0	0	34	11	21	0	1	32	21	44	0	0	65	131
18:15:00	42	15	0	0	57	8	12	0	0	20	11	37	0	0	48	125
Grand Total	134	48	0	0	182	32	60	0	4	92	77	186	0	0	263	537
Approach%	73.6%	26.4%	0%		-	34.8%	65.2%	0%		-	29.3%	70.7%	0%		-	-
Totals %	25%	8.9%	0%		33.9%	6%	11.2%	0%		17.1%	14.3%	34.6%	0%		49%	-
PHF	0.8	0.75	0		0.8	0.73	0.71	0		0.72	0.77	0.85	0		0.82	-
Heavy	0	0	0		0	2	0	0		2	0	2	0		2	-
Heavy %	0%	0%	0%		0%	6.3%	0%	0%		2.2%	0%	1.1%	0%		0.8%	-
Lights	134	48	0		182	30	60	0		90	77	184	0		261	-
Lights %	100%	100%	0%		100%	93.8%	100%	0%		97.8%	100%	98.9%	0%		99.2%	-
Single-Unit Trucks	0	0	0		0	0	0	0		0	0	1	0		1	-
Single-Unit Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0.5%	0%		0.4%	-
Buses	0	0	0		0	1	0	0		1	0	0	0		0	-
Buses %	0%	0%	0%		0%	3.1%	0%	0%		1.1%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0		0	1	0	0		1	0	1	0		1	-
Articulated Trucks %	0%	0%	0%		0%	3.1%	0%	0%		1.1%	0%	0.5%	0%		0.4%	-
Pedestrians	-	-	-	0	-	-	-	-	2	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	50%	-	-	-	-	0%	-	-
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	2	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	0%	-	-	-	-	50%	-	-	-	-	0%	-	-
Bicycles on Road	1	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-
Bicycles on Road%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Partly Cloudy (15.8 °C)



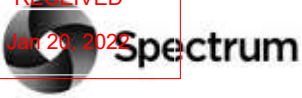
Peak Hour: 05:30 PM - 06:30 PM Weather: Partly Cloudy (25 °C)





Turning Movement Count (7 . EMIL KOLB PKWY / COLERAINE DR & KING ST)

Start Time	N Approach Southbound Approach					E Approach EMIL KOLB PKWY					S Approach KING ST					W Approach EMIL KOLB PKWY					Int. Total (15 min)	Int. Total (1 hr)				
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N			U-Turn W:W	Peds W:	Approach Total	
06:00:00	0	0	0	0	0	0	8	29	0	0	37	34	0	8	0	0	42	28	51	0	1	0	80	159		
06:15:00	0	0	0	0	0	0	8	31	0	0	39	40	0	11	0	0	51	38	59	0	0	0	97	187		
06:30:00	0	0	0	0	0	0	7	40	0	0	47	41	0	11	0	0	52	27	63	0	0	0	90	189		
06:45:00	0	0	0	0	0	0	16	42	0	0	58	61	0	18	0	2	79	31	69	0	0	0	100	237	772	
07:00:00	0	0	0	0	0	0	12	42	0	0	54	45	0	12	0	0	57	38	47	0	0	0	85	196	809	
07:15:00	0	0	0	0	0	0	16	38	0	3	54	31	0	10	0	1	41	32	75	0	0	0	107	202	824	
07:30:00	0	0	0	0	0	0	14	43	1	0	58	72	0	15	0	0	87	26	67	0	1	0	94	239	874	
07:45:00	0	0	0	0	0	0	15	38	1	0	54	56	0	9	0	0	65	29	90	0	1	0	120	239	876	
08:00:00	0	0	0	0	0	0	20	33	0	0	53	56	0	17	0	0	73	17	54	0	1	0	72	198	878	
08:15:00	0	0	0	0	0	0	24	37	0	0	61	40	0	9	0	0	49	34	70	0	0	0	104	214	890	
08:30:00	0	0	0	0	0	0	18	26	1	0	45	57	0	20	0	0	77	18	80	0	0	0	98	220	871	
08:45:00	0	0	0	0	0	0	21	40	0	0	61	71	0	15	0	0	86	26	46	0	0	0	72	219	851	
09:00:00	0	0	0	0	0	0	7	35	1	0	43	38	0	15	2	0	55	20	57	0	0	0	77	175	828	
09:15:00	0	0	0	0	0	0	9	29	0	0	38	34	0	13	0	0	47	16	31	0	0	0	47	132	746	
09:30:00	0	0	0	0	0	0	14	29	0	0	43	51	0	14	0	0	65	11	34	0	0	0	45	153	679	
09:45:00	0	0	0	0	0	0	18	32	0	0	50	35	0	10	0	0	45	8	28	0	0	1	36	131	591	
BREAK																										
15:00:00	0	0	0	0	0	0	52	44	1	0	97	46	0	13	0	0	59	9	25	0	0	0	34	190		
15:15:00	0	0	0	0	0	0	43	55	0	0	98	54	0	17	0	0	71	8	23	0	0	0	31	200		
15:30:00	0	0	0	0	0	0	73	64	0	0	137	37	0	11	0	0	48	21	33	0	0	0	54	239		
15:45:00	0	0	0	0	0	0	51	51	0	0	102	55	0	27	0	0	82	17	17	0	0	0	34	218	847	
16:00:00	0	0	0	0	0	0	80	83	1	1	164	56	0	39	0	0	95	23	21	0	0	0	44	303	960	
16:15:00	0	0	0	0	0	0	57	77	2	0	136	48	0	34	0	0	82	31	25	0	0	0	56	274	1034	
16:30:00	0	0	0	0	0	0	119	83	0	0	202	54	0	32	0	0	86	17	22	0	1	0	40	328	1123	
16:45:00	0	0	0	0	0	0	74	58	0	0	132	70	0	38	0	0	108	12	28	0	0	0	40	280	1185	
17:00:00	0	0	0	0	0	0	108	69	0	0	177	52	0	52	0	0	104	17	15	0	0	0	32	313	1195	
17:15:00	0	0	0	0	0	0	97	63	1	0	161	62	0	48	0	0	110	26	8	0	0	0	34	305	1226	
17:30:00	0	0	0	0	0	0	66	62	2	0	130	50	0	46	0	0	96	21	17	0	1	0	39	265	1163	
17:45:00	0	0	0	0	0	0	67	62	2	0	131	68	0	76	0	0	144	17	19	0	0	0	36	311	1194	
18:00:00	0	0	0	0	0	0	56	66	0	0	122	44	0	60	0	0	104	20	19	0	0	0	39	265	1146	
18:15:00	0	0	0	0	0	0	50	63	1	0	114	72	0	48	0	0	120	19	23	0	0	0	42	276	1117	



18:30:00	0	0	0	0	0	0	39	53	0	0	92	62	0	28	0	0	90	18	24	0	0	0	42	224	1076
18:45:00	0	0	0	0	0	0	48	47	0	0	95	43	0	26	0	0	69	16	12	0	0	0	28	192	957
Grand Total	0	0	0	0	0	0	1307	1564	14	4	2885	1635	0	802	2	3	2439	691	1252	0	6	1	1949	7273	-
Approach%	0%	0%	0%	0%	-	0%	45.3%	54.2%	0.5%	-	-	67%	0%	32.9%	0.1%	-	-	35.5%	64.2%	0%	0.3%	-	-	-	-
Totals %	0%	0%	0%	0%	0%	0%	0%	18%	21.5%	0.2%	39.7%	22.5%	0%	11%	0%	-	33.5%	9.5%	17.2%	0%	0.1%	-	26.8%	-	-
Heavy	0	0	0	0	-	0	146	146	2	-	-	136	0	61	2	-	-	59	165	0	1	-	-	-	-
Heavy %	0%	0%	0%	0%	-	0%	11.2%	9.3%	14.3%	-	-	8.3%	0%	7.6%	100%	-	-	8.5%	13.2%	0%	16.7%	-	-	-	-
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Overcast (20.5 °C)

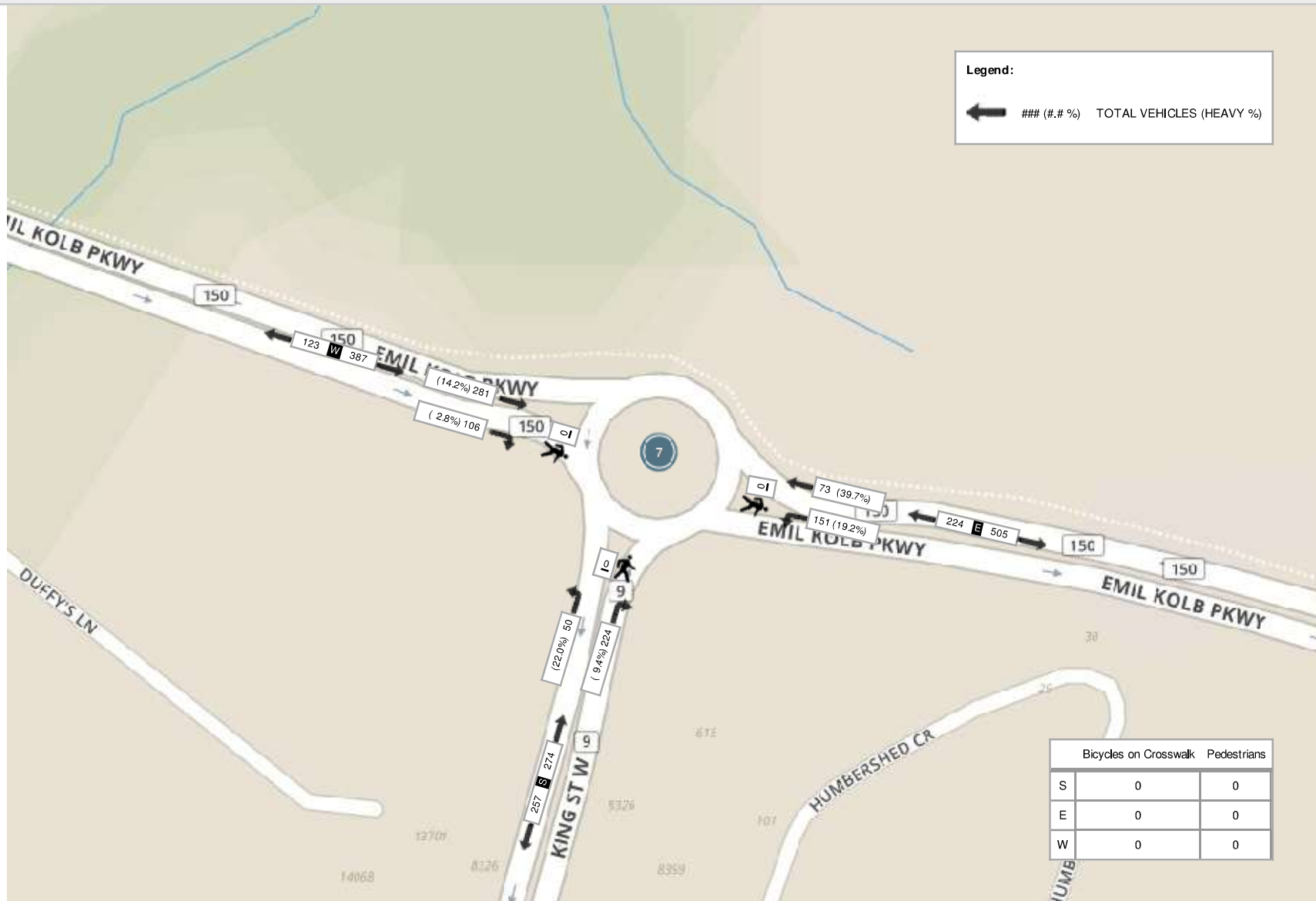
Start Time	N Approach					E Approach						S Approach						W Approach						Int. Total (15 min)
	Southbound Approach					EMIL KOLB PKWY						KING ST						EMIL KOLB PKWY						
	Right	Thru	Left	U-Turn	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
07:30:00	0	0	0	0	0	0	14	43	1	0	58	72	0	15	0	0	87	26	67	0	1	0	94	239
07:45:00	0	0	0	0	0	0	15	38	1	0	54	56	0	9	0	0	65	29	90	0	1	0	120	239
08:00:00	0	0	0	0	0	0	20	33	0	0	53	56	0	17	0	0	73	17	54	0	1	0	72	198
08:15:00	0	0	0	0	0	0	24	37	0	0	61	40	0	9	0	0	49	34	70	0	0	0	104	214
Grand Total	0	0	0	0	0	0	73	151	2	0	226	224	0	50	0	0	274	106	281	0	3	0	390	890
Approach%	0%	0%	0%	0%	-	0%	32.3%	66.8%	0.9%	-	-	81.8%	0%	18.2%	0%	-	-	27.2%	72.1%	0%	0.8%	-	-	-
Totals %	0%	0%	0%	0%	0%	0%	8.2%	17%	0.2%	25.4%	25.2%	0%	5.6%	0%	-	30.8%	11.9%	31.6%	0%	0.3%	-	43.8%	-	-
PHF	0	0	0	0	0	0	0.76	0.88	0.5	0.93	0.78	0	0.74	0	-	0.79	0.78	0.78	0	0.75	-	0.81	-	-
Heavy	0	0	0	0	0	0	29	29	2	-	60	21	0	11	0	-	32	3	40	0	1	-	44	-
Heavy %	0%	0%	0%	0%	0%	0%	39.7%	19.2%	100%	26.5%	9.4%	0%	22%	0%	-	11.7%	2.8%	14.2%	0%	33.3%	-	11.3%	-	-
Lights	0	0	0	0	0	0	44	122	0	-	166	203	0	39	0	-	242	103	241	0	2	-	346	-
Lights %	0%	0%	0%	0%	0%	0%	60.3%	80.8%	0%	73.5%	90.6%	0%	78%	0%	-	88.3%	97.2%	85.8%	0%	66.7%	-	88.7%	-	-
Single-Unit Trucks	0	0	0	0	0	0	15	20	1	-	36	16	0	9	0	-	25	1	18	0	1	-	20	-
Single-Unit Trucks %	0%	0%	0%	0%	0%	0%	20.5%	13.2%	50%	15.9%	7.1%	0%	18%	0%	-	9.1%	0.9%	6.4%	0%	33.3%	-	5.1%	-	-
Buses	0	0	0	0	0	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	-
Buses %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	-	0.4%	0%	0%	0%	0%	-	0%	-
Articulated Trucks	0	0	0	0	0	0	14	9	1	-	24	5	0	1	0	-	6	2	22	0	0	-	24	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	19.2%	6%	50%	10.6%	2.2%	0%	2%	0%	-	2.2%	1.9%	7.8%	0%	0%	-	6.2%	-	-
Pedestrians	-	-	-	-	-	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-	0	-	-	-
Pedestrians%	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-	0	-	-	-
Bicycles on Crosswalk%	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-



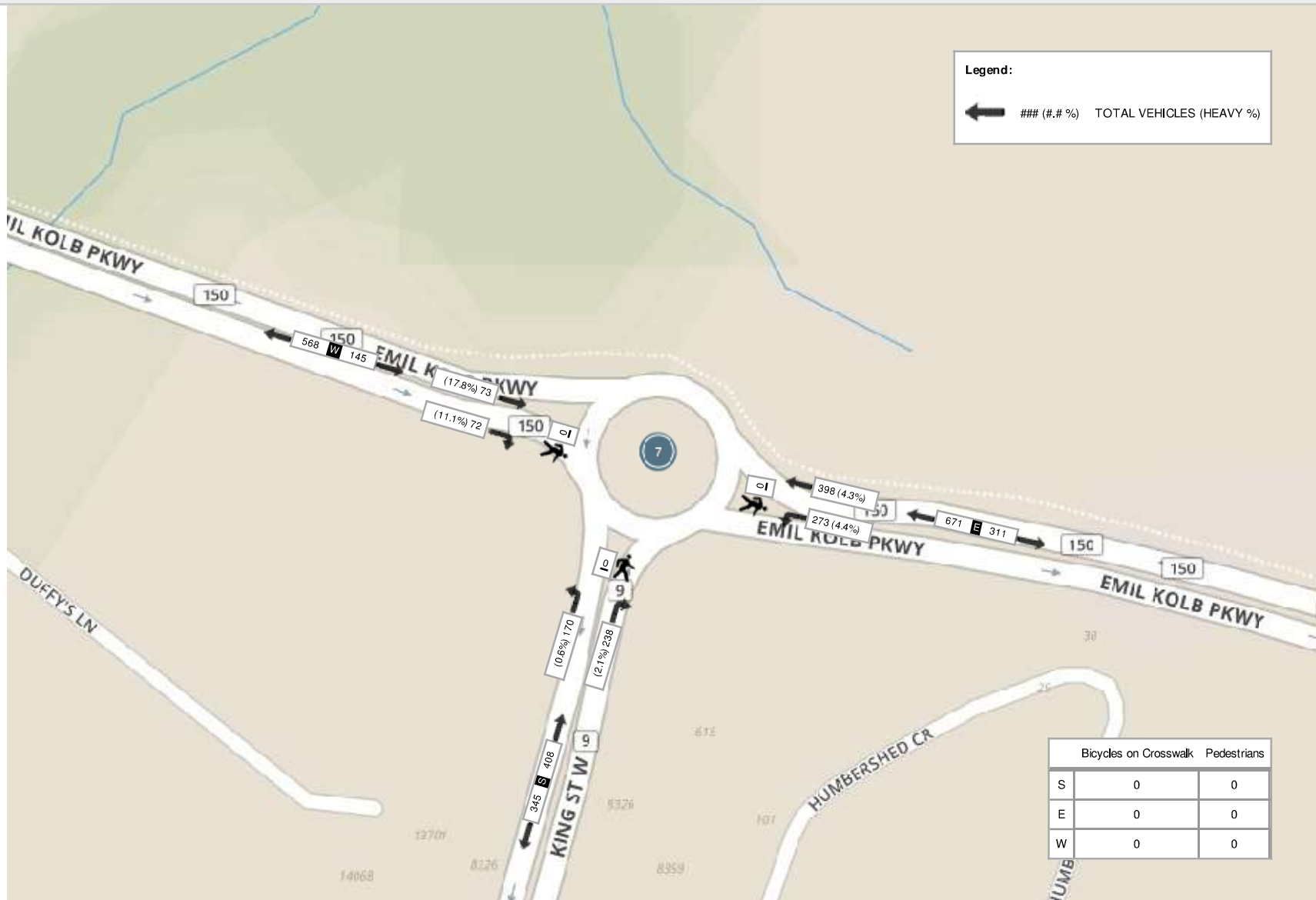
Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (23.6 °C)

Start Time	N Approach					E Approach						S Approach						W Approach						Int. Total (15 min)
	Southbound Approach					EMIL KOLB PKWY						KING ST						EMIL KOLB PKWY						
	Right	Thru	Left	U-Turn	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:30:00	0	0	0	0	0	0	119	83	0	0	202	54	0	32	0	0	86	17	22	0	1	0	40	328
16:45:00	0	0	0	0	0	0	74	58	0	0	132	70	0	38	0	0	108	12	28	0	0	0	40	280
17:00:00	0	0	0	0	0	0	108	69	0	0	177	52	0	52	0	0	104	17	15	0	0	0	32	313
17:15:00	0	0	0	0	0	0	97	63	1	0	161	62	0	48	0	0	110	26	8	0	0	0	34	305
Grand Total	0	0	0	0	0	0	398	273	1	0	672	238	0	170	0	0	408	72	73	0	1	0	146	1226
Approach%	0%	0%	0%	0%	-	0%	59.2%	40.6%	0.1%	-	-	58.3%	0%	41.7%	0%	-	-	49.3%	50%	0%	0.7%	-	-	-
Totals %	0%	0%	0%	0%	0%	0%	32.5%	22.3%	0.1%	54.8%	-	19.4%	0%	13.9%	0%	-	33.3%	5.9%	6%	0%	0.1%	-	11.9%	-
PHF	0	0	0	0	0	0	0.84	0.82	0.25	-	0.83	0.85	0	0.82	0	-	0.93	0.69	0.65	0	0.25	-	0.91	-
Heavy	0	0	0	0	0	0	17	12	0	-	29	5	0	1	0	-	6	8	13	0	0	-	21	-
Heavy %	0%	0%	0%	0%	0%	0%	4.3%	4.4%	0%	4.3%	-	2.1%	0%	0.6%	0%	-	1.5%	11.1%	17.8%	0%	0%	-	14.4%	-
Lights	0	0	0	0	0	0	381	261	1	-	643	233	0	169	0	-	402	64	60	0	1	-	125	-
Lights %	0%	0%	0%	0%	0%	0%	95.7%	95.6%	100%	95.7%	-	97.9%	0%	99.4%	0%	-	98.5%	88.9%	82.2%	0%	100%	-	85.6%	-
Single-Unit Trucks	0	0	0	0	0	0	8	10	0	-	18	3	0	1	0	-	4	6	5	0	0	-	11	-
Single-Unit Trucks %	0%	0%	0%	0%	0%	0%	2%	3.7%	0%	2.7%	-	1.3%	0%	0.6%	0%	-	1%	8.3%	6.8%	0%	0%	-	7.5%	-
Buses	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	-
Buses %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	1.4%	0%	0%	0%	-	0.7%	-
Articulated Trucks	0	0	0	0	0	0	9	2	0	-	11	2	0	0	0	-	2	1	8	0	0	-	9	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	2.3%	0.7%	0%	1.6%	-	0.8%	0%	0%	0%	-	0.5%	1.4%	11%	0%	0%	-	6.2%	-
Pedestrians	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Overcast (20.5 °C)



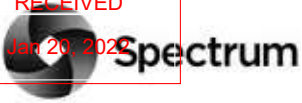
Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (23.6 °C)





Turning Movement Count (16 . HWY 50 & BOLTON HEIGHTS DR)

Start Time	N Approach HWY 50						E Approach BOLTON HEIGHTS DR						S Approach HWY 50						W Approach CROSS COUNTRY BLVD						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total			
06:00:00	0	106	0	0	0	106	1	0	15	0	0	16	1	18	0	0	0	19	3	0	1	0	0	4	145		
06:15:00	0	111	3	0	2	114	2	0	12	0	0	14	4	23	0	0	0	27	6	0	2	0	0	8	163		
06:30:00	1	122	2	0	0	125	4	0	22	0	0	26	3	32	0	0	0	35	4	0	0	0	0	4	190		
06:45:00	0	138	1	0	0	139	5	1	21	0	0	27	2	47	2	0	0	51	8	0	1	0	0	9	226	724	
07:00:00	0	121	2	0	1	123	2	0	26	0	0	28	4	39	4	0	0	47	7	0	1	0	0	8	206	785	
07:15:00	5	144	1	0	0	150	3	0	18	0	0	21	5	41	0	0	0	46	6	0	4	0	0	10	227	849	
07:30:00	0	131	2	0	0	133	3	0	27	0	0	30	3	40	3	0	1	46	5	0	1	0	0	6	215	874	
07:45:00	2	134	2	0	0	138	8	0	39	0	0	47	3	38	7	0	1	48	9	0	4	0	0	13	246	894	
08:00:00	2	111	3	0	1	116	6	0	29	0	0	35	6	63	2	0	0	71	8	0	3	0	1	11	233	921	
08:15:00	3	123	3	0	0	129	6	0	20	0	0	26	2	66	4	0	1	72	6	0	6	0	0	12	239	933	
08:30:00	1	111	1	0	3	113	6	0	22	0	1	28	7	68	1	0	2	76	11	2	3	0	1	16	233	951	
08:45:00	0	157	5	0	0	162	8	0	15	0	0	23	4	85	5	0	0	94	3	0	2	0	0	5	284	989	
09:00:00	1	120	2	0	0	123	5	0	17	0	0	22	10	64	3	0	0	77	5	0	0	0	0	5	227	983	
09:15:00	2	115	4	0	0	121	1	1	20	0	0	22	8	78	2	0	0	88	1	1	2	0	0	4	235	979	
09:30:00	2	101	2	0	0	105	2	0	8	0	0	10	4	58	1	0	0	63	2	0	3	0	0	5	183	929	
09:45:00	2	128	1	0	0	131	1	2	15	0	0	18	1	61	4	0	0	66	3	1	4	0	0	8	223	868	
BREAK																											
15:00:00	0	67	2	0	2	69	1	0	9	0	0	10	10	125	8	0	0	143	2	0	1	0	2	3	225		
15:15:00	0	68	5	0	0	73	1	1	5	0	0	7	15	143	10	0	0	168	1	1	3	0	0	5	253		
15:30:00	1	76	3	0	0	80	5	0	8	0	0	13	12	172	7	0	0	191	4	1	1	0	0	6	290		
15:45:00	4	102	2	0	0	108	3	1	15	0	0	19	18	171	14	0	1	203	5	2	6	0	0	13	343	1111	
16:00:00	3	91	5	0	0	99	5	1	11	0	1	17	14	152	18	0	0	184	1	1	3	0	0	5	305	1191	
16:15:00	3	85	3	0	0	91	4	0	16	0	0	20	15	161	21	0	4	197	5	1	0	0	0	6	314	1252	
16:30:00	6	83	4	0	0	93	5	0	9	0	0	14	15	191	18	0	0	224	4	1	1	0	0	6	337	1299	
16:45:00	9	79	3	1	0	92	6	1	12	0	0	19	25	186	12	0	0	223	5	1	4	0	0	10	344	1300	
17:00:00	3	71	8	0	1	82	3	1	5	0	2	9	24	194	23	0	2	241	3	1	3	0	1	7	339	1334	
17:15:00	3	77	5	0	4	85	3	0	8	0	2	11	19	193	21	0	1	233	3	1	1	0	1	5	334	1354	
17:30:00	3	73	7	0	0	83	2	1	7	0	0	10	20	199	18	0	3	237	4	0	1	0	0	5	335	1352	
17:45:00	3	86	10	0	0	99	4	1	13	0	0	18	20	173	17	0	0	210	3	1	4	0	0	8	335	1343	
18:00:00	1	78	1	0	0	80	5	2	8	0	0	15	28	182	16	0	0	226	3	0	3	0	0	6	327	1331	
18:15:00	7	71	2	0	0	80	7	1	13	0	0	21	15	162	21	1	1	199	0	0	8	0	1	8	308	1305	



18:30:00	2	75	4	0	3	81	4	1	13	0	0	18	24	137	8	0	0	169	5	0	3	0	0	8	276	1246
18:45:00	3	79	1	0	6	83	2	0	6	0	0	8	20	145	9	0	0	174	3	0	1	0	5	4	269	1180
Grand Total	72	3234	99	1	23	3406	123	15	484	0	6	622	361	3507	279	1	17	4148	138	15	80	0	12	233	8409	-
Approach%	2.1%	95%	2.9%	0%		-	19.8%	2.4%	77.8%	0%		-	8.7%	84.5%	6.7%	0%		-	59.2%	6.4%	34.3%	0%		-	-	-
Totals %	0.9%	38.5%	1.2%	0%		40.5%	1.5%	0.2%	5.8%	0%		7.4%	4.3%	41.7%	3.3%	0%		49.3%	1.6%	0.2%	1%	0%		2.8%	-	-
Heavy	0	39	4	0		-	3	1	0	0		-	4	51	4	0		-	2	1	2	0		-	-	-
Heavy %	0%	1.2%	4%	0%		-	2.4%	6.7%	0%	0%		-	1.1%	1.5%	1.4%	0%		-	1.4%	6.7%	2.5%	0%		-	-	-
Bicycles	0	0	0	0		-	0	2	0	0		-	1	0	0	0		-	0	0	0	0		-	-	-
Bicycle %	0%	0%	0%	0%		-	0%	13.3%	0%	0%		-	0.3%	0%	0%	0%		-	0%	0%	0%	0%		-	-	-



Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (20.2 °C)

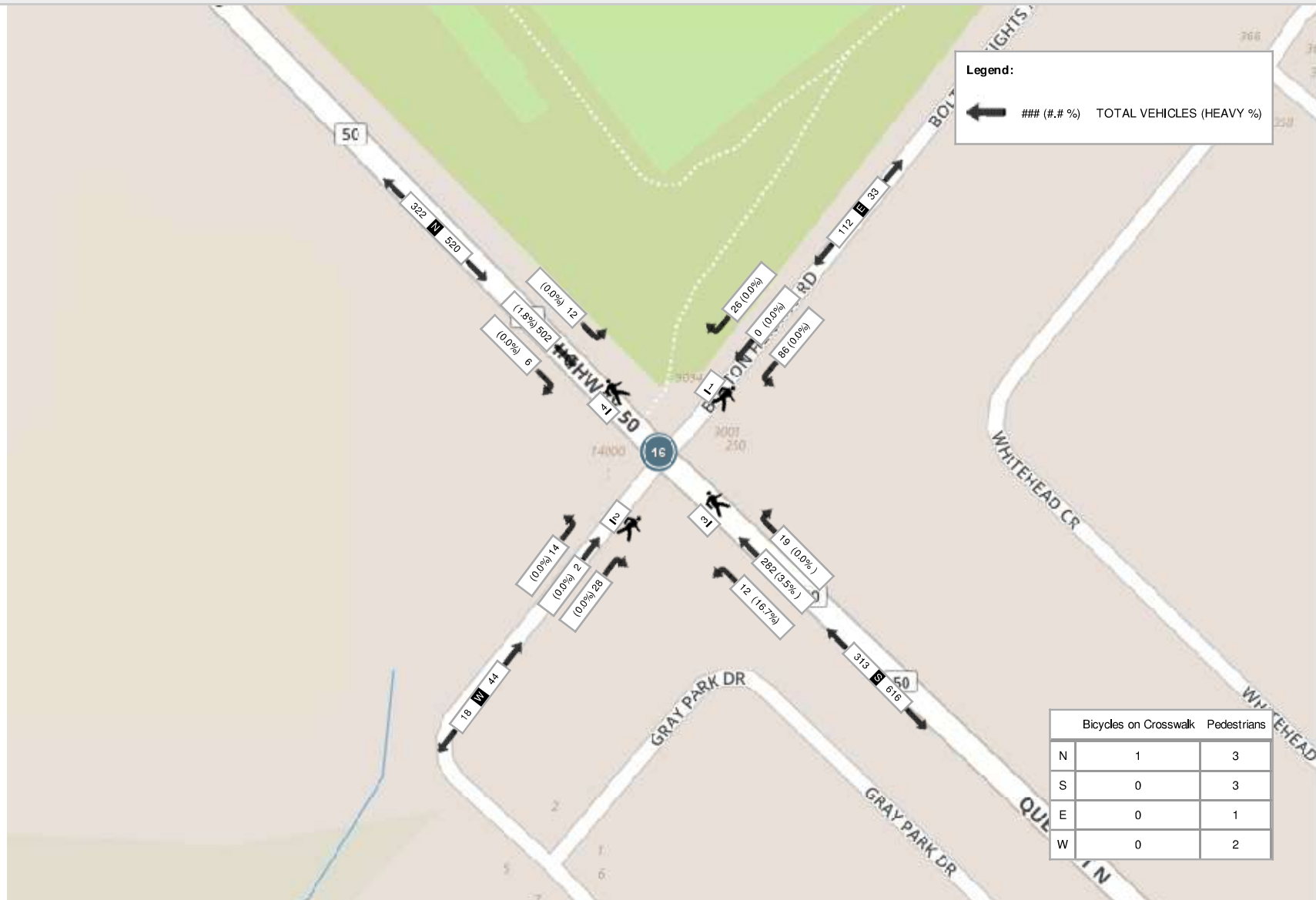
Start Time	N Approach HWY 50						E Approach BOLTON HEIGHTS DR						S Approach HWY 50						W Approach CROSS COUNTRY BLVD						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
08:00:00	2	111	3	0	1	116	6	0	29	0	0	35	6	63	2	0	0	71	8	0	3	0	1	11	233
08:15:00	3	123	3	0	0	129	6	0	20	0	0	26	2	66	4	0	1	72	6	0	6	0	0	12	239
08:30:00	1	111	1	0	3	113	6	0	22	0	1	28	7	68	1	0	2	76	11	2	3	0	1	16	233
08:45:00	0	157	5	0	0	162	8	0	15	0	0	23	4	85	5	0	0	94	3	0	2	0	0	5	284
Grand Total	6	502	12	0	4	520	26	0	86	0	1	112	19	282	12	0	3	313	28	2	14	0	2	44	989
Approach%	1.2%	96.5%	2.3%	0%		-	23.2%	0%	76.8%	0%		-	6.1%	90.1%	3.8%	0%		-	63.6%	4.5%	31.8%	0%		-	-
Totals %	0.6%	50.8%	1.2%	0%		52.6%	2.6%	0%	8.7%	0%		11.3%	1.9%	28.5%	1.2%	0%		31.6%	2.8%	0.2%	1.4%	0%		4.4%	-
PHF	0.5	0.8	0.6	0		0.8	0.81	0	0.74	0		0.8	0.68	0.83	0.6	0		0.83	0.64	0.25	0.58	0		0.69	-
Heavy	0	9	0	0		9	0	0	0	0		0	0	10	2	0		12	0	0	0	0		0	-
Heavy %	0%	1.8%	0%	0%		1.7%	0%	0%	0%	0%		0%	0%	3.5%	16.7%	0%		3.8%	0%	0%	0%	0%		0%	-
Lights	6	493	12	0		511	26	0	86	0		112	19	272	10	0		301	28	2	14	0		44	-
Lights %	100%	98.2%	100%	0%		98.3%	100%	0%	100%	0%		100%	100%	96.5%	83.3%	0%		96.2%	100%	100%	100%	0%		100%	-
Single-Unit Trucks	0	2	0	0		2	0	0	0	0		0	0	8	2	0		10	0	0	0	0		0	-
Single-Unit Trucks %	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	2.8%	16.7%	0%		3.2%	0%	0%	0%	0%		0%	-
Buses	0	5	0	0		5	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	-
Buses %	0%	1%	0%	0%		1%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.6%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	2	0	0		2	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0.4%	0%	0%		0.4%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	2	-	-
Pedestrians%	-	-	-	-	30%		-	-	-	-	10%		-	-	-	-	30%		-	-	-	-	20%		-
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	10%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-
Bicycles on Road	0	0	0	0	0	-	0	2	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-



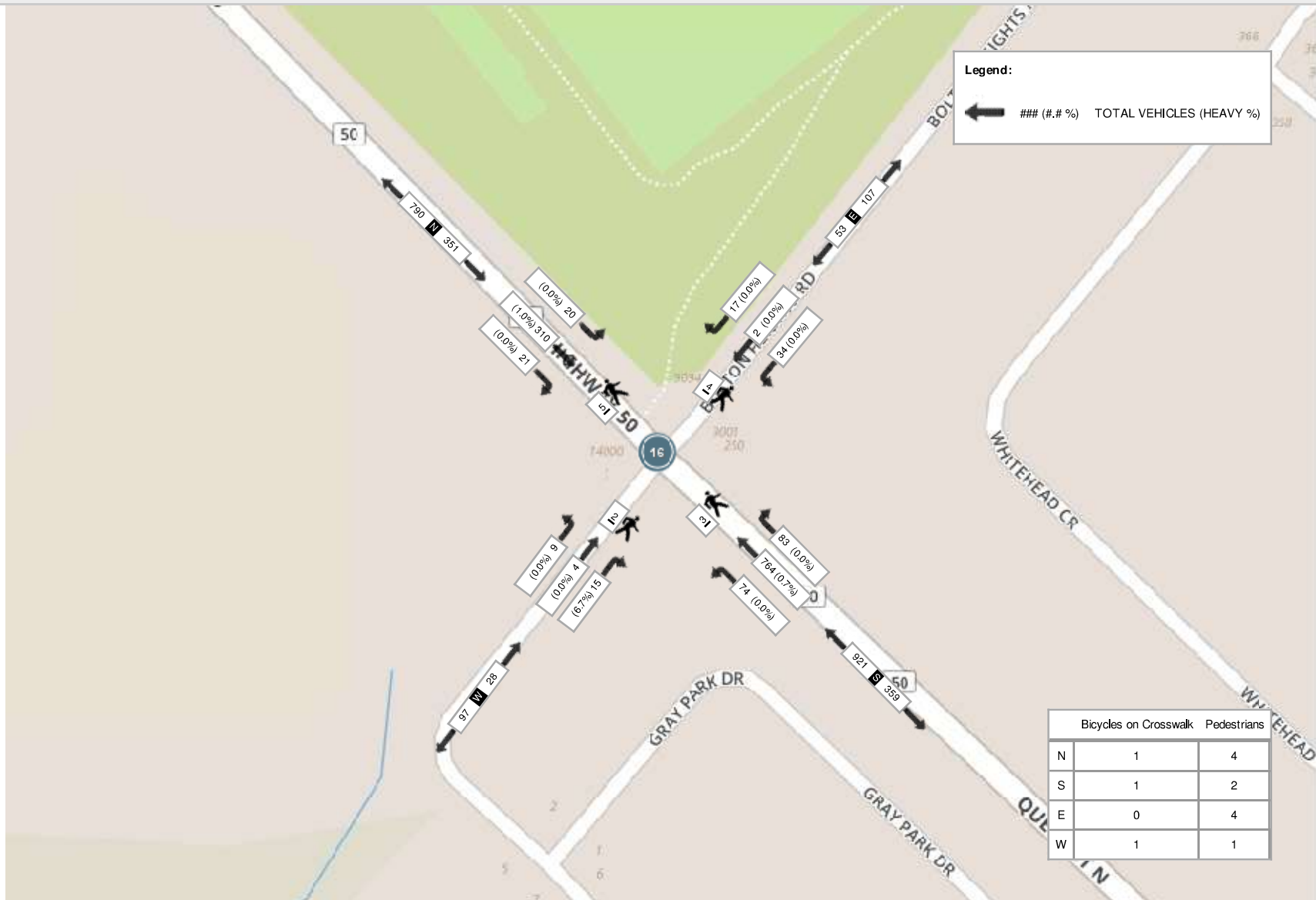
Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (24.2 °C)

Start Time	N Approach HWY 50						E Approach BOLTON HEIGHTS DR						S Approach HWY 50						W Approach CROSS COUNTRY BLVD						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:30:00	6	83	4	0	0	93	5	0	9	0	0	14	15	191	18	0	0	224	4	1	1	0	0	6	337
16:45:00	9	79	3	1	0	92	6	1	12	0	0	19	25	186	12	0	0	223	5	1	4	0	0	10	344
17:00:00	3	71	8	0	1	82	3	1	5	0	2	9	24	194	23	0	2	241	3	1	3	0	1	7	339
17:15:00	3	77	5	0	4	85	3	0	8	0	2	11	19	193	21	0	1	233	3	1	1	0	1	5	334
Grand Total	21	310	20	1	5	352	17	2	34	0	4	53	83	764	74	0	3	921	15	4	9	0	2	28	1354
Approach%	6%	88.1%	5.7%	0.3%		-	32.1%	3.8%	64.2%	0%		-	9%	83%	8%	0%		-	53.6%	14.3%	32.1%	0%		-	-
Totals %	1.6%	22.9%	1.5%	0.1%		26%	1.3%	0.1%	2.5%	0%		3.9%	6.1%	56.4%	5.5%	0%		68%	1.1%	0.3%	0.7%	0%		2.1%	-
PHF	0.58	0.93	0.63	0.25		0.95	0.71	0.5	0.71	0		0.7	0.83	0.98	0.8	0		0.96	0.75	1	0.56	0		0.7	-
Heavy	0	3	0	0		3	0	0	0	0		0	0	5	0	0		5	1	0	0	0		1	-
Heavy %	0%	1%	0%	0%		0.9%	0%	0%	0%	0%		0%	0%	0.7%	0%	0%		0.5%	6.7%	0%	0%	0%		3.6%	-
Lights	21	307	20	1		349	17	2	34	0		53	83	759	74	0		916	14	4	9	0		27	-
Lights %	100%	99%	100%	100%		99.1%	100%	100%	100%	0%		100%	100%	99.3%	100%	0%		99.5%	93.3%	100%	100%	0%		96.4%	-
Single-Unit Trucks	0	2	0	0		2	0	0	0	0		0	0	4	0	0		4	1	0	0	0		1	-
Single-Unit Trucks %	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	6.7%	0%	0%	0%		3.6%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.1%	0%	0%		0.1%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0.3%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	2	-	-	-	-	-	1	-	-
Pedestrians%	-	-	-	-	28.6%		-	-	-	-	28.6%		-	-	-	-	14.3%		-	-	-	-	7.1%		-
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-
Bicycles on Crosswalk%	-	-	-	-	7.1%		-	-	-	-	0%		-	-	-	-	7.1%		-	-	-	-	7.1%		-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (20.2 °C)



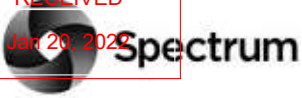
Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (24.2 °C)





Turning Movement Count (15 . HWY 50 & COLUMBIA WAY)

Start Time	N Approach HWY 50						E Approach COLUMBIA WAY						S Approach HWY 50						W Approach COLUMBIA WAY						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total		
06:00:00	0	82	3	0	0	85	8	0	24	0	0	32	1	17	2	0	0	20	0	0	0	0	0	0	137	
06:15:00	0	77	4	0	0	81	8	0	33	0	0	41	6	19	0	0	0	25	0	0	0	0	0	0	147	
06:30:00	6	101	1	0	0	108	8	1	34	0	0	43	3	23	0	0	0	26	0	0	0	0	0	0	177	
06:45:00	8	97	5	0	0	110	9	1	41	0	0	51	7	35	6	0	0	48	3	0	1	0	0	4	213	674
07:00:00	2	97	1	0	0	100	9	0	22	0	0	31	4	30	1	0	0	35	1	0	0	0	0	1	167	704
07:15:00	2	118	9	0	0	129	15	0	27	0	0	42	6	36	1	0	0	43	0	0	1	0	0	1	215	772
07:30:00	0	94	3	0	0	97	19	1	24	0	0	44	6	39	0	0	0	45	1	1	3	0	0	5	191	786
07:45:00	1	99	7	0	0	107	25	0	34	0	0	59	7	35	1	0	0	43	2	0	5	0	0	7	216	789
08:00:00	1	81	9	0	0	91	24	0	34	0	0	58	15	51	2	0	0	68	1	1	1	0	0	3	220	842
08:15:00	0	95	6	0	0	101	20	0	33	0	0	53	19	57	1	0	0	77	1	0	0	0	0	1	232	859
08:30:00	2	92	11	0	0	105	19	0	18	0	0	37	12	53	0	0	0	65	3	0	0	0	0	3	210	878
08:45:00	0	134	12	0	0	146	19	0	38	0	0	57	17	48	0	0	0	65	0	0	0	0	0	0	268	930
09:00:00	0	91	9	0	0	100	14	0	19	0	0	33	13	45	1	0	0	59	0	0	0	0	0	0	192	902
09:15:00	1	89	6	0	0	96	8	0	21	0	0	29	15	60	1	0	0	76	0	0	0	0	0	0	201	871
09:30:00	0	78	4	0	0	82	6	1	21	0	0	28	9	54	1	0	0	64	0	0	0	0	0	0	174	835
09:45:00	1	108	13	0	0	122	7	1	11	0	0	19	13	41	0	0	0	54	0	0	0	0	0	0	195	762
BREAK																										
15:00:00	3	53	11	0	0	67	4	0	14	0	0	18	30	94	0	0	0	124	1	0	0	0	0	1	210	
15:15:00	0	57	16	0	0	73	2	0	13	0	0	15	28	115	4	0	2	147	0	0	1	0	0	1	236	
15:30:00	1	62	13	0	0	76	9	1	11	0	0	21	37	131	0	0	0	168	10	0	14	0	0	24	289	
15:45:00	2	61	8	0	0	71	8	0	34	0	0	42	35	125	0	0	0	160	0	0	2	0	0	2	275	1010
16:00:00	0	62	18	0	0	80	12	0	21	0	0	33	37	128	0	0	0	165	0	0	2	0	0	2	280	1080
16:15:00	0	71	19	0	0	90	11	0	16	0	0	27	24	135	0	0	0	159	0	0	0	0	0	0	276	1120
16:30:00	1	72	22	0	0	95	9	0	16	0	0	25	40	141	0	0	0	181	0	0	0	0	0	0	301	1132
16:45:00	1	70	21	0	0	92	10	0	21	0	0	31	41	133	0	0	0	174	0	0	0	0	0	0	297	1154
17:00:00	1	54	14	0	0	69	7	0	14	0	0	21	49	149	0	0	0	198	0	0	3	0	0	3	291	1165
17:15:00	2	65	34	0	0	101	7	0	14	0	0	21	55	130	0	0	0	185	1	0	0	0	0	1	308	1197
17:30:00	0	56	20	0	0	76	12	0	11	0	0	23	49	147	0	0	0	196	0	0	1	0	0	1	296	1192
17:45:00	0	64	20	0	0	84	13	0	22	0	0	35	47	127	0	0	0	174	0	0	0	0	0	0	293	1188
18:00:00	0	50	26	0	0	76	15	0	25	0	0	40	47	137	0	0	0	184	0	0	0	0	0	0	300	1197
18:15:00	0	53	21	0	0	74	13	0	21	0	0	34	41	127	0	0	0	168	0	0	0	0	0	0	276	1165



Turning Movement Count
Location Name: HWY 50 & COLUMBIA WAY
Date: Tue, Aug 22, 2017 Deployment Lead: Theo Daglis

Crozier & Associates

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18:30:00	0	51	18	0	0	69	12	1	25	0	0	38	52	96	0	0	0	148	0	0	0	0	0	0	255	1124
18:45:00	0	58	9	0	0	67	7	0	19	0	0	26	39	91	0	0	0	130	0	1	0	0	0	1	224	1055
Grand Total	35	2492	393	0	0	2920	369	7	731	0	0	1107	804	2649	21	0	2	3474	24	3	34	0	0	61	7562	-
Approach%	1.2%	85.3%	13.5%	0%		-	33.3%	0.6%	66%	0%		-	23.1%	76.3%	0.6%	0%		-	39.3%	4.9%	55.7%	0%		-	-	-
Totals %	0.5%	33%	5.2%	0%		38.6%	4.9%	0.1%	9.7%	0%		14.6%	10.6%	35%	0.3%	0%		45.9%	0.3%	0%	0.4%	0%		0.8%	-	-
Heavy	10	34	20	0		-	10	1	4	0		-	10	49	1	0		-	2	0	8	0		-	-	-
Heavy %	28.6%	1.4%	5.1%	0%		-	2.7%	14.3%	0.5%	0%		-	1.2%	1.8%	4.8%	0%		-	8.3%	0%	23.5%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-



Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (20.2 °C)

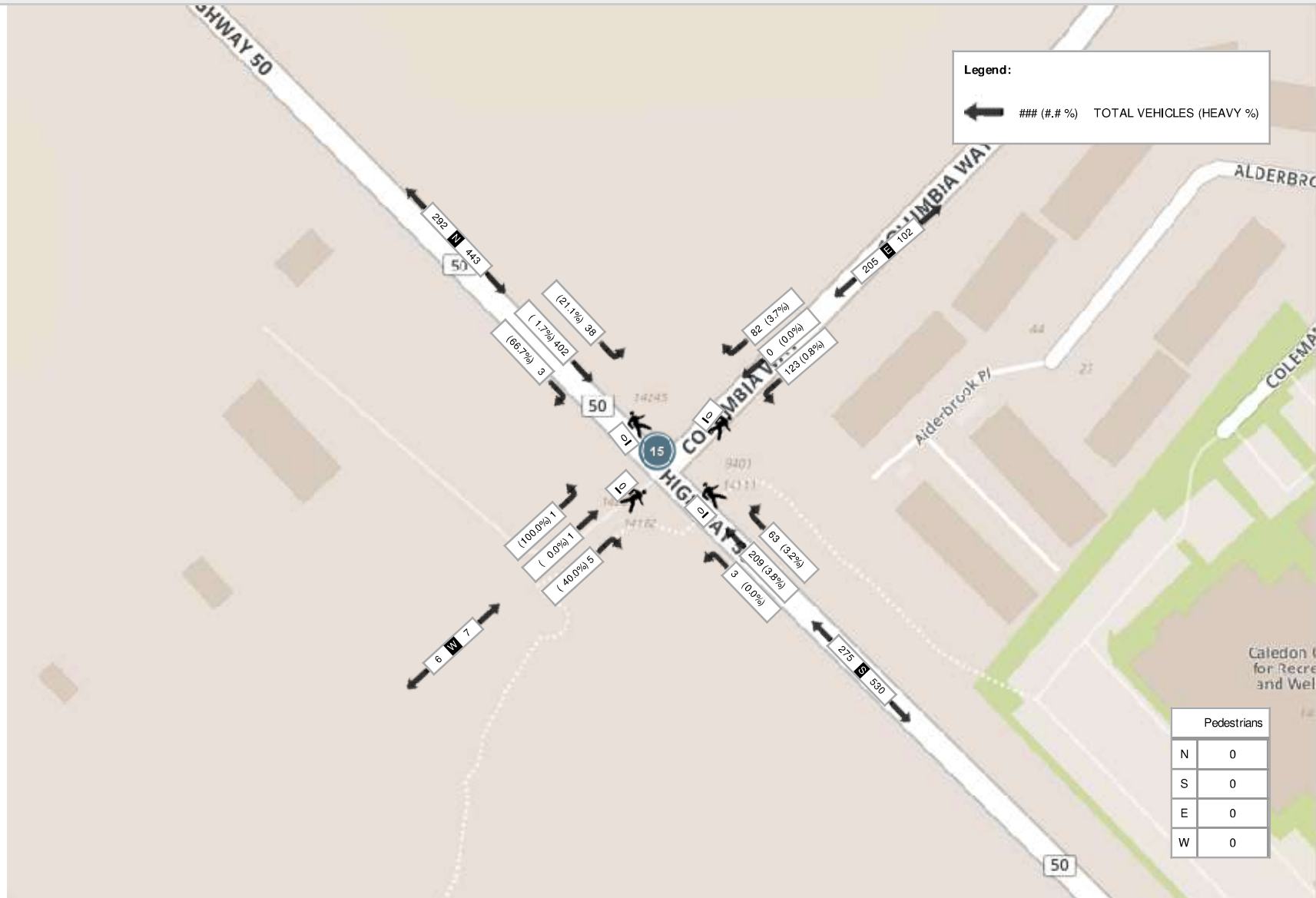
Start Time	N Approach HWY 50						E Approach COLUMBIA WAY						S Approach HWY 50						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
08:00:00	1	81	9	0	0	91	24	0	34	0	0	58	15	51	2	0	0	68	1	1	1	0	0	3	220
08:15:00	0	95	6	0	0	101	20	0	33	0	0	53	19	57	1	0	0	77	1	0	0	0	0	1	232
08:30:00	2	92	11	0	0	105	19	0	18	0	0	37	12	53	0	0	0	65	3	0	0	0	0	3	210
08:45:00	0	134	12	0	0	146	19	0	38	0	0	57	17	48	0	0	0	65	0	0	0	0	0	0	268
Grand Total	3	402	38	0	0	443	82	0	123	0	0	205	63	209	3	0	0	275	5	1	1	0	0	7	930
Approach%	0.7%	90.7%	8.6%	0%		-	40%	0%	60%	0%		-	22.9%	76%	1.1%	0%		-	71.4%	14.3%	14.3%	0%		-	-
Totals %	0.3%	43.2%	4.1%	0%		47.6%	8.8%	0%	13.2%	0%		22%	6.8%	22.5%	0.3%	0%		29.6%	0.5%	0.1%	0.1%	0%		0.8%	-
PHF	0.38	0.75	0.79	0		0.76	0.85	0	0.81	0		0.88	0.83	0.92	0.38	0		0.89	0.42	0.25	0.25	0		0.58	-
Heavy	2	7	8	0		17	3	0	1	0		4	2	8	0	0		10	2	0	1	0		3	-
Heavy %	66.7%	1.7%	21.1%	0%		3.8%	3.7%	0%	0.8%	0%		2%	3.2%	3.8%	0%	0%		3.6%	40%	0%	100%	0%		42.9%	-
Lights	1	395	30	0		426	79	0	122	0		201	61	201	3	0		265	3	1	0	0		4	-
Lights %	33.3%	98.3%	78.9%	0%		96.2%	96.3%	0%	99.2%	0%		98%	96.8%	96.2%	100%	0%		96.4%	60%	100%	0%	0%		57.1%	-
Single-Unit Trucks	1	2	7	0		10	2	0	0	0		2	2	6	0	0		8	1	0	0	0		1	-
Single-Unit Trucks %	33.3%	0.5%	18.4%	0%		2.3%	2.4%	0%	0%	0%		1%	3.2%	2.9%	0%	0%		2.9%	20%	0%	0%	0%		14.3%	-
Buses	1	3	1	0		5	0	0	1	0		1	0	2	0	0		2	1	0	1	0		2	-
Buses %	33.3%	0.7%	2.6%	0%		1.1%	0%	0%	0.8%	0%		0.5%	0%	1%	0%	0%		0.7%	20%	0%	100%	0%		28.6%	-
Articulated Trucks	0	2	0	0		2	1	0	0	0		1	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0.5%	0%	0%		0.5%	1.2%	0%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-



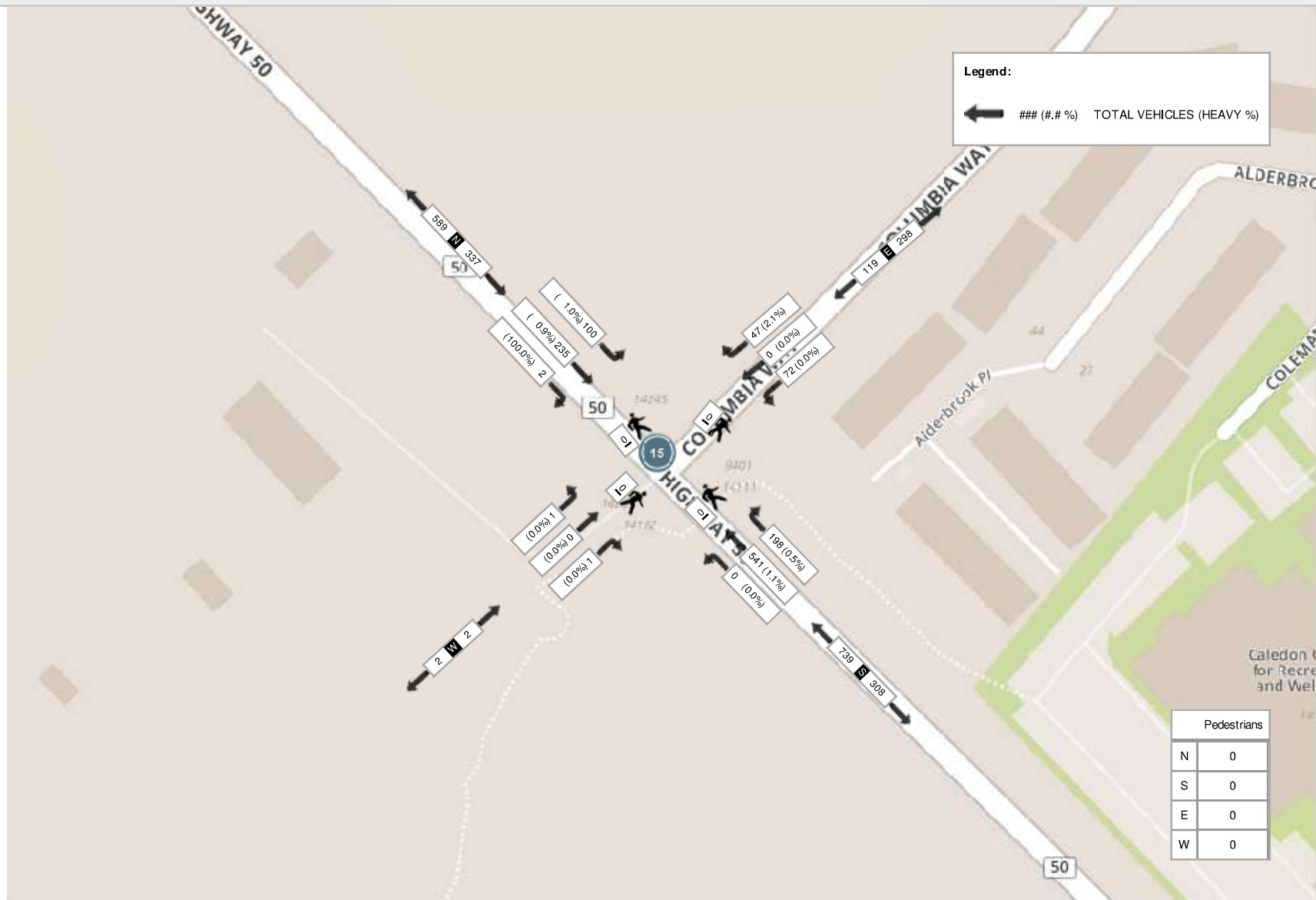
Peak Hour: 05:15 PM - 06:15 PM Weather: Mostly Cloudy (24.2 °C)

Start Time	N Approach HWY 50						E Approach COLUMBIA WAY						S Approach HWY 50						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
17:15:00	2	65	34	0	0	101	7	0	14	0	0	21	55	130	0	0	0	185	1	0	0	0	0	1	308
17:30:00	0	56	20	0	0	76	12	0	11	0	0	23	49	147	0	0	0	196	0	0	1	0	0	1	296
17:45:00	0	64	20	0	0	84	13	0	22	0	0	35	47	127	0	0	0	174	0	0	0	0	0	0	293
18:00:00	0	50	26	0	0	76	15	0	25	0	0	40	47	137	0	0	0	184	0	0	0	0	0	0	300
Grand Total	2	235	100	0	0	337	47	0	72	0	0	119	198	541	0	0	0	739	1	0	1	0	0	2	1197
Approach%	0.6%	69.7%	29.7%	0%		-	39.5%	0%	60.5%	0%		-	26.8%	73.2%	0%	0%		-	50%	0%	50%	0%		-	-
Totals %	0.2%	19.6%	8.4%	0%		28.2%	3.9%	0%	6%	0%		9.9%	16.5%	45.2%	0%	0%		61.7%	0.1%	0%	0.1%	0%		0.2%	-
PHF	0.25	0.9	0.74	0		0.83	0.78	0	0.72	0		0.74	0.9	0.92	0	0		0.94	0.25	0	0.25	0		0.5	-
Heavy	2	2	1	0		5	1	0	0	0		1	1	6	0	0		7	0	0	0	0		0	-
Heavy %	100%	0.9%	1%	0%		1.5%	2.1%	0%	0%	0%		0.8%	0.5%	1.1%	0%	0%		0.9%	0%	0%	0%	0%		0%	-
Lights	0	233	99	0		332	46	0	72	0		118	197	535	0	0		732	1	0	1	0		2	-
Lights %	0%	99.1%	99%	0%		98.5%	97.9%	0%	100%	0%		99.2%	99.5%	98.9%	0%	0%		99.1%	100%	0%	100%	0%		100%	-
Single-Unit Trucks	0	2	0	0		2	1	0	0	0		1	1	5	0	0		6	0	0	0	0		0	-
Single-Unit Trucks %	0%	0.9%	0%	0%		0.6%	2.1%	0%	0%	0%		0.8%	0.5%	0.9%	0%	0%		0.8%	0%	0%	0%	0%		0%	-
Buses	2	0	0	0		2	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Buses %	100%	0%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	0.2%	0%	0%		0.1%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	0	1	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0%	1%	0%		0.3%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (20.2 °C)



Peak Hour: 05:15 PM - 06:15 PM Weather: Mostly Cloudy (24.2 °C)





Turning Movement Count (14 . HWY 50 & EMIL KOLB PKWY)

Start Time	N Approach HIGHWAY 50						E Approach Westbound Approach					S Approach HIGHWAY 50					W Approach EMIL KOLB PKWY					Int. Total (15 min)		Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total		
06:00:00	67	76	0	1	0	144	0	0	0	0	0	0	18	10	0	0	28	3	0	11	0	0	14	186	
06:15:00	87	84	0	1	0	172	0	0	0	0	0	0	26	10	0	0	36	3	0	17	0	0	20	228	
06:30:00	74	109	0	0	0	183	0	0	0	0	0	0	24	4	0	0	28	4	0	12	0	0	16	227	
06:45:00	86	114	0	0	0	200	0	0	0	0	0	0	37	8	0	0	45	4	0	25	0	0	29	274	915
07:00:00	79	104	0	1	0	184	0	0	0	0	0	0	21	11	0	0	32	6	0	16	0	0	22	238	967
07:15:00	79	119	0	0	0	198	0	0	0	0	0	0	41	12	1	0	54	3	0	18	0	0	21	273	1012
07:30:00	80	95	0	0	0	175	0	0	0	0	0	0	46	12	0	0	58	3	0	27	0	0	30	263	1048
07:45:00	79	105	0	0	0	184	0	0	0	0	0	0	42	22	1	0	65	4	0	16	0	0	20	269	1043
08:00:00	58	80	0	1	0	139	0	0	0	0	0	0	62	13	1	0	76	8	0	21	0	0	29	244	1049
08:15:00	79	100	0	1	0	180	0	0	0	0	0	0	55	16	0	0	71	7	0	24	0	0	31	282	1058
08:30:00	71	101	0	1	0	173	0	0	0	0	0	0	56	12	1	0	69	12	0	21	0	0	33	275	1070
08:45:00	66	138	0	2	0	206	0	0	0	0	0	0	54	10	0	0	64	15	0	17	0	0	32	302	1103
09:00:00	40	93	0	0	0	133	0	0	0	0	0	0	47	13	1	0	61	12	0	16	0	0	28	222	1081
09:15:00	31	76	0	0	0	107	0	0	0	0	0	0	59	5	0	0	64	6	0	11	0	0	17	188	987
09:30:00	32	80	0	0	0	112	0	0	0	0	0	0	49	8	0	0	57	4	0	23	0	0	27	196	908
09:45:00	27	109	0	0	0	136	0	0	0	0	0	0	47	1	0	0	48	5	0	14	0	0	19	203	809
BREAK																									
15:00:00	23	58	0	0	0	81	0	0	0	0	0	0	107	3	0	0	110	10	0	45	0	0	55	246	
15:15:00	27	59	0	0	0	86	0	0	0	0	0	0	108	4	0	0	112	10	0	47	0	0	57	255	
15:30:00	33	67	0	0	0	100	0	0	0	0	0	0	144	9	0	0	153	14	0	48	0	0	62	315	
15:45:00	27	64	0	1	0	92	0	0	0	0	0	0	124	7	1	0	132	9	0	66	0	0	75	299	1115
16:00:00	30	68	0	0	0	98	0	0	0	0	0	0	140	15	0	0	155	18	0	78	0	0	96	349	1218
16:15:00	41	77	0	0	0	118	0	0	0	0	0	0	136	10	0	0	146	14	0	80	0	0	94	358	1321
16:30:00	25	73	0	0	0	98	0	0	0	0	0	0	143	5	3	0	151	21	0	96	0	0	117	366	1372
16:45:00	27	67	0	0	0	94	0	0	0	0	0	0	145	8	0	0	153	15	0	95	0	0	110	357	1430
17:00:00	21	62	0	0	0	83	0	0	0	0	0	0	156	10	0	0	166	15	0	115	0	0	130	379	1460
17:15:00	30	72	0	0	0	102	0	0	0	0	0	0	148	2	1	0	151	26	0	128	0	0	154	407	1509
17:30:00	23	60	0	0	0	83	0	0	0	0	0	0	148	9	0	0	157	13	0	96	0	0	109	349	1492
17:45:00	29	55	0	0	0	84	0	0	0	0	0	0	133	8	1	0	142	22	0	91	0	0	113	339	1474
18:00:00	15	48	0	0	0	63	0	0	0	0	0	0	135	19	0	0	154	25	0	88	0	0	113	330	1425
18:15:00	30	55	0	0	0	85	0	0	0	0	0	0	134	10	0	0	144	24	0	80	0	0	104	333	1351



Turning Movement Count

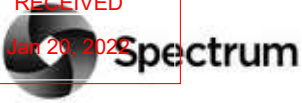
Location Name: HWY 50 & EMIL KOLB PKWY

Date: Tue, Aug 22, 2017 Deployment Lead: Theo Daglis

Crozier & Associates

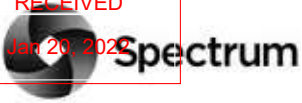
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18:30:00	23	48	0	0	0	71	0	0	0	0	0	0	99	9	0	0	108	11	0	44	0	0	55	234	1236
18:45:00	18	57	0	0	0	75	0	0	0	0	0	0	90	5	1	0	96	9	0	58	0	0	67	238	1135
Grand Total	1457	2573	0	9	0	4039	0	0	0	0	0	0	2774	300	12	0	3086	355	0	1544	0	0	1899	9024	-
Approach%	36.1%	63.7%	0%	0.2%		-	0%	0%	0%	0%	-	0%	89.9%	9.7%	0.4%		-	18.7%	0%	81.3%	0%		-	-	-
Totals %	16.1%	28.5%	0%	0.1%		44.8%	0%	0%	0%	0%	0%	0%	30.7%	3.3%	0.1%		34.2%	3.9%	0%	17.1%	0%		21%	-	-
Heavy	203	50	0	2		-	0	0	0	0	-	0	67	22	0		-	37	0	169	0		-	-	-
Heavy %	13.9%	1.9%	0%	22.2%		-	0%	0%	0%	0%	-	0%	2.4%	7.3%	0%		-	10.4%	0%	10.9%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-



Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (20.2 °C)

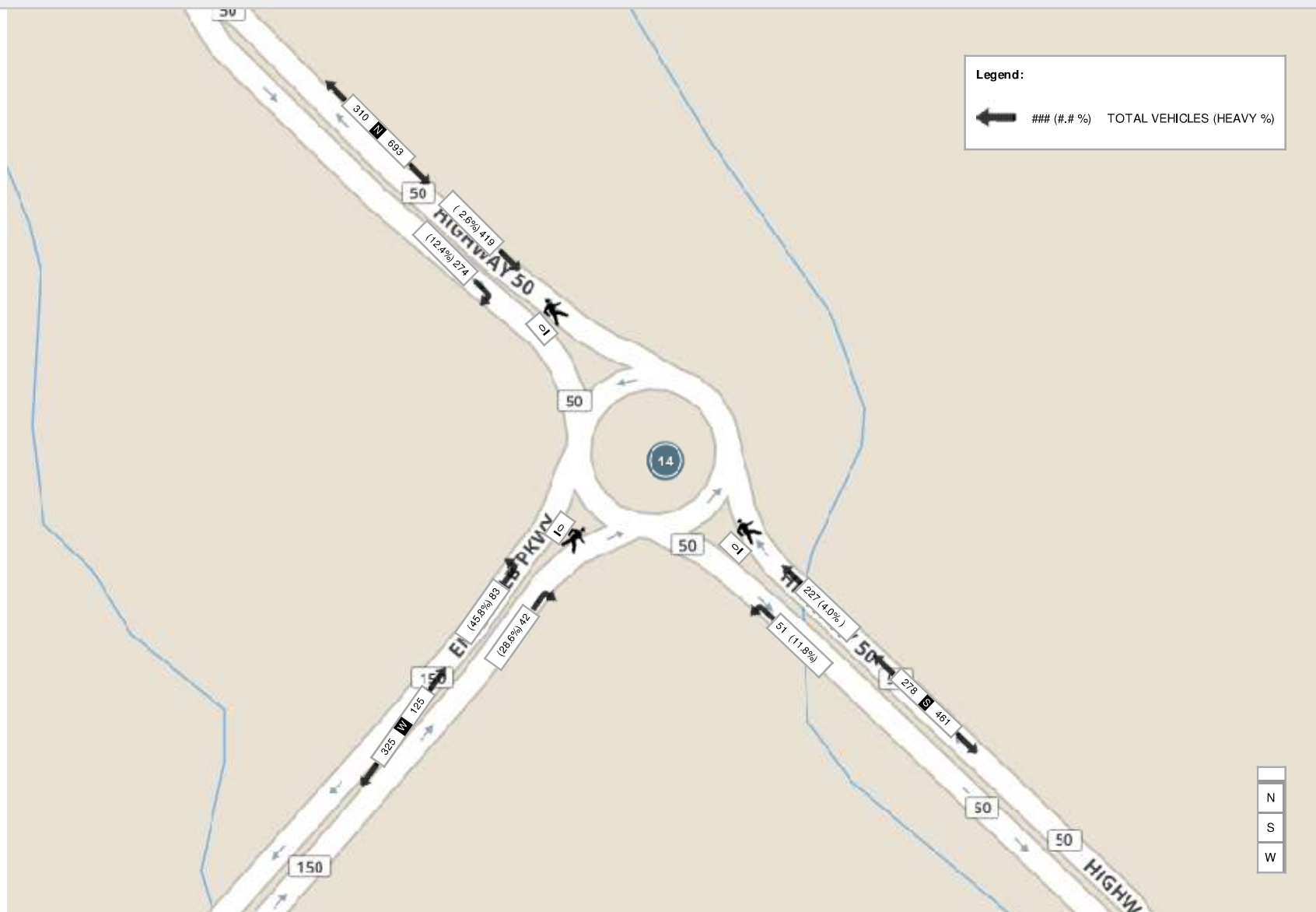
Start Time	N Approach HIGHWAY 50						E Approach Westbound Approach					S Approach HIGHWAY 50						W Approach EMIL KOLB PKWY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
08:00:00	58	80	0	1	0	139	0	0	0	0	0	0	62	13	1	0	76	8	0	21	0	0	29	244
08:15:00	79	100	0	1	0	180	0	0	0	0	0	0	55	16	0	0	71	7	0	24	0	0	31	282
08:30:00	71	101	0	1	0	173	0	0	0	0	0	0	56	12	1	0	69	12	0	21	0	0	33	275
08:45:00	66	138	0	2	0	206	0	0	0	0	0	0	54	10	0	0	64	15	0	17	0	0	32	302
Grand Total	274	419	0	5	0	698	0	0	0	0	0	0	227	51	2	0	280	42	0	83	0	0	125	1103
Approach%	39.3%	60%	0%	0.7%		-	0%	0%	0%	0%	-	0%	81.1%	18.2%	0.7%		-	33.6%	0%	66.4%	0%		-	-
Totals %	24.8%	38%	0%	0.5%		63.3%	0%	0%	0%	0%	0%	0%	20.6%	4.6%	0.2%		25.4%	3.8%	0%	7.5%	0%		11.3%	-
PHF	0.87	0.76	0	0.63		0.85	0	0	0	0	0	0	0.92	0.8	0.5		0.92	0.7	0	0.86	0		0.95	-
Heavy	34	11	0	2		47	0	0	0	0	0	0	9	6	0		15	12	0	38	0		50	-
Heavy %	12.4%	2.6%	0%	40%		6.7%	0%	0%	0%	0%	0%	0%	4%	11.8%	0%		5.4%	28.6%	0%	45.8%	0%		40%	-
Lights	240	408	0	3		651	0	0	0	0	0	0	218	45	2		265	30	0	45	0		75	-
Lights %	87.6%	97.4%	0%	60%		93.3%	0%	0%	0%	0%	0%	0%	96%	88.2%	100%		94.6%	71.4%	0%	54.2%	0%		60%	-
Single-Unit Trucks	14	6	0	2		22	0	0	0	0	0	0	7	5	0		12	10	0	17	0		27	-
Single-Unit Trucks %	5.1%	1.4%	0%	40%		3.2%	0%	0%	0%	0%	0%	0%	3.1%	9.8%	0%		4.3%	23.8%	0%	20.5%	0%		21.6%	-
Buses	0	3	0	0		3	0	0	0	0	0	0	2	0	0		2	1	0	0	0		1	-
Buses %	0%	0.7%	0%	0%		0.4%	0%	0%	0%	0%	0%	0%	0.9%	0%	0%		0.7%	2.4%	0%	0%	0%		0.8%	-
Articulated Trucks	20	2	0	0		22	0	0	0	0	0	0	0	1	0		1	1	0	21	0		22	-
Articulated Trucks %	7.3%	0.5%	0%	0%		3.2%	0%	0%	0%	0%	0%	0%	0%	2%	0%		0.4%	2.4%	0%	25.3%	0%		17.6%	-



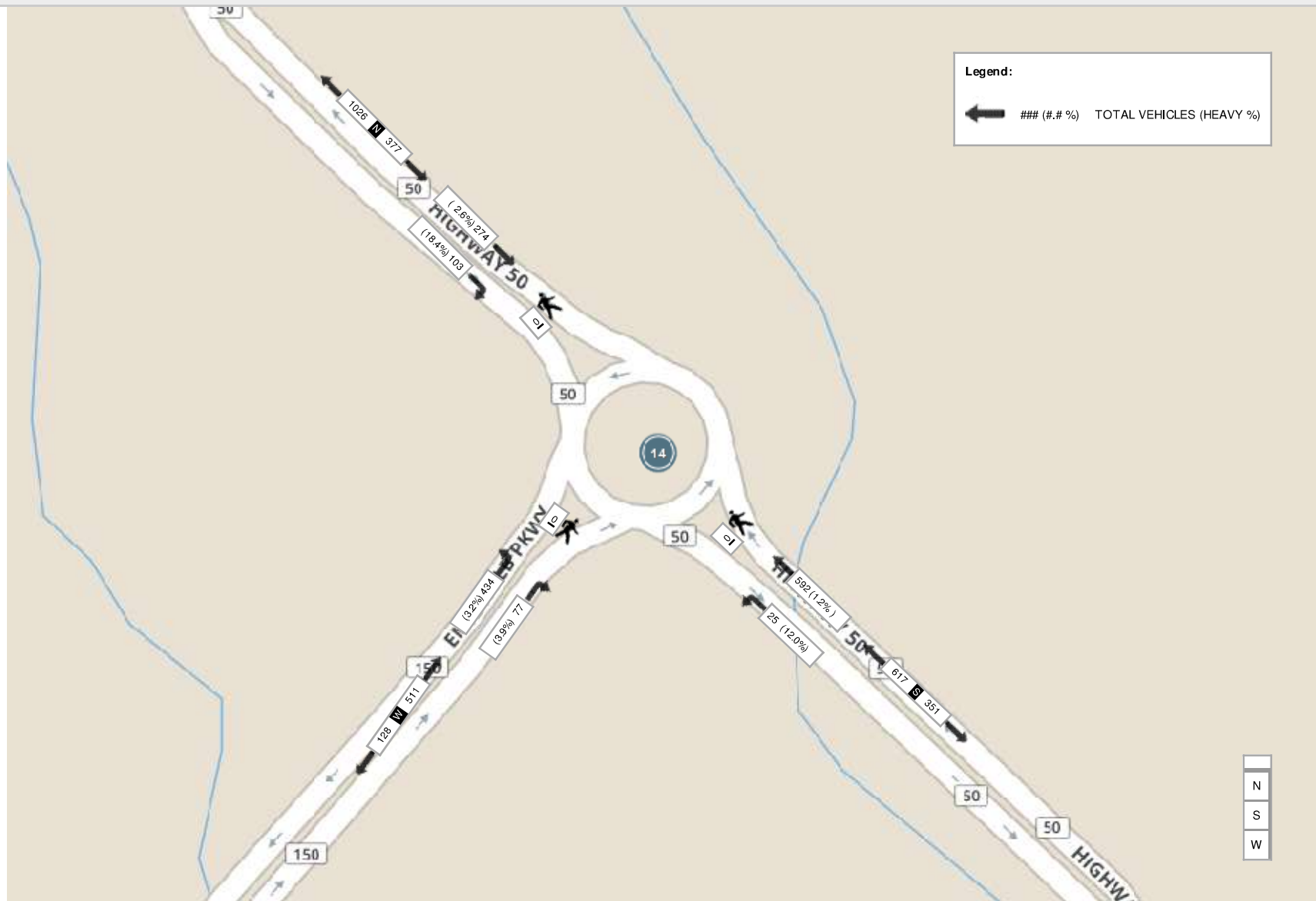
Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (24.2 °C)

Start Time	N Approach HIGHWAY 50						E Approach Westbound Approach					S Approach HIGHWAY 50						W Approach EMIL KOLB PKWY						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:30:00	25	73	0	0	0	98	0	0	0	0	0	0	143	5	3	0	151	21	0	96	0	0	117	366
16:45:00	27	67	0	0	0	94	0	0	0	0	0	0	145	8	0	0	153	15	0	95	0	0	110	357
17:00:00	21	62	0	0	0	83	0	0	0	0	0	0	156	10	0	0	166	15	0	115	0	0	130	379
17:15:00	30	72	0	0	0	102	0	0	0	0	0	0	148	2	1	0	151	26	0	128	0	0	154	407
Grand Total	103	274	0	0	0	377	0	0	0	0	0	0	592	25	4	0	621	77	0	434	0	0	511	1509
Approach%	27.3%	72.7%	0%	0%		-	0%	0%	0%	0%	-	0%	95.3%	4%	0.6%		-	15.1%	0%	84.9%	0%		-	-
Totals %	6.8%	18.2%	0%	0%		25%	0%	0%	0%	0%	0%	0%	39.2%	1.7%	0.3%		41.2%	5.1%	0%	28.8%	0%		33.9%	-
PHF	0.86	0.94	0	0		0.92	0	0	0	0	0	0	0.95	0.63	0.33		0.94	0.74	0	0.85	0		0.83	-
Heavy	19	7	0	0		26	0	0	0	0	0	0	7	3	0		10	3	0	14	0		17	-
Heavy %	18.4%	2.6%	0%	0%		6.9%	0%	0%	0%	0%	0%	0%	1.2%	12%	0%		1.6%	3.9%	0%	3.2%	0%		3.3%	-
Lights	84	267	0	0		351	0	0	0	0	0	0	585	22	4		611	74	0	420	0		494	-
Lights %	81.6%	97.4%	0%	0%		93.1%	0%	0%	0%	0%	0%	0%	98.8%	88%	100%		98.4%	96.1%	0%	96.8%	0%		96.7%	-
Single-Unit Trucks	9	0	0	0		9	0	0	0	0	0	0	6	2	0		8	1	0	8	0		9	-
Single-Unit Trucks %	8.7%	0%	0%	0%		2.4%	0%	0%	0%	0%	0%	0%	1%	8%	0%		1.3%	1.3%	0%	1.8%	0%		1.8%	-
Buses	0	4	0	0		4	0	0	0	0	0	0	0	1	0		1	0	0	0	0		0	-
Buses %	0%	1.5%	0%	0%		1.1%	0%	0%	0%	0%	0%	0%	0%	4%	0%		0.2%	0%	0%	0%	0%		0%	-
Articulated Trucks	10	3	0	0		13	0	0	0	0	0	0	1	0	0		1	2	0	6	0		8	-
Articulated Trucks %	9.7%	1.1%	0%	0%		3.4%	0%	0%	0%	0%	0%	0%	0.2%	0%	0%		0.2%	2.6%	0%	1.4%	0%		1.6%	-

Peak Hour: 08:00 AM - 09:00 AM Weather: Overcast (20.2 °C)



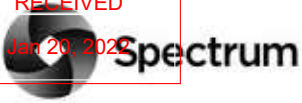
Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (24.2 °C)





Turning Movement Count (17 . HWY 50 & KING ST)

Start Time	N Approach HWY 50						E Approach KING ST						S Approach HWY 50						W Approach KING ST						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	U-Turn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	U-Turn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	U-Turn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	U-Turn W:W	Peds W:	Approach Total			
06:00:00	9	112	16	0	0	137	8	22	28	0	0	58	6	22	2	0	0	30	12	33	2	0	0	47	272		
06:15:00	6	126	13	0	0	145	13	29	28	0	0	70	5	22	4	0	0	31	7	21	3	0	0	31	277		
06:30:00	8	145	15	0	0	168	10	31	33	0	0	74	9	36	4	0	0	49	12	24	5	0	0	41	332		
06:45:00	9	155	13	0	0	177	9	27	43	0	0	79	9	37	6	0	0	52	5	29	12	0	0	46	354	1235	
07:00:00	4	158	14	0	0	176	8	34	36	0	0	78	15	36	7	0	0	58	10	38	4	0	0	52	364	1327	
07:15:00	13	165	11	0	1	189	9	35	42	0	0	86	20	31	2	0	0	53	13	24	4	0	0	41	369	1419	
07:30:00	10	163	10	0	0	183	6	31	41	0	1	78	16	46	11	0	0	73	11	32	6	0	0	49	383	1470	
07:45:00	8	173	12	0	3	193	9	38	79	0	2	126	17	40	7	0	1	64	14	42	8	0	2	64	447	1563	
08:00:00	8	167	15	0	0	190	6	37	40	0	0	83	17	57	9	0	0	83	8	28	9	0	0	45	401	1600	
08:15:00	12	122	12	0	1	146	15	34	69	0	4	118	20	42	8	0	1	70	16	23	13	0	0	52	386	1617	
08:30:00	7	148	14	0	0	169	10	32	40	0	1	82	20	74	8	0	1	102	13	35	13	0	4	61	414	1648	
08:45:00	10	152	17	0	3	179	14	53	50	0	1	117	45	72	4	0	1	121	18	40	23	0	0	81	498	1699	
09:00:00	13	128	20	0	0	161	21	31	51	0	3	103	40	60	8	0	1	108	17	32	10	0	1	59	431	1729	
09:15:00	14	120	18	0	0	152	13	31	33	0	1	77	35	60	13	0	1	108	22	30	12	0	3	64	401	1744	
09:30:00	11	100	12	0	0	123	18	36	43	0	3	97	22	53	9	0	0	84	19	22	6	0	1	47	351	1681	
09:45:00	11	123	10	0	0	144	14	24	55	0	0	93	31	61	17	0	0	109	22	28	11	0	0	61	407	1590	
BREAK																											
15:00:00	3	85	12	0	6	100	11	37	48	0	6	96	65	138	15	0	4	218	18	39	10	0	8	67	481		
15:15:00	7	68	9	0	8	84	11	45	53	0	3	109	67	135	18	0	5	220	18	46	15	0	2	79	492		
15:30:00	5	89	10	0	2	104	10	48	29	0	4	87	67	170	10	0	2	247	17	46	13	0	8	76	514		
15:45:00	5	111	6	0	7	122	16	46	56	0	4	118	73	170	11	0	3	254	17	39	20	0	3	76	570	2057	
16:00:00	10	100	11	0	1	121	17	51	33	0	4	101	88	158	9	0	5	255	12	44	15	0	4	71	548	2124	
16:15:00	10	107	5	0	3	122	13	55	48	0	3	116	63	176	9	0	4	248	16	62	12	0	2	90	576	2208	
16:30:00	3	86	7	0	4	96	14	48	56	0	7	118	84	198	8	0	3	290	11	63	12	0	0	86	590	2284	
16:45:00	5	85	9	0	7	99	5	44	41	0	4	90	102	184	14	0	1	300	11	63	19	0	1	93	582	2296	
17:00:00	14	59	7	0	7	80	9	60	38	0	5	107	73	187	9	0	1	269	18	69	26	0	2	113	569	2317	
17:15:00	8	83	7	0	2	98	10	48	47	0	0	105	115	203	8	0	2	326	13	55	15	0	10	83	612	2353	
17:30:00	6	72	9	0	1	87	16	59	39	0	0	114	81	187	7	0	0	275	20	64	22	0	5	106	582	2345	
17:45:00	7	71	10	0	3	88	12	58	32	0	1	102	63	179	12	0	2	254	13	57	23	0	2	93	537	2300	
18:00:00	16	82	13	0	7	111	8	46	40	0	3	94	57	177	20	0	5	254	12	39	20	0	4	71	530	2261	
18:15:00	10	63	9	0	6	82	10	46	43	0	4	99	61	153	20	0	1	234	17	56	19	0	0	92	507	2156	



18:30:00	8	95	11	0	2	114	8	32	36	0	1	76	67	159	16	0	6	242	10	34	15	0	3	59	491	2065
18:45:00	6	77	15	0	2	98	12	35	45	0	3	92	55	145	13	0	6	213	21	34	18	0	6	73	476	2004
Grand Total	276	3590	372	0	76	4238	365	1283	1395	0	68	3043	1508	3468	318	0	56	5294	463	1291	415	0	71	2169	14744	-
Approach%	6.5%	84.7%	8.8%	0%		-	12%	42.2%	45.8%	0%		-	28.5%	65.5%	6%	0%		-	21.3%	59.5%	19.1%	0%		-	-	-
Totals %	1.9%	24.3%	2.5%	0%		28.7%	2.5%	8.7%	9.5%	0%		20.6%	10.2%	23.5%	2.2%	0%		35.9%	3.1%	8.8%	2.8%	0%		14.7%	-	-
Heavy	1	44	3	0		-	5	23	21	0		-	22	56	5	0		-	8	17	5	0		-	-	-
Heavy %	0.4%	1.2%	0.8%	0%		-	1.4%	1.8%	1.5%	0%		-	1.5%	1.6%	1.6%	0%		-	1.7%	1.3%	1.2%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-



Peak Hour: 08:30 AM - 09:30 AM Weather: Overcast (20.2 °C)

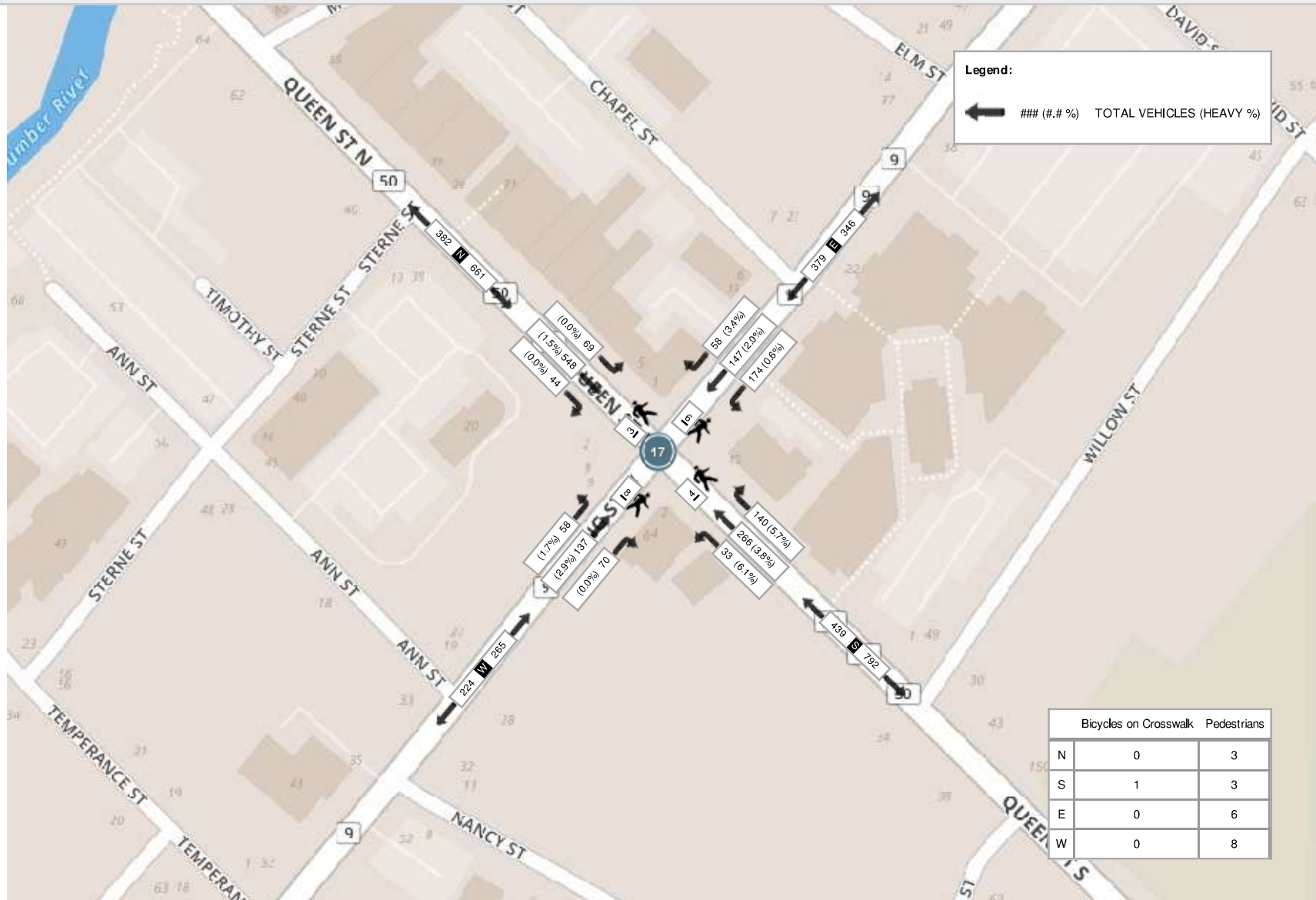
Start Time	N Approach HWY 50						E Approach KING ST						S Approach HWY 50						W Approach KING ST						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
08:30:00	7	148	14	0	0	169	10	32	40	0	1	82	20	74	8	0	1	102	13	35	13	0	4	61	414
08:45:00	10	152	17	0	3	179	14	53	50	0	1	117	45	72	4	0	1	121	18	40	23	0	0	81	498
09:00:00	13	128	20	0	0	161	21	31	51	0	3	103	40	60	8	0	1	108	17	32	10	0	1	59	431
09:15:00	14	120	18	0	0	152	13	31	33	0	1	77	35	60	13	0	1	108	22	30	12	0	3	64	401
Grand Total	44	548	69	0	3	661	58	147	174	0	6	379	140	266	33	0	4	439	70	137	58	0	8	265	1744
Approach%	6.7%	82.9%	10.4%	0%		-	15.3%	38.8%	45.9%	0%		-	31.9%	60.6%	7.5%	0%		-	26.4%	51.7%	21.9%	0%		-	-
Totals %	2.5%	31.4%	4%	0%		37.9%	3.3%	8.4%	10%	0%		21.7%	8%	15.3%	1.9%	0%		25.2%	4%	7.9%	3.3%	0%		15.2%	-
PHF	0.79	0.9	0.86	0		0.92	0.69	0.69	0.85	0		0.81	0.78	0.9	0.63	0		0.91	0.8	0.86	0.63	0		0.82	-
Heavy	0	8	0	0		8	2	3	1	0		6	8	10	2	0		20	0	4	1	0		5	-
Heavy %	0%	1.5%	0%	0%		1.2%	3.4%	2%	0.6%	0%		1.6%	5.7%	3.8%	6.1%	0%		4.6%	0%	2.9%	1.7%	0%		1.9%	-
Lights	44	540	69	0		653	56	144	173	0		373	132	256	31	0		419	70	133	57	0		260	-
Lights %	100%	98.5%	100%	0%		98.8%	96.6%	98%	99.4%	0%		98.4%	94.3%	96.2%	93.9%	0%		95.4%	100%	97.1%	98.3%	0%		98.1%	-
Single-Unit Trucks	0	4	0	0		4	1	2	1	0		4	5	8	2	0		15	0	2	1	0		3	-
Single-Unit Trucks %	0%	0.7%	0%	0%		0.6%	1.7%	1.4%	0.6%	0%		1.1%	3.6%	3%	6.1%	0%		3.4%	0%	1.5%	1.7%	0%		1.1%	-
Buses	0	4	0	0		4	1	1	0	0		2	2	1	0	0		3	0	2	0	0		2	-
Buses %	0%	0.7%	0%	0%		0.6%	1.7%	0.7%	0%	0%		0.5%	1.4%	0.4%	0%	0%		0.7%	0%	1.5%	0%	0%		0.8%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	1	1	0	0		2	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0.7%	0.4%	0%	0%		0.5%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	6	-	-	-	-	-	3	-	-	-	-	-	8	-	-
Pedestrians%	-	-	-	-	14.3%		-	-	-	-	28.6%		-	-	-	-	14.3%		-	-	-	-	38.1%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	4.8%		-	-	-	-	0%		-



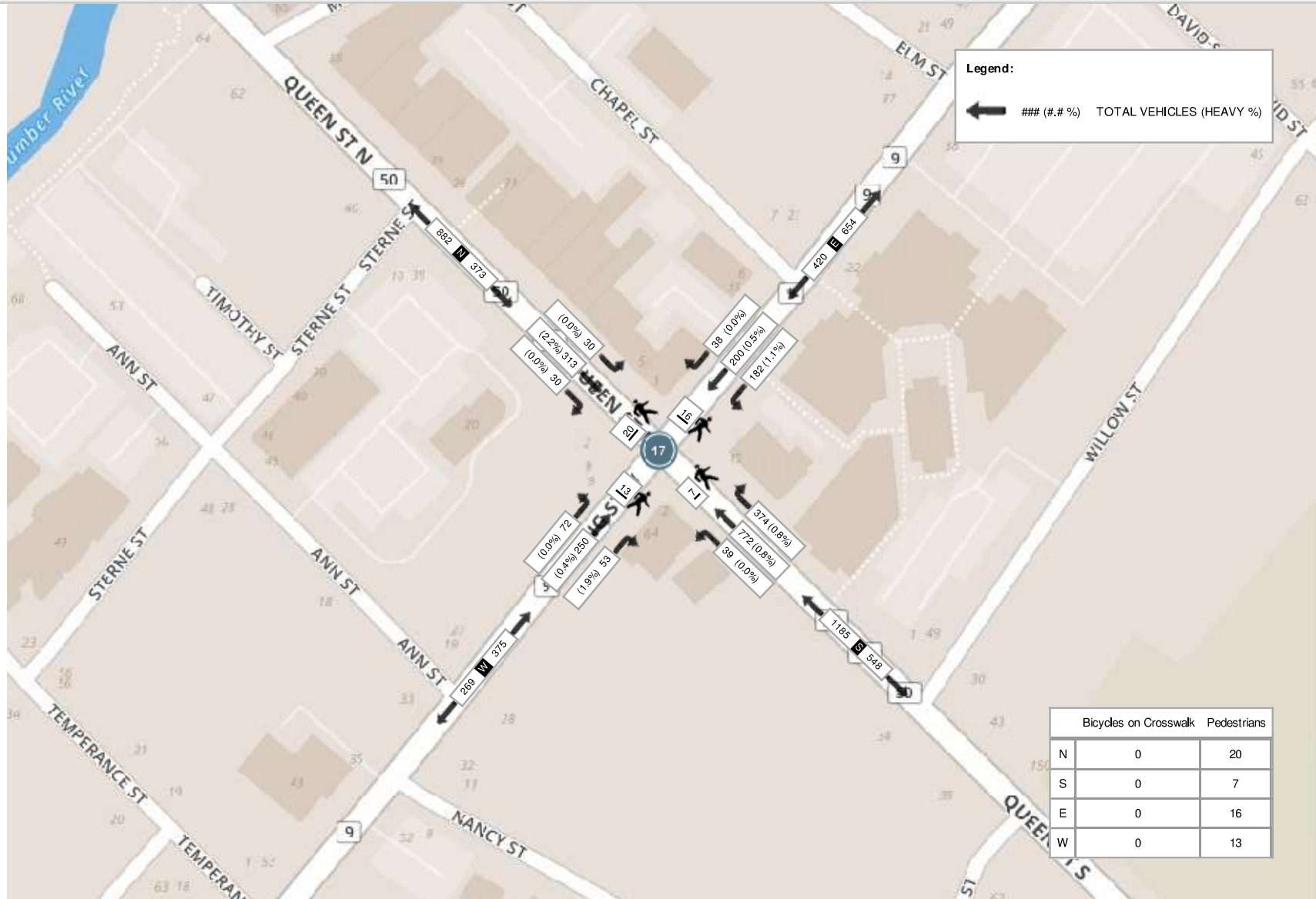
Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (24.2 °C)

Start Time	N Approach HWY 50						E Approach KING ST						S Approach HWY 50						W Approach KING ST						Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:30:00	3	86	7	0	4	96	14	48	56	0	7	118	84	198	8	0	3	290	11	63	12	0	0	86	590
16:45:00	5	85	9	0	7	99	5	44	41	0	4	90	102	184	14	0	1	300	11	63	19	0	1	93	582
17:00:00	14	59	7	0	7	80	9	60	38	0	5	107	73	187	9	0	1	269	18	69	26	0	2	113	569
17:15:00	8	83	7	0	2	98	10	48	47	0	0	105	115	203	8	0	2	326	13	55	15	0	10	83	612
Grand Total	30	313	30	0	20	373	38	200	182	0	16	420	374	772	39	0	7	1185	53	250	72	0	13	375	2353
Approach%	8%	83.9%	8%	0%		-	9%	47.6%	43.3%	0%		-	31.6%	65.1%	3.3%	0%		-	14.1%	66.7%	19.2%	0%		-	-
Totals %	1.3%	13.3%	1.3%	0%		15.9%	1.6%	8.5%	7.7%	0%		17.8%	15.9%	32.8%	1.7%	0%		50.4%	2.3%	10.6%	3.1%	0%		15.9%	-
PHF	0.54	0.91	0.83	0		0.94	0.68	0.83	0.81	0		0.89	0.81	0.95	0.7	0		0.91	0.74	0.91	0.69	0		0.83	-
Heavy	0	7	0	0		7	0	1	2	0		3	3	6	0	0		9	1	1	0	0		2	-
Heavy %	0%	2.2%	0%	0%		1.9%	0%	0.5%	1.1%	0%		0.7%	0.8%	0.8%	0%	0%		0.8%	1.9%	0.4%	0%	0%		0.5%	-
Lights	30	306	30	0		366	38	199	180	0		417	371	766	39	0		1176	52	249	72	0		373	-
Lights %	100%	97.8%	100%	0%		98.1%	100%	99.5%	98.9%	0%		99.3%	99.2%	99.2%	100%	0%		99.2%	98.1%	99.6%	100%	0%		99.5%	-
Single-Unit Trucks	0	6	0	0		6	0	1	2	0		3	3	5	0	0		8	1	1	0	0		2	-
Single-Unit Trucks %	0%	1.9%	0%	0%		1.6%	0%	0.5%	1.1%	0%		0.7%	0.8%	0.6%	0%	0%		0.7%	1.9%	0.4%	0%	0%		0.5%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.1%	0%	0%		0.1%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Articulated Trucks %	0%	0.3%	0%	0%		0.3%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	20	-	-	-	-	-	16	-	-	-	-	-	7	-	-	-	-	-	13	-	-
Pedestrians%	-	-	-	-	35.7%		-	-	-	-	28.6%		-	-	-	-	12.5%		-	-	-	-	23.2%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-

Peak Hour: 08:30 AM - 09:30 AM Weather: Overcast (20.2 °C)



Peak Hour: 04:30 PM - 05:30 PM Weather: Mostly Cloudy (24.2 °C)



REGIONAL MUNICIPALITY OF PEEL											
Traffic Signal Timing Parameters											
Database Date			August 1, 2017				Prepared Date:		September 11, 2017		
Database Rev			8				Completed By:		RC		
Timing Card / Field rev			-				Checked By:		RS		
Location:	Highway 50 at Cross Country/Bolton Heights						TIME PERIOD				
Phase #	Direction	Vehicle Minimum (sec.)	Pedestrian Minimum (sec.)		Amber (sec.)	All Red (sec.)	(sec.) (Green+Amber+All Red)				
			WALK	FDWALK			AM MAX	OFF MAX	PM MAX		
1	Not in Use										
2	Highway 50 - NB/SB	12.0	8.0	18.0	4.0	2.6	61.0	39.0	64.0		
3	Bolton Heights - WB PP LT Phase	5.0			3.0		13.0				
4	Bolton Heights/Cross Country - EB/WB	8.0	8.0	28.0	4.0	3.1	36.0	36.0	36.0		
System Control		Yes									
Local Control		No									
Semi-Actuated Mode		Yes									
					TIME (M-F)	PEAK	CYCLE LENGTH (sec.)	OFFSET (sec.)			
					06:00-09:00	AM	110	36			
					9:00 - 15:00	OFF	75	36			
					15:00 - 19:00	PM	100	57			

REGIONAL MUNICIPALITY OF PEEL											
Traffic Signal Timing Parameters											
Database Date			August 1, 2017				Prepared Date:		September 11, 2017		
Database Rev			8				Completed By:		RC		
Timing Card / Field rev			-				Checked By:		RS		
Location:	Highway 50 at Columbia Way						TIME PERIOD (sec.) (Green+Amber+All Red)				
Phase #	Direction	Vehicle Minimum (sec.)	Pedestrian Minimum (sec.)		Amber (sec.)	All Red (sec.)					
			WALK	FDWALK			AM MAX	OFF MAX	PM MAX		
1	Not in Use										
2	Highway 50 - NB/SB	20.0	8.0	16.0	4.0	2.7	65.0	39.0	64.0		
3	Not in Use										
4	Columbia Way/Private Entrance - EB/WB	8.0	8.0	11.0	4.0	2.0	45.0	36.0	36.0		
System Control		Yes									
Local Control		No									
Semi-Actuated Mode		Yes									
				TIME (M-F)		PEAK	CYCLE LENGTH (sec.)		OFFSET (sec.)		
				06:00-09:00		AM	110		0		
				9:00 - 15:00		OFF	75		0		
				15:00 - 19:00		PM	100		15		

REGIONAL MUNICIPALITY OF PEEL									
Traffic Signal Timing Parameters									
Database Date		February 23, 2016				Prepared Date:		September 14, 2017	
Database Rev		43				Completed By:		RC	
Timing Card / Field rev		-				Checked By:		RS	
Location:		Hwy 50 @ King					TIME PERIOD (sec.) (Green+Amber+All Red)		
Phase #	Direction	Vehicle Minimum (sec.)	Pedestrian Minimum (sec.)		Amber (sec.)	All Red (sec.)			
			WALK	FDWALK			AM MAX	OFF MAX	PM MAX
1	Hwy 50 - N/B P.P. LT	5.0			3.0		0.0	12.0	23.0
2	Hwy 50 - S/B	8.0	8.0	9.0	4.0	2.0	65.0	50.0	57.0
3	King - E/B P.P LT	5.0			3.0		10.0	10.0	20.0
4	King - W/B	8.0	16.0	10.0	4.0	2.3	45.0	38.0	40.0
5	Hwy 50 - S/B P.P. LT	5.0			3.0		10.0		
6	Hwy 50 - N/B	8.0	8.0	9.0	4.0	2.0	55.0	62.0	80.0
7	King - W/B P.P. LT	5.0			3.0		18.0	15.0	20.0
8	King - E/B	8.0	16.0	10.0	4.0	2.3	37.0	33.0	40.0
System Control		YES							
Local Control		NO							
Semi-Actuated Mode		YES							
					TIME (M-F)	PEAK	CYCLE LENGTH (sec.)		OFFSET (sec.)
					06:00-09:00	AM	120		14
					09:00-15:00	OFF	110		109
					15:00-20:00	PM	140		117

Tue Sep 05 2017 14:25:50 GMT-0400 (Eastern Daylight Time) - Run Time: 2216ms

Cross Tabulation Query Form - Trip - 2011
Row: Planning district of origin - pd_orig
Column: Planning district of destination - pd_dest

Filters:
Trip purpose of destination - purp_dest In W
and
(2006 GTA zone of destination - gta06_dest In 3017
and
Start time of trip - start_time In 1500-2000
and
Primary travel mode of trip - mode_prime In d)
and
Planning district of destination - pd_dest In 34

Trip 2011
Table:

Origin	Caledon	Row Labels	Sum of Caledon	%
PD 9 of Toronto	53	Adjala-Tosorontio	31	6.00%
Markham	24	Brampton	135	26.11%
Caledon	228	Caledon	228	44.10%
Brampton	135	Innisfil	26	5.03%
Orangeville	20	Markham	24	4.64%
Innisfil	26	Orangeville	20	3.87%
Adjala-Tosorontio	31	PD 9 of Toronto	53	10.25%
		Grand Total	517	100.00%
		BOLTON TMP		
		Dufferin	222	1.40%
		Simcoe	171	1.08%
		Wellington	65	0.41%
		Hamilton	51	0.32%
		Halton	327	2.06%
		Mississauga	1493	9.41%
		Brampton	1690	10.66%
		Caledon	638	4.02%
		Bolton	5925	37.36%
		Toronto	2979	18.79%
		York	2279	14.37%
		Durham	18	0.11%
			15858	

TIME RANGES WERE NOT WORKING
Tue Sep 05 2017 16:26:34 GMT-0400 (Eastern Daylight Time) - Run Time: 2717ms

Cross Tabulation Query Form - Trip - 2011
Row: Planning district of destination - pd_dest
Column: Planning district of origin - pd_orig

Filters:
(2006 GTA : 3191 3190 3016 3194 3192 3153 3193 3002 3003
and
Primary travel mode of trip - mode_prime In D
and
Trip purpos:)

Trip 2011
Table:

Destination Caledon		Row Labels	Sum of Caledon	Sum of Caledon2
PD 1 of Ton	475	Adjala-Torontio	18	0.17%
PD 2 of Ton	41	Ajax	18	0.17%
PD 3 of Ton	186	Barrie	18	0.17%
PD 4 of Ton	189	Bradford-West Gwillimbury	51	0.48%
PD 6 of Ton	18	Brampton	1657	15.45%
PD 7 of Ton	69	Brantford	23	0.21%
PD 8 of Ton	216	Burlington	65	0.61%
PD 9 of Ton	803	Caledon	2114	19.71%
PD 10 of Tc	459	City of Guelph	138	1.29%
PD 11 of Tc	123	Collingwood	23	0.21%
PD 12 of Tc	104	Erin	23	0.21%
PD 16 of Tc	60	Halton Hills	122	1.14%
Ajax	18	Hamilton	23	0.21%
Richmond H	197	King	248	2.31%
Markham	239	Kitchener	18	0.17%
King	248	Markham	239	2.23%
Vaughan	1381	Milton	45	0.42%
Caledon	2114	Mississauga	1394	12.99%
Brampton	1657	Mono Township	28	0.26%
Mississauga	1394	New Tecumseth	18	0.17%
Halton Hills	122	Oakville	65	0.61%
Milton	45	Orangeville	59	0.55%
Oakville	65	PD 1 of Toronto	475	4.43%
Burlington	65	PD 10 of Toronto	459	4.28%
Hamilton	23	PD 11 of Toronto	123	1.15%
Kitchener	18	PD 12 of Toronto	104	0.97%
City of Guel	138	PD 16 of Toronto	60	0.56%
Erin	23	PD 2 of Toronto	41	0.38%
Orangeville	59	PD 3 of Toronto	186	1.73%
Barrie	18	PD 4 of Toronto	189	1.76%
Bradford-W	51	PD 6 of Toronto	18	0.17%
New Tecum	18	PD 7 of Toronto	69	0.64%
Adjala-Toso	18	PD 8 of Toronto	216	2.01%
Collingwooc	23	PD 9 of Toronto	803	7.49%
Mono Town	28	Richmond Hill	197	1.84%
Brantford	23	Vaughan	1381	12.87%
		Grand Total	10728	100.00%

APPENDIX D

Level of Service Definitions

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Level of Service Definitions

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Arcady Junctions 8 User Guide – Level of Service Definition

(Highway Capacity Manual (HMC 2000))

The transportation LOS system uses the letters A through F, with the definitions below being typical:

A = Free Flow

B = Reasonably Free Flow

C = Stable Flow

D = Approaching Unstable Flow

E = Unstable Flow

F = Forced or Breakdown Flow

The thresholds A-F are based on the queuing delay on each arm, and these thresholds differ for unsignalized and signalized junctions. Note that the LOS in **Junction 8** is based purely on the queueing delay, taking into account delay experienced in previous time segments (i.e. The Average Delay Per Arriving Vehicle).

APPENDIX E

Detailed Capacity Analysis Worksheets

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2021
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Filename: Highway 50 & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady
Report generation date: 2021-12-06 10:58:01 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2017 Existing Traffic						
Emil Kolb Pkwy	0.10	~1	2.54	0.07	A	1.89	A
Highway 50 (North)	0.40	~1	1.91	0.28	A		
Highway 50 (South)	0.13	~1	1.57	0.11	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 3:00 PM - 4:30 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 3:00 PM - 4:30 PM
"D7 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 ROPA 30, PM" model duration: 3:00 PM - 4:30 PM

Run using Junctions 8.0.6.541 at 2021-12-06 10:58:00 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2017 Existing Traffic, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2017 Existing Traffic, AM	2017 Existing Traffic	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		1.89	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy	3	Emil Kolb Pkwy	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	1	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy	0.00	0.00

Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy	ONE HOUR	✓	125.00	100.000
Highway 50 (North)	ONE HOUR	✓	693.00	100.000
Highway 50 (South)	ONE HOUR	✓	278.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.000	227.000	51.000
	Highway 50 (North)	419.000	0.000	274.000
	Emil Kolb Pkwy	42.000	83.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.00	0.82	0.18
	Highway 50 (North)	0.60	0.00	0.40
	Emil Kolb Pkwy	0.34	0.66	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	1.000	1.040	1.120
	Highway 50 (North)	1.030	1.000	1.120
	Emil Kolb Pkwy	1.270	1.460	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.0	4.0	12.0
	Highway 50 (North)	3.0	0.0	12.0
	Emil Kolb Pkwy	27.0	46.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy	0.07	2.54	0.10	~1	A	114.70	172.05	6.83	2.38	0.08	6.83	2.38
Highway 50 (North)	0.28	1.91	0.40	~1	A	635.91	953.86	28.56	1.80	0.32	28.56	1.80
Highway 50 (South)	0.11	1.57	0.13	~1	A	255.10	382.65	9.76	1.53	0.11	9.76	1.53

Junctions 8
ARCADY 8 - Roundabout Module
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:20:19 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - 2017 Existing Traffic							
Emil Kolb Pkwy (North)	0.22	~1	1.86	0.17	A	1.87	A
Emil Kolb Pkwy (South)	0.12	~1	1.80	0.09	A		
King Street	0.16	~1	1.96	0.13	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
 "D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
 "D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
 "D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
 "D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:20:19 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2017 Existing Traffic, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2017 Existing Traffic, AM	2017 Existing Traffic	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		1.87	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	
King Street	7.00	8.00	30.00	25.00	55.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	387.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	224.00	100.000
King Street	ONE HOUR	✓	274.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.000	73.000	151.000
	Emil Kolb Pkwy (North)	281.000	0.000	106.000
	King Street	224.000	50.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.00	0.33	0.67
	Emil Kolb Pkwy (North)	0.73	0.00	0.27
	King Street	0.82	0.18	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	1.000	1.400	1.190
	Emil Kolb Pkwy (North)	1.140	1.000	1.030
	King Street	1.090	1.220	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.0	40.0	19.0
	Emil Kolb Pkwy (North)	14.0	0.0	3.0
	King Street	9.0	22.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.17	1.86	0.22	~1	A	355.12	532.68	15.74	1.77	0.17	15.74	1.77
Emil Kolb Pkwy (South)	0.09	1.80	0.12	~1	A	205.55	308.32	9.07	1.76	0.10	9.07	1.76
King Street	0.13	1.96	0.16	~1	A	251.43	377.14	11.63	1.85	0.13	11.63	1.85

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Lanes, Volumes, Timings

2017 Existing AM

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3: Highway 50 & Private Access/Columbia Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1	1	5	123	0	82	3	209	63	38	402	3
Future Volume (vph)	1	1	5	123	0	82	3	209	63	38	402	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		0.0	125.0		30.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.904			0.850				0.850			0.850
Flt Protected		0.993		0.950			0.950			0.950		
Satd. Flow (prot)	0	1207	0	1767	1570	0	1785	1847	1579	1475	1883	952
Flt Permitted		0.964		0.753			0.520			0.627		
Satd. Flow (perm)	0	1172	0	1401	1570	0	977	1847	1579	974	1883	952
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			659				63			30
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		46.8			237.9			633.3			932.3	
Travel Time (s)		3.4			14.3			38.0			55.9	
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 (%)	100%	0%	40%	1%	0%	4%	0%	4%	3%	21%	2%	67%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	1	5	123	0	82	3	209	63	38	402	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	7	0	123	82	0	3	209	63	38	402	3
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left						Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	15.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

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Synchro 11 Report
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Lanes, Volumes, Timings

2017 Existing AM

3: Highway 50 & Private Access/Columbia Way

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	45.0	45.0		45.0	45.0		65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	40.9%	40.9%		40.9%	40.9%		59.1%	59.1%	59.1%	59.1%	59.1%	59.1%
Maximum Green (s)	39.0	39.0		39.0	39.0		58.3	58.3	58.3	58.3	58.3	58.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effect Green (s)		13.0		13.0	13.0		61.7	61.7	61.7	61.7	61.7	61.7
Actuated g/C Ratio		0.15		0.15	0.15		0.71	0.71	0.71	0.71	0.71	0.71
v/c Ratio		0.04		0.59	0.10		0.00	0.16	0.06	0.06	0.30	0.00
Control Delay		21.1		45.6	0.3		5.0	5.2	1.6	5.1	6.0	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		21.1		45.6	0.3		5.0	5.2	1.6	5.1	6.0	0.0
LOS		C		D	A		A	A	A	A	A	A
Approach Delay		21.1			27.4			4.4			5.9	
Approach LOS		C			C			A			A	
Queue Length 50th (m)		0.3		19.5	0.0		0.2	10.1	0.0	1.7	21.9	0.0
Queue Length 95th (m)		4.0		36.7	0.0		1.1	21.7	3.9	5.6	42.9	0.0
Internal Link Dist (m)		22.8			213.9			609.3			908.3	
Turn Bay Length (m)				70.0			140.0			125.0		30.0
Base Capacity (vph)		526		626	1066		689	1304	1133	687	1329	680
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.01		0.20	0.08		0.00	0.16	0.06	0.06	0.30	0.00

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 87.4

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 10.3

Intersection LOS: B

Intersection Capacity Utilization 56.3%

ICU Level of Service B

Lanes, Volumes, Timings
3: Highway 50 & Private Access/Columbia Way

2017 Existing AM
10-29-2021

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way




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Lanes, Volumes, Timings

2017 Existing AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

10-29-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	2	28	86	0	26	12	282	19	12	502	6
Future Volume (vph)	14	2	28	86	0	26	12	282	19	12	502	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98		1.00	0.98		1.00		0.98	1.00		0.98
Frt		0.860			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1614	0	1785	1607	0	1526	3510	1591	1785	1883	1591
Flt Permitted	0.740			0.553			0.430			0.579		
Satd. Flow (perm)	1385	1614	0	1035	1607	0	689	3510	1556	1086	1883	1552
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			521				70			70
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	4		3	3		4	2		1	1		2
Confl. Bikes (#/hr)					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
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	17%	4%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	14	2	28	86	0	26	12	282	19	12	502	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	30	0	86	26	0	12	282	19	12	502	6
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0		15.0	15.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

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4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	4			3			2			6		
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		10.0	56.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		13.0	49.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.7%	32.7%		11.8%	44.5%		55.5%	55.5%	55.5%	55.5%	55.5%	55.5%
Maximum Green (s)	28.9	28.9		10.0	41.9		54.4	54.4	54.4	54.4	54.4	54.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		0.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		3.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0			8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	4	4			4		2	2	2	2	2	2
Act Effect Green (s)	12.6	12.6		22.6	19.8		63.8	63.8	63.8	63.8	63.8	63.8
Actuated g/C Ratio	0.14	0.14		0.24	0.21		0.69	0.69	0.69	0.69	0.69	0.69
v/c Ratio	0.07	0.12		0.26	0.03		0.03	0.12	0.02	0.02	0.39	0.01
Control Delay	33.9	13.6		25.9	0.1		12.3	9.3	0.1	12.1	12.4	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	13.6		25.9	0.1		12.3	9.3	0.1	12.1	12.4	0.0
LOS	C	B		C	A		B	A	A	B	B	A
Approach Delay	20.1			19.9			8.8			12.3		
Approach LOS	C			B			A			B		
Queue Length 50th (m)	2.3	0.3		11.7	0.0		0.8	9.8	0.0	0.7	42.1	0.0
Queue Length 95th (m)	7.4	7.6		21.7	0.0		5.4	29.2	0.0	5.2	120.9	0.0
Internal Link Dist (m)	88.1			177.9			747.8			609.3		
Turn Bay Length (m)	30.0			85.0			90.0		75.0	65.0		90.0
Base Capacity (vph)	459	553		349	1037		476	2425	1097	750	1301	1094
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.05		0.25	0.03		0.03	0.12	0.02	0.02	0.39	0.01

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 92.3

Natural Cycle: 90

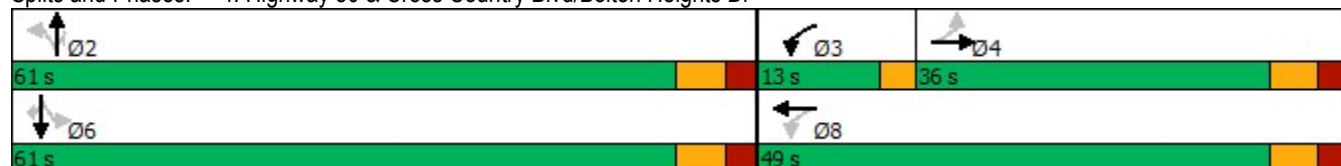
Control Type: Semi Act-Uncoord

2017 Existing AM

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



















Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Blvd/Bolton Heights Dr



Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St2017 Existing AM
10-29-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	137	70	174	147	58	33	266	140	69	548	44
Future Volume (vph)	58	137	70	174	147	58	33	266	140	69	548	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.99		0.98	1.00	0.99			1.00	0.96		1.00	
Frt			0.850		0.958				0.850		0.990	
Flt Protected	0.950			0.950				0.995			0.995	
Satd. Flow (prot)	1575	1679	1437	1591	1607	0	0	1651	1351	0	3193	0
Flt Permitted	0.629			0.527				0.891			0.874	
Satd. Flow (perm)	1037	1679	1412	879	1607	0	0	1476	1296	0	2802	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		17				140		9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		38.6			25.4			37.3			2.4	
Confl. Peds. (#/hr)	3		4	4		3	8		6	6		8
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%	3%	0%	1%	2%	3%	6%	4%	6%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	58	137	70	174	147	58	33	266	140	69	548	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	137	70	174	205	0	0	299	140	0	661	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.17	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	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	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St2017 Existing AM
10-29-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		8.0	8.0	8.0	5.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		23.5	23.5	23.5	9.5	23.5	
Total Split (s)	10.0	37.0	37.0	18.0	45.0		55.0	55.0	55.0	10.0	65.0	
Total Split (%)	8.3%	30.8%	30.8%	15.0%	37.5%		45.8%	45.8%	45.8%	8.3%	54.2%	
Maximum Green (s)	7.0	30.7	30.7	15.0	38.7		49.0	49.0	49.0	7.0	59.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0	6.0		6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	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	3.0	3.0	
Recall Mode	None	None	None	None	None		Max	Max	Max	None	Max	
Walk Time (s)		16.0	16.0		16.0		8.0	8.0	8.0		8.0	
Flash Dont Walk (s)		10.0	10.0		10.0		9.0	9.0	9.0		9.0	
Pedestrian Calls (#/hr)		4	4		4		8	8	8		8	
Act Effect Green (s)	24.7	14.7	14.7	34.1	23.0			59.3	59.3		59.3	
Actuated g/C Ratio	0.24	0.14	0.14	0.33	0.22			0.58	0.58		0.58	
v/c Ratio	0.20	0.57	0.24	0.45	0.55			0.35	0.17		0.41	
Control Delay	24.9	50.5	4.1	29.0	38.4			14.4	2.8		13.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	24.9	50.5	4.1	29.0	38.4			14.4	2.8		13.8	
LOS	C	D	A	C	D			B	A		B	
Approach Delay		32.6			34.1			10.7			13.8	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	8.3	27.4	0.0	26.9	35.8			30.9	0.0		37.0	
Queue Length 95th (m)	17.1	47.1	4.3	44.0	58.7			63.9	10.1		65.8	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	290	505	501	397	620			854	809		1625	
Starvation Cap Reductn	0	0	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.20	0.27	0.14	0.44	0.33			0.35	0.17		0.41	

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 102.5

Natural Cycle: 75

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.57

Lanes, Volumes, Timings
5: Highway 50 & King St

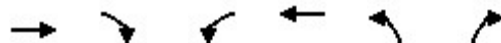
2017 Existing AM
10-29-2021

Intersection Signal Delay: 20.3	Intersection LOS: C
Intersection Capacity Utilization 77.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Highway 50 & King St



Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way2017 Existing AM
10-29-2021

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (vph)	72	15	25	151	41	29
Future Volume (vph)	72	15	25	151	41	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			1.00		
Frt	0.977				0.944	
Flt Protected				0.993	0.972	
Satd. Flow (prot)	1787	0	0	1891	1742	0
Flt Permitted				0.966	0.972	
Satd. Flow (perm)	1787	0	0	1838	1742	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	15				29	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	7%	0%	1%	2%	0%
Adj. Flow (vph)	72	15	25	151	41	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	87	0	0	176	70	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way2017 Existing AM
10-29-2021

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	51.0		51.0	51.0	39.0	
Total Split (%)	56.7%		56.7%	56.7%	43.3%	
Maximum Green (s)	46.5		46.5	46.5	34.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	3		3	3	0	
Act Effect Green (s)	60.7			60.7	7.4	
Actuated g/C Ratio	0.82			0.82	0.10	
v/c Ratio	0.06			0.12	0.35	
Control Delay	2.0			2.3	25.4	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.0			2.3	25.4	
LOS	A			A	C	
Approach Delay	2.0			2.3	25.4	
Approach LOS	A			A	C	
Queue Length 50th (m)	1.7			4.4	6.0	
Queue Length 95th (m)	5.0			10.2	16.3	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1471			1510	832	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.06			0.12	0.08	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 73.9

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.35

Intersection Signal Delay: 7.1

Intersection LOS: A

Intersection Capacity Utilization 27.7%

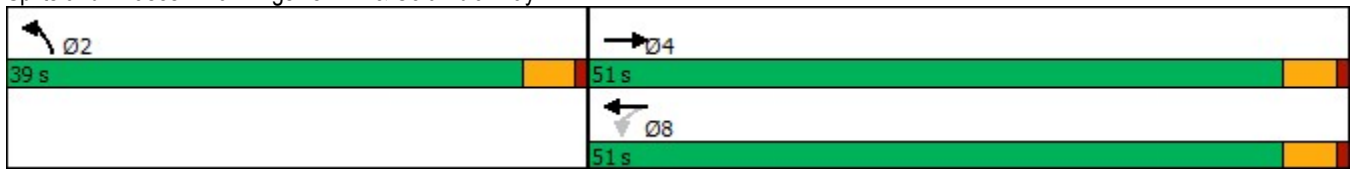
ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2017 Existing AM
10-29-2021

Splits and Phases: 6: Kingsview Dr & Columbia Way



HCM Unsignalized Intersection Capacity Analysis
















7: Westchester Blvd & Columbia Way

2017 Existing AM
10-29-2021

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↱	↘↗	
Traffic Volume (veh/h)	75	22	7	105	72	49
Future Volume (Veh/h)	75	22	7	105	72	49
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	75	22	7	105	72	49
Pedestrians				1	7	
Lane Width (m)				3.7	3.7	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			104		212	94
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		212	94
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	95
cM capacity (veh/h)			1491		772	951
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	97	112	121			
Volume Left	0	7	72			
Volume Right	22	0	49			
cSH	1700	1491	836			
Volume to Capacity	0.06	0.00	0.14			
Queue Length 95th (m)	0.0	0.1	4.0			
Control Delay (s)	0.0	0.5	10.0			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.5	10.0			
Approach LOS			B			
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			25.2%	ICU Level of Service	A	
Analysis Period (min)			15			

Jan 20, 2021










HCM Unsignalized Intersection Capacity Analysis
8: Mt Hope Rd & Columbia Way2017 Existing AM
10-29-2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	95	12	8	79	5	18	2	17	17	3	20
Future Volume (Veh/h)	15	95	12	8	79	5	18	2	17	17	3	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	15	95	12	8	79	5	18	2	17	17	3	20
Pedestrians		1			1			10				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.2			1.2			1.2				
Percent Blockage		0			0			1				
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	84			117			261	241	112	248	244	82
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	84			117			261	241	112	248	244	82
tC, single (s)	4.2			4.3			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.4			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			99			97	100	98	97	100	98
cM capacity (veh/h)	1482			1329			660	648	938	670	645	982
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	122	92	37	40								
Volume Left	15	8	18	17								
Volume Right	12	5	17	20								
cSH	1482	1329	763	794								
Volume to Capacity	0.01	0.01	0.05	0.05								
Queue Length 95th (m)	0.2	0.1	1.2	1.3								
Control Delay (s)	1.0	0.7	10.0	9.8								
Lane LOS	A	A	A	A								
Approach Delay (s)	1.0	0.7	10.0	9.8								
Approach LOS			A	A								
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			21.1%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

9: Townline & Columbia Way

2017 Existing AM
10-29-2021

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	183	16	91	499	10
Future Volume (Veh/h)	15	183	16	91	499	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	183	16	91	499	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	627	504	509			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	627	504	509			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	97	68	98			
cM capacity (veh/h)	444	570	1036			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	198	107	509			
Volume Left	15	16	0			
Volume Right	183	0	10			
cSH	558	1036	1700			
Volume to Capacity	0.35	0.02	0.30			
Queue Length 95th (m)	12.8	0.4	0.0			
Control Delay (s)	15.0	1.4	0.0			
Lane LOS	B	A				
Approach Delay (s)	15.0	1.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay				3.8		
Intersection Capacity Utilization				45.7%	ICU Level of Service	A
Analysis Period (min)				15		

Junctions 8
ARCADY 8 - Roundabout Module
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Filename: Highway 50 & Emil Kolb Pkwy.arc8

Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady

Report generation date: 2021-12-06 10:58:55 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - 2017 Existing Traffic							
Emil Kolb Pkwy	0.32	~1	2.07	0.24	A	2.24	A
Highway 50 (North)	0.18	~1	1.60	0.15	A		
Highway 50 (South)	0.52	1.12	2.77	0.32	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - 2017 Existing Traffic, PM" model duration: 3:00 PM - 4:30 PM
 "D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - 2031 Future Background, PM" model duration: 3:00 PM - 4:30 PM
 "D7 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
 "D8 - 2031 ROPA 30, PM" model duration: 3:00 PM - 4:30 PM

Run using Junctions 8.0.6.541 at 2021-12-06 10:58:54 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2017 Existing Traffic, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2017 Existing Traffic, PM	2017 Existing Traffic	PM		ONE HOUR	15:00	16:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.24	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy	3	Emil Kolb Pkwy	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	1	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy	0.00	0.00

Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy	ONE HOUR	✓	511.00	100.000
Highway 50 (North)	ONE HOUR	✓	377.00	100.000
Highway 50 (South)	ONE HOUR	✓	617.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.000	592.000	25.000
	Highway 50 (North)	274.000	0.000	103.000
	Emil Kolb Pkwy	77.000	434.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.00	0.96	0.04
	Highway 50 (North)	0.73	0.00	0.27
	Emil Kolb Pkwy	0.15	0.85	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	1.000	1.120	1.120
	Highway 50 (North)	1.030	1.000	1.180
	Emil Kolb Pkwy	1.040	1.030	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.0	12.0	12.0
	Highway 50 (North)	3.0	0.0	18.0
	Emil Kolb Pkwy	4.0	3.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy	0.24	2.07	0.32	~1	A	468.90	703.35	22.37	1.91	0.25	22.37	1.91
Highway 50 (North)	0.15	1.60	0.18	~1	A	345.94	518.91	13.46	1.56	0.15	13.46	1.56
Highway 50 (South)	0.32	2.77	0.52	1.12	A	566.17	849.26	34.62	2.45	0.38	34.62	2.45

Junctions 8
ARCADY 8 - Roundabout Module
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:20:19 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - 2017 Existing Traffic							
Emil Kolb Pkwy (North)	0.22	~1	1.86	0.17	A	1.87	A
Emil Kolb Pkwy (South)	0.12	~1	1.80	0.09	A		
King Street	0.16	~1	1.96	0.13	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
 "D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
 "D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
 "D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
 "D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:20:19 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2017 Existing Traffic, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2017 Existing Traffic, AM	2017 Existing Traffic	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		1.87	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	
King Street	7.00	8.00	30.00	25.00	55.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	387.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	224.00	100.000
King Street	ONE HOUR	✓	274.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.000	73.000	151.000
	Emil Kolb Pkwy (North)	281.000	0.000	106.000
	King Street	224.000	50.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.00	0.33	0.67
	Emil Kolb Pkwy (North)	0.73	0.00	0.27
	King Street	0.82	0.18	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	1.000	1.400	1.190
	Emil Kolb Pkwy (North)	1.140	1.000	1.030
	King Street	1.090	1.220	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.0	40.0	19.0
	Emil Kolb Pkwy (North)	14.0	0.0	3.0
	King Street	9.0	22.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.17	1.86	0.22	~1	A	355.12	532.68	15.74	1.77	0.17	15.74	1.77
Emil Kolb Pkwy (South)	0.09	1.80	0.12	~1	A	205.55	308.32	9.07	1.76	0.10	9.07	1.76
King Street	0.13	1.96	0.16	~1	A	251.43	377.14	11.63	1.85	0.13	11.63	1.85


Jan 20, 2022

Lanes, Volumes, Timings

2017 Existing PM

10-29-2021

3: Highway 50 & Private Access/Columbia Way

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1	0	1	72	0	47	0	541	198	100	235	2
Future Volume (vph)	1	0	1	72	0	47	0	541	198	100	235	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		0.0	125.0		30.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.932			0.850				0.850			0.850
Flt Protected		0.976		0.950						0.950		
Satd. Flow (prot)	0	1748	0	1785	1601	0	1879	1902	1610	1767	1902	795
Flt Permitted		0.855		0.757						0.445		
Satd. Flow (perm)	0	1531	0	1422	1601	0	1879	1902	1610	828	1902	795
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40			320				198			33
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		46.8			237.9			633.3			932.3	
Travel Time (s)		3.4			14.3			38.0			55.9	
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 (%)	0%	0%	0%	0%	0%	2%	0%	1%	1%	1%	1%	100%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	0	1	72	0	47	0	541	198	100	235	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	0	72	47	0	0	541	198	100	235	2
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left						Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	15.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Jan 20, 2022

Lanes, Volumes, Timings

2017 Existing PM

3: Highway 50 & Private Access/Columbia Way

10-29-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	30.0	30.0		30.0	30.0		57.3	57.3	57.3	57.3	57.3	57.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effect Green (s)		10.1		10.1	10.1		66.0	66.0	66.0	66.0	66.0	66.0
Actuated g/C Ratio		0.12		0.12	0.12		0.78	0.78	0.78	0.78	0.78	0.78
v/c Ratio		0.01		0.42	0.10		0.36	0.15	0.15	0.15	0.16	0.00
Control Delay		0.0		41.6	0.4		5.0	1.0	4.6	3.9	0.0	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.0		41.6	0.4		5.0	1.0	4.6	3.9	0.0	0.0
LOS		A		D	A		A	A	A	A	A	A
Approach Delay				25.3			3.9				4.0	
Approach LOS				C			A				A	
Queue Length 50th (m)		0.0		11.8	0.0		27.6	0.0	4.2	9.8	0.0	0.0
Queue Length 95th (m)		0.0		23.5	0.0		50.9	5.6	10.7	19.8	0.0	0.0
Internal Link Dist (m)		22.8			213.9		609.3				908.3	
Turn Bay Length (m)				70.0					125.0			30.0
Base Capacity (vph)		571		506	776		1486	1301	647	1486	628	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.00		0.14	0.06		0.36	0.15	0.15	0.16	0.00	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 84.5

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 6.1

Intersection LOS: A

Intersection Capacity Utilization 68.3%

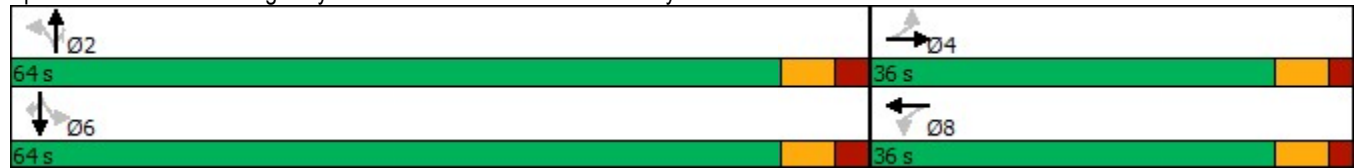
ICU Level of Service C

Lanes, Volumes, Timings
3: Highway 50 & Private Access/Columbia Way

2017 Existing PM
10-29-2021

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way



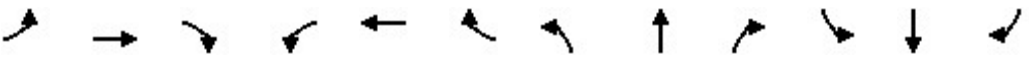










Jan 20, 2022

Lanes, Volumes, Timings

2017 Existing PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

10-29-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	4	15	34	2	17	74	764	83	20	310	21
Future Volume (vph)	9	4	15	34	2	17	74	764	83	20	310	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98		1.00	0.99		1.00		0.97	1.00		0.98
Frt		0.882			0.866				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1575	0	1785	1640	0	1785	3614	1591	1785	1902	1591
Flt Permitted	0.745			0.745			0.572			0.362		
Satd. Flow (perm)	1394	1575	0	1394	1640	0	1072	3614	1547	679	1902	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			17				83			45
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	5		3	3		5	2		4	4		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
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	9	4	15	34	2	17	74	764	83	20	310	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	19	0	34	19	0	74	764	83	20	310	21
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0		15.0	15.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Jan 20, 2022

Lanes, Volumes, Timings

2017 Existing PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

10-29-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2		6		
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	28.9	28.9		28.9	28.9		57.4	57.4	57.4	57.4	57.4	57.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5		5	5		4	4	4	4	4	4
Act Effect Green (s)	12.8	12.8		12.8	12.8		71.0	71.0	71.0	71.0	71.0	71.0
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.81	0.81	0.81	0.81	0.81	0.81
v/c Ratio	0.04	0.08		0.17	0.08		0.09	0.26	0.07	0.04	0.20	0.02
Control Delay	29.8	16.0		32.9	14.1		6.8	5.8	2.4	7.5	6.2	1.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	16.0		32.9	14.1		6.8	5.8	2.4	7.5	6.2	1.0
LOS	C	B		C	B		A	A	A	A	A	A
Approach Delay		20.4			26.2			5.6			5.9	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	1.6	0.7		6.2	0.4		2.8	17.8	0.0	0.7	12.9	0.0
Queue Length 95th (m)	5.1	5.9		12.4	5.6		15.7	63.5	7.1	6.1	54.1	1.4
Internal Link Dist (m)		88.1			177.9			747.8			609.3	
Turn Bay Length (m)	30.0			85.0			90.0		75.0	65.0		90.0
Base Capacity (vph)	481	554		481	578		864	2914	1263	547	1534	1261
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.03		0.07	0.03		0.09	0.26	0.07	0.04	0.20	0.02

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 88.1

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.26

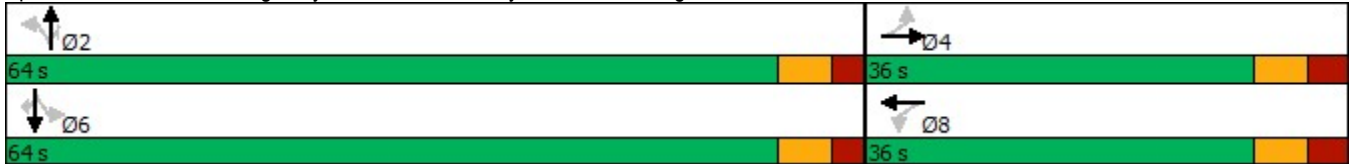
4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

2017 Existing PM

10-29-2021






















Intersection Signal Delay: 6.8	Intersection LOS: A
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases:
4: Highway 50 & Cross Country Blvd/Bolton Heights Dr



Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St2017 Existing PM
10-29-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	250	53	182	200	38	39	772	374	30	313	30
Future Volume (vph)	72	250	53	182	200	38	39	772	374	30	313	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.97		0.98	0.99	0.99			1.00	0.92		0.99	
Frt			0.850		0.976				0.850		0.988	
Flt Protected	0.950			0.950				0.998			0.996	
Satd. Flow (prot)	1606	1729	1409	1591	1647	0	0	1709	1417	0	3161	0
Flt Permitted	0.584			0.302				0.964			0.770	
Satd. Flow (perm)	957	1729	1377	502	1647	0	0	1649	1298	0	2444	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			70		6				277		7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		267.9			353.4			522.6			32.8	
Travel Time (s)		19.3			25.4			37.6			2.4	
Confl. Peds. (#/hr)	20		7	7		20	13		16	16		13
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 (%)	0%	0%	2%	1%	1%	0%	0%	1%	1%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	1	0	0	0	1	0	0	0
Adj. Flow (vph)	72	250	53	182	200	38	39	772	374	30	313	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	250	53	182	238	0	0	811	374	0	373	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.17	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	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	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St2017 Existing PM
10-29-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		8.0	23.5	23.5	23.5	23.5	
Total Split (s)	20.0	40.0	40.0	20.0	40.0		23.0	80.0	80.0	57.0	57.0	
Total Split (%)	14.3%	28.6%	28.6%	14.3%	28.6%		16.4%	57.1%	57.1%	40.7%	40.7%	
Maximum Green (s)	17.0	33.7	33.7	17.0	33.7		20.0	74.0	74.0	51.0	51.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		0.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0	6.0		6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			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	3.0	3.0	
Recall Mode	None	None	None	None	None		None	Max	Max	Max	Max	
Walk Time (s)		16.0	16.0		16.0			8.0	8.0	8.0	8.0	
Flash Dont Walk (s)		10.0	10.0		10.0			9.0	9.0	9.0	9.0	
Pedestrian Calls (#/hr)		20	20		20			16	16	16	16	
Act Effect Green (s)	36.2	23.6	23.6	45.3	31.8			74.3	74.3		74.3	
Actuated g/C Ratio	0.28	0.18	0.18	0.35	0.25			0.58	0.58		0.58	
v/c Ratio	0.23	0.79	0.17	0.59	0.58			0.85	0.43		0.26	
Control Delay	29.5	68.1	6.5	38.3	48.5			34.7	6.1		15.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	29.5	68.1	6.5	38.3	48.5			34.7	6.1		15.0	
LOS	C	E	A	D	D			C	A		B	
Approach Delay		52.0			44.1			25.7			15.0	
Approach LOS		D			D			C			B	
Queue Length 50th (m)	12.9	65.2	0.0	35.2	55.7			177.4	11.7		25.1	
Queue Length 95th (m)	24.0	95.8	7.5	54.7	86.3			#306.1	37.5		41.1	
Internal Link Dist (m)		243.9			329.4			498.6			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	409	454	413	321	447			952	866		1414	
Starvation Cap Reductn	0	0	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.18	0.55	0.13	0.57	0.53			0.85	0.43		0.26	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 128.7

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 31.5
Intersection LOS: C

Intersection Capacity Utilization 107.6%
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: 5: Highway 50 & King St

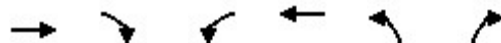
 Ø1 23 s	 Ø2 57 s	 Ø3 20 s	 Ø4 40 s
 Ø6 80 s	 Ø7 20 s	 Ø8 40 s	

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way2017 Existing PM
10-29-2021

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↱	
Traffic Volume (vph)	246	83	53	117	21	29
Future Volume (vph)	246	83	53	117	21	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99			1.00		
Frt	0.966				0.922	
Flt Protected				0.985	0.979	
Satd. Flow (prot)	1828	0	0	1892	1698	0
Flt Permitted				0.845	0.979	
Satd. Flow (perm)	1828	0	0	1620	1698	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	34				29	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		4	4			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	0%	0%	0%	5%	0%
Adj. Flow (vph)	246	83	53	117	21	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	329	0	0	170	50	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way2017 Existing PM
10-29-2021

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	59.0		59.0	59.0	31.0	
Total Split (%)	65.6%		65.6%	65.6%	34.4%	
Maximum Green (s)	54.5		54.5	54.5	26.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	4		4	4	0	
Act Effect Green (s)	71.2			71.2	6.8	
Actuated g/C Ratio	0.88			0.88	0.08	
v/c Ratio	0.20			0.12	0.29	
Control Delay	1.7			1.7	24.7	
Queue Delay	0.0			0.0	0.0	
Total Delay	1.7			1.7	24.7	
LOS	A			A	C	
Approach Delay	1.7			1.7	24.7	
Approach LOS	A			A	C	
Queue Length 50th (m)	7.4			4.0	3.4	
Queue Length 95th (m)	15.6			9.2	13.6	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1616			1428	579	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.20			0.12	0.09	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 80.7

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.29

Intersection Signal Delay: 3.8

Intersection LOS: A

Intersection Capacity Utilization 42.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Kingsview Dr & Columbia Way



HCM Unsignalized Intersection Capacity Analysis

















7: Westchester Blvd & Columbia Way

2017 Existing PM
10-29-2021

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↱	↘↗	
Traffic Volume (veh/h)	186	77	48	134	60	32
Future Volume (Veh/h)	186	77	48	134	60	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	186	77	48	134	60	32
Pedestrians						4
Lane Width (m)						3.7
Walking Speed (m/s)						1.2
Percent Blockage						0
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			267	458		228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			267	458		228
tC, single (s)			4.1	6.4		6.3
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.4
p0 queue free %			96	89		96
cM capacity (veh/h)			1304	542		798
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	263	182	92			
Volume Left	0	48	60			
Volume Right	77	0	32			
cSH	1700	1304	610			
Volume to Capacity	0.15	0.04	0.15			
Queue Length 95th (m)	0.0	0.9	4.2			
Control Delay (s)	0.0	2.3	12.0			
Lane LOS	A		B			
Approach Delay (s)	0.0	2.3	12.0			
Approach LOS			B			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			39.6%	ICU Level of Service		A
Analysis Period (min)			15			

Jan 20, 2021










HCM Unsignalized Intersection Capacity Analysis
8: Mt Hope Rd & Columbia Way2017 Existing PM
10-29-2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	135	28	29	121	10	23	4	5	17	4	35
Future Volume (Veh/h)	54	135	28	29	121	10	23	4	5	17	4	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	54	135	28	29	121	10	23	4	5	17	4	35
Pedestrians								13				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.2				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	131			176			491	459	162	448	468	126
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	131			176			491	459	162	448	468	126
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	96			98			95	99	99	96	99	96
cM capacity (veh/h)	1467			1397			440	468	878	482	462	930
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	217	160	32	56								
Volume Left	54	29	23	17								
Volume Right	28	10	5	35								
cSH	1467	1397	481	686								
Volume to Capacity	0.04	0.02	0.07	0.08								
Queue Length 95th (m)	0.9	0.5	1.7	2.1								
Control Delay (s)	2.1	1.5	13.0	10.7								
Lane LOS	A	A	B	B								
Approach Delay (s)	2.1	1.5	13.0	10.7								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.7									
Intersection Capacity Utilization			28.4%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

9: Townline & Columbia Way

2017 Existing PM
10-29-2021

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	70	156	552	169	30
Future Volume (Veh/h)	11	70	156	552	169	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	70	156	552	169	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1048	184	199			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1048	184	199			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	92	89			
cM capacity (veh/h)	226	856	1379			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	81	708	199			
Volume Left	11	156	0			
Volume Right	70	0	30			
cSH	621	1379	1700			
Volume to Capacity	0.13	0.11	0.12			
Queue Length 95th (m)	3.6	3.1	0.0			
Control Delay (s)	11.7	2.8	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.7	2.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization		63.3%		ICU Level of Service		B
Analysis Period (min)			15			

Junctions 8							
ARCADY 8 - Roundabout Module							
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Filename: Highway 50 & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady
Report generation date: 2021-12-06 10:59:34 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - 2031 Future Background							
Emil Kolb Pkwy	0.15	~1	2.95	0.10	A	2.15	A
Highway 50 (North)	0.62	1.06	2.21	0.37	A		
Highway 50 (South)	0.19	~1	1.67	0.15	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 3:00 PM - 4:30 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 3:00 PM - 4:30 PM
"D7 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 ROPA 30, PM" model duration: 3:00 PM - 4:30 PM

Run using Junctions 8.0.6.541 at 2021-12-06 10:59:33 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Background, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Background, AM	2031 Future Background	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.15	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy	3	Emil Kolb Pkwy	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	1	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy	0.00	0.00
Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy	ONE HOUR	✓	165.00	100.000
Highway 50 (North)	ONE HOUR	✓	915.00	100.000
Highway 50 (South)	ONE HOUR	✓	367.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.000	300.000	67.000
	Highway 50 (North)	553.000	0.000	362.000
	Emil Kolb Pkwy	55.000	110.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.00	0.82	0.18
	Highway 50 (North)	0.60	0.00	0.40
	Emil Kolb Pkwy	0.33	0.67	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	1.000	1.040	1.120
	Highway 50 (North)	1.030	1.000	1.120
	Emil Kolb Pkwy	1.270	1.460	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.0	4.0	12.0
	Highway 50 (North)	3.0	0.0	12.0
	Emil Kolb Pkwy	27.0	46.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy	0.10	2.95	0.15	~1	A	151.41	227.11	10.19	2.69	0.11	10.19	2.69
Highway 50 (North)	0.37	2.21	0.62	1.06	A	839.62	1259.43	42.39	2.02	0.47	42.40	2.02
Highway 50 (South)	0.15	1.67	0.19	~1	A	336.77	505.15	13.55	1.61	0.15	13.55	1.61

Junctions 8							
ARCADY 8 - Roundabout Module							
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:21:19 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - 2031 Future Background							
Emil Kolb Pkwy (North)	0.32	~1	2.07	0.23	A	2.07	A
Emil Kolb Pkwy (South)	0.17	~1	1.88	0.12	A		
King Street	0.25	~1	2.23	0.18	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
"D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
"D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:21:18 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Background, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Background, AM	2031 Future Background	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.07	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	
King Street	7.00	8.00	30.00	25.00	55.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	511.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	295.00	100.000
King Street	ONE HOUR	✓	362.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	0.000	96.000	199.000
	Emil Kolb Pkwy (North)	371.000	0.000	140.000
	King Street	296.000	66.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	0.00	0.33	0.67
	Emil Kolb Pkwy (North)	0.73	0.00	0.27
	King Street	0.82	0.18	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	1.000	1.400	1.190

	Emil Kolb Pkwy (North)	1.140	1.000	1.030
	King Street	1.090	1.220	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.0	40.0	19.0
	Emil Kolb Pkwy (North)	14.0	0.0	3.0
	King Street	9.0	22.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.23	2.07	0.32	~1	A	468.90	703.35	22.70	1.94	0.25	22.70	1.94
Emil Kolb Pkwy (South)	0.12	1.88	0.17	~1	A	270.70	406.05	12.38	1.83	0.14	12.38	1.83
King Street	0.18	2.23	0.25	~1	A	332.18	498.27	17.10	2.06	0.19	17.10	2.06






















Jan 20, 2022

Lanes, Volumes, Timings

2031 Future Background AM


12-03-2021

3: Highway 50 & Private Access/Columbia Way

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	7	162	0	108	4	276	83	50	530	4
Future Volume (vph)	1	1	7	162	0	108	4	276	83	50	530	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		0.0	125.0		30.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.895			0.850				0.850			0.850
Flt Protected		0.994		0.950			0.950			0.950		
Satd. Flow (prot)	0	1202	0	1767	1570	0	1785	1847	1579	1475	1883	952
Flt Permitted		0.973		0.752			0.428			0.590		
Satd. Flow (perm)	0	1176	0	1399	1570	0	804	1847	1579	916	1883	952
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			559				83			30
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		46.8			237.9			633.3			932.3	
Travel Time (s)		3.4			14.3			38.0			55.9	
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 (%)	100%	0%	40%	1%	0%	4%	0%	4%	3%	21%	2%	67%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	1	7	162	0	108	4	276	83	50	530	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	162	108	0	4	276	83	50	530	4
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left						Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	15.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

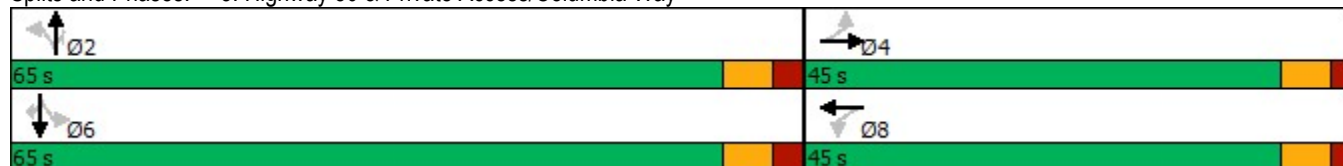
Lanes, Volumes, Timings 3: Highway 50 & Private Access/Columbia Way

2031 Future Background AM
12-03-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	45.0	45.0		45.0	45.0		65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	40.9%	40.9%		40.9%	40.9%		59.1%	59.1%	59.1%	59.1%	59.1%	59.1%
Maximum Green (s)	39.0	39.0		39.0	39.0		58.3	58.3	58.3	58.3	58.3	58.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effect Green (s)		15.5		15.5	15.5		60.3	60.3	60.3	60.3	60.3	60.3
Actuated g/C Ratio		0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio		0.04		0.66	0.15		0.01	0.22	0.08	0.08	0.41	0.01
Control Delay		18.8		47.0	0.4		6.0	6.5	1.7	6.2	8.1	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		18.8		47.0	0.4		6.0	6.5	1.7	6.2	8.1	0.0
LOS		B		D	A		A	A	A	A	A	A
Approach Delay		18.8			28.3			5.4			7.9	
Approach LOS		B			C			A			A	
Queue Length 50th (m)		0.3		26.4	0.0		0.2	15.9	0.0	2.6	36.0	0.0
Queue Length 95th (m)		4.3		46.8	0.0		1.4	32.6	5.0	8.0	69.1	0.0
Internal Link Dist (m)		22.8			213.9			609.3			908.3	
Turn Bay Length (m)				70.0			140.0			125.0		30.0
Base Capacity (vph)		522		617	1005		548	1259	1102	624	1283	658
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.02		0.26	0.11		0.01	0.22	0.08	0.08	0.41	0.01
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 88.5												
Natural Cycle: 60												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.66												
Intersection Signal Delay: 11.7							Intersection LOS: B					
Intersection Capacity Utilization 67.8%							ICU Level of Service C					

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way














Lanes, Volumes, Timings

2031 Future Background AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-03-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	3	37	113	0	34	16	372	25	16	662	8
Future Volume (vph)	18	3	37	113	0	34	16	372	25	16	662	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98		1.00	0.98				0.98	1.00		0.98
Frt		0.861			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1617	0	1785	1607	0	1526	3510	1591	1785	1883	1591
Flt Permitted	0.735			0.551			0.312			0.531		
Satd. Flow (perm)	1376	1617	0	1031	1607	0	501	3510	1556	996	1883	1552
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			383				70			70
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	4		3	3		4	2		1	1		2
Confl. Bikes (#/hr)					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
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	17%	4%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	3	37	113	0	34	16	372	25	16	662	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	40	0	113	34	0	16	372	25	16	662	8
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0		15.0	15.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

2031 Future Background AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-03-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	4			3			2			6		
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.5	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	43.1	43.1		9.6	52.7		57.3	57.3	57.3	57.3	57.3	57.3
Total Split (%)	39.2%	39.2%		8.7%	47.9%		52.1%	52.1%	52.1%	52.1%	52.1%	52.1%
Maximum Green (s)	36.0	36.0		6.6	45.6		50.7	50.7	50.7	50.7	50.7	50.7
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		0.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		3.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0			8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	4	4			4		2	2	2	2	2	2
Act Effct Green (s)	12.6	12.6		22.4	18.3		56.0	56.0	56.0	56.0	56.0	56.0
Actuated g/C Ratio	0.14	0.14		0.25	0.21		0.63	0.63	0.63	0.63	0.63	0.63
v/c Ratio	0.09	0.15		0.33	0.05		0.05	0.17	0.02	0.03	0.55	0.01
Control Delay	31.0	11.9		25.9	0.1		11.9	9.2	0.0	11.2	14.7	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	11.9		25.9	0.1		11.9	9.2	0.0	11.2	14.7	0.0
LOS	C	B		C	A		B	A	A	B	B	A
Approach Delay	17.8			20.0			8.8			14.5		
Approach LOS	B			B			A			B		
Queue Length 50th (m)	2.8	0.5		14.6	0.0		0.9	12.3	0.0	0.9	57.5	0.0
Queue Length 95th (m)	8.2	8.3		26.0	0.0		6.4	36.2	0.0	6.1	170.0	0.0
Internal Link Dist (m)	88.1			177.9			747.8			609.3		
Turn Bay Length (m)	30.0			85.0			90.0		75.0	65.0		90.0
Base Capacity (vph)	569	690		339	1024		318	2230	1013	632	1196	1011
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.06		0.33	0.03		0.05	0.17	0.02	0.03	0.55	0.01

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 88.2

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Lanes, Volumes, Timings

2031 Future Background AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-03-2021

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 13.4

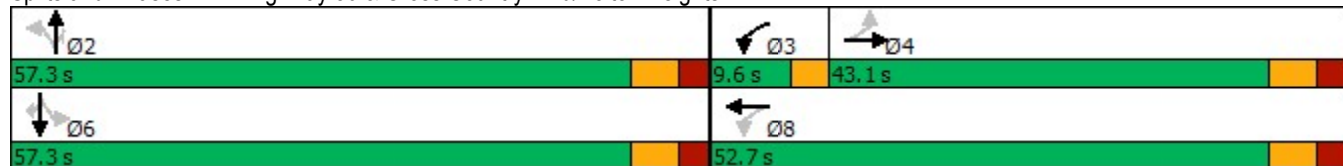
Intersection LOS: B

Intersection Capacity Utilization 61.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Blvd/Bolton Heights Dr
























Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 Future Background AM

12-03-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	181	92	230	194	77	44	351	185	91	723	58
Future Volume (vph)	77	181	92	230	194	77	44	351	185	91	723	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	1.00		0.98	1.00	0.99			1.00	0.96		1.00	
Frt			0.850		0.957				0.850		0.990	
Flt Protected	0.950			0.950				0.994			0.995	
Satd. Flow (prot)	1575	1679	1437	1591	1605	0	0	1649	1351	0	3193	0
Flt Permitted	0.593			0.436				0.842			0.822	
Satd. Flow (perm)	978	1679	1412	727	1605	0	0	1396	1296	0	2636	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		18				185		9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		267.9			353.4			484.2			32.8	
Travel Time (s)		19.3			25.4			34.9			2.4	
Confl. Peds. (#/hr)	3		4	4		3	8		6	6		8
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%	3%	0%	1%	2%	3%	6%	4%	6%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	77	181	92	230	194	77	44	351	185	91	723	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	181	92	230	271	0	0	395	185	0	872	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.17	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	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	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 Future Background AM

12-03-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		8.0	8.0	8.0	5.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		23.5	23.5	23.5	9.5	23.5	
Total Split (s)	10.0	37.0	37.0	18.0	45.0		55.0	55.0	55.0	10.0	65.0	
Total Split (%)	8.3%	30.8%	30.8%	15.0%	37.5%		45.8%	45.8%	45.8%	8.3%	54.2%	
Maximum Green (s)	7.0	30.7	30.7	15.0	38.7		49.0	49.0	49.0	7.0	59.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0	6.0		6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	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	3.0	3.0	
Recall Mode	None	None	None	None	None		Max	Max	Max	None	Max	
Walk Time (s)		16.0	16.0		16.0		8.0	8.0	8.0		8.0	
Flash Dont Walk (s)		10.0	10.0		10.0		9.0	9.0	9.0		9.0	
Pedestrian Calls (#/hr)		4	4		4		8	8	8		8	
Act Effect Green (s)	27.1	17.0	17.0	37.7	26.5			59.2	59.2		59.2	
Actuated g/C Ratio	0.26	0.16	0.16	0.36	0.25			0.56	0.56		0.56	
v/c Ratio	0.27	0.68	0.29	0.61	0.65			0.51	0.23		0.59	
Control Delay	25.5	54.6	7.4	32.9	41.7			18.5	2.8		18.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	25.5	54.6	7.4	32.9	41.7			18.5	2.8		18.2	
LOS	C	D	A	C	D			B	A		B	
Approach Delay		35.8			37.7			13.5			18.2	
Approach LOS		D			D			B			B	
Queue Length 50th (m)	11.1	37.6	0.0	37.0	50.7			50.0	0.0		61.3	
Queue Length 95th (m)	21.5	60.8	10.2	57.8	79.1			92.7	11.3		98.4	
Internal Link Dist (m)		243.9			329.4			460.2			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	291	488	487	381	599			780	805		1477	
Starvation Cap Reductn	0	0	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.26	0.37	0.19	0.60	0.45			0.51	0.23		0.59	

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 105.9

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.68

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 Future Background AM
12-03-2021

Intersection Signal Delay: 23.9	Intersection LOS: C
Intersection Capacity Utilization 95.2%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: Highway 50 & King St



Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 Future Background AM

12-03-2021

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↱	
Traffic Volume (vph)	95	20	33	199	54	38
Future Volume (vph)	95	20	33	199	54	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			1.00		
Frt	0.977				0.944	
Flt Protected				0.993	0.971	
Satd. Flow (prot)	1787	0	0	1891	1741	0
Flt Permitted				0.959	0.971	
Satd. Flow (perm)	1787	0	0	1825	1741	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	17				38	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	7%	0%	1%	2%	0%
Adj. Flow (vph)	95	20	33	199	54	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	115	0	0	232	92	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 Future Background AM

12-03-2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	51.0		51.0	51.0	39.0	
Total Split (%)	56.7%		56.7%	56.7%	43.3%	
Maximum Green (s)	46.5		46.5	46.5	34.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	3		3	3	0	
Act Effect Green (s)	58.9			58.9	7.9	
Actuated g/C Ratio	0.81			0.81	0.11	
v/c Ratio	0.08			0.16	0.41	
Control Delay	2.3			2.7	25.0	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.3			2.7	25.0	
LOS	A			A	C	
Approach Delay	2.3			2.7	25.0	
Approach LOS	A			A	C	
Queue Length 50th (m)	2.5			6.4	8.0	
Queue Length 95th (m)	6.9			14.2	18.7	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1452			1479	850	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.08			0.16	0.11	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 72.6

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.41

Intersection Signal Delay: 7.2

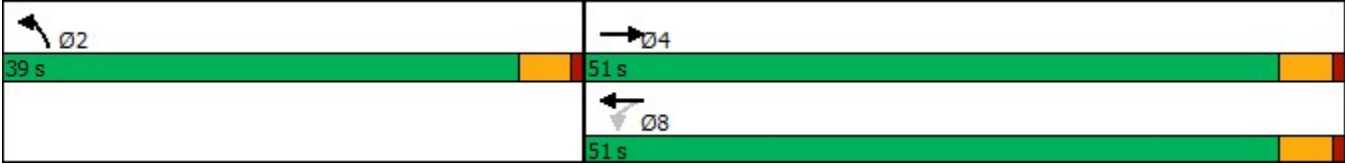
Intersection LOS: A

Intersection Capacity Utilization 31.8%

ICU Level of Service A










Analysis Period (min) 15

Splits and Phases: 6: Kingsview Dr & Columbia Way



HCM Unsignalized Intersection Capacity Analysis 7: Westchester Blvd & Columbia Way

2031 Future Background AM
12-03-2021

















						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	99	29	9	139	95	65
Future Volume (Veh/h)	99	29	9	139	95	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	99	29	9	139	95	65
Pedestrians				1	7	
Lane Width (m)				3.7	3.7	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	1	
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			135		278	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			135		278	122
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		87	93
cM capacity (veh/h)			1453		708	918
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	128	148	160			
Volume Left	0	9	95			
Volume Right	29	0	65			
cSH	1700	1453	780			
Volume to Capacity	0.08	0.01	0.21			
Queue Length 95th (m)	0.0	0.1	6.1			
Control Delay (s)	0.0	0.5	10.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.5	10.8			
Approach LOS			B			
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			30.8%	ICU Level of Service		A
Analysis Period (min)			15			

Jan 20, 2021

HCM Unsignalized Intersection Capacity Analysis
8: Mt Hope Rd & Columbia Way

2031 Future Background AM











12-03-2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	125	16	11	104	7	24	3	22	22	4	26
Future Volume (Veh/h)	20	125	16	11	104	7	24	3	22	22	4	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	20	125	16	11	104	7	24	3	22	22	4	26
Pedestrians		1			1			10				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.2			1.2			1.2				
Percent Blockage		0			0			1				
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	111			151			342	316	144	327	320	108
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	111			151			342	316	144	327	320	108
tC, single (s)	4.2			4.3			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.4			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			99			96	99	98	96	99	97
cM capacity (veh/h)	1448			1290			577	585	900	587	581	950
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	161	122	49	52								
Volume Left	20	11	24	22								
Volume Right	16	7	22	26								
cSH	1448	1290	689	725								
Volume to Capacity	0.01	0.01	0.07	0.07								
Queue Length 95th (m)	0.3	0.2	1.8	1.9								
Control Delay (s)	1.0	0.8	10.6	10.4								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.0	0.8	10.6	10.4								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			23.8%	ICU Level of Service				A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

9: Townline & Columbia Way

2031 Future Background AM
12-03-2021

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	241	21	120	658	13
Future Volume (Veh/h)	20	241	21	120	658	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	241	21	120	658	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	826	664	671			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	826	664	671			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	94	48	98			
cM capacity (veh/h)	336	462	901			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	261	21	120	671		
Volume Left	20	21	0	0		
Volume Right	241	0	0	13		
cSH	449	901	1700	1700		
Volume to Capacity	0.58	0.02	0.07	0.39		
Queue Length 95th (m)	28.9	0.6	0.0	0.0		
Control Delay (s)	23.5	9.1	0.0	0.0		
Lane LOS	C	A				
Approach Delay (s)	23.5	1.4		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay				5.9		
Intersection Capacity Utilization				58.1%	ICU Level of Service	B
Analysis Period (min)				15		

Junctions 8							
ARCADY 8 - Roundabout Module							
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Filename: Highway 50 & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady
Report generation date: 2021-12-06 11:24:23 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - 2031 Future Background							
Emil Kolb Pkwy	0.52	1.03	2.53	0.34	A	2.93	A
Highway 50 (North)	0.26	~1	1.71	0.20	A		
Highway 50 (South)	0.99	1.12	4.00	0.47	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 3:00 PM - 4:30 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 3:00 PM - 4:30 PM
"D7 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 ROPA 30, PM" model duration: 3:00 PM - 4:30 PM

Run using Junctions 8.0.6.541 at 2021-12-06 11:24:23 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Background, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Background, PM	2031 Future Background	PM		ONE HOUR	15:00	16:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.93	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy	3	Emil Kolb Pkwy	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	1	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy	0.00	0.00
Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy	ONE HOUR	✓	675.00	100.000
Highway 50 (North)	ONE HOUR	✓	498.00	100.000
Highway 50 (South)	ONE HOUR	✓	814.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.000	781.000	33.000
	Highway 50 (North)	362.000	0.000	136.000
	Emil Kolb Pkwy	102.000	573.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.00	0.96	0.04
	Highway 50 (North)	0.73	0.00	0.27
	Emil Kolb Pkwy	0.15	0.85	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	1.000	1.120	1.120
	Highway 50 (North)	1.030	1.000	1.180
	Emil Kolb Pkwy	1.040	1.030	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.0	12.0	12.0
	Highway 50 (North)	3.0	0.0	18.0
	Emil Kolb Pkwy	4.0	3.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy	0.34	2.53	0.52	1.03	A	619.39	929.09	34.76	2.24	0.39	34.76	2.24
Highway 50 (North)	0.20	1.71	0.26	~1	A	456.97	685.46	18.73	1.64	0.21	18.73	1.64
Highway 50 (South)	0.47	4.00	0.99	1.12	A	746.94	1120.41	60.50	3.24	0.67	60.50	3.24

Junctions 8
ARCADY 8 - Roundabout Module
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:21:41 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 Future Background						
Emil Kolb Pkwy (North)	0.12	~1	2.06	0.10	A	2.23	A
Emil Kolb Pkwy (South)	0.69	1.04	2.54	0.40	A		
King Street	0.29	~1	1.76	0.22	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
"D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
"D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:21:40 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Background, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Background, PM	2031 Future Background	PM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.23	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	
King Street	7.00	8.00	30.00	25.00	55.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	191.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	885.00	100.000
King Street	ONE HOUR	✓	538.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	0.000	525.000	360.000
	Emil Kolb Pkwy (North)	96.000	0.000	95.000
	King Street	314.000	224.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	0.00	0.59	0.41
	Emil Kolb Pkwy (North)	0.50	0.00	0.50
	King Street	0.58	0.42	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	1.000	1.040	1.040

	Emil Kolb Pkwy (North)	1.180	1.000	1.110
	King Street	1.020	1.010	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.0	4.0	4.0
	Emil Kolb Pkwy (North)	18.0	0.0	11.0
	King Street	2.0	1.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.10	2.06	0.12	~1	A	175.26	262.90	8.50	1.94	0.09	8.50	1.94
Emil Kolb Pkwy (South)	0.40	2.54	0.69	1.04	A	812.09	1218.14	45.78	2.25	0.51	45.78	2.25
King Street	0.22	1.76	0.29	~1	A	493.68	740.52	20.64	1.67	0.23	20.64	1.67






















Jan 20, 2022

Lanes, Volumes, Timings

2031 Future Background PM

3: Highway 50 & Private Access/Columbia Way

12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	95	0	62	0	714	261	132	310	3
Future Volume (vph)	1	0	1	95	0	62	0	714	261	132	310	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		0.0	125.0		30.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.932			0.850				0.850			0.850
Flt Protected		0.976		0.950						0.950		
Satd. Flow (prot)	0	1748	0	1785	1601	0	1879	1902	1610	1767	1902	795
Flt Permitted		0.865		0.757						0.344		
Satd. Flow (perm)	0	1549	0	1422	1601	0	1879	1902	1610	640	1902	795
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40			214				261			33
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		46.8			237.9			633.3			932.3	
Travel Time (s)		3.4			14.3			38.0			55.9	
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 (%)	0%	0%	0%	0%	0%	2%	0%	1%	1%	1%	1%	100%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	0	1	95	0	62	0	714	261	132	310	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	0	95	62	0	0	714	261	132	310	3
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left						Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	15.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	













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Lanes, Volumes, Timings

2031 Future Background PM

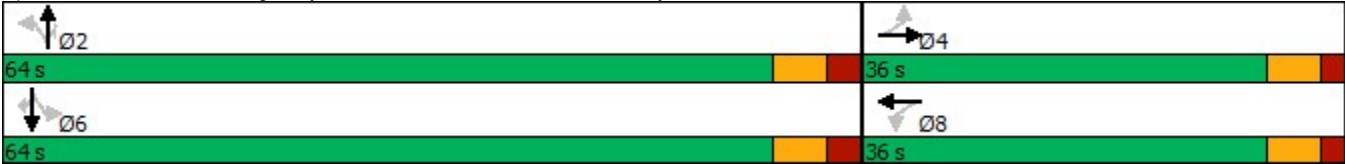
12-06-2021

3: Highway 50 & Private Access/Columbia Way

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	30.0	30.0		30.0	30.0		57.3	57.3	57.3	57.3	57.3	57.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effect Green (s)		11.2		11.2	11.2			64.0	64.0	64.0	64.0	64.0
Actuated g/C Ratio		0.13		0.13	0.13			0.77	0.77	0.77	0.77	0.77
v/c Ratio		0.01		0.50	0.15			0.49	0.20	0.27	0.21	0.00
Control Delay		0.0		42.4	0.8			6.9	1.1	6.5	4.6	0.0
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay		0.0		42.4	0.8			6.9	1.1	6.5	4.6	0.0
LOS		A		D	A			A	A	A	A	A
Approach Delay					26.0			5.3			5.1	
Approach LOS					C			A			A	
Queue Length 50th (m)		0.0		14.7	0.0			44.5	0.0	6.5	14.4	0.0
Queue Length 95th (m)		0.0		29.2	0.0			83.6	7.0	17.6	28.8	0.0
Internal Link Dist (m)		22.8			213.9			609.3			908.3	
Turn Bay Length (m)				70.0						125.0		30.0
Base Capacity (vph)		582		511	712			1457	1294	490	1457	616
Starvation Cap Reductn		0		0	0			0	0	0	0	0
Spillback Cap Reductn		0		0	0			0	0	0	0	0
Storage Cap Reductn		0		0	0			0	0	0	0	0
Reduced v/c Ratio		0.00		0.19	0.09			0.49	0.20	0.27	0.21	0.00
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 83.6												
Natural Cycle: 60												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.50												
Intersection Signal Delay: 7.3							Intersection LOS: A					
Intersection Capacity Utilization 79.7%							ICU Level of Service D					

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way

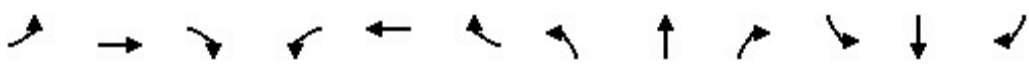


Lanes, Volumes, Timings

2031 Future Background PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	5	20	45	3	22	98	1008	110	26	409	28
Future Volume (vph)	12	5	20	45	3	22	98	1008	110	26	409	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98		1.00	0.99		1.00		0.97	1.00		0.98
Frt		0.880			0.868				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1570	0	1785	1644	0	1785	3614	1591	1785	1902	1591
Flt Permitted	0.741			0.741			0.521			0.270		
Satd. Flow (perm)	1387	1570	0	1387	1644	0	977	3614	1547	507	1902	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			22				110			45
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	5		3	3		5	2		4	4		2
Confl. Bikes (#/hr)					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
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	12	5	20	45	3	22	98	1008	110	26	409	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	25	0	45	25	0	98	1008	110	26	409	28
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0		15.0	15.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

2031 Future Background PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-06-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	Perm	NA	Perm
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		44.0	44.0		56.0	56.0	56.0	56.0	56.0	56.0
Total Split (%)	44.0%	44.0%		44.0%	44.0%		56.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Maximum Green (s)	36.9	36.9		36.9	36.9		49.4	49.4	49.4	49.4	49.4	49.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5		5	5		4	4	4	4	4	4
Act Effct Green (s)	12.8	12.8		12.8	12.8		61.2	61.2	61.2	61.2	61.2	61.2
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.78	0.78	0.78	0.78	0.78	0.78
v/c Ratio	0.05	0.09		0.20	0.09		0.13	0.36	0.09	0.07	0.28	0.02
Control Delay	25.3	13.2		28.5	12.0		7.7	7.1	2.4	8.6	7.4	2.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	13.2		28.5	12.0		7.7	7.1	2.4	8.6	7.4	2.1
LOS	C	B		C	B		A	A	A	A	A	A
Approach Delay	17.1			22.6			6.8			7.1		
Approach LOS	B			C			A			A		
Queue Length 50th (m)	1.7	0.7		6.7	0.4		3.8	25.8	0.0	1.0	18.3	0.0
Queue Length 95th (m)	5.4	6.3		13.8	6.0		20.9	90.8	8.5	7.8	75.0	2.7
Internal Link Dist (m)	88.1			177.9			747.8			609.3		
Turn Bay Length (m)	30.0			85.0			90.0		75.0	65.0		90.0
Base Capacity (vph)	664	762		664	798		763	2823	1232	396	1486	1223
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.03		0.07	0.03		0.13	0.36	0.09	0.07	0.28	0.02

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 78.3

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Lanes, Volumes, Timings

2031 Future Background PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-06-2021

Maximum v/c Ratio: 0.36

Intersection Signal Delay: 7.7

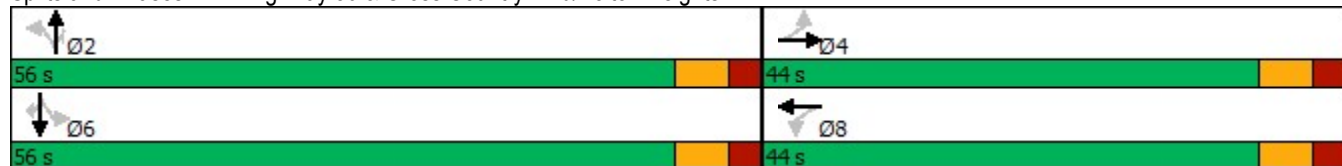
Intersection LOS: A

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Blvd/Bolton Heights Dr
























Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 Future Background PM

12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	330	70	240	264	50	51	1019	493	40	413	40
Future Volume (vph)	95	330	70	240	264	50	51	1019	493	40	413	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.97		0.98	1.00	0.99			1.00	0.92		0.99	
Frt			0.850		0.976				0.850		0.988	
Flt Protected	0.950			0.950				0.998			0.996	
Satd. Flow (prot)	1606	1729	1409	1591	1647	0	0	1709	1417	0	3161	0
Flt Permitted	0.368			0.138				0.952			0.597	
Satd. Flow (perm)	604	1729	1377	230	1647	0	0	1629	1298	0	1895	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94		6				330		10	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		267.9			353.4			499.1			32.8	
Travel Time (s)		19.3			25.4			35.9			2.4	
Confl. Peds. (#/hr)	20		7	7		20	13		16	16		13
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 (%)	0%	0%	2%	1%	1%	0%	0%	1%	1%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	1	0	0	0	1	0	0	0
Adj. Flow (vph)	95	330	70	240	264	50	51	1019	493	40	413	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	330	70	240	314	0	0	1070	493	0	493	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.17	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	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	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 Future Background PM

12-06-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		8.0	23.5	23.5	23.5	23.5	
Total Split (s)	9.9	32.3	32.3	17.0	39.4		8.0	90.7	90.7	82.7	82.7	
Total Split (%)	7.1%	23.1%	23.1%	12.1%	28.1%		5.7%	64.8%	64.8%	59.1%	59.1%	
Maximum Green (s)	6.9	26.0	26.0	14.0	33.1		5.0	84.7	84.7	76.7	76.7	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		0.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0	6.0		6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			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	3.0	3.0	
Recall Mode	None	None	None	None	None		None	Max	Max	Max	Max	
Walk Time (s)		16.0	16.0		16.0			8.0	8.0	8.0	8.0	
Flash Dont Walk (s)		10.0	10.0		10.0			9.0	9.0	9.0	9.0	
Pedestrian Calls (#/hr)		20	20		20			16	16	16	16	
Act Effect Green (s)	36.2	26.0	26.0	46.3	33.1			84.7	84.7		84.7	
Actuated g/C Ratio	0.26	0.19	0.19	0.33	0.24			0.60	0.60		0.60	
v/c Ratio	0.46	1.03	0.21	1.13	0.80			1.09	0.54		0.43	
Control Delay	43.1	112.6	5.5	137.7	65.5			82.9	7.0		15.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	43.1	112.6	5.5	137.7	65.5			82.9	7.0		15.8	
LOS	D	F	A	F	E			F	A		B	
Approach Delay		84.1			96.7			58.9			15.8	
Approach LOS		F			F			E			B	
Queue Length 50th (m)	19.7	~102.5	0.0	~64.7	85.2			~349.0	21.7		37.5	
Queue Length 95th (m)	34.2	#165.3	7.9	#121.1	#131.2			#433.1	49.7		51.0	
Internal Link Dist (m)		243.9			329.4			475.1			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	205	321	332	212	393			985	915		1150	
Starvation Cap Reductn	0	0	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.46	1.03	0.21	1.13	0.80			1.09	0.54		0.43	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 140

Natural Cycle: 130

Control Type: Semi Act-Uncoord








Maximum v/c Ratio: 1.13

Lanes, Volumes, Timings

5: Highway 50 & King St

Intersection Signal Delay: 62.9	Intersection LOS: E
Intersection Capacity Utilization 131.4%	ICU Level of Service H
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 5: Highway 50 & King St

 Ø1	 Ø2	 Ø3	 Ø4
8 s	82.7 s	9.9 s	39.4 s
 Ø6		 Ø7	 Ø8
90.7 s		17 s	32.3 s

Lanes, Volumes, Timings 6: Kingsview Dr & Columbia Way

2031 Future Background PM
12-06-2021

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↱	
Traffic Volume (vph)	325	110	70	154	28	38
Future Volume (vph)	325	110	70	154	28	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99			1.00		
Frt	0.966				0.922	
Flt Protected				0.985	0.979	
Satd. Flow (prot)	1828	0	0	1892	1698	0
Flt Permitted				0.800	0.979	
Satd. Flow (perm)	1828	0	0	1535	1698	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	34				38	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		4	4			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	0%	0%	0%	5%	0%
Adj. Flow (vph)	325	110	70	154	28	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	435	0	0	224	66	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 Future Background PM

12-06-2021











	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	59.0		59.0	59.0	31.0	
Total Split (%)	65.6%		65.6%	65.6%	34.4%	
Maximum Green (s)	54.5		54.5	54.5	26.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	4		4	4	0	
Act Effct Green (s)	69.1			69.1	7.2	
Actuated g/C Ratio	0.84			0.84	0.09	
v/c Ratio	0.28			0.17	0.36	
Control Delay	2.4			2.3	24.3	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.4			2.3	24.3	
LOS	A			A	C	
Approach Delay	2.4			2.3	24.3	
Approach LOS	A			A	C	
Queue Length 50th (m)	11.2			5.7	4.6	
Queue Length 95th (m)	23.3			13.0	15.6	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1544			1292	575	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.28			0.17	0.11	
Intersection Summary						
Area Type:	Other					
Cycle Length: 90						
Actuated Cycle Length: 82.1						
Natural Cycle: 45						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.36						
Intersection Signal Delay: 4.4				Intersection LOS: A		
Intersection Capacity Utilization 51.3%				ICU Level of Service A		
Analysis Period (min) 15						

Splits and Phases: 6: Kingsview Dr & Columbia Way



















ICM Unsignalized Intersection Capacity Analysis 7: Westchester Blvd & Columbia Way

2031 Future Background PM
12-06-2021

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	245	102	63	177	79	42
Future Volume (Veh/h)	245	102	63	177	79	42
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	245	102	63	177	79	42
Pedestrians					4	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			351		603	300
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			351		603	300
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			95		82	94
cM capacity (veh/h)			1215		440	728
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	347	240	121			
Volume Left	0	63	79			
Volume Right	102	0	42			
cSH	1700	1215	510			
Volume to Capacity	0.20	0.05	0.24			
Queue Length 95th (m)	0.0	1.3	7.3			
Control Delay (s)	0.0	2.5	14.2			
Lane LOS		A	B			
Approach Delay (s)	0.0	2.5	14.2			
Approach LOS			B			
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			49.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 8: Mt Hope Rd & Columbia Way

2031 Future Background PM
12-06-2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	178	37	38	160	13	30	5	7	22	5	46
Future Volume (Veh/h)	71	178	37	38	160	13	30	5	7	22	5	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	71	178	37	38	160	13	30	5	7	22	5	46
Pedestrians								13				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.2				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	173			228			642	600	210	590	612	166
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	173			228			642	600	210	590	612	166
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			97			91	99	99	94	99	95
cM capacity (veh/h)	1416			1337			337	381	827	378	375	883
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	286	211	42	73								
Volume Left	71	38	30	22								
Volume Right	37	13	7	46								
cSH	1416	1337	380	591								
Volume to Capacity	0.05	0.03	0.11	0.12								
Queue Length 95th (m)	1.3	0.7	3.0	3.4								
Control Delay (s)	2.2	1.6	15.7	12.0								
Lane LOS	A	A	C	B								
Approach Delay (s)	2.2	1.6	15.7	12.0								
Approach LOS			C	B								
Intersection Summary												
Average Delay			4.1									
Intersection Capacity Utilization			35.3%		ICU Level of Service		A					
Analysis Period (min)			15									

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2021
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Filename: Highway 50 & Emil Kolb Pkwy (Option 1&2 FT).arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady
Report generation date: 2021-12-07 11:29:44 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 Future Total (Option 1/2)						
Emil Kolb Pkwy (East-Street F)	0.15	~1	2.49	0.12	A	2.76	A
Emil Kolb Pkwy (West)	0.26	~1	2.86	0.18	A		
Highway 50 (North)	0.95	1.05	3.22	0.48	A		
Highway 50 (South)	0.30	~1	1.92	0.22	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 8:15 AM
"D8 - 2031 Future Total (Option 1/2), PM" model duration: 3:00 PM - 3:15 PM

Run using Junctions 8.0.6.541 at 2021-12-07 11:29:43 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Total (Option

1/2), AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Total (Option 1/2), AM	2031 Future Total (Option 1/2)	AM		PHF	08:00	08:15	15	15		✓		✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3,4		✓		2.76	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (East-Street F)	1	Emil Kolb Pkwy (East-Street F)	
Emil Kolb Pkwy (West)	3	Emil Kolb Pkwy (West)	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	4	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (East-Street F)	0.00	99999.00		0.00
Emil Kolb Pkwy (West)	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (East-Street F)	7.00	8.00	30.00	35.00	60.00	25.00	

Emil Kolb Pkwy (West)	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (East-Street F)	0.00	0.00
Emil Kolb Pkwy (West)	0.00	0.00
Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (East-Street F)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (West)	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (East-Street F)		(calculated)	(calculated)	1.505	2853.857
Emil Kolb Pkwy (West)		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (East-Street F)	PHF	✓	211.00	100.000
Emil Kolb Pkwy (West)	PHF	✓	327.00	100.000
Highway 50 (North)	PHF	✓	1066.00	100.000
Highway 50 (South)	PHF	✓	560.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (East-Street F)	211.00	1.00	N/A
Emil Kolb Pkwy (West)	327.00	1.00	N/A
Highway 50 (North)	1066.00	1.00	N/A
Highway 50 (South)	560.00	1.00	N/A

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	0.000	9.000	170.000	32.000
	Highway 50 (North)	12.000	0.000	457.000	597.000
	Emil Kolb Pkwy (West)	35.000	149.000	0.000	143.000
	Highway 50 (South)	5.000	341.000	214.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	0.00	0.04	0.81	0.15
	Highway 50 (North)	0.01	0.00	0.43	0.56
	Emil Kolb Pkwy (West)	0.11	0.46	0.00	0.44
	Highway 50 (South)	0.01	0.61	0.38	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	1.000	1.040	1.120	1.000
	Highway 50 (North)	1.030	1.000	1.120	1.000
	Emil Kolb Pkwy (West)	1.270	1.460	1.000	1.000
	Highway 50 (South)	1.000	1.040	1.120	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	0.0	4.0	12.0	0.0
	Highway 50 (North)	3.0	0.0	12.0	0.0
	Emil Kolb Pkwy (West)	27.0	46.0	0.0	0.0
	Highway 50 (South)	0.0	4.0	12.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (East-Street F)	0.12	2.49	0.15	~1	A	211.00	52.75	2.15	2.44	0.14	2.15	2.45
Emil Kolb Pkwy (West)	0.18	2.86	0.26	~1	A	327.00	81.75	3.82	2.81	0.25	3.82	2.81
Highway 50 (North)	0.48	3.22	0.95	1.05	A	1066.00	266.50	13.94	3.14	0.93	13.95	3.14
Highway 50 (South)	0.22	1.92	0.30	~1	A	560.00	140.00	4.42	1.89	0.29	4.42	1.89

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2021
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:19:29 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 Future Total (Option 1/2)						
Emil Kolb Pkwy (North)	1.21	?	3.36	0.52	A	4.59	A
Emil Kolb Pkwy (South)	0.28	~1	2.59	0.18	A		
King Street	1.61	?	7.76	0.58	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
"D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
"D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:19:28 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Total (Option 1/2), AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Total (Option 1/2), AM	2031 Future Total (Option 1/2)	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		4.59	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
------	----------------------------------	---------------------	---------------------------------	----------------------	-----------------------------------	------------------------------------	-----------

Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	
King Street	7.00	8.00	30.00	25.00	55.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	1179.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	357.00	100.000
King Street	ONE HOUR	✓	685.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

		To		
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.000	158.000	199.000
	Emil Kolb Pkwy (North)	895.000	0.000	284.000
	King Street	296.000	389.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.00	0.44	0.56
	Emil Kolb Pkwy (North)	0.76	0.00	0.24
	King Street	0.43	0.57	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	1.000	1.400	1.190
	Emil Kolb Pkwy (North)	1.140	1.000	1.030
	King Street	1.090	1.220	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.0	40.0	19.0
	Emil Kolb Pkwy (North)	14.0	0.0	3.0
	King Street	9.0	22.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.52	3.36	1.21	?	A	1081.87	1622.81	76.72	2.84	0.85	76.73	2.84
Emil Kolb Pkwy (South)	0.18	2.59	0.28	~1	A	327.59	491.38	19.54	2.39	0.22	19.54	2.39
King Street	0.58	7.76	1.61	?	A	628.57	942.85	83.39	5.31	0.93	83.40	5.31

Jan 20, 2022

Lanes, Volumes, Timings

2031 FT AM

12-06-2021

3: Highway 50 & Private Access/Columbia Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕		↕	↕↕	↕	↕	↕↕	
Traffic Volume (vph)	1	1	7	167	0	142	4	320	85	110	630	4
Future Volume (vph)	1	1	7	167	0	142	4	320	85	110	630	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		15.0	125.0		0.0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.895			0.850				0.850		0.999	
Flt Protected		0.994		0.950			0.950			0.950		
Satd. Flow (prot)	0	1202	0	1767	1570	0	1785	3510	1579	1475	3561	0
Flt Permitted		0.971		0.752			0.411			0.558		
Satd. Flow (perm)	0	1174	0	1399	1570	0	772	3510	1579	866	3561	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			502				85		1	
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		46.8			237.9			633.3			632.5	
Travel Time (s)		3.4			14.3			38.0			38.0	
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
Heavy Vehicles (%)	100%	0%	40%	1%	0%	4%	0%	4%	3%	21%	2%	67%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	1	7	167	0	142	4	320	85	110	630	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	167	142	0	4	320	85	110	634	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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.01
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						Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	15.0		10.0	10.0		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												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

2031 FT AM

Synchro 11 Report
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Jan 20, 2022

Lanes, Volumes, Timings

2031 FT AM

12-06-2021

3: Highway 50 & Private Access/Columbia Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	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)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	
Total Split (s)	45.0	45.0		45.0	45.0		65.0	65.0	65.0	65.0	65.0	
Total Split (%)	40.9%	40.9%		40.9%	40.9%		59.1%	59.1%	59.1%	59.1%	59.1%	
Maximum Green (s)	39.0	39.0		39.0	39.0		58.3	58.3	58.3	58.3	58.3	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	
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)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effect Green (s)		15.7		15.7	15.7		59.4	59.4	59.4	59.4	59.4	
Actuated g/C Ratio		0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	
v/c Ratio		0.04		0.67	0.21		0.01	0.13	0.08	0.19	0.26	
Control Delay		18.7		46.8	0.7		6.2	5.8	1.8	7.2	6.4	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		18.7		46.8	0.7		6.2	5.8	1.8	7.2	6.4	
LOS		B		D	A		A	A	A	A	A	
Approach Delay		18.7			25.6			5.0			6.5	
Approach LOS		B			C			A			A	
Queue Length 50th (m)		0.3		27.4	0.0		0.2	9.1	0.0	6.2	19.9	
Queue Length 95th (m)		4.3		48.2	0.0		1.5	17.7	5.2	16.4	35.3	
Internal Link Dist (m)		22.8			213.9			609.3			608.5	
Turn Bay Length (m)				70.0			140.0		15.0	125.0		
Base Capacity (vph)		526		622	976		522	2374	1095	585	2409	
Starvation Cap Reductn		0		0	0		0	0	0	0	0	
Spillback Cap Reductn		0		0	0		0	0	0	0	0	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.02		0.27	0.15		0.01	0.13	0.08	0.19	0.26	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 87.8

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 10.2

Intersection LOS: B

Intersection Capacity Utilization 66.3%

ICU Level of Service C

2031 FT AM

Synchro 11 Report
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Lanes, Volumes, Timings
3: Highway 50 & Private Access/Columbia Way

2031 FT AM
12-06-2021

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way

























Jan 20, 2022

Lanes, Volumes, Timings

2031 FT AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	3	37	113	0	41	16	412	25	24	757	8
Future Volume (vph)	18	3	37	113	0	41	16	412	25	24	757	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99		1.00	0.98		1.00		0.98	1.00	1.00	
Frt		0.861			0.850				0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1632	0	1785	1607	0	1526	3510	1591	1785	3571	0
Flt Permitted	0.730			0.551			0.339			0.510		
Satd. Flow (perm)	1367	1632	0	1033	1607	0	544	3510	1556	957	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			341				70		1	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	4		3	3		4	2		1	1		2
Confl. Bikes (#/hr)					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
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	17%	4%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	3	37	113	0	41	16	412	25	24	757	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	40	0	113	41	0	16	412	25	24	765	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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.01
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	Right	Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	15.0	15.0		15.0	15.0		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	

2031 FT AM

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Lanes, Volumes, Timings

2031 FT AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-06-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4			3			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)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	
Minimum Split (s)	43.1	43.1		9.5	43.1		32.6	32.6	32.6	32.6	32.6	
Total Split (s)	43.1	43.1		9.6	52.7		57.3	57.3	57.3	57.3	57.3	
Total Split (%)	39.2%	39.2%		8.7%	47.9%		52.1%	52.1%	52.1%	52.1%	52.1%	
Maximum Green (s)	36.0	36.0		6.6	45.6		50.7	50.7	50.7	50.7	50.7	
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.1	3.1		0.0	3.1		2.6	2.6	2.6	2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.1	7.1		3.0	7.1		6.6	6.6	6.6	6.6	6.6	
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)	8.0	8.0			8.0		8.0	8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)	4	4			4		2	2	2	2	2	
Act Effct Green (s)	12.6	12.6		22.4	18.3		55.8	55.8	55.8	55.8	55.8	
Actuated g/C Ratio	0.14	0.14		0.25	0.21		0.63	0.63	0.63	0.63	0.63	
v/c Ratio	0.09	0.15		0.33	0.07		0.05	0.19	0.02	0.04	0.34	
Control Delay	31.0	11.9		25.8	0.2		11.9	9.3	0.0	11.1	10.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	31.0	11.9		25.8	0.2		11.9	9.3	0.0	11.1	10.4	
LOS	C	B		C	A		B	A	A	B	B	
Approach Delay	17.8			19.0			8.9			10.4		
Approach LOS	B			B			A			B		
Queue Length 50th (m)	2.8	0.5		14.6	0.0		0.9	13.7	0.0	1.4	28.8	
Queue Length 95th (m)	8.2	8.3		26.0	0.0		6.4	40.0	0.0	8.0	77.5	
Internal Link Dist (m)	88.1			177.9			747.8			609.3		
Turn Bay Length (m)	30.0			85.0			90.0		75.0	65.0		
Base Capacity (vph)	567	699		340	1006		345	2227	1012	607	2266	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.03	0.06		0.33	0.04		0.05	0.19	0.02	0.04	0.34	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 88

Natural Cycle: 90

Control Type: Semi Act-Uncoord

2031 FT AM

Lanes, Volumes, Timings




4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

2031 FT AM

12-06-2021

Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 11.1	Intersection LOS: B
Intersection Capacity Utilization 57.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 4: Highway 50 & Cross Country Blvd/Bolton Heights Dr






















 Ø2	 Ø3	 Ø4
57.3 s	9.6 s	43.1 s
 Ø6	 Ø8	
57.3 s	52.7 s	

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Lanes, Volumes, Timings
5: Highway 50 & King St

2031 FT AM

12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	181	92	230	194	86	44	381	185	114	793	59
Future Volume (vph)	77	181	92	230	194	86	44	381	185	114	793	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	1.00		0.98	1.00	1.00			0.99			1.00	
Frt			0.850		0.954			0.955			0.991	
Flt Protected	0.950			0.950				0.996			0.994	
Satd. Flow (prot)	1575	1679	1437	1591	1604	0	0	2946	0	0	3194	0
Flt Permitted	0.588			0.436				0.814			0.749	
Satd. Flow (perm)	972	1679	1412	727	1604	0	0	2407	0	0	2405	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		20			69			8	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		267.9			353.4			484.2			32.8	
Travel Time (s)		19.3			25.4			34.9			2.4	
Confl. Peds. (#/hr)	3		4	4		3	8		6	6		8
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%	3%	0%	1%	2%	3%	6%	4%	6%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	77	181	92	230	194	86	44	381	185	114	793	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	181	92	230	280	0	0	610	0	0	966	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.16	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	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	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	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	

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Lanes, Volumes, Timings
5: Highway 50 & King St

2031 FT AM

12-06-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases	3	8		7	4			6		5	2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		6	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		8.0	8.0		5.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		23.5	23.5		9.5	23.5	
Total Split (s)	10.0	37.0	37.0	18.0	45.0		55.0	55.0		10.0	65.0	
Total Split (%)	8.3%	30.8%	30.8%	15.0%	37.5%		45.8%	45.8%		8.3%	54.2%	
Maximum Green (s)	7.0	30.7	30.7	15.0	38.7		49.0	49.0		7.0	59.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		4.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		2.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0			6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag		Lead		
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	3.0	
Recall Mode	None	None	None	None	None		Max	Max		None	Max	
Walk Time (s)		16.0	16.0		16.0		8.0	8.0			8.0	
Flash Dont Walk (s)		10.0	10.0		10.0		9.0	9.0			9.0	
Pedestrian Calls (#/hr)		4	4		4		8	8			8	
Act Effect Green (s)	27.1	17.0	17.0	37.7	26.5			59.2			59.2	
Actuated g/C Ratio	0.26	0.16	0.16	0.36	0.25			0.56			0.56	
v/c Ratio	0.27	0.68	0.29	0.61	0.67			0.44			0.72	
Control Delay	25.5	54.6	7.4	32.9	42.4			14.0			22.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	25.5	54.6	7.4	32.9	42.4			14.0			22.0	
LOS	C	D	A	C	D			B			C	
Approach Delay		35.8			38.1			14.0			22.0	
Approach LOS		D			D			B			C	
Queue Length 50th (m)	11.1	37.6	0.0	37.0	52.4			33.9			76.3	
Queue Length 95th (m)	21.5	60.8	10.2	57.8	81.8			57.8			123.8	
Internal Link Dist (m)		243.9			329.4			460.2			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	290	488	488	381	600			1376			1347	
Starvation Cap Reductn	0	0	0	0	0			0			0	
Spillback Cap Reductn	0	0	0	0	0			0			0	
Storage Cap Reductn	0	0	0	0	0			0			0	
Reduced v/c Ratio	0.27	0.37	0.19	0.60	0.47			0.44			0.72	

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 105.9

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 FT AM
12-06-2021

Intersection Signal Delay: 25.4	Intersection LOS: C
Intersection Capacity Utilization 94.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: Highway 50 & King St



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Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 FT AM

12-06-2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	146	30	33	229	66	39
Future Volume (vph)	146	30	33	229	66	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			1.00		
Frt	0.977				0.950	
Flt Protected				0.994	0.970	
Satd. Flow (prot)	1788	0	0	1893	1748	0
Flt Permitted				0.957	0.970	
Satd. Flow (perm)	1788	0	0	1821	1748	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	17				38	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	7%	0%	1%	2%	0%
Adj. Flow (vph)	146	30	33	229	66	39
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	0	0	262	105	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

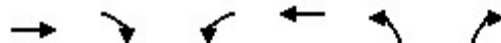
2031 FT AM

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 FT AM

12-06-2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	51.0		51.0	51.0	39.0	
Total Split (%)	56.7%		56.7%	56.7%	43.3%	
Maximum Green (s)	46.5		46.5	46.5	34.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	3		3	3	0	
Act Effect Green (s)	57.5			57.5	8.3	
Actuated g/C Ratio	0.80			0.80	0.12	
v/c Ratio	0.12			0.18	0.44	
Control Delay	2.6			3.0	25.7	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.6			3.0	25.7	
LOS	A			A	C	
Approach Delay	2.6			3.0	25.7	
Approach LOS	A			A	C	
Queue Length 50th (m)	4.4			7.7	9.5	
Queue Length 95th (m)	10.7			16.7	20.8	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1437			1460	864	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.12			0.18	0.12	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 71.7

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 7.2

Intersection LOS: A

Intersection Capacity Utilization 46.2%

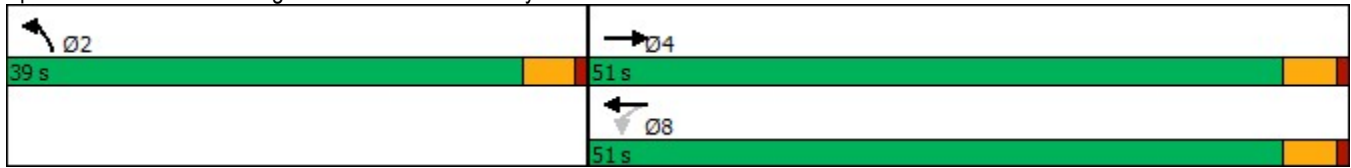
ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 FT AM
12-06-2021

Splits and Phases: 6: Kingsview Dr & Columbia Way



HCM Unsignalized Intersection Capacity Analysis

7: Westchester Blvd & Columbia Way

2031 FT AM
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












	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↱	↰↱	
Traffic Volume (veh/h)	139	40	10	161	102	65
Future Volume (Veh/h)	139	40	10	161	102	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	139	40	10	161	102	65
Pedestrians				1	7	
Lane Width (m)				3.7	3.7	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	1	
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			186		347	167
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			186		347	167
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		84	92
cM capacity (veh/h)			1392		645	866
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	179	10	161	167		
Volume Left	0	10	0	102		
Volume Right	40	0	0	65		
cSH	1700	1392	1700	716		
Volume to Capacity	0.11	0.01	0.09	0.23		
Queue Length 95th (m)	0.0	0.2	0.0	7.2		
Control Delay (s)	0.0	7.6	0.0	11.5		
Lane LOS	A		B			
Approach Delay (s)	0.0	0.4	11.5			
Approach LOS	B					
Intersection Summary						
Average Delay			3.9			
Intersection Capacity Utilization			27.1%	ICU Level of Service	A	
Analysis Period (min)			15			

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HCM Unsignalized Intersection Capacity Analysis
8: Mt Hope Rd & Columbia Way

2031 FT AM

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	166	16	11	125	7	24	3	22	22	4	28
Future Volume (Veh/h)	20	166	16	11	125	7	24	3	22	22	4	28
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			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
Hourly flow rate (vph)	20	166	16	11	125	7	24	3	22	22	4	28
Pedestrians	1			1			10					
Lane Width (m)	3.7			3.7			3.7					
Walking Speed (m/s)	1.2			1.2			1.2					
Percent Blockage	0			0			1					
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	132			192			406	378	185	381	382	130
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	132			192			406	378	185	381	382	130
tC, single (s)	4.2			4.3			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.4			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			99			95	99	97	96	99	97
cM capacity (veh/h)	1423			1244			522	540	854	539	537	925
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total	20	182	143	49	54							
Volume Left	20	0	11	24	22							
Volume Right	0	16	7	22	28							
cSH	1423	1700	1244	634	688							
Volume to Capacity	0.01	0.11	0.01	0.08	0.08							
Queue Length 95th (m)	0.3	0.0	0.2	2.0	2.0							
Control Delay (s)	7.6	0.0	0.7	11.2	10.7							
Lane LOS	A		A	B	B							
Approach Delay (s)	0.7		0.7	11.2	10.7							
Approach LOS				B	B							
Intersection Summary												
Average Delay				3.1								
Intersection Capacity Utilization				27.1%	ICU Level of Service				A			
Analysis Period (min)				15								

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HCM Unsignalized Intersection Capacity Analysis
9: Townline & Columbia Way

2031 FT AM

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	42	274	27	120	658	16
Future Volume (Veh/h)	42	274	27	120	658	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	42	274	27	120	658	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	840	666	674			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	840	666	674			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	87	41	97			
cM capacity (veh/h)	328	461	899			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	316	27	120	674		
Volume Left	42	27	0	0		
Volume Right	274	0	0	16		
cSH	438	899	1700	1700		
Volume to Capacity	0.72	0.03	0.07	0.40		
Queue Length 95th (m)	45.4	0.7	0.0	0.0		
Control Delay (s)	31.9	9.1	0.0	0.0		
Lane LOS	D	A				
Approach Delay (s)	31.9	1.7		0.0		
Approach LOS	D					
Intersection Summary						
Average Delay			9.1			
Intersection Capacity Utilization			61.5%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: Emil Kolb & Duffy's Lane

2031 FT AM
12-06-2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	301	1124	14	20	61
Future Volume (Veh/h)	14	301	1124	14	20	61
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	301	1124	14	20	61
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1138				1310	569
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1138				1310	569
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				86	87
cM capacity (veh/h)	610				147	465
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	14	150	150	749	389	81
Volume Left	14	0	0	0	0	20
Volume Right	0	0	0	0	14	61
cSH	610	1700	1700	1700	1700	303
Volume to Capacity	0.02	0.09	0.09	0.44	0.23	0.27
Queue Length 95th (m)	0.6	0.0	0.0	0.0	0.0	8.4
Control Delay (s)	11.0	0.0	0.0	0.0	0.0	21.1
Lane LOS	B					C
Approach Delay (s)	0.5			0.0		21.1
Approach LOS						C
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			43.0%		ICU Level of Service	A
Analysis Period (min)			15			

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Lanes, Volumes, Timings
11: Street B/Street A & Emil Kolb

2031 FT AM

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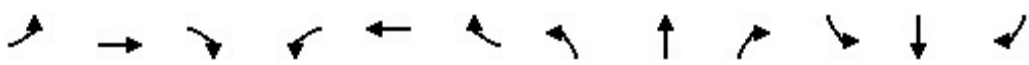
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↔↔			↔			↔	
Traffic Volume (vph)	35	277	18	12	845	10	72	0	12	19	0	142
Future Volume (vph)	35	277	18	12	845	10	72	0	12	19	0	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.998			0.981			0.881	
Flt Protected		0.995			0.999			0.959			0.994	
Satd. Flow (prot)	0	3532	0	0	3568	0	0	1772	0	0	1649	0
Flt Permitted		0.853			0.950			0.786			0.947	
Satd. Flow (perm)	0	3028	0	0	3393	0	0	1452	0	0	1571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			3			36			65	
Link Speed (k/h)		50			70			50			50	
Link Distance (m)		673.7			345.6			384.5			240.1	
Travel Time (s)		48.5			17.8			27.7			17.3	
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
Adj. Flow (vph)	35	277	18	12	845	10	72	0	12	19	0	142
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	330	0	0	867	0	0	84	0	0	161	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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	
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		5.0	5.0		5.0	5.0	

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Synchro 11 Report
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Lanes, Volumes, Timings 11: Street B/Street A & Emil Kolb





2031 FT AM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
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 Effect Green (s)		22.8			22.8			7.8			7.8	
Actuated g/C Ratio		0.62			0.62			0.21			0.21	
v/c Ratio		0.18			0.41			0.25			0.42	
Control Delay		4.8			6.0			9.2			11.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		4.8			6.0			9.2			11.1	
LOS		A			A			A			B	
Approach Delay		4.8			6.0			9.2			11.1	
Approach LOS		A			A			A			B	
Queue Length 50th (m)		4.3			14.2			2.3			4.8	
Queue Length 95th (m)		10.6			29.8			8.9			14.4	
Internal Link Dist (m)		649.7			321.6			360.5			216.1	
Turn Bay Length (m)												
Base Capacity (vph)		1885			2107			729			802	
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		0.18			0.41			0.12			0.20	

Intersection Summary

Area Type:	Other
Cycle Length: 45	
Actuated Cycle Length: 36.8	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 6.5	Intersection LOS: A
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 11: Street B/Street A & Emil Kolb

















 22.5 s	 22.5 s
 22.5 s	 22.5 s

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Lanes, Volumes, Timings
13: Highway 50 & Street D/Street E

2031 FT AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	10	95	0	10	1	457	31	13	953	14
Future Volume (vph)	11	0	10	95	0	10	1	457	31	13	953	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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
Frt		0.936			0.987			0.990			0.998	
Flt Protected		0.974			0.957						0.999	
Satd. Flow (prot)	0	1717	0	0	1779	0	0	3543	0	0	3568	0
Flt Permitted		0.823			0.747			0.954			0.948	
Satd. Flow (perm)	0	1451	0	0	1389	0	0	3380	0	0	3386	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36			36			18			4	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		315.0			272.7			262.2			860.4	
Travel Time (s)		22.7			19.6			15.7			51.6	
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
Adj. Flow (vph)	11	0	10	95	0	10	1	457	31	13	953	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	21	0	0	105	0	0	489	0	0	980	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

2031 FT AM

Synchro 11 Report
Page 25

Lanes, Volumes, Timings 13: Highway 50 & Street D/Street E

2031 FT AM
12-06-2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
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		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 Effect Green (s)		7.4			7.5			27.4			27.4	
Actuated g/C Ratio		0.20			0.20			0.72			0.72	
v/c Ratio		0.07			0.35			0.20			0.40	
Control Delay		4.0			12.1			4.0			5.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		4.0			12.1			4.0			5.1	
LOS		A			B			A			A	
Approach Delay		4.0			12.1			4.0			5.1	
Approach LOS		A			B			A			A	
Queue Length 50th (m)		0.0			4.6			6.6			16.7	
Queue Length 95th (m)		2.3			11.1			14.2			32.9	
Internal Link Dist (m)		291.0			248.7			238.2			836.4	
Turn Bay Length (m)												
Base Capacity (vph)		710			680			2446			2447	
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		0.03			0.15			0.20			0.40	

Intersection Summary

Area Type: Other

Cycle Length: 45

Actuated Cycle Length: 37.9

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.40

Intersection Signal Delay: 5.2

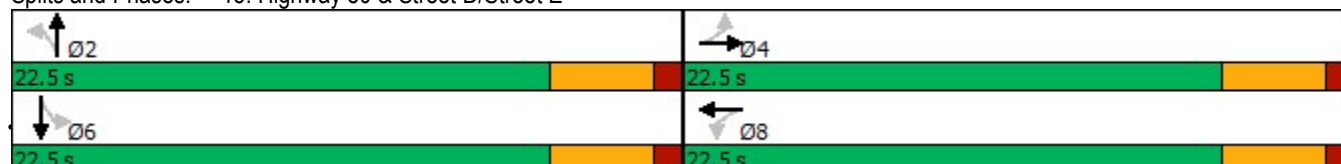
Intersection LOS: A

Intersection Capacity Utilization 52.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 13: Highway 50 & Street D/Street E












Jan 20, 2022

Lanes, Volumes, Timings
14: Highway 50 & Street G

2031 FT AM

12-06-2021

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	18	71	496	9	21	734
Future Volume (vph)	18	71	496	9	21	734
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		0.0	70.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.892		0.997			
Flt Protected	0.990					0.999
Satd. Flow (prot)	1663	0	3568	0	0	3575
Flt Permitted	0.990					0.939
Satd. Flow (perm)	1663	0	3568	0	0	3360
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	71		5			
Link Speed (k/h)	50		50			60
Link Distance (m)	339.5		632.5			508.7
Travel Time (s)	24.4		45.5			30.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	18	71	496	9	21	734
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	0	505	0	0	755
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.5			3.5
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		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	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	







2031 FT AM

Jan 20, 2022

Lanes, Volumes, Timings
14: Highway 50 & Street G

2031 FT AM

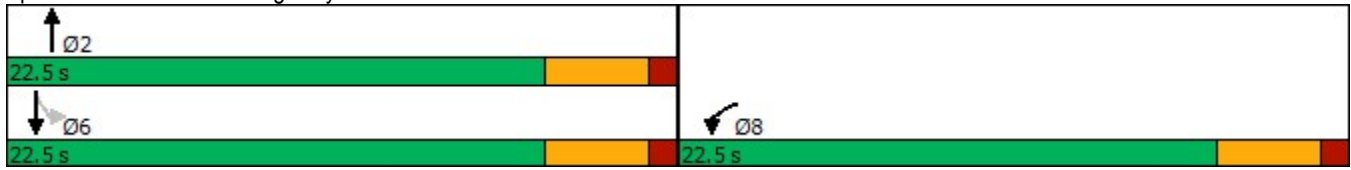
12-06-2021

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	22.5		22.5		22.5	22.5
Total Split (s)	22.5		22.5		22.5	22.5
Total Split (%)	50.0%		50.0%		50.0%	50.0%
Maximum Green (s)	18.0		18.0		18.0	18.0
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.5		4.5			4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		Max	Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	6.5		30.6			30.6
Actuated g/C Ratio	0.16		0.76			0.76
v/c Ratio	0.27		0.18			0.29
Control Delay	8.1		3.2			3.6
Queue Delay	0.0		0.0			0.0
Total Delay	8.1		3.2			3.6
LOS	A		A			A
Approach Delay	8.1		3.2			3.6
Approach LOS	A		A			A
Queue Length 50th (m)	1.5		6.0			10.0
Queue Length 95th (m)	7.6		12.6			20.3
Internal Link Dist (m)	315.5		608.5			484.7
Turn Bay Length (m)						
Base Capacity (vph)	795		2732			2572
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	0.11		0.18			0.29
Intersection Summary						
Area Type:	Other					
Cycle Length: 45						
Actuated Cycle Length: 40						
Natural Cycle: 45						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.29						
Intersection Signal Delay: 3.7				Intersection LOS: A		
Intersection Capacity Utilization 48.3%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
14: Highway 50 & Street G

2031 FT AM
12-06-2021

Splits and Phases: 14: Highway 50 & Street G



Junctions 8
ARCADY 8 - Roundabout Module
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Filename: Highway 50 & Emil Kolb Pkwy (Option 1&2 FT).arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady
Report generation date: 2021-12-07 11:31:59 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 Future Total (Option 1/2)						
Emil Kolb Pkwy (East-Street F)	0.83	~1	25.01	0.45	D	6.22	A
Emil Kolb Pkwy (West)	1.55	2.57	4.77	0.55	A		
Highway 50 (North)	0.35	~1	2.05	0.25	A		
Highway 50 (South)	2.41	6.31	8.17	0.70	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 8:15 AM
"D8 - 2031 Future Total (Option 1/2), PM" model duration: 3:00 PM - 3:15 PM

Run using Junctions 8.0.6.541 at 2021-12-07 11:31:58 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Total (Option

1/2), PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Total (Option 1/2), PM	2031 Future Total (Option 1/2)	PM		PHF	15:00	15:15	15	15		✓		✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3,4		✓		6.22	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (East-Street F)	1	Emil Kolb Pkwy (East-Street F)	
Emil Kolb Pkwy (West)	3	Emil Kolb Pkwy (West)	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	4	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (East-Street F)	0.00	99999.00		0.00
Emil Kolb Pkwy (West)	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (East-Street F)	7.00	8.00	30.00	35.00	60.00	25.00	

Emil Kolb Pkwy (West)	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (East-Street F)	0.00	0.00
Emil Kolb Pkwy (West)	0.00	0.00
Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (East-Street F)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (West)	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (East-Street F)		(calculated)	(calculated)	1.505	2853.857
Emil Kolb Pkwy (West)		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (East-Street F)	PHF	✓	120.00	100.000
Emil Kolb Pkwy (West)	PHF	✓	1171.00	100.000
Highway 50 (North)	PHF	✓	621.00	100.000
Highway 50 (South)	PHF	✓	1052.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (East-Street F)	120.00	1.00	N/A
Emil Kolb Pkwy (West)	1171.00	1.00	N/A
Highway 50 (North)	621.00	1.00	N/A
Highway 50 (South)	1052.00	1.00	N/A

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	0.000	23.000	68.000	29.000
	Highway 50 (North)	12.000	0.000	200.000	409.000
	Emil Kolb Pkwy (West)	201.000	693.000	0.000	277.000
	Highway 50 (South)	14.000	857.000	181.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	0.00	0.19	0.57	0.24
	Highway 50 (North)	0.02	0.00	0.32	0.66
	Emil Kolb Pkwy (West)	0.17	0.59	0.00	0.24
	Highway 50 (South)	0.01	0.81	0.17	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	1.000	1.040	1.120	1.000
	Highway 50 (North)	1.030	1.000	1.120	1.000
	Emil Kolb Pkwy (West)	1.270	1.460	1.000	1.000
	Highway 50 (South)	1.000	1.040	1.120	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

	To				
		Emil Kolb Pkwy (East-Street F)	Highway 50 (North)	Emil Kolb Pkwy (West)	Highway 50 (South)
From	Emil Kolb Pkwy (East-Street F)	0.0	4.0	12.0	0.0
	Highway 50 (North)	3.0	0.0	12.0	0.0
	Emil Kolb Pkwy (West)	27.0	46.0	0.0	0.0
	Highway 50 (South)	0.0	4.0	12.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (East-Street F)	0.45	25.01	0.83	~1	D	120.00	30.00	11.13	22.26	0.74	11.20	22.41
Emil Kolb Pkwy (West)	0.55	4.77	1.55	2.57	A	1171.00	292.75	22.38	4.59	1.49	22.41	4.59
Highway 50 (North)	0.25	2.05	0.35	~1	A	621.00	155.25	5.21	2.01	0.35	5.21	2.01
Highway 50 (South)	0.70	8.17	2.41	6.31	A	1052.00	263.00	33.56	7.66	2.24	33.68	7.68

Junctions 8
ARCADY 8 - Roundabout Module
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:22:40 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 Future Total (Option 1/2)						
Emil Kolb Pkwy (North)	0.39	~1	2.49	0.25	A	4.91	A
Emil Kolb Pkwy (South)	3.14	4.16	7.04	0.75	A		
King Street	0.47	1.01	2.18	0.32	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
"D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
"D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:22:40 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 Future Total (Option 1/2), PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 Future Total (Option 1/2), PM	2031 Future Total (Option 1/2)	PM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		4.91	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
------	----------------------------------	---------------------	---------------------------------	----------------------	-----------------------------------	------------------------------------	-----------

Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	
King Street	7.00	8.00	30.00	25.00	55.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	511.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	1481.00	100.000
King Street	ONE HOUR	✓	703.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.000	1121.000	360.000
	Emil Kolb Pkwy (North)	221.000	0.000	290.000
	King Street	314.000	389.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	0.00	0.76	0.24
	Emil Kolb Pkwy (North)	0.43	0.00	0.57
	King Street	0.45	0.55	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	1.000	1.040	1.040
	Emil Kolb Pkwy (North)	1.180	1.000	1.110
	King Street	1.020	1.010	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	0.0	4.0	4.0
	Emil Kolb Pkwy (North)	18.0	0.0	11.0
	King Street	2.0	1.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.25	2.49	0.39	~1	A	468.90	703.35	26.45	2.26	0.29	26.45	2.26
Emil Kolb Pkwy (South)	0.75	7.04	3.14	4.16	A	1358.99	2038.49	161.81	4.76	1.80	161.82	4.76
King Street	0.32	2.18	0.47	1.01	A	645.09	967.63	31.99	1.98	0.36	31.99	1.98





















Jan 20, 2022

Lanes, Volumes, Timings

2031 FT PM

12-06-2021

3: Highway 50 & Private Access/Columbia Way

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	1	98	0	132	0	824	266	191	405	3
Future Volume (vph)	1	0	1	98	0	132	0	824	266	191	405	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		15.0	125.0		0.0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.932			0.850				0.850		0.999	
Flt Protected		0.976		0.950						0.950		
Satd. Flow (prot)	0	1028	0	1767	1570	0	1879	3510	1579	1475	3558	0
Flt Permitted		0.864		0.757						0.336		
Satd. Flow (perm)	0	910	0	1408	1570	0	1879	3510	1579	522	3558	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40			165				149			1
Link Speed (k/h)		50			60			60				60
Link Distance (m)		46.8			237.9			633.3				632.5
Travel Time (s)		3.4			14.3			38.0				38.0
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
Heavy Vehicles (%)	100%	0%	40%	1%	0%	4%	0%	4%	3%	21%	2%	67%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	0	1	98	0	132	0	824	266	191	405	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	0	98	132	0	0	824	266	191	408	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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.01
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						Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	15.0		10.0	10.0		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												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

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Lanes, Volumes, Timings

2031 FT PM

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3: Highway 50 & Private Access/Columbia Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	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)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0	64.0	64.0	64.0	
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	
Maximum Green (s)	30.0	30.0		30.0	30.0		57.3	57.3	57.3	57.3	57.3	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	
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)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effect Green (s)		11.4		11.4	11.4			60.3	60.3	60.3	60.3	
Actuated g/C Ratio		0.13		0.13	0.13			0.71	0.71	0.71	0.71	
v/c Ratio		0.01		0.52	0.37			0.33	0.23	0.51	0.16	
Control Delay		0.0		42.5	6.1			5.3	2.6	12.4	4.4	
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay		0.0		42.5	6.1			5.3	2.6	12.4	4.4	
LOS		A		D	A			A	A	B	A	
Approach Delay					21.6			4.6			6.9	
Approach LOS					C			A			A	
Queue Length 50th (m)		0.0		15.0	0.0			22.3	5.0	11.9	9.4	
Queue Length 95th (m)		0.0		29.9	9.5			37.7	14.7	36.4	17.5	
Internal Link Dist (m)		22.8			213.9			609.3			608.5	
Turn Bay Length (m)				70.0					15.0	125.0		
Base Capacity (vph)		349		501	665			2505	1169	372	2540	
Starvation Cap Reductn		0		0	0			0	0	0	0	
Spillback Cap Reductn		0		0	0			0	0	0	0	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.01		0.20	0.20			0.33	0.23	0.51	0.16	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 84.5

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 7.4

Intersection LOS: A

Intersection Capacity Utilization 65.2%

ICU Level of Service C

2031 FT PM

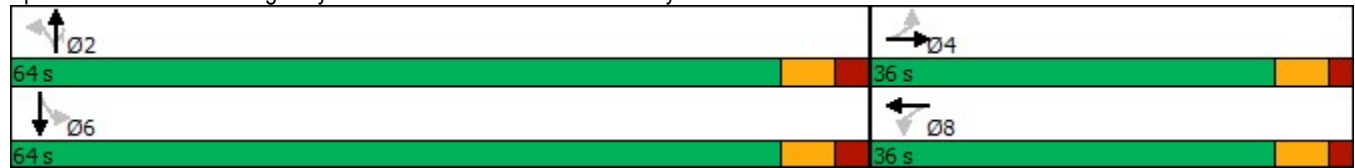
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Lanes, Volumes, Timings
3: Highway 50 & Private Access/Columbia Way

2031 FT PM
12-06-2021

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way

























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Lanes, Volumes, Timings

2031 FT PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	5	20	45	3	31	98	1114	110	41	494	28
Future Volume (vph)	12	5	20	45	3	31	98	1114	110	41	494	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99		1.00	0.99		1.00		0.98	1.00	1.00	
Frt		0.880			0.863				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1671	0	1785	1635	0	1526	3510	1591	1785	3549	0
Flt Permitted	0.735			0.741			0.459			0.232		
Satd. Flow (perm)	1377	1671	0	1389	1635	0	736	3510	1556	436	3549	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			31				110			8
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	4		3	3		4	2		1	1		2
Confl. Bikes (#/hr)					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
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	17%	4%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	12	5	20	45	3	31	98	1114	110	41	494	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	25	0	45	34	0	98	1114	110	41	522	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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.01
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	Right	Left	Thru	
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	15.0	15.0		15.0	15.0		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	

2031 FT PM

Lanes, Volumes, Timings

2031 FT PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-06-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	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)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	
Total Split (s)	44.0	44.0		44.0	44.0		56.0	56.0	56.0	56.0	56.0	
Total Split (%)	44.0%	44.0%		44.0%	44.0%		56.0%	56.0%	56.0%	56.0%	56.0%	
Maximum Green (s)	36.9	36.9		36.9	36.9		49.4	49.4	49.4	49.4	49.4	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)	5	5		5	5		4	4	4	4	4	
Act Effct Green (s)	12.9	12.9		12.9	12.9		59.0	59.0	59.0	59.0	59.0	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.73	0.73	0.73	0.73	0.73	
v/c Ratio	0.05	0.09		0.20	0.12		0.18	0.43	0.09	0.13	0.20	
Control Delay	25.2	12.9		29.2	10.6		9.0	8.4	2.4	9.6	6.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	25.2	12.9		29.2	10.6		9.0	8.4	2.4	9.6	6.5	
LOS	C	B		C	B		A	A	A	A	A	
Approach Delay	16.9			21.2			8.0			6.8		
Approach LOS	B			C			A			A		
Queue Length 50th (m)	1.7	0.7		6.5	0.4		4.0	30.0	0.0	1.6	11.0	
Queue Length 95th (m)	5.4	6.3		13.8	6.8		22.5	105.6	8.5	11.7	42.0	
Internal Link Dist (m)	88.1			177.9			747.8			609.3		
Turn Bay Length (m)	30.0			85.0			90.0		75.0	65.0		
Base Capacity (vph)	637	784		643	773		537	2561	1165	318	2592	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.02	0.03		0.07	0.04		0.18	0.43	0.09	0.13	0.20	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 80.9

Natural Cycle: 80

Control Type: Semi Act-Uncoord

2031 FT PM

Lanes, Volumes, Timings

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

2031 FT PM

12-06-2021

Maximum v/c Ratio: 0.43

Intersection Signal Delay: 8.3

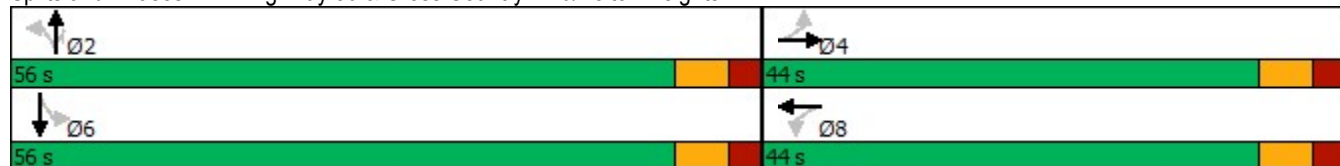
Intersection LOS: A

Intersection Capacity Utilization 69.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Blvd/Bolton Heights Dr
























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Lanes, Volumes, Timings
5: Highway 50 & King St

2031 FT PM

12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	330	70	240	264	76	51	1098	493	58	481	40
Future Volume (vph)	96	330	70	240	264	76	51	1098	493	58	481	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	1.00		0.98	1.00	1.00			0.99			1.00	
Frt			0.850		0.966			0.955			0.990	
Flt Protected	0.950			0.950				0.998			0.995	
Satd. Flow (prot)	1575	1679	1437	1591	1628	0	0	2952	0	0	3191	0
Flt Permitted	0.310			0.138				0.904			0.578	
Satd. Flow (perm)	513	1679	1411	231	1628	0	0	2673	0	0	1854	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94		10			87			9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		267.9			353.4			484.2			32.8	
Travel Time (s)		19.3			25.4			34.9			2.4	
Confl. Peds. (#/hr)	3		4	4		3	8		6	6		8
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%	3%	0%	1%	2%	3%	6%	4%	6%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	96	330	70	240	264	76	51	1098	493	58	481	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	96	330	70	240	340	0	0	1642	0	0	579	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.16	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	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	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	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	

2031 FT PM

Synchro 11 Report
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Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 FT PM

12-06-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		8.0	23.5		23.5	23.5	
Total Split (s)	9.9	32.3	32.3	17.0	39.4		8.0	90.7		82.7	82.7	
Total Split (%)	7.1%	23.1%	23.1%	12.1%	28.1%		5.7%	64.8%		59.1%	59.1%	
Maximum Green (s)	6.9	26.0	26.0	14.0	33.1		5.0	84.7		76.7	76.7	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0			6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			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	3.0	
Recall Mode	None	None	None	None	None		None	Max		Max	Max	
Walk Time (s)		16.0	16.0		16.0			8.0		8.0	8.0	
Flash Dont Walk (s)		10.0	10.0		10.0			9.0		9.0	9.0	
Pedestrian Calls (#/hr)		20	20		20			16		16	16	
Act Effect Green (s)	36.2	26.0	26.0	46.3	33.1			84.7			84.7	
Actuated g/C Ratio	0.26	0.19	0.19	0.33	0.24			0.60			0.60	
v/c Ratio	0.52	1.06	0.21	1.13	0.87			0.99			0.51	
Control Delay	46.4	121.5	5.5	137.7	72.1			47.0			17.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	46.4	121.5	5.5	137.7	72.1			47.0			17.6	
LOS	D	F	A	F	E			D			B	
Approach Delay		90.6			99.3			47.0			17.6	
Approach LOS		F			F			D			B	
Queue Length 50th (m)	19.9	~105.3	0.0	~64.6	93.3			231.2			47.7	
Queue Length 95th (m)	34.7	#168.2	7.9	#121.0	#148.5			#299.3			64.2	
Internal Link Dist (m)		243.9			329.4			460.2			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	184	311	338	212	392			1651			1125	
Starvation Cap Reductn	0	0	0	0	0			0			0	
Spillback Cap Reductn	0	0	0	0	0			0			0	
Storage Cap Reductn	0	0	0	0	0			0			0	
Reduced v/c Ratio	0.52	1.06	0.21	1.13	0.87			0.99			0.51	

Intersection Summary

Area Type: CBD
 Cycle Length: 140
 Actuated Cycle Length: 140
 Natural Cycle: 120
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.13

Lanes, Volumes, Timings





5: Highway 50 & King St

2031 FT PM

12-06-2021

Intersection Signal Delay: 57.6	Intersection LOS: E
Intersection Capacity Utilization 124.2%	ICU Level of Service H
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 5: Highway 50 & King St

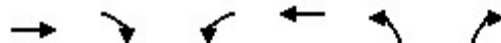
 Ø1	 Ø2	 Ø3	 Ø4
8 s	82.7 s	9.9 s	39.4 s
 Ø6		 Ø7	 Ø8
90.7 s		17 s	32.3 s

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 FT PM

12-06-2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (vph)	368	131	71	219	41	39
Future Volume (vph)	368	131	71	219	41	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99			1.00		
Frt	0.965				0.934	
Flt Protected				0.988	0.975	
Satd. Flow (prot)	1756	0	0	1884	1732	0
Flt Permitted				0.818	0.975	
Satd. Flow (perm)	1756	0	0	1559	1732	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	36				39	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	7%	0%	1%	2%	0%
Adj. Flow (vph)	368	131	71	219	41	39
Shared Lane Traffic (%)						
Lane Group Flow (vph)	499	0	0	290	80	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

2031 FT PM

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Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 FT PM

12-06-2021



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	59.0		59.0	59.0	31.0	
Total Split (%)	65.6%		65.6%	65.6%	34.4%	
Maximum Green (s)	54.5		54.5	54.5	26.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	4		4	4	0	
Act Effect Green (s)	67.7			67.7	7.7	
Actuated g/C Ratio	0.83			0.83	0.09	
v/c Ratio	0.34			0.22	0.40	
Control Delay	2.9			2.6	26.4	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.9			2.6	26.4	
LOS	A			A	C	
Approach Delay	2.9			2.6	26.4	
Approach LOS	A			A	C	
Queue Length 50th (m)	14.7			8.4	6.8	
Queue Length 95th (m)	30.2			17.9	18.2	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1469			1299	592	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.34			0.22	0.14	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 81.2

Natural Cycle: 50

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.40

Intersection Signal Delay: 5.0

Intersection LOS: A

Intersection Capacity Utilization 58.8%

ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis 7: Westchester Blvd & Columbia Way

2031 FT PM
12-06-2021


















	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↘	↗	↘	
Traffic Volume (veh/h)	276	116	64	230	91	43
Future Volume (Veh/h)	276	116	64	230	91	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	276	116	64	230	91	43
Pedestrians				1	7	
Lane Width (m)				3.7	3.7	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			399		699	342
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			399		699	342
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		76	94
cM capacity (veh/h)			1164		384	691
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	392	64	230	134		
Volume Left	0	64	0	91		
Volume Right	116	0	0	43		
cSH	1700	1164	1700	448		
Volume to Capacity	0.23	0.06	0.14	0.30		
Queue Length 95th (m)	0.0	1.4	0.0	9.9		
Control Delay (s)	0.0	8.3	0.0	16.4		
Lane LOS		A		C		
Approach Delay (s)	0.0	1.8		16.4		
Approach LOS				C		
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			43.2%	ICU Level of Service		A
Analysis Period (min)			15			

Jan 20, 2021

HCM Unsignalized Intersection Capacity Analysis
8: Mt Hope Rd & Columbia Way

2031 FT PM

12-06-2021











												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	209	37	38	217	13	30	6	7	22	5	47
Future Volume (Veh/h)	73	209	37	38	217	13	30	6	7	22	5	47
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			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
Hourly flow rate (vph)	73	209	37	38	217	13	30	6	7	22	5	47
Pedestrians	1			1			10					
Lane Width (m)	3.7			3.7			3.7					
Walking Speed (m/s)	1.2			1.2			1.2					
Percent Blockage	0			0			1					
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	230			256			734	690	238	666	702	224
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230			256			734	690	238	666	702	224
tC, single (s)	4.2			4.3			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.4			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	94			97			90	98	99	93	98	94
cM capacity (veh/h)	1309			1176			290	336	798	334	331	819
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total	73	246	268	43	74							
Volume Left	73	0	38	30	22							
Volume Right	0	37	13	7	47							
cSH	1309	1700	1176	331	534							
Volume to Capacity	0.06	0.14	0.03	0.13	0.14							
Queue Length 95th (m)	1.4	0.0	0.8	3.5	3.8							
Control Delay (s)	7.9	0.0	1.4	17.5	12.8							
Lane LOS	A		A	C	B							
Approach Delay (s)	1.8		1.4	17.5	12.8							
Approach LOS				C	B							
Intersection Summary												
Average Delay				3.8								
Intersection Capacity Utilization				43.0%	ICU Level of Service				A			
Analysis Period (min)				15								

Jan 20, 2021

HCM Unsignalized Intersection Capacity Analysis
9: Townline & Columbia Way

2031 FT PM

12-06-2021

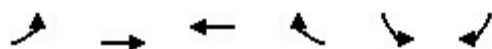
						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	105	240	728	223	65
Future Volume (Veh/h)	22	105	240	728	223	65
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	22	105	240	728	223	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1464	256	288			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1464	256	288			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	81	87	81			
cM capacity (veh/h)	116	786	1251			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	127	240	728	288		
Volume Left	22	240	0	0		
Volume Right	105	0	0	65		
cSH	392	1251	1700	1700		
Volume to Capacity	0.32	0.19	0.43	0.17		
Queue Length 95th (m)	11.0	5.7	0.0	0.0		
Control Delay (s)	18.5	8.6	0.0	0.0		
Lane LOS	C	A				
Approach Delay (s)	18.5	2.1		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			52.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Jan 20, 2021

HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb & Duffy's Lane

2031 FT PM

12-06-2021



















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	74	1437	476	27	28	31
Future Volume (Veh/h)	74	1437	476	27	28	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	74	1437	476	27	28	31
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	503				1356	252
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	503				1356	252
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				79	96
cM capacity (veh/h)	1058				131	748
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	74	718	718	317	186	59
Volume Left	74	0	0	0	0	28
Volume Right	0	0	0	0	27	31
cSH	1058	1700	1700	1700	1700	231
Volume to Capacity	0.07	0.42	0.42	0.19	0.11	0.26
Queue Length 95th (m)	1.8	0.0	0.0	0.0	0.0	7.9
Control Delay (s)	8.7	0.0	0.0	0.0	0.0	25.9
Lane LOS	A					D
Approach Delay (s)	0.4			0.0		25.9
Approach LOS						D
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			49.8%		ICU Level of Service	A
Analysis Period (min)			15			

Jan 20, 2022

Lanes, Volumes, Timings
11: Street B/Street A & Emil Kolb

2031 FT PM

12-06-2021

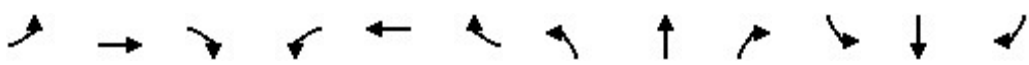
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	1055	87	36	379	22	35	0	16	21	0	69
Future Volume (vph)	167	1055	87	36	379	22	35	0	16	21	0	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.992			0.958			0.896	
Flt Protected		0.994			0.996			0.967			0.988	
Satd. Flow (prot)	0	3521	0	0	3536	0	0	1745	0	0	1667	0
Flt Permitted		0.828			0.832			0.784			0.905	
Satd. Flow (perm)	0	2933	0	0	2954	0	0	1415	0	0	1527	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			14			36			69	
Link Speed (k/h)		50			70			50			50	
Link Distance (m)		673.7			345.6			384.5			240.1	
Travel Time (s)		48.5			17.8			27.7			17.3	
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
Adj. Flow (vph)	167	1055	87	36	379	22	35	0	16	21	0	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1309	0	0	437	0	0	51	0	0	90	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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	
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		5.0	5.0		5.0	5.0	

2031 FT PM

Synchro 11 Report
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Lanes, Volumes, Timings 11: Street B/Street A & Emil Kolb

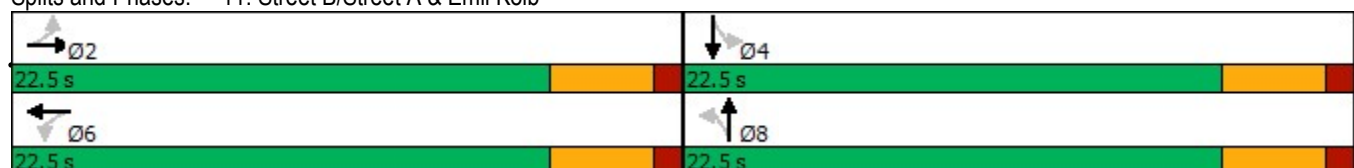
2031 FT PM
12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
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 Effect Green (s)		26.7			26.7			6.4			6.4	
Actuated g/C Ratio		0.73			0.73			0.18			0.18	
v/c Ratio		0.61			0.20			0.18			0.28	
Control Delay		8.1			3.6			8.0			7.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		8.1			3.6			8.0			7.6	
LOS		A			A			A			A	
Approach Delay		8.1			3.6			8.0			7.6	
Approach LOS		A			A			A			A	
Queue Length 50th (m)		24.1			5.1			0.9			1.3	
Queue Length 95th (m)		#68.5			11.4			5.6			7.5	
Internal Link Dist (m)		649.7			321.6			360.5			216.1	
Turn Bay Length (m)												
Base Capacity (vph)		2149			2163			718			790	
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		0.61			0.20			0.07			0.11	

Intersection Summary

Area Type:	Other
Cycle Length: 45	
Actuated Cycle Length: 36.5	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 67.4%	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: 11: Street B/Street A & Emil Kolb


















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Jan 20, 2022

Lanes, Volumes, Timings
13: Highway 50 & Street D/Street E

2031 FT PM

12-06-2021

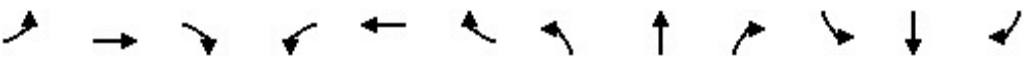
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	0	5	62	0	27	12	1430	114	13	953	14
Future Volume (vph)	29	0	5	62	0	27	12	1430	114	13	953	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.980			0.959			0.989			0.998	
Flt Protected		0.959			0.966						0.999	
Satd. Flow (prot)	0	1770	0	0	1745	0	0	3539	0	0	3568	0
Flt Permitted		0.788			0.771			0.947			0.928	
Satd. Flow (perm)	0	1454	0	0	1393	0	0	3352	0	0	3314	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36			36			22			4	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		315.0			272.7			262.2			860.4	
Travel Time (s)		22.7			19.6			15.7			51.6	
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
Adj. Flow (vph)	29	0	5	62	0	27	12	1430	114	13	953	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	34	0	0	89	0	0	1556	0	0	980	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
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		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

2031 FT PM

Synchro 11 Report
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Lanes, Volumes, Timings 13: Highway 50 & Street D/Street E

2031 FT PM
12-06-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
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		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 Effect Green (s)		6.9			7.0			27.5			27.5	
Actuated g/C Ratio		0.18			0.19			0.73			0.73	
v/c Ratio		0.11			0.31			0.63			0.40	
Control Delay		5.7			11.3			8.8			4.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		5.7			11.3			8.8			4.8	
LOS		A			B			A			A	
Approach Delay		5.7			11.3			8.8			4.8	
Approach LOS		A			B			A			A	
Queue Length 50th (m)		0.0			3.5			32.1			15.5	
Queue Length 95th (m)		3.8			9.4			#84.5			31.0	
Internal Link Dist (m)		291.0			248.7			238.2			836.4	
Turn Bay Length (m)												
Base Capacity (vph)		717			688			2453			2421	
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		0.05			0.13			0.63			0.40	

Intersection Summary

Area Type: Other

Cycle Length: 45

Actuated Cycle Length: 37.6

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 7.4

Intersection LOS: A

Intersection Capacity Utilization 64.2%

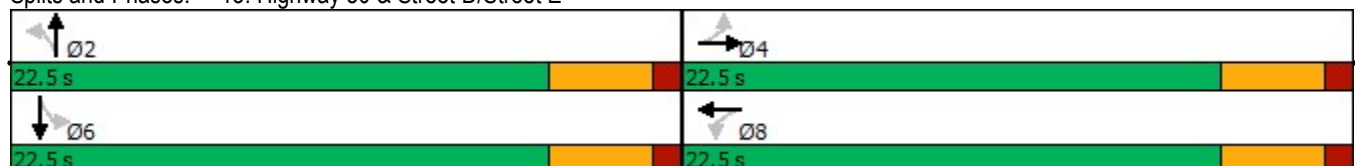
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 13: Highway 50 & Street D/Street E












Jan 20, 2022

Lanes, Volumes, Timings
14: Highway 50 & Street G

2031 FT PM

12-06-2021

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	16	48	965	17	77	620
Future Volume (vph)	16	48	965	17	77	620
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		0.0	70.0	
Storage Lanes	1	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.899		0.997			
Flt Protected	0.988					0.995
Satd. Flow (prot)	1673	0	3568	0	0	3561
Flt Permitted	0.988					0.795
Satd. Flow (perm)	1673	0	3568	0	0	2845
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	42		5			
Link Speed (k/h)	50		50			60
Link Distance (m)	339.5		632.5			508.7
Travel Time (s)	24.4		45.5			30.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	16	48	965	17	77	620
Shared Lane Traffic (%)						
Lane Group Flow (vph)	64	0	982	0	0	697
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.5			3.5
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		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	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	







2031 FT PM

Jan 20, 2022

Lanes, Volumes, Timings
14: Highway 50 & Street G

2031 FT PM

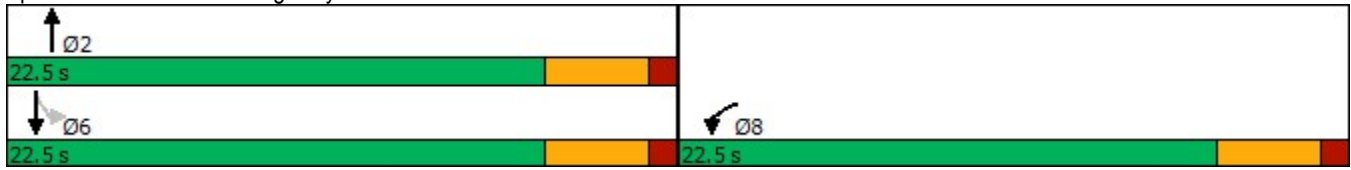
12-06-2021

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	22.5		22.5		22.5	22.5
Total Split (s)	22.5		22.5		22.5	22.5
Total Split (%)	50.0%		50.0%		50.0%	50.0%
Maximum Green (s)	18.0		18.0		18.0	18.0
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.5		4.5			4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		Max	Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	6.4		33.5			33.5
Actuated g/C Ratio	0.16		0.84			0.84
v/c Ratio	0.21		0.33			0.29
Control Delay	9.9		2.9			2.9
Queue Delay	0.0		0.0			0.0
Total Delay	9.9		2.9			2.9
LOS	A		A			A
Approach Delay	9.9		2.9			2.9
Approach LOS	A		A			A
Queue Length 50th (m)	1.3		0.0			0.0
Queue Length 95th (m)	7.8		26.9			19.7
Internal Link Dist (m)	315.5		608.5			484.7
Turn Bay Length (m)						
Base Capacity (vph)	786		3014			2403
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	0.08		0.33			0.29
Intersection Summary						
Area Type:	Other					
Cycle Length: 45						
Actuated Cycle Length: 39.7						
Natural Cycle: 45						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.33						
Intersection Signal Delay: 3.1				Intersection LOS: A		
Intersection Capacity Utilization 62.0%				ICU Level of Service B		
Analysis Period (min) 15						

Lanes, Volumes, Timings
14: Highway 50 & Street G

2031 FT PM
12-06-2021

Splits and Phases: 14: Highway 50 & Street G



Junctions 8
ARCADY 8 - Roundabout Module
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Filename: Highway 50 & Emil Kolb Pkwy.arc8

Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady

Report generation date: 2021-12-06 11:21:54 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 ROPA 30						
Emil Kolb Pkwy	0.20	~1	3.03	0.13	A	2.46	A
Highway 50 (North)	0.76	1.06	2.68	0.42	A		
Highway 50 (South)	0.32	~1	1.88	0.23	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - 2017 Existing Traffic, PM" model duration: 3:00 PM - 4:30 PM
 "D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - 2031 Future Background, PM" model duration: 3:00 PM - 4:30 PM
 "D7 - 2031 ROPA 30, AM " model duration: 8:00 AM - 9:30 AM
 "D8 - 2031 ROPA 30, PM" model duration: 3:00 PM - 4:30 PM

Run using Junctions 8.0.6.541 at 2021-12-06 11:21:53 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 ROPA 30, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 ROPA 30, AM	2031 ROPA 30	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.46	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy	3	Emil Kolb Pkwy	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	1	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)

Emil Kolb Pkwy	0.00	0.00
Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy	ONE HOUR	✓	212.00	100.000
Highway 50 (North)	ONE HOUR	✓	932.00	100.000
Highway 50 (South)	ONE HOUR	✓	557.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.000	314.000	243.000
	Highway 50 (North)	570.000	0.000	362.000
	Emil Kolb Pkwy	102.000	110.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.00	0.56	0.44
	Highway 50 (North)	0.61	0.00	0.39
	Emil Kolb Pkwy	0.48	0.52	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	1.000	1.040	1.120
	Highway 50 (North)	1.030	1.000	1.120
	Emil Kolb Pkwy	1.270	1.460	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.0	4.0	12.0
	Highway 50 (North)	3.0	0.0	12.0
	Emil Kolb Pkwy	27.0	46.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy	0.13	3.03	0.20	~1	A	194.53	291.80	13.33	2.74	0.15	13.33	2.74
Highway 50 (North)	0.42	2.68	0.76	1.06	A	855.22	1282.83	50.44	2.36	0.56	50.45	2.36
Highway 50 (South)	0.23	1.88	0.32	~1	A	511.11	766.67	22.68	1.78	0.25	22.68	1.78

Junctions 8
ARCADY 8 - Roundabout Module
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:30:38 AM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 ROPA 30						
Emil Kolb Pkwy (North)	0.48	~1	2.30	0.30	A	2.31	A
Emil Kolb Pkwy (South)	0.18	~1	1.94	0.13	A		
King Street	0.31	~1	2.63	0.22	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
 "D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
 "D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
 "D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
 "D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:30:37 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 ROPA 30, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 ROPA 30, AM	2031 ROPA 30	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.31	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	

King Street	7.00	8.00	30.00	25.00	55.00	25.00	
-------------	------	------	-------	-------	-------	-------	--

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	686.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	311.00	100.000
King Street	ONE HOUR	✓	386.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
From	Emil Kolb Pkwy (South)	0.000	112.000	199.000
	Emil Kolb Pkwy (North)	509.000	0.000	177.000
	King Street	296.000	90.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street

From	Emil Kolb Pkwy (South)	0.00	0.36	0.64
	Emil Kolb Pkwy (North)	0.74	0.00	0.26
	King Street	0.77	0.23	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	1.000	1.400	1.190
	Emil Kolb Pkwy (North)	1.140	1.000	1.030
	King Street	1.090	1.220	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.0	40.0	19.0
	Emil Kolb Pkwy (North)	14.0	0.0	3.0
	King Street	9.0	22.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.30	2.30	0.48	~1	A	629.49	944.23	33.23	2.11	0.37	33.23	2.11
Emil Kolb Pkwy (South)	0.13	1.94	0.18	~1	A	285.38	428.07	13.40	1.88	0.15	13.40	1.88
King Street	0.22	2.63	0.31	~1	A	354.20	531.30	20.81	2.35	0.23	20.81	2.35

Jan 20, 2022

Lanes, Volumes, Timings

2031 ROPA 30 AM

12-07-2021

3: Highway 50 & Private Access/Columbia Way



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1	1	7	162	0	115	4	278	83	64	559	4
Future Volume (vph)	1	1	7	162	0	115	4	278	83	64	559	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		0.0	125.0		30.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.895			0.850				0.850			0.850
Flt Protected		0.994		0.950			0.950			0.950		
Satd. Flow (prot)	0	1202	0	1767	1570	0	1785	1847	1579	1475	1883	952
Flt Permitted		0.973		0.752			0.409			0.589		
Satd. Flow (perm)	0	1176	0	1399	1570	0	768	1847	1579	915	1883	952
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			586				83			33
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		46.8			237.9			633.3			632.5	
Travel Time (s)		3.4			14.3			38.0			38.0	
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
Heavy Vehicles (%)	100%	0%	40%	1%	0%	4%	0%	4%	3%	21%	2%	67%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	1	7	162	0	115	4	278	83	64	559	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	162	115	0	4	278	83	64	559	4
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left						Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	15.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	













Jan 20, 2022

Lanes, Volumes, Timings

2031 ROPA 30 AM

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3: Highway 50 & Private Access/Columbia Way

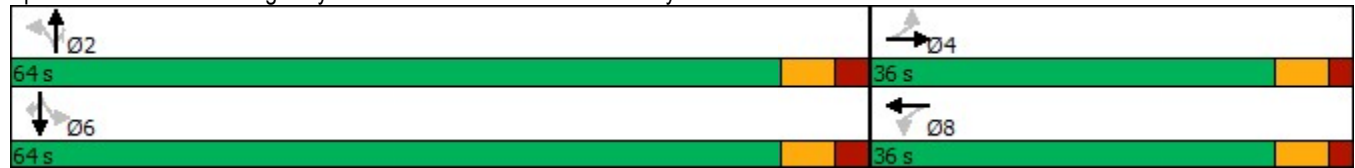
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	30.0	30.0		30.0	30.0		57.3	57.3	57.3	57.3	57.3	57.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effect Green (s)		15.4		15.4	15.4		59.5	59.5	59.5	59.5	59.5	59.5
Actuated g/C Ratio		0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio		0.04		0.66	0.15		0.01	0.22	0.08	0.10	0.44	0.01
Control Delay		18.4		46.3	0.4		6.0	6.5	1.8	6.5	8.5	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		18.4		46.3	0.4		6.0	6.5	1.8	6.5	8.5	0.0
LOS		B		D	A		A	A	A	A	A	A
Approach Delay		18.4			27.2			5.4			8.2	
Approach LOS		B			C			A			A	
Queue Length 50th (m)		0.3		26.1	0.0		0.2	15.8	0.0	3.3	38.3	0.0
Queue Length 95th (m)		4.2		46.3	0.0		1.5	33.1	5.1	9.8	75.0	0.0
Internal Link Dist (m)		22.8			213.9			609.3			608.5	
Turn Bay Length (m)				70.0			140.0			125.0		30.0
Base Capacity (vph)		408		479	923		521	1255	1099	621	1279	657
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.02		0.34	0.12		0.01	0.22	0.08	0.10	0.44	0.01
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 87.6												
Natural Cycle: 60												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.66												
Intersection Signal Delay: 11.6							Intersection LOS: B					
Intersection Capacity Utilization 77.9%							ICU Level of Service D					

Lanes, Volumes, Timings
3: Highway 50 & Private Access/Columbia Way

2031 ROPA 30 AM
12-07-2021

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way

























Jan 20, 2022

Lanes, Volumes, Timings

2031 ROPA 30 AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-07-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	3	37	113	0	36	16	383	25	19	688	8
Future Volume (vph)	18	3	37	113	0	36	16	383	25	19	688	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98		1.00	0.98		1.00		0.98	1.00		0.98
Frt		0.861			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1617	0	1785	1608	0	1526	3510	1591	1785	1883	1591
Flt Permitted	0.734			0.731			0.329			0.525		
Satd. Flow (perm)	1375	1617	0	1368	1608	0	528	3510	1556	985	1883	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			399				45			45
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	4		3	3		4	2		1	1		2
Confl. Bikes (#/hr)					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
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	17%	4%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	3	37	113	0	36	16	383	25	19	688	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	40	0	113	36	0	16	383	25	19	688	8
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0		15.0	15.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

2031 ROPA 30 AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-07-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex			
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0			
Turn Type	Perm	NA	Perm		NA	Perm		NA	Perm	Perm	NA	Perm
Protected Phases	4		8		2		2		6		6	
Permitted Phases	4		8		2		2		2	6	6	
Detector Phase	4	4	8		8	2		2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0		8.0	12.0		12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1	43.1		43.1	32.6		32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0	44.0		44.0	56.0		56.0	56.0	56.0	56.0	56.0
Total Split (%)	44.0%	44.0%	44.0%		44.0%	56.0%		56.0%	56.0%	56.0%	56.0%	56.0%
Maximum Green (s)	36.9	36.9	36.9		36.9	49.4		49.4	49.4	49.4	49.4	49.4
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1	3.1		3.1	2.6		2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1	7.1		7.1	6.6		6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None		None	Max		Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	28.0	28.0	28.0		28.0	18.0		18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5	5		5	4		4	4	4	4	4
Act Effct Green (s)	14.9	14.9	14.9		14.9	55.8		55.8	55.8	55.8	55.8	55.8
Actuated g/C Ratio	0.19	0.19	0.19		0.19	0.70		0.70	0.70	0.70	0.70	0.70
v/c Ratio	0.07	0.12	0.44		0.06	0.04		0.16	0.02	0.03	0.52	0.01
Control Delay	24.5	9.6	32.8		0.2	9.4		7.3	1.8	8.8	11.9	0.0
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	9.6	32.8		0.2	9.4		7.3	1.8	8.8	11.9	0.0
LOS	C	A	C		A	A		A	A	A	B	A
Approach Delay	14.2		24.9		7.0		11.6					
Approach LOS	B		C		A		B					
Queue Length 50th (m)	2.3	0.4	15.6		0.0	0.7		9.6	0.0	0.8	46.6	0.0
Queue Length 95th (m)	7.1	7.4	29.0		0.0	5.4		31.1	2.3	5.8	151.6	0.0
Internal Link Dist (m)	88.1		177.9		747.8		609.3					
Turn Bay Length (m)	30.0		85.0			90.0			75.0	65.0		90.0
Base Capacity (vph)	644	778	641		966	369		2456	1102	689	1317	1100
Starvation Cap Reductn	0	0	0		0	0		0	0	0	0	0
Spillback Cap Reductn	0	0	0		0	0		0	0	0	0	0
Storage Cap Reductn	0	0	0		0	0		0	0	0	0	0
Reduced v/c Ratio	0.03	0.05	0.18		0.04	0.04		0.16	0.02	0.03	0.52	0.01

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 79.8

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Lanes, Volumes, Timings

2031 ROPA 30 AM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-07-2021

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 11.8

Intersection LOS: B

Intersection Capacity Utilization 62.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Blvd/Bolton Heights Dr
























Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 ROPA 30 AM

12-07-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	181	92	230	194	78	44	360	185	97	743	58
Future Volume (vph)	77	181	92	230	194	78	44	360	185	97	743	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	1.00		0.98	1.00	1.00			0.99			1.00	
Frt			0.850		0.957			0.953			0.990	
Flt Protected	0.950			0.950				0.996			0.995	
Satd. Flow (prot)	1575	1679	1437	1591	1610	0	0	2935	0	0	3192	0
Flt Permitted	0.544			0.392				0.811			0.777	
Satd. Flow (perm)	899	1679	1411	654	1610	0	0	2390	0	0	2490	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94		14			91			8	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		267.9			353.4			484.2			32.8	
Travel Time (s)		19.3			25.4			34.9			2.4	
Confl. Peds. (#/hr)	3		4	4		3	8		6	6		8
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%	3%	0%	1%	2%	3%	6%	4%	6%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	77	181	92	230	194	78	44	360	185	97	743	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	181	92	230	272	0	0	589	0	0	898	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.16	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	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	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	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	

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Lanes, Volumes, Timings
5: Highway 50 & King St

2031 ROPA 30 AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		8.0	23.5		23.5	23.5	
Total Split (s)	9.8	34.0	34.0	18.8	43.0		8.0	87.2		79.2	79.2	
Total Split (%)	7.0%	24.3%	24.3%	13.4%	30.7%		5.7%	62.3%		56.6%	56.6%	
Maximum Green (s)	6.8	27.7	27.7	15.8	36.7		5.0	81.2		73.2	73.2	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0			6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			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	3.0	
Recall Mode	None	None	None	None	None		None	Max		Max	Max	
Walk Time (s)		16.0	16.0		16.0			8.0		8.0	8.0	
Flash Dont Walk (s)		10.0	10.0		10.0			9.0		9.0	9.0	
Pedestrian Calls (#/hr)		20	20		20			16		16	16	
Act Effect Green (s)	30.1	20.0	20.0	41.9	30.9			81.4			81.4	
Actuated g/C Ratio	0.23	0.15	0.15	0.32	0.23			0.62			0.62	
v/c Ratio	0.32	0.71	0.31	0.73	0.70			0.39			0.59	
Control Delay	36.8	69.0	11.5	50.3	55.2			12.2			18.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	36.8	69.0	11.5	50.3	55.2			12.2			18.0	
LOS	D	E	B	D	E			B			B	
Approach Delay		46.8			52.9			12.2			18.0	
Approach LOS		D			D			B			B	
Queue Length 50th (m)	15.2	47.9	0.0	50.3	66.9			33.5			72.2	
Queue Length 95th (m)	27.6	74.0	15.1	75.2	99.3			53.7			108.1	
Internal Link Dist (m)		243.9			329.4			460.2			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	239	352	370	319	457			1504			1534	
Starvation Cap Reductn	0	0	0	0	0			0			0	
Spillback Cap Reductn	0	0	0	0	0			0			0	
Storage Cap Reductn	0	0	0	0	0			0			0	
Reduced v/c Ratio	0.32	0.51	0.25	0.72	0.60			0.39			0.59	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 132.3

Natural Cycle: 90

Control Type: Semi Act-Uncoord








Maximum v/c Ratio: 0.73

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 ROPA 30 AM
12-07-2021

Intersection Signal Delay: 28.3	Intersection LOS: C
Intersection Capacity Utilization 92.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 5: Highway 50 & King St

 Ø1	 Ø2	 Ø3	 Ø4
8 s	79.2 s	9.8 s	43 s
 Ø6		 Ø7	 Ø8
87.2 s		18.8 s	34 s

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Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 ROPA 30 AM

12-07-2021



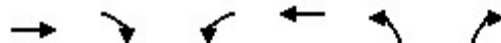
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (vph)	106	23	33	203	57	38
Future Volume (vph)	106	23	33	203	57	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			1.00		
Frt	0.976				0.946	
Flt Protected				0.993	0.971	
Satd. Flow (prot)	1785	0	0	1891	1744	0
Flt Permitted				0.957	0.971	
Satd. Flow (perm)	1785	0	0	1821	1744	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	22				38	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		3	3			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	7%	0%	1%	2%	0%
Adj. Flow (vph)	106	23	33	203	57	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	129	0	0	236	95	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

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Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 ROPA 30 AM

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	59.0		59.0	59.0	31.0	
Total Split (%)	65.6%		65.6%	65.6%	34.4%	
Maximum Green (s)	54.5		54.5	54.5	26.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	4		4	4	0	
Act Effect Green (s)	66.6			66.6	8.3	
Actuated g/C Ratio	0.83			0.83	0.10	
v/c Ratio	0.09			0.16	0.45	
Control Delay	2.1			2.5	28.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.1			2.5	28.5	
LOS	A			A	C	
Approach Delay	2.1			2.5	28.5	
Approach LOS	A			A	C	
Queue Length 50th (m)	2.8			6.8	9.4	
Queue Length 95th (m)	7.6			14.7	21.2	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1476			1502	600	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.09			0.16	0.16	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 80.7

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 7.8

Intersection LOS: A

Intersection Capacity Utilization 44.2%

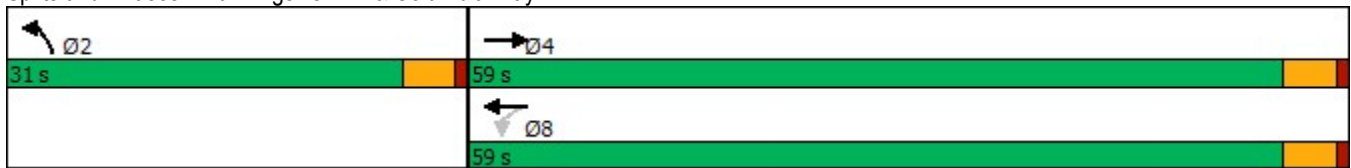
ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

















2031 ROPA 30 AM
12-07-2021

Splits and Phases: 6: Kingsview Dr & Columbia Way



HCM Unsignalized Intersection Capacity Analysis 8: Mt Hope Rd & Columbia Way

2031 ROPA 30 AM
12-07-2021











												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	134	16	11	106	7	24	3	22	22	4	26
Future Volume (Veh/h)	20	134	16	11	106	7	24	3	22	22	4	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	20	134	16	11	106	7	24	3	22	22	4	26
Pedestrians		1			1			10				
Lane Width (m)		3.7			3.7			3.7				
Walking Speed (m/s)		1.2			1.2			1.2				
Percent Blockage		0			0			1				
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	113			160			352	327	153	338	332	110
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	113			160			352	327	153	338	332	110
tC, single (s)	4.2			4.3			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.4			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			99			96	99	98	96	99	97
cM capacity (veh/h)	1446			1280			567	577	890	577	573	947
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	170	124	49	52								
Volume Left	20	11	24	22								
Volume Right	16	7	22	26								
cSH	1446	1280	678	716								
Volume to Capacity	0.01	0.01	0.07	0.07								
Queue Length 95th (m)	0.3	0.2	1.9	1.9								
Control Delay (s)	1.0	0.8	10.7	10.4								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.0	0.8	10.7	10.4								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			24.1%	ICU Level of Service				A				
Analysis Period (min)			15									

Jan 20, 2022

Lanes, Volumes, Timings
10: Highway 50 & Access A

2031 ROPA 30 AM

12-07-2021







						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	42	190	385	20	61	585
Future Volume (vph)	42	190	385	20	61	585
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		0.0	25.0	
Storage Lanes	1	0		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.889		0.993			
Flt Protected	0.991				0.950	
Satd. Flow (prot)	1659	0	1870	0	1789	1883
Flt Permitted	0.991				0.518	
Satd. Flow (perm)	1659	0	1870	0	976	1883
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	190		7			
Link Speed (k/h)	50		50			60
Link Distance (m)	339.5		632.5			508.7
Travel Time (s)	24.4		45.5			30.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	42	190	385	20	61	585
Shared Lane Traffic (%)						
Lane Group Flow (vph)	232	0	405	0	61	585
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		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	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	

Jan 20, 2022

Lanes, Volumes, Timings
10: Highway 50 & Access A

2031 ROPA 30 AM

12-07-2021

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	22.5		22.5		22.5	22.5
Total Split (s)	22.5		47.5		47.5	47.5
Total Split (%)	32.1%		67.9%		67.9%	67.9%
Maximum Green (s)	18.0		43.0		43.0	43.0
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.5		4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		Max	Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	8.2		46.4		46.4	46.4
Actuated g/C Ratio	0.13		0.73		0.73	0.73
v/c Ratio	0.61		0.30		0.09	0.43
Control Delay	14.0		4.1		3.6	5.1
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	14.0		4.1		3.6	5.1
LOS	B		A		A	A
Approach Delay	14.0		4.1			4.9
Approach LOS	B		A			A
Queue Length 50th (m)	4.4		11.4		1.5	19.0
Queue Length 95th (m)	21.4		30.3		5.9	49.4
Internal Link Dist (m)	315.5		608.5			484.7
Turn Bay Length (m)					25.0	
Base Capacity (vph)	607		1365		711	1372
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	0.38		0.30		0.09	0.43
Intersection Summary						
Area Type:	Other					
Cycle Length: 70						
Actuated Cycle Length: 63.6						
Natural Cycle: 50						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.61						
Intersection Signal Delay: 6.3				Intersection LOS: A		
Intersection Capacity Utilization 52.3%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
10: Highway 50 & Access A

2031 ROPA 30 AM
12-07-2021

Splits and Phases: 10: Highway 50 & Access A



Junctions 8
ARCADY 8 - Roundabout Module
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Filename: Highway 50 & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis\Arcady
Report generation date: 2021-12-06 11:25:55 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 ROPA 30						
Emil Kolb Pkwy	0.95	1.40	3.88	0.41	A	3.56	A
Highway 50 (North)	0.28	~1	1.80	0.21	A		
Highway 50 (South)	1.19	?	4.25	0.53	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
"D2 - 2017 Existing Traffic, PM" model duration: 3:00 PM - 4:30 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
"D4 - 2031 Future Background, PM" model duration: 3:00 PM - 4:30 PM
"D7 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
"D8 - 2031 ROPA 30, PM" model duration: 3:00 PM - 4:30 PM

Run using Junctions 8.0.6.541 at 2021-12-06 11:25:55 AM

File summary

Title	Bolton North Hill
Location	Highway 50 & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 ROPA 30, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 ROPA 30, PM	2031 ROPA 30	PM		ONE HOUR	15:00	16:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		3.56	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy	3	Emil Kolb Pkwy	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	1	Highway 50 (South)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy	0.00	99999.00		0.00
Highway 50 (North)	0.00	99999.00		0.00
Highway 50 (South)	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy	7.00	8.00	30.00	25.00	55.00	25.00	
Highway 50 (North)	7.00	8.00	30.00	35.00	60.00	25.00	
Highway 50 (South)	7.00	8.00	30.00	35.00	60.00	25.00	

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)

Emil Kolb Pkwy	0.00	0.00
Highway 50 (North)	0.00	0.00
Highway 50 (South)	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy	Percentage	Opening day within 10 years		85.00
Highway 50 (North)	Percentage	Opening day within 10 years		85.00
Highway 50 (South)	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy		(calculated)	(calculated)	1.562	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy	ONE HOUR	✓	806.00	100.000
Highway 50 (North)	ONE HOUR	✓	512.00	100.000
Highway 50 (South)	ONE HOUR	✓	923.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.000	813.000	110.000
	Highway 50 (North)	376.000	0.000	136.000
	Emil Kolb Pkwy	233.000	573.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.00	0.88	0.12
	Highway 50 (North)	0.73	0.00	0.27
	Emil Kolb Pkwy	0.29	0.71	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	1.000	1.040	1.120
	Highway 50 (North)	1.030	1.000	1.120
	Emil Kolb Pkwy	1.270	1.460	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
From	Highway 50 (South)	0.0	4.0	12.0
	Highway 50 (North)	3.0	0.0	12.0
	Emil Kolb Pkwy	27.0	46.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy	0.41	3.88	0.95	1.40	A	739.60	1109.40	61.82	3.34	0.69	61.82	3.34
Highway 50 (North)	0.21	1.80	0.28	~1	A	469.82	704.73	20.05	1.71	0.22	20.05	1.71
Highway 50 (South)	0.53	4.25	1.19	?	A	846.96	1270.44	70.59	3.33	0.78	70.60	3.33

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2021
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Filename: King Street & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2021 Analysis
Report generation date: 2021-12-06 10:31:59 AM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031 ROPA 30						
Emil Kolb Pkwy (North)	0.18	~1	2.15	0.13	A	2.53	A
Emil Kolb Pkwy (South)	0.95	~1	3.01	0.48	A		
King Street	0.33	~1	1.85	0.24	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2017 Existing Traffic, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - 2017 Existing Traffic, PM" model duration: 8:00 AM - 9:30 AM
 "D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - 2031 Future Background, PM" model duration: 8:00 AM - 9:30 AM
 "D7 - 2031 Future Total (Option 1/2), AM" model duration: 8:00 AM - 9:30 AM
 "D8 - 2031 Future Total (Option 1/2), PM" model duration: 8:00 AM - 9:30 AM
 "D9 - 2031 ROPA 30, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - 2031 ROPA 30, PM" model duration: 8:00 AM - 9:30 AM

Run using Junctions 8.0.6.541 at 2021-12-06 10:31:58 AM

File summary

Title	Bolton North Hill
Location	King Street & Emil Kolb Parkway
Site Number	
Date	2020-07-15
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	Crozier Consulting Engineers
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
5.75	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031 ROPA 30, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
2031 ROPA 30, PM	2031 ROPA 30	PM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓		2.53	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy (North)	2	Emil Kolb Pkwy (North)	
Emil Kolb Pkwy (South)	1	Emil Kolb Pkwy (South)	
King Street	3	King Street	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
Emil Kolb Pkwy (North)	0.00	99999.00		0.00
Emil Kolb Pkwy (South)	0.00	99999.00		0.00
King Street	0.00	99999.00		0.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Emil Kolb Pkwy (North)	7.00	8.00	30.00	25.00	55.00	25.00	
Emil Kolb Pkwy (South)	7.00	8.00	30.00	25.00	55.00	25.00	

King Street	7.00	8.00	30.00	25.00	55.00	25.00	
-------------	------	------	-------	-------	-------	-------	--

Large Roundabout Data

Name	Circulating flow (PCE/hr)	Entry-to-exit separation (m)
Emil Kolb Pkwy (North)	0.00	0.00
Emil Kolb Pkwy (South)	0.00	0.00
King Street	0.00	0.00

Slope / Intercept / Capacity

Leg Intercept Adjustments

Name	Type	Reason	Direct Intercept Adjustment (PCE/hr)	Percentage Intercept Adjustment (%)
Emil Kolb Pkwy (North)	Percentage	Opening day within 10 years		85.00
Emil Kolb Pkwy (South)	Percentage	Opening day within 10 years		85.00
King Street	Percentage	Opening day within 10 years		85.00

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)		(calculated)	(calculated)	1.562	2831.014
Emil Kolb Pkwy (South)		(calculated)	(calculated)	1.562	2831.014
King Street		(calculated)	(calculated)	1.562	2831.014

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Emil Kolb Pkwy (North)	ONE HOUR	✓	269.00	100.000
Emil Kolb Pkwy (South)	ONE HOUR	✓	1031.00	100.000
King Street	ONE HOUR	✓	577.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.000	671.000	360.000
	Emil Kolb Pkwy (North)	127.000	0.000	142.000
	King Street	314.000	263.000	0.000

Turning Proportions (PCE) - Highway 50 & Emil Kolb Pkwy (for whole period)

	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street

From	Emil Kolb Pkwy (South)	0.00	0.65	0.35
	Emil Kolb Pkwy (North)	0.47	0.00	0.53
	King Street	0.54	0.46	0.00

Vehicle Mix

Average PCE Per Vehicle - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	1.000	1.040	1.040
	Emil Kolb Pkwy (North)	1.180	1.000	1.110
	King Street	1.020	1.010	1.000

Truck Percentages - Highway 50 & Emil Kolb Pkwy (for whole period)

From	To			
		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.0	4.0	4.0
	Emil Kolb Pkwy (North)	18.0	0.0	11.0
	King Street	2.0	1.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
Emil Kolb Pkwy (North)	0.13	2.15	0.18	~1	A	246.84	370.26	12.38	2.01	0.14	12.38	2.01
Emil Kolb Pkwy (South)	0.48	3.01	0.95	~1	A	946.06	1419.10	60.77	2.57	0.68	60.77	2.57
King Street	0.24	1.85	0.33	~1	A	529.47	794.20	23.01	1.74	0.26	23.01	1.74

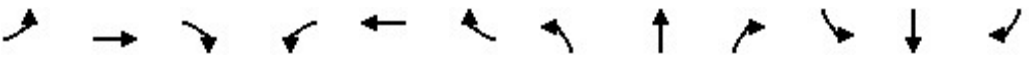
Jan 20, 2022

Lanes, Volumes, Timings

2031 ROPA 30 PM

12-07-2021

3: Highway 50 & Private Access/Columbia Way

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1	0	1	95	0	77	0	720	261	144	335	3
Future Volume (vph)	1	0	1	95	0	77	0	720	261	144	335	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5
Storage Length (m)	0.0		0.0	70.0		0.0	140.0		0.0	125.0		30.0
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.932			0.850				0.850			0.850
Flt Protected		0.976		0.950						0.950		
Satd. Flow (prot)	0	1748	0	1785	1601	0	1879	1902	1610	1767	1902	795
Flt Permitted		0.860		0.757						0.340		
Satd. Flow (perm)	0	1540	0	1422	1601	0	1879	1902	1610	632	1902	795
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40			211				261			33
Link Speed (k/h)		50			60			60			60	
Link Distance (m)		46.8			237.9			633.3			616.6	
Travel Time (s)		3.4			14.3			38.0			37.0	
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
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	1%	1%	1%	100%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	1	0	1	95	0	77	0	720	261	144	335	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	0	95	77	0	0	720	261	144	335	3
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left						Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	12.0		8.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	-3.0		-2.0	-2.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	15.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	













Jan 20, 2022

Lanes, Volumes, Timings

2031 ROPA 30 PM

12-07-2021

3: Highway 50 & Private Access/Columbia Way

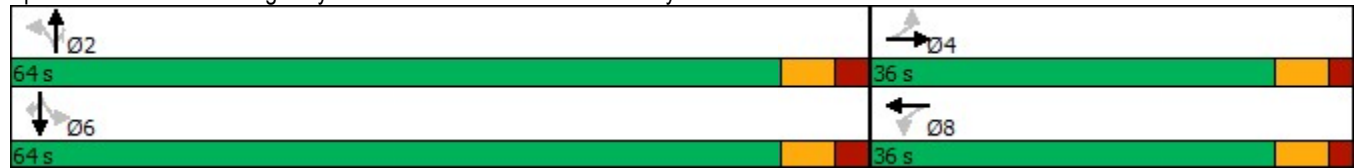
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	30.0	30.0		30.0	30.0		57.3	57.3	57.3	57.3	57.3	57.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
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	3.0
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effect Green (s)		11.2		11.2	11.2			63.4	63.4	63.4	63.4	63.4
Actuated g/C Ratio		0.14		0.14	0.14			0.76	0.76	0.76	0.76	0.76
v/c Ratio		0.01		0.50	0.19			0.50	0.20	0.30	0.23	0.00
Control Delay		0.0		42.0	1.1			7.0	1.1	6.9	4.7	0.0
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay		0.0		42.0	1.1			7.0	1.1	6.9	4.7	0.0
LOS		A		D	A			A	A	A	A	A
Approach Delay					23.7			5.4			5.3	
Approach LOS					C			A			A	
Queue Length 50th (m)		0.0		14.5	0.0			44.9	0.0	7.2	15.8	0.0
Queue Length 95th (m)		0.0		29.2	0.0			85.1	7.0	19.7	31.3	0.0
Internal Link Dist (m)		22.8			213.9			609.3			592.6	
Turn Bay Length (m)				70.0						125.0		30.0
Base Capacity (vph)		583		515	714			1453	1291	483	1453	615
Starvation Cap Reductn		0		0	0			0	0	0	0	0
Spillback Cap Reductn		0		0	0			0	0	0	0	0
Storage Cap Reductn		0		0	0			0	0	0	0	0
Reduced v/c Ratio		0.00		0.18	0.11			0.50	0.20	0.30	0.23	0.00
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 82.9												
Natural Cycle: 60												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.50												
Intersection Signal Delay: 7.3							Intersection LOS: A					
Intersection Capacity Utilization 80.0%							ICU Level of Service D					

Lanes, Volumes, Timings
3: Highway 50 & Private Access/Columbia Way

2031 ROPA 30 PM
12-07-2021

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Private Access/Columbia Way

























Jan 20, 2022

Lanes, Volumes, Timings

2031 ROPA 30 PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-07-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	5	20	45	3	25	98	1035	110	30	431	28
Future Volume (vph)	12	5	20	45	3	25	98	1035	110	30	431	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.7	3.5	3.7	3.7	3.5	3.7	3.5	3.5	3.7	3.5
Storage Length (m)	30.0		0.0	85.0		0.0	90.0		75.0	65.0		90.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98		1.00	0.99		1.00		0.97	1.00		0.98
Frt		0.880			0.866				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1570	0	1785	1640	0	1785	3614	1591	1785	1902	1591
Flt Permitted	0.739			0.741			0.506			0.261		
Satd. Flow (perm)	1383	1570	0	1387	1640	0	949	3614	1547	490	1902	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			25				110			45
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		8.1			14.5			46.3			38.0	
Confl. Peds. (#/hr)	5		3	3		5	2		4	4		2
Confl. Bikes (#/hr)					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
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	12	5	20	45	3	25	98	1035	110	30	431	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	25	0	45	28	0	98	1035	110	30	431	28
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			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	0.99	0.99	1.01	0.99	0.99	1.01	0.99	1.02	1.01	0.99	1.02
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	12.0	12.0		12.0	12.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	15.0	15.0		15.0	15.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

2031 ROPA 30 PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-07-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex			
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0			
Turn Type	Perm	NA	Perm		NA	Perm		NA	Perm	Perm	NA	Perm
Protected Phases	4		8		2		2		6		6	
Permitted Phases	4		8		2		2		2	6	6	
Detector Phase	4	4	8		8	2		2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0		8.0	12.0		12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1	43.1		43.1	32.6		32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0	44.0		44.0	56.0		56.0	56.0	56.0	56.0	56.0
Total Split (%)	44.0%	44.0%	44.0%		44.0%	56.0%		56.0%	56.0%	56.0%	56.0%	56.0%
Maximum Green (s)	36.9	36.9	36.9		36.9	49.4		49.4	49.4	49.4	49.4	49.4
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1	3.1		3.1	2.6		2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1	7.1		7.1	6.6		6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None		None	Max		Max	Max	Max	Max	Max
Walk Time (s)	8.0	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	28.0	28.0	28.0		28.0	18.0		18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5	5		5	4		4	4	4	4	4
Act Effct Green (s)	12.8	12.8	12.8		12.8	61.1		61.1	61.1	61.1	61.1	61.1
Actuated g/C Ratio	0.16	0.16	0.16		0.16	0.78		0.78	0.78	0.78	0.78	0.78
v/c Ratio	0.05	0.09	0.20		0.10	0.13		0.37	0.09	0.08	0.29	0.02
Control Delay	25.2	13.2	28.5		11.4	7.8		7.2	2.4	8.7	7.5	2.1
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	13.2	28.5		11.4	7.8		7.2	2.4	8.7	7.5	2.1
LOS	C	B	C		B	A		A	A	A	A	A
Approach Delay	17.1		21.9		6.9		7.2					
Approach LOS	B		C		A		A					
Queue Length 50th (m)	1.7	0.7	6.6		0.4	3.8		26.7	0.0	1.1	19.6	0.0
Queue Length 95th (m)	5.4	6.3	13.8		6.1	21.0		94.0	8.5	8.8	79.8	2.7
Internal Link Dist (m)	88.1		177.9		747.8		609.3					
Turn Bay Length (m)	30.0		85.0			90.0			75.0	65.0		90.0
Base Capacity (vph)	663	763	665		799	741		2822	1232	382	1485	1222
Starvation Cap Reductn	0	0	0		0	0		0	0	0	0	0
Spillback Cap Reductn	0	0	0		0	0		0	0	0	0	0
Storage Cap Reductn	0	0	0		0	0		0	0	0	0	0
Reduced v/c Ratio	0.02	0.03	0.07		0.04	0.13		0.37	0.09	0.08	0.29	0.02

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 78.2

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Lanes, Volumes, Timings

2031 ROPA 30 PM

4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

12-07-2021

Maximum v/c Ratio: 0.37

Intersection Signal Delay: 7.8

Intersection LOS: A

Intersection Capacity Utilization 67.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Blvd/Bolton Heights Dr
























Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 ROPA 30 PM

12-07-2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	330	70	240	264	53	51	1042	493	45	429	40
Future Volume (vph)	95	330	70	240	264	53	51	1042	493	45	429	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.7	3.5	3.5	3.7	3.7	3.7	3.7	3.5	3.7	3.7	3.5
Storage Length (m)	30.0		35.0	30.0		0.0	0.0		0.0	0.0		10.0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Ped Bike Factor	0.98		0.98	1.00	0.99			0.97			0.99	
Frt			0.850		0.975			0.953			0.988	
Flt Protected	0.950			0.950				0.998			0.996	
Satd. Flow (prot)	1606	1729	1409	1591	1653	0	0	3013	0	0	3162	0
Flt Permitted	0.429			0.161				0.909			0.621	
Satd. Flow (perm)	712	1729	1377	268	1653	0	0	2743	0	0	1971	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94		7			88			9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		267.9			353.4			499.1			32.8	
Travel Time (s)		19.3			25.4			35.9			2.4	
Confl. Peds. (#/hr)	20		7	7		20	13		16	16		13
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 (%)	0%	0%	2%	1%	1%	0%	0%	1%	1%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	1	0	0	0	1	0	0	0
Adj. Flow (vph)	95	330	70	240	264	53	51	1042	493	45	429	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	330	70	240	317	0	0	1586	0	0	514	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)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.16	1.13	1.16	1.16	1.13	1.13	1.13	1.13	1.16	1.13	1.13	1.16
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	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	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	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	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	

Jan 20, 2022

Lanes, Volumes, Timings
5: Highway 50 & King St

2031 ROPA 30 PM

12-07-2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.3	32.3	9.5	32.3		8.0	23.5		23.5	23.5	
Total Split (s)	9.8	34.0	34.0	18.8	43.0		8.0	87.2		79.2	79.2	
Total Split (%)	7.0%	24.3%	24.3%	13.4%	30.7%		5.7%	62.3%		56.6%	56.6%	
Maximum Green (s)	6.8	27.7	27.7	15.8	36.7		5.0	81.2		73.2	73.2	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	6.3	6.3	3.0	6.3			6.0			6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			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	3.0	
Recall Mode	None	None	None	None	None		None	Max		Max	Max	
Walk Time (s)		16.0	16.0		16.0			8.0		8.0	8.0	
Flash Dont Walk (s)		10.0	10.0		10.0			9.0		9.0	9.0	
Pedestrian Calls (#/hr)		20	20		20			16		16	16	
Act Effect Green (s)	37.8	27.7	27.7	49.8	36.7			81.2			81.2	
Actuated g/C Ratio	0.27	0.20	0.20	0.36	0.26			0.58			0.58	
v/c Ratio	0.40	0.96	0.20	0.98	0.72			0.97			0.45	
Control Delay	38.4	95.9	5.3	90.4	56.7			44.1			17.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0			0.0	
Total Delay	38.4	95.9	5.3	90.4	56.7			44.1			17.9	
LOS	D	F	A	F	E			D			B	
Approach Delay		72.0			71.2			44.1			17.9	
Approach LOS		E			E			D			B	
Queue Length 50th (m)	18.9	96.3	0.0	53.0	82.8			217.9			42.1	
Queue Length 95th (m)	32.8	#159.0	7.7	#107.3	119.2			#284.6			56.7	
Internal Link Dist (m)		243.9			329.4			475.1			8.8	
Turn Bay Length (m)	30.0		35.0	30.0								
Base Capacity (vph)	235	342	347	244	438			1627			1146	
Starvation Cap Reductn	0	0	0	0	0			0			0	
Spillback Cap Reductn	0	0	0	0	0			0			0	
Storage Cap Reductn	0	0	0	0	0			0			0	
Reduced v/c Ratio	0.40	0.96	0.20	0.98	0.72			0.97			0.45	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 140

Natural Cycle: 120

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.98

Lanes, Volumes, Timings

5: Highway 50 & King St

2031 ROPA 30 PM

12-07-2021

Intersection Signal Delay: 49.0	Intersection LOS: D
Intersection Capacity Utilization 121.0%	ICU Level of Service H
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 5: Highway 50 & King St

 Ø1	 Ø2	 Ø3	 Ø4
8 s	79.2 s	9.8 s	43 s
 Ø6		 Ø7	 Ø8
87.2 s		18.8 s	34 s

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 ROPA 30 PM

12-07-2021



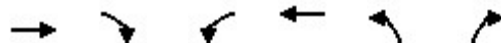
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (vph)	332	115	70	166	31	38
Future Volume (vph)	332	115	70	166	31	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99			1.00		
Frt	0.965				0.926	
Flt Protected				0.985	0.978	
Satd. Flow (prot)	1826	0	0	1892	1702	0
Flt Permitted				0.805	0.978	
Satd. Flow (perm)	1826	0	0	1545	1702	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	35				38	
Link Speed (k/h)	60			60	40	
Link Distance (m)	237.9			417.0	131.8	
Travel Time (s)	14.3			25.0	11.9	
Confl. Peds. (#/hr)		4	4			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	0%	0%	0%	5%	0%
Adj. Flow (vph)	332	115	70	166	31	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	447	0	0	236	69	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	3.7	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (m)	10.0		2.0	10.0	2.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	
Detector 1 Size(m)	0.6		2.0	0.6	2.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	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		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			

Jan 20, 2022

Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	4		8	8	2	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	59.0		59.0	59.0	31.0	
Total Split (%)	65.6%		65.6%	65.6%	34.4%	
Maximum Green (s)	54.5		54.5	54.5	26.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	7.0		7.0	7.0	7.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	
Pedestrian Calls (#/hr)	4		4	4	0	
Act Effect Green (s)	68.8			68.8	7.3	
Actuated g/C Ratio	0.84			0.84	0.09	
v/c Ratio	0.29			0.18	0.37	
Control Delay	2.5			2.3	24.9	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.5			2.3	24.9	
LOS	A			A	C	
Approach Delay	2.5			2.3	24.9	
Approach LOS	A			A	C	
Queue Length 50th (m)	11.9			6.2	5.1	
Queue Length 95th (m)	24.4			13.8	16.3	
Internal Link Dist (m)	213.9			393.0	107.8	
Turn Bay Length (m)						
Base Capacity (vph)	1539			1297	578	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.29			0.18	0.12	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 81.9

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.37

Intersection Signal Delay: 4.5

Intersection LOS: A

Intersection Capacity Utilization 52.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Kingsview Dr & Columbia Way



















Jan 20, 2021

HCM Unsignalized Intersection Capacity Analysis
8: Mt Hope Rd & Columbia Way

2031 ROPA 30 PM

12-07-2021











												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	182	37	38	169	13	30	5	7	22	5	46
Future Volume (Veh/h)	71	182	37	38	169	13	30	5	7	22	5	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	71	182	37	38	169	13	30	5	7	22	5	46
Pedestrians								13				
Lane Width (m)								3.7				
Walking Speed (m/s)								1.2				
Percent Blockage								1				
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	182			232			656	614	214	604	626	176
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	182			232			656	614	214	604	626	176
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			97			91	99	99	94	99	95
cM capacity (veh/h)	1405			1333			330	374	822	371	368	873
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	290	220	42	73								
Volume Left	71	38	30	22								
Volume Right	37	13	7	46								
cSH	1405	1333	373	581								
Volume to Capacity	0.05	0.03	0.11	0.13								
Queue Length 95th (m)	1.3	0.7	3.0	3.4								
Control Delay (s)	2.2	1.5	15.9	12.1								
Lane LOS	A	A	C	B								
Approach Delay (s)	2.2	1.5	15.9	12.1								
Approach LOS			C	B								
Intersection Summary												
Average Delay			4.1									
Intersection Capacity Utilization			35.9%		ICU Level of Service				A			
Analysis Period (min)			15									

Jan 20, 2022

Lanes, Volumes, Timings
10: Highway 50 & Access A

2031 ROPA 30 PM

12-07-2021







						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	38	109	777	45	185	445
Future Volume (vph)	38	109	777	45	185	445
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		0.0	25.0	
Storage Lanes	1	0		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.900		0.993			
Flt Protected	0.987				0.950	
Satd. Flow (prot)	1673	0	1870	0	1789	1883
Flt Permitted	0.987				0.295	
Satd. Flow (perm)	1673	0	1870	0	556	1883
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	109		8			
Link Speed (k/h)	50		50			60
Link Distance (m)	483.2		616.6			506.2
Travel Time (s)	34.8		44.4			30.4
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	38	109	777	45	185	445
Shared Lane Traffic (%)						
Lane Group Flow (vph)	147	0	822	0	185	445
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.7		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (m)	2.0		10.0		2.0	10.0
Trailing Detector (m)	0.0		0.0		0.0	0.0
Detector 1 Position(m)	0.0		0.0		0.0	0.0
Detector 1 Size(m)	2.0		0.6		2.0	0.6
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0		0.0	0.0
Detector 1 Queue (s)	0.0		0.0		0.0	0.0
Detector 1 Delay (s)	0.0		0.0		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	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	

Jan 20, 2022

Lanes, Volumes, Timings
10: Highway 50 & Access A

2031 ROPA 30 PM

12-07-2021

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	5.0		5.0		5.0	5.0
Minimum Split (s)	22.5		22.5		22.5	22.5
Total Split (s)	22.5		47.5		47.5	47.5
Total Split (%)	32.1%		67.9%		67.9%	67.9%
Maximum Green (s)	18.0		43.0		43.0	43.0
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.5		4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		Max	Max
Walk Time (s)	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	7.6		50.8		50.8	50.8
Actuated g/C Ratio	0.12		0.79		0.79	0.79
v/c Ratio	0.50		0.56		0.42	0.30
Control Delay	15.2		5.8		7.5	3.6
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	15.2		5.8		7.5	3.6
LOS	B		A		A	A
Approach Delay	15.2		5.8			4.8
Approach LOS	B		A			A
Queue Length 50th (m)	4.4		32.0		6.1	12.9
Queue Length 95th (m)	18.0		76.8		23.7	30.5
Internal Link Dist (m)	459.2		592.6			482.2
Turn Bay Length (m)					25.0	
Base Capacity (vph)	547		1475		438	1484
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	0.27		0.56		0.42	0.30
Intersection Summary						
Area Type:	Other					
Cycle Length: 70						
Actuated Cycle Length: 64.4						
Natural Cycle: 70						
Control Type: Semi Act-Uncoord						
Maximum v/c Ratio: 0.56						
Intersection Signal Delay: 6.3				Intersection LOS: A		
Intersection Capacity Utilization 73.9%				ICU Level of Service D		
Analysis Period (min) 15						

Lanes, Volumes, Timings
10: Highway 50 & Access A

2031 ROPA 30 PM
12-07-2021

Splits and Phases: 10: Highway 50 & Access A



Lanes, Volumes, Timings
6: Kingsview Dr & Columbia Way

2031 FT PM
12-06-2021

Splits and Phases: 6: Kingsview Dr & Columbia Way



APPENDIX F

ITE Excerpts

Land Use: 210

Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates based on a small sample of sites are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 251), and higher than those for senior adult housing -- single-family (Land Use 251). Further analysis of this housing type will be conducted in a future edition of *Trip Generation Manual*.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

For 30 of the study sites, data on the number of residents and number of household vehicles are available. The overall averages for the 30 sites are 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Minnesota, Montana, New Jersey, North Carolina, Ohio, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, Virginia, and West Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077, 1078, 1079

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 192

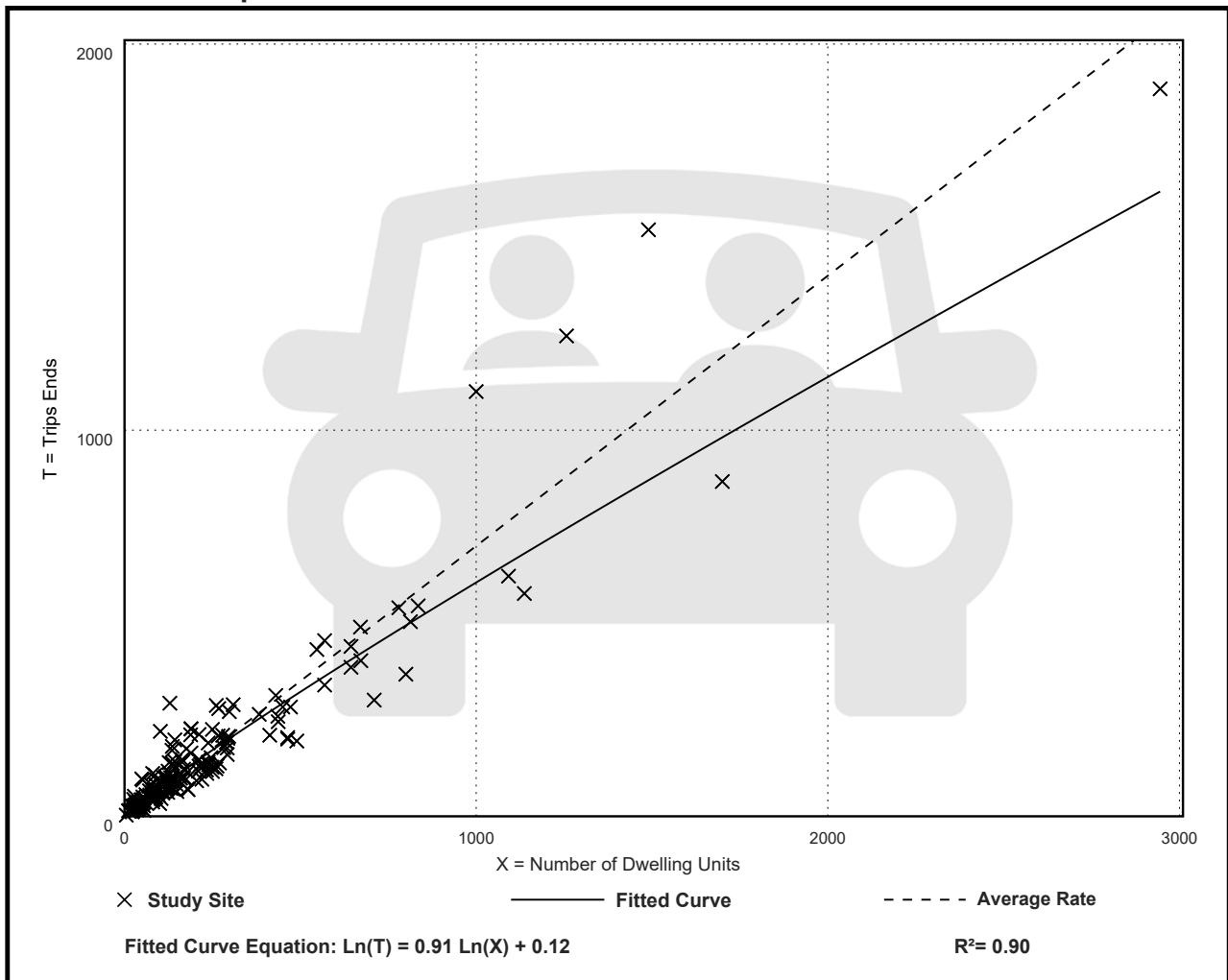
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 208

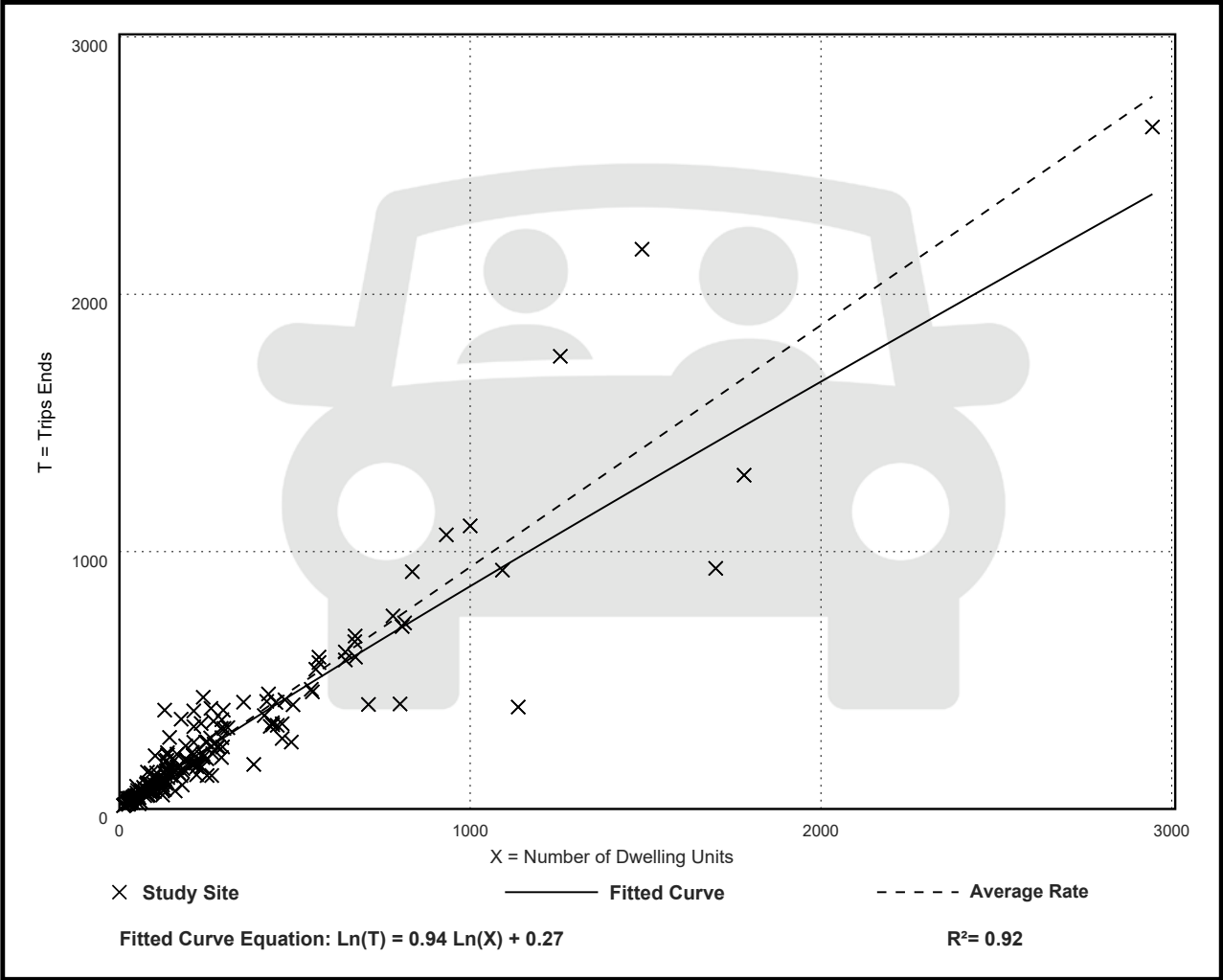
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



Land Use: 220

Multifamily Housing (Low-Rise)

Description

Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.

- A walkup apartment typically is two or three floors in height with dwelling units that are accessed by a single or multiple entrances with stairways and hallways.
- A mansion apartment is a single structure that contains several apartments within what appears to be a single-family dwelling unit.
- A fourplex is a single two-story structure with two matching dwelling units on the ground and second floors. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.
- A stacked townhouse is designed to match the external appearance of a townhouse. But, unlike a townhouse dwelling unit that only shares walls with an adjoining unit, the stacked townhouse units share both floors and walls. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), affordable housing (Land Use 223), and off-campus student apartment (low-rise) (Land Use 225) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the three sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.72 residents per occupied dwelling unit.

For the two sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96.2 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip

generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

For the three sites for which data were provided for both occupied dwelling units and residents, there was an average of 2.72 residents per occupied dwelling unit.

It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in British Columbia (CAN), California, Delaware, Florida, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, and Washington.

Source Numbers

188, 204, 237, 300, 305, 306, 320, 321, 357, 390, 412, 525, 530, 579, 583, 638, 864, 866, 896, 901, 903, 904, 936, 939, 944, 946, 947, 948, 963, 964, 966, 967, 1012, 1013, 1014, 1036, 1047, 1056, 1071, 1076

Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 49

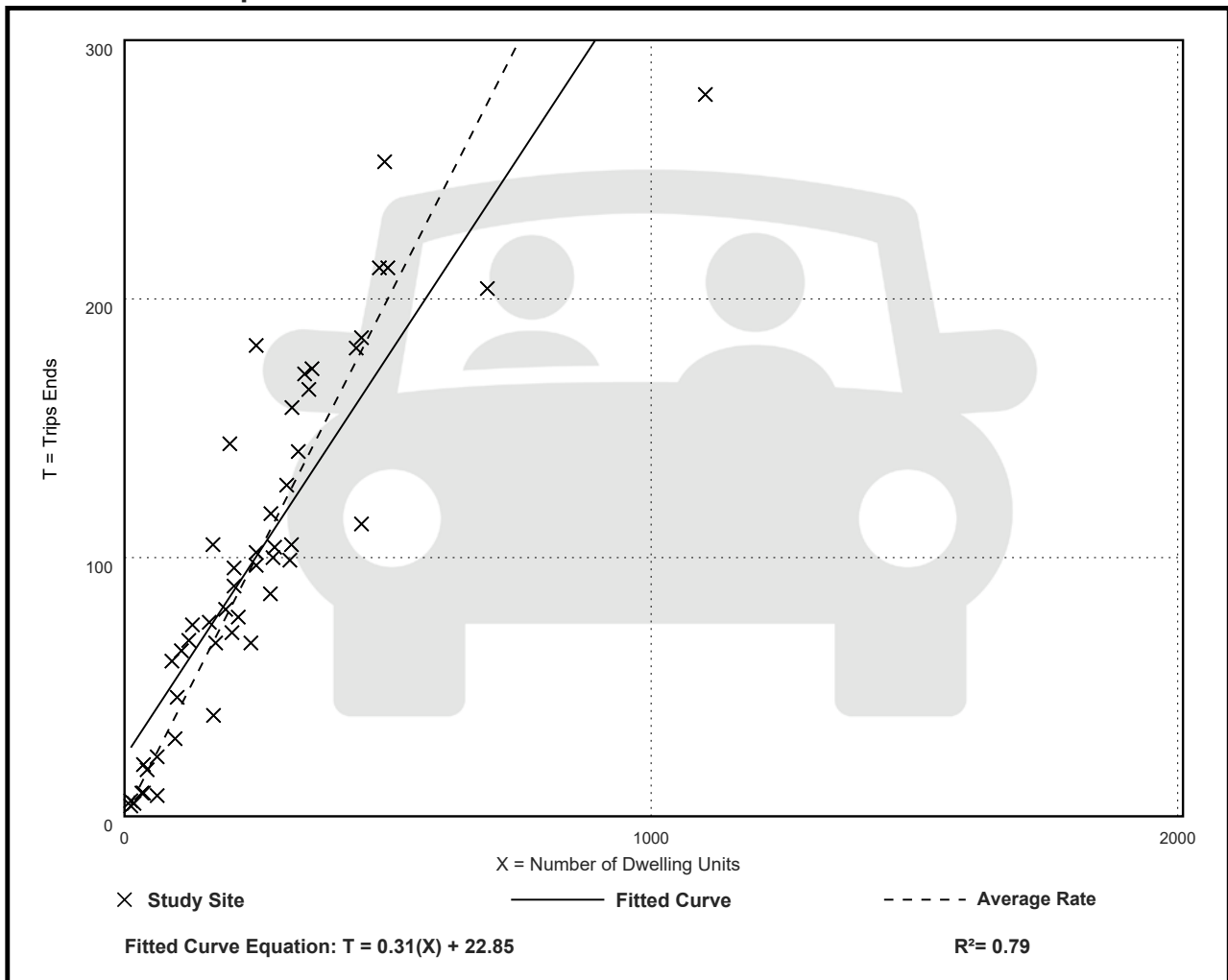
Avg. Num. of Dwelling Units: 249

Directional Distribution: 24% entering, 76% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.40	0.13 - 0.73	0.12

Data Plot and Equation



Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 59

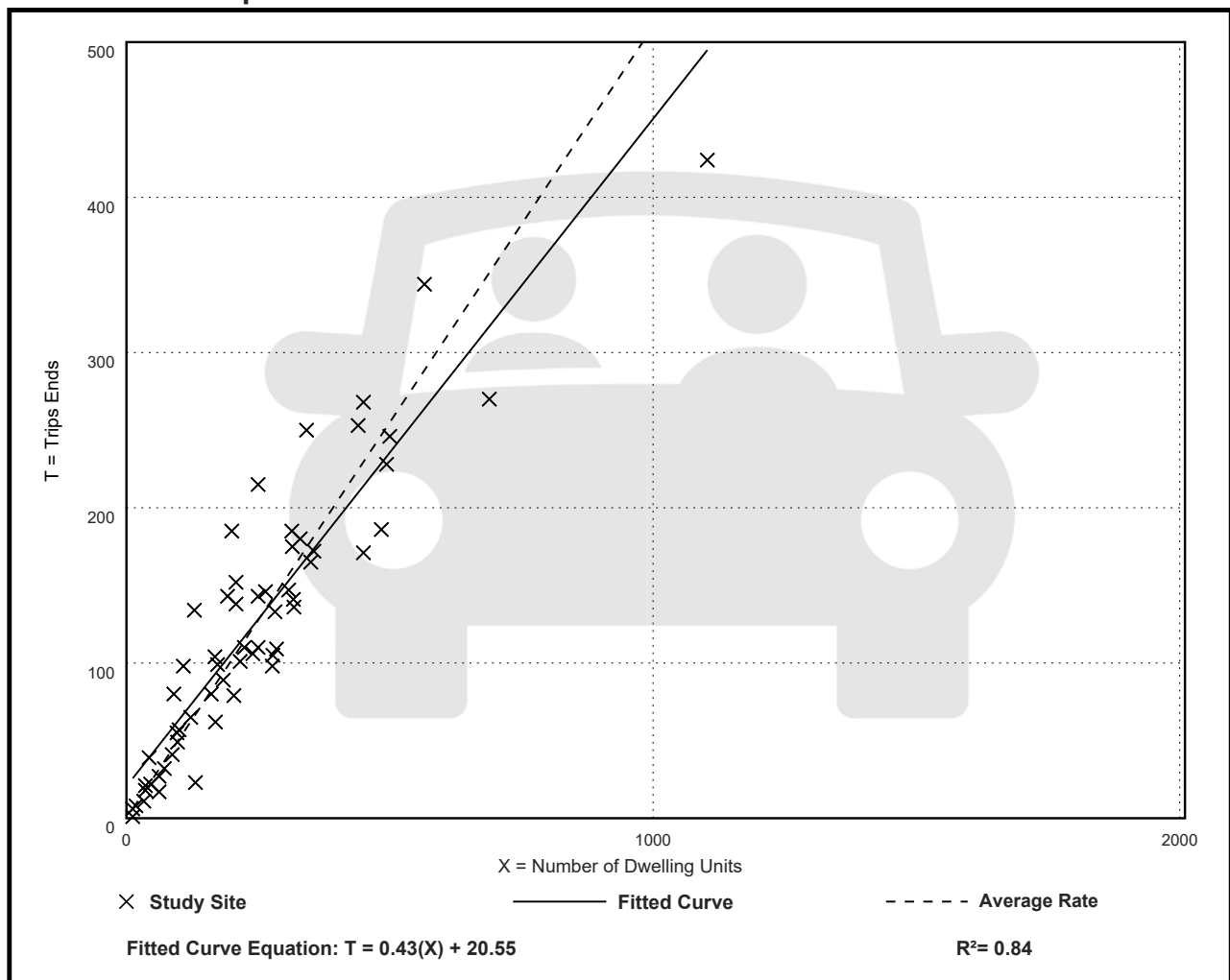
Avg. Num. of Dwelling Units: 241

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.51	0.08 - 1.04	0.15

Data Plot and Equation



Land Use: 221

Multifamily Housing (Mid-Rise)

Description

Mid-rise multifamily housing includes apartments and condominiums located in a building that has between four and 10 floors of living space. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways.

Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), off-campus student apartment (mid-rise) (Land Use 226), and mid-rise residential with ground-floor commercial (Land Use 231) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the six sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.5 residents per occupied dwelling unit.

For the five sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, District of Columbia, Florida, Georgia, Illinois, Maryland, Massachusetts, Minnesota, Montana, New Jersey, New York, Ontario (CAN), Oregon, Utah, and Virginia.

Source Numbers

168, 188, 204, 305, 306, 321, 818, 857, 862, 866, 901, 904, 910, 949, 951, 959, 963, 964, 966, 967, 969, 970, 1004, 1014, 1022, 1023, 1025, 1031, 1032, 1035, 1047, 1056, 1057, 1058, 1071, 1076

Multifamily Housing (Mid-Rise) Not Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 30

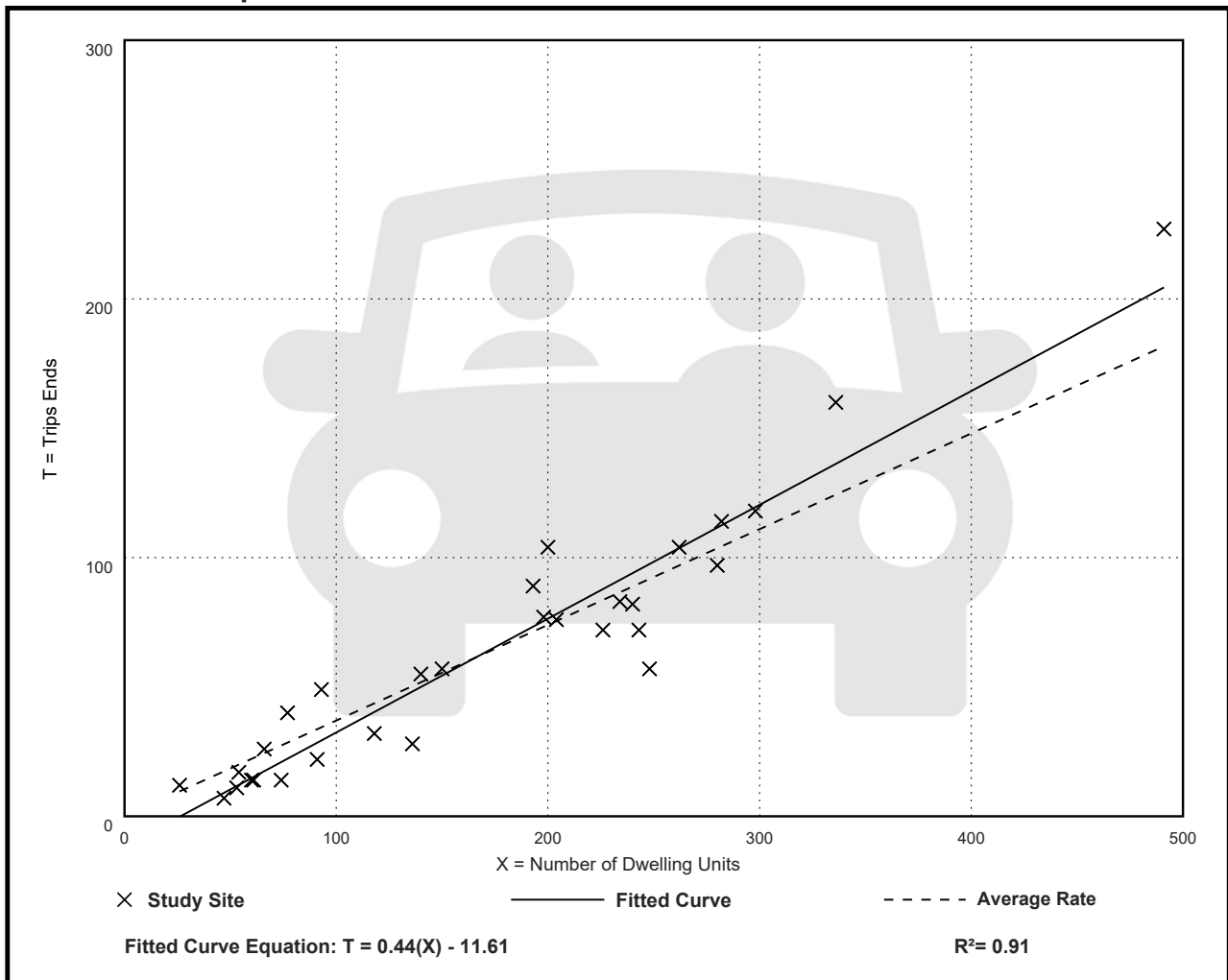
Avg. Num. of Dwelling Units: 173

Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.37	0.15 - 0.53	0.09

Data Plot and Equation



Multifamily Housing (Mid-Rise) Not Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 31

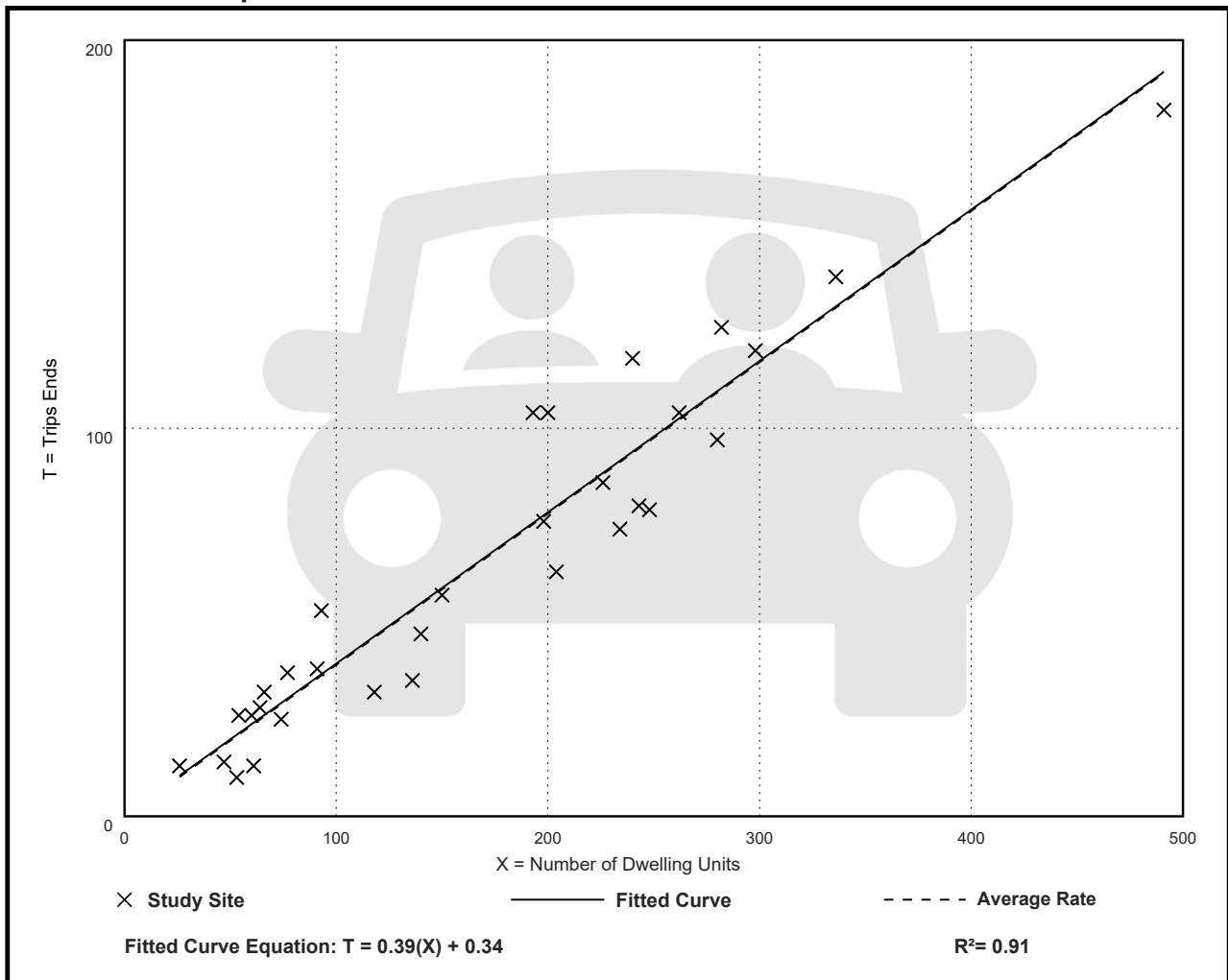
Avg. Num. of Dwelling Units: 169

Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

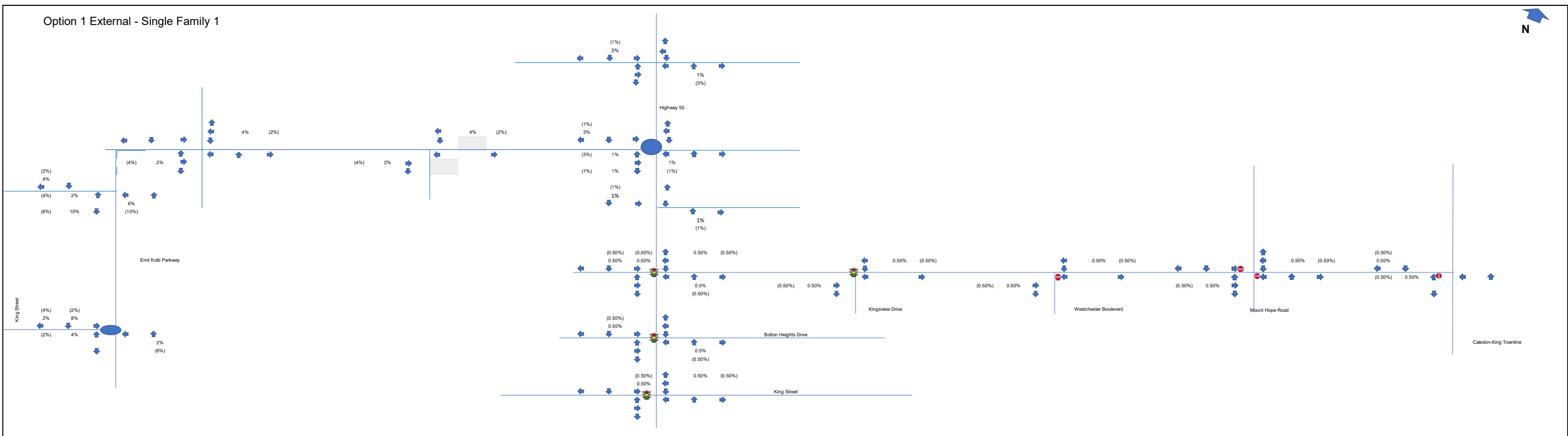
Average Rate	Range of Rates	Standard Deviation
0.39	0.19 - 0.57	0.08

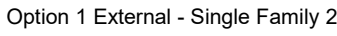
Data Plot and Equation

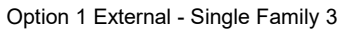


APPENDIX G

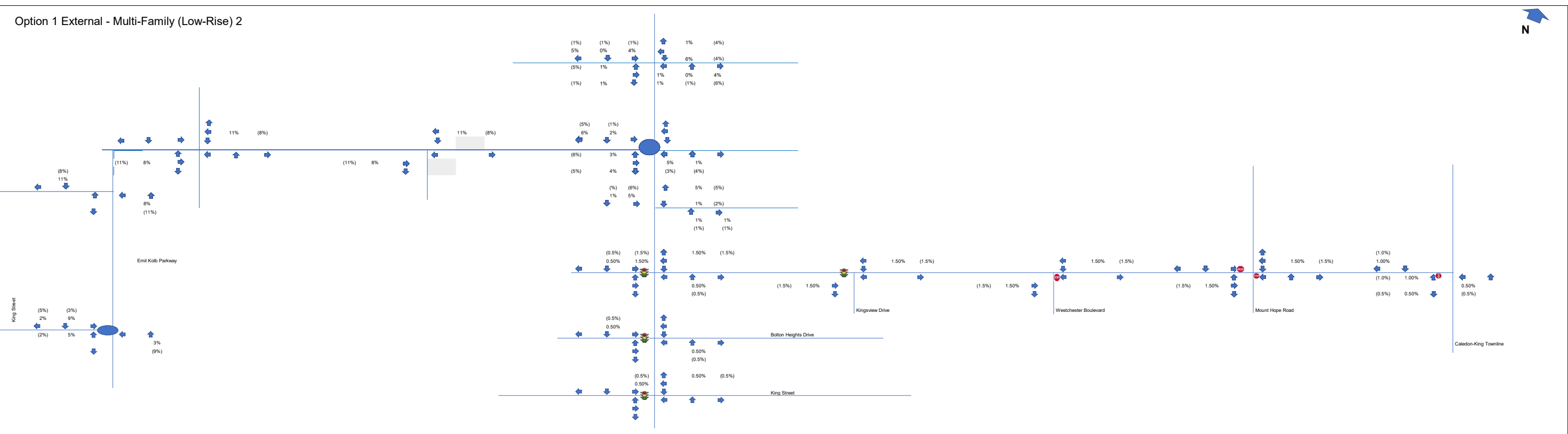
Trip Distribution and Assignment Analysis

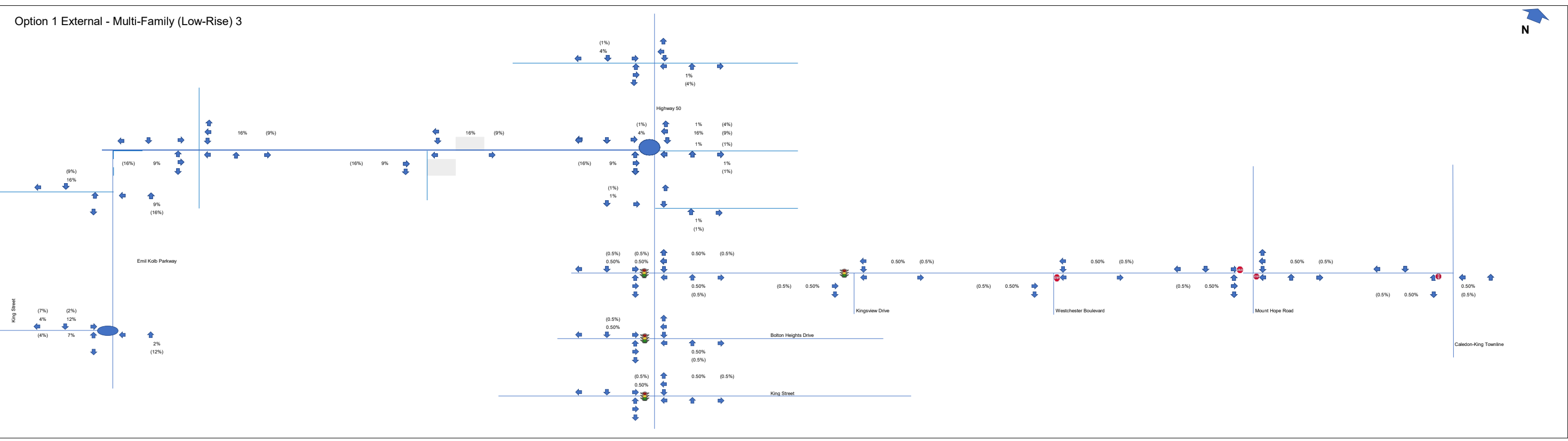


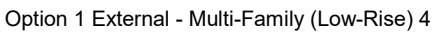


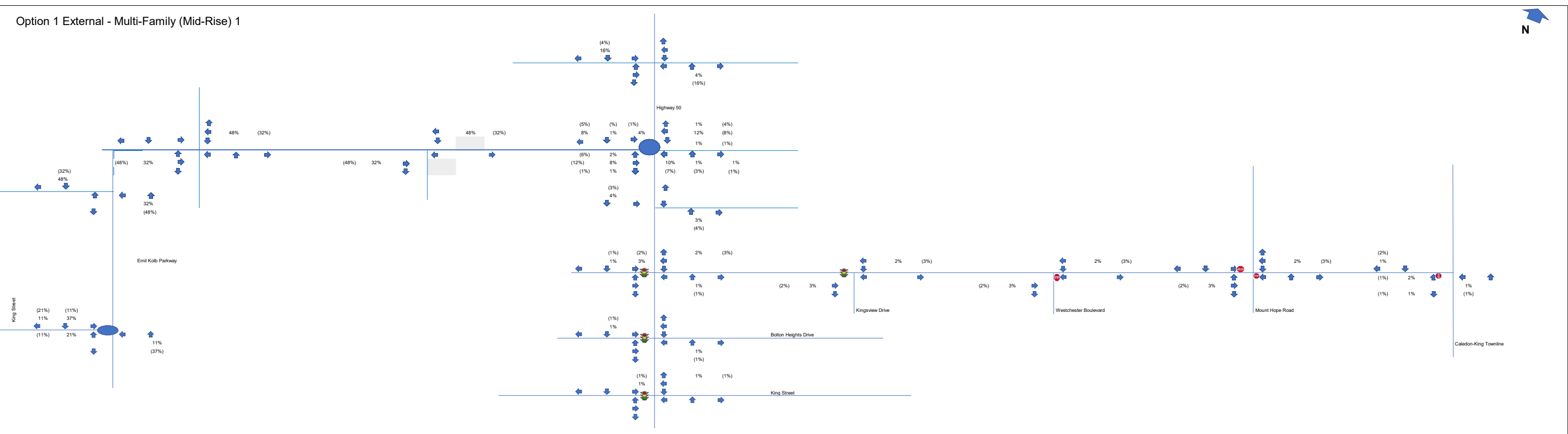


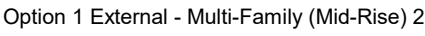


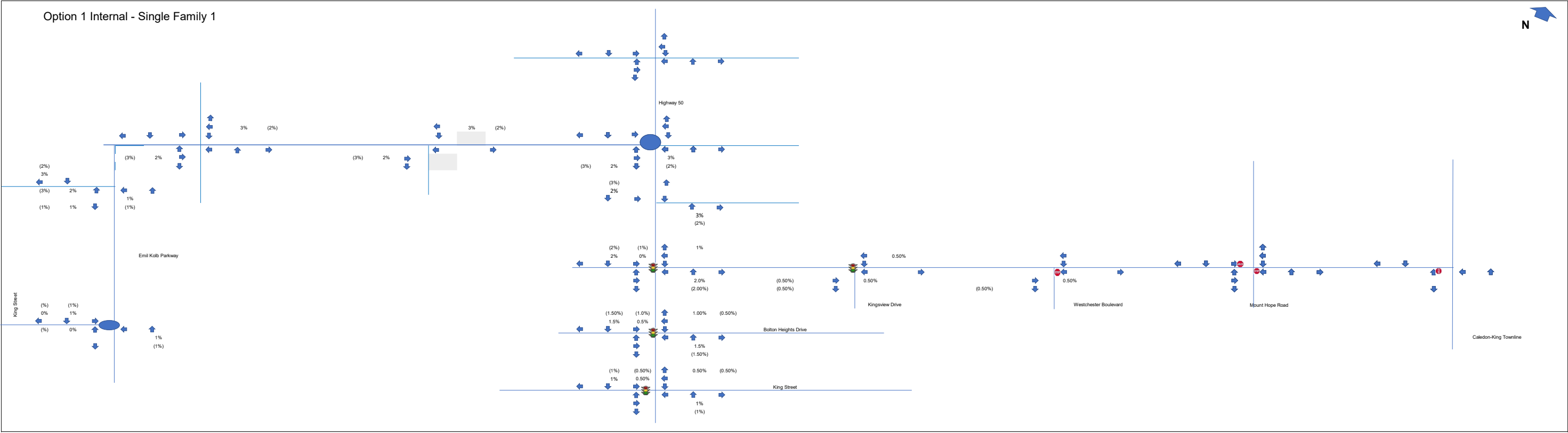


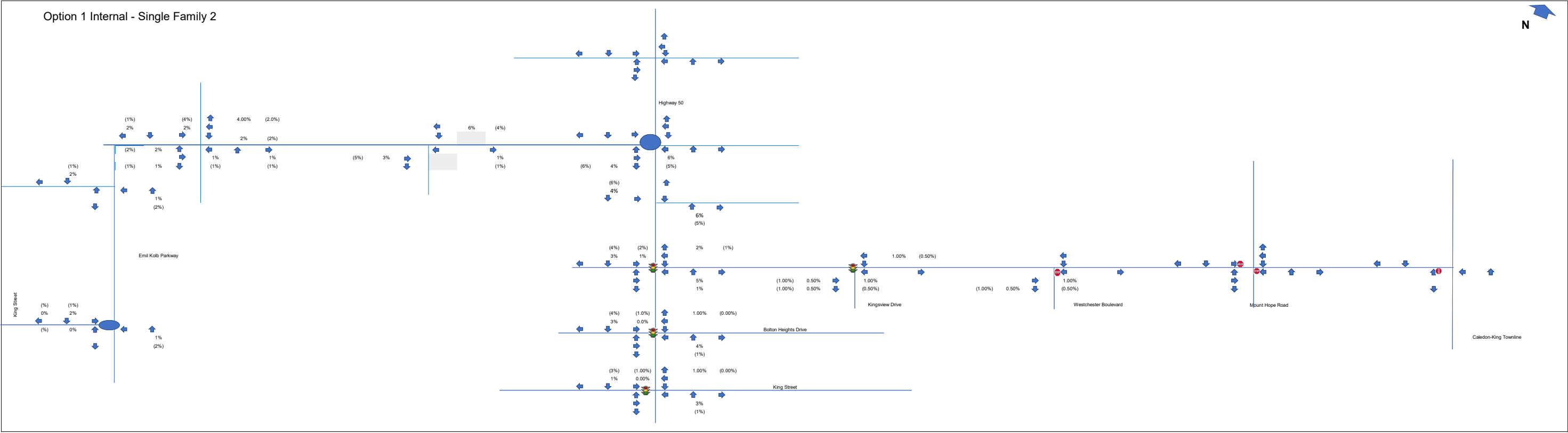


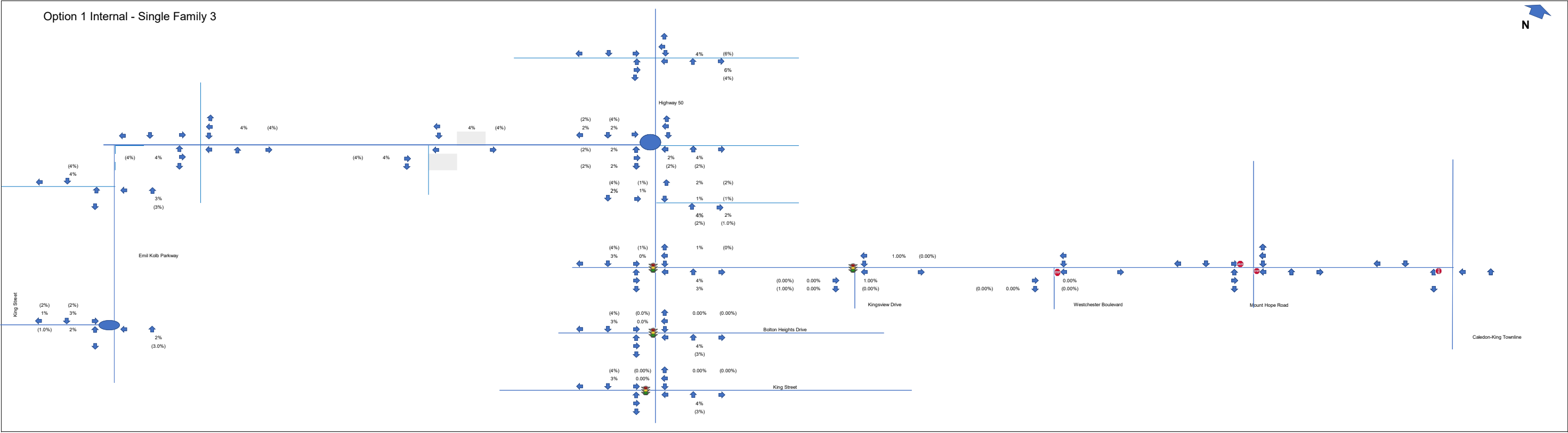


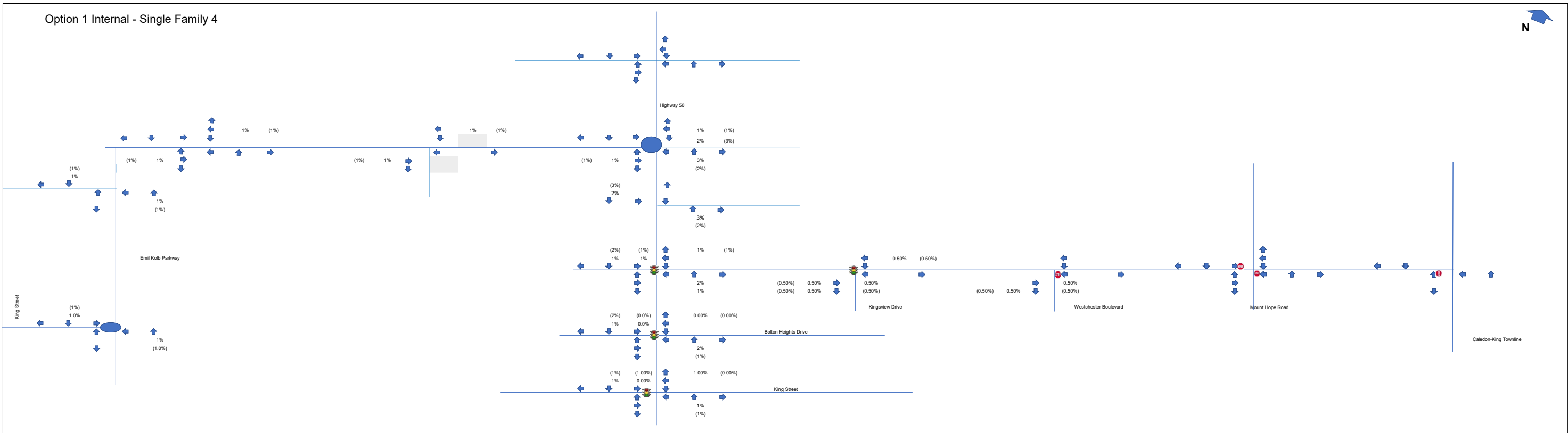


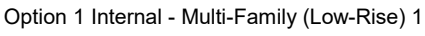


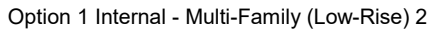


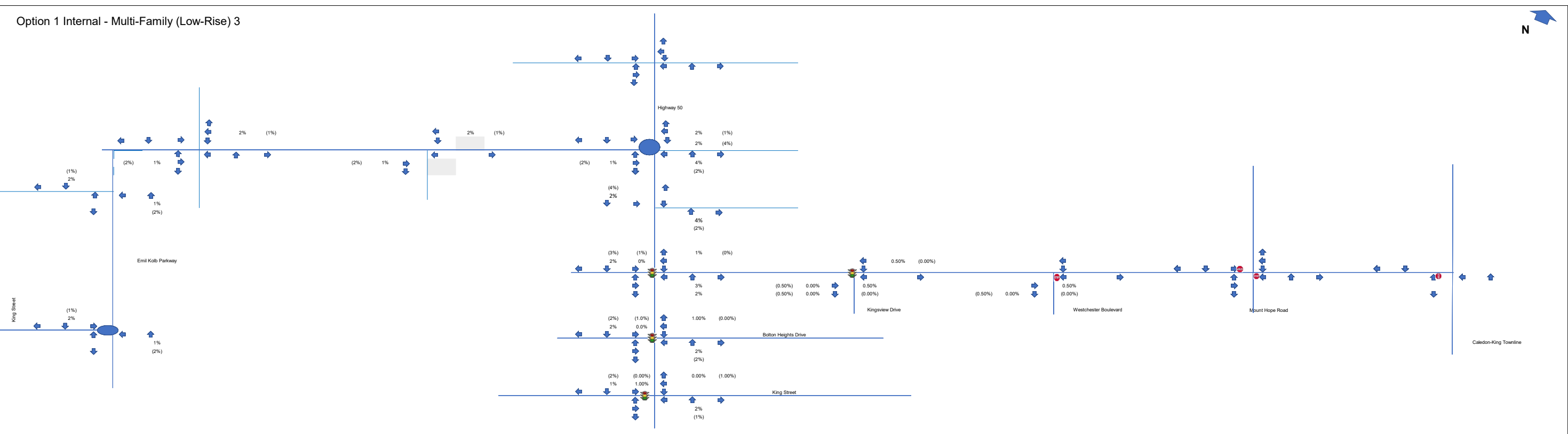


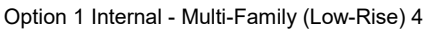






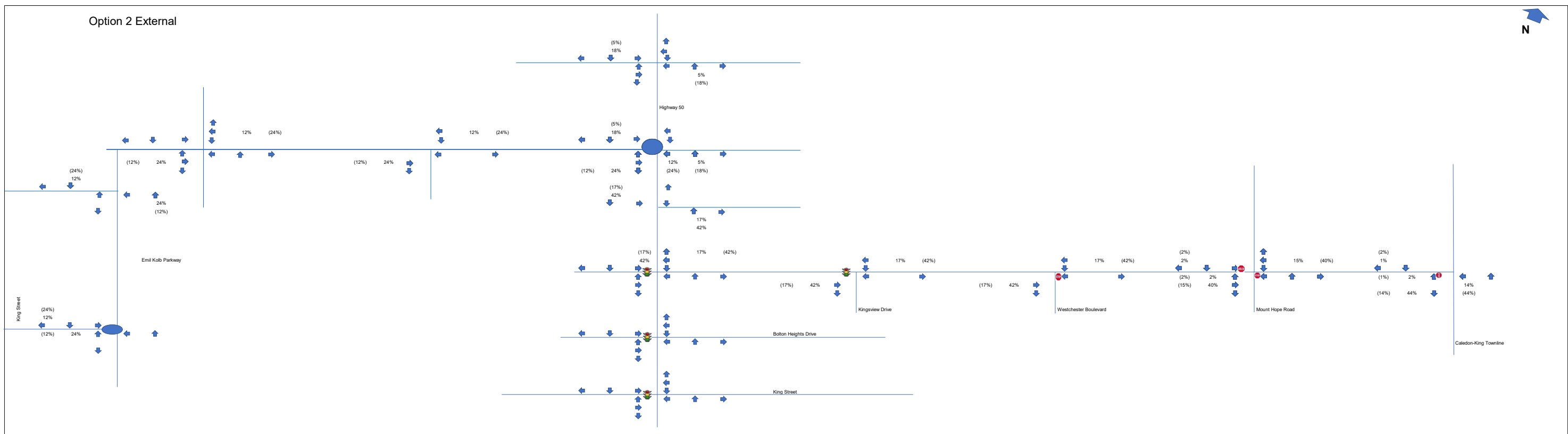






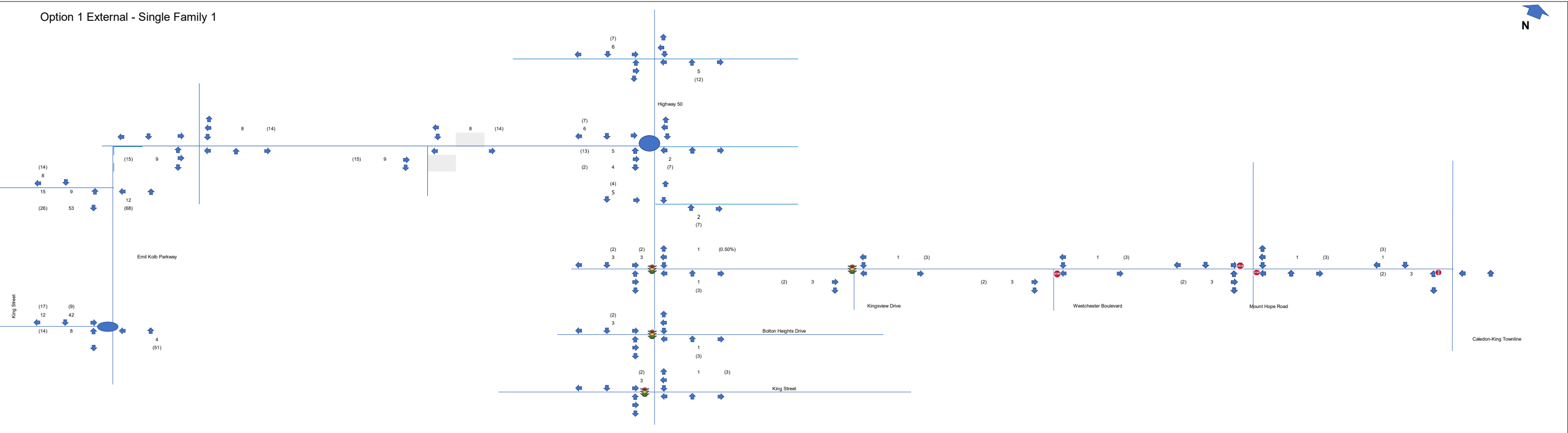




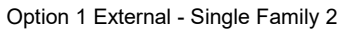




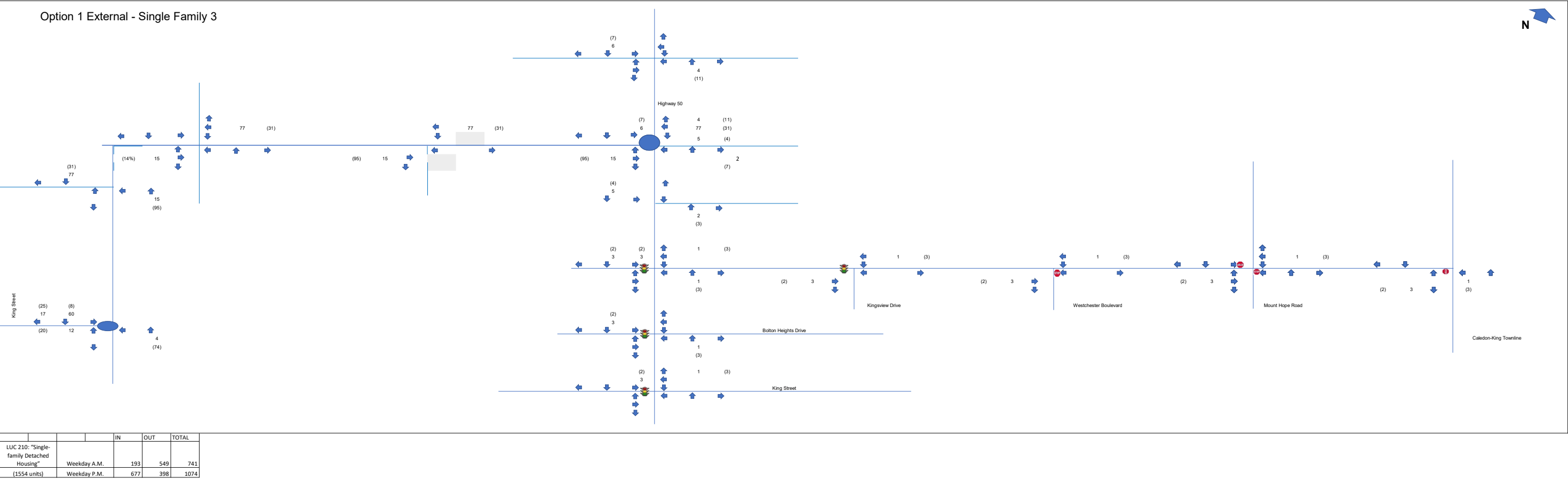
Option 1 External - Single Family 1

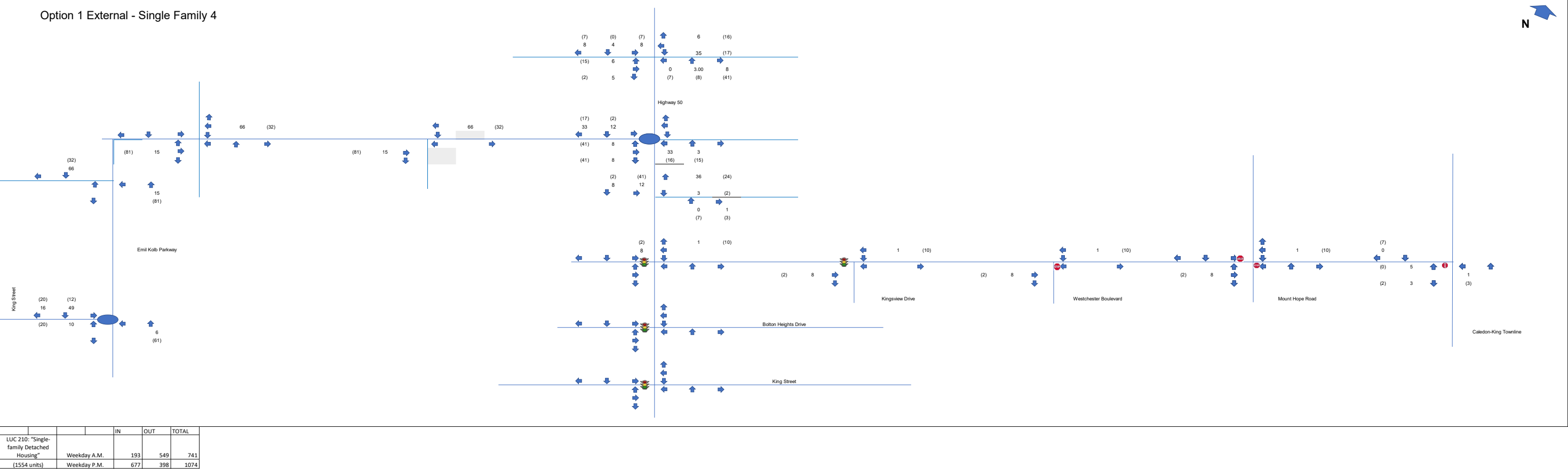


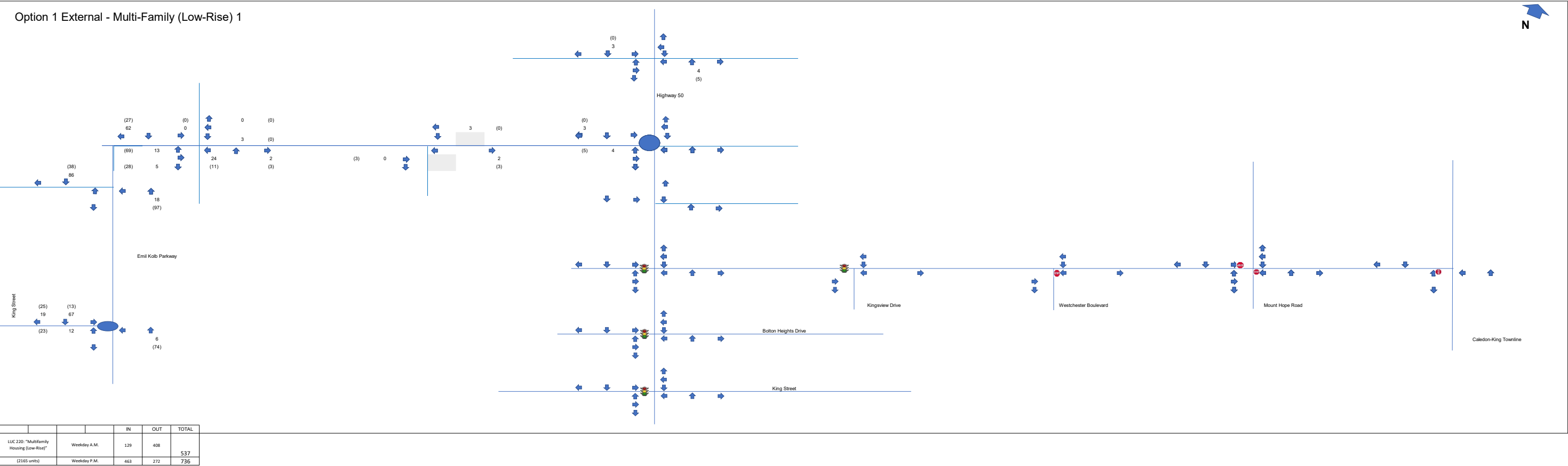
		IN	OUT	TOTAL
LUC 210: "Single-family Detached Housing"	Weekday A.M.	193	549	741
(1554 units)	Weekday P.M.	677	398	1074



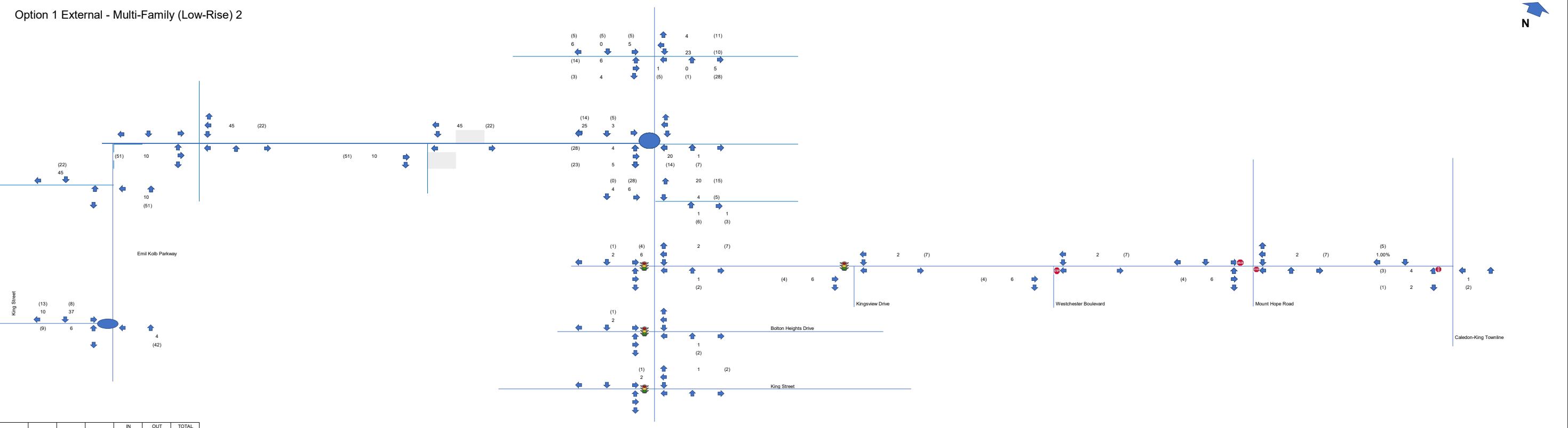
		IN	OUT	TOTAL
LUC 210: "Single-family Detached Housing"	Weekday A.M.	193	549	741
(1554 units)	Weekday P.M.	677	398	1074



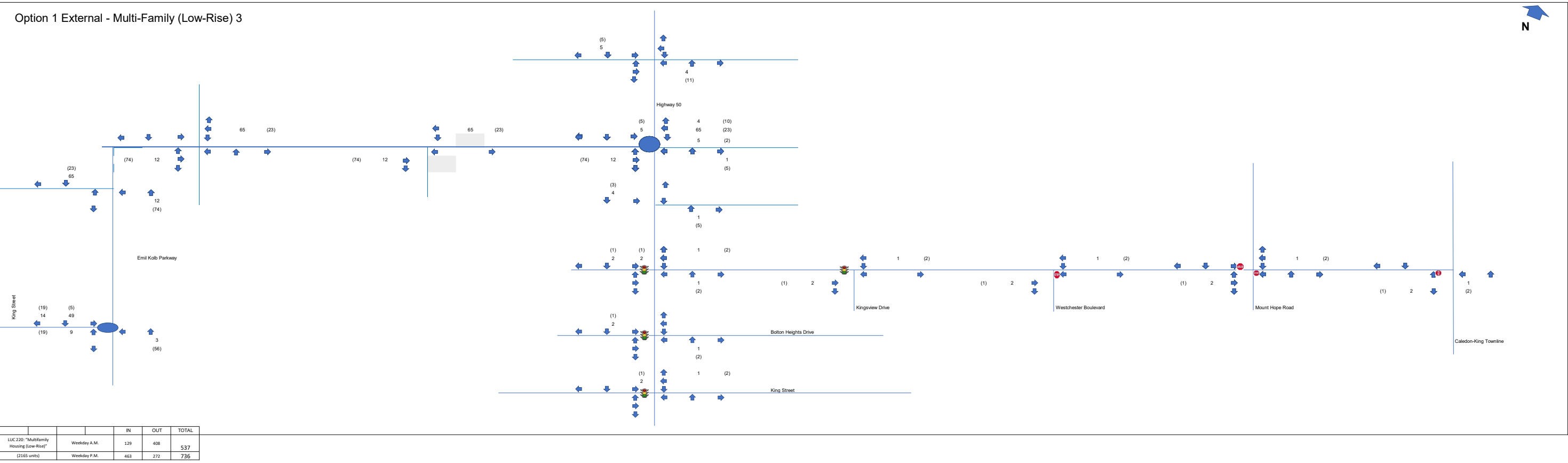


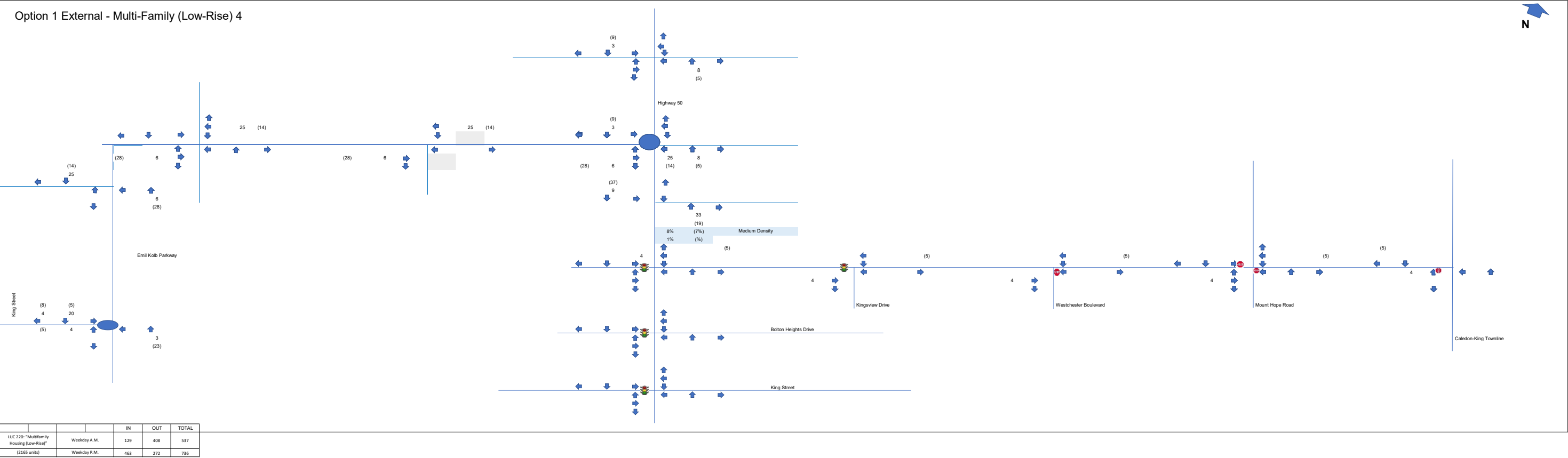


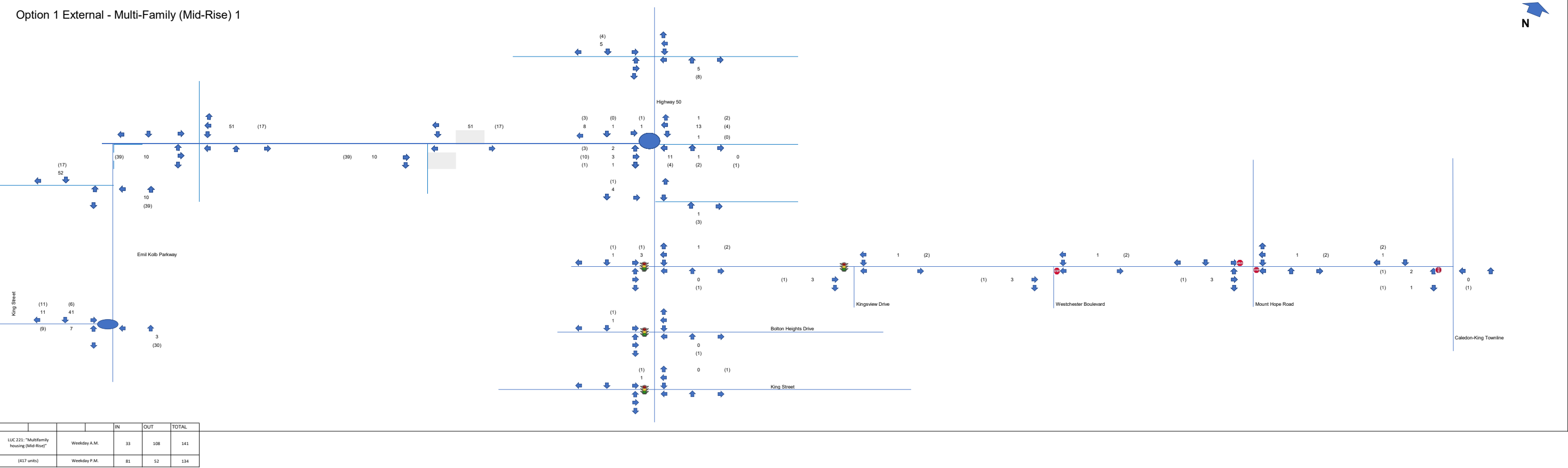
Option 1 External - Multi-Family (Low-Rise) 2

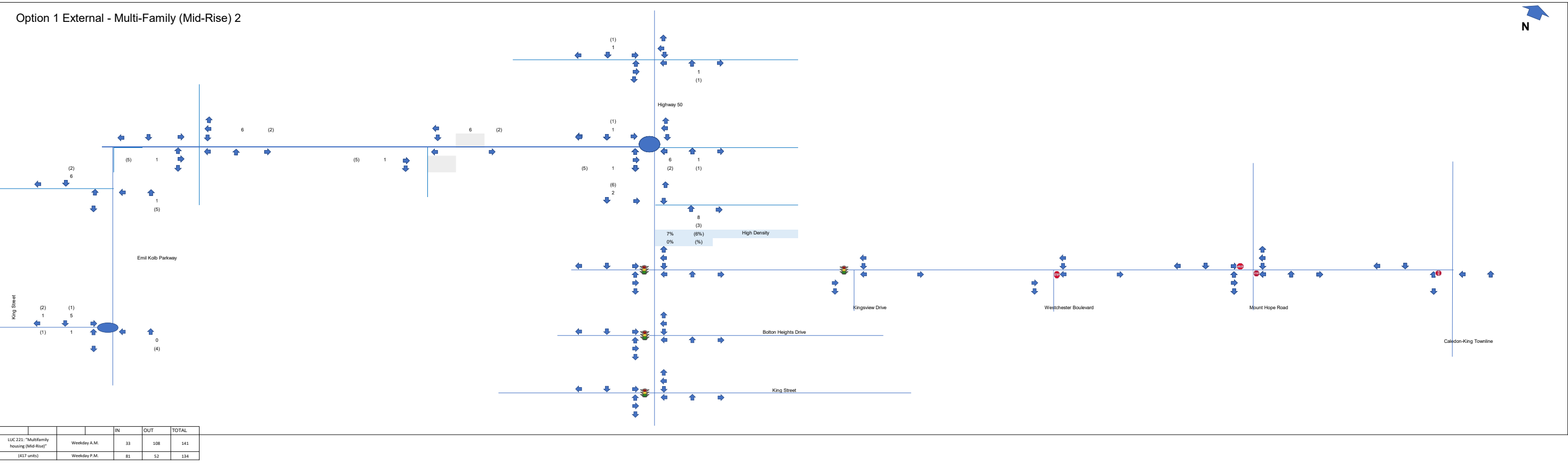


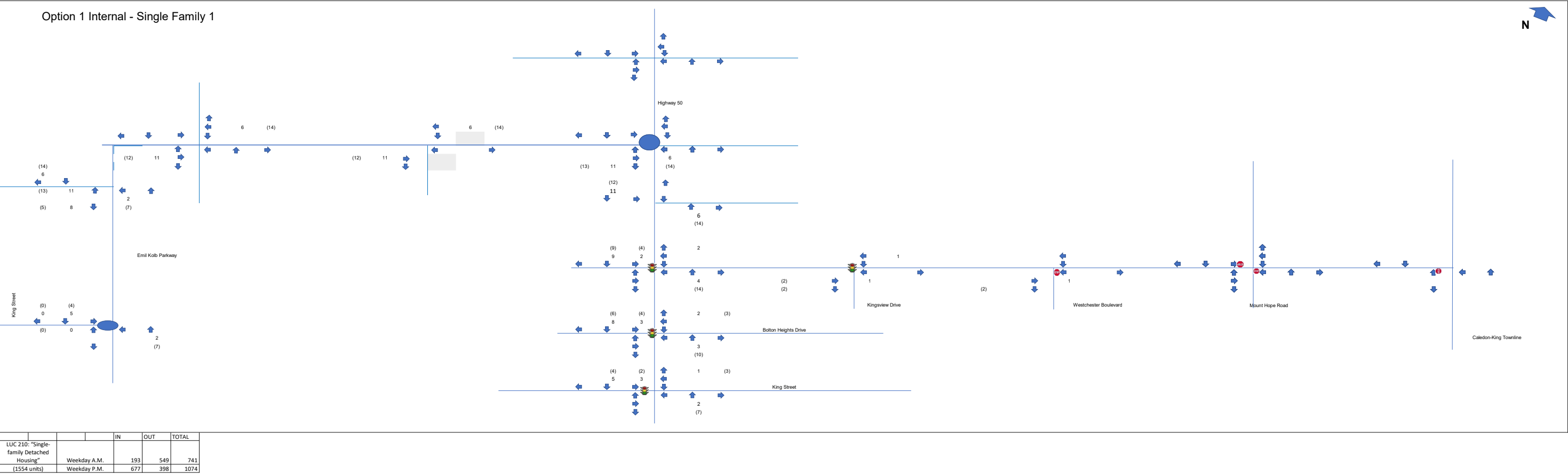
			IN	OUT	TOTAL
LUC 220: "Multifamily Housing (Low-Rise)"	Weekday A.M.		129	408	537
(2165 units)	Weekday P.M.		463	272	736

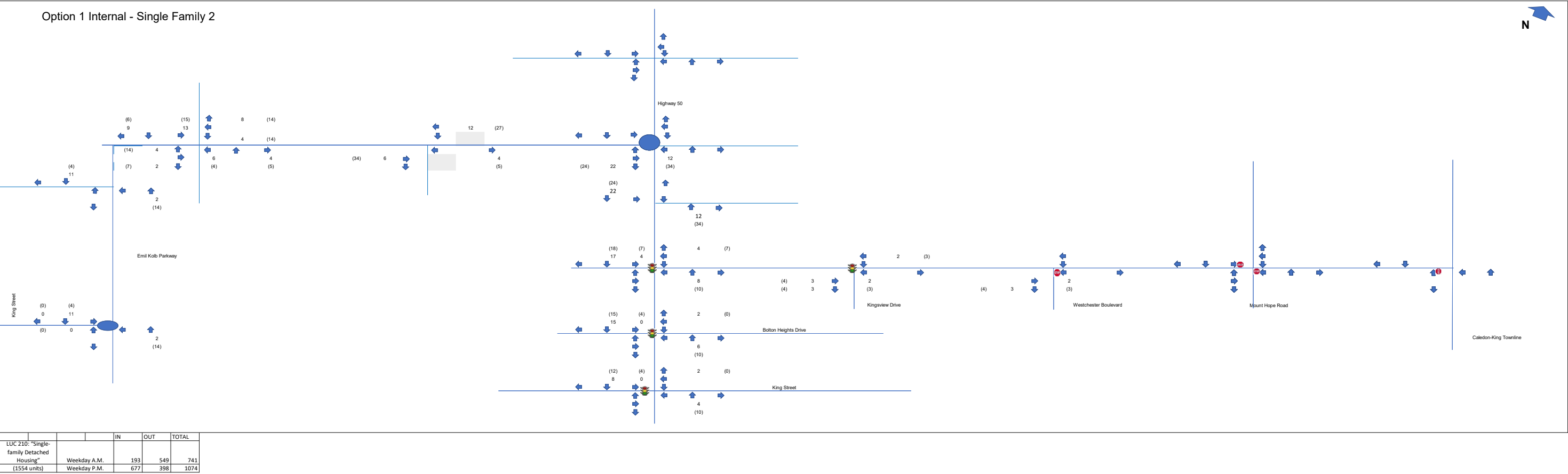


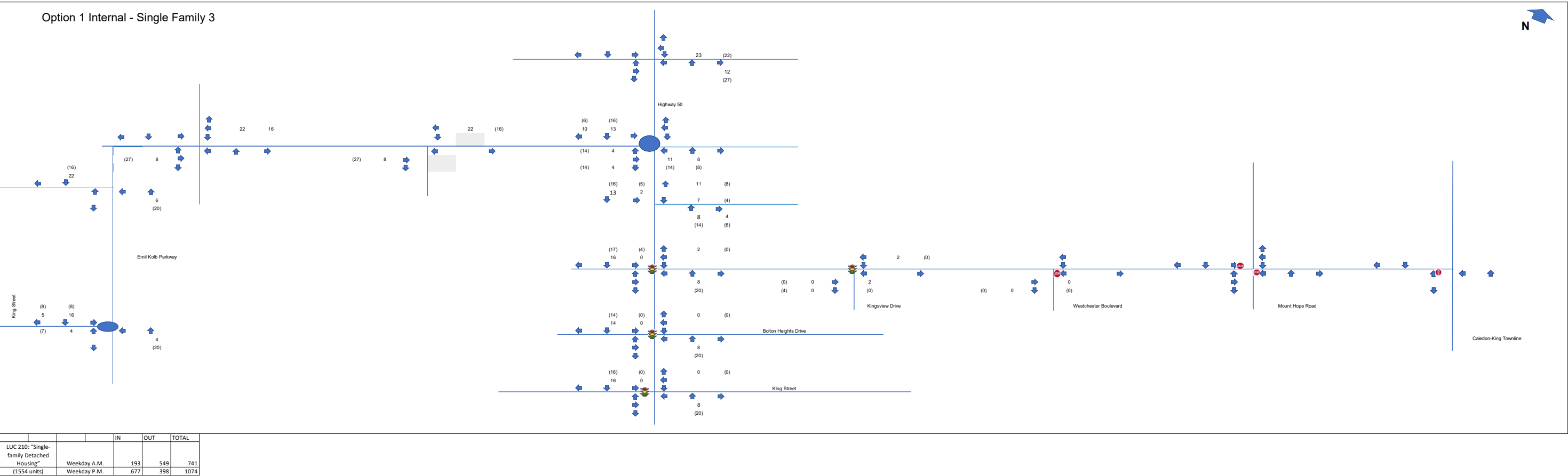


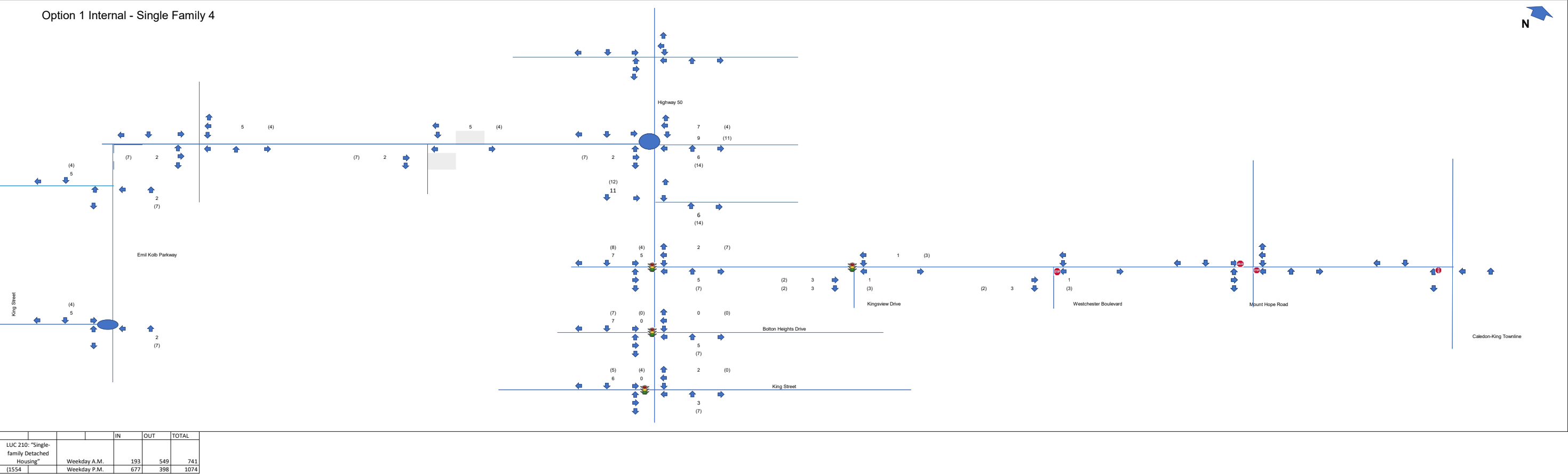


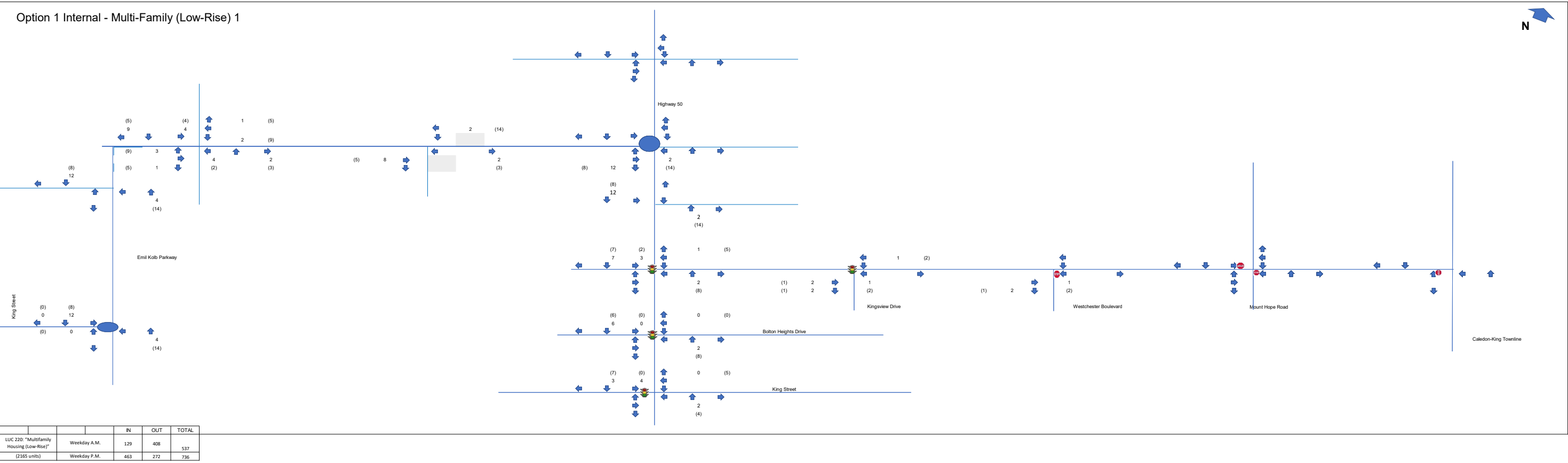


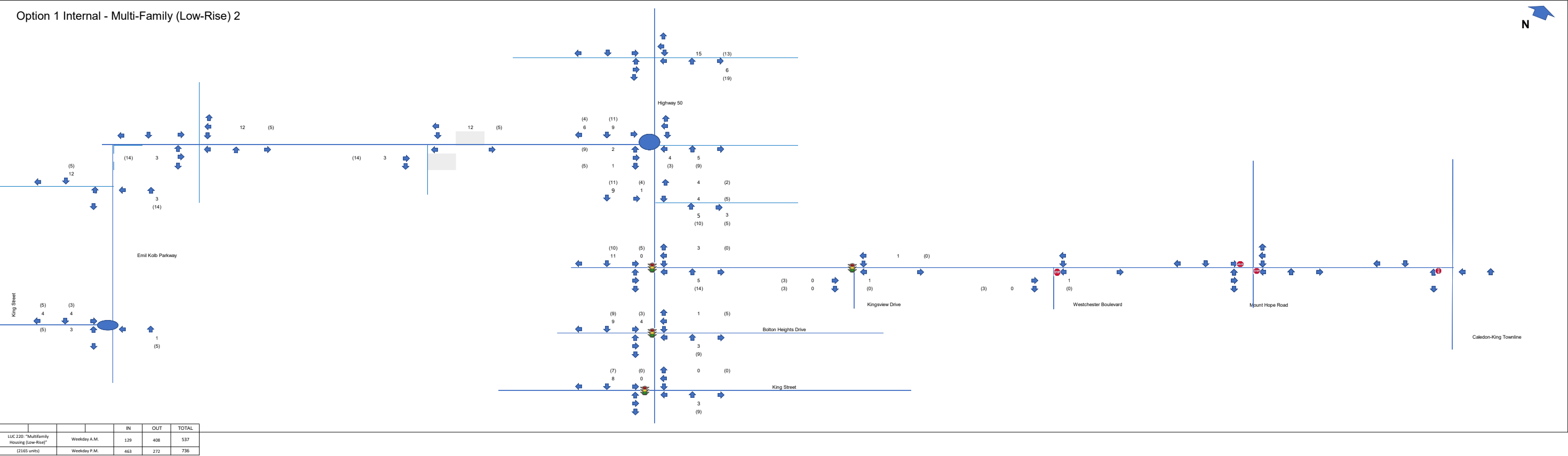


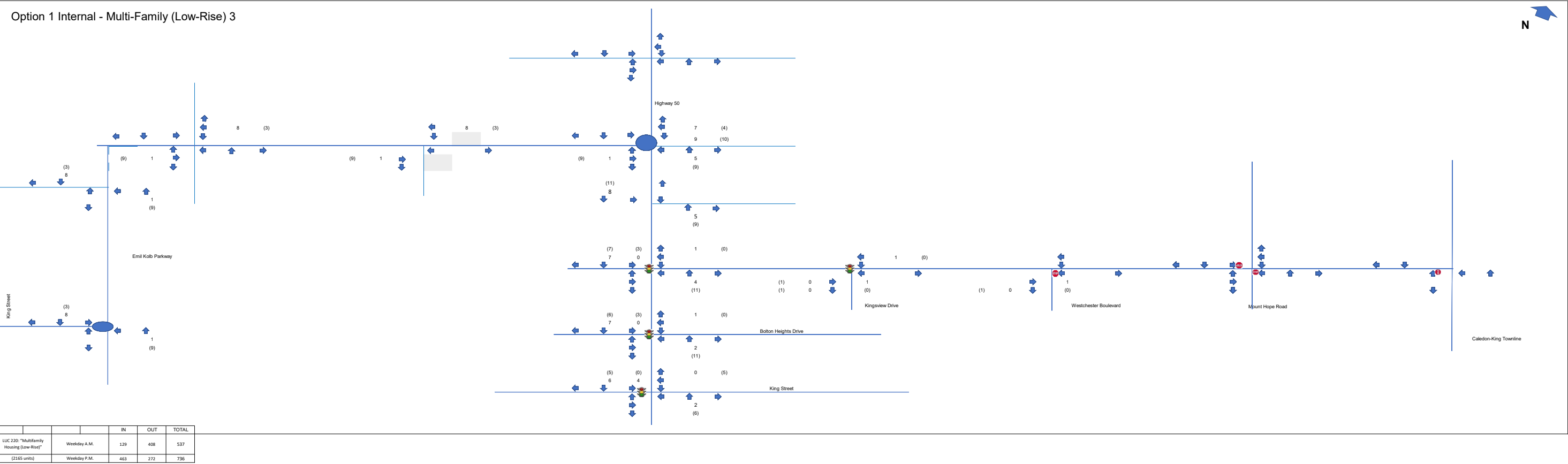


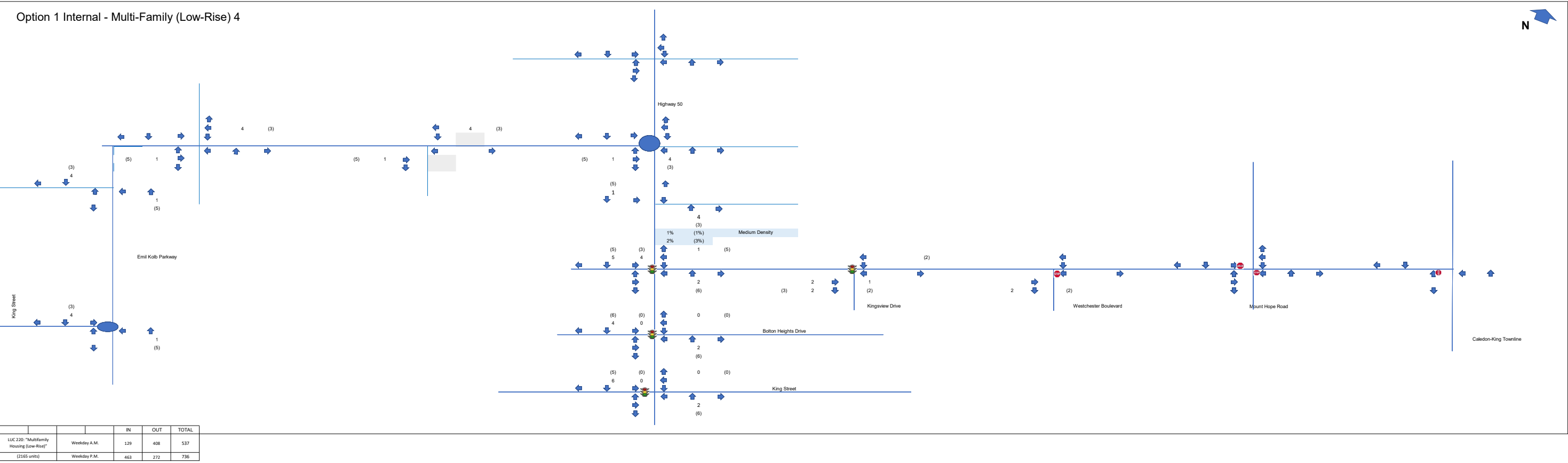


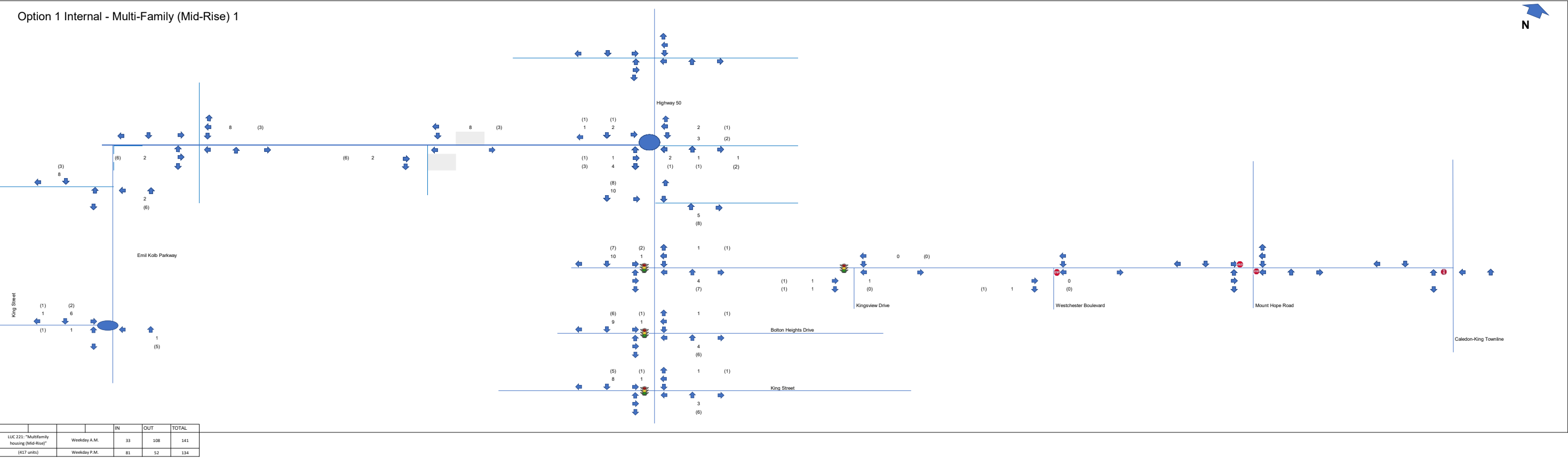


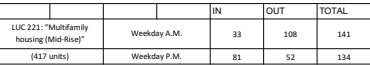


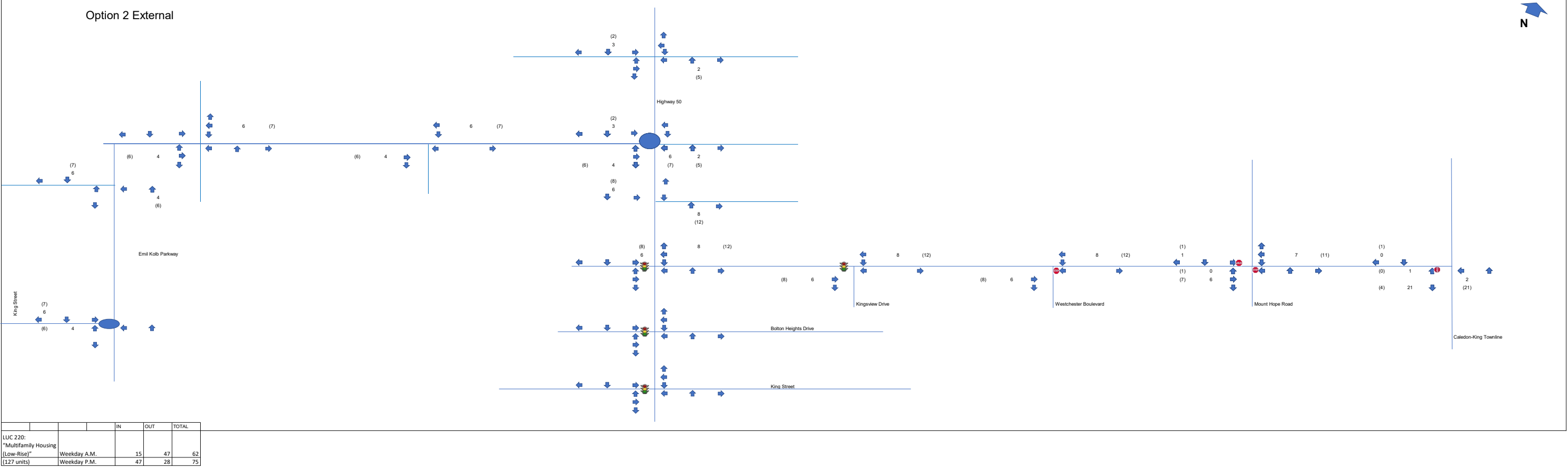


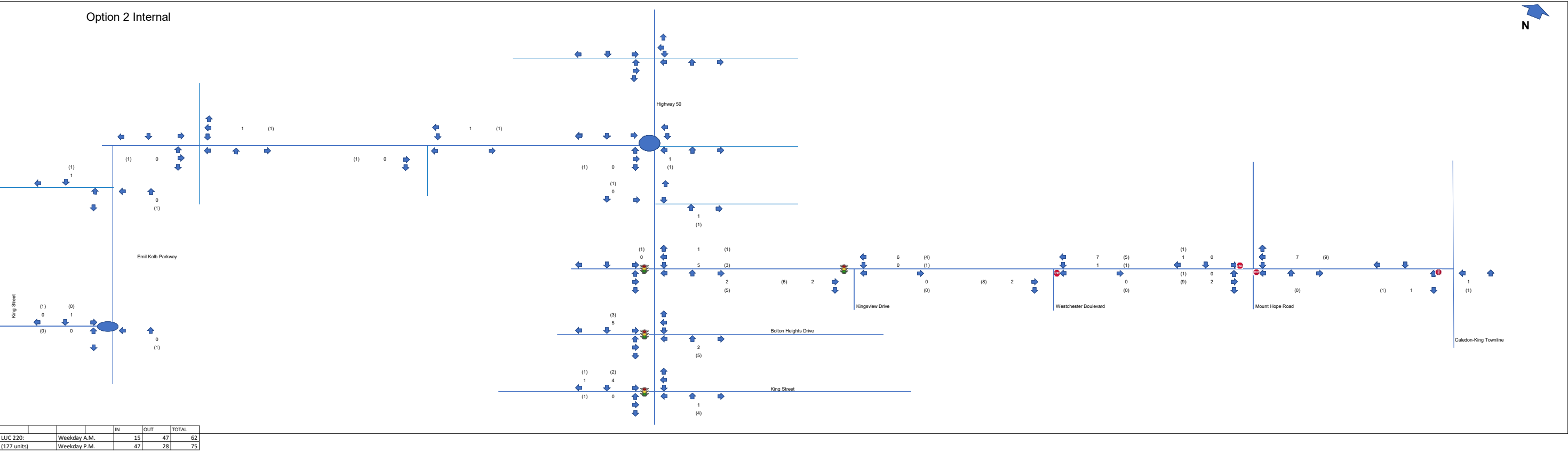












APPENDIX H

Road Widening Analysis

2031 Future Background Conditions

Roadway	Segment	Classification	V/C Threshold	Link Capacity Threshold per Lane	Direction	Numbe of Lanes per Direction	Link Capacity	Forcasted Peak Hour Volume	v/c Ratio	Additional Considerations
Highway 50	Castlederg Side Road to Emil Kolb Parkway	Arterial	0.9	900	Northbound	1	900	1354	1.50	
				900	Southbound	1	900	914	1.02	
Highway 50	Emil Kolb Parkway to Columbia Way	Arterial	0.9	900	Northbound	1	900	777	0.86	
				900	Southbound	1	900	585	0.65	
Highway 50	Columbia Way to Bolton Heights Drive	Arterial	0.9	900	Northbound	2	1800	975	0.54	
				900	Southbound	1	900	699	0.78	
Highway 50	Bolton Heights Drive to King Street	Arterial	0.9	900	Northbound	2	1800	1215	0.68	
				900	Southbound	1	900	872	0.97	
Emil Kolb Parkway	Highway 50 to King Street	Arterial	0.9	900	Eastbound	1	900	674	0.75	
				900	Westbound	1	900	429	0.48	
Caledon-King Townline	Columbia Way to King Street	Collector	0.9	700	Northbound	1	700	934	1.33	
				700	Southbound	1	700	900	1.29	
Columbia Way	Highway 50 to Kingsview Drive	Collector	0.9	700	Eastbound	1	700	434	0.62	
				700	Westbound	1	700	286	0.41	
Columbia Way	Kingsview Drive to Westchester Boulevard	Collector	0.9	700	Eastbound	1	700	347	0.50	
				700	Westbound	1	700	240	0.34	
Columbia Way	Westchester Boulevard to Mount Hope Road	Collector	0.9	700	Eastbound	1	700	286	0.41	
				700	Westbound	1	700	211	0.30	
Columbia Way	Mount Hope Road to Caledon-King Townline	Collector	0.9	700	Eastbound	1	700	261	0.37	
				700	Westbound	1	700	245	0.35	

2031 ROPA 30 Conditions

Roadway	Segment	Classification	V/C Threshold	Link Capacity Threshold per Lane	Direction	Numbe of Lanes per Direction	Link Capacity	Forcasted Peak Hour Volume	v/c Ratio	Additional Considerations
Highway 50	Castlederg Side Road to Emil Kolb Parkway	Arterial	0.9	900	Northbound	2	1800	1386	0.77	
				900	Southbound	2	1800	931	0.5173	
Highway 50	Emil Kolb Parkway to Columbia Way	Arterial	0.9	900	Northbound	1	900	886	0.98485	
				900	Southbound	1	900	629	0.69936	
Highway 50	Columbia Way to Bolton Heights Drive	Arterial	0.9	900	Northbound	2	1800	981	0.54503	
				900	Southbound	1	900	714	0.79381	
Highway 50	Bolton Heights Drive to King Street	Arterial	0.9	900	Northbound	2	1800	1242	0.69003	
				900	Southbound	2	1800	898	0.49869	
Emil Kolb Parkway	Highway 50 to King Street	Arterial	0.9	900	Eastbound	1	900	859	0.95446	
				900	Westbound	1	900	686	0.76233	
Caledon-King Townline	Columbia Way to King Street	Collector	0.9	700	Northbound	2	1400	937	0.66941	
				700	Southbound	2	1400	902	0.6442	
Columbia Way	Highway 50 to Kingsview Drive	Collector	0.9	700	Eastbound	1	700	447	0.63806	
				700	Westbound	1	700	260	0.37121	
Columbia Way	Kingsview Drive to Westchester Boulevard	Collector	0.9	700	Eastbound	1	700	354	0.50598	
				700	Westbound	1	700	268	0.38271	
Columbia Way	Westchester Boulevard to Mount Hope Road	Collector	0.9	700	Eastbound	1	700	290	0.41415	
				700	Westbound	1	700	245	0.35018	
Columbia Way	Mount Hope Road to Caledon-King Townline	Collector	0.9	700	Eastbound	1	700	269	0.38417	
				700	Westbound	1	700	254	0.36338	

2031 Future Total Conditions

Roadway	Segment	Classification	V/C Threshold	Link Capacity Threshold per Lane	Direction	Numbe of Lanes per Direction	Link Capacity	Forcasted Peak Hour Volume	v/c Ratio	Additional Considerations
Highway 50	Castlederg Side Road to Emil Kolb Parkway	Arterial	0.9	900	Northbound	2	1800	1556	0.86421	
				900	Southbound	2	1800	980	0.54421	
Highway 50	Emil Kolb Parkway to Columbia Way	Arterial	0.9	900	Northbound	1	900	1053	1.16959	Improvement Added
				900	Southbound	1	900	755	0.83885	
Highway 50	Columbia Way to Bolton Heights Drive	Arterial	0.9	900	Northbound	2	1800	1090	0.60561	Improvement Added
				900	Southbound	1	900	789	0.87623	
Highway 50	Bolton Heights Drive to King Street	Arterial	0.9	900	Northbound	2	1800	1321	0.73411	
				900	Southbound	2	1800	966	0.53654	
Emil Kolb Parkway	Highway 50 to King Street	Arterial	0.9	900	Eastbound	1	900	1512	1.67966	
				900	Westbound	1	900	1137	1.26386	
Caledon-King Townline	Columbia Way to King Street	Collector	0.9	700	Northbound	2	1400	968	0.69178	
				700	Southbound	2	1400	933	0.66616	
Columbia Way	Highway 50 to Kingsview Drive	Collector	0.9	700	Eastbound	1	700	499	0.71332	
				700	Westbound	1	700	295	0.42172	
Columbia Way	Kingsview Drive to Westchester Boulevard	Collector	0.9	700	Eastbound	1	700	392	0.55987	
				700	Westbound	1	700	321	0.45908	
Columbia Way	Westchester Boulevard to Mount Hope Road	Collector	0.9	700	Eastbound	1	700	319	0.45587	
				700	Westbound	1	700	295	0.42079	
Columbia Way	Mount Hope Road to Caledon-King Townline	Collector	0.9	700	Eastbound	1	700	316	0.45179	
				700	Westbound	1	700	305	0.43585	

APPENDIX I

Signal Warrant Analysis Worksheets

Major Road: Columbia Way
Minor Road: Mount Hope Road
Horizon Year: 2031

Condition: Free Flow
Major Rd. Lanes: 1
Intersection Type: Existing

Date: 20210.12.02
Project No.: 708-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	576	864	720	1080	288	50%	38%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	144	204	144	204	55	38%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	576	864	720	1080	233	40%	40%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	60	90	144	204	29	48%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Caledon-King Townline
Minor Road: Columbia Way
Horizon Year: 2031

Condition: Free Flow
Major Rd. Lanes: 2
Intersection Type: Existing

Date: 20210.12.02
Project No.: 708-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION N	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	864	1296	1080	1620	2530	234%	51%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	216	306	216	306	111	51%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	864	1296	1080	1620	519	48%	7%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	90	135	216	306	16	7%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Columbia Way
Minor Road: Westchester
Horizon Year: 2031

Condition: Free Flow
Major Rd. Lanes: 1
Intersection Type: Existing

Date: 20210.12.02
Project No.: 708-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION N	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	864	1296	1080	1620	334	39%	35%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	216	306	216	306	75	35%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	864	1296	1080	1620	259	30%	30%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	90	135	216	306	48	54%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Columbia Way
Minor Road: Duffins Lane
Horizon Year: 2031

Condition: Free Flow
Major Rd. Lanes: 2
Intersection Type: Existing

Date: 20210.12.02
Project No.: 708-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION N	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	864	1296	1080	1620	902	83%	16%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	216	306	216	306	35	16%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	864	1296	1080	1620	867	80%	6%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	90	135	216	306	12	6%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Emil Kolb Parkway
Minor Road: Street A/ Street B
Horizon Year: 2031

Condition: Free Flow
Major Rd. Lanes: 2
Intersection Type: Proposed

Date: 20210.12.02
Project No.: 708-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	720	1080	900	1350	832	92%	54%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	180	255	180	255	97	54%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	720	1080	900	1350	667	74%	20%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	75	113	180	255	37	20%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Highway 50
Minor Road: Street D/ Street E
Horizon Year: 2031

Condition: Free Flow
Major Rd. Lanes: 2
Intersection Type: Proposed

Date: 2021.12.02
Project No.: 708-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION N	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	720	1080	900	1350	962	107%	35%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	180	255	180	255	62	35%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	720	1080	900	1350	899	100%	27%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	75	113	180	255	49	27%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Highway 50
Minor Road: Street G
Horizon Year: 2031

Condition: Free Flow
Major Rd. Lanes: 2
Intersection Type: Proposed

Date: 20210.12.02
Project No.: 708-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION N	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	1080	1620	1350	2025	773	57%	14%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	270	382.5	270	382.5	38	14%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	1080	1620	1350	2025	735	54%	3%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	112.5	168.75	270	382.5	9	3%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Columbia Way
Minor Road: Mount Hope Road
Horizon Year: 2031 (ROPA)

Condition: Free Flow
Major Rd. Lanes: 1
Intersection Type: Existing

Date: 2021.12.02
Project No.: 324-2840
Analyst: Alex Fleming

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	576	864	720	1080	255	44%	38%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	144	204	144	204	54	38%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	576	864	720	1080	201	35%	35%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	60	90	144	204	29	48%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Columbia Way
Minor Road: Westchester Boulevard
Horizon Year: 2031 (ROPA)

Condition: Free Flow
Major Rd. Lanes: 1
Intersection Type: Existing

Date: 2021.12.02
Project No.: 703-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	864	1296	1080	1620	294	34%	33%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	216	306	216	306	72	33%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	864	1296	1080	1620	223	26%	26%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	90	135	216	306	45	50%	

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Caledon-King Townline
Minor Road: Columbia Way
Horizon Year: 2031 (ROPA)

Condition: Free Flow
Major Rd. Lanes: 1
Intersection Type: Existing

Date: 2021.12.02
Project No.: 703-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	864	1296	1080	1620	600	69%	44%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	216	306	216	306	95	44%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	864	1296	1080	1620	475	55%	11%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	90	135	216	306	10	11%	

Note:

Existing Intersection Requires 120 % Justification
Proposed Intersection Requires 150 % Justification

Signal Justification 7 Met: ☐ Yes ☒ No

Major Road: Highway 50
Minor Road: Access A
Horizon Year: 2031 (ROPA)

Condition: Free Flow
Major Rd. Lanes: 1
Intersection Type: Proposed

Date: 2021.12.02
Project No.: 703-3446
Analyst: KH

OTM Book 12 - Table 19 - Justification 7 - Projected Volumes (Traffic Signal Justification for Future Development - Traffic Impact Studies)

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE		COMPLIANCE		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire Percentage
						Numerical	Percentage	
1. Minimum Vehicular Volume	A. Vehicle Volume, All Approaches (Avg. Hour)	1080	1620	1350	2025	721	67%	35%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	270	383	270	383	95	35%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	1080	1620	1350	2025	626	58%	36%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	113	169	270	383	40	36%	

Signal Justification 7 Met: ☐ Yes ☒ No

APPENDIX J

Left-Turn Lane Warrant Analysis Worksheets



MTO DESIGN SUPPLEMENT

FOR

TAC GEOMETRIC DESIGN GUIDE (GDG) FOR CANADIAN ROADS

APRIL 2020

STANDARDS &
SPECIFICATIONS BRANCH
DESIGN STANDARDS &
SPECIFICATIONS OFFICE

Exhibit 9A-11

2031 Future Total AM - Columbia at Westchester

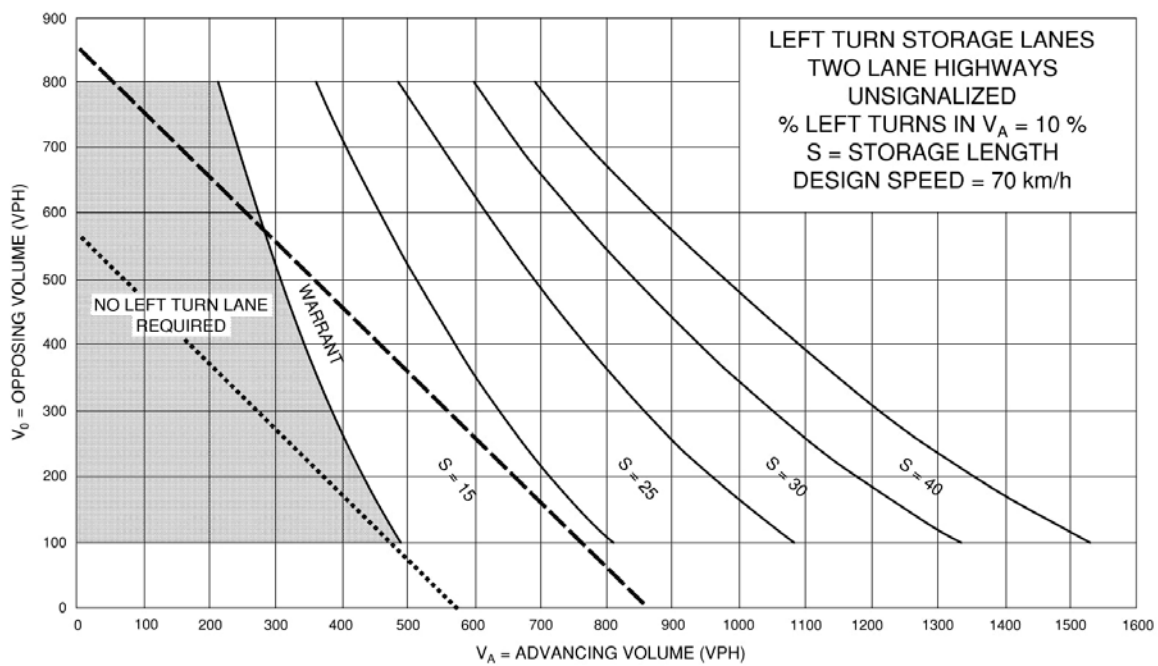
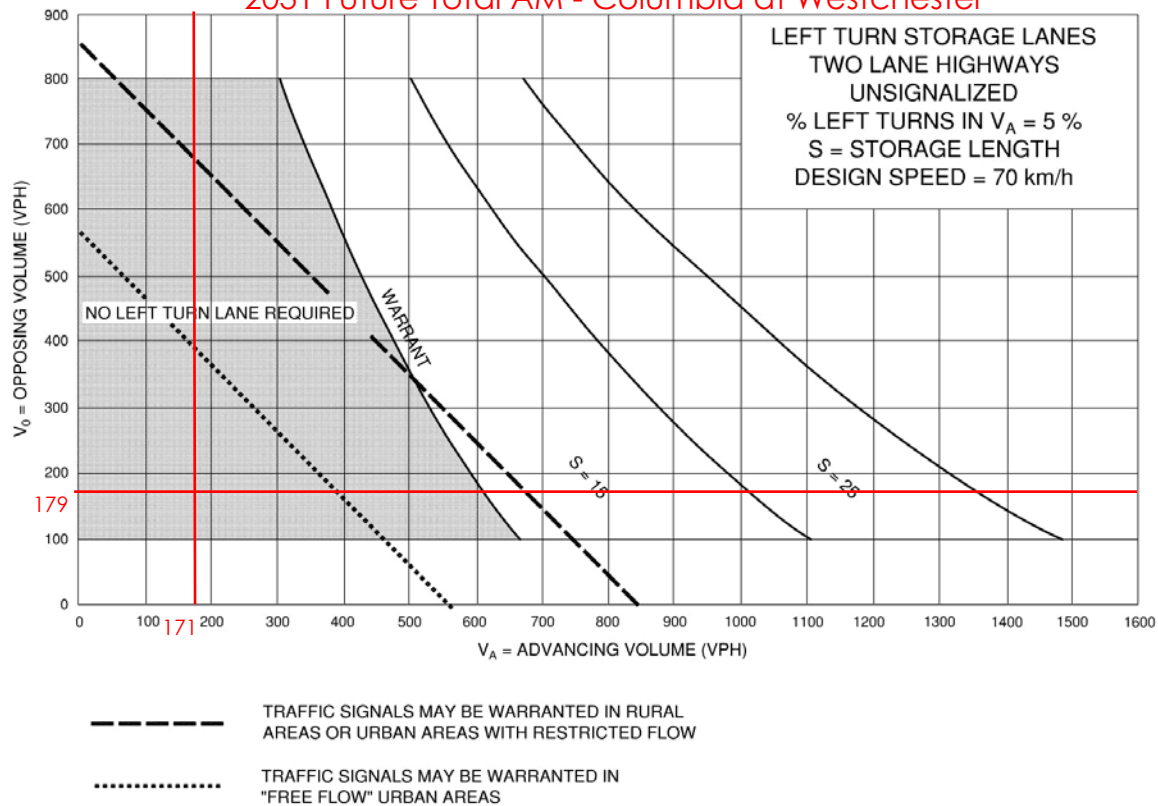


Exhibit 9A-11

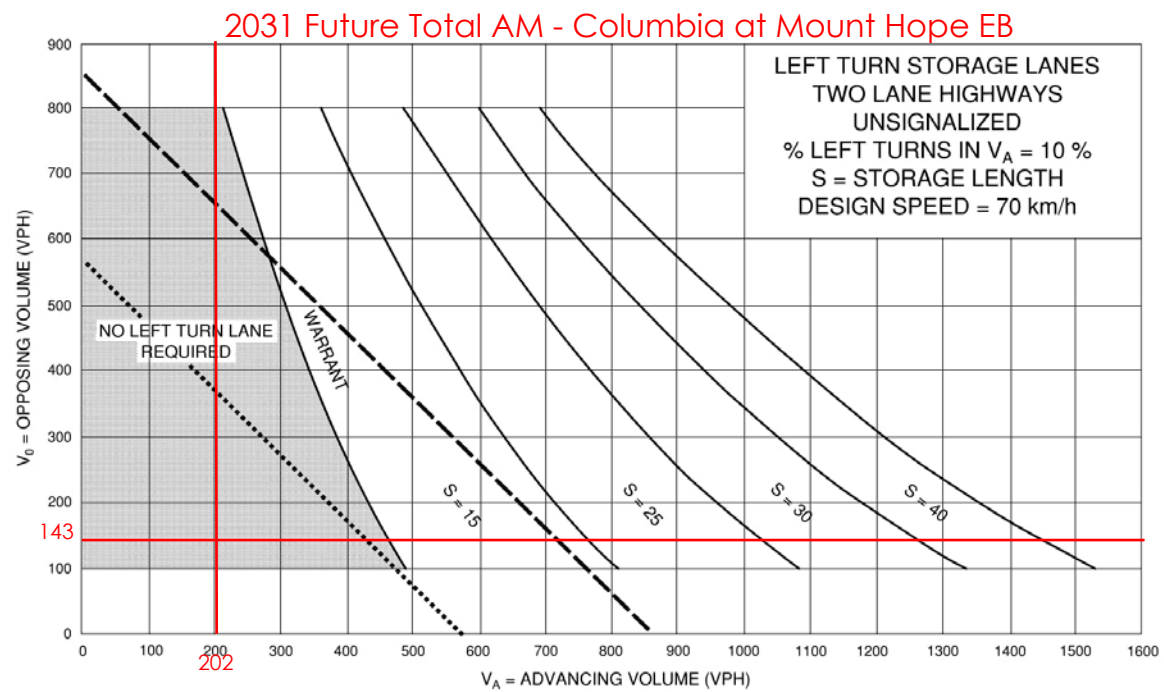
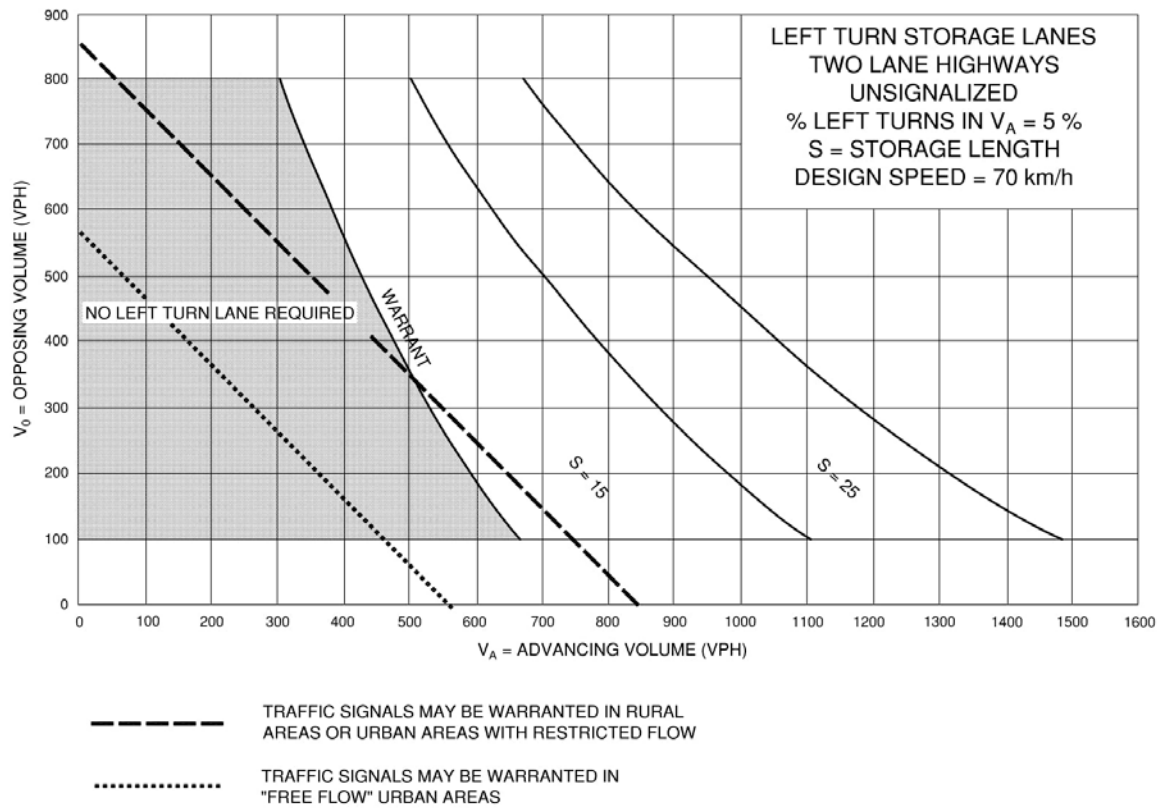
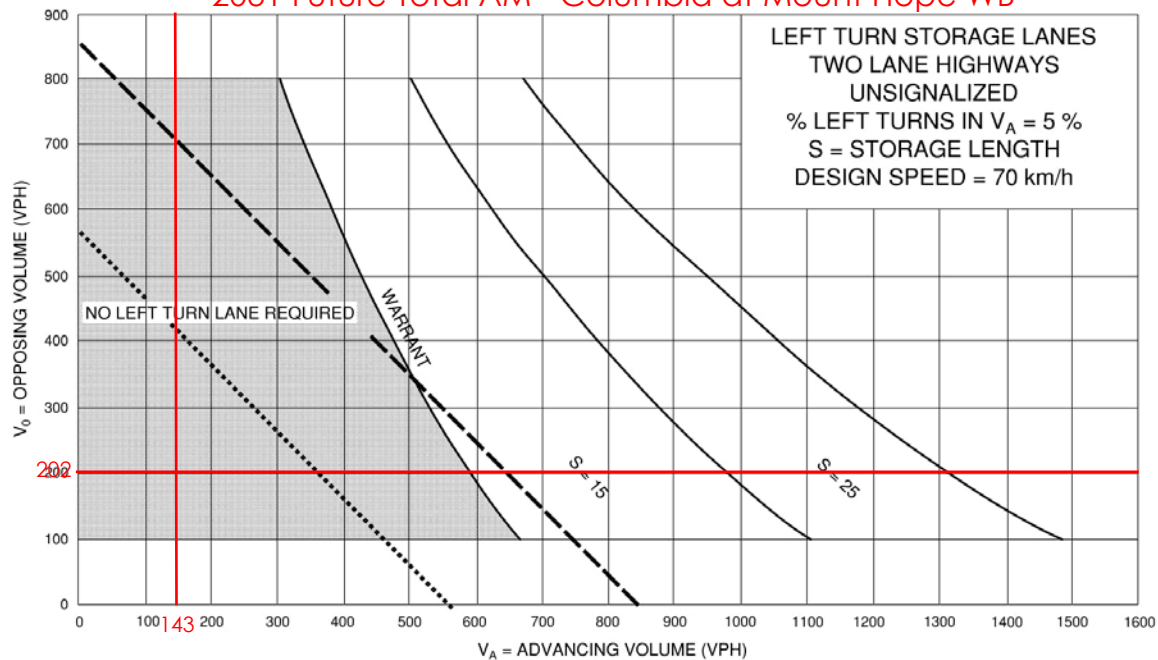


Exhibit 9A-11

2031 Future Total AM - Columbia at Mount Hope WB



- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
- TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

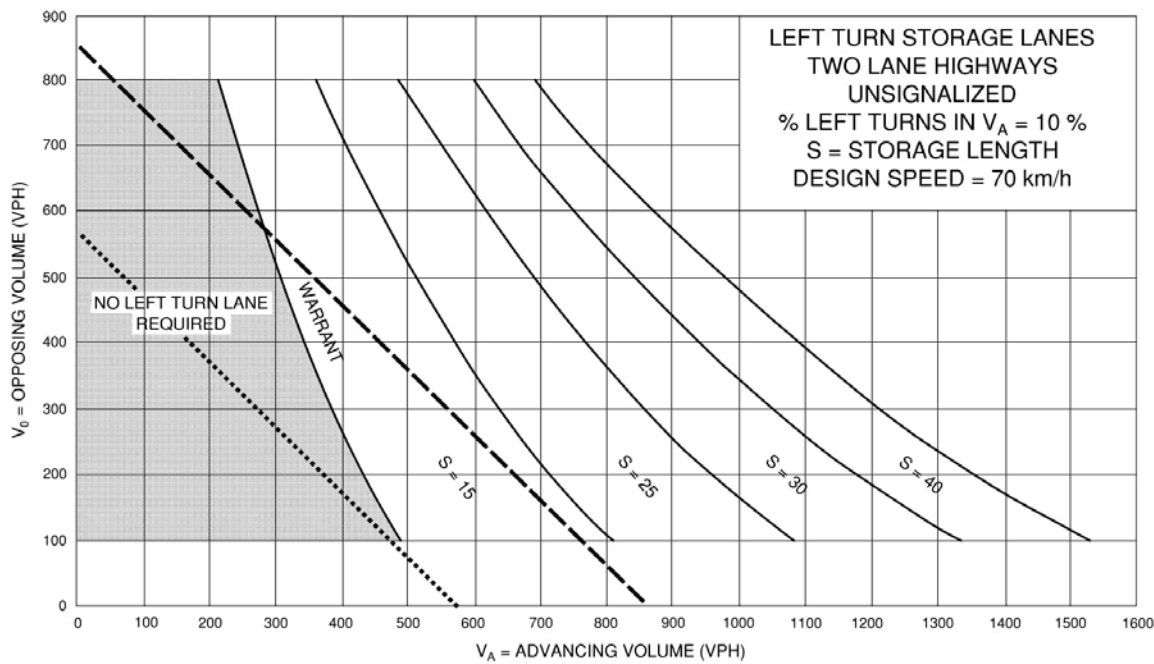


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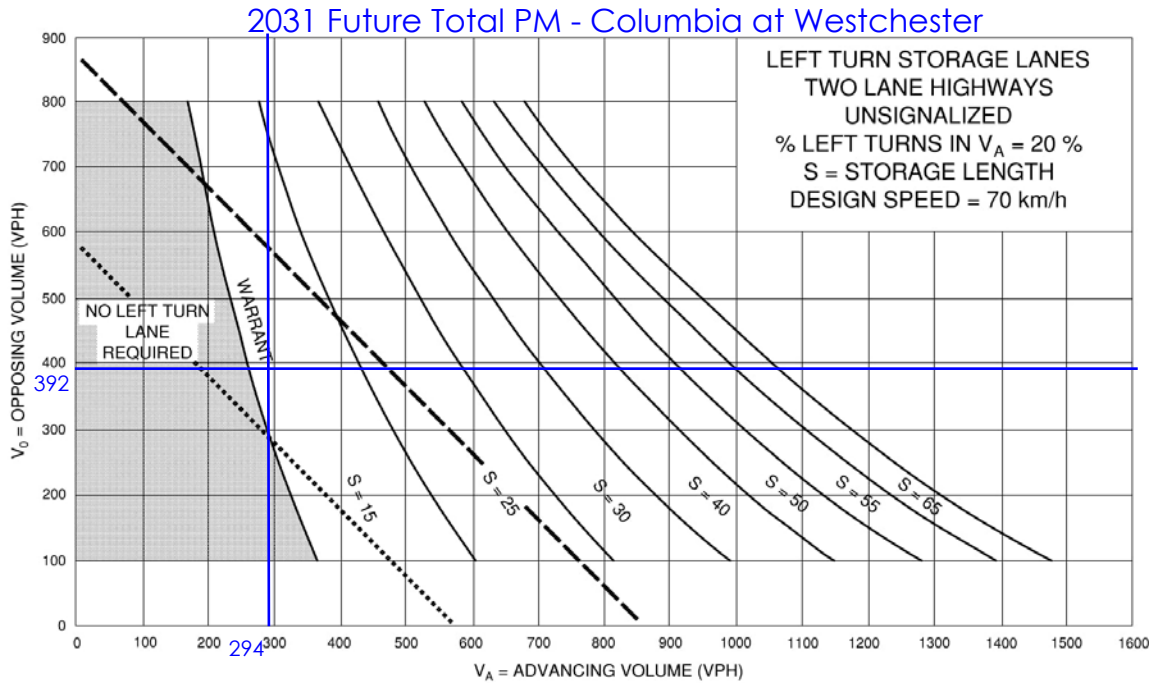
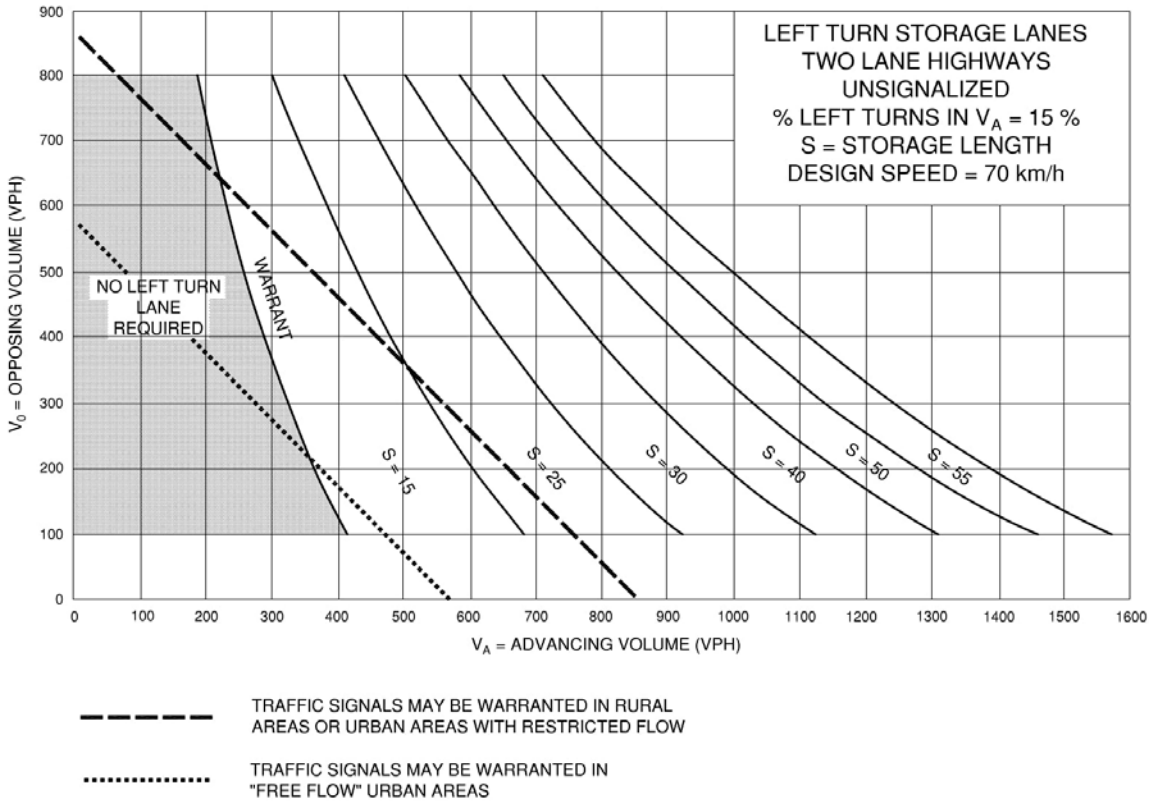


Exhibit 9A-12

2031 Future Total PM - Columbia at Mount Hope WB

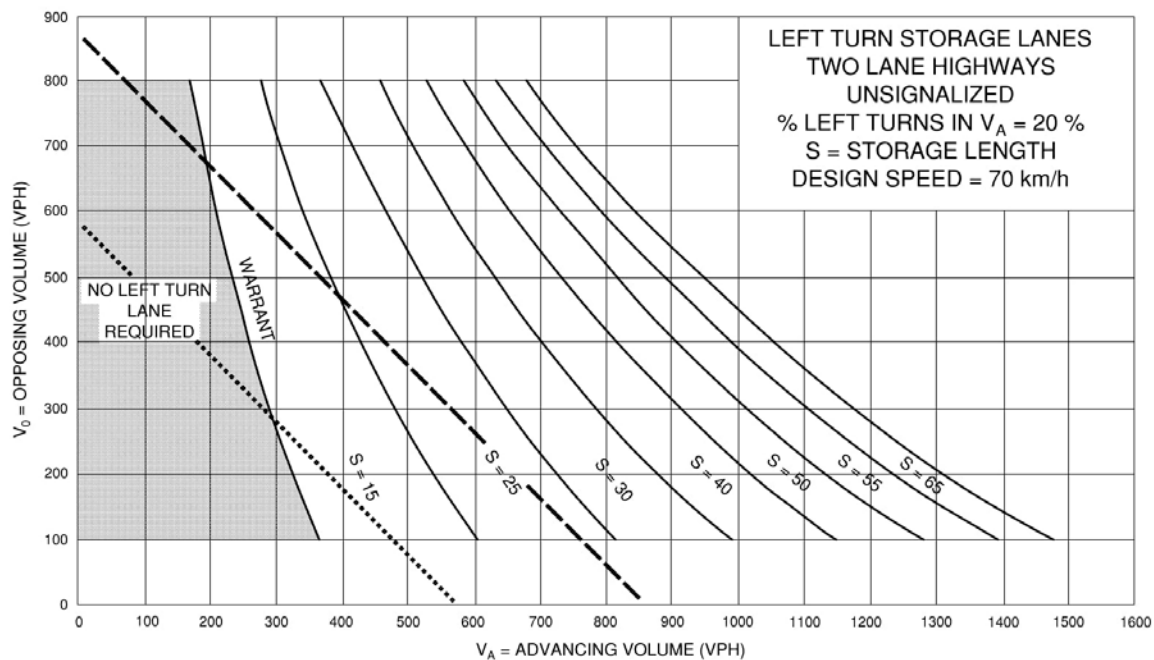
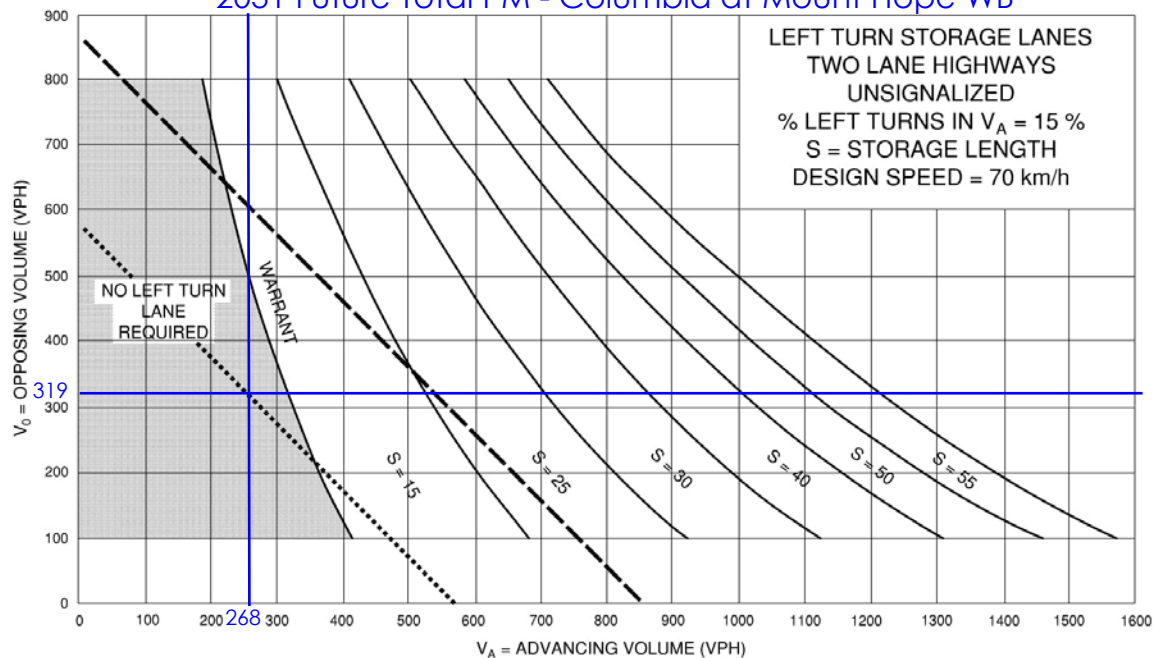
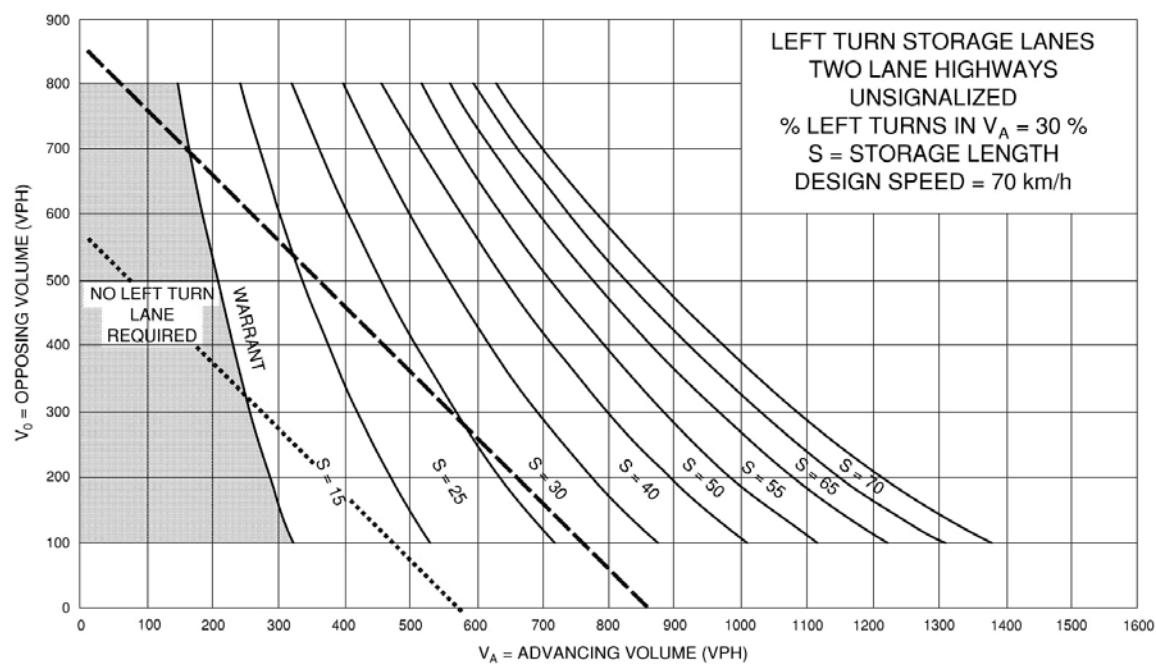
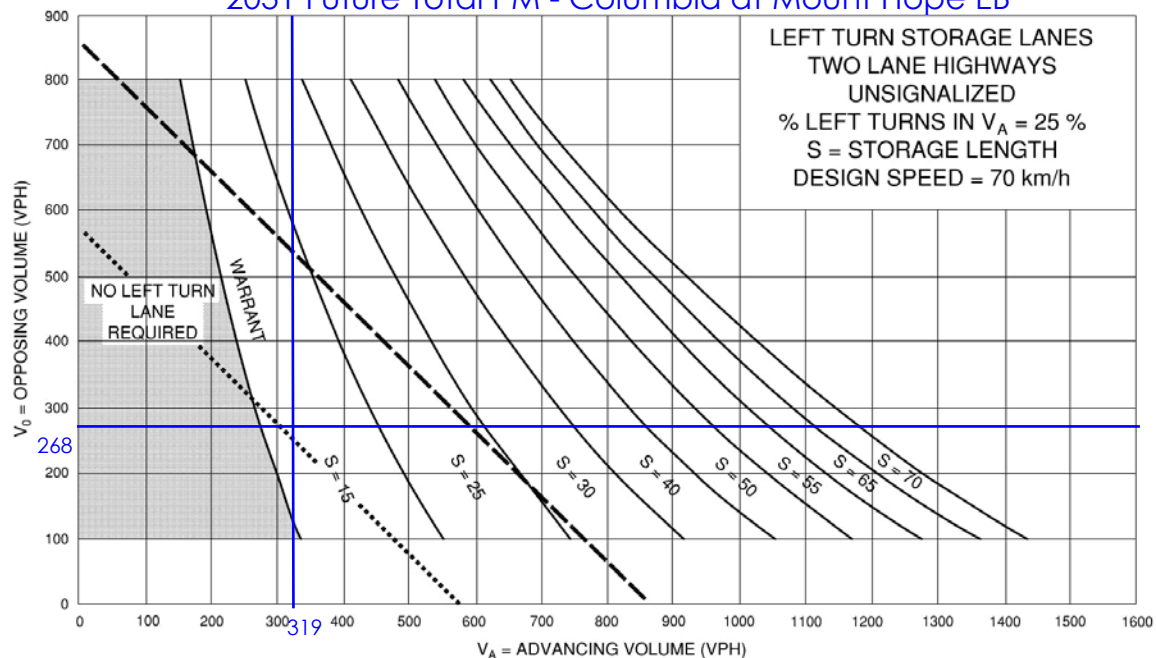


Exhibit 9A-13

2031 Future Total PM - Columbia at Mount Hope EB



2031 Future Total - Emil Kolb Parkway at Duffy's Lane
AM/PM

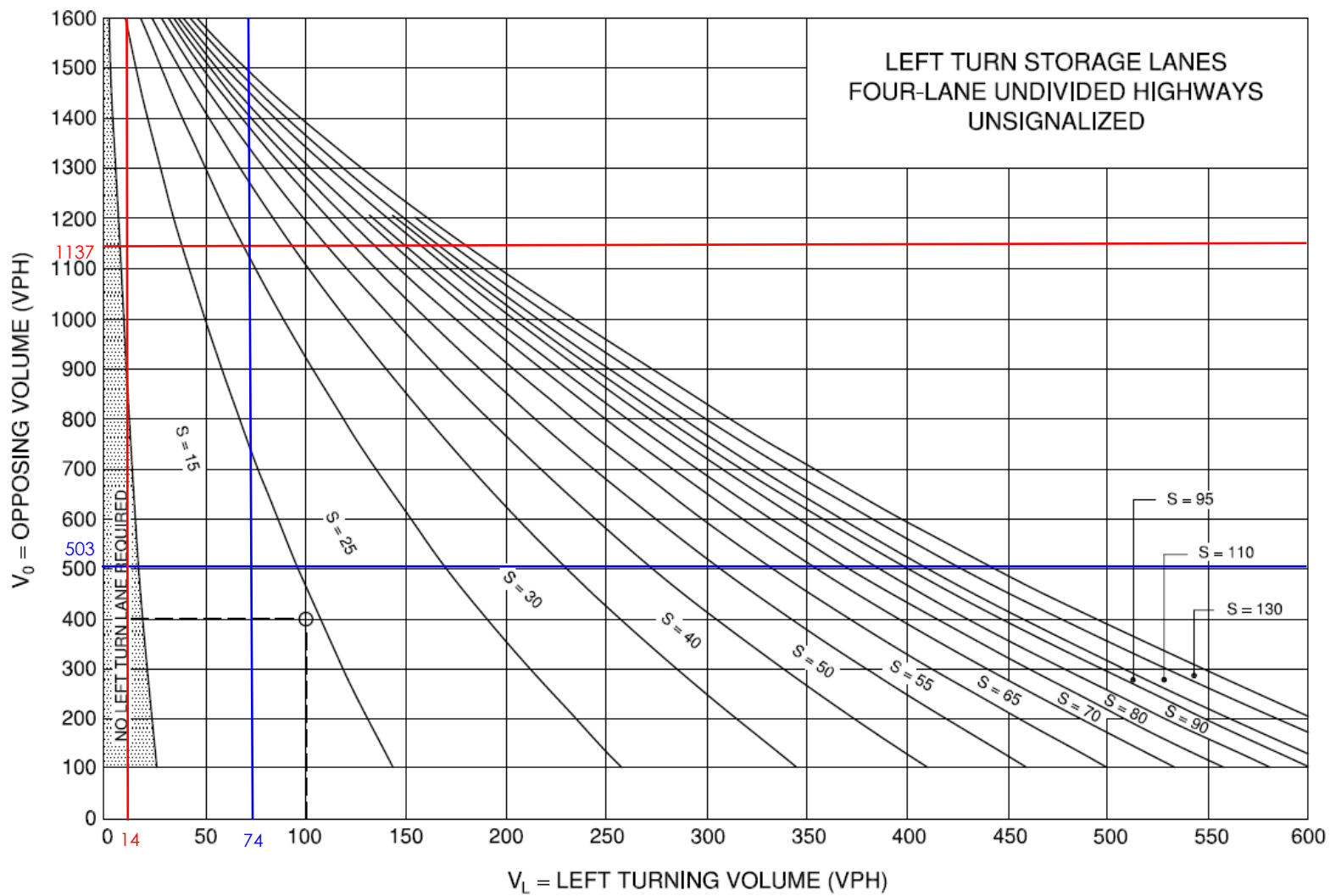
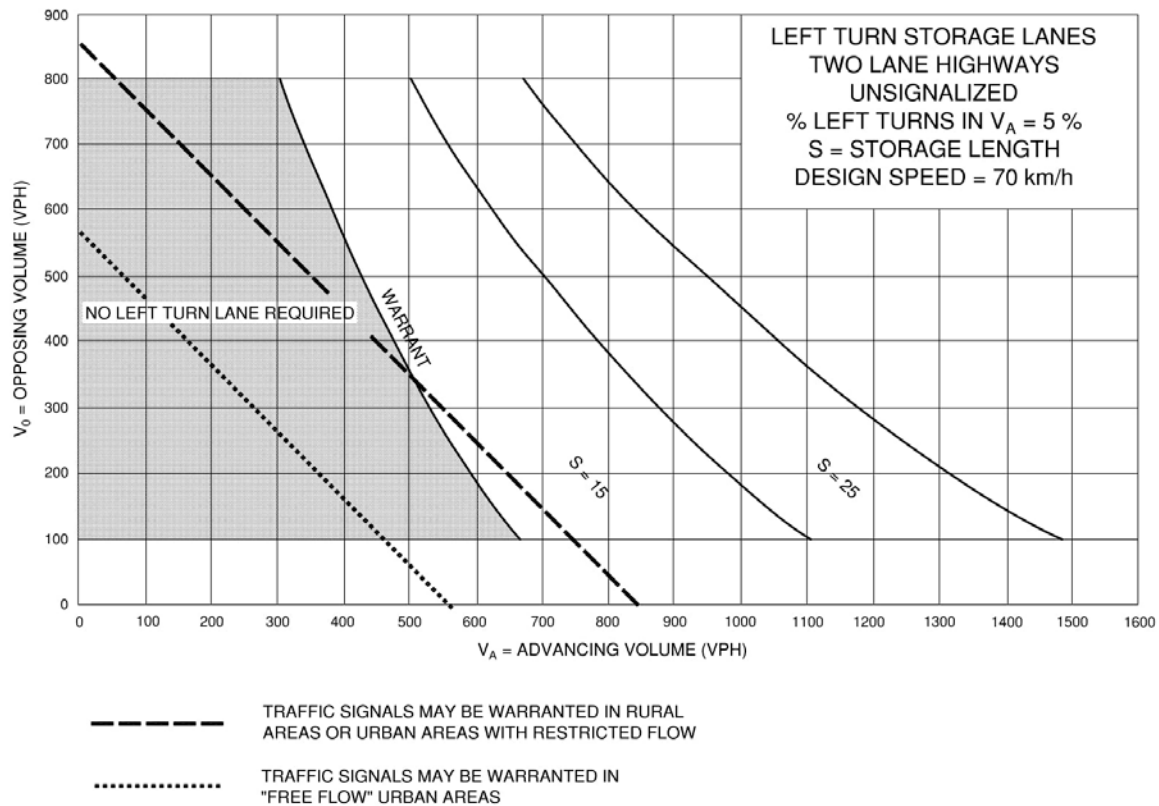


Exhibit 9A-31

Exhibit 9A-11



ROPA 30 Access A - AM

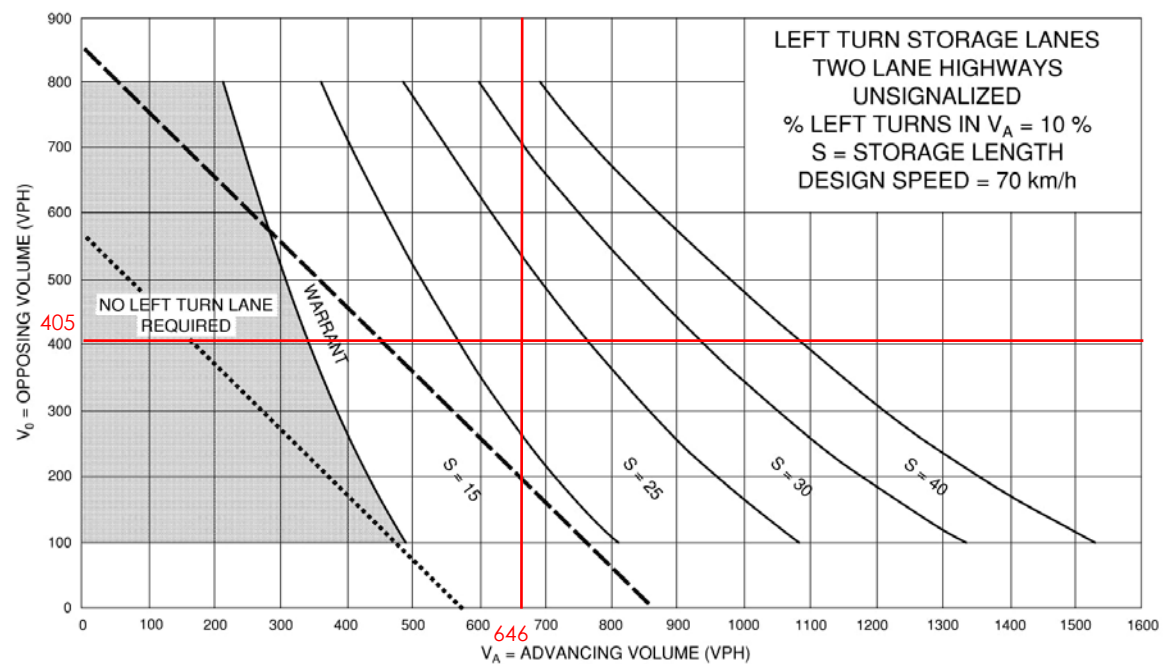


Exhibit 9A-11
ROPA 30 Columbia at Westchester - AM

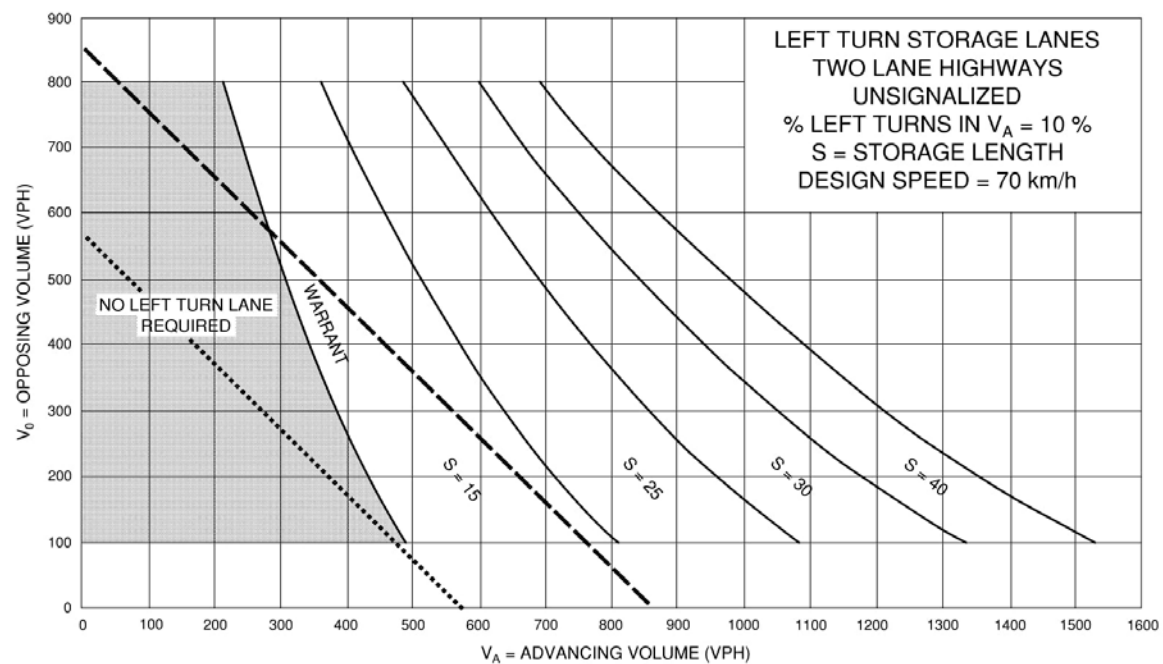
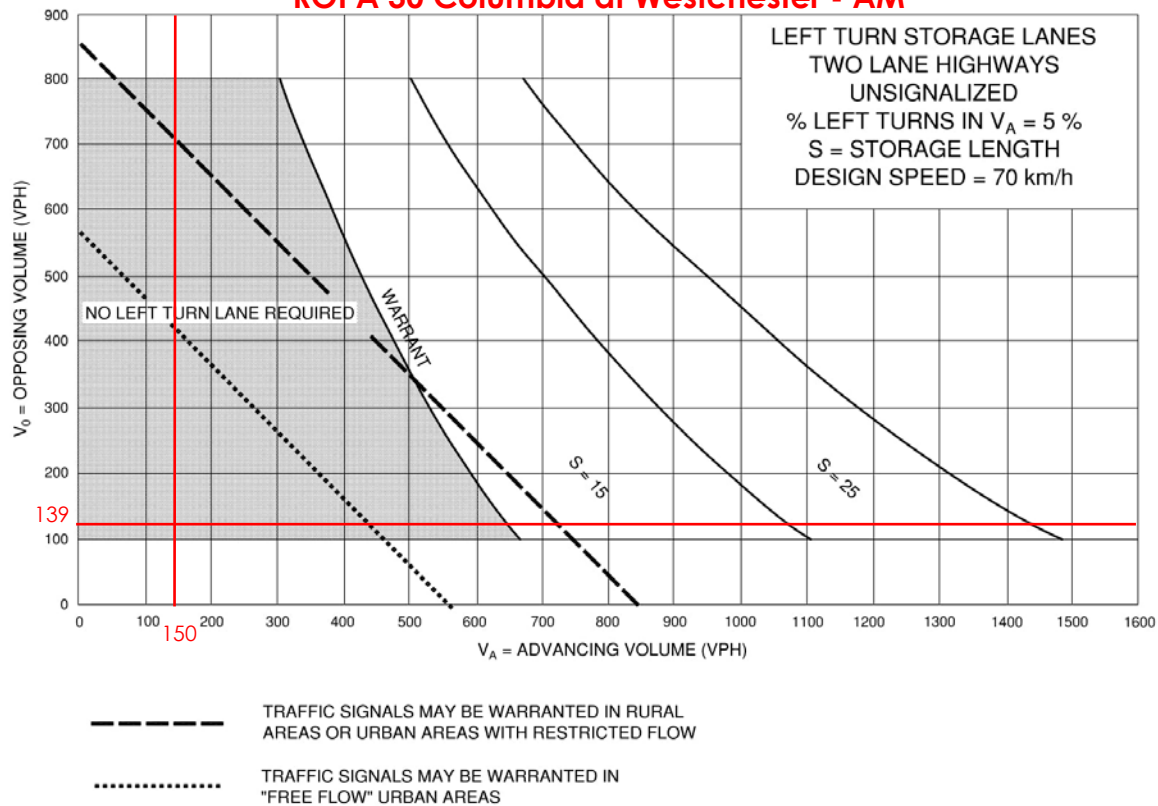
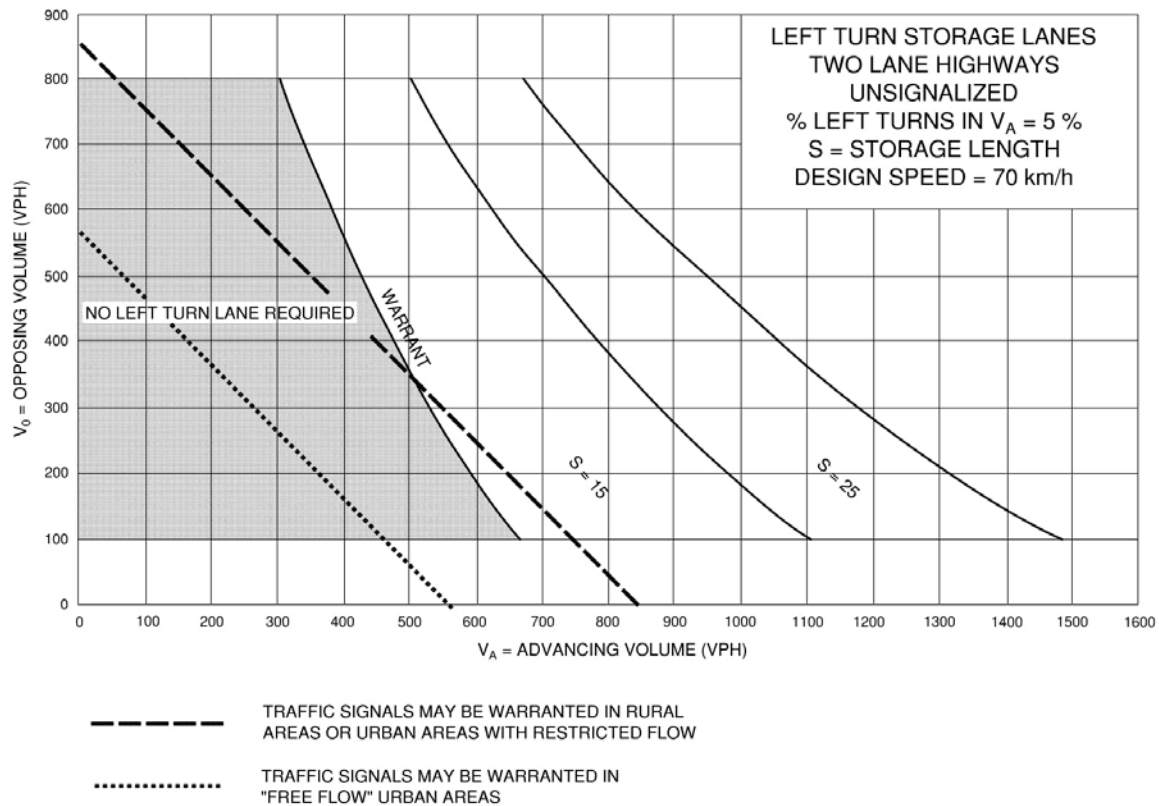


Exhibit 9A-11



ROPA 30 Columbia at Mount Hope EB - AM

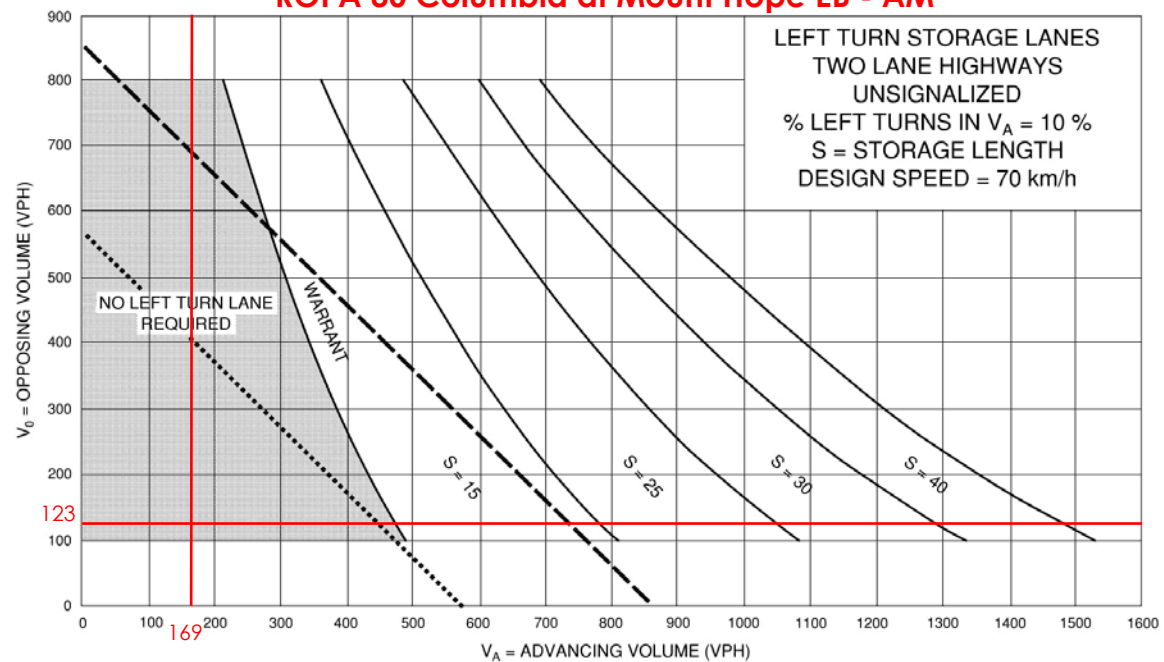
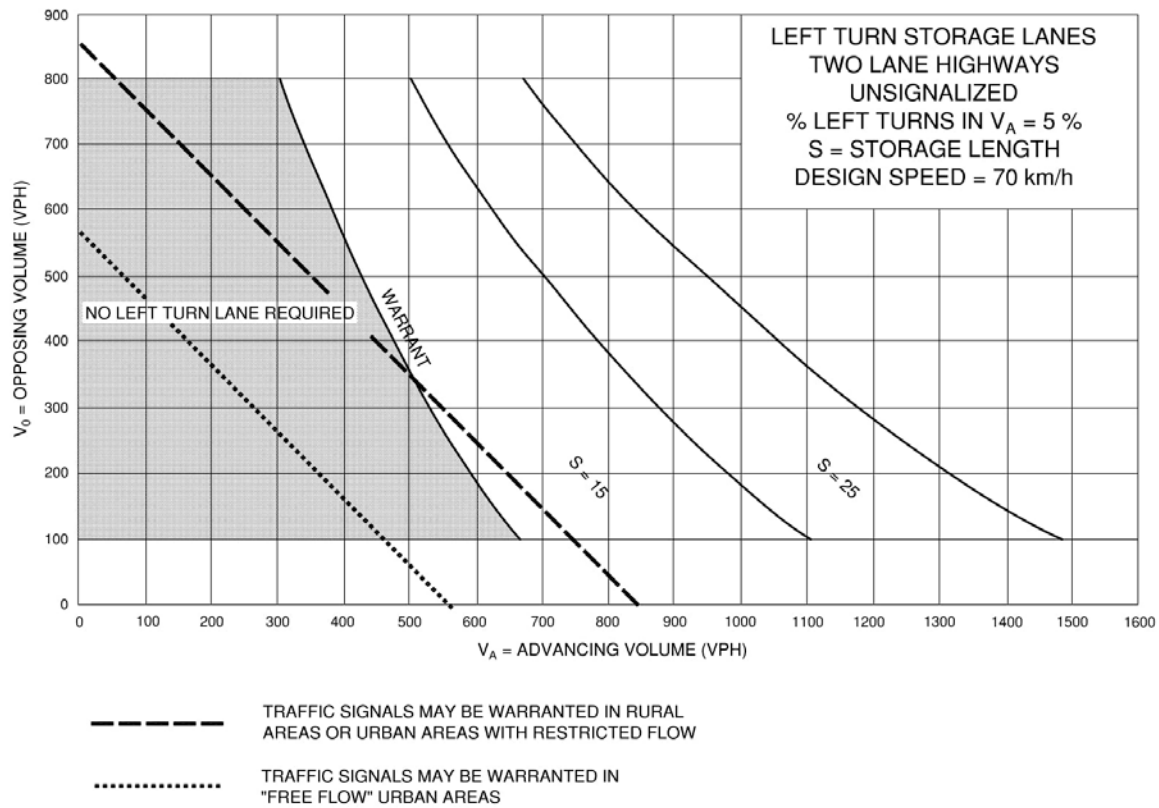


Exhibit 9A-11



ROPA 30 Columbia at Mount Hope WB - AM

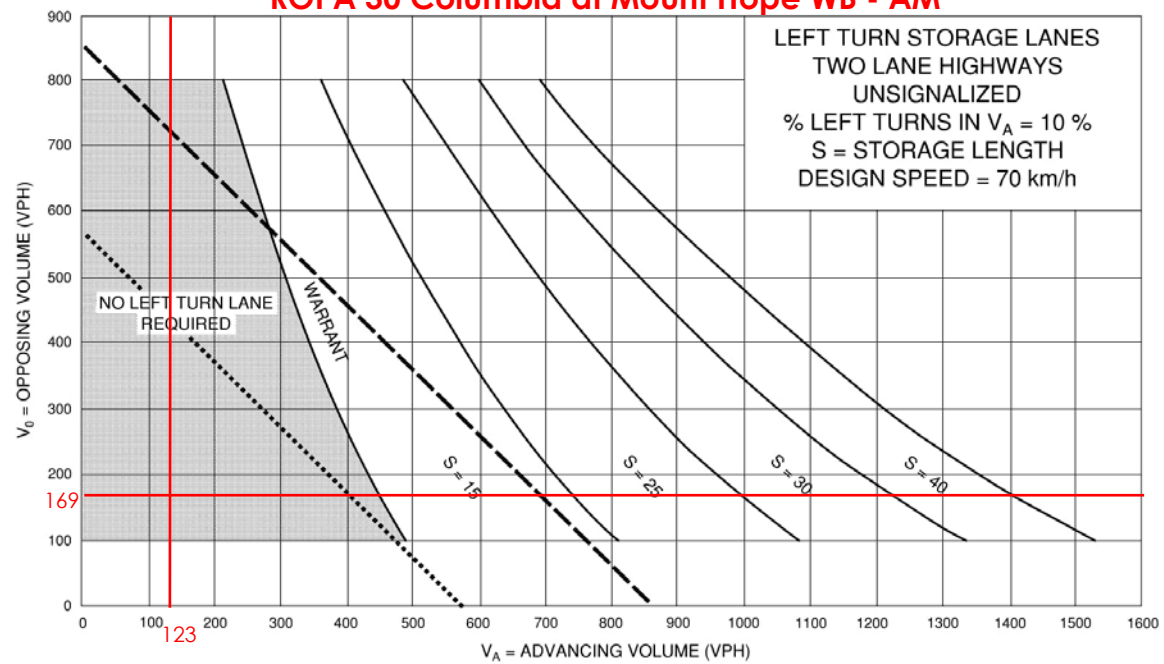
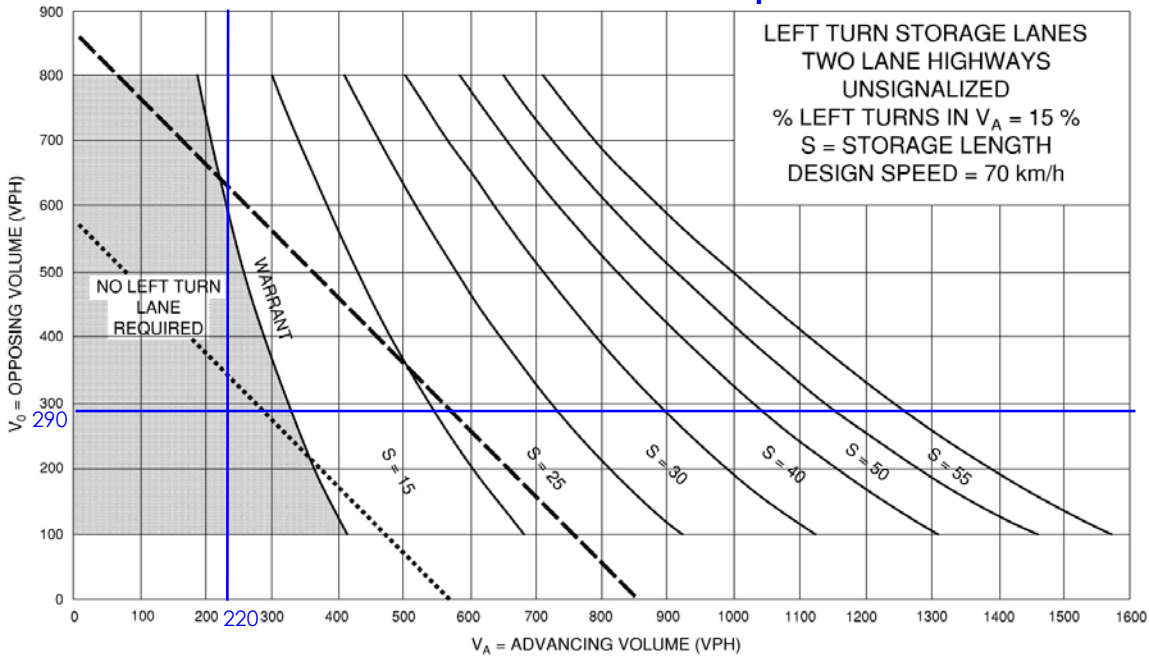


Exhibit 9A-12
ROPA 30 Columbia at Mount Hope WB - PM



- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW
- TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

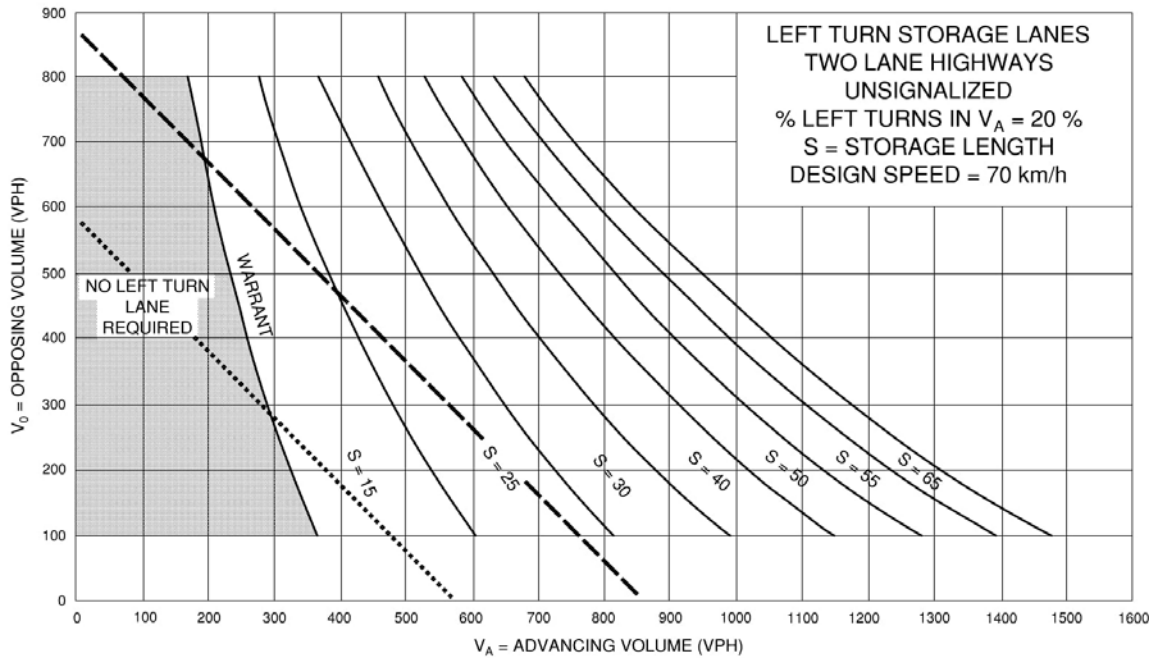
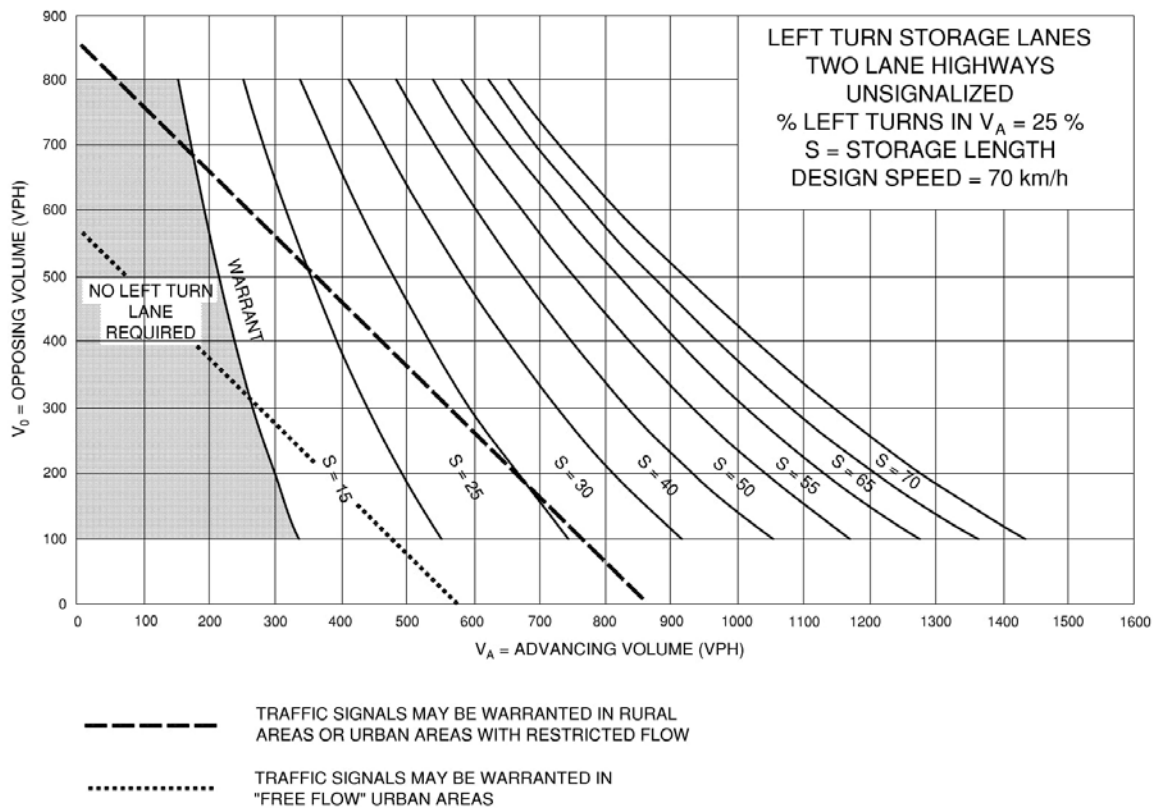


Exhibit 9A-13



ROPA 30 Access A - PM

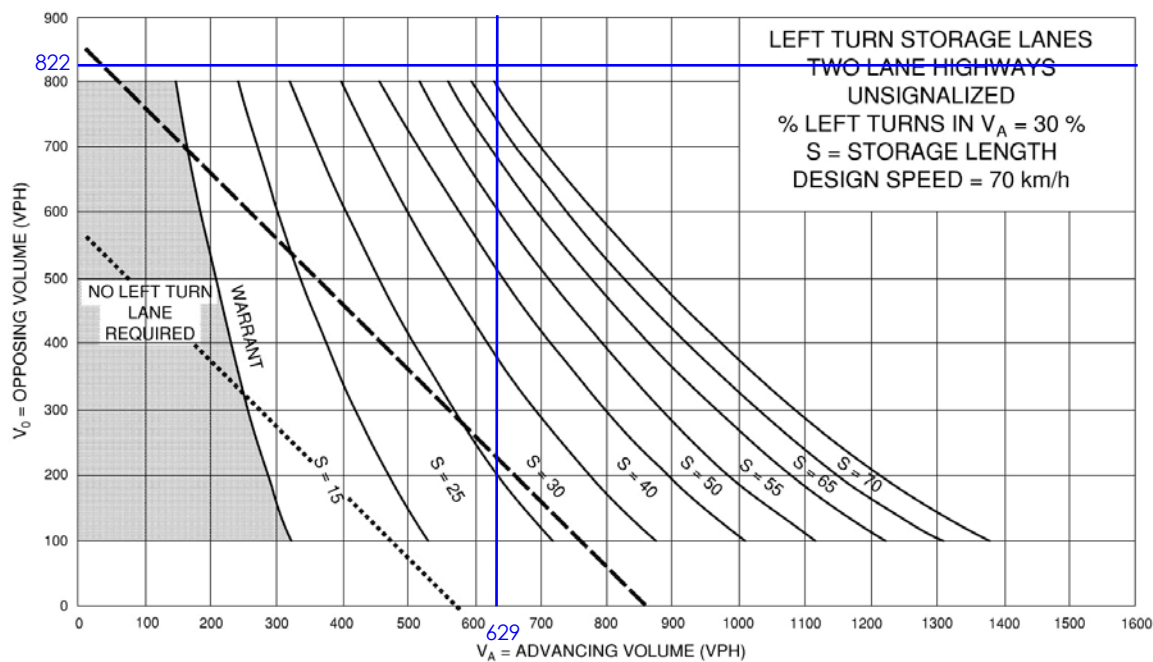


Exhibit 9A-13
ROPA 30 Columbia at Westchester - PM

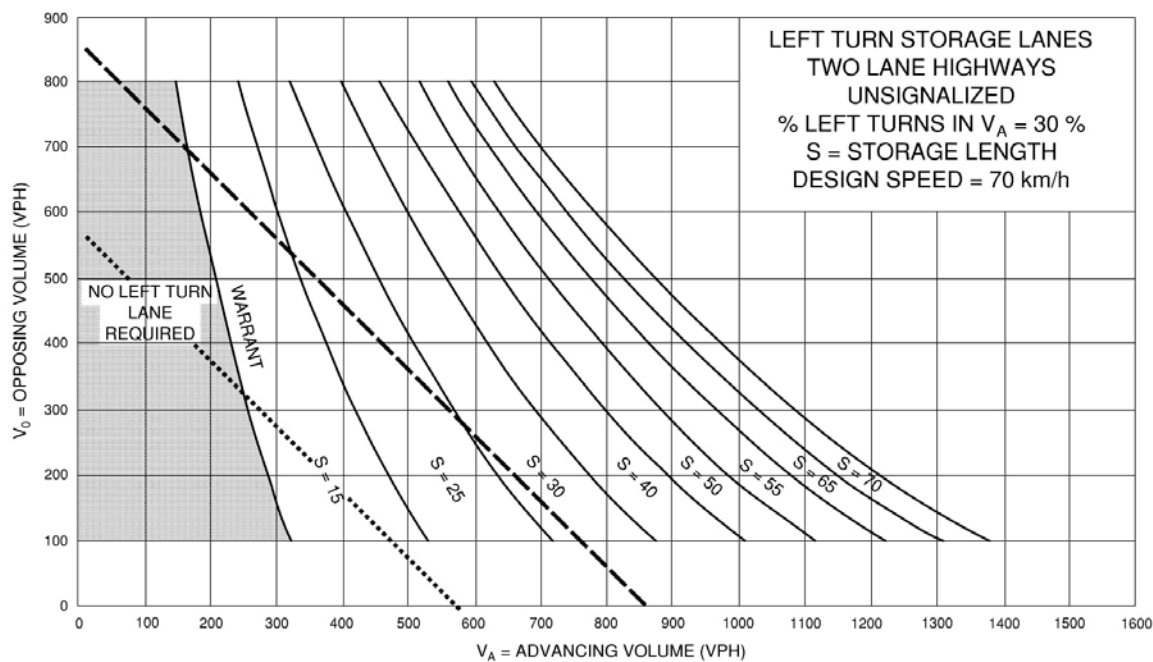
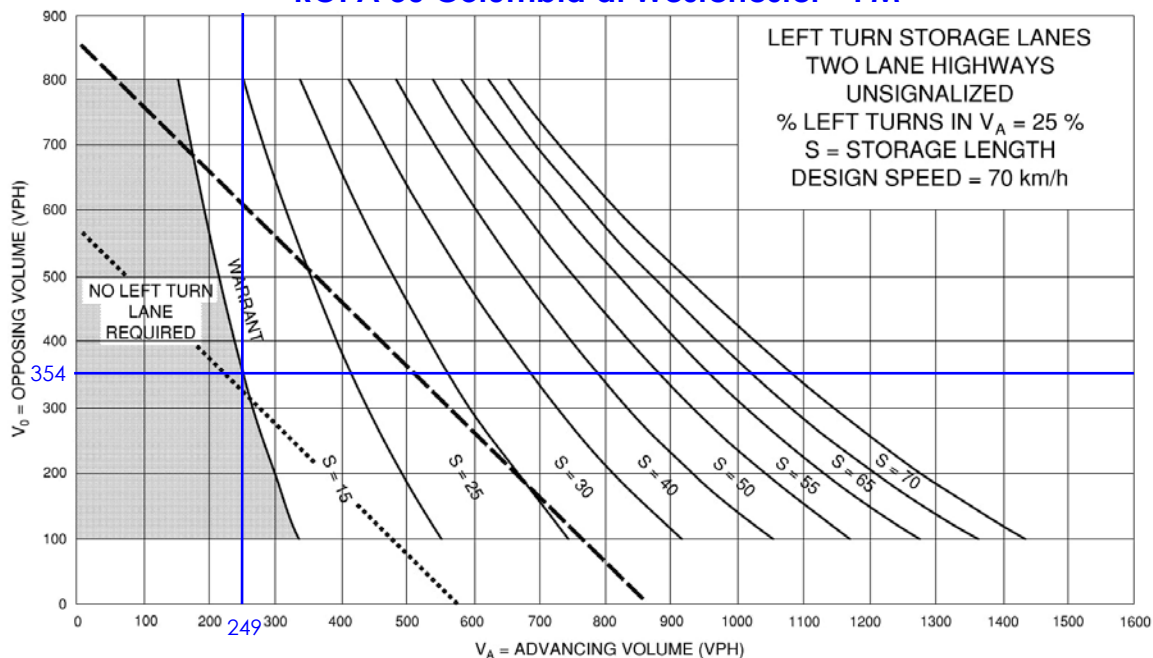
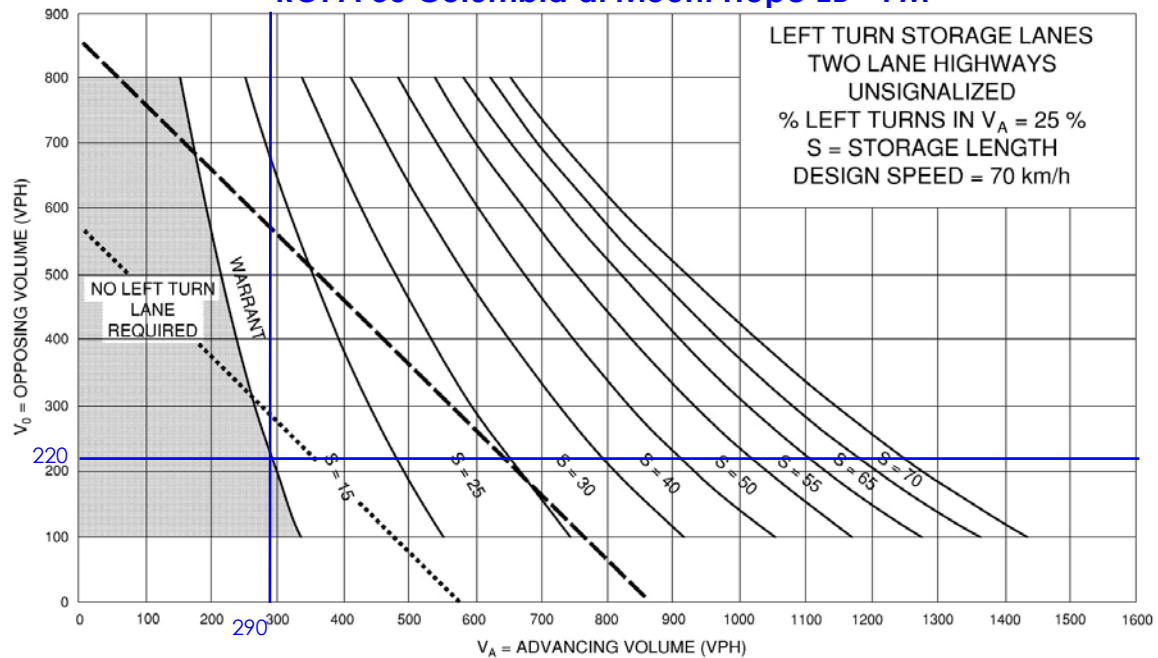
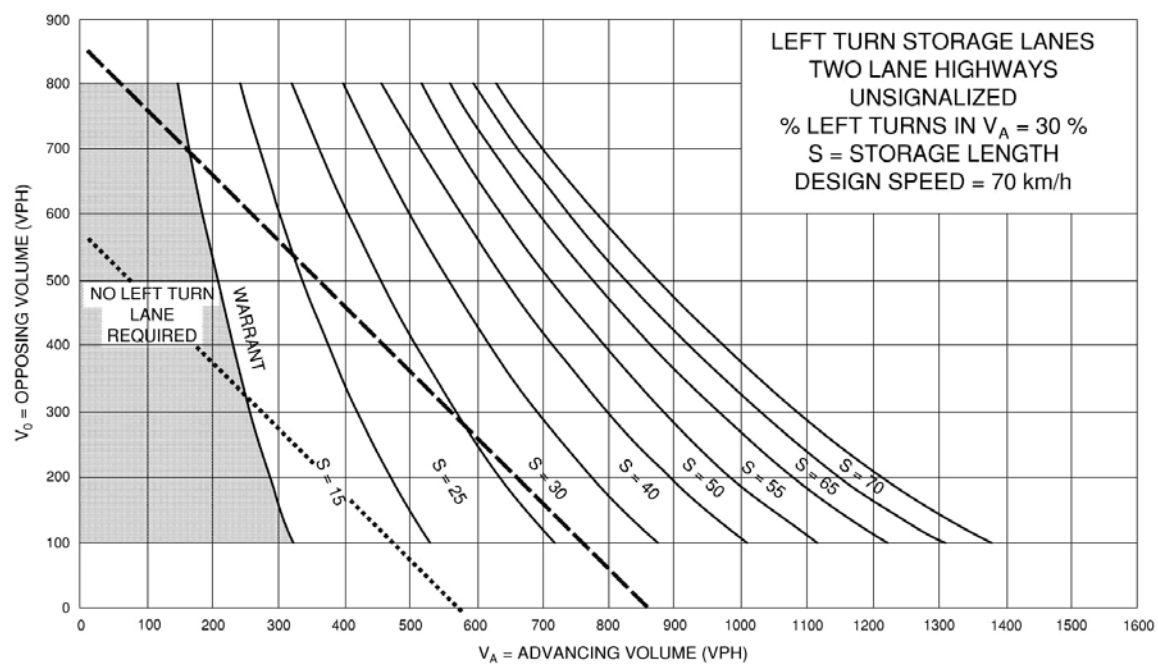


Exhibit 9A-13
ROPA 30 Columbia at Mount Hope EB - PM



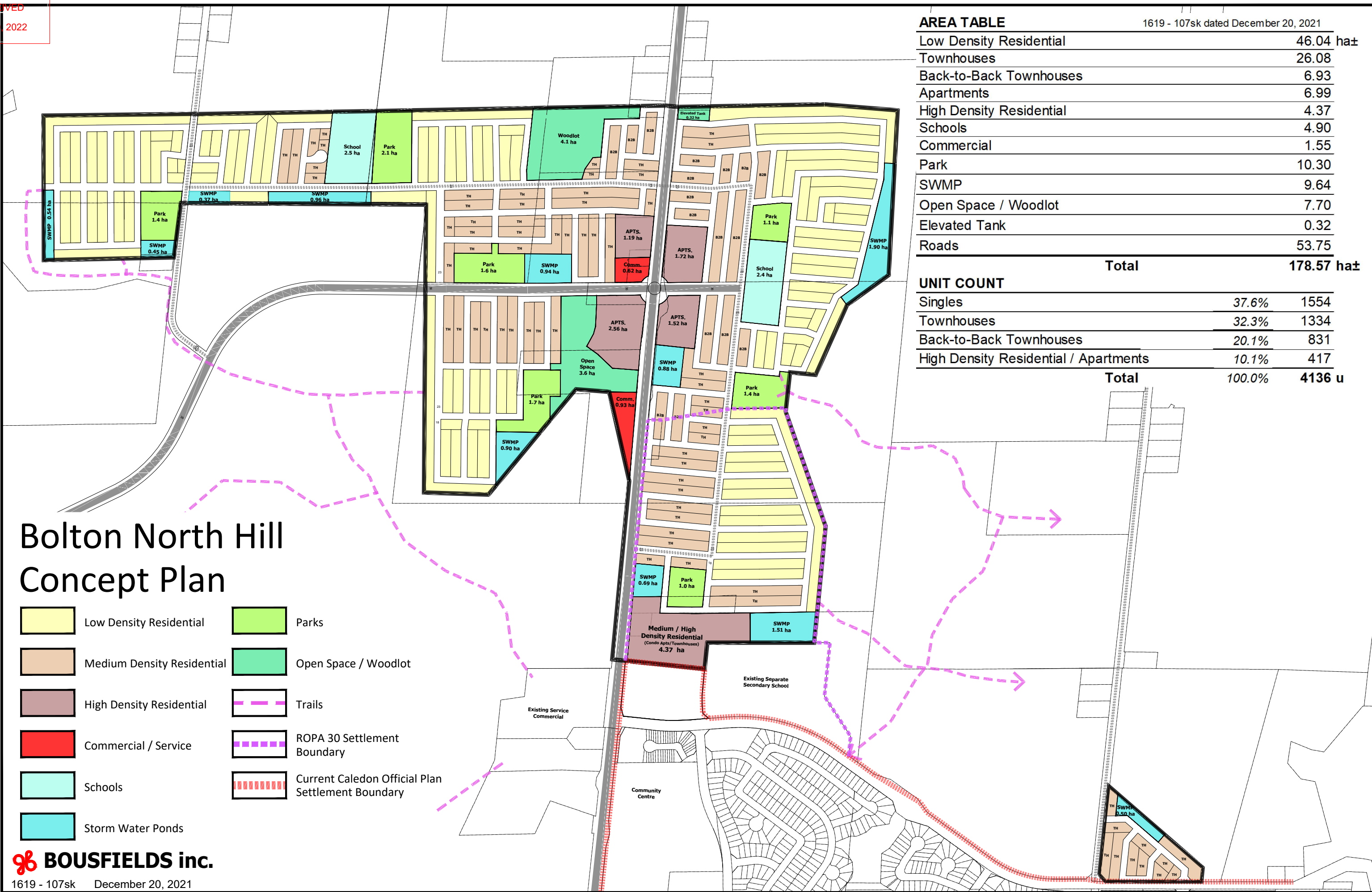
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- TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

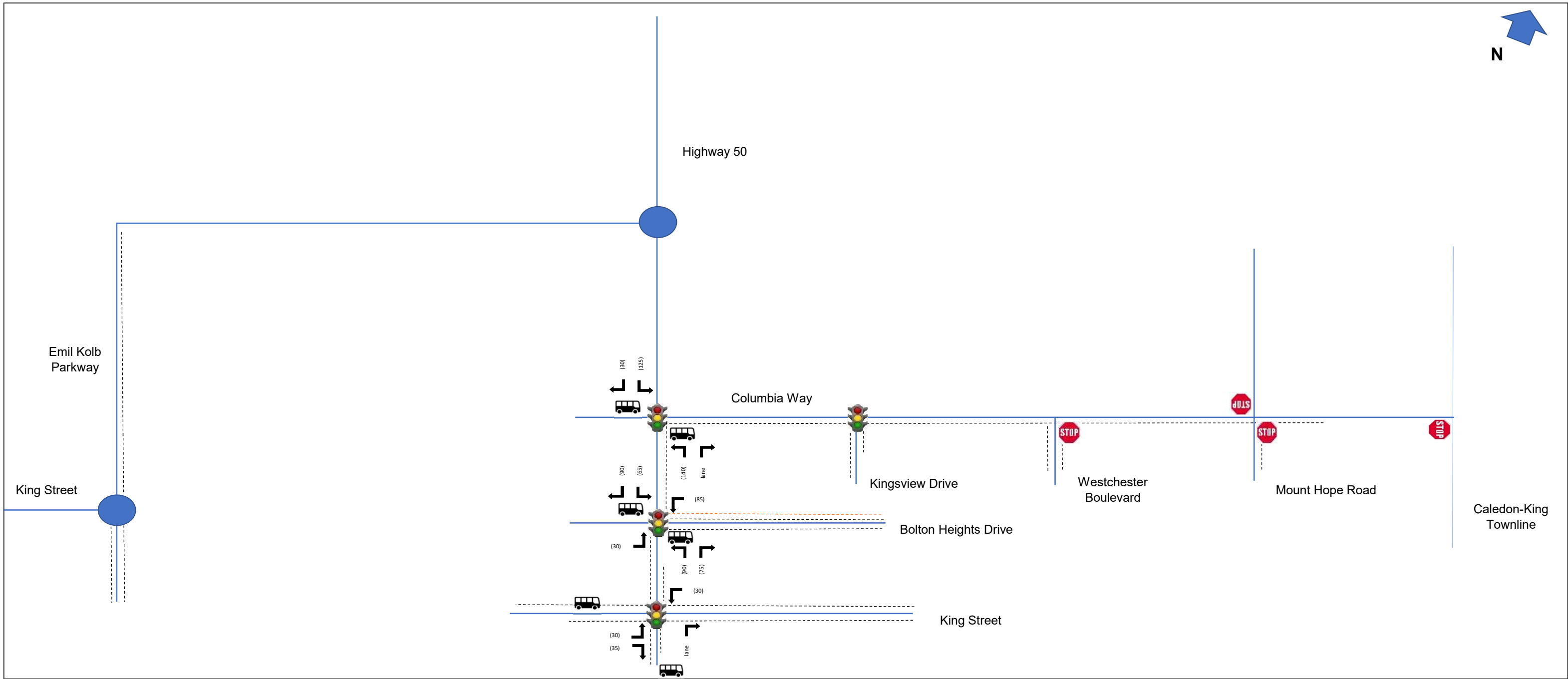


FIGURES

Enclosed.

- Figure 1:** Option 1/2 Concept Plan
- Figure 2:** Existing Boundary Road Network
- Figure 3:** 2017 Existing Traffic Volumes
- Figure 4:** 2031 Future Background Traffic Volumes
- Figure 5:** Future Background Roadway Improvements
- Figure 6:** Trip Assignment - Option 1/2 Lands
- Figure 7:** Required Roadway Improvements – Option 1/2 Lands
- Figure 8:** 2031 Future Total Traffic Volumes – Option 1/2 Lands
- Figure 9:** Future Road Network Layout
- Figure 10:** Trip Assignment - ROPA 30 Lands
- Figure 11:** 2031 Future Total Traffic Volumes – ROPA 30 Lands
- Figure 12:** Required Roadway Improvements – ROPA 30 Lands





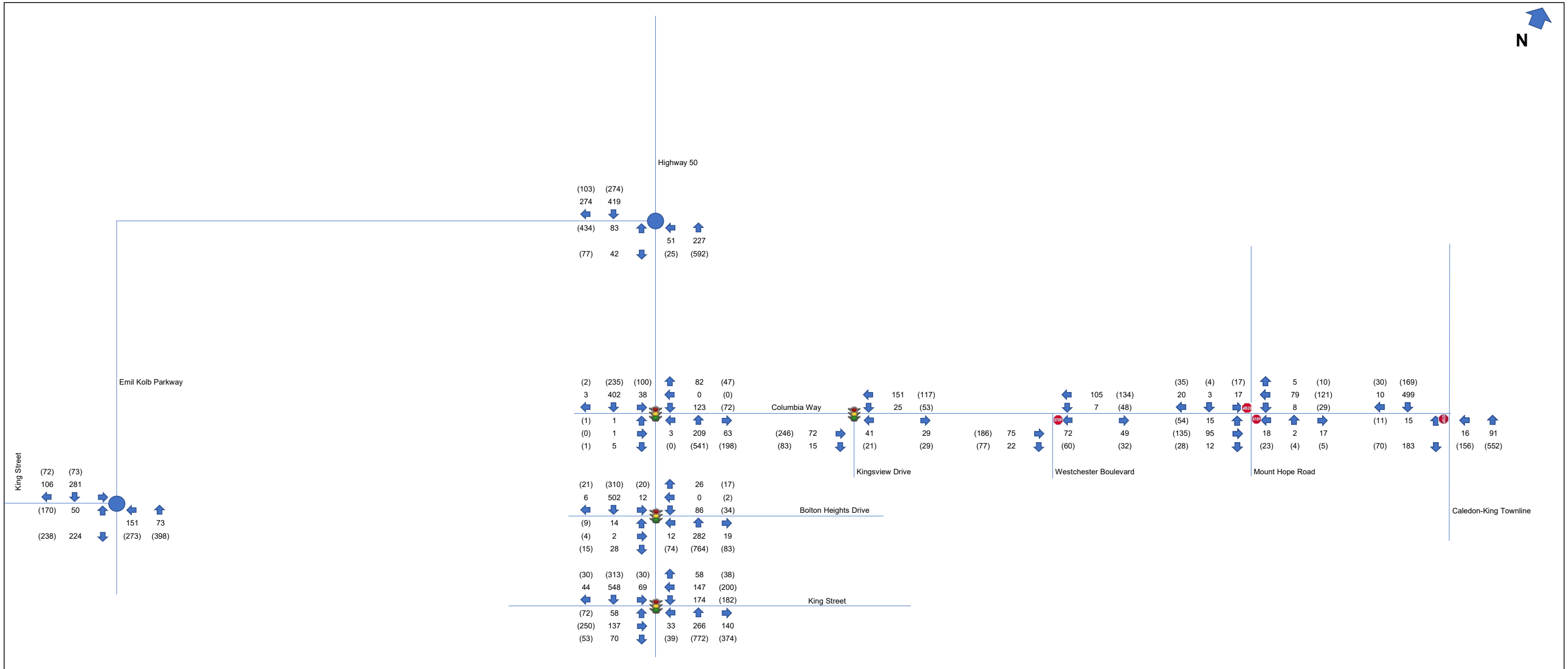
- LEGEND:**
- | | | | |
|--|--------------------------|--|------------------------------|
| | Traffic Signal | | Sidewalk |
| | Stop Control | | Bus Stop |
| | Roundabout | | Bike Lane/ Signed Bike Route |
| | Left Turn Lane (Storage) | | Right Turn Lane (Storage) |

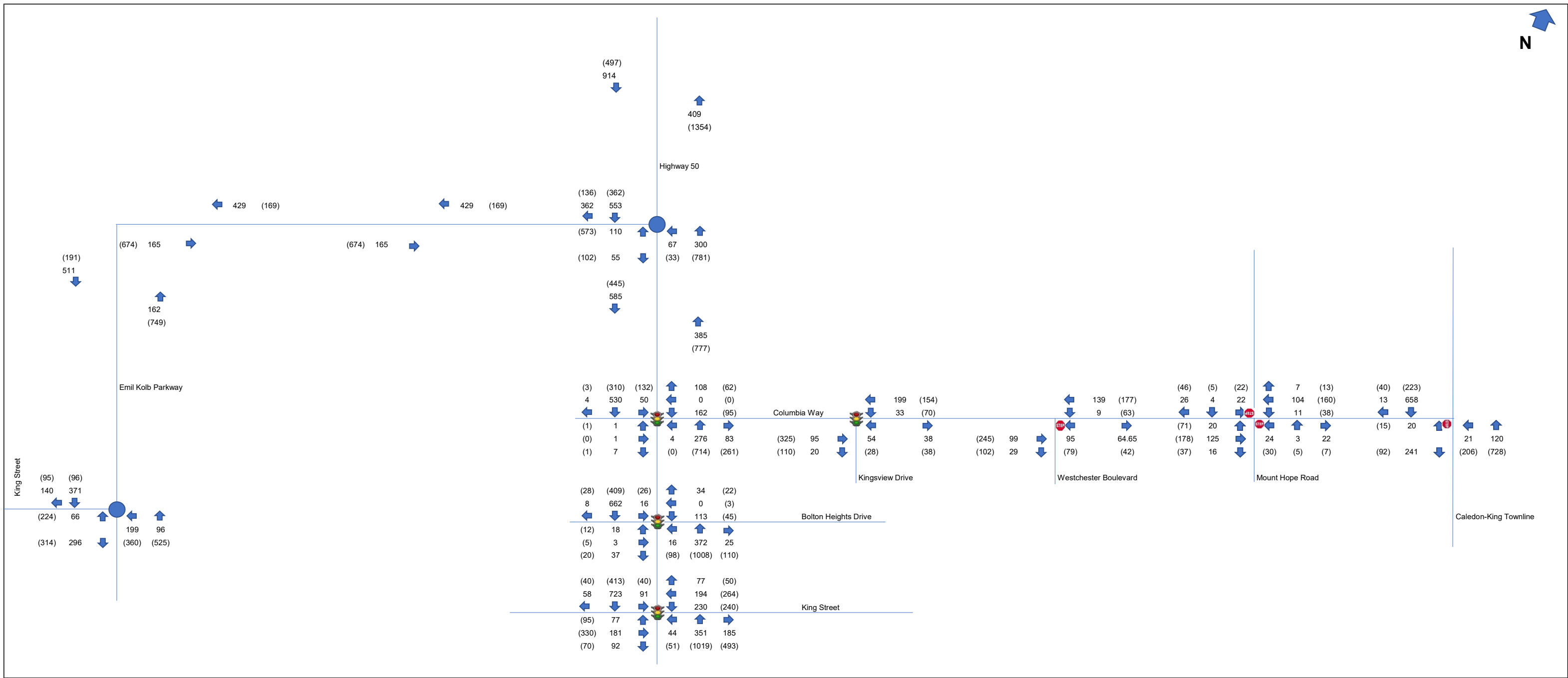
PROJECT:
BOLTON NORTH HILL

TITLE:
EXISTING BOUNDARY ROAD NETWORK



DATE:	2021-12-16	PROJECT #:	708-3446
PREP. BY:	KH	ID:	FIG 2





- LEGEND:**
- Traffic Signal
 - Stop Control
 - Roundabout

PROJECT: BOLTON NORTH HILL

TITLE: 2031 FUTURE BACKGROUND TRAFFIC VOLUMES

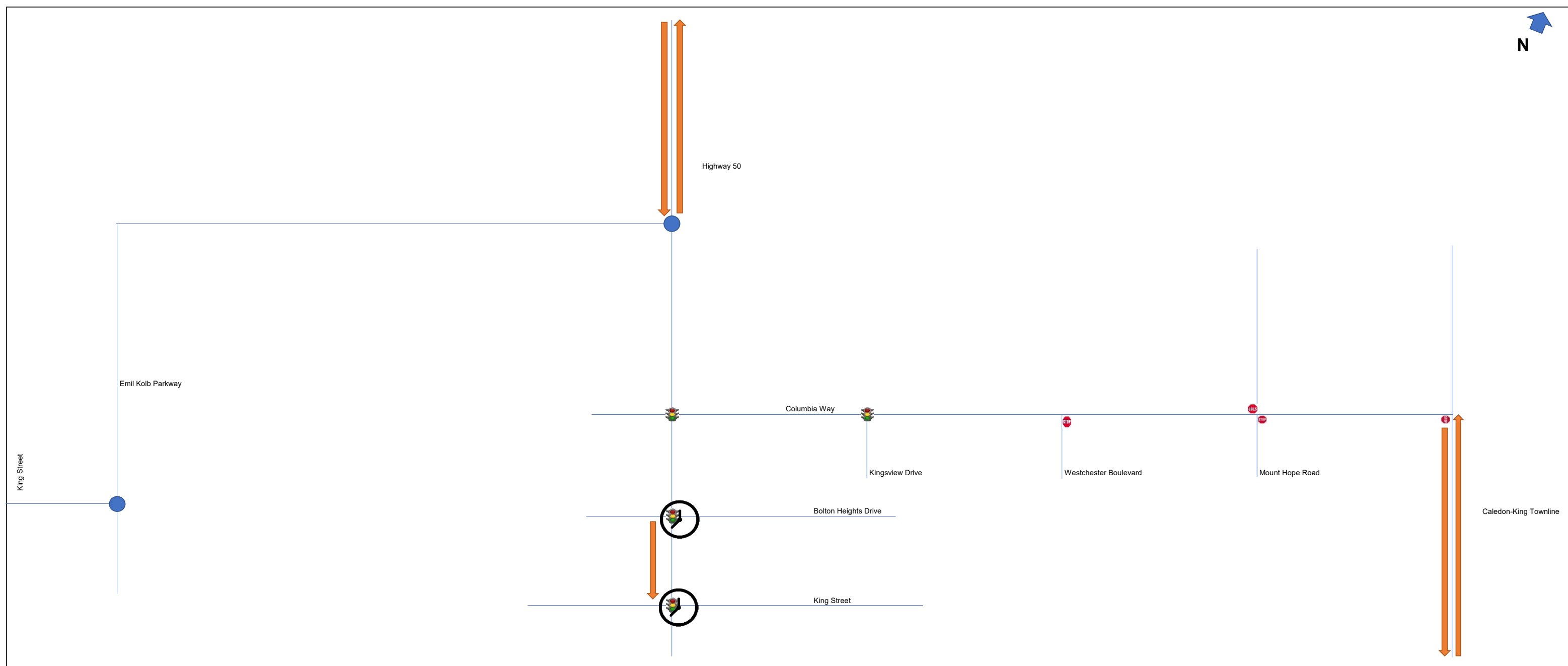


DATE: 2021-12-16

PREP: KH

PROJECT #: 708-3446

ID: FIG 4





Traffic Signal



Stop Control



Roundabout



Road Widening



Signal Timing Optimization

PROJECT:

BOLTON NORTH HILL

TITLE:

2031 FUTURE BACKGROUND ROADWAY IMPROVEMENTS



DATE:

2021-12-16

PREP.

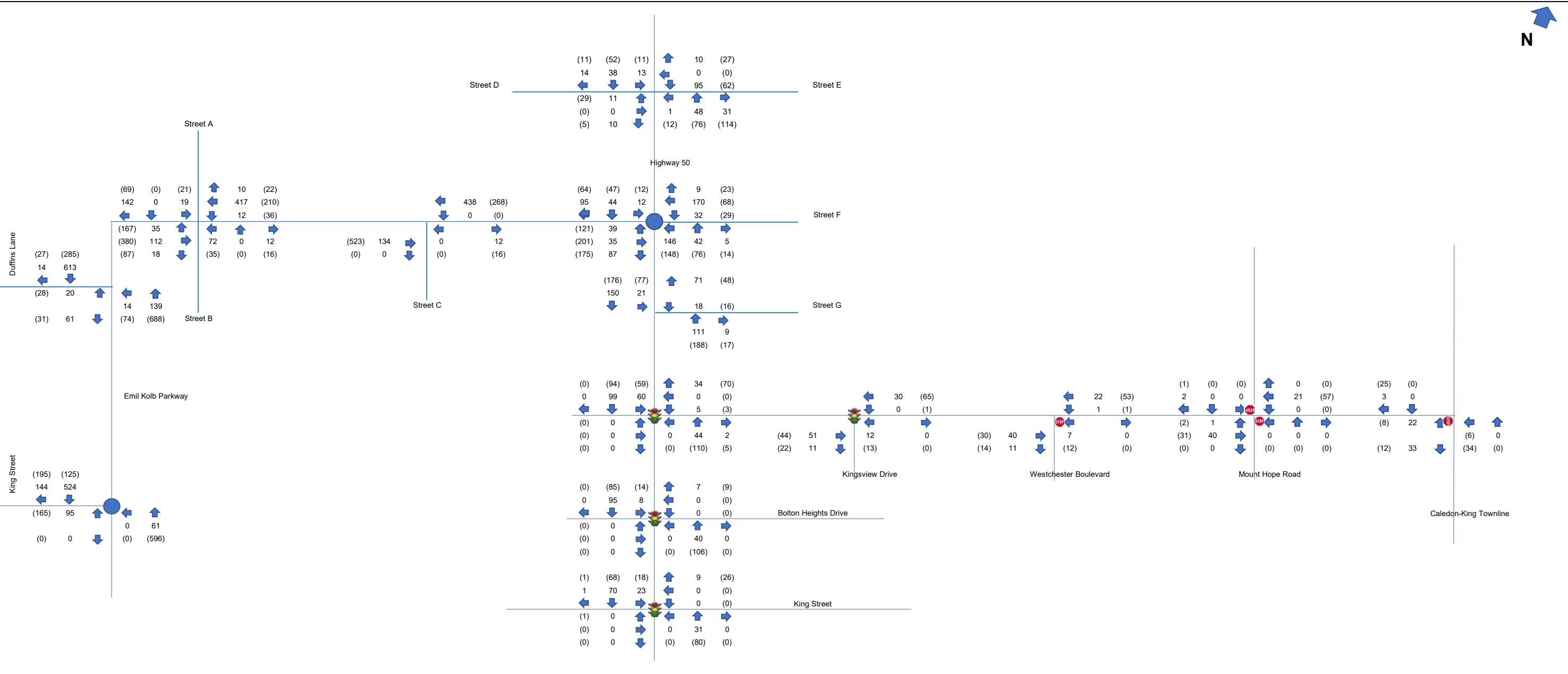
KH

PROJECT #:

708-3446

ID:

FIG 5



LEGEND:

- Traffic Signal
- Stop Control
- Roundabout

PROJECT: **BOLTON NORTH HILL**

TITLE: **TRIP ASSIGNMENT - OPTION 1/2 LANDS**

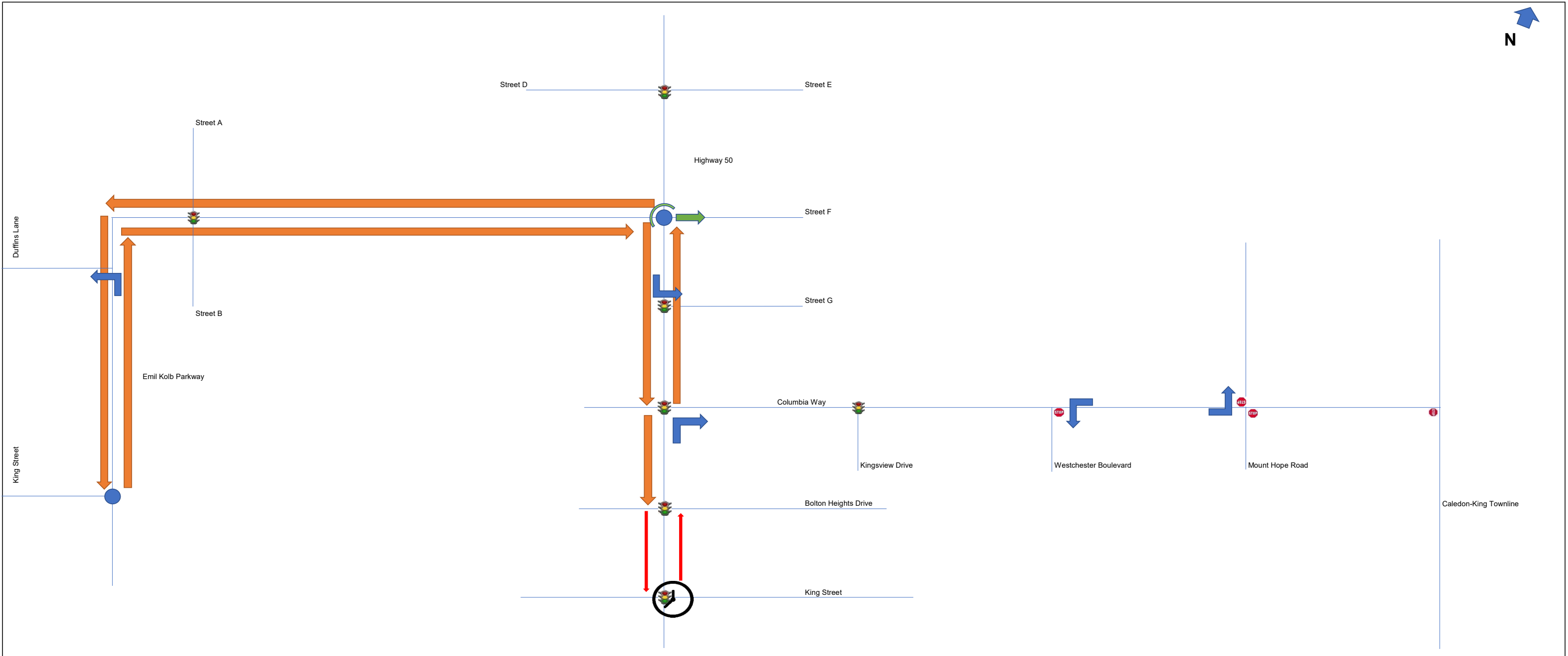
DATE: **2021-12-16**

PREP: **KH**

PROJECT #: **708-3446**

ID: **FIG 6**

CROZIER
CONSULTING ENGINEERS



LEGEND:

	Traffic Signal		Signal Timing Optimization	<p>PROJECT:</p> <p>BOLTON NORTH HILL</p> <p>REQUIRED ROADWAY IMPROVEMENTS - OPTION 1/2 LANDS</p>
	Stop Control		Turn Lane	
	Roundabout		Parking Restriction	
	Road Widening		Additional Roundabout Leg	
	Additional Roundabout Lane			

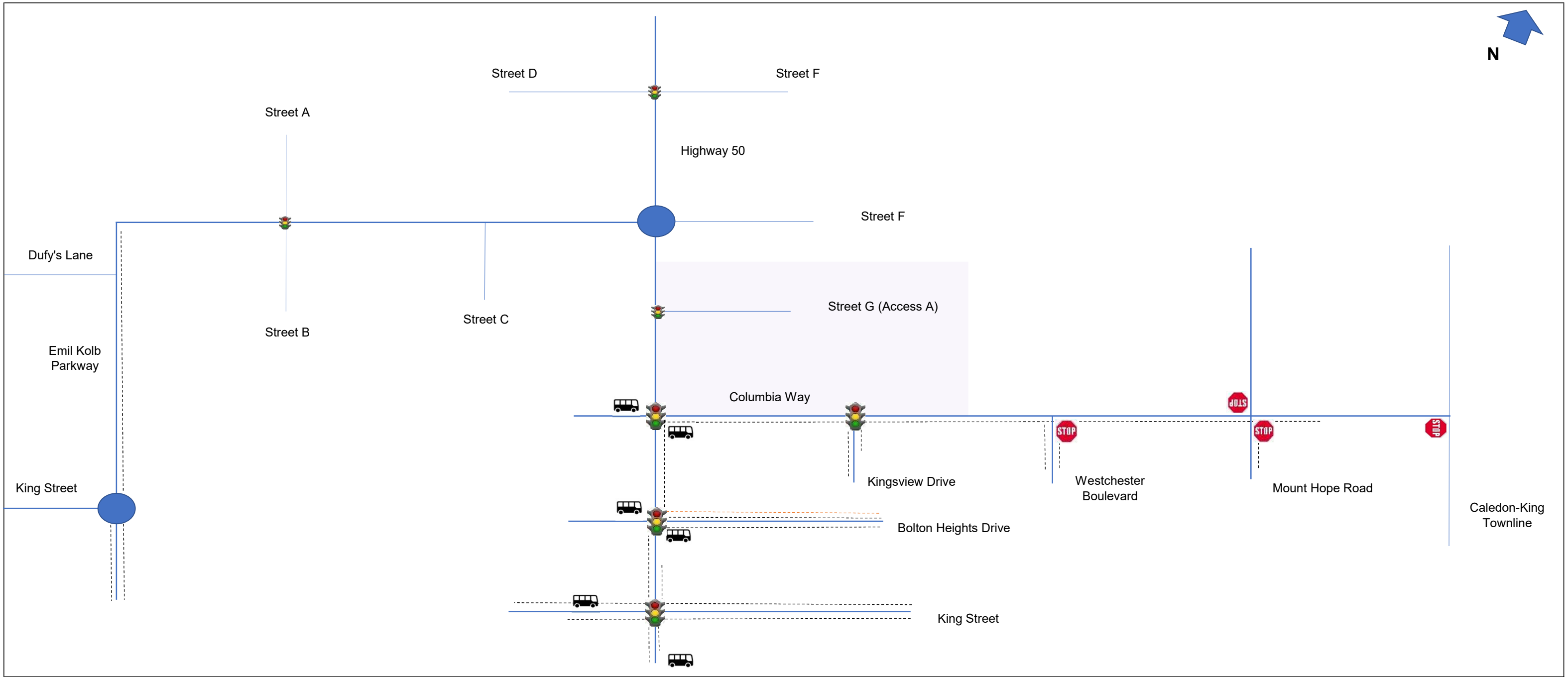
DATE: 2021-12-16

PREP: KH

PROJECT #: 708-3446

ID: FIG 7





LEGEND:

- | | | | |
|--|----------------|--|------------------------------|
| | Traffic Signal | | Roadway |
| | Stop Control | | Sidewalk |
| | Roundabout | | Bus Stop |
| | ROPA 30 Lands | | Bike Lane/ Signed Bike Route |

PROJECT:

BOLTON NORTH HILL

TITLE:

FUTURE ROAD NETWORK LAYOUT



DATE:

2021-12-16

PROJECT #:

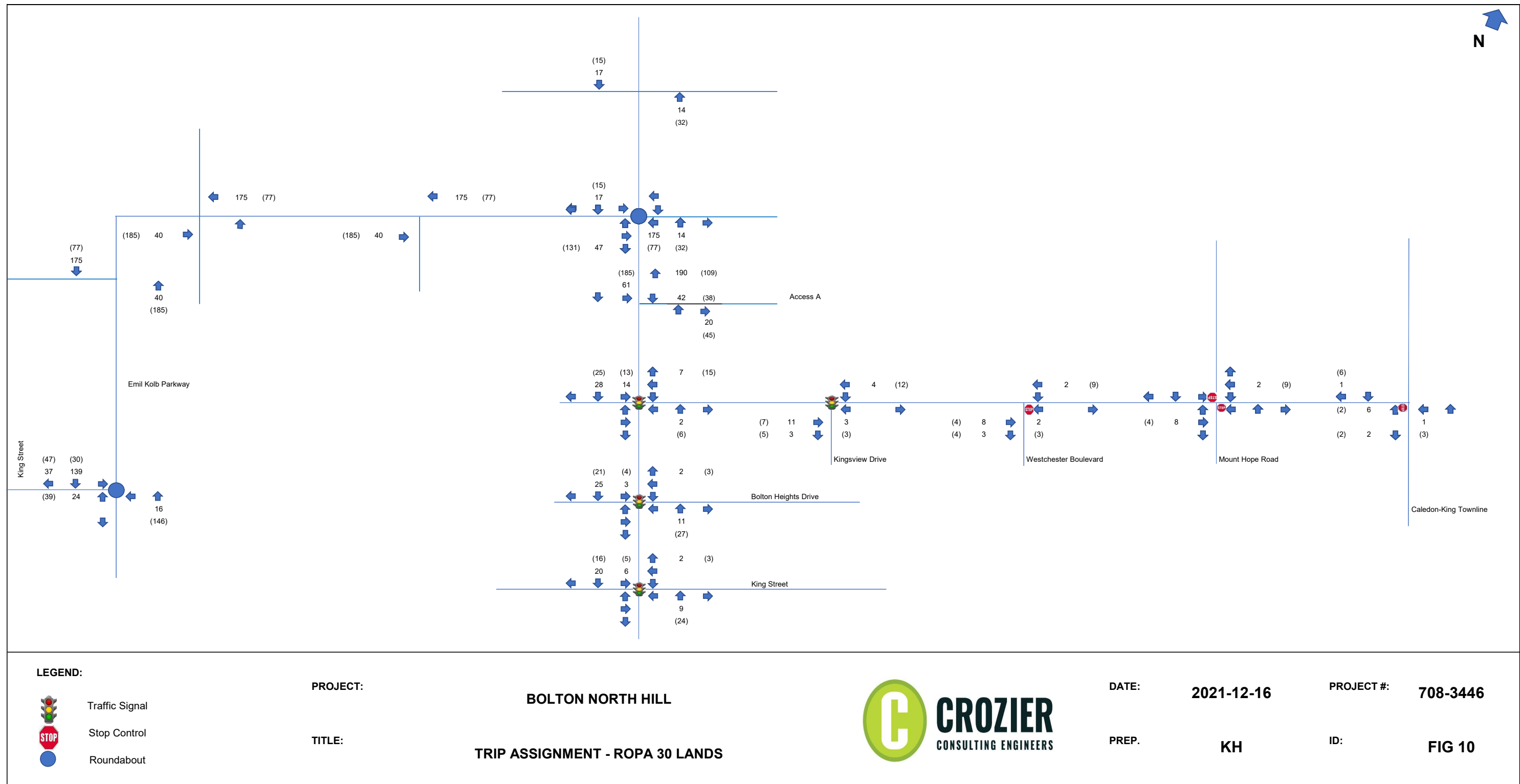
708-3446

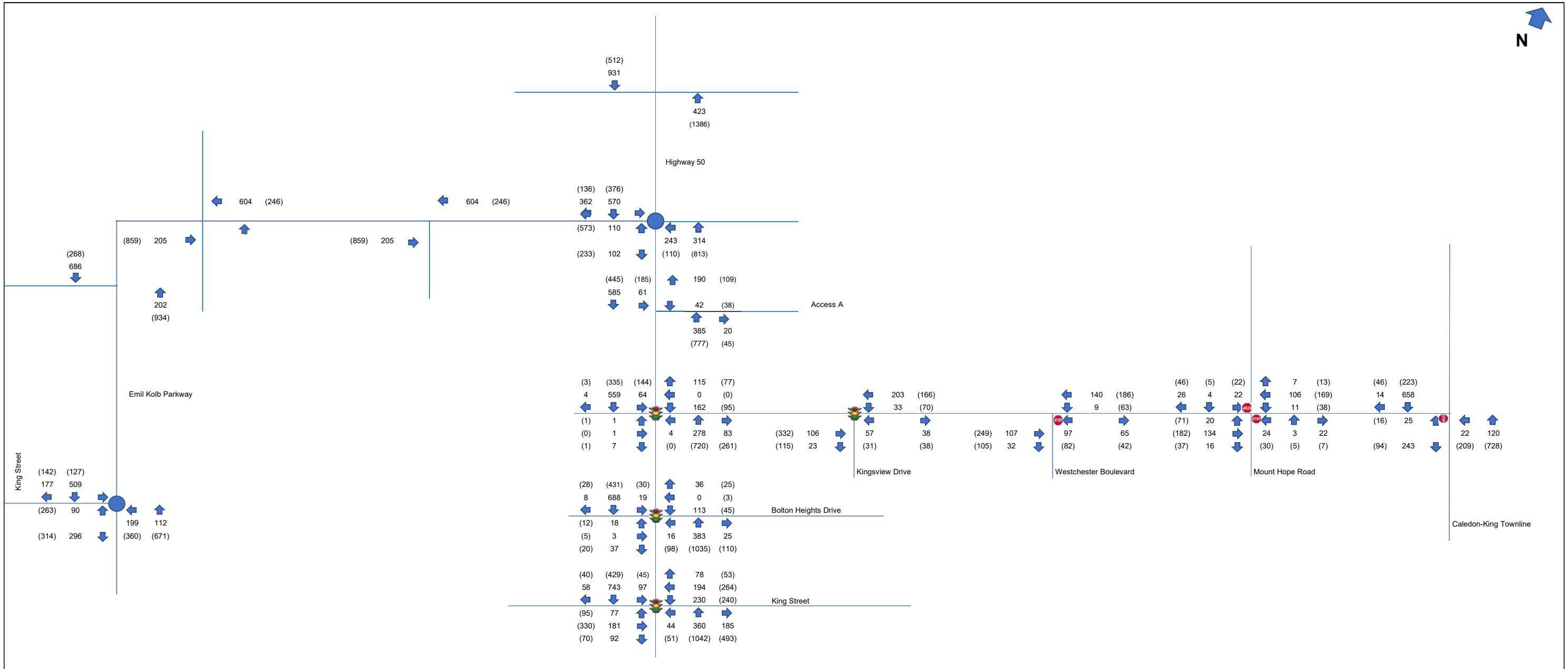
PREP.

KH

ID:

FIG 9





LEGEND:

- Traffic Signal
- Stop Control
- Roundabout

PROJECT: BOLTON NORTH HILL

TITLE: 2031 FUTURE TOTAL TRAFFIC VOLUMES - ROPA 30 LANDS

CROZIER
CONSULTING ENGINEERS

DATE: 2021-12-16

PREP. KH

PROJECT #: 708-3446

ID: FIG 11

