

TRANSPORTATION ASSESSMENT UPDATE

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

**TOWN OF CALEDON
REGION OF PEEL**

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

**PREPARED BY:
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**TOWN OF CALEDON
PLANNING
RECEIVED
Feb 19, 2025**



Revision Number	Date	Comments
Rev. 0	October 2020	LPAT Submission
Rev. 1	December 2021	Option 1/2 Assessment Submission
Rev. 2	February 2025	Second Submission

1.0 Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by the 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 'development') in the Town of Caledon, Region of Peel.

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. This updated assessment was undertaken to address changes to the Concept Plan (Bousfields Inc., January 27, 2025) as well as to update the study to address comments received from the Town of Caledon and Region of Peel on the December 2021 submission. The key findings of study are as follows:

2024 Existing Conditions

The following existing intersections were 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 Forest Gate Avenue
- Columbia Way and Caledon King Townline

The boundary road network is currently operating at overall acceptable levels of service with minor control delays and no critical movements. At the intersection of Highway 50 and King Street East/West, the 95th percentile queue lengths exceed the available storage in the westbound left-turn lane. These results indicate that under 2024 existing traffic operations, all intersections in the study area are currently operating efficiently with minimal delays and reserve capacity to accommodate future increases in traffic volume.

Background Developments

Through communications with the Region of Peel it was confirmed that the growth rate estimates account for growth based on the development of the ROPA 30 Bolton Residential Expansion Settlement Area. The Town of Caledon confirmed that proposed developments within the ROPA 30 boundary should not be double counted as background developments and within the network growth.

As such, a review of the background developments requested by the Town of Caledon was undertaken. A portion of the development of 14275 The Gore Road was carried forward as a background development as it sits outside the ROPA 30 boundary. It was also agreed that the inclusion of 14245 Highway 50 as a background development was acceptable as it will share a collector road with the greater development lands.

Planned Improvements

There are several studies that are currently ongoing, and improvements have been considered based on currently available information.

The 2019 Long Range Transportation Plan identified Highway 50 as maintaining a four lane cross-section. It is noted that the downtown core of Bolton provides one-lane in each direction with on-street parking under existing conditions. The Town of Caledon prepared a Queen Street Corridor Study Report in March 2019, which recommended maintaining the two-lane cross section in the Downtown Core in favour of increased active transportation facilities such as bike lanes and maintaining on-street parking. The Region of Peel is currently undertaking a Complete Corridor Study and Preliminary Design for Queen Street (Highway 50) from Queensgate Boulevard to Columbia Way. Since the public meeting in November 2023 there has been no further information of roadway design released. As such, the existing cross-section for Highway 50 has been maintained for the purposes of this assessment.

The Town of Caledon completed a Multi-Modal Transportation Master Plan in April 2024. Figure ES-1 of the report illustrated the planned widening of both Columbia Way and the Caledon King Townline (south of Columbia Way) to four lanes by the 2041 horizon. Both widenings have been assessed under the 2041 future background and future total horizons.

The Caledon Station Secondary Plan Transportation Study presents a future lane configuration of two through lanes per direction on King Street west of Emil Kolb. The widening has been assessed under the 2041 future background and future total horizons.

The Town's Multi-Modal Transportation Master Plan also identifies the planned GTA-West Transportation Corridor (Highway 413) with interchanges planned for Coleraine Drive and with Highway 427, both south of Bolton. The Highway has been identified within the planned improvements but any impact on existing travel patterns have not been assessed under future background and future total horizons.

2041 Future Background Conditions

The boundary road network is expected to operate at overall acceptable Levels of Service, with the exception of the intersection of Highway 50 and King Street, which is expected to operate at LOS "D", and a maximum volume-to-capacity ratio of 0.97 and 1.01 during the weekday a.m. and p.m. peak hours, respectively. Similar to the existing conditions, under both peak hours, the 95th percentile queue lengths are exceeding the designated storage length for the westbound left-turn lane at the intersection.

These operations are not uncommon at high-volume arterial roadway intersections in urban areas. As previously noted, the Region of Peel is undertaking an Environmental Assessment of the downtown area of Bolton, including the intersection of Highway 50 and King Street. The final cross-section of the roadways determined by the assessment and any additional recommendations are not known at this time. Monitoring of the intersection for signal optimization is recommended as development of Bolton continues over the next 20 years.

Site Generated Traffic

The proposed development is expected to generate 2,930 two-way trips during the weekday a.m. peak hour, and 3,573 two-way trips during the weekday p.m. peak hour at full build-out. Development volumes are dispersed onto the internal and external road networks. Collector roads internal to the Option 1 lands act as site accesses to the boundary road network.

Recommendations

No additional improvements were identified to support the build-out of the ROPA 30 lands. However, additional improvements are required on the boundary road network under 2041 future total conditions to improve traffic operations.

Multi-modal recommendations include the expansion of existing transit into the development area and the implementation of pedestrian and cycling facilities to promote active transportation connections to the existing services, pedestrian/cycling networks and trails within Bolton.

A capacity screening of the road network under 2041 future total conditions was conducted to identify any required road widening. Signal and turn lane warrants as well as a review of unmitigated operations was undertaken to determine further recommendations to support the increase of volumes on the boundary road network.

Table E1 outlines the road network recommendations and the anticipated timeline for the improvement.

E1: Recommendations

Roadway	Segment or Intersection	Recommendation	Timeline
Highway 50	Centennial Drive to Castlederg Side Road	Widening to a four-lane cross-section	Future Background – 2041 Horizon Year
	Columbia Way	Convert southbound right-turn lane to southbound through/right-turn lane	With Widening of Highway 50
		Northbound auxiliary right-turn lane (30 m storage length)	
	Bolton Heights	Convert southbound right-turn lane to southbound through/right-turn lane	
	King Street	Optimization of splits in the a.m. and p.m. peak hours	Future Total – 2041 Horizon Year
	Street A	Signalization	With construction of Street A
		Implemented left-turn lane in all directions based on traffic operations with the following storage lengths: - Eastbound (25 m) - Westbound (50 m) - Northbound (20 m) - Southbound (20 m)	
	Emil Kolb / Street B	Revised circulation/signage	With construction of Street B
	Street C	Signalization	With construction of Street C
		Implemented left-turn lane in all directions based on traffic operations with the following storage lengths: - Northbound (15 m) - Southbound (75 m) - Eastbound (15 m) - Westbound (25 m)	
	Street D	Implemented left-turn lane in the southbound directions (40 m storage length) based on warrants	With construction of Street D
Columbia Way	Kingsview Drive/Street G	Optimization of splits in the a.m. and p.m. peak hours	With construction of Street G

Roadway	Segment or Intersection	Recommendation	Timeline
	Mount Hope Road	Implemented left-turn lane in the eastbound/westbound directions (15 m storage length) based on warrants	With Widening of Mount Hope Road
	Forest Gate Avenue/Street I	Implemented left-turn lane in the eastbound/westbound directions (15 m storage length) based on warrants	With construction of Street I
Emil Kolb Parkway	Duffy's Lane to Highway 50	Widening to a four-lane cross-section	Future Background – 2041 Horizon Year
	Duffy's Lane	Signalization	Future Total – 2041 Horizon Year
		Convert southbound right-turn lane to southbound through/right-turn lane	With Widening of Emil Kolb Parkway
	Street E	Signalization	With construction of Street E
		Implemented left-turn lane in the eastbound/westbound directions (15 m storage length) based on traffic operations	
	Street F	Implemented left-turn lane in the eastbound/westbound directions (30 m storage length) based on warrants.	With construction of Street F

2041 Future Total Conditions

Under 2041 future total conditions, with the noted recommendations and mitigations, the study intersections are expected to operate with minimal delay and additional capacity with the exception of Highway 50 and Emil Kolb Parkway/Street B, Highway 50 and King Street, and Emil Kolb Parkway and Street F.

The intersection of Highway 50 and Emil Kolb/Street B is forecasted operate with an overall Level of Service 'A' in the a.m. peak hour and p.m. peak hours. However, in the p.m. peak hour the westbound leg of the intersection (Street B) is expected to experience significant delay, due to the high number of vehicles travelling northbound in the p.m. peak hour. Ongoing monitoring of the intersection should occur as unit are constructed to understand the actual impact of the fourth leg. It is also noted that the signalization of surrounding intersections, particularly Highway 50 and Street C to the south, will provide breaks in traffic flow, so the actual operations are anticipated to improve over the modeling results presented above.

Similar to the future background operations the intersection of Highway 50 and King Street is expected to operate at capacity with extended delays for several movements. The recommendations of the Queen Street Environmental Assessment should be considered before further mitigation are made. It is expected that additional through lanes would improve operations, however the Town of Caledon is in favour of maintaining the two-lane cross-section and providing additional active transportation facilities. Significant delay may encourage more users to by-pass downtown Bolton in favour of parallel routes, which would be supported by future Highway 413 interchanges.

Street F and Emil Kolb Parkway experiences 65.7s of delay for northbound outbound vehicles. The intersection was not recommended for signalization due to its proximity to Street E. Users may decide to favour the signalized intersection of Street E and Emil Kolb Parkway, if the delay at Street F is significant. It is also noted that the Region may require restricted movements at the access, therefore impacting the operations. The intersection, its spacing and operations, can be further reviewed when associated Draft Plans are prepared.

It is noted that the 2041 operations are reviewing 17 years of sustained growth and the addition of more than 4,300 residential units on the Highway 50 corridor; approximately half the number of existing private dwellings in the community of Bolton. Ongoing monitoring with the build-out of the ROPA 30 lands and into the future horizons is recommended to capture changes in travel behaviour and traffic patterns within the community.

Multi-Modal Conditions

The collector roads are proposed to have 20 m Right-of-Ways (ROW) and local roads are proposed to have 18 m ROWs. The Town of Caledon is updating their ROW cross-sections to incorporate improved active transportation facilities. Town staff indicated that they were open to cross-section recommendations as part of the secondary plan.

The 18 m local road cross-section is proposed to have 1.8 m sidewalks on both sides of the roadway and a pavement width of 9.0 m, accommodating 2.4 m of street parking on one side of the roadway and 3.3 m travel lanes in each direction. On-road, shared cycling can be accommodated within the provided width.

The 20 m collector road has two cross-sections proposed. The first cross-section proposed the use of 2 m sidewalks and 2.9 m boulevards on both sides of the roadway. Pavement width of 10.2 m provides a 3.3 m travel lane in each direction with a 1.5 m bike lane and 0.3 m buffer on each side of the road. The second cross-section proposes a 3 m multi-use trail both sides of the road with a 2.5 m boulevard. A pavement width of 9 m accommodates 2.4 m of street parking on one side of the roadway and 3.3 m travel

Extension of the existing multi-use path on Highway 50 is recommended along the site frontage to Street A. The use of cross-ride pavement markings and/or pedestrian/cycling signal heads is recommended to be considered for detailed design.

While the Town of Caledon does not have a bike parking requirement within their Zoning By-Law, bike parking should be provided for high density residential units as well as commercial and institutional buildings to promote cycling as an alternative for motor vehicle trips.

Expansion of Brampton Transit Route 41 through the development will provide transit coverage within 400 m of walking distance to the majority of the development. Future expansion of transit within Caledon and the proposed GO Transit Station will provide an increase in multi-modal travel option for the development and the existing community of Bolton.

Conclusion

The proposed Bolton North Hill development can be accommodated on the boundary road network with the noted recommendations and ongoing monitoring. Future reports prepared to support Subdivision Draft Plan Applications and Site Plan Applications can monitor experienced growth as well as provide greater detail regarding mitigations and timelines required to support the construction and occupancy of the development.

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2.0 Introduction

2.1 Background and Purpose

C.F. Crozier & Associates Inc. (Crozier) was retained by the 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 'development') in the Town of Caledon, Region of Peel. The development is located 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 the development and to determine if mitigation measures are required on the boundary road network to support the development into the future.

This updated assessment was undertaken to address changes to the Concept Plan (Bousfields Inc., January 27, 2025) as well as to update the study to address comments received from the Town of Caledon and Region of Peel on the December 2021 submission. **Figure 1** illustrates the January 2025 Concept Plan. **Appendix A** includes a Comment Response Matrix for reference.

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. 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.

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 B** illustrates the original Bolton Residential Expansion areas.

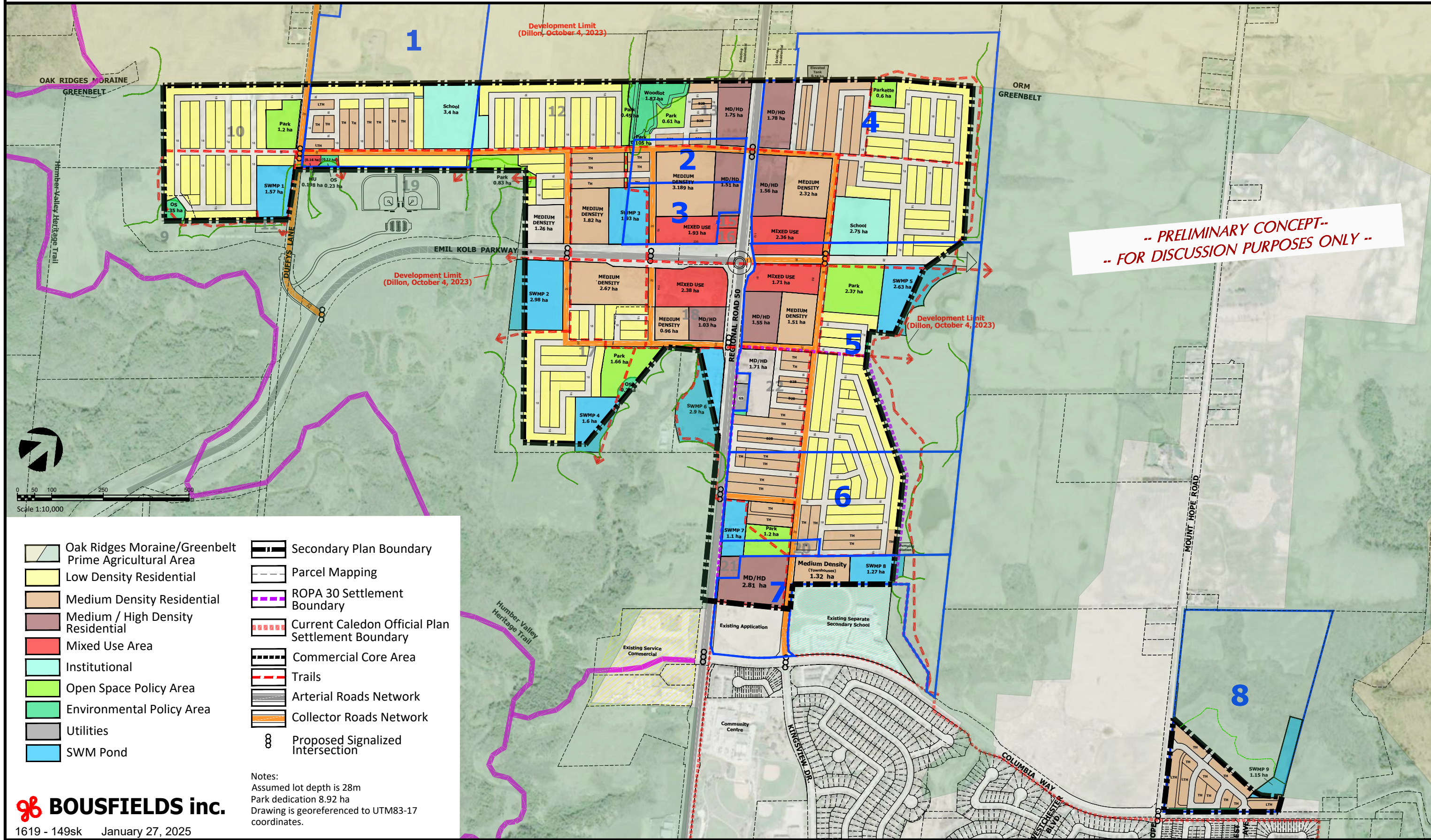
2.3 Study Area

The Option 1 Lands are approximately 171 ha and are located along Regional Road 50, north of Columbia Way, extending west to the north and south of Emil Kolb Parkway and west of Duffy's Lane. The 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 development 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.

Bolton North Hill Secondary Plan

Detailed Concept Plan



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 January 2025 Concept Plan and unit yields were provided by Bousfields. Non-participating areas included in the Option 1/2 lands have also been considered and included. **Table 1** summarizes the unit counts for the various land uses within the Bolton North Hill development.

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

Owner	Single-Detached	Townhouses	Apartments
1328272 Ontario Ltd.	88	135	0
Ballymore Building (Bolton) Corp.	0	40	112
F.P.L.E.T. Group Inc.	0	0	229
14685 Hwy 50 Inc.	269	199	427
Oakbank Estates Inc.	181	175	455
Marhome Ventures	126	217	0
Georgian Humbervale	0	0	147
Cold Creek Developments	0	126	0
Remaining Developments East	624	130	685
Remaining Developments West	0	7	22
Total	1,288	1,029	2,078

A total of 8.58 ha has been designated as mixed-use and have been considered for commercial uses. Additionally, there are two school blocks proposed in lands, one public school block of 3.40 ha west of Highway 50 and one Catholic school block of 2.75 ha east of Highway 50.

3.0 Existing Conditions

An analysis of existing conditions has been completed to understand how the road network is currently operating.

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 Forest Gate Avenue
- Columbia Way and Caledon King Townline

3.2 Boundary Road Network

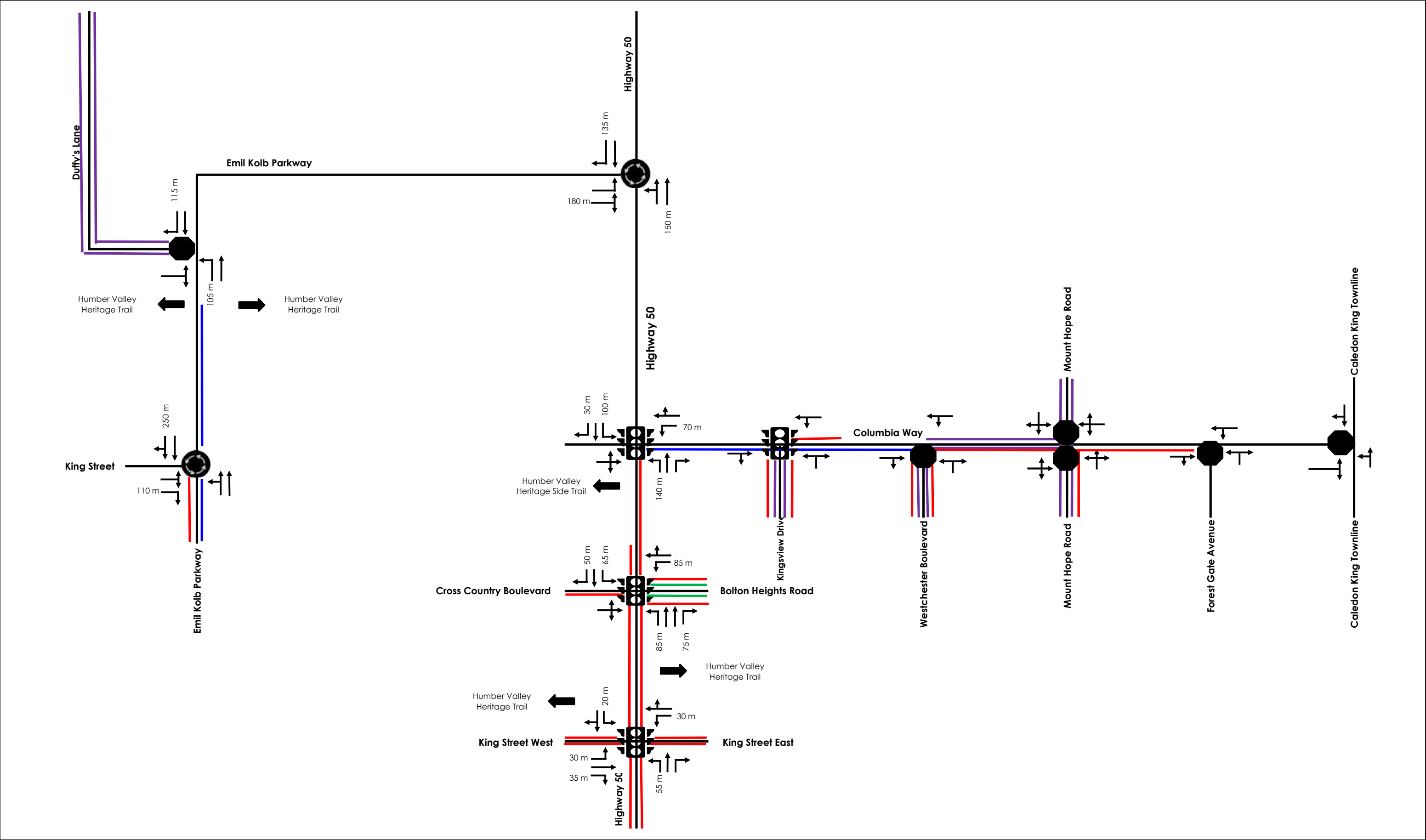
The boundary road network at the site frontage is described in **Table 2**.

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 (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)	Collector	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)	Collector	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

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



Legend:	Trail Head	Turn Lane Parallel Length
Sidewalk	Signalized Intersection	Movement per Lane
Bike Lane	Stop-Controlled Intersection	Roundabout
On-Street Cycling Multi-Use Path		

Bolton North Hill	CROZIER CONSULTING ENGINEERS	Figure 2
Existing Boundary Road Network		Project No. 708-3446 Date: June 2024 Analyst: KH

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.

It is noted that on-street parking is currently permitted on Highway 50 (Queen Street) from Mill Street to King Street within the downtown area.

3.3 Transit Operations

Brampton Transit operates Route 41 between Columbia Way in Bolton and Highway 7 in Brampton. The route is only serviced during peak commuter hours and trips can be planned through the Triplinx website linked on the Town of Caledon’s website.

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, with connection to Union 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.

Assistive transportation services are also available to seniors and residents with disabilities through the Region of Peel’s Transhelp and the Town’s Caledon Community Services.

Table 3 outlines the existing transit routes in the study area.

Table 3: Existing Transit Services

Route	Direction	Span	Operation	Bus Stops in Development Area
Brampton Transit Route 41	Two-way (North/South)	Columbia Way/Bolton Heights to Queen Street/Highway 7	Weekday a.m. and p.m. peak hours	Kingsview Dr @ Columbia Way Highway 50 @ Caledon Recreation Centre
Go Transit Route 38	Two-Way (North/South)	Highway 50 and Columbia Way to Malton Go Station	Weekday at 5:05 and 6:05 a.m. and 5:17 and 7:37 pm	Highway 50 @ Columbia Way

The boundary road network in **Figure 2** illustrates the existing bus stop locations in the study area. **Appendix C** 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	Multi-Use Path on south side of the roadway	Highway 50 to Forest Gate Avenue (with sections of grass boulevard and behind guardrail)
	On-street cycling route	Kingsview Drive to Mount Hope Road
Kingsview Drive	Paved sidewalk on both sides of roadway	Columbia Way to Taylorwood Avenue, sidewalk on at least one side to Hathaway Court
	On-street cycling route	Columbia Way to Longwood Drive
Westchester Boulevard	Paved sidewalk on both sides of roadway	Columbia Way to Egan Crescent
	On-street cycling route	Columbia Way to Guardhouse Drive
Mount Hope Road	Paved sidewalk on east side of roadway	Columbia Way to Guardhouse Drive
	On-street cycling route	Castlederg Side Road to Guardhouse Drive
Bolton Heights Road	Paved sidewalk on both sides of roadway	Highway 50 to Kingsview Drive
	Painted bike lanes on both sides of the roadway	
Duffy's Lane	On-street cycling	Castlederg Side Road to Emil Kolb Parkway
Emil Kolb Parkway	Multi-Use Path on east side of the roadway	South of King Street to the Humber Valley
Humber Valley Heritage Trail	Multi-use trail	Spanning from Emil Kolb Parkway to Albion Vaughn Road with a network of side trails

The boundary road network in **Figure 2** illustrates the existing pedestrian and cycling facilities in the study area.

There are also 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, 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.

Appendix C 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 on April 4th, 2024, 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.

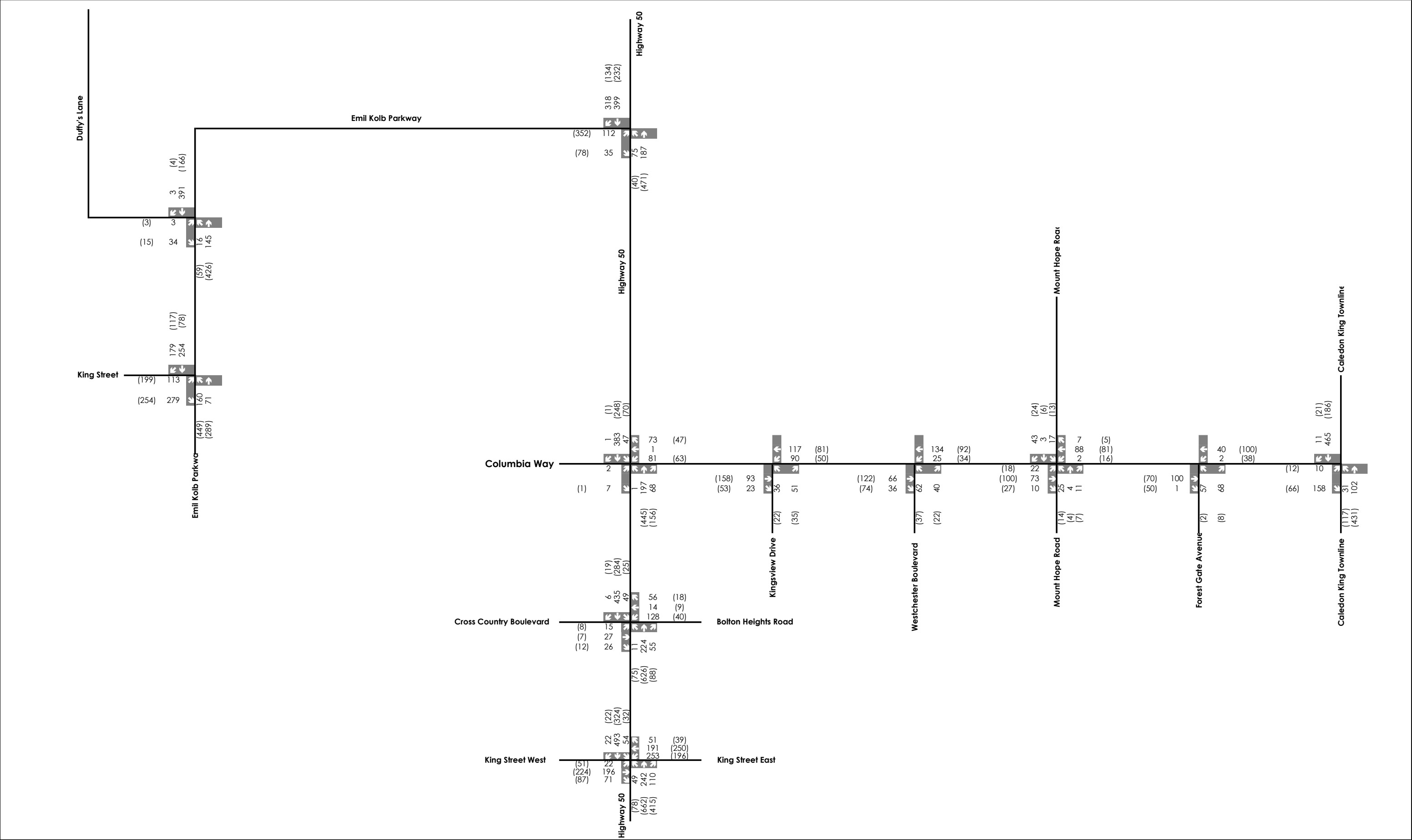
Table 5 outlines the TMC count dates and signal timing plan preparation date for each study intersection.

Table 5: Summary of Traffic Data

Intersection	Signal Timing Plan Date	TMC Count Date
King Street and Emil Kolb Parkway	N/A (roundabout)	April 4 th , 2024
Highway 50 and Emil Kolb Parkway	N/A (roundabout)	
Highway 50 and Columbia Way	August 1, 2017	
Highway 50 and Bolton Heights Road	June 3, 2024	
Highway 50 and King Street East/West	June 3, 2024	
Columbia Way and Kingsview Drive	May 28, 2024	
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)	

Appendix D contains the traffic count data and signal timing plans. **Figure 3** illustrates the 2024 existing traffic volumes.

It should be noted that volumes at the intersection of Columbia Way and Forest Gate were derived from the surrounding intersection of Columbia Way/Mount Hope Road and Columbia Way/Caledon King Townline. The intersection will gain a fourth leg with the development of a site access to the north which is assessed under 2041 future total operations.



3.6 Traffic Modelling

The assessment of signalized and stop controlled intersections was undertaken with Synchro modelling software and intersection operations were derived from Synchro using HCM2000 methodology. The network was modelled in Synchro Version 11 in conformance with the modelling guidelines within the Region of Peel's Traffic Impact Study Guidelines.

The critical volume-to-capacity (v/c) ratio is considered to be the maximum ratio for movements at the intersection. 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, respectively. Movements exceeding the Region's threshold have been highlighted. The 95th percentile queue lengths were also derived from Synchro.

The assessment of roundabout intersections was conducted using the Junctions 8 (ARCADY) roundabout software. Roundabout geometrics were estimated from the existing roundabouts.

3.7 Level of Service

The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU) and the Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM2000). The Level of Service for a roundabout is based on the average delay per arriving vehicle. **Appendix E** outlines the Levels of Service (LOS) for unsignalized, signalized, and roundabout intersections.

3.8 Peak Hour Factors

The updated Traffic Impact Study and Modelling Guidelines from the Region no longer list a peak hour factor to be applied to the study intersections. As such, **Table 6** outlines the peak hour factors calculated for the study intersections.

Table 6: Peak Hour Factors

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	Hour	Factor	Hour	Factor
King Street and Emil Kolb Parkway	7:30 a.m. - 8:30 a.m.	0.95	4:45 p.m. - 5:45 p.m.	0.90
Highway 50 and Emil Kolb Parkway	7:45 a.m. - 8:45 a.m.	0.96	4:45 p.m. - 5:45 p.m.	0.91
Highway 50 and Columbia Way	7:45 a.m. - 8:45 a.m.	0.92	4:45 p.m. - 5:45 p.m.	0.96
Highway 50 and Bolton Heights Road	7:45 a.m. - 8:45 a.m.	0.83	4:45 p.m. - 5:45 p.m.	0.97
Highway 50 and King Street	8:00 a.m. - 9:00 a.m.	0.94	4:45 p.m. - 5:45 p.m.	0.97
Columbia Way and Kingsview Drive	7:45 a.m. - 8:45 a.m.	0.83	5:00 p.m. - 6:00 p.m.	0.91
Columbia Way and Westchester Boulevard	7:45 a.m. - 8:45 a.m.	0.80	5:00 p.m. - 6:00 p.m.	0.92
Columbia Way and Mount Hope Road	7:45 a.m. - 8:45 a.m.	0.82	5:00 p.m. - 6:00p.m.	0.95
Columbia Way and Caledon King Townline	7:30 a.m. - 8:30 a.m.	0.94	4:15 p.m. - 5:15 p.m.	0.97
Emil Kolb Parkway and Duffy's Lane	7:30 a.m. - 8:30 a.m.	0.90	4:45 p.m. - 5:45 p.m.	0.84

It is noted that the morning bell (8:12 a.m.) of the St. Michael Catholic Secondary School aligns with the a.m. peak hour. The afternoon bell (2:15) is outside of the p.m. peak hour of the network.

3.9 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 F**.

Table 7 outlines the 2024 existing traffic operations.

Table 7: 2024 Existing Traffic Operations

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	LOS	V/C Ratio	Delay (s)
King Street and Emil Kolb Parkway	Overall	A	-	0.73	A	-	1.19
	SB	A	-	0.68	A	-	1.11
	NB	A	-	0.71	A	-	1.58
	EB	A	-	0.78	A	-	0.59
Highway 50 and Emil Kolb Parkway	Overall	A	-	0.92	A	-	0.79
	EB	A	-	1.01	A	-	0.71
	SB	A	-	1.09	A	-	0.64
	NB	A	-	0.41	A	-	0.95
Highway 50 and Columbia Way	Overall	A	0.55	9.9	A	0.44	6.2
	EBLTR	A	0.07	1.0	A	0.00	0.00
	WBL	E	0.55	57.9	D	0.44	0.44
	WBTR	B	0.32	13.0	A	0.10	0.10
	NBL	A	0.00	4.0	-	-	-
	NBT	A	0.15	4.0	A	0.31	0.31
	NBR	A	0.06	1.1	A	0.12	0.12
	SBL	A	0.06	4.0	A	0.10	0.10
	SBT	A	0.29	4.8	A	0.17	0.17
Highway 50 and Bolton Heights Road	SBR	A	0.00	0.0	A	0.00	0.00
	Overall	B	0.43	19.8	A	0.23	8.2
	EBL	-	-	-	-	-	-
	EBTR	C	0.34	31.5	C	0.11	24.0
	WBL	C	0.38	34.4	D	0.21	39.9
	WBTR	B	0.19	10.1	B	0.11	18.6
	NBL	C	0.03	28.5	A	0.09	7.6
	NBT	C	0.12	22.2	A	0.23	6.7
	NBR	B	0.06	15.7	A	0.07	2.4
	SBL	B	0.08	13.0	A	0.04	8.2
	SBT	B	0.43	15.3	A	0.20	7.2
	SBR	A	0.01	0.0	A	0.02	0.3
Highway 50 and King Street	Overall	C	0.79	32.5	C	0.81	33.9
	EBL	C	0.08	25.2	C	0.20	30.0
	EBT	E	0.76	64.8	E	0.81	76.8
	EBR	A	0.23	3.5	A	0.27	4.7

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	LOS	V/C Ratio	Delay (s)
	WBL	D	0.79	48.3	D	0.61	40.0
	WBTR	D	0.59	43.5	D	0.69	54.3
	NBL	B	0.15	12.1	B	0.16	14.5
	NBT	C	0.31	20.8	D	0.75	35.1
	NBR	A	0.16	4.1	A	0.49	8.9
	SBL	B	0.09	11.5	B	0.12	15.0
	SBTR	C	0.64	27.4	C	0.43	27.3
Columbia Way and Kingsview Drive	Overall	A	0.32	8.1	A	0.20	6.7
	EBTR	A	0.11	4.0	A	0.18	4.5
	WBTL	A	0.24	5.7	A	0.13	5.0
	NBLR	B	0.32	19.2	B	0.20	18.8
Columbia Way and Westchester Boulevard	Overall	B	-	-	B	-	-
	EBTR	--	0.07	0.0	-	0.13	0.0
	WBTL	A	0.02	1.3	A	0.03	2.2
	NBLR	B	0.17	10.9	B	0.09	10.6
Columbia Way and Mount Hope Road	Overall	B	-	-	B	-	-
	EBLTR	A	0.02	1.7	A	0.01	1.0
	WBLT	A	0.00	0.1	A	0.01	1.3
	NBLTR	B	0.07	10.9	B	0.04	10.5
	SBLTR	A	0.09	9.9	A	0.06	9.8
Columbia Way and Caledon King Townline	Overall	B	-	-	B	-	-
	EBLR	B	0.32	14.5	B	0.12	11.3
	NBTL	A	0.03	2.2	A	0.09	2.4
	SBTR	--	0.30	0.0	-	0.13	0.0
Emil Kolb Parkway and Duffy's Lane	Overall	B	-	-	B	-	-
	EBLR	B	0.07	11.4	B	0.03	10.7
	NBL	A	0.02	8.5	A	0.05	7.0
	NBT	--	0.09	0.0	-	0.30	0.0
	SBT	--	0.26	0.0	-	0.12	0.0
	SBR	--	0.00	0.0	-	0.00	0.0

Table 8: 2024 Existing Queuing

Intersection	Storage Length	95 th Percentile Queue	
		A.M. Peak Hour	P.M. Peak Hour
King Street and Emil Kolb Parkway	-	SB – 3.1 m NB – 7.5 m EB – 3.0 m	SB – 1.4 m NB – 14.7 m EB – 4.4 m
Highway 50 and Emil Kolb Parkway	-	EB – 7.5 m SB – 9.5 m NB – 7.5 m	EB – 2.5 m SB – 0.4 m NB – 6 m
Highway 50 and Columbia Way	WBL – 70 m NBL – 140 m SBL – 100 m SBR – 30 m	WBL – 34 m NBL – 1 m SBL – 7 m SBR – 0 m	WBL – 26 m NBL – 0 m SBL – 8 m SBR – 0 m
Highway 50 and Bolton Heights Road	WBL – 85 m NBL – 85 m NBR – 75 m SBL – 65 m SBR – 50 m	WBL – 31 m NBL – 8 m NBR – 15 m SBL – 16 m SBR – 0 m	WBL – 14 m NBL – 18 m NBR – 8 m SBL – 8 m SBR – 1 m
Highway 50 and King Street	EBL – 30 m EBR – 35 m WBL – 30 m NBL – 55 m SBL – 20 m	EBL – 9 m EBR – 5 m WBL – 75 m NBL – 12 m SBL – 7 m	EBL – 18 m EBR – 7 m WBL – 58 m NBL – 20 m SBL – 10 m
Columbia Way and Kingsview Drive	-	-	-
Columbia Way and Westchester Boulevard	-	-	-
Columbia Way and Mount Hope Road	-	-	-
Columbia Way and Caledon King Townline	-	-	-
Emil Kolb Parkway and Duffy's Lane	NBL – 105 m SBR – 115 m	NBL – 1 m SBR – 0 m	NBL – 1 m SBR – 0 m

The boundary road network is currently operating at overall acceptable levels of service with minor control delays and no critical movements. At the intersection of Highway 50 and King Street East/West, the 95th percentile queue lengths exceed the available storage in the westbound left-turn lane. These results indicate that under 2024 existing traffic operations, all intersections in the study area are currently operating efficiently with minimal delays and reserve capacity to accommodate future increases in traffic volume.

4.0 Future Background Conditions

A future background analysis is used to determine the impact of growth on the boundary road network without the addition of volumes generated by the proposed development.

4.1 Background Studies

A number of background studies were reviewed to understand the future conditions and overall transportation planning strategy for the study area. The following reports were reviewed and are referenced:

- Queen Street (Highway 50) from Queensgate Boulevard to Columbia Way, Bolton Complete Corridor Study and Preliminary Design (Region of Peel, ongoing)
- Columbia Way Class Environmental Assessment Study (Town of Caledon, 2021)
- Town of Caledon Active Transportation Master Plan (2024)

- Town of Caledon Transportation Master Plan (2017)
- Town of Caledon Multi-Modal Transportation Master Plan (2024 Draft)
- Bolton Transportation Master Plan (MMM Group Ltd., 2015)
- Region of Peel Road Characterization Study (2013)
- Region of Peel Long Range Transportation Plan (2019)
- Region of Peel 2051 Transportation Master Plan (ongoing progress updates)

4.2 Horizon Years

As previously noted, a portion of the proposed development is within the Bolton Residential Expansion Settlement Area approved for development by 2031 under ROPA 30. The remaining development is anticipated to proceed by 2051. For the purposes of this study the horizon year of 2031 was retained from the previous study to align with the ROPA 30 horizon, and previous reports completed for the expansion areas.

The horizon year of 2041 was also assessed to review the impact of the remaining development proceeding. The 2041 horizon aligns with the Regions EMME modelling and Long Range Transportation planning horizons. Future assessments can update the timeline and horizons of development while reassessing future traffic growth on the road network.

4.3 Growth Rate

EMME Modelling Plots and compounded growth rate volumes for 2021-2031 and 2031-2041 were provided by the Region of Peel. Based on the information provided and the location of development applications in the Town of Caledon the following compounded annual growth rate were applied:

- 1% on Emil Kolb Parkway, Columbia Way, King Street, Mount Hope Road, Caledon King Townline, Duffy's Lane and Forest Gate Avenue.
- 0.5% on Highway 50.
- No growth on Cross County Boulevard, Bolton Heights Road, Kingsview Drive, and Westchester Boulevard.

Appendix G includes the EMME modelling and development mapping for reference.

4.4 Background Developments

Through communications with the Region of Peel it was confirmed that the growth rate estimates account for growth based on the development of the ROPA 30 Bolton Residential Expansion Settlement Area. The Town of Caledon confirmed that proposed developments within the ROPA 30 boundary should not be double counted as background developments and within the network growth. As such, a review of the background developments requested by the Town of Caledon was undertaken. A portion of the development of 14275 The Gore Road was carried forward as a background development as it sits outside the ROPA 30 boundary. It was also agreed that the inclusion of 14245 Highway 50 as a background development was acceptable as it will share a collector road with the greater development lands. **Appendix A** includes record of communications with Region and Town staff.

The Transportation Impact Study (January 2022) prepared by CGH Transportation for the development of 14245 Highway 50 reviews the proposal for 24 townhouse units, 118 stacked townhouse units and 409 residential apartment units. The site proposes a full-moves access to

Columbia Way and a right-in-right-out access to Highway 50. It is acknowledged that the Town will require the access to Columbia Way to align with Kingsview Drive and continue north to provide connection with the Bolton North Hill development. As such, updates are expected to the Site Plan included in the 2022 Transportation Impact Study.

The trip assignment for the development of 14245 Highway 50 was obtained from Figure 16 in the Transportation Impact Study. Trips distributed to study intersections outside of those analyzed in the study were distributed based on the trip distribution outlined in **Section 6.3**. The background development is expected to be fully built-out by the 2031 horizon year. **Figure 4** illustrates the trip assignment reviewed for 14245 Highway 50.

The Transportation Impact Study (February 2021) prepared by the BA Group for the development of 14275 The Gore Road (Caledon Station Secondary Plan) reviews the proposal for a total of 3,104 single-detached residential units, 1,6000 low-rise residential units, 3,967 mid-rise residential units, three school blocks and lands for a future GO Transit station. The development proposed two connections to King Street, two connections to The Gore Road and one to Emil Kolb Parkway.

The portion of the development east of Street J on the Draft Plan is within the ROPA 30 boundary and the Region of Peel growth projections. As such the remaining residential units and trip generation outlined in **Table 9** were assessed in the 2041 horizon.

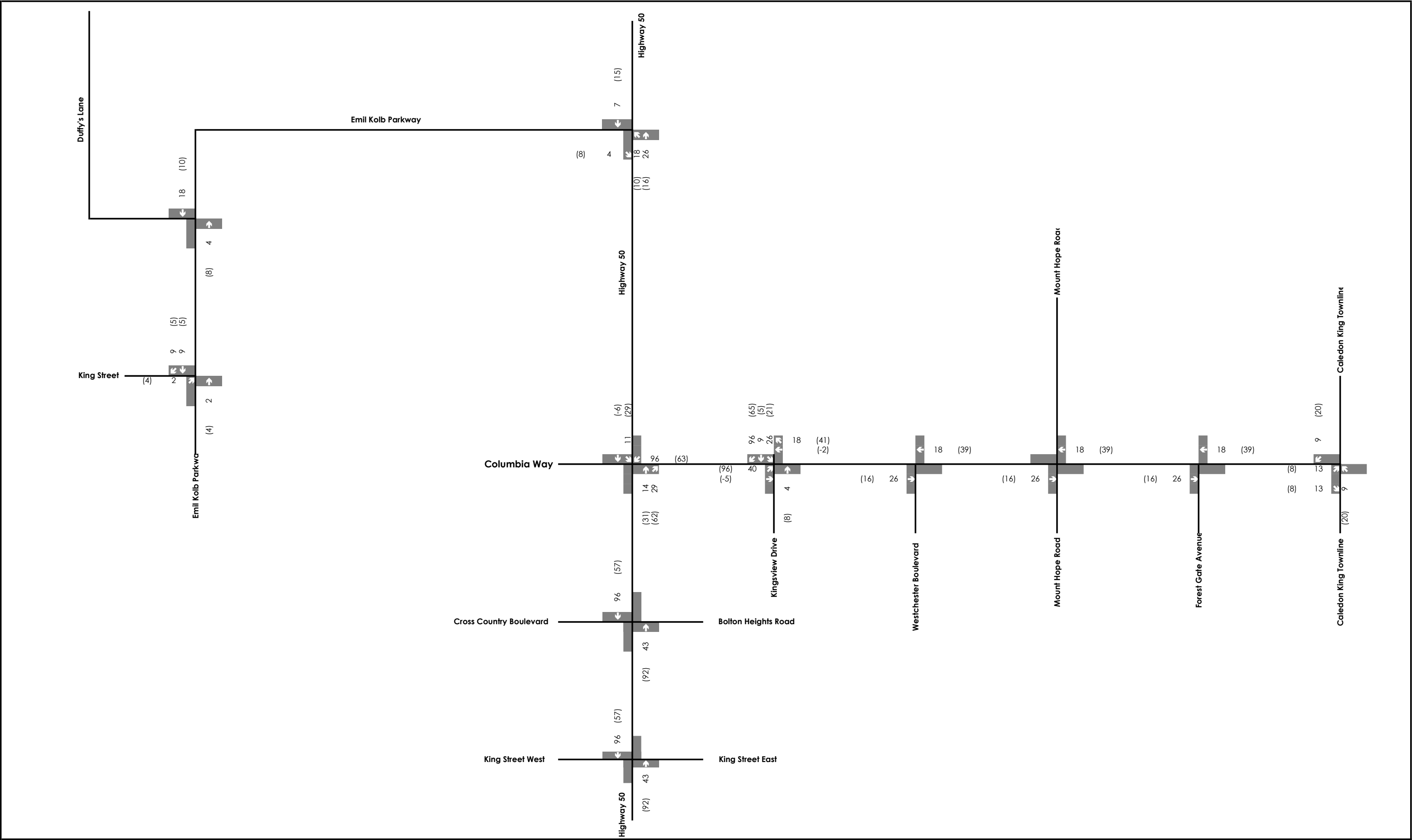
Table 9: 14275 The Gore Road Trip Generation

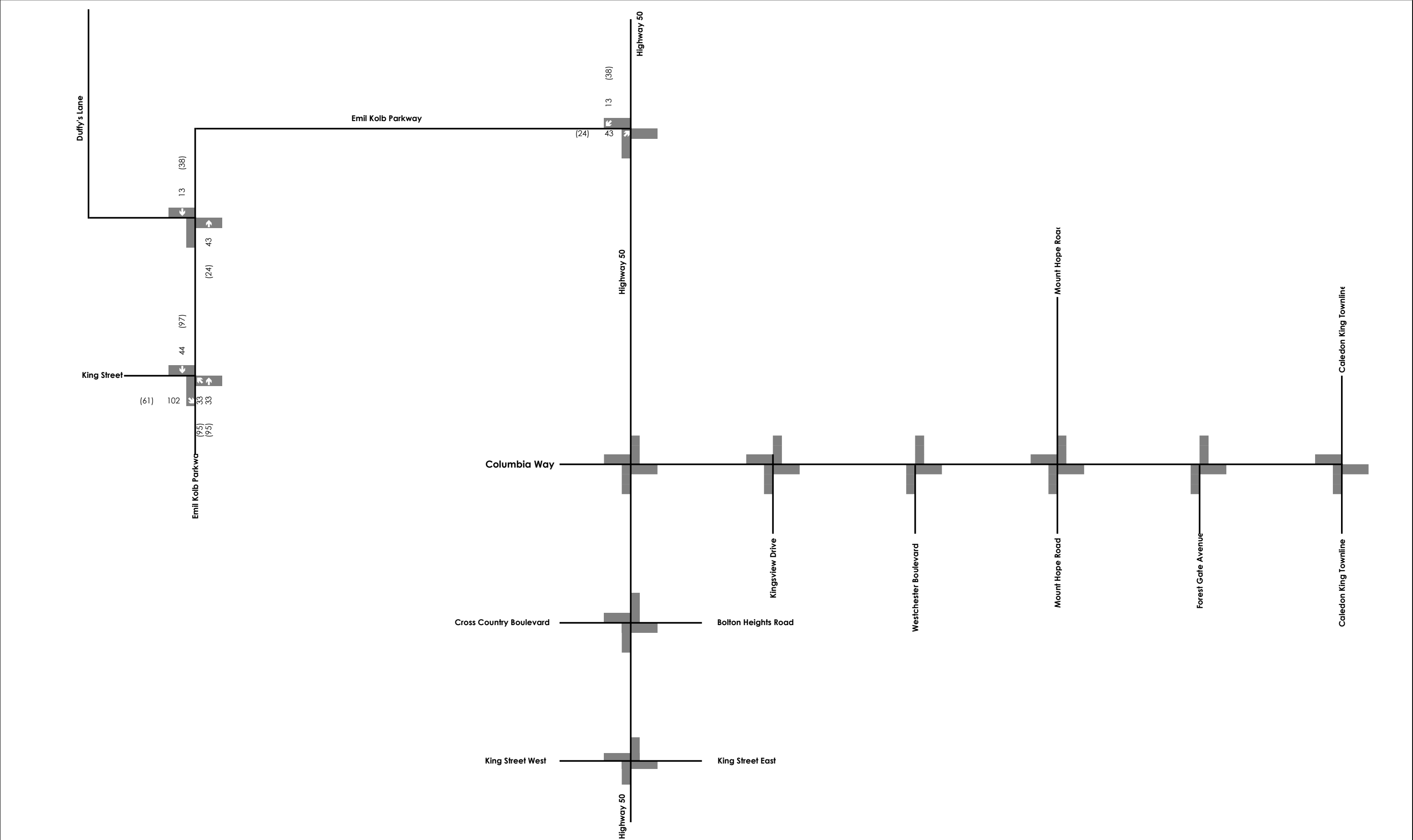
Land Use Code	Units	Peak Hour	Inbound	Outbound	Total
210: Single-Family Detached	513	A.M.	82	248	330
		P.M.	291	171	462
215: Single-Family Attached Housing	827	A.M.	106	318	424
		P.M.	290	202	492
221: Multi-Family Housing (Mid-Rise)	754	A.M.	74	246	320
		P.M.	180	114	294

The residential trip distribution was applied based on Table 17 in the BA Group 2021 Transportation Impact Study.

Two school blocks are located outside the ROPA 30 boundary. School trips were assigned based on Figure 12 of the BA Group 2021 Transportation Impact Study. All trips distributed north on Emil Kolb Parkway are assumed to continue north on Highway 50. **5** illustrates the trip assignment for 14275 The Gore Road.

Appendix H includes excerpts from the background development studies.





4.5 Planned Roadway Improvements

The background studies outlined in **Section 4.1** were reviewed and referenced to identify proposed roadway improvements within the study area. There are several studies that are currently ongoing, and improvements have been considered based on currently available information.

The Region of Peel is undertaking a 2051 Transportation Master Plan. The Region is in the process of updating and combining a number of existing studies. The 2019 Long Range Transportation Plan identified Highway 50 as maintaining a four-lane cross-section. It is noted that the downtown core of Bolton provides one-lane in each direction with on-street parking under existing conditions.

The Town of Caledon prepared a Queen Street Corridor Study Report in March 2019, which recommended maintaining the two-lane cross section in the Downtown Core in favour of increased active transportation facilities such as bike lanes and maintaining on-street parking. The Region of Peel is currently undertaking a Complete Corridor Study and Preliminary Design for Queen Street (Highway 50) from Queensgate Boulevard to Columbia Way. Since the public meeting in November 2023 there has been no further information of roadway design released. As such, the existing cross-section for Highway 50 has been maintained for the purposes of this assessment.

The Town of Caledon completed a Multi-Modal Transportation Master Plan in April 2024. Figure ES-1 of the report illustrated the planned widening of both Columbia Way and the Caledon King Townline (south of Columbia Way) to four lanes by the 2041 horizon. Both widenings have been assessed under the 2041 future background and future total horizons.

The Caledon Station Secondary Plan Transportation Study presents a future lane configuration of two through lanes per direction on King Street west of Emil Kolb. The widening has been assessed under the 2041 future background and future total horizons.

As no improvements are planned within the study area for the 2031 horizon the existing conditions remain within the based model for future background and future total conditions.

The Town's Multi-Modal Transportation Master Plan also identifies the planned GTA-West Transportation Corridor (Highway 413) with interchanges planned for Coleraine Drive and with Highway 427, both south of Bolton. The Highway has been identified within the planned improvements but any impact on existing travel patterns have not been assessed under future background and future total horizons.

Appendix I includes excerpts from the Multi-Modal Transportation Master Plan report.

4.6 Future Background Recommended Network Improvements

Additional improvements are required on the boundary road network under 2041 future background conditions to improve traffic operations. A screening of the road network under 2041 future background conditions was conducted to identify any required future background road widenings or other intersection improvements. Although this was not modelled in the 2041 future background scenario, consideration for road widening is recommended for Highway 50 north of Emil Kolb Parkway based on the capacity analysis outlined in **Section 7.1**.

The analysis of the 2041 future background conditions has identified required improvements as outlined in **Table 10**.

Table 10: Additional Future Background Roadway Improvements

Roadway	Segment or Intersection	Improvement Type	Improvement
Highway 50	Columbia Way	Signal timing adjustment	Optimization of splits in the a.m. and p.m. peak hours

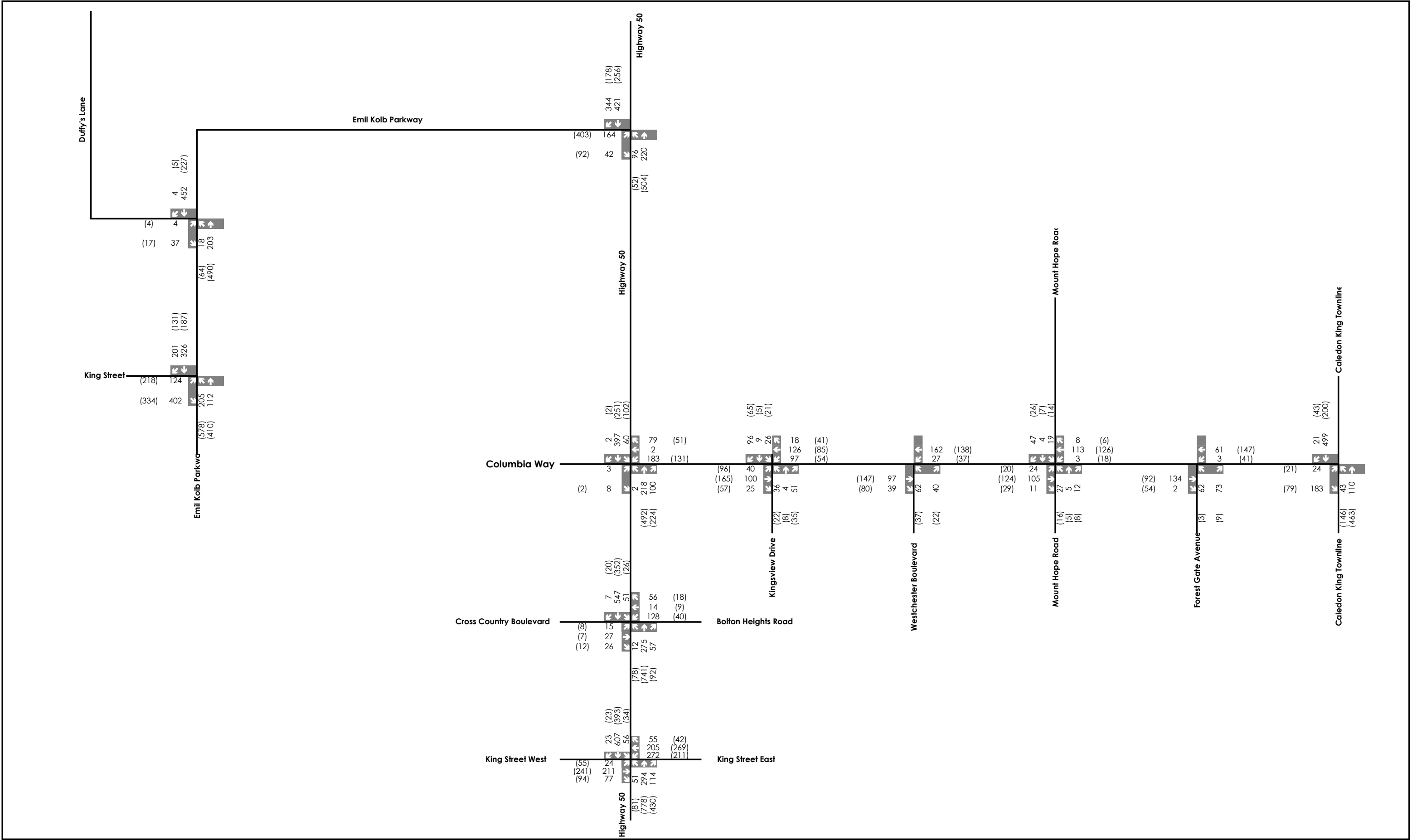
No network improvements are recommended for the 2031 horizon to support buildout of the ROPA 30 lands.

4.7 Intersection Operations

The background improvements identified in **Section 4.5** and recommendation outlined in **Section 4.6** were modelled as described under the 2041 future background conditions. The 2031 horizon maintains the existing network conditions as illustrated in **Figure 2**.

The 2031 and 2041 future background intersection operations at the study intersections outlined in **Table 11** and **Table 12** were analyzed using the 2031 and 2041 future background traffic volumes illustrated in **Figure 6** and **Figure 7**, respectively. **Table 13** and **Table 14** outline the forecasted 95th percentile queues in the 2031 and 2041 future background horizon years, respectively.

Detailed capacity analysis worksheets are included in **Appendix F**.



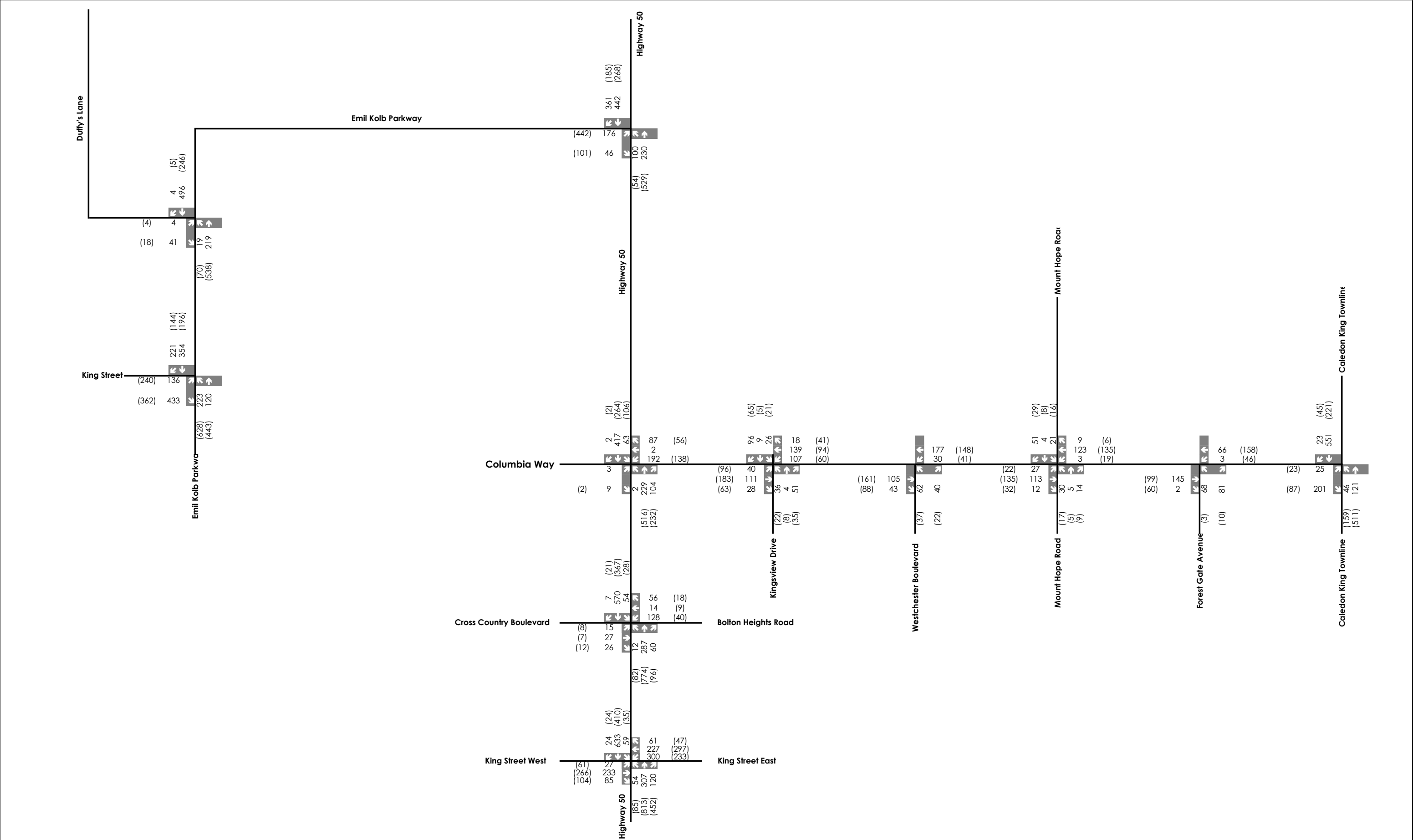


Table 11: 2031 Future Background Traffic Operations

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	LOS	V/C Ratio	Delay (s)
King Street and Emil Kolb Parkway	Overall	A	-	1.33	A	-	1.80
	SB	A	-	1.39	A	-	1.61
	NB	A	-	1.51	A	-	2.40
	EB	A	-	1.09	A	-	0.73
Highway 50 and Emil Kolb Parkway	Overall	A	-	1.03	A	-	0.93
	EB	A	-	1.13	A	-	0.82
	SB	A	-	1.22	A	-	0.75
	NB	A	-	0.52	A	-	1.17
Highway 50 and Columbia Way	Overall	B	0.74	16.0	B	0.64	10.1
	EBLTR	A	0.06	0.5	A	0.00	0.0
	WBL	E	0.74	57.1	D	0.64	52.6
	WBTR	A	0.23	8.9	A	0.10	0.4
	NBL	A	0.01	7.5	-	-	-
	NBT	A	0.19	7.5	A	0.38	7.0
	NBR	A	0.10	1.8	A	0.19	1.2
	SBL	A	0.09	7.4	A	0.18	6.3
	SBT	A	0.33	8.7	A	0.19	5.6
	SBR	A	0.00	0.0	A	0.00	0.0
Highway 50 and Bolton Heights Road	Overall	C	0.54	20.8	A	0.28	8.2
	EBTR	C	0.34	31.5	C	24.0	24.0
	WBL	C	0.38	34.4	D	39.9	39.9
	WBTR	B	0.19	10.1	B	18.6	18.6
	NBL	C	0.04	29.0	A	7.7	7.7
	NBT	C	0.15	23.3	A	6.9	6.9
	NBR	B	0.07	16.2	A	2.4	2.4
	SBL	B	0.09	13.1	A	8.3	8.3
	SBT	B	0.54	17.6	A	7.5	7.5
	SBR	A	0.01	0.0	A	0.5	0.5
Highway 50 and King Street	Overall	C	0.86	34.9	D	0.93	40.5
	EBL	C	0.21	25.0	C	0.21	29.3
	EBT	E	0.82	65.9	E	0.82	77.3
	EBR	A	0.28	4.3	A	0.28	5.5
	WBL	D	0.64	55.7	D	0.64	39.8
	WBTR	D	0.70	44.3	D	0.70	53.5
	NBL	B	0.20	13.4	B	0.20	15.6
	NBT	D	0.93	22.4	D	0.93	53.0
	NBR	B	0.54	4.1	B	0.54	12.6
	SBL	B	0.21	10.1	B	0.21	17.8
	SBTR	C	0.54	31.3	C	0.54	31.3

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	LOS	V/C Ratio	Delay (s)
Columbia Way and Kingsview Drive	Overall	A	0.32	8.0	A	0.20	6.6
	EBTR	A	0.12	4.0	A	0.19	4.5
	WBTL	A	0.26	5.9	A	0.14	5.1
	NBLR	B	0.32	19.2	B	0.20	18.8
Columbia Way and Westchester Boulevard	Overall	B	-	-	B	-	-
	EBTR	-	0.10	0.0	-	0.15	0.0
	WBTL	A	0.02	1.3	A	0.03	1.8
	NBLR	B	0.19	11.6	B	0.10	11.2
Columbia Way and Mount Hope Road	Overall	B	-	-	B	-	-
	EBLTR	A	0.02	1.4	A	0.01	1.0
	WBLT	A	0.00	0.2	A	0.01	1.0
	NBLTR	B	0.09	11.8	B	0.05	11.3
	SBLTR	B	0.11	10.4	B	0.07	10.4
Columbia Way and Caledon King Townline	Overall	C	-	-	B	-	-
	EBLR	C	0.44	17.4	B	0.19	13.3
	NBTL	A	0.05	1.2	A	0.11	2.9
	SBTR	-	0.33	0.0	-	0.15	0.0
Emil Kolb Parkway and Duffy's Lane	Overall	B	-	-	B	-	-
	EBLR	B	0.08	12.3	B	0.05	11.9
	NBL	A	0.02	8.8	A	0.06	7.9
	NBT	-	0.13	0.0	-	0.34	0.0
	SBT	-	0.30	0.0	-	0.16	0.0
	SBR	-	0.00	0.0	-	0.00	0.0

Table 12: 2041 Future Background Traffic Operations

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	LOS	V/C Ratio	Delay (s)
King Street and Emil Kolb Parkway	Overall	A	-	1.07	A	-	2.15
	SB	A	-	0.97	A	-	1.90
	NB	A	-	0.92	A	-	2.91
	EB	A	-	1.26	A	-	1.06
Highway 50 and Emil Kolb Parkway	Overall	A	-	1.10	A	-	1.03
	EB	A	-	1.20	A	-	0.92
	SB	A	-	1.31	A	-	0.77
	NB	A	-	0.54	A	-	1.34
Highway 50 and Columbia Way	Overall	B	0.64	10.7	A	0.52	7.6
	EBLTR	A	0.05	0.3	A	0.0	0.0
	WBL	C	0.64	28.6	C	0.52	27.7
	WBTR	A	0.22	5.5	A	0.11	0.5
	NBL	A	0.01	5.5	-	-	-
	NBT	A	0.13	6.7	A	0.23	6.4
	NBR	A	0.12	3.4	A	0.21	1.7
	SBL	A	0.12	8.9	A	0.20	8.1
Highway 50 and Bolton Heights Road	SBT	A	0.23	8.2	A	0.12	6.0
	Overall	B	0.41	19.1	A	0.29	8.0
	EBL	D	0.11	41.7	C	0.04	33.9
	EBTR	C	0.25	26.4	C	0.07	20.4
	WBL	D	0.41	35.2	D	0.20	39.8
	WBTR	B	0.20	10.2	B	0.11	18.6
	NBL	C	0.04	28.3	A	0.11	7.8
	NBT	C	0.15	23.1	A	0.29	7.0
	NBR	B	0.07	16.4	A	0.08	2.4
	SBL	B	0.10	14.3	A	0.06	8.4
Highway 50 and King Street	SBT	B	0.30	13.9	A	0.15	6.2
	Overall	D	0.97	41.2	D	1.01	47.3
	EBL	C	0.10	24.6	C	0.24	28.7
	EBT	E	0.82	68.0	E	0.86	79.9
	EBR	A	0.25	5.1	A	0.30	7.4
	WBL	E	0.97	74.6	D	0.69	40.6
	WBTR	D	0.66	45.4	D	0.73	53.5
	NBL	B	0.25	14.7	B	0.23	16.8
	NBT	C	0.41	23.5	C	1.01	71.9
	NBR	A	0.17	4.1	A	0.58	14.4
	SBL	B	0.12	11.7	B	0.28	21.2
Columbia Way	SBTR	D	0.83	39.7	D	0.59	34.4
	Overall	A	0.32	7.2	A	0.20	5.8

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	LOS	V/C Ratio	Delay (s)
and Kingsview Drive	EBTR	A	0.07	3.6	A	0.11	3.5
	WBTL	A	0.16	5.0	A	0.09	4.6
	NBLR	B	0.32	19.1	B	0.20	18.8
Columbia Way and Westchester Boulevard	Overall	B	-	-	B	-	-
	EBTR	-	0.06	0.0	-	0.09	0.0
	WBTL	A	0.09	2.8	A	0.06	3.7
	NBLR	B	0.18	11.2	B	0.10	11.1
Columbia Way and Mount Hope Road	Overall	B	-	-	B	-	-
	EBLTR	A	0.02	2.6	A	0.06	1.9
	WBLT	A	0.05	0.4	A	0.05	1.8
	NBLTR	B	0.10	11.7	B	0.05	11.1
	SBLTR	B	0.12	10.2	B	0.08	10.3
Columbia Way and Caledon King Townline	Overall	C	-	-	C	-	-
	EBLR	C	0.43	17.5	C	0.12	24.8
	NBTL	A	0.08	9.1	A	0.31	8.2
	SBTR	-	0.36	0.0	-	0.16	0.0
Emil Kolb Parkway and Duffy's Lane	Overall	B	-	-	B	-	-
	EBLR	B	0.08	10.9	B	0.04	10.8
	NBL	A	0.02	9.1	A	0.07	8.0
	NBT	-	0.07	0.0	-	0.19	0.0
	SBT	-	0.22	0.0	-	0.11	0.0
	SBR	-	0.11	0.0	-	0.06	0.0

Table 13: 2031 Future Background Queuing

Intersection	Storage Length	95 th Percentile Queue	
		A.M. Peak Hour	P.M. Peak Hour
King Street and Emil Kolb Parkway	-	SB – 9.1 m NB – 11.1 m EB – 7.1 m	SB – 6.8 m NB – 25.1 m EB – 5.6 m
Highway 50 and Emil Kolb Parkway	-	EB – 7.5 m SB – 11.7 m NB – 7.5 m	EB – 5.3 m SB – 3.4 m NB – 7.1 m
Highway 50 and Columbia Way	WBL – 70 m NBL – 140 m SBL – 100 m SBR – 30 m	WBL – 63 m NBL – 1 m SBL – 12 m SBR – 0 m	WBL – 44 m NBL – 0 m SBL – 15 m SBR – 0 m
Highway 50 and Bolton Heights Road	WBL – 85 m NBL – 85 m NBR – 75 m SBL – 65 m SBR – 50 m	WBL – 31 m NBL – 8 m NBR – 16 m SBL – 17 m SBR – 0 m	WBL – 14 m NBL – 18 m NBR – 8 m SBL – 8 m SBR – 1 m
Highway 50 and King Street	EBL – 30 m EBR – 35 m WBL – 30 m NBL – 55 m SBL – 20 m	EBL – 10 m EBR – 6 m WBL – 91 m NBL – 12 m SBL – 6 m	EBL – 19 m EBR – 9 m WBL – 63 m NBL – 21 m SBL – 11 m
Columbia Way and Kingsview Drive	-	-	-
Columbia Way and Westchester Boulevard	-	-	-
Columbia Way and Mount Hope Road	-	-	-
Columbia Way and Caledon King Townline	-	-	-
Emil Kolb Parkway and Duffy's Lane	NBL – 105 m SBR – 115 m	NBL – 2 m SBR – 0 m	NBL – 1 m SBR – 0 m

Table 14: 2041 Future Background Queueing

Intersection	Storage Length	95 th Percentile Queue	
		A.M. Peak Hour	P.M. Peak Hour
King Street and Emil Kolb Parkway	-	SB – 7.1 m NB – 2.3 m EB – 9.2 m	SB – 7.6 m NB – 29.1 m EB – 8.0 m
Highway 50 and Emil Kolb Parkway	-	EB – 3.2 m SB – 12.9 m NB – 7.5 m	EB – 6.1 m SB – 4.9 m NB – 8.9 m
Highway 50 and Columbia Way	NBL – 140 m NBR – 30 m SBL – 125 m	NBL – 1 m NBR – 1 m SBL – 11 m	NBL – 0 m NBR – 9 m SBL – 15 m
Highway 50 and Bolton Heights Road	EBL – 30 m WBL – 85 m NBL – 90 m NBR – 75 m SBL – 65 m	EBL – 8 m WBL – 31 m NBL – 7 m NBR – 16 m SBL – 18 m	EBL – 5 m WBL – 14 m NBL – 20 m NBR – 8 m SBL – 9 m
Highway 50 and King Street East/West	EBL – 30 m EBR – 35 m WBL – 30 m NBL – 55 m SBL – 20 m	EBL – 11 m EBR – 8 m WBL – 117 m NBL – 13 m SBL – 6 m	EBL – 21 m EBR – 12 m WBL – 69 m NBL – 22 m SBL – 11 m
Columbia Way and Kingsview Drive	-	-	-
Columbia Way and Westchester Boulevard	-	-	-
Columbia Way and Mount Hope Road	-	-	-
Columbia Way and Caledon King Townline	-	-	-
Emil Kolb Parkway and Duffy's Lane	NBL – 105 m SBR – 115 m	NBL – 1 m SBR – 0 m	NBL – 2 m SBR – 0 m

The boundary road network is expected to operate at overall acceptable Levels of Service under 2041 future background conditions, with the exception of the intersection of Highway 50 and King Street, which is expected to operate at LOS "D", and a maximum volume-to-capacity ratio of 0.97 and 1.01 during the weekday a.m. and p.m. peak hours, respectively. Similar to the existing conditions, under both peak hours, the 95th percentile queue lengths are exceeding the designated storage length for the westbound left-turn lane at the intersection.

These operations are not uncommon at high-volume arterial roadway intersections in urban areas. As previously noted the Region of Peel is undertaking an Environmental Assessment of the downtown area of Bolton, including the intersection of Highway 50 and King Street. The final cross-section of the roadways determined by the assessment and any additional recommendations are not known at this time. Monitoring of the intersection for signal optimization is recommended as development of Bolton continues over the next 20 years.

5.0 Secondary Plan Road Network Review

The Bolton North Hill Secondary Plan proposes seven collector roads (Street A through Street G) within the Option 1 Lands and a number of local roads. The collector roads provide direct connection to the existing boundary road network. The Option 2 Lands do not propose any collector roads and has only local road connections.

5.1 Rights-of-Way

The collector roads are proposed to have 20 m Right-of-Ways (ROW) and local roads are proposed to have 18 m ROWs. The Town of Caledon is working on updating their ROW cross-sections to incorporate improved active transportation facilities. Town staff indicated that they were open to cross-section recommendations as part of the secondary plan.

The 18 m local road cross-section is proposed to have 1.8 m sidewalks on both sides of the roadway and a pavement width of 9.0 m, accommodating 2.4 m of street parking on one side of the roadway and 3.3 m travel lanes in each direction. On-road, shared cycling can be accommodated within the provided width.

The 20 m collector road has two cross-sections proposed. The first cross-section proposed the use of 2 m sidewalks and 2.9 m boulevards on both sides of the roadway. Pavement width of 10.2 m provides a 3.3 m travel lane in each direction with a 1.5 m bike lane and 0.3 m buffer on each side of the road. The second cross-section proposes a 3 m multi-use trail both sides of the road with a 2.5 m boulevard. A pavement width of 9 m accommodates 2.4 m of street parking on one side of the roadway and 3.3 m travel lanes in each direction. On-street parking would not be permitted on the collector roadways.

Appendix J includes samples cross-sections for consideration as the Secondary Plan advances.

5.2 Collector Roadways

The Concept Plan (Bousfields Inc., January 27, 2025) illustrates the proposed collector and local roadways. For the purpose of the assessment herein the collector roadways providing connection to the boundary road network have been assigned letter designations. Site accesses to individual blocks are further outlined in **Section 5.3**. The following passages describe the collector road network. Signalization of intersections was determined as outlined in **Section 7.2.2**.

Street A is a proposed east-west collector road, the collector portion spanning from Duffy's Lane to Street G. The intersection of Street A and Highway 50 will be signalized. The intersection of Street A and Duffy's Lane will be minor stop controlled with Duffy's Lane as the major roadway. The intersection of Street A and Street G will be all-way stop controlled to prevent a long stretch of road with no stops. Crosswalks on all side will also support pedestrians travelling to and from the school and park. The west leg of the intersection of Street A and Duffy's Lane will be a local road. The north and east leg of the intersection of Street A and Street G will be a local road. A mid-block pedestrian crossing is recommended for Street A in from of the school block west of Highway 50 to provide safe crossing of pedestrians.

Street B is a proposed east-west collector road, spanning from Highway 50 at Emil Kolb Parkway to Street G. The intersection of Street B and Street G will be all-way stop controlled to protect pedestrian crossing for the school block. Easterly of Street G, Street B will be a local road.

Street C is a proposed east-west collector road, spanning from Street E to Street G south of the Highway 50/Emil Kolb Parkway roundabout. The intersection of Street C and Street E will stop controlled for Street E only. The west leg of the intersection will be a local road. The intersection of Street C and Street F will be all-way stop to prevent a long span of roadway with no stopping and protect crosswalks for pedestrians heading to and from the adjacent park. The intersection of Highway 50 and Street C will be signalized based on operations. The intersection of Street C and Street G will be minor stop controlled for Street C.

Street D is a proposed east-west collector road, spanning from Highway 50 to Street G. The intersection of Street D and Highway 50 as well as the intersection of Street D and Street G will be stop-controlled for Street D.

Street E is a proposed north-south collector road, spanning from Street A to Street C west of the Highway 50/Emil Kolb Parkway roundabout. The intersection of Street E and Street A will be stop controlled for Street E. The intersection of Street E and Emil Kolb Parkway will be a signalized intersection.

Street F is a proposed north-south collector road, spanning from Street A to Street C west of the Highway 50/Emil Kolb Parkway roundabout. The intersection of Street F and Street A will be all-way stop controlled to prevent a long stretch of no stopping on Street A and to provide safe crossing to the adjacent park for pedestrians. The intersection of Street F and Emil Kolb Parkway will be stop-controlled for Street F.

Street G is a proposed north-south collector road, spanning from Street A to Columbia Way. Street G is proposed to connect to Columbia Way through the neighbouring property to the south, creating a fourth leg at the existing signalized intersection of Columbia Way and Kingsview Drive.

Duffy's Lane is proposed to be widened to a 26 m ROW and will remain in its existing location, providing connection from Street A to the north and to Emil Kolb Parkway to the south.

Figure 8 illustrates the proposed future road network.

As noted, the use of stop controlled intersection can prevent both collector and local roads from having excessive long segments of roadway, without stopping or protected pedestrian crossings. On-street bike lanes and/or vehicle parking can visually narrow lanes, encouraging lower speeds. Additional traffic calming measures such as coloured/textured crosswalks, curb extensions and chicanes can be explored through Draft Plans and detailed design.

5.3 Site Accesses

As previously described the collector road connections to the boundary road network comprise the majority of site access to the Secondary Plan area. **Figure 8** illustrates the road network and labels the naming convention applied for the accesses. Formal names will be assigned to the roadways, with acceptance by the Town of Caledon during a future application stage.

A review of access spacing was undertaken for the proposed site accesses. The full-moves accesses to Emil Kolb Parkway and Highway 50 are to meet the minimum access spacing requirements of the Region of Peel as outlined in the Region's Road Characterisation Study. The accesses to Columbia Way and Mount Hope road are to adhere to the minimum access spacing recommended in the Transportation Association of Canada (TAC) Geometric Guidelines for Canadian Roads (GDGCR). **Table 15** outlines the proposed site accesses and the approximate curb to curb access spacing.

Bolton North Hill Secondary Plan

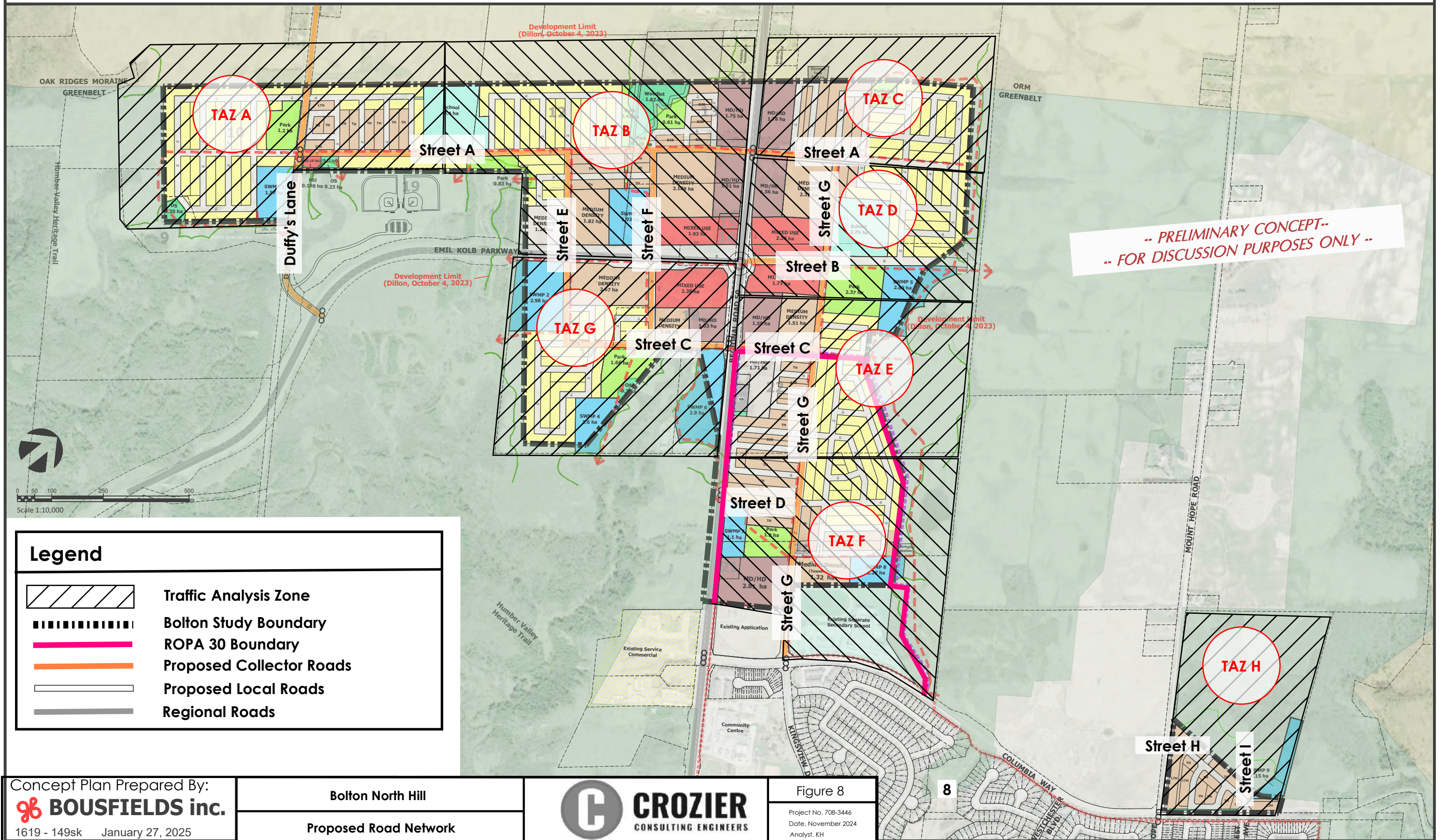


Table 15: Site Accesses

Street Name	Intersecting Roadways	Intersection Layout	Minimum Spacing Required	Access Spacing	Access Spacing
Street A	Duffy's Lane	4-leg stop-controlled	40 m	515 m (south)	>500 m (north)
	Highway 50	4-leg signalized	300 m	340 m (south)	>500 m (north)
Street B	Highway 50 and Emil Kolb Parkway	4-leg roundabout	300 m	Aligns with Existing Intersection	
Street C	Highway 50	4-leg signalized	300 m	425 m (south)	225 m (north)
Street D	Highway 50	3-leg stop-controlled	300 m	465 m (south)	425 m (north)
Street E	Emil Kolb Parkway	4-leg signalized	300 m	790 m (west)	240 m (east)
Street F	Emil Kolb Parkway	4-leg stop-controlled	300 m	240 m (west)	240 m (east)
Street G	Columbia Way and Kingsview Drive	4-leg signalized	60 m	Aligns with Existing Intersection	
Street H	Mount Hope Road	3-leg stop-controlled	40 m	210 (north)	>500 (north)
Street I	Columbia Way and Forest Gate Avenue	4-leg signalized	60 m	Aligns with Existing Intersection	

It is recognized that Street C and Street F are deficient in their access spacing. Street F has been assessed as a full moves, unsignalized intersection and potentially could be converted into a right-in-right-out intersection as Street E and the Highway 50 roundabout will support the access of vehicles. However, this would route commercial trips through residential areas to access the proposed mixed use areas on the west side of Highway 50. The location of Street F is important as it supports access to the mixed-use commercial blocks, providing frontage for site accesses not on the regional roadway. Street C is located as far south as possible, outside of the environment policy areas and storm water management features.

Further discussion of access spacing, and configuration can be undertaken with the Region of Peel as Draft Plans proceed. The intersection spacing of Street G and Street D are sufficient and both accesses can be supported for the buildout within the ROPA 30 boundary.

6.0 Bolton North Hill Secondary Plan

The build-out of the development 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.

6.1 Basis of Assessment

For the purposes of the assessment contained herein and to address comments provided on the 2021 Transportation Assessment the trip assignment for the Bolton North Hill was updated. Trip generation was forecasted based on published data from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition for the entirety of the development as outlined in **Section 6.2**. The trip distribution for residential, commercial, and school trips was established as outlined in **Section 6.3** and was applied to the generated trips based on the Traffic Analysis Zones (TAZ) outlined in **Section 6.4**. The trips were then assigned to the boundary road network for assessment in the future total horizon.

6.2 Trip Generation

The ITE Trip Generation Manual is a compilation 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 study areas:

- LUC 210: "Single-Family Detached Housing" was applied to the single-detached dwellings.
- LUC 215: "Single-Family Attached Housing" was applied to the townhouse dwellings.
- LUC 221: "Multifamily Housing (Mid-Rise)" was applied to the residential medium-density and high-density apartment dwellings.
- LUC 520: "Elementary School" was applied to the proposed school blocks.
- LUC 820: "Shopping Centre (>150k)" was applied to the commercial/mixed use areas.

Table 16 outlines the residential trip generation forecasted for the subject lands.

Table 16: Residential Trip Generation

Land Use Category	Peak Hour	Inbound	Outbound	Total
LUC 210: "Single-family Detached Housing" (1288 units)	A.M.	191	572	763
	P.M.	692	406	1098
LUC 215: "Single-family Attached Housing" (1029 units)	A.M.	132	397	529
	P.M.	362	252	614
LUC 221: "Multifamily housing (Mid-Rise)" (2078 units)	A.M.	208	695	903
	P.M.	494	316	810
Total	A.M.	947	1983	2930
	P.M.	2050	1523	3573

The trip generation for the commercial areas (mixed-use blocks) was assessed based on a lot coverage of 40%. It should be noted that the small mixed-use block east of Duffy's Lane is expected to have a neighbourhood commercial use, while the commercial uses proposed for the four

quadrants of the intersection of Highway 50 and Emil Kolb Parkway are expected to be destination commercial.

For the purposes of the analysis herein the total trip generation of the commercial area was assessed. Primary trips add additional volumes to the road network as the site is the ultimate destination while pass-by trips are generated by existing vehicles on the road network, which stop at the site when travelling to their primary destination.

Pass-by trips were established based on the Pass-By Tables included in the Appendix of the 11th Edition Manual. As each block has pass-by trips assigned independently and each block is anticipated to have less than 150,000 ft² of gross floor area (GFA), the pass-by rate of 0% in the a.m. peak hour and 40% in the p.m. peak hour was assessed per Land Use Category 821: Shopping Plaza (40-150k) . **Table 17** outlines the commercial trip generation forecasted for the subject lands.

Table 17: Commercial Trip Generation

Land Use Category	Type	Peak Hour	Inbound	Outbound	Total
LUC 820: "Shopping Centre (>150k)" (277,000 ft²)	Primary	A.M.	144	88	232
		P.M.	181	196	377
	Pass-By	A.M.	0	0	0
		P.M.	271	294	565
Total		A.M.	144	88	232
		P.M.	452	490	942

Based on the Ministry of Education's "Building Our Schools, Building Our Future" (June 2010) a lot coverage of 20% would support a school capacity of 680 students at the Peel District School Board site of the west (3.4 ha) and a capacity of 540 students at the Dufferin-Peel Catholic District School Board site to the east (2.75). These capacities align with existing elementary schools within the respective boards.

Based on anticipated student yields provided by the school boards as part of their comments on the December 2021 Transportation Impact Study 100% of the school capacity will be filled by households internal to the development and are not expected to draw students externally from Bolton. **Table 18** outlined the elementary school trip generation.

Table 18: Elementary School Trip Generation

Land Use Category	Peak Hour	Inbound	Outbound	Total
LUC 520: "Elementary School" (680 Public School Students)	A.M.	272	231	503
	P.M.	50	59	109
LUC 520: "Elementary School" (540 Catholic School Students)	A.M.	184	216	400
	P.M.	40	46	86

The entirety of the development is expected to generate approximately 2,930 and 3,573 total two-way trips during the weekday a.m. and p.m. peak hours, respectively.

6.3 Trip Distribution

The trip distribution for the development was prepared by reviewing the Bolton Transportation Master Plan (MMM Group Ltd., 2015) and the 2016 Transportation Tomorrow Survey data for the community of Bolton. Approximately 40% of trips generated are expected to remain within the community of Bolton, with other significant destinations (approximately 10% each) being York Region, the City of Toronto, the City of Mississauga, and the City of Brampton.

Based on the trip destinations and origins the following residential trip distribution was established:

- 20% to and from the north on Highway 50
- 10% to and from the east on Columbia Way (proceeding south on the Caledon King Townline)
- 30% to and from the south on Highway 50
- 40% to and from the west on Emil Kolb parkway (20% proceeding west on King Street and 20% proceeding south on Emil Kolb Parkway)

The following commercial trip distribution was established based on trip destinations and origins as well as anticipated catchment areas:

- 20% to and from the north on Highway 50
- 10% to and from the east on Columbia Way
 - 5% to and from Kingsview Drive
 - 5% to and from Westchester Boulevard
- 30% to and from the south on Highway 50
- 40% to and from the west on Emil Kolb parkway (20% proceeding west on King Street and 20% proceeding south on Emil Kolb Parkway)

As previously noted enrollment of the proposed elementary schools are forecasted to be contained to the Bolton North Hill development. With close proximity to the neighbourhood it is serving, many trips to and from the school are anticipated to be walking and cycling.

The vehicle trips generated, as established in **Section 6.2** are expected to be parents who drop students off on the way to work. The trips to and from external employment are counted in the residential trip generation. In order to prevent double counting of trips, no external distribution was applied to the boundary road network. Trips crossing the boundary road network have been accounted for and are assigned based on the break down of units in the respective Traffic Analysis Zone.

Appendix K can be referenced for further details regarding trip distributions and Transportation Tomorrow Survey data.

6.4 Traffic Analysis Zones

As the proposed development encompasses multiple existing intersections, proposed site accesses, and land parcels, the site was divided into eight Traffic Analysis Zones (TAZ). **Figure 8** illustrates the Traffic Analysis Zones established.

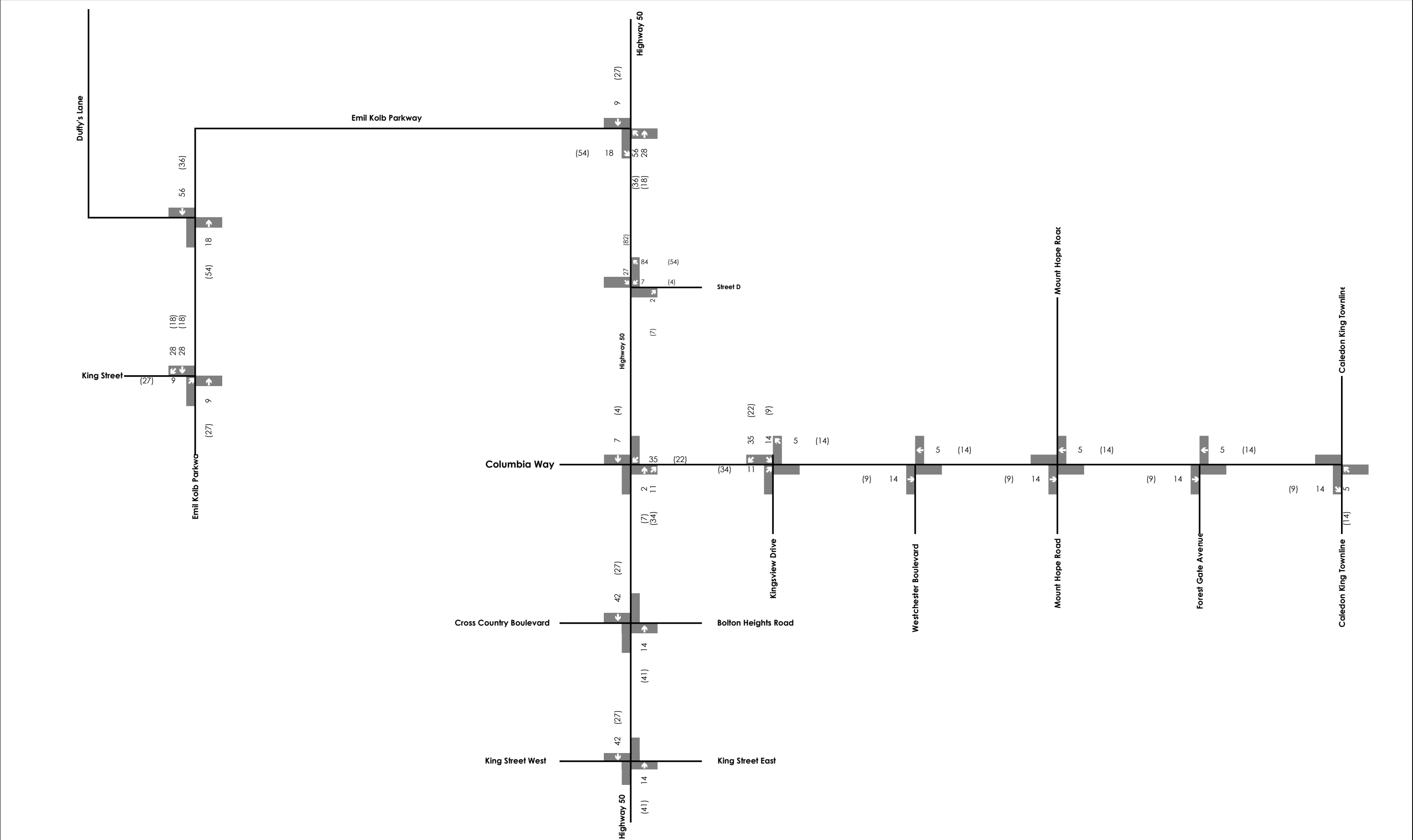
The trip distributions outlined in **Section 6.3** were applied to each TAZ, with further breakdown of the distribution at the site accesses outlined in **Section 5.3**.

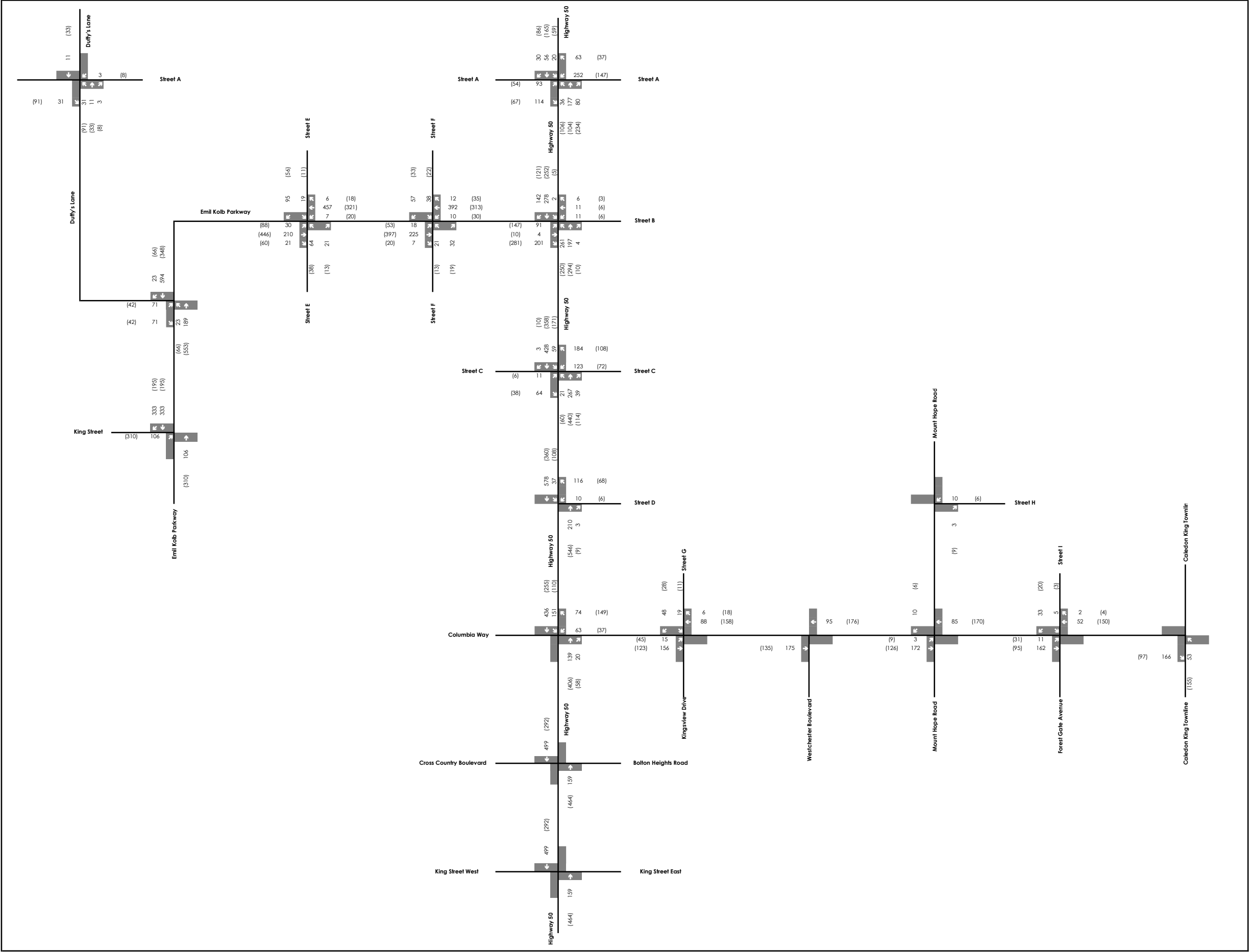
6.5 Trip Assignment

The trip generation forecasted in **Section 6.2** was divided amongst the eight Traffic Analysis Zones based on their proportional number of units and assigned to the boundary road network based on the associated trip distribution. Trip assignment per TAZ can be referenced in **Appendix K**.

The ROPA 30 lands consist of TAZ F and a portion of TAZ E south of Street C. The ROPA 30 trip assignment is based on the trip distribution of TAZ F and the residential units within the ROPA 30 boundary. **Figure 9** illustrates the ROPA 30 trip assignment.

Figure 10 illustrates the total residential trip assignment. **Figure 11** illustrates the total commercial trip assignment and **Figure 12** illustrates the total school trip assignment.





Legend:



Direction of
Travel

xx (xx)

A.M. Peak Hour (P.M. Peak Hour)
Trip Assignment

Bolton North Hill

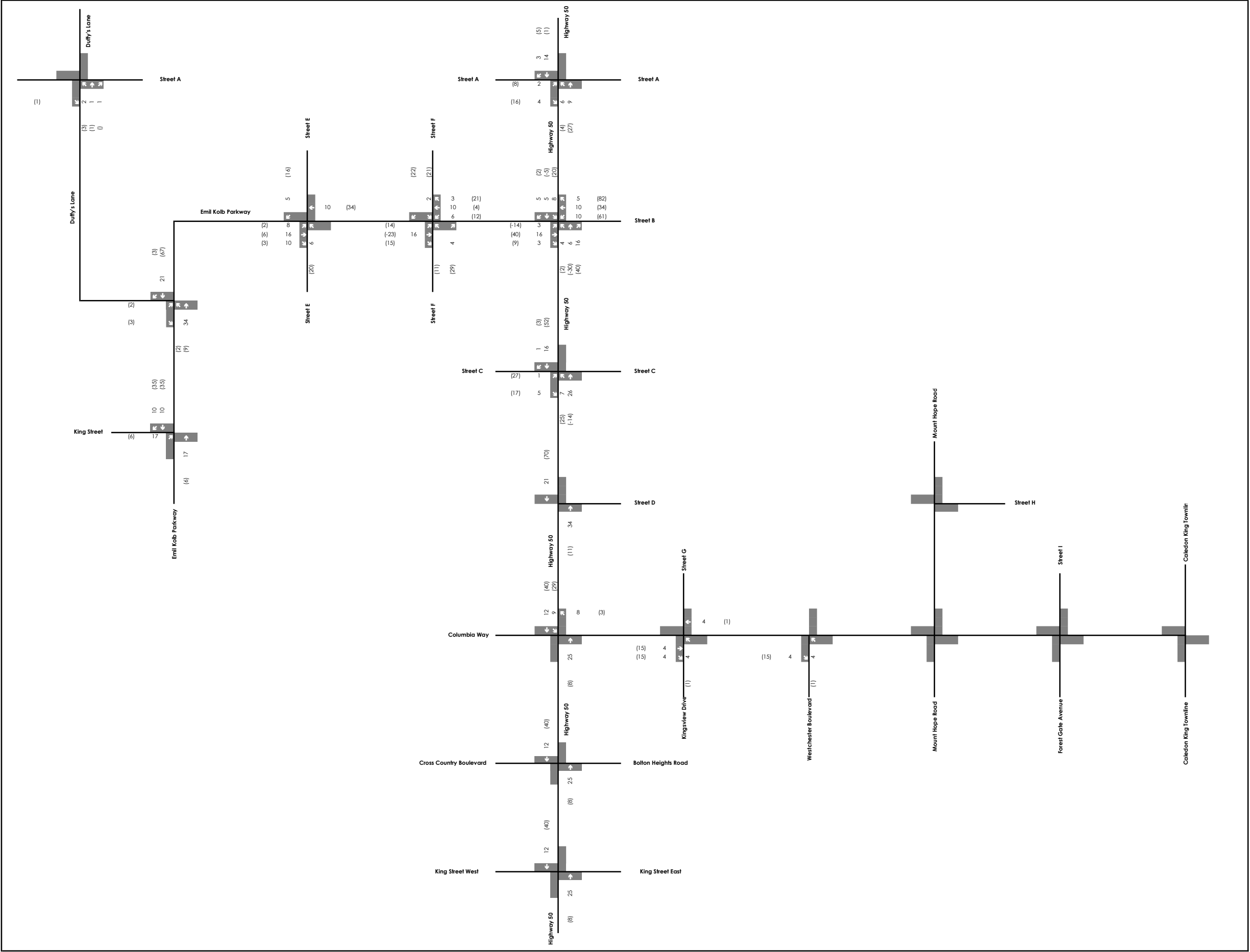
Residential Trip Assignment



CROZIER
CONSULTING ENGINEERS

Figure 10

Project No. 708-3446
Date, June 2024
Analyst, AK



Legend:



Direction of
Travel

xx (xx)

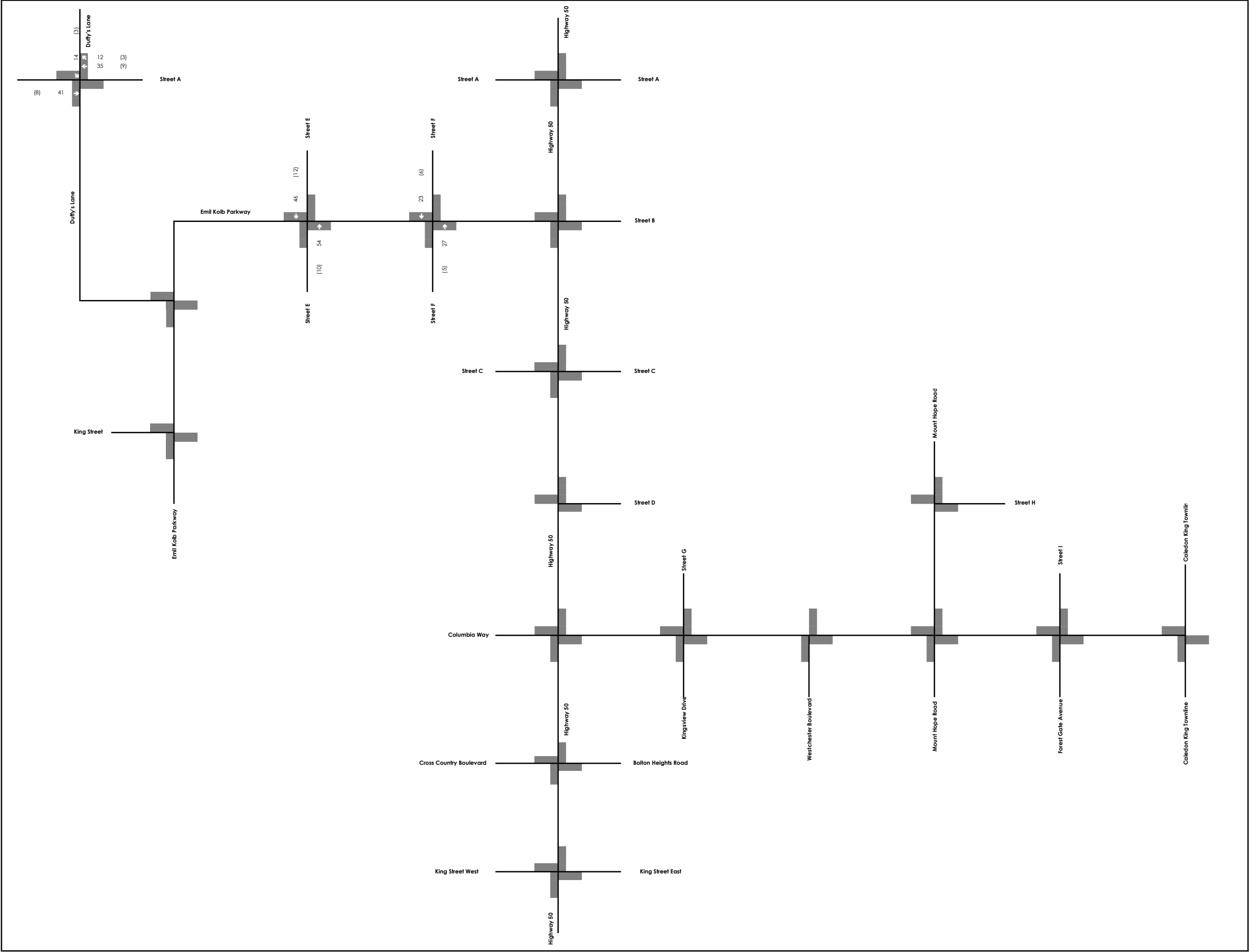
A.M. Peak Hour (P.M. Peak Hour)
Trip Assignment

Bolton North Hill
Commercial Trip Assignment



Figure 11

Project No. 708-3446
Date, June 2024
Analyst, AK



Legend:



Direction of
Travel

xx (xx)

A.M. Peak Hour (P.M. Peak Hour)
Trip Assignment

Bolton North Hill
School Trip Assignment



Figure 12

Project No. 708-3446
Date, June 2024
Analyst, AK

7.0 Improvement 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.

7.1 Road Widening Analysis Methodology

The Region of Peel's Long Range Transportation Plan (2019) and the Town of 's 2017 Transportation Master Plan 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 with set link capacities to determine link capacity thresholds (per hour per lane) for various roadway classifications to apply to this analysis.

Table 19 compares the link capacities in other municipalities and outlines the assumed link capacity for this analysis.

Table 19: Link Capacity Thresholds

Roadway Classification	Link Capacity (vehicles per hour per lane)			
	Region of Halton	County of Simcoe	Region of York	Link Capacity Assumed
Collector	500-700 (Rural)	400-600	800	700
Major Arterial	800-900	900	1100 (Rural Highway)	900

The existing and proposed boundary road network was assessed to determine the need for road widening and if the number of lanes proposed was sufficient to support the development. **Table 20** outlines the future background capacity available on the boundary road network. **Table 21** outlines the future total capacity availability.

The capacity analysis reaffirms the need for widening Caledon King Townline, south of Columbia Way, which is planned to be completed by the 2041 horizon. Assessment of the future background traffic volumes identified the need for an additional northbound lane on Highway 50, north of Emil Kolb Parkway. In the 2041 future total horizon, the need for two southbound through lanes on Highway 50 and a secondary through lane in each direction on Emil Kolb Parkway was identified.

As previously noted, the Town of Caledon's Queen Street Corridor Study recommends maintaining the two-lane cross-section of Highway 50 in downtown Bolton. A four-lane cross-section of Highway 50 has been assessed north the downtown area to north of Emil Kolb Parkway under the 2041 horizon

Table 20: Future Background Road Capacity

Road	Segment	Lanes per Direction	Capacity (vphpl)	Horizon	Northbound/Eastbound		Southbound/Westbound	
					Max. vph	Max. v/c Ratio	Max. vph	Max. v/c Ratio
Highway 50	South of King Street	2 north 1 south	900	2031	1289	0.72	686	0.76
	2041			1350	0.75	716	0.80	
	King Street to Bolton Height			2031	911	0.51	605	0.67
	2041			952	0.53	631	0.70	
	Bolton Heights to Columbia Way			2031	716	0.40	459	0.51
	2041	748		0.42	482	0.54		
	Columbia Way to Emil Kolb	1		2031	546	0.61	459	0.51
	2041			572	0.64	482	0.54	
	North of Emil Kolb			2031	878	0.98	764	0.85
2041	921		1.02	802	0.89			
Emil Kolb Parkway	Highway 50 to Duffy's Lane	1	900	2031	494	0.55	454	0.50
	2041			542	0.60	499	0.55	
	Duffy's Lane to King Street			2031	554	0.62	489	0.54
	2041			608	0.68	537	0.60	
Columbia Way	Highway 50 to Mount Hope	1	700	2031	318	0.45	264	0.38
	2	2041		342	0.24	281	0.20	
	Mount Hope to Caledon King Townline	1		2031	207	0.30	188	0.27
	2	2041		226	0.16	204	0.15	
Caledon King Townline	North of Columbia Way	1	700	2031	484	0.69	520	0.74
	1	2041		534	0.76	574	0.82	
	South of Columbia Way	1		2031	609	0.87	682	0.97
	2	2041		670	0.48	752	0.54	
King Street	West of Emil Kolb	1	900	2031	552	0.61	709	0.79
	2	2041		602	0.33	772	0.43	
King Street	West of Highway 50	1	900	2031	390	0.43	373	0.41
	2041			431	0.48	406	0.45	
	East of Highway 50			2031	705	0.78	532	0.59
	2041			753	0.84	588	0.65	

Table 21: Future Total Capacity

Road	Segment	Lanes per Direction	Capacity (vphpl)	Horizon	Northbound/Eastbound		Southbound/Westbound	
					Max. vph	Max. v/c Ratio	Max. vph	Max. v/c Ratio
Highway 50	South of King Street	2 north 1 south	900	2031	1330	0.74	728	0.81
	2041			1823	1.01	1228	1.36	
	King Street to Bolton Height			2031	952	0.53	647	0.72
	2041			1398	0.78	1143	1.27	
	Bolton Heights to Columbia Way			2031	758	0.42	466	0.52
	2041	1273		0.71	1143	1.27		
	Columbia Way to Emil Kolb	1		2031	600	0.67	487	0.54
	2041			1149	1.28	1119	1.24	
	North of Emil Kolb			2031	896	1.00	773	0.86
2041	1053	1.17	872	0.97				
Emil Kolb Parkway	Highway 50 to Duffy's Lane	1	900	2031	548	0.61	509	0.57
	2041			1194	1.28	1138	1.26	
	Duffy's Lane to King Street			2031	608	0.68	544	0.60
	2041			1239	1.38	1262	1.40	
Columbia Way	Highway 50 to Mount Hope	1	700	2031	353	0.50	299	0.43
	2	2041		541	0.39	427	0.31	
	Mount Hope to Caledon King Townline	1		2031	221	0.32	202	0.29
	2	2041		393	0.28	355	0.25	
Caledon King Townline	North of Columbia Way	1	700	2031	484	0.69	520	0.74
	1	2041		534	0.76	574	0.82	
	South of Columbia Way	1		2031	623	0.89	696	0.99
	2	2041		825	0.59	919	0.66	

Road	Segment	Lanes per Direction	Capacity (vphpl)	Horizon	Northbound/Eastbound		Southbound/Westbound	
					Max. vph	Max. v/c Ratio	Max. vph	Max. v/c Ratio
King Street	West of Emil Kolb	1	900	2031	580	0.64	727	0.81
		2		2041	918	0.51	1002	0.56
King Street	West of Highway 50	1	900	2031	390	0.43	373	0.41
				2041	431	0.48	406	0.45
	East of Highway 50			2031	705	0.78	532	0.59
				2041	753	0.84	588	0.65
Street A	East of Duffy's Lane	1	700	2041	59	0.08	50	0.07
	West of Highway 50			2041	213	0.30	196	0.28
	East of Highway 50			2041	294	0.42	315	0.45
Street B	East of Highway 50	1	700	2041	125	0.18	195	0.28
Street C	East of Highway 50	1	700	2041	287	0.41	307	0.44
	West of Highway 50			2041	90	0.13	98	0.14
Street D	East of Highway 50	1	700	2031	89	0.13	91	0.13
				2041	119	0.17	127	0.18
Street E	North of Emil Kolb	1	700	2041	119	0.17	167	0.24
	South of Emil Kolb			2041	148	0.21	96	0.14
Street F	Nort of Emil Kolb	1	700	2041	96	0.14	122	0.17
	South of Emil Kolb			2041	86	0.12	96	0.14
Street G	North of Columbia Way	1	700	2031	194	0.28	180	0.26
				2041	210	0.30	200	0.29

7.2 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.

7.2.1. 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. The signal optimization recommendations are shown in **Section 7.3**.

7.2.2. Signal Warrant Analysis

Signal warrant analysis was conducted for the proposed site accesses on the boundary road network under 2041 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 only the proposed intersections were assessed.

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. **Table 22** outlines the intersections that were recommended to be signalized based on warrants and intersection operations. **Appendix L** contains signal warrant analysis worksheets.

Table 22: Signal Warrants

Roadway	Warranted	Recommendation
Emil Kolb Parkway and Duffy's Lane	No	Not warranted Signalized intersection based on traffic operations
Emil Kolb Parkway and Street E	No	Not warranted Signalized intersection based on traffic operation
Highway 50 and Street A	Yes	Signalized intersection based on warrants
Highway 50 and Street C	No	Not warranted Signalized intersection based on traffic operations

7.2.3. Turn Lane Analysis

Auxiliary left-turn lane warrant analysis was conducted at the proposed site accesses on the boundary road network impacted under 2041 future total conditions. The analysis was conducted using the Ministry of Transportation (MTO)'s Design Supplement for TAC GDGCR

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

Auxiliary turn lane analysis was conducted at signalized intersections on the boundary road network under 2041 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 signalized intersections 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.

Based on the analysis described above, the left-turn lanes are recommended for the study intersections as shown in **Table 23**.

Table 23: Turn Lane Warrants

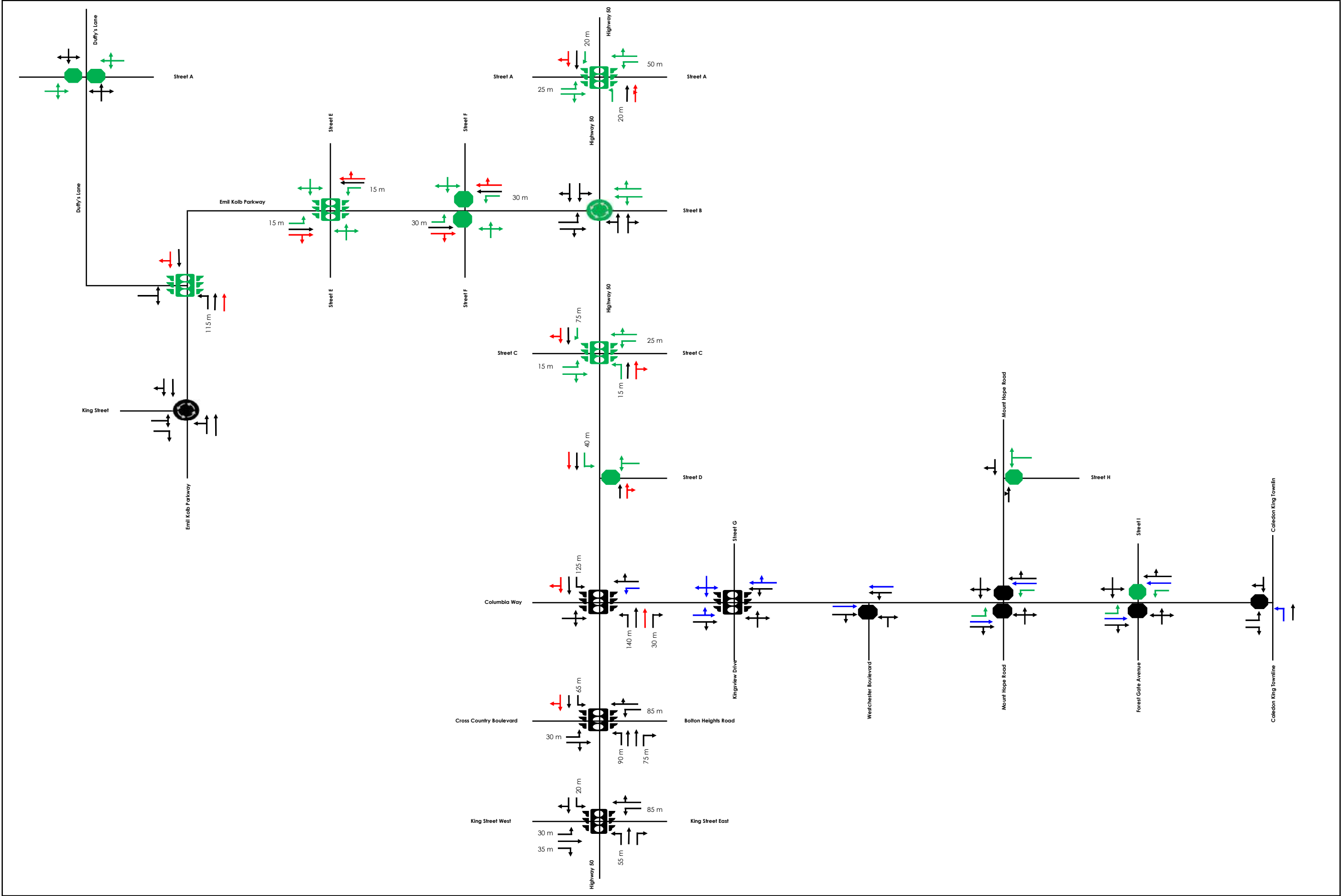
Roadway	Warranted	Recommended	Storage Lengths
Emil Kolb Parkway and Duffy's Lane	No	Yes, based on traffic operations	Northbound: 115 m (existing)
Emil Kolb Parkway and Street E	No	Yes, based on traffic operations	Eastbound: 15 m
			Westbound: 15 m
Emil Kolb Parkway and Street F	Yes	Yes	Eastbound: 30 m
			Westbound: 30 m
Highway 50 and Street A	No	Yes, based on traffic operations	Eastbound: 25 m
			Westbound: 50 m
			Northbound: 20 m
			Southbound: 20 m
Highway 50 and Street C	No	Yes, based on traffic operations	Northbound: 15 m
			Southbound: 75 m
Highway 50 and Street D	Yes	Yes	Southbound: 40 m
			Westbound: 15 m
Columbia Way and Forest Gate Avenue/Street I	Yes	Yes	Eastbound: 15 m
			Westbound: 15 m
Columbia Way and Mount Hope Road	Yes	Yes	Eastbound: 15 m
	No		Westbound: 15 m

7.3 Future Total Recommended Network Improvements

Additional improvements are required on the boundary road network under 2041 future total conditions to improve traffic operations.

A screening of the road network under 2041 future total conditions was conducted to identify any required future total road widenings or other intersection improvements. This analysis was conducted using the methodology outlined in **Section 7.1**.

Table 25 outline the required improvements identified for the as outlined in 2041 future total horizon. No recommendations were identified for the 2031 future total horizon with the buildout of the ROPA 30 lands. **Figure 13** illustrates the Future Total Road Network Configuration.



Legend:
Existing
Planned Improvement
Future Background Recommendation
Development Recommendation

XX Turn Lane Storage Length
Signalized Intersection
Stop-Controlled Intersection

Movement per Lane
Roundabout

Bolton North Hill

Future Total Road Network Configuration

**CROZIER**
CONSULTING ENGINEERS

Figure 13
Project No. 708-3446
Date: June 2024
Analyst: KH

Table 24: Additional Future Total Roadway Improvements

Roadway	Segment or Intersection	Improvement
Highway 50	Centennial Drive to Castlederg Side Road	Additional through lanes in both directions
	Columbia Way	Southbound right-turn lane becomes southbound through/right-turn lane
		Northbound right-turn lane (30 m)
	Bolton Heights	Southbound right-turn lane becomes southbound through/right-turn lane
	King Street	Optimization of splits in the a.m. and p.m. peak hours
	Street A	Signalized intersection based on warrants. Implemented left-turn lane in all directions based on traffic operations with the following storage lengths: <ul style="list-style-type: none"> - Eastbound (25 m) - Westbound (50 m) - Northbound (20 m) - Southbound (20 m)
	Emil Kolb / Street B	Revised circulation/signage
	Street C	Signalized intersection based on traffic operations. Implemented left-turn lane in all directions based on traffic operations with the following storage lengths: <ul style="list-style-type: none"> - Northbound (15 m) - Southbound (75 m) - Eastbound (15 m) - Westbound (25 m)
Columbia Way	Street D	Implemented left-turn lane based on warrants with the following storage lengths: <ul style="list-style-type: none"> - Southbound (40 m)
	Kingsview Drive/Street G	Optimization of splits in the p.m. peak hours
	Mount Hope Road	Implemented left-turn lane in the eastbound/westbound directions (15 m storage length) based on warrants
Emil Kolb Parkway	Forest Gate Avenue/Street I	Implemented left-turn lane in eastbound/westbound directions (15 m storage length) based on warrants
	Duffy's Lane to Highway 50	Additional through lanes in both directions
	Duffy's Lane	Signalized intersection based on traffic operations. Southbound right-turn lane becomes southbound through/right-turn lane
	Street E	Signalized intersection based on traffic operations. Implemented left-turn lane in eastbound/westbound directions (15 m storage length) based on traffic operations
	Street F	Implemented left-turn lane in eastbound/westbound directions (30 m storage length) based on warrants.

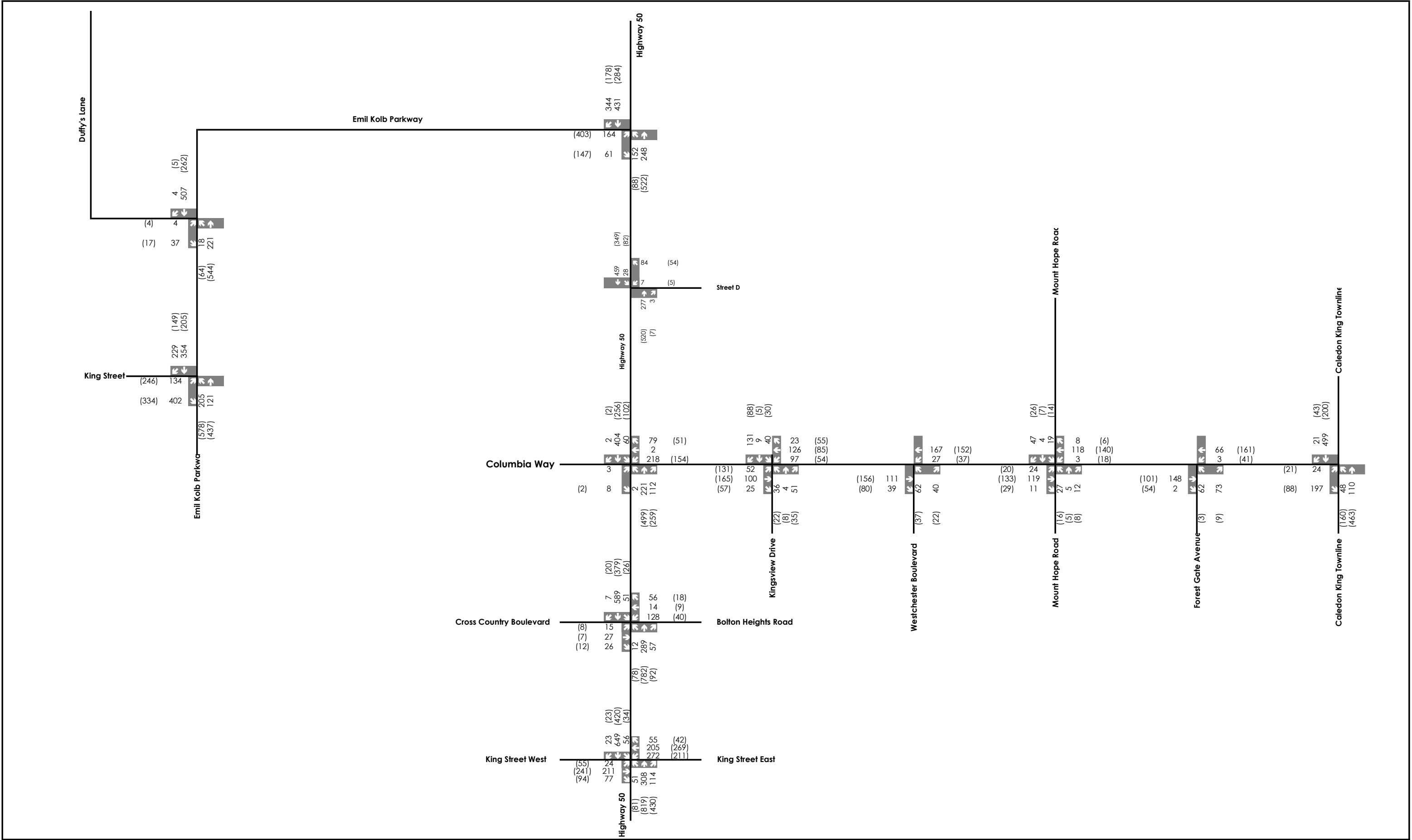
8.0 Future Total Conditions

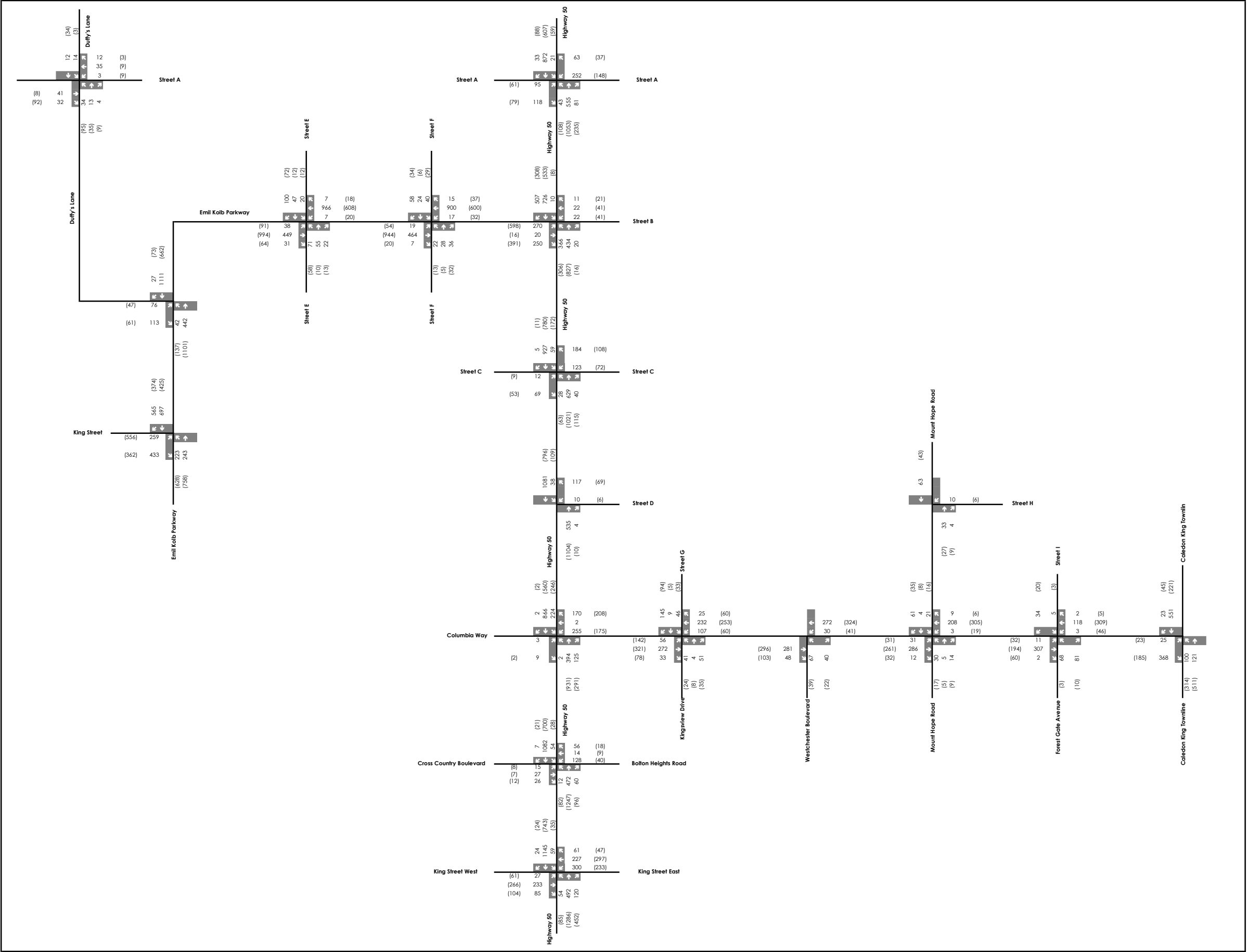
A future total analysis is used to determine the impact of growth on the boundary road network with the addition of volumes generated by the proposed development. This analysis includes the recommendations determined in **Section 7.0**.

8.1 Intersection Operations


The 2031 future total operation are outlined in **Table 25** and are based on the volumes illustrated in **Figure 14**. The 2041 future total operations are outlined in **Table 26** and are based in the volumes illustrated in **Figure 15**.

Appendix F includes detailed capacity analysis worksheets for reference.





Legend:

 Direction of Travel

XX (XX) A.M. Peak Hour [P.M. Peak Hour]

Bolton North Hill

2041 Future Total Traffic Volumes

 **CROZIER**
CONSULTING ENGINEERS

Figure 15

Project No. 708-3446
Date, June 2024
Analyst, AK

Table 25: 2031 Future Total Traffic Operations

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	V/C Ratio	LOS	Delay (s)
King Street and Emil Kolb Parkway	Overall	A	-	1.03	A	-	1.92
	SB	A	-	0.96	A	-	1.04
	NB	A	-	0.87	A	-	3.51
	EB	A	-	1.20	A	-	0.87
Highway 50 and Emil Kolb Parkway	Overall	A	-	1.14	A	-	1.92
	EB	A	-	1.17	A	-	0.93
	SB	A	-	1.40	A	-	1.70
	NB	A	-	0.63	A	-	2.57
Highway 50 and Columbia Way	Overall	B	0.77	17.7	B	0.68	11.1
	EBLTR	A	0.05	0.5	A	0.00	0.0
	WBL	E	0.77	55.9	D	0.68	52.6
	WBTR	A	0.21	7.9	A	0.10	0.4
	NBL	A	0.01	9.0	-	-	-
	NBT	A	0.20	8.8	A	0.39	7.9
	NBR	A	0.11	2.0	A	0.22	1.3
	SBL	A	0.09	8.8	A	0.18	7.1
	SBT	B	0.35	10.3	A	0.20	6.3
	SBR	A	0.0	0.0	A	0.00	0.0
Highway 50 and Bolton Heights Road	Overall	C	0.59	21.2	A	0.29	7.3
	EB	C	0.34	31.5	B	0.23	15.3
	WBL	C	0.38	34.4	D	0.21	39.9
	WBTR	B	0.19	10.1	B	0.10	19.0
	NBL	C	0.05	29.8	A	0.10	7.8
	NBT	C	0.16	23.5	A	0.28	7.0
	NBR	B	0.07	16.4	A	0.29	1.8
	SBL	B	0.09	13.2	A	0.21	9.2
	SBT	B	0.59	18.6	A	0.26	7.6
	SBR	A	0.01	0.0	A	0.02	0.2
Highway 50 and King Street	Overall	D	0.86	35.6	D	0.99	44.5
	EBL	C	0.09	25.0	C	0.21	29.3
	EBT	E	0.78	65.9	E	0.82	77.3
	EBR	A	0.24	4.3	A	0.28	5.5
	WBL	E	0.86	55.7	D	0.64	39.8
	WBTR	D	0.62	44.3	D	0.70	53.5
	NBL	B	0.24	14.0	B	0.21	15.8
	NBT	C	0.39	22.6	E	0.99	64.8
	NBR	A	0.17	4.1	B	0.54	13.4
	SBL	A	0.11	9.5	B	0.25	19.4
	SBTR	C	0.84	33.8	C	0.57	32.4
Columbia Way	Overall	B	0.55	10.1	A	0.48	8.4

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	V/C Ratio	LOS	Delay (s)
and Kingsview Drive/Street G	EBTR	B	0.38	10.6	B	0.48	12.0
	WBTL	B	0.55	13.7	A	0.41	6.8
	NBLTR	A	0.23	7.3	A	0.29	5.6
	SBLTR	A	0.38	6.3	A	0.24	6.7
Columbia Way and Westchester Boulevard	Overall	B	-	-	B	-	-
	EBTR	-	0.11	0.0	-	0.15	0.0
	WBTL	A	0.02	1.3	A	0.03	1.7
	NBLR	B	0.20	11.9	B	0.10	11.4
Columbia Way and Mount Hope Road	Overall	A	-	-	B	-	-
	EBLTR	A	0.02	1.3	A	0.02	0.9
	WBLT	A	0.0	0.2	A	0.01	1.0
	NBLTR	B	0.10	12.0	B	0.05	11.5
	SBLTR	B	0.12	10.5	B	0.07	10.6
Columbia Way and Caledon King Townline	Overall	A	-	-	A	-	-
	EB	C	0.46	18.1	B	0.21	13.4
	NBTL	A	0.05	3.0	A	0.12	3.1
	SBTR	-	0.33	0.0	-	0.15	0.0
Emil Kolb Parkway and Duffy's Lane	Overall	B	-	-	B	-	-
	EB	B	0.09	13.0	B	0.05	12.7
	NBL	A	0.02	9.0	A	0.06	8.1
	NBT	-	0.14	0.0	-	0.38	0.0
	SBT	-	0.33	0.0	-	0.18	0.0
	SBR	-	0.0	0.0	-	0.0	0.0
Highway 50 and Street D	Overall	B	-	-	B	-	-
	WBLR	B	0.12	10.9	B	0.20	11.6
	NBTR	-	0.11	0.0	-	0.11	0.0
	SBL	A	0.02	7.9	A	0.08	8.8
	SBT	-	0.27	0.0	-	0.21	0.0

Table 26: 2041 Future Total Traffic Operations

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	V/C Ratio	LOS	Delay (s)
King Street and Emil Kolb Parkway	Overall	A	-	3.04	A	-	6.20
	SB	A	-	3.01	A	-	4.28
	NB	A	-	1.29	A	-	9.03
	EB	A	-	4.26	A	-	3.60
Highway 50 and Emil Kolb Parkway/ Street B	Overall	A	-	6.20	C	-	15.88
	EB	A	-	3.60	A	-	8.10
	SB	A		4.28	A		2.28
	NB	A	-	9.03	A	-	7.82
	WB	A	-		F	-	164.2
Highway 50 and Columbia Way	Overall	B	0.80	15.9	B	0.74	13.5
	EBLTR	A	0.05	1.0	A	0.0	0.0
	WBL	D	0.80	54.4	D	0.70	51.6
	WBTR	A	0.35	5.9	C	0.57	22.0
	NBL	B	0.01	11.0	-	-	-
	NBT	A	0.19	9.8	A	0.40	8.0
	NBR	A	0.13	2.3	A	0.25	2.5
	SBL	B	0.43	15.1	C	0.74	27.9
	SBTR	B	0.42	11.7	A	0.24	6.9
Highway 50 and Bolton Heights Road	Overall	B	0.57	16.2	A	0.45	8.2
	EBL	D	0.11	41.7	C	0.04	33.9
	EBTR	C	0.25	26.4	B	0.20	12.8
	WBL	D	0.41	35.2	D	0.21	39.9
	WBTR	B	0.20	10.2	B	0.10	19.0
	NBL	B	0.08	16.0	A	0.15	8.6
	NBT	B	0.25	11.9	A	0.45	8.6
	NBR	A	0.07	3.8	A	0.31	1.9
	SBL	B	0.13	13.6	B	0.40	15.8
Highway 50 and King Street	Overall	F	1.40	103.3	F	1.42	98.8
	EBL	D	0.16	40.1	E	0.58	65.8
	EBT	F	0.91	97.4	F	0.96	105.5
	EBR	B	0.29	11.2	B	0.35	16.2
	WBL	F	1.40	239	F	1.42	255.9
	WBTR	E	0.78	67.8	F	1.03	112.7
	NBL	D	0.56	37.7	B	0.33	11.1
	NBT	C	0.52	20.5	F	1.27	155.3
	NBR	A	0.15	2.5	A	0.50	9.3
	SBL	A	0.14	9.7	B	0.35	17.5
Columbia Way and	Overall	A	0.39	8.4	A	0.43	7.1
	EBLTR	A	0.32	8.9	A	0.43	9.3

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	V/C Ratio	LOS	Delay (s)
Kingsview Drive/Street G	WBLTR	A	0.36	9.5	A	0.37	5.7
	NBLTR	A	0.22	7.0	A	0.29	5.3
	SBLTR	A	0.39	6.0	A	0.25	6.2
Columbia Way and Westchester Boulevard	Overall	C	-	-	B	-	-
	EBTR	-	0.14	0.0	-	0.13	0.0
	WBL	A	0.13	2.3	A	0.04	2.6
	NBLR	C	0.27	15	B	0.14	13.7
Columbia Way and Mount Hope Road	Overall	C	-	-	B	-	-
	EBL	A	0.03	7.8	A	0.03	8.1
	EBTR	-	0.14	0.0	-	0.11	0.0
	WBL	A	0.00	8.0	A	0.02	8.3
	WBTR	-	0.10	0.0	-	0.13	0.0
	NBLTR	C	0.15	15.9	B	0.08	14.3
	SBLTR	B	0.16	11.6	B	0.11	12.4
Columbia Way and Caledon King Townline	Overall	D	-	-	E	-	-
	EBL	C	0.11	21.1	E	0.21	45.3
	EBR	D	0.78	33.0	B	0.24	11.0
	NBL	A	0.11	9.4	A	0.25	8.7
	NBTR	-	0.08	0.0	-	0.31	0.0
	SBTR	-	0.36	0.0	-	0.16	0.0
Emil Kolb Parkway and Duffy's Lane	Overall	B	0.65	11.0	B	0.67	11.2
	EBLR	B	0.38	14.6	A	0.24	9.3
	NBL	B	0.37	17.8	B	0.57	19.1
	NBT	A	0.29	7.8	B	0.67	11.8
	SBTR	B	0.65	11.4	A	0.48	9.1
Duffy's Lane and Street A	Overall	A	-	-	B	-	-
	EBLTR	A	0.09	9.6	A	0.10	9.1
	WBLTR	A	0.06	9.8	B	0.04	11.3
	NBLTR	A	0.02	4.9	A	0.06	5.2
	SBLTR	A	0.01	3.9	A	0.0	0.6
Emil Kolb Parkway and Street E	Overall	A	0.48	9.7	A	0.47	7.9
	EBL	A	0.15	8.7	A	0.19	6.8
	EBTR	A	0.24	7.3	A	0.47	7.7
	WBL	A	0.01	6.4	A	0.07	6.0
	WBTR	A	0.48	9.6	A	0.27	6.2
	NBLTR	B	0.32	18.2	C	0.23	22.1
	SBLTR	A	0.29	9.5	B	0.21	10.3
Emil Kolb Parkway and Street F	Overall	F	-	-	E	-	-
	EBL	A	0.03	10.0	A	0.07	9.1
	EBTR	-	0.18	0.0	-	0.36	0.0
	WBL	A	0.02	8.4	A	0.05	9.7

Intersection	Movement	A.M. Peak Hour			P.M. Peak Hour		
		LOS	V/C Ratio	Delay (s)	V/C Ratio	LOS	Delay (s)
	WBTR	-	0.35	0.0	-	0.22	0.0
	NBLTR	E	0.44	37.0	E	0.41	36.3
	SBLTR	F	0.71	65.4	E	0.52	39.9
Highway 50 and Street A	Overall	B	0.61	10.9	A	0.55	8.9
	EBL	B	0.22	16.5	C	0.23	32.5
	EBTR	A	0.20	4.3	A	0.14	0.5
	WBL	C	0.61	24.4	D	0.55	41.1
	WBTR	A	0.09	0.3	A	0.08	0.4
	NBL	A	0.17	9.6	A	0.23	6.3
	NBTR	A	0.34	8.3	A	0.53	7.0
	SBL	A	0.06	7.6	A	0.26	8.5
	SBTR	B	0.48	10.1	A	0.28	5.1
Highway 50 and Street C	Overall	A	0.49	8.5	B	0.54	10.5
	EBL	B	0.06	16.8	C	0.18	23.6
	EBTR	A	0.14	0.6	A	0.12	0.5
	WBL	C	0.49	25.8	C	0.37	27.8
	WBTR	A	0.34	2.0	A	0.25	1.3
	NBL	A	0.06	4.0	A	0.16	4.4
	NBTR	A	0.36	8.4	B	0.54	12.3
	SBL	A	0.11	5.1	A	0.41	6.4
	SBTR	A	0.43	8.3	A	0.37	9.3
Highway 50 and Street D	Overall	B	-	-	C	-	-
	WBLR	B	0.22	12.8	C	0.19	16.4
	NBTR	-	0.21	0.0	-	0.43	0.0
	SBL	A	0.04	8.6	B	0.16	11.4
	SBT	-	0.32	0.0	-	0.23	0.0
Mount Hope Road and Street H	Overall	A	-	-	A	-	-
	WBLR	A	0.01	9.0	A	8.9	0.01
	NBTR	-	0.02	0.0	-	0.0	0.02
	SBTL	-	0.0	0.0	-	0.0	0.0
Columbia Way and Forest Gate Avenue/ Street I	Overall	A	-	-	B	-	-
	EBL	A	0.01	7.5	A	0.03	8.0
	EBTR	-	0.12	0.0	-	0.08	0.0
	WBL	A	0.0	7.9	A	0.04	7.9
	WBTR	-	0.05	0.0	-	0.12	0.0
	NBLTR	B	0.23	12.3	B	0.02	10.3
	SBLTR	A	0.04	9.3	B	0.03	10.0

Table 27: 2031 Future Total Queueing

Intersection	Storage Length	95 th Percentile Queue	
		A.M. Peak Hour	P.M. Peak Hour
King Street and Emil Kolb Parkway	-	SB – 7 m NB – 3 m EB – 8 m	SB – 2 m NB – 26 m EB – 7 m
Highway 50 and Emil Kolb Parkway	-	EB – 6 m SB – 8 m NB – 26 m	EB – 7 m SB – 3 m NB – 8 m
Highway 50 and Columbia Way	WBL – 70 m NBL – 140 m SBL – 100 m SBR – 30 m	WBL – 72 m NBL – 2 m SBL – 13 m SBR – 0 m	WBL – 49 m NBL – 0 m SBL – 17 m SBR – 0 m
Highway 50 and Bolton Heights Road	WBL – 85 m NBL – 85 m NBR – 75 m SBL – 65 m SBR – 50 m	WBL – 31 NBL – 8 NBR – 16 SBL – 17 SBR – 0 m	WBL – 14 m NBL – 18 m NBR – 0 m SBL – 6 m SBR – 0 m
Highway 50 and King Street	EBL – 30 m EBR – 35 m WBL – 30 m NBL – 55 m SBL – 20 m	EBL – 10 m EBR – 6 m WBL – 91 m NBL – 12 m SBL – 5 m	EBL – 19 m EBR – 9 m WBL – 63 m NBL – 21 m SBL – 11 m
Columbia Way and Kingsview Drive	-	-	-
Columbia Way and Westchester Boulevard	-	-	-
Columbia Way and Mount Hope Road	-	-	-
Columbia Way and Caledon King Townline	-	-	-
Emil Kolb Parkway and Duffy's Lane	NBL – 105 m SBR – 115 m	NBL – 1 m SBR – 0 m	NBL – 0 m SBR – 0 m
Highway 50 and Street D	-	-	-

Table 28: 2041 Future Total Queueing

Intersection	Storage Length	95 th Percentile Queue	
		A.M. Peak Hour	P.M. Peak Hour
King Street and Emil Kolb Parkway ¹	-	SB – 34 m NB – 8 m EB – 27 m	SB – 33 m NB – 92 m EB – 30 m
Highway 50 and Emil Kolb Parkway ¹	-	EB – 24 m SB – 41 m NB – 15 m WB – 2 m	EB – 68 m SB – 22 m NB – 78 m WB – 219 m
Highway 50 and Columbia Way	NBL – 140 m NBR – 30 m SBL – 125 m	NBL – 2 m NBR – 9 m SBL – 68 m	NBL – 0 m NBR – 16 m SBL – 93 m
Highway 50 and Bolton Heights Road	EBL – 30 m WBL – 85 m NBL – 90 m NBR – 75 m SBL – 65 m	EBL – 8 m WBL – 31 m NBL – 7 m NBR – 7 m SBL – 19 m	EBL – 5 m WBL – 14 m NBL – 20 m NBR – 0 m SBL – 7 m
Highway 50 and King Street East/West	EBL – 30 m EBR – 35 m WBL – 30 m NBL – 55 m SBL – 20 m	EBL – 15 m EBR – 15 m WBL – 164 m NBL – 21 m SBL – 12 m	EBL – 30 m EBR – 22 m WBL – 133 m NBL – 15 m SBL – 8 m
Columbia Way and Kingsview Drive	-	-	-
Columbia Way and Westchester Boulevard	-	-	-
Columbia Way and Mount Hope Road	EBL – 15 m WBL – 15 m	EBL – 1 m WBL – 1 m	EBL – 1 m WBL – 1 m
Columbia Way and Caledon King Townline	-	-	-
Emil Kolb Parkway and Duffy's Lane	NBL – 105 m	NBL – 12 m	NBL – 27 m
Duffy's Lane and Street A	-	-	-
Emil Kolb Parkway and Street E	EBL – 15 m WBL – 15 m	EBL – 7 m WBL – 2 m	EBL – 11 m WBL – 4 m
Emil Kolb Parkway and Street F	EBL – 30 m WBL – 30 m	EBL – 1 m WBL – 1 m	EBL – 2 m WBL – 1 m
Highway 50 and Street A	EBL – 25 m WBL – 50 m NBL – 20 m SBL – 20 m	EBL – 18 m WBL – 46 m NBL – 8 m SBL – 4 m	EBL – 21 m WBL – 45 m NBL – 13 m SBL – 10 m
Highway 50 and Street C	EBL – 15 m WBL – 25 m NBL – 15 m SBL – 75 m	EBL – 4 m WBL – 23 m NBL – 3 m SBL – 6 m	EBL – 10 m WBL – 17 m NBL – 7 m SBL – 12 m
Highway 50 and Street D	SBL – 40 m	SBL – 0 m	SBL – 5 m
Mount Hope Road and Street H	-	-	-
Columbia Way and Forest Gate Avenue/Street I	EBL – 15 m WBL – 15 m	EBL – 1 m WBL – 1 m	EBL – 1 m WBL – 1 m

Note 1: Passenger Car Equivalent provided in Arcady reports. 7.5 m per vehicle assumed.

Under 2041 future total conditions, with the noted recommendations and mitigations, the study +intersections are expected to operate with minimal delay and additional capacity with the exception of Highway 50 and Emil Kolb Parkway/Street B, Highway 50 and King Street, and Emil Kolb Parkway and Street F.

The intersection of Highway 50 and Emil Kolb/Street B is forecasted operate with an overall Level of Service 'A' in the a.m. peak hour and p.m. peak hours. However, in the p.m. peak hour the westbound leg of the intersection (Street B) is expected to experience significant delay, due to the high number of vehicles travelling northbound in the p.m. peak hour. Ongoing monitoring of the intersection should occur as unit are constructed to understand the actual impact of the fourth leg. It is also noted that the signalization of surrounding intersections, particularly Highway 50 and Street C to the south, will provide breaks in traffic flow, so the actual operations are anticipated to improve over the modeling results presented above.

Similar to the future background operations the intersection of Highway 50 and King Street is expected to operate at capacity with extended delays for several movements. The recommendations of the Queen Street Environmental Assessment should be considered before further mitigation are made. It is expected that additional through lanes would improve operations, however the Town of Caledon is in favour of maintaining the two lane cross-section and providing additional active transportation facilities. Significant delay may encourage more users to by-pass downtown Bolton in favour of parallel routes, which would be supported by future Highway 413 interchanges.

Street F and Emil Kolb Parkway experiences 65.4s of delay for northbound outbound vehicles. The intersection was not recommended for signalization due to its proximity to Street E. Users may decide to favour the signalized intersection of Street E and Emil Kolb Parkway, if the delay at Street F is significant. It is also noted that the Region may require restricted movements at the access, therefore impacting the operations. The intersection, its spacing and operations, can be further reviewed when associated Draft Plans are prepared.

It is noted that the 2041 operations are reviewing 17 years of sustained growth and the addition of more than 4,300 residential units on the Highway 50 corridor; approximately half the number of existing private dwellings in the community of Bolton. Ongoing monitoring with the build-out of the ROPA 30 lands and into the future horizons is recommended to capture changes in travel behaviour and traffic patterns within the community.

9.0 Zoning By-Law Review

The following section reviews the parking and loading requirements outlined in the Town of Caledon's Zoning By-Law 2006-50. Although parking locations and provisions have not been determined at this stage, the requirements have been provided for review and are recommended for implementation at the detailed design stage. Should a reduction in parking or loading be recommended at a future Site Plan phase, supporting documentation will be required for review and approval by the Town of Caledon.

9.1 Vehicle Parking

Vehicle parking requirement are outlined in Section 5: Parking, Loading and Delivery Standards in Zoning By-Law 2006-50. As the proposed development is made up of residential area, commercial areas and school zones, the requirements were obtained from Section 5.2.2: Residential Parking Requirements (Table 5.1) and Section 5.2.3: Non-Residential Parking Requirements (Table 5.2).

Table 29 outlines the vehicle parking requirements according to the Town of Caledon's Zoning By-Law.

Table 29: Zoning By-Law No. 2006-50 Vehicle Parking Requirement Assessment

Land Use (By-Law Land Use)	Residential Parking Space Rate	Visitor Parking Space Rate
Singles (Dwelling, Detached)	2 parking spaces per dwelling unit	
Townhouses (Dwelling, Townhouse)	2 parking spaces per dwelling unit	0.25 parking spaces per dwelling unit
Mid-Density/High-Density Apartments (Building, apartment)	1.5 parking spaces per dwelling unit	0.25 parking spaces per dwelling unit
Commercial/Mixed Use (Retail Store)	1 parking per 20 m ² of net floor area ¹	
Elementary School (School – Elementary)	1 parking per 20 m ² of GFA ²	

9.2 Accessible Parking

The accessible parking requirements are found in Section 1 of Schedule “K” in the Town of Caledon’s Zoning By-Law 2015-058. The requirement for apartments, retail store and elementary schools is 11 accessible (barrier-free) parking spaces plus 1% for parking requirements exceeding 1000 spaces.

Please note that accessible parking for single-detached and townhouse units have not been included as individual driveways are assumed. Should a unit not provide the required parking within its lot, a separate parking area must adhere to the accessible parking requirements as outlined in the Zoning By-Law.

9.3 Bicycle Parking

The Town of Caledon does not currently have bicycle parking requirements within it's Zoning By-Law. The Town's Active Transportation Master Plan provides sample By-Law recommendations for bicycle parking rates and Town staff recommended that the bike parking requirements of comparable municipalities should be considered for new developments. **Table 30** outlines a variety of land uses and the associated bicycle parking rates from the Town of Orangeville and the Active Transportation Master Plan.

Table 30: Bicycle Parking Rates

Land Use	Active Transportation Master Plan Sample Rate	Town of Orangeville Rates
Residential	10% of the total require motor vehicle parking for buildings that do not have an exclusive use garage	-
Commercial	5% of the total required motor vehicle parking with a minimum of 6 spaces per building	1,000 m ² of floor area
School	4 per classroom	1 per 20 students
Office	1 per 200 m ² of net floor area of office space	-
Institutional	10% of the total required motor vehicle parking	2 plus 1 per 1,000 m ² of floor area
Industrial	-	2 plus 0.25 per 1,000 m ² of floor area

9.4 Loading

The loading and delivery spaces requirement are outlined in Section 5.3.2 and 5.4.2, respectively, of the Town's Zoning By-Law 2006-50. Should the commercial lands include a supermarket, loading spaces of 14 m by 3.5 m will be required. Other commercial uses such as convenience stores, restaurants and retail stores will require a 9 m by 3.5 m delivery spaces on site.

The school sites will require two loading spaces per lot. The loading requirements will be confirmed and illustrated when Site Plans are prepared for future applications.

10.0 Transportation Demand Management

Transportation Demand Management (TDM) refers to various strategies to reduce traffic congestion, minimize the number of single-occupant vehicles, encourage non-auto modes of travel, and reduce vehicle dependency to create a sustainable transportation system.

TDM strategies have multiple benefits, including the following:

- Reduced auto-related emissions to improve air quality.
- Decreased traffic congestion to reduce travel time.
- Increased travel options for residents and commuters.
- Reduced personal transportation costs and energy consumption.
- Support Provincial Smart Growth Objectives.

10.1 Pedestrian and Cycling Facilities

As stated in **Section 3.4**, Bolton has a network of active transportation facilities, composed of hiking trails, bike routes, paved and unpaved multi-use trails and footpaths.

The Town of Caledon's Active Transportation Master Plan and Multi-Modal Transportation Plan propose several improvements to the active transportation network within the study area. **Table 31** outlines the planned improvements.

Appendix N includes excerpts from the Town's Active Transportation Master Plan. **Figure 16** illustrates the future active transportation network.

It is recommended that the existing multi-use path on the east side of Highway 50 be extended north of Columbia Way to Street A along the site frontage to provide pedestrian connection to proposed transit and the recreation facilities to the south.

Bolton North Hill Secondary Plan

Detailed Concept Plan

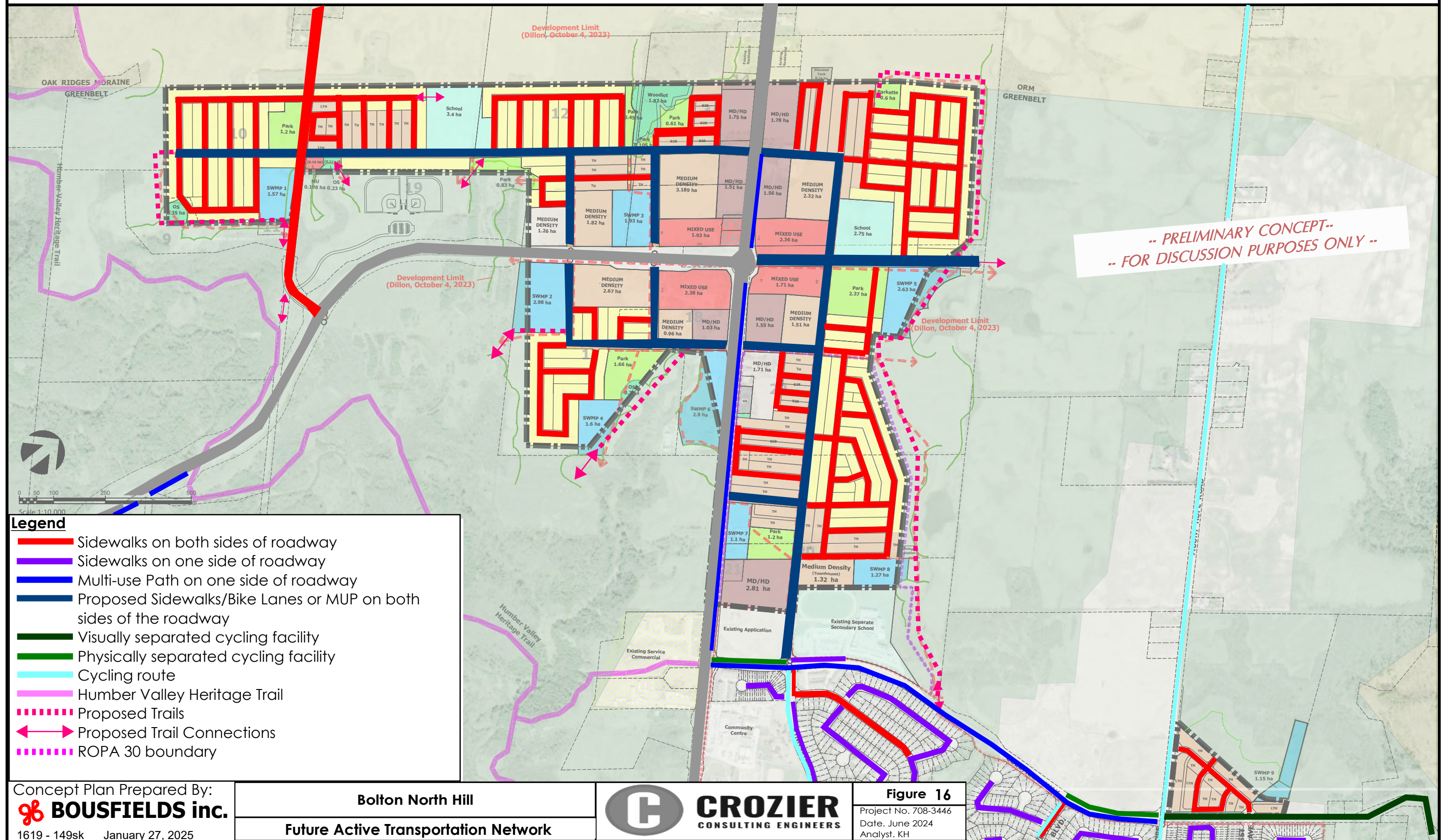


Table 31: Planned Active Transportation Network Improvements

Roadway	Span	Improvement
Columbia Way	Highway 50 to Mount Hope Road	Multi-Use Trail
	Highway 50 to Caledon King Townline	Visually Separated Facilities (Bike Lane Assumed)
Highway 50	Mayfield Road to Columbia Way	Regional Pedestrian and Cycling Improvements
Emil Kolb Parkway	Duffy's Lane to King Street	Multi-Use Trail
King Street West	Emil Kolb Parkway to Hurontario Street	Regional Pedestrian and Cycling Improvements
Kingsview Drive	Columbia Way to Woodrow Avenue/ Whitehead Crescent	Signed Cycling Route (Shared Facility)
Mount Hope Road	Guardhouse Drive to Castlederg Side Road	Signed Cycling Route (Shared Facility)
Bolton Heights Drive	Highway 50 to Kingsview Drive	Multi-Use Trail
Duffy's Lane	Emil Kolb Parkway to Castlederg Side Road	Signed Cycling Route (Shared Facility)

Connection between the boundary road network and proposed roadway will increase pedestrian and cycling accessibility encouraging residents and employees to commute via walking or cycling. The use of cross-ride pavement markings and/or designated cycling and pedestrian signal heads are recommended to be used at intersections with Multi-Use Paths and bike lanes as appropriate based on Ontario Traffic Manual Book 15 and Book 18. Such intersection elements will be confirmed through detailed design.

10.2 Transit Expansion

The use of public transportation is a proven Transportation Demand Management measure. Existing transit facilities outlined in **Section 3.3** should be expanded to include the full buildout of the Bolton North Hill development. **Figure 17** illustrates a recommended expansion of Route 41 and the location of potential transit stops to provide 400 m of transit coverage to the majority of the development.

10.2.1. Proposed Transit Network

The Town of Caledon's Multi-Modal Transportation Master Plan, Figure ES-3 illustrates the proposed transit network for the Town. The existing Bolton Line is shown, alongside a proposed transit corridor along Highway 50, north of Columbia Way, continuing on Emil Kolb towards King Street and the future Caledon GO Station.

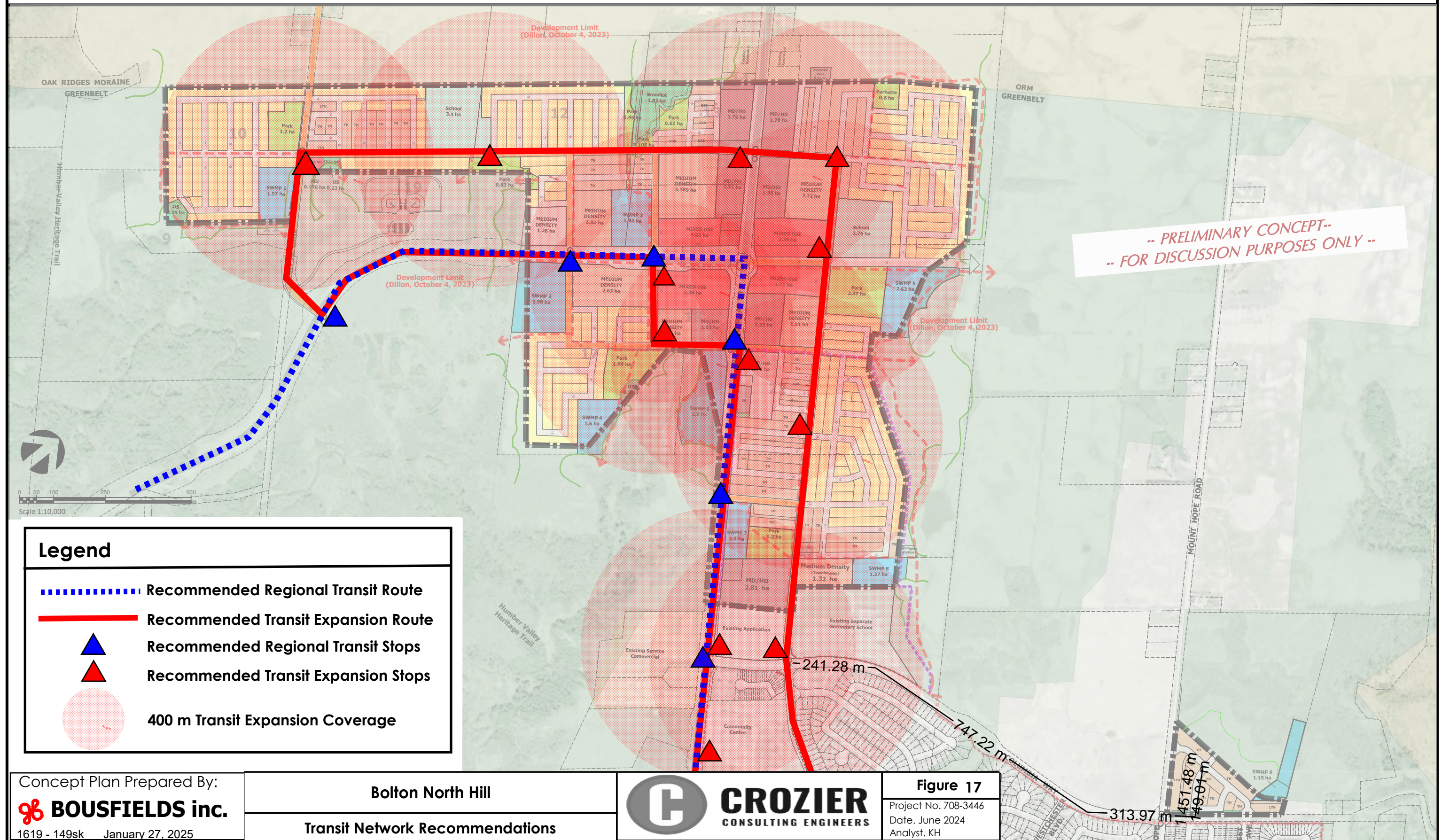
10.2.2. Proposed GO Transit Station

As outlined in the Caledon Station Secondary Plan Transportation Study (BA Group, 2023) the Caledon GO Station was identified by the Province and Peel Region's Official Plan as a Major Transit Station. The GO Station will provide rail and bus services, the latter planned to operate along the planned Highway 413. The station is expected to be supported by existing bus services in Bolton, operated by Brampton Transit.

The proposed transit corridor along Emil Kolb and King Street, as presented in the Town's Multi-Modal Transportation Master Plan, are opportunities for local connection to the Go Station.

Bolton North Hill Secondary Plan

Detailed Concept Plan



11.0 Recommendations

A number of recommendations have been made to mitigate the increase of volumes on the boundary road network and improve the operations of existing and proposed intersections. **Table 32** outlines the future background and future total road network recommendations and provides an approximate timeline for their construction.

Table 32: Timeline of Recommendations

Roadway	Segment or Intersection	Recommendation	Timeline
Highway 50	Centennial Drive to Castlederg Side Road	Widening to a four-lane cross-section	Future Background – 2041 Horizon Year
	Columbia Way	Convert southbound right-turn lane to southbound through/right-turn lane	With Widening of Highway 50
		Northbound auxiliary right-turn lane	
	Bolton Heights	Convert southbound right-turn lane to southbound through/right-turn lane	With Widening of Highway 50
	King Street	Optimization of splits in the a.m. and p.m. peak hours	Future Total – 2041 Horizon Year
	Street A	Signalization	With construction of Street A
		Auxiliary left-turn lane on each approach	
	Emil Kolb / Street B	Revised circulation/signage	With construction of Street B
	Street C	Signalization	With construction of Street C
		Auxiliary left-turn lane on each approach	
Columbia Way	Street D	Southbound left-turn lane	With construction of Street D
	Kingsview Drive/Street G	Optimization of splits in the a.m. and p.m. peak hours	With construction of Street G
	Mount Hope Road	Eastbound left-turn lane	With Widening of Columbia Way
		Westbound left-turn lane	
	Forest Gate Avenue/Street I	Eastbound left-turn lane	With construction of Street I
		Westbound left-turn lane	
Emil Kolb Parkway	Duffy's Lane to Highway 50	Widening to a four-lane cross-section	Future Background – 2041 Horizon Year
	Duffy's Lane	Signalization	Future Total – 2041 Horizon Year
		Convert southbound right-turn lane to southbound through/right-turn lane	With Widening of Emil Kolb Parkway
	Street E	Signalization	With construction of Street E
		Eastbound left-turn lane	
		Westbound left-turn lane	
	Street F	Eastbound left-turn lane	With construction of Street F
		Westbound left-turn lane	

Multi-modal recommendations include the expansion of existing transit into the development area and the implementation of pedestrian and cycling facilities to promote active transportation connections to the existing services, pedestrian/cycling networks and trails within Bolton.

12.0 Conclusions

The key findings of the analysis within this study are as follows:

2024 Existing Conditions

- All intersections in the study area are currently operating efficiently with minimal delays and with reserve capacity to accommodate future increases in traffic volume.

Planned Improvements

- The Region of Peel is undertaking and 2051 Transportation Master Plan. They are in the process of updating and combining a number of existing studies.
 - The 2019 Long Range Transportation Plan identified Highway 50 as a four lane cross-section while the Town's Queen Street Corridor Study Report recommends maintaining the two-lane cross section in the Downtown Core.
- The Region is currently undertaking an EA for Queen Street and the recommendations of that study are not yet known.
- The Town of Caledon completed a Multi-Modal Transportation Master Plan in April 2024.
 - The report illustrates the planned widening of both Columbia Way and the Caledon King Townline (south of Columbia Way) to four lanes by the 2041 horizon.
- The Caledon Station Secondary Plan Transportation Study presents a future lane configuration of two through lanes per direction on King Street west of Emil Kolb.
- The Town's Multi-Modal Transportation Master Plan also identifies the planned GTA-West Transportation Corridor (Highway 413) with interchanges planned for Coleraine Drive and with Highway 427, both south of Bolton.

2041 Future Background Conditions

- The boundary road network is expected to operate at overall acceptable levels of service under 2041 future background conditions, with the exception of the intersection of Highway 50 and King Street.
- Highway 50 and King Street is expected to operate at LOS "D", and a maximum volume-to-capacity ratio of 0.97 and 1.01 during the weekday a.m. and p.m. peak hours, respectively.
 - Similar to the existing conditions, under both peak hours the 95th percentile queue lengths are exceeding the designated storage length for the westbound left-turn lane.
 - Monitoring of the intersection for signal optimization is recommended as development of Bolton continues over the next 20 years.
- The traffic operations on the boundary road network are expected to be acceptable under 2041 future background conditions.

Site Generated Traffic

- The proposed development is expected to generate 2,930 two-way trips during the weekday a.m. peak hour, and 3,573 two-way trips during the weekday p.m. peak hour at full build-out.
- Development volumes are dispersed onto the internal and external road networks. Collector roads internal to the Option 1 lands act as site accesses to the boundary road network.

2041 Future Total Conditions

- With integration of recommendations and mitigations, the study intersections are expected to operate with minimal delay and additional capacity with the exception of
 - Highway 50 and Emil Kolb Parkway/Street B
 - Highway 50 and King Street
 - Emil Kolb Parkway and Street F
- The intersection of Highway 50 and Emil Kolb/Street B is forecasted to operate with an overall Level of Service 'A' in both the a.m. and p.m. peak hours. However, in the p.m. peak hour, the westbound leg of the intersection (Street B) is expected to experience significant delay.
 - Signalization of surrounding intersections will provide breaks in traffic flow not accounted for in the model.
 - Ongoing monitoring of the intersection should occur as units are constructed to understand the actual impact of the fourth leg.
- The intersection of Highway 50 and King is expected to continue operating at capacity with extended delays for several movements.
 - The recommendations of the Queen Street Environmental Assessment should be considered before further mitigation are made.
 - Significant delays may encourage users to bypass downtown Bolton in favor of parallel routes, which would be supported by future Highway 413 interchanges.
- The intersection of Street F and Emil Kolb Parkway experiences a delay for outbound vehicles.
 - The intersection was not recommended for signalization due to its proximity to Street E. Users may decide to favor the signalized intersection of Street E and Emil Kolb Parkway, if the delay at Street F is significant
 - It is also noted that the Region may require restricted movements at the access, therefore impacting the operations.
 - The intersection, its spacing and operations, can be further reviewed when associated Draft Plans are prepared.

Multi-Modal Conditions

- Sidewalks are to be provided on both sides of local roads and the use of bike lanes and sidewalks or multi-use paths is recommended for collector roadways.
 - The use of cross-ride pavement markings and/or pedestrian/cycling signal heads is recommended to be considered for detailed design.
- Extension of the existing multi-use path on Highway 50 is recommended along the site frontage to Street A.
- Bike parking should be provided for high density residential units as well as commercial and institutional buildings to promote cycling as an alternative for motor vehicle trips.
- Expansion of Brampton Transit Route 41 through the development will provide transit coverage within 400 m of walking distance to the majority of the development.
- Future expansion of transit within Caledon and the proposed GO Transit Station will provide an increase in multi-modal travel option for the development and the existing community of Bolton.

In conclusion, the development can be accommodated on the boundary road network with the noted recommendations and ongoing monitoring. Future reports prepared to support Subdivision Draft Plan Applications and Site Plan Applications can monitor experienced growth as well as provide greater detail regarding mitigations and timelines required to support the construction and occupancy of the development.

Respectfully submitted by,

C.F. CROZIER & ASSOCIATES INC.



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Partner, Director of Transportation

C.F. CROZIER & ASSOCIATES INC.



Kerianne Hagan, EIT
Engineering Intern, Transportation

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APPENDIX A

Comment Response Matrix

Bolton North Hill Secondary Plan POPA-2022-0001 / Region File Number: OZ-22-001C Official Plan Amendment Application		
NO.	TOWN COMMENT	RESPONSE
Town of Caledon Planning: Tanjot Bai, August 28, 2023		
27	Subject to confirmation from Transportation and Development Engineering, it is recommended that pedestrian circulation trails shall be incorporated into SWM Ponds.	Maintenance access roads for the SWM ponds can double as pedestrian trails. These can be detailed at a later stage.
Road Network		
39	The Town has reviewed the proposed road network and provide the following comments: a. Road right of way widths determined prior to draft plan approval will be based on the functions of the right of way and may include stormwater management measures in the form of low impact development. b. The Town will require that Emil Kolb Parkway extend to the eastern limit of the plan so that it can be connected to the Option 2 lands when they develop. The Subwatershed Study is to evaluate this extension, recommend a suitable cross-section through the Greenbelt and recommend mitigation measures that may be required to offset the impacts of achieving the connection in the future. c. The Town requires that Kingsview Drive extend into the Bolton North Hill Secondary plan at its current right of way width of 26 meters. This right of way (ROW) is to extend through the development. d. A road connection is to be provide to the north on the west side of Highway 50. The ROW width is to be determined through the Transportation Impact study. e. Duffy's Lane is to be an urbanized collector with a 26 m ROW from the north end of the development to Emil Kolb Parkway. f. The current ROW width of Emil Kolb Parkway near Highway 50 currently exceeds the proposed ROW width of 35 m shown on the secondary plan. Further conversations with the Region and Town are required to determine the appropriate ROW width of Emil Kolb Parkway. Emil Kolb Parkway ROW of will need to be determined and reflected on the concept plan and in the applicable studies.	- Acknowledged. Acknowledged. The Region has noted that this connection is not of interest to be owned by them. However, it is our understanding that the road will be a collector owned by the Town The Concept Plan illustrates a ROW of 20m for the north-south collector roadway. An option for the proposed 20 m cross-section (included in Appendix J) includes a 10.2 m asphalt width, similar to the existing Kingsview Drive. The narrower cross-section reduces the boulevard width. However pedestrian and cycling facilities are provided. The extension of the roadway will also need to be coordinated with the landowner to the south of the Bolton North Hill Secondary Plan Area, who is already within the settlement boundary. Acknowledged. Acknowledged. Acknowledged.
Transportation Engineering		
Secondary Plan and Draft OPA		
49	Policy 10.9.2 – Please note “alternative parking standards” should be provided with sufficient justification within the Transportation Assessment to the satisfaction of the Town.	Through communications with the Town (KH/EH - 22/05/2024) it was agreed that any deviation in parking standards will need to be justified and that at this time no justification is required. Rather alternative parking standards and supporting justification would accompany a future ZBA application if required at that time.
50	Please see attached mark-up of Schedule A – Land Use Plan_TE Mark-ups with additional collector roads within the Secondary Plan Area with protection for connection to the east, north and south.	Noted.
51	The access on Columbia Way connecting to Forest Gate Ave should be assessed for signalization.	Noted. The volumes on Columbia Way and Forest Gate Avenue/Site Access are too low to warrant signalization. Signal Warrants can be reference in Appendix L of the Transportation Assessment. Left turn lanes are required and under minor stop control the intersection operates with a Level of Service B for northbound volumes and minimal delay.
Transportation Assessment Study		
52	Please include the intersections of the proposed site accesses on Columbia Way and Mount Hope Road in the analysis.	Noted. The site accesses have been included as part of the updated Transportation analysis.
53	Please note the following comments regarding the reported boundary road network characteristics: • Table 2 “Boundary Road Network” should identify Columbia Way and Caledon King Townline as Collector Roads as per the Town's Official Plan.	Acknowledged. Table 2 has been updated.
	• Transit routes and schedules have been updated and Table 3 “Existing Transit Service” no longer describes transit in Bolton. Please revise accordingly.	Acknowledged. Transit services outlined in Section 3.3. of the updated Transportation Assessment reflect the most recent transit routes and schedules.
	• Table 4 “Active Transportation Network” is missing: i. the Multi-Use Path on Columbia Way ii. the bike lanes on Bolton Heights Road iii. The bike route along Kingsview Drive, Columbia Way (from Kingsview Drive to Mount Hope Road), through Mount Hope Road.	Acknowledged. Table 4 has been updated.
54	Considering the location of the site in proximity to a school along Columbia Way and Downtown Bolton, please collect updated non-summer traffic data to adequately capture existing conditions in this location.	Acknowledged. Updated traffic volumes were collected on April 4th, 2024 as outlined in Section 3.5 of the update Transportation Assessment.
55	Regarding Traffic Operations Analysis and Reporting: • Please revise the peak hour factors to reflect existing TMC's at Town intersections due to school and commuter traffic. • Please report Levels of Service and queues by approach. • Please utilize a walking speed of 1.0 m/s at Town intersections. • Please confirm the speed limit on Columbia Way in Synchro matches the Posted Speed Limit in the 40 km/hour zones.	- Peak Hour Factors have been updated to reflect the data collected on April 4th, 2024 Noted. Noted. Noted.
56	Growth rate calculations should utilize data as close the study area as possible. Please confirm the growth rate calculations with Peel Region and update accordingly.	EMME Modelling and growth rate projections provided by the Region of Peel have been applied as outlined in Section 4.3 in the updated Transportation Assessment.
57	Please revisit Section 4.3.2 - Additional Roadway Improvements once new data is collected, and growth rates are adequately determined for the area. Please ensure continuity of the improvements and how they fit in the broader transportation network are considered when providing recommendations.	Noted.
58	Please include the following background developments in the analysis: • SBD 21T-12005C – Bolton HiLands • SBD 21T-19001C -13247 Nunnville Rd • RZ 2019-0003 – 84 Nancy Street • RZ 2018-0008 – 336 King Street • OP 2022-0002 – 12425 Hwy 50 • OP 2020-0001 – Chickadee Grove • OP 2021-0002 – Bolton GO • SPA 2016-0063 – Bandas Stone TIS • SPA 2021-0064 -0 Humber Station Road • SPA 2021-0077 Harvest Moon Drive • SPA 2022-0064 – 3 Manchester Court	Through communications with the Town (KH/EH - 22/05/2024) it was agreed developments within the ROPA 30 boundary, which the Region confirmed are part of their EMME growth forecasts, should not be double counted. As such only the portion of OP 2021-0002 outside of the boundary was included. Additionally, though within the ROPA 30 boundary, the development under OP 2022-0002 was included as the development is proposed to share a connection with Bolton North Hill to Columbia Way. This approach is outlined in Section 4.4 in the updated Transportation Assessment.
59	Regarding trip generation and assignment: • Please review the use of the Land Use Code utilized to estimate the trip generation of the Townhouse units. LUC 220 states it is applicable to walk-up apartments, mansion apartments, and stacked townhouses. LUC 215 is more applicable to the proposed townhouse units. • There are some inconsistencies with the trip generation rates utilized in Table 10. Please revisit and revise accordingly.	- Noted. The Land Use Code 215 has been applied in the updated Transportation Assessment. Noted. Trip Generation has been updated as to reflect the latest site plan statistics.
	• The Town of Caledon TIS Guidelines require that all trip generation assumptions and adjustments assumed in the calculation of “new” trips be documented and justified in terms of previous research or surveys. Please include this required information for the proposed School and Commercial Areas.	At the secondary plan level there is not enough data or information to provide detailed trip generation excerpts for the commercial and school blocks. These sites would be subject to approvals through draft plan, zoning and site plan applications which would assess their traffic impact on a more micro scale looking at the surrounding intersections and community they impact. The assumptions utilized for the commercial and school sites have been outlined in Section 6.2.

	<ul style="list-style-type: none"> • Please reference the TTS data query summaries in the Appendix, including the data queries referenced in Section 5.3. 	Noted. The TTS inquiry has been included in Appendix J.
	<ul style="list-style-type: none"> • Please confirm the rounding of external and internal trips during assignment does not significantly vary the trip assignments from the described distributions. 	Confirmed.
	<ul style="list-style-type: none"> • Please provide Trip Generation and distributions by Block (or TAZ) so as to clearly justify logic of Trip distributions Assignment in related to the illustrated Block/TAZ. Appendix G is difficult to follow, please revise accordingly. 	Noted. Please reference the TAZ blocks as illustrated in Figure 9 and the distributions as outlined in Appendix J.
60	Please provide street names in the concept plan or a figure in the Transportation Assessment illustrating all the proposed accesses noted in Table 11 – Option 1 Site Accesses. Please ensure all site access are considered in the Transportation Assessment.	All proposed site accesses have been considered. At this stage of the development, internal roadways have not been named formally. The access have been given naming references for the purposes of the study as illustrated in Figure 8.
61	The Columbia Way access for Option 2 Area should also be assessed as it will be the fourth leg to the intersection and could have significant impacts to the existing development to the south.	Acknowledged. The access has been considered in the updated Transportation Analysis.
62	The Columbia Way access for Option 2 Area should also be assessed as it will be the fourth leg to the intersection and could have significant impacts to the existing development to the south.	Repeated Comment.
63	The Columbia Way at Mount Hope Road intersection should be assessed for signalization.	Noted.
64	Please provide a Pedestrian and Cyclist Circulation Plan within the Active Transportation section of the Transportation Assessment that includes the following items:	-
	<ul style="list-style-type: none"> • Boundary Connections: Please develop a map that identifies all existing and planned pedestrian, cycling, and community facilities (including current development applications) within the vicinity of the site (including along the boundary of the site), and demonstrate how the site will be connected/complimentary to them through active transportation. The Pedestrian and Cyclist Circulation Plan should identify how pedestrians and cyclists can access these facilities from the site. Currently, the Active Transportation section does not include network recommendations. 	Noted. Please reference Figure 18. Active Transportation recommendations are included in the proposed cross-section included in Appendix J. No additional active transportation recommendations
	<ul style="list-style-type: none"> • Internal Circulation: The map should also include the proposed pedestrian, cyclist, and trail circulation within the site. This includes: <ul style="list-style-type: none"> i. Pedestrian Walkways & Crossings: The applicant should identify all pedestrian walkways, including the widths of all proposed facilities. Pedestrian walkways should be designed in accordance with the Town of Caledon's Design Standards Manual. Please also identify the location of all proposed pedestrian crossings. ii. Cycling Facilities: The applicant should identify the location of all cycling facilities within road ROW's. Facility selection should be in accordance with OTM Book 18. iii. Bike Parking: Bike parking locations should be included in the Pedestrian and Cyclist Circulation Plan mentioned above. Within the AT section of the Transportation Assessment, please provide a review of bike parking rates for comparable municipalities as a justification for the number of bike parking spaces available. Bike parking should be presented through spaces per 100m² GFA for non-residential, and spaces per unit for residential. Additionally, please include specifications for both long-term and short-term bike parking within the Active Transportation section of the Transportation Assessment. Bike parking design should be in accordance with recommendations within OTM Book 18. iv. Trails: The applicant should identify all trails, including the widths and surfacing of all proposed trail facilities. v. Additional Items: Any additional proposed pedestrian, cycling, and trail facilities or amenities should be identified in the Pedestrian and Cyclist Circulation Plan 	<p>Noted.</p> <p>i) Pedestrian facilities have been identified. The location of pedestrian crossings should be refined as design progresses.</p> <p>ii) Cycling facilities have been identified and will be further refined through detailed design.</p> <p>iii) Through communications with the Town (KH/EH - 22/05/2024) it was agreed that recommendations for the location and amount of bike parking can be made at this time (see Section 9.3 of the updated Traffic Assessment, however it is premature to identify the location of bike parking on a circulation plan and is deferred until individual site plans are prepared.</p> <p>iv) Through communications with the Town (KH/EH - 22/05/2024) it was agreed that agreed that the location of existing and proposed trails and connections can be illustrated and discussed however the width and surfacing should be reviewed by the Town and a Landscape Architect as the project and development plans progress.</p>
65	Please illustrate all lane configurations at all the study area intersections in Figure 2 –Existing Boundary Road Network.	Noted. Please reference Figure 2 in the updated Transportation Assessment.
66	Please note there is a bus stop at the Columbia Way and Kingsview Drive intersection. Please revise Figure 2 – Existing Boundary Road Network accordingly.	Noted and revised.
67	Please illustrate all lane configurations at all the study area intersections in Figure 9 – Future Road Network Layout. Please differentiate between existing, recommended improvements for future background conditions and recommended improvements to facilitate the proposed Secondary Plan Area.	Noted. Please reference Figure 13 in the updated Transportation Assessment.
68	Additional items that need to be addressed within the Transportation Assessment:	-
	<ul style="list-style-type: none"> • Please assess the intersection spacing and sight distance of all new roads along Columbia Way and Mount Hope Road. 	Highway 50, Emil Kolb Parkway and Mount Hope Road are relatively straight and flat where accesses are proposed. Access to Columbia Way is to occur at an existing intersection. Where more detailed plans are available a detailed sight distance assessment can be completed.
	<ul style="list-style-type: none"> • Please assess the proposed road framework in terms of adequate access to collector roads, cyclist and vehicular connectivity, adequate transit coverage (approximately 300-400 metres walking distance to a bus stop), etc. 	Noted. Please reference Figure 17 for proposed transit route coverage.
	<ul style="list-style-type: none"> • Please provide a figure illustrating the road classifications of all new roads and the proposed rights-of-way. Please ensure active transportation facilities are provided according to the roadway classifications and context within the development. 	Noted. The Concept Plan classifies the roadways at 18 m local, 20 m and 26 m collectors.
	<ul style="list-style-type: none"> • Please include a Transit Plan for the Secondary Plan Area including potential bus stop locations to ensure adequate coverage for future residents. 	Noted. Please reference Figure 17 for proposed transit route coverage.
	<ul style="list-style-type: none"> • Please identify high level Transportation Demand Management measures and initiatives, and Parking policies to achieve the Town's future non-auto modal split targets and to reduce single-occupant-vehicles. 	Noted. Please reference Section 10 of the updated Transportation Assessment.
	<ul style="list-style-type: none"> • Please include a discussion of the design parameters that were taken into consideration when developing the internal road layout, and how traffic calming will be achieved through design. 	The internal road layout provides a grid or collector and local roadways. Traffic calming considerations are outlined in Section 5.2 in the updated Transportation Assessment.
69	Identify development phasing plans based on the planned and scheduled proposed transportation infrastructure improvements.	It is assumed at this time that the ROPA 30 lands will proceed first. It is expected that development will extend north through participating lands and will likely follow servicing requirements. This phasing can be spoken to at a high level within the report, however it is premature to develop a phasing plan for the site and a schedule for improvements. Phasing can be revisited as Draft Plans of Subdivision are prepared.
70	Please note that Transportation Engineering reserves the right for additional comments based on a revised submission. Transportation Engineering requests that the Traffic Consultant provide a response letter with the re-submission package clearly reiterating the Town's comments in order and including details for how each comment has been addressed.	Acknowledged.

Region of Peel: Patrick Amaral, June 2, 2023																
A Staging and Sequencing Plan																
	Approval of secondary plans by the Town within the 2051 New Urban Area are to proceed only in accordance with staging and sequencing plans to the satisfaction of the Region. The staging and sequencing plan must ensure orderly, fiscally responsible and efficient progression of development that is coordinated with the Region's Capital Plan, Peel Water and Wastewater Master Plan, and Transportation Master Plans.	Noted.														
	<ul style="list-style-type: none"> The proposal includes infrastructure that is not included in current Water/Wastewater and Transportation Master Plans. Updates will be required to the master plans to reflect the forecasts in the Regional of Peel Official Plan, this work will further include, in collaboration with local municipalities, the determining of any opportunities to provide and advance infrastructure that would accelerate growth sooner. Any new planned infrastructure will require council direction and approval. 	Noted. We understand that the proposed municipal infrastructure and associated Master Plans are being progressed by the Region and Town.														
Structure of a connected transportation System																
	Regional Official Plan policy 5.6.20.14.12 requires the town to permit approval of secondary plans within the 2051 New Urban Area only after the structure of a connected transportation system is planned to the Region's satisfaction. This includes a conceptual alignment of a transit system for an East-West high order transit corridor.	Noted.														
Transportation and Traffic Development																
	The concept plan shows an extension of the Emil Kolb Parkway to the west. The Region has no plans for this extension and further discussions is necessary to confirm that this would be a Town road.	Noted. A fourth leg east of Highway 50 has been proposed. The roadway can be assumed by the Town and does not need to be a continuation of the regional road network.														
	There are two Regional Roads within the planning area – Regional road 50 (Highway 50) and Regional Road 150 (Emil Kolb Parkway)	Acknowledged.														
	Land dedication	-														
	Land dedication requirements along Regional roads are as follows:															
	<table border="1"> <thead> <tr> <th rowspan="2"></th><th colspan="2">Right-of-way (meters)</th></tr> <tr> <th>Highway 50</th><th>Emil Kolb Parkway</th></tr> </thead> <tbody> <tr> <td>Mid-block</td><td>36</td><td>45</td></tr> <tr> <td>245 meters within a single left-turn lane intersection</td><td>41.5</td><td>50.5</td></tr> <tr> <td>245 meters within a dual left-turn lane intersection</td><td>45</td><td>54</td></tr> </tbody> </table>		Right-of-way (meters)		Highway 50	Emil Kolb Parkway	Mid-block	36	45	245 meters within a single left-turn lane intersection	41.5	50.5	245 meters within a dual left-turn lane intersection	45	54	Acknowledged.
	Right-of-way (meters)															
	Highway 50	Emil Kolb Parkway														
Mid-block	36	45														
245 meters within a single left-turn lane intersection	41.5	50.5														
245 meters within a dual left-turn lane intersection	45	54														
	Please note, a revised Traffic Impact Study (TIS) will be required to further determine the required intersection layout to support the development. The detailed land dedication requirement will be confirmed through review of the TIS.	A Transportation Impact Study will be completed at the Draft Plan level. The updated Transportation Assessment is meant to support the Secondary Plan and reviews the collector road layout and intersection locations.														
	Access Spacing requirements	-														
	Minimum spacing requirements between proposed new intersection/access															
	<table border="1"> <thead> <tr> <th rowspan="2"></th><th colspan="2">Right-of-way (meters)</th></tr> <tr> <th>Highway 50</th><th>Emil Kolb Parkway</th></tr> </thead> <tbody> <tr> <td>Mid-block</td><td>36</td><td>45</td></tr> <tr> <td>245 meters within a single left-turn lane intersection</td><td>41.5</td><td>50.5</td></tr> <tr> <td>245 meters within a dual left-turn lane intersection</td><td>45</td><td>54</td></tr> </tbody> </table>		Right-of-way (meters)		Highway 50	Emil Kolb Parkway	Mid-block	36	45	245 meters within a single left-turn lane intersection	41.5	50.5	245 meters within a dual left-turn lane intersection	45	54	Acknowledged.
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	An updated detailed concept plan which includes proposed spacing measurements of any new roadways connections is to be provided for our review and comment;	An updated Concept Plan has been prepared by Bousfields. Intersection spacing is reviewed within Section 5.3 of the updated Transportation Assessment.														
	Please ensure any proposed new road connections on to Regional Roads meet the minimum spacing requirements noted within the Region's Road Characterization Study (as per the above table);	Acknowledged. Section 5.3 of the updated Transportation Assessment notes a deficiency in spacing of Street C and Street F and comments on the potential restriction of the intersection given the spacing deficiency. However, the intersections are assessed as full moves with the Assessment, pending discussion and confirmation with the Region.														
	Please note due to the limited frontage available to the proposed commercial block located at the NW corner of Highway 50 and Emil Kolb Parkway, access will only be considered as restricted.	Acknowledged.														
	Please note due to the limited frontage available to the proposed high density residential block located at the SW corner of Highway 50 and Emil Kolb Parkway, access will only be considered as restricted.	Acknowledged.														
Traffic Impact Study																
	The provided TIS dated December 2021 contains outdated information and count data. Further conducting an analysis beyond 2031 is preferred since full build-out of the development may not be completed by 2031. Current studies are required to be completed and used within the revised TIS. With regards to any proposed Traffic Signals at intersections it is to be noted that traffic signal on Regional Road can only be supported when meets the signal warrants. The revised Traffic Impact Study should include signal warrants analysis at the proposed signal locations.	Acknowledged. Updated Traffic data, development horizons and signal warrants are included in the updated Transportation Analysis.														
	Further, the travel patterns in the report do not take into consideration major road improvements, such as the Highway 427 extension to Major Mackenzie. This extension to the 400-series highway may have a significant impact on the existing travel patterns observed in the study area (i.e., more vehicles travelling SB through the Downtown Bolton, area along Highway 50).	Updated traffic data has captured the 427 extension.														
	The report notes that a growth rate of 2%, compounded annually, was applied to all movements on the boundary road network under the 2017 existing conditions. This value is a bit larger than what the Region is currently forecasting for this area, and may overestimate the increase in the number of background trips between 2017 and 2031.	EMME Modelling and growth rate projections have been provided by the Region of Peel and have been applied.														
	The need and justification is unclear for major road widening on Hwy 50 from Bolton Heights Dr to north of King St in the southbound direction.	Under existing conditions there are two northbound and one southbound lanes on Highway 50 between Bolton Heights Drive and King Street. Based on a vehicle per hour, per lane capacity of 900, the 2041 future total volume forecast of 1143 vehicles in a peak hour exceeds the lane capacity. An additional southbound lane is recommended, understanding Queen Street may remain one lane per direction south of Hickman Street based on the Towns vision for the downtown core and the results of the Queen Street Corridor Study.														
	Some of the future improvements that are listed in the Transportation Assessment may not be feasible in the context of recently approved recommendations, or recently initiated projects on Queen St through downtown Bolton:	Noted. Recommendations for Queen Street within the downtown core should be made following the completion of the Queen Street Corridor Study, if required.														
	Parking restriction on Hwy 50, north of King St, may not be feasible in the context of recently approved recommendations from Peel's Parking Pilot for all-day on street parking in downtown Bolton.	Noted. Recommendations for Queen Street within the downtown core should be made following the completion of the Queen Street Corridor Study, if required.														
	Signal timing adjustments at Hwy 50/King St and an exclusive right-turn lane at Hwy 50/Columbia Way may not align with future recommendations of Peel's Queen St (Hwy 50) Complete Corridor Study and Preliminary Design.	Noted. The recommendations of the Queen Street Corridor Study are unknown at this time. If the study does not account for the volume growth associated with these lands it is recommended that the intersection be monitored and signal timings be adjusted based on experienced conditions.														
Regional Municipal Class EA																
	The Region of Peel has initiated a 'Complete Corridor Study and Preliminary Design' Schedule A+ Municipal Class Environmental Assessment Study for improvements to Queen Street (Highway 50) from Queensgate Boulevard to Columbia Way in the Village of Bolton. Coordination between the proposal and the EA will be required. For any questions regarding the project, please contact the Project Manager Sonya Bubas at sonya.bubas@peelregion.ca.	Acknowledged. Crozier has been in communication with Sonya and has been monitoring the progress of the EA.														
Waste Development																
	All townhouse units would be eligible to receive Region of Peel curbside cart-based waste collection of garbage, recycling, and organics provided that the requirements outlined in Sections 2.0 and 3.0 of the Waste Collection Design Standards Manual are met;	Acknowledged.														

	All multi-residential and stacked townhouse units would be eligible to receive Region of Peel front-end waste collection of garbage and recycling provided that the requirements outlined in Section 2.0 and 4.0 of the waste collection design standards manual are met;	Acknowledged.															
	Retail and Employment units will be required to receive private waste collection	Acknowledged.															
	For more information, please consult the following: o The Waste Collection Design Standards Manual available at: https://peelregion.ca/public-works/design-standards/pdf/waste-collection-design-standards-manual.pdf	Acknowledged.															
Peel District School Board: Zach Tessaro, April 14, 2023																	
	Peel District School Board (PDSB) has reviewed the above noted proposed Bolton North Hill Secondary Plan consisting of 1,554 single-detached dwellings, 2,165 Townhomes, and 417 Apartment Units. PDSB requires two elementary school sites of 8 Acres (3.24 Hectares) to accommodate the proposed number of units proposed for this development. PDSB prefers to have school sites with two frontages along the street to accommodate bus and vehicle access to the site.	Noted.															
	PDSB has the following comments based on its School Accommodation Criteria:	-															
	The anticipated student yield from this plan is as follows: <table><tr><td>Kindergarten to Grade 8</td><td>Grade 9 to 12</td></tr><tr><td>1,662</td><td>574</td></tr></table>	Kindergarten to Grade 8	Grade 9 to 12	1,662	574	Noted.											
Kindergarten to Grade 8	Grade 9 to 12																
1,662	574																
	The students generated from this development would reside within the boundaries of the following schools: <table><tr><th>Public School</th><th>School Enrolment</th><th>School Capacity</th><th>Number of Occupied Portables</th></tr><tr><td>Palgrave P.S. (K-5)</td><td>571</td><td>581</td><td>3</td></tr><tr><td>Humberview S.S. (9-12)</td><td>1,196</td><td>1,437</td><td>3</td></tr></table>	Public School	School Enrolment	School Capacity	Number of Occupied Portables	Palgrave P.S. (K-5)	571	581	3	Humberview S.S. (9-12)	1,196	1,437	3	-			
Public School	School Enrolment	School Capacity	Number of Occupied Portables														
Palgrave P.S. (K-5)	571	581	3														
Humberview S.S. (9-12)	1,196	1,437	3														
Dufferin-Peel Catholic District School Board: Krystina Koops, April 6, 2023																	
	The applicant proposes the development of 1554 detached, 2165 townhouse and 417 high density units which are anticipated to yield: •455 Junior Kindergarten to Grade 8 Students; and •326 Grade 9 to Grade 12 Students	Noted.															
	The proposed development is located within the following school catchment areas which currently operate under the following student accommodation conditions: <table><tr><th>Catchment Area</th><th>School</th><th>Enrolment</th><th>Capacity</th><th># of Portables / Temporary Classrooms</th></tr><tr><td>Elementary School</td><td>St. John Paul II</td><td>630</td><td>654</td><td>6</td></tr><tr><td>Secondary School</td><td>St. Michael</td><td>958</td><td>1266</td><td>0</td></tr></table>	Catchment Area	School	Enrolment	Capacity	# of Portables / Temporary Classrooms	Elementary School	St. John Paul II	630	654	6	Secondary School	St. Michael	958	1266	0	-
Catchment Area	School	Enrolment	Capacity	# of Portables / Temporary Classrooms													
Elementary School	St. John Paul II	630	654	6													
Secondary School	St. Michael	958	1266	0													

Kerianne Hagan

From: Emma Howlett <Emma.Howlett@caledon.ca>
Sent: May 15, 2024 4:09 PM
To: Kerianne Hagan
Cc: Kavleen Younan; Arash Olia
Subject: FW: Bolton North Hill TIS

Follow Up Flag: Follow up
Flag Status: Completed

Hello Keri,

You as well!

Regarding the email please see my responses bellow in green

Sorry I don't have a response from planning on sharing the TIS for OP 2022-02 yet, based on your voice message direction on the majority of items today desired over waiting.

Hope you have a good long weekend,

Emma Howlett, EIT

Transportation Coordinator, Engineering, Public Works, & Transportation Department

Office: 905.584.2272 x 4309 | Email: Emma.Howlett@caledon.ca

Town of Caledon | www.caledon.ca | www.visitcaledon.ca | Follow us @TownofCaledon

From: Kerianne Hagan <khagan@cfcrozier.ca>
Sent: May 10, 2024 11:02 AM
To: Emma Howlett <Emma.Howlett@caledon.ca>
Subject: Bolton North Hill TIS

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the contents to be safe.

Hi Emma,

I hope you are doing well. It was wonderful to see you at the design charrette earlier this year!

We have reviewed the comments received previously on the Bolton North Hill TIS. I was hoping to discuss a few comments to receive clarification and resolve prior to our resubmission this month. I have outlined the comments and some notes below. I am hoping we can resolve these items next week. If there are any that you wish to discuss in a meeting or phone call please let me know and we can arrange a time.

Comment 48:

"Local roads with a ROW of 18 m or more should have a sidewalk on both sides."

- It was discussed in the Design Charrette that the Town is establishing new cross-sections. Should we be referencing the cross-sections as outlined in the draft Multi-Modal Transportation Master Plan? Are there any standard drawings of the new cross-sections the Town could share at this time?
- Please reference information available in the [DRAFT MMTMP](#) and [DRAFT ATMP](#), we do not have updated standards at this time.
- Please note that:
 - the Town will open to reviewing one-side sidewalk at the Draft Plan Level on local roadways based on Engineering Judgment on the pedestrian lines of desire and roadway characteristics (i.e., traffic volume, traffic speed, pedestrian crossings, schools, parks, etc..). Please note the recommendations in the DRAFT ATMP could be referenced in the Town's review.
 - Proposed ROW cross sections are reviewed from a multi-disciplinary approach thus divisions other than transportation could have infrastructure requirements.

Comment 49:

"Please note 'alternative parking standards' should be provided with sufficient justification within the Transportation Assessment to the satisfaction of the Town."

- We will not to Bousfields that any deviation in parking standards will need to be justified but would like acceptance from the Town that justification is not required as part of this submission and would accompany a future ZBA application should deviation from the parking standard be proposed at that time. At this stage discussion of parking requirements is premature.
- Agreed

Comment 58:

"Please include the following background developments in the analysis:"

- Of the list of developments provided, several are outside of the study area. Additionally, the listed developments are all within the ROPA 30 boundary. In communications with the Region of Peel, their EMME modelling accounts for expansion of the ROPA 30 lands as part of the forecasted growth. The inclusion of both growth and background developments will double count the expected future volumes on the road network. If a Traffic Impact Study or development statistics can be provided for OP 2022-02 we will consider its trips as a background development as it will have shared access with the Bolton North Hill Lands.
Generally background developments accounted for in the Region's EMME modeling do not need to be repeated in the background developments. I am working to confirm with planning that the OP2022-02 TIS Excerpts can be shared, if permitted I will follow up by email.
- We recommend the remaining background developments within the study area be reconsidered for Draft Plan/Site Plan applications when timelines are further defined.
- Mostly disagreed, where the background developments are anticipated to add volumes not accounted for in the assumed growth rates (or existing traffic counts) , trip assignments should be included. For some developments it is possible to justify the volumes are minimal, thus the impacts minor, thus not significantly impact the findings of this report.

Comment 64:

"Please provide a Pedestrian and Cyclist Circulation Plan within the Active Transportation Section of the Transportation Assessment that includes the following items: [...] Bike Parking [...], Trails..."

- We are happy to provide a high-level Circulation Plan and make written recommendations for the location and amount of bike parking. However, it is far to premature to provide the location of bike parking on the PCCP and should be deferred till individual site plans are prepared.
- Additionally, we can identify the location of existing trails and connection and any proposed at this time, however the width (AODA required) and surfacing should be reviewed by the Town and a landscape architect as the project and development plans progress and is too detailed for this high-level stage.

Agreed

Comment 69:

"Identify development phasing plans based on the planned and scheduled proposed Transportation infrastructure improvements."

- It is assumed at this time that the ROPA 30 lands will proceed first. It is expected that development will extend north through participating lands and will likely follow servicing requirements. This phasing can be spoken to at a high level within the report, however it is premature to develop a phasing plan for the site and a schedule for improvements. Phasing can be revisited as Draft Plans of Subdivision are prepared.
- Generally agreed, however confirmation is required from Development Engineering on when phasing will be reviewed.

Thank you and have a wonderful weekend,
Keri

Kerianne Hagan, EIT
Engineering Intern, Transportation
Office: 705.434.3407

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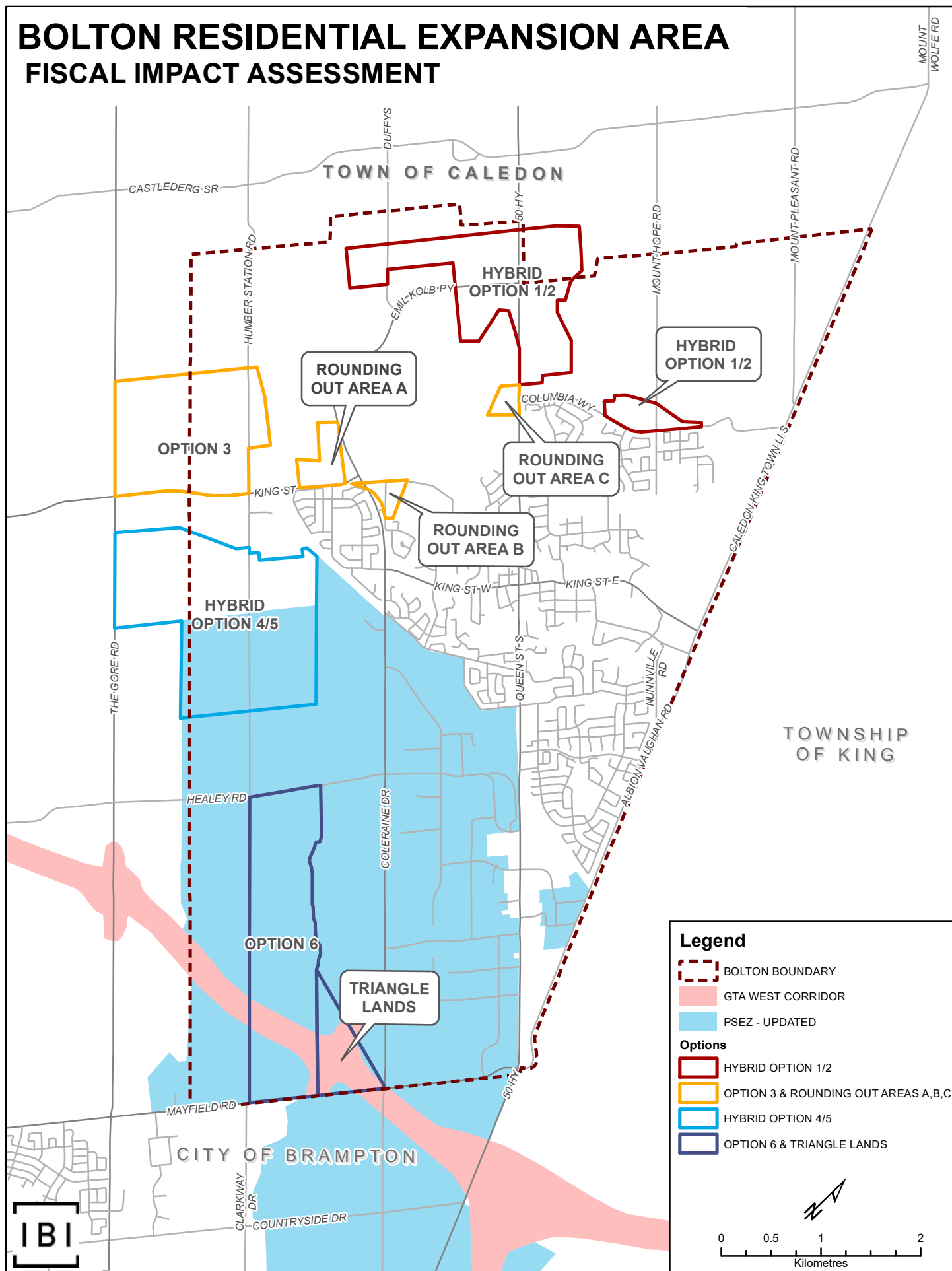
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APPENDIX B

Original Bolton Residential Expansion Areas

BOLTON RESIDENTIAL EXPANSION AREA

FISCAL IMPACT ASSESSMENT



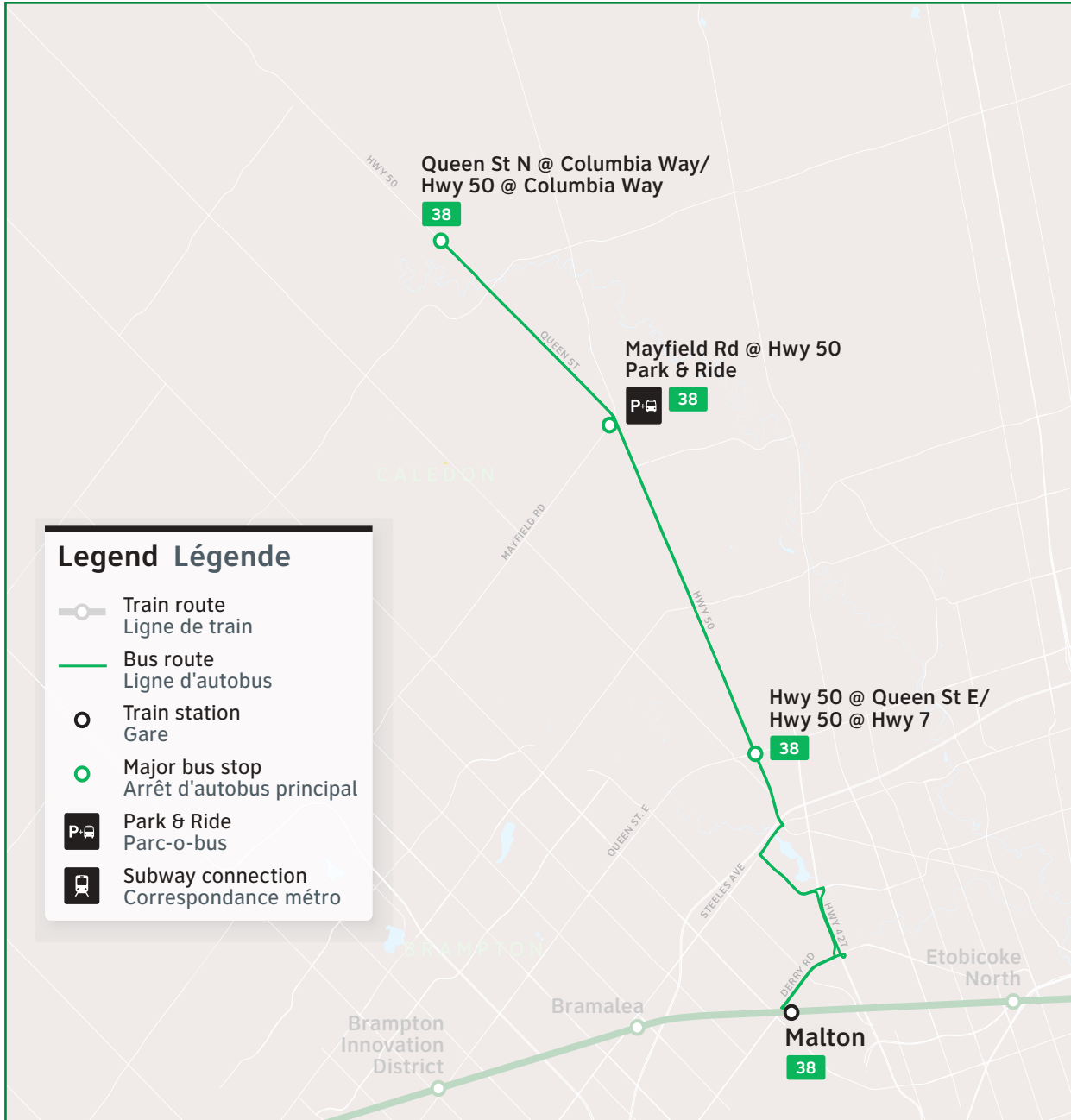
APPENDIX C

Transit & Active Transportation Information

38

Route number
Nombre d'itinéraire

Bolton/Malton



CONTACT US

1-888-438-6646
416-869-3200
TTY: #711 or call
1-800-855-0511

gotransit.com/schedules

@GOtransitBus
@GOtransitKT

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

prestocard.ca

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:

24 JUNE 2023



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 cidessous.

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

Noon to midnight
12 01 - 24 00

De minuit à midi:
00 01 - 12 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	Dp	58	56	56	31	Ar	31	Ar
		Caledon		Queen St. N. @ Columbia Way	Bolton	Queen St. S. @ Allan Dr.	Mayfield Rd. @ Hwy. 50	Hwy. 50 @ Queen St. E.	Mississauga	Malton GO
								Transfer - Correspondances		Union Station
38	38170	05 05	05 10	05 17	05 28	05 45	3604	06 00	06 29	
38	38220	06 05	06 10	06 17	06 28	06 45	3606	07 00	07 29	

Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)										
NORTHBOUND / EN DIRECTION NORD										
Route Number Numéro du trajet	Zone→	2	Dp	31	Ar	31	Dp	56	56	58
		Toronto		Mississauga		Transfer - Correspondances		Woodbridge	Brampton	Bolton
								Hwy. 50 @ Hwy. 7	Mayfield Rd. @ Hwy. 50	Queen St. S. @ Wilton Dr.
										Caledon
										Hwy. 50 @ Columbia Way
38	3923	15 34	16 02	38631	16 12h	16 30	16 55	17 02	17 17	
38	3829	18 04	18 32	38801	18 42h	19 00	19 20	19 27	19 37	

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.

Weekday Service Map

Legend

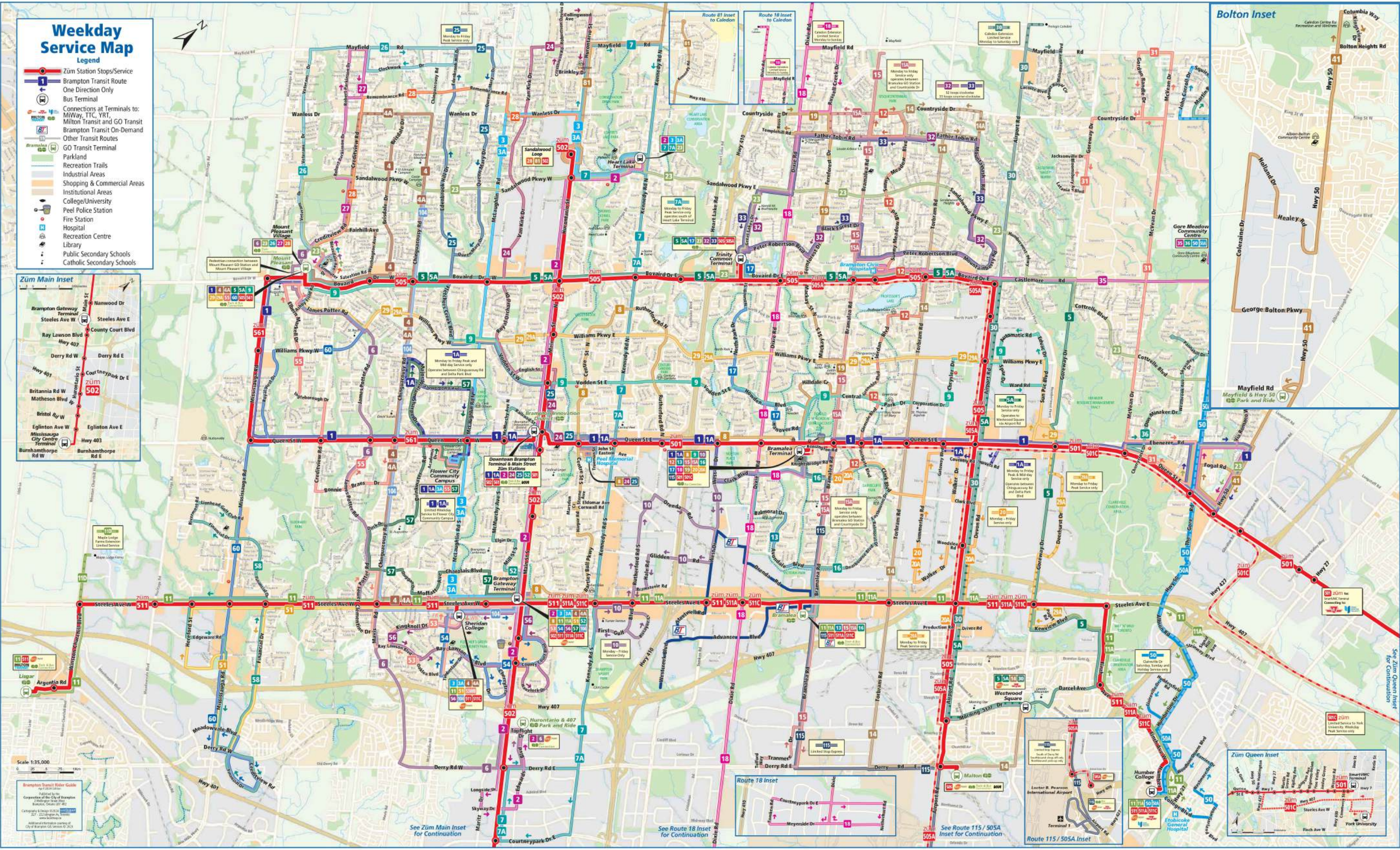
- Züm Station Stops/Service
- Brampton Transit Route
- One Direction Only
- Bus Terminal

Connections at Terminals to:

- MIWay, TTC, YRT
- Milton Transit and GO Transit
- Brampton Transit On-Demand
- Other Transit Routes
- GO Transit Terminal
- Parkland
- Recreation Trails
- Industrial Areas
- Shopping & Commercial Areas
- Institutional Areas
- College/University
- Peel Police Station
- Fire Station
- Hospital
- Recreation Centre
- Library
- Public Secondary Schools
- Catholic Secondary Schools

Züm Main Inset

Steeles Ave W
Steeles Ave E
Ray Lawson Blvd
Hwy 407
Derry Rd W
Derry Rd E
Hwy 401
Britannia Rd W
Matheson Blvd W
Bristol Rd W
Eglinton Ave W
Mississauga City Centre
Burnhamthorpe Rd W
Burnhamthorpe Rd E



Bolton Inset

Columbia Way
Bolton Heights Rd
Hwy 50
Hwy 41
Bolton Community Centre
Bolton Heights Rd
Hwy 50
Hwy 41

Züm Queen Inset

Queen St E
Hwy 401
Hwy 403
Hwy 7
Steeles Ave W
Steeles Ave E
Hwy 401
Hwy 403
Hwy 7

Brampton Transit Rider Guide
April 2023 Edition
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<https://www.triplinx.ca/>

Printing date: 6/18/2024



41







Bolton

Towards 41 BOLTON NORTHBOUND

Date: Tuesday, 6/18/2024

Schedule

Stop	Trips		
Transport modes	 	 	
City : BRAMPTON			
Highway 50 - Zum Queen Station Stop WB 	 2:35 pm	 4:25 pm	 6:20 pm
City : VAUGHAN			
Highway 50 n/of Langstaff Rd 	2:40 pm	4:30 pm	6:25 pm
Highway 50 n/of Rutherford Rd 	2:43 pm	4:33 pm	6:28 pm
City : BRAMPTON			
Mayfield GO Park & Ride - Route 41 NB Stop 	2:51 pm	4:41 pm	6:36 pm
City : CALEDON			
George Bolton Pkwy w/of Highway 50 	2:54 pm	4:44 pm	6:40 pm
George Bolton Pkwy e/of Coleraine Dr	2:57 pm	4:47 pm	6:43 pm

Stop	Trips		
Coleraine Dr at 12724 Coleraine Dr	2:58 pm	4:48 pm	6:45 pm
Coleraine Dr at 12880 Coleraine Dr	2:59 pm	4:49 pm	6:46 pm
Holland Dr e/of Coleraine Dr 	3:02 pm	4:52 pm	6:50 pm
Holland Dr n/of Browning Crt	3:04 pm	4:54 pm	6:52 pm
Healey Rd w/of Highway 50	3:07 pm	4:57 pm	6:55 pm
Highway 50 s/of Queensgate Blvd 	3:08 pm	4:58 pm	6:57 pm
Highway 50 s/of Allan Dr	3:09 pm	4:59 pm	6:58 pm
Highway 50 s/of Downey Dr	3:10 pm	5:00 pm	6:59 pm
Highway 50 s/of King St 	3:12 pm	5:02 pm	7:01 pm
Highway 50 at Hickman St	3:12 pm	5:02 pm	7:01 pm
Highway 50 s/of Bolton Heights Dr	3:14 pm	5:04 pm	7:04 pm
Highway 50 at Caledon Recreation Centre	 3:15 pm	 5:05 pm	 7:05 pm

Schedules are given as a guideline, and depend on traffic conditions.



Bus

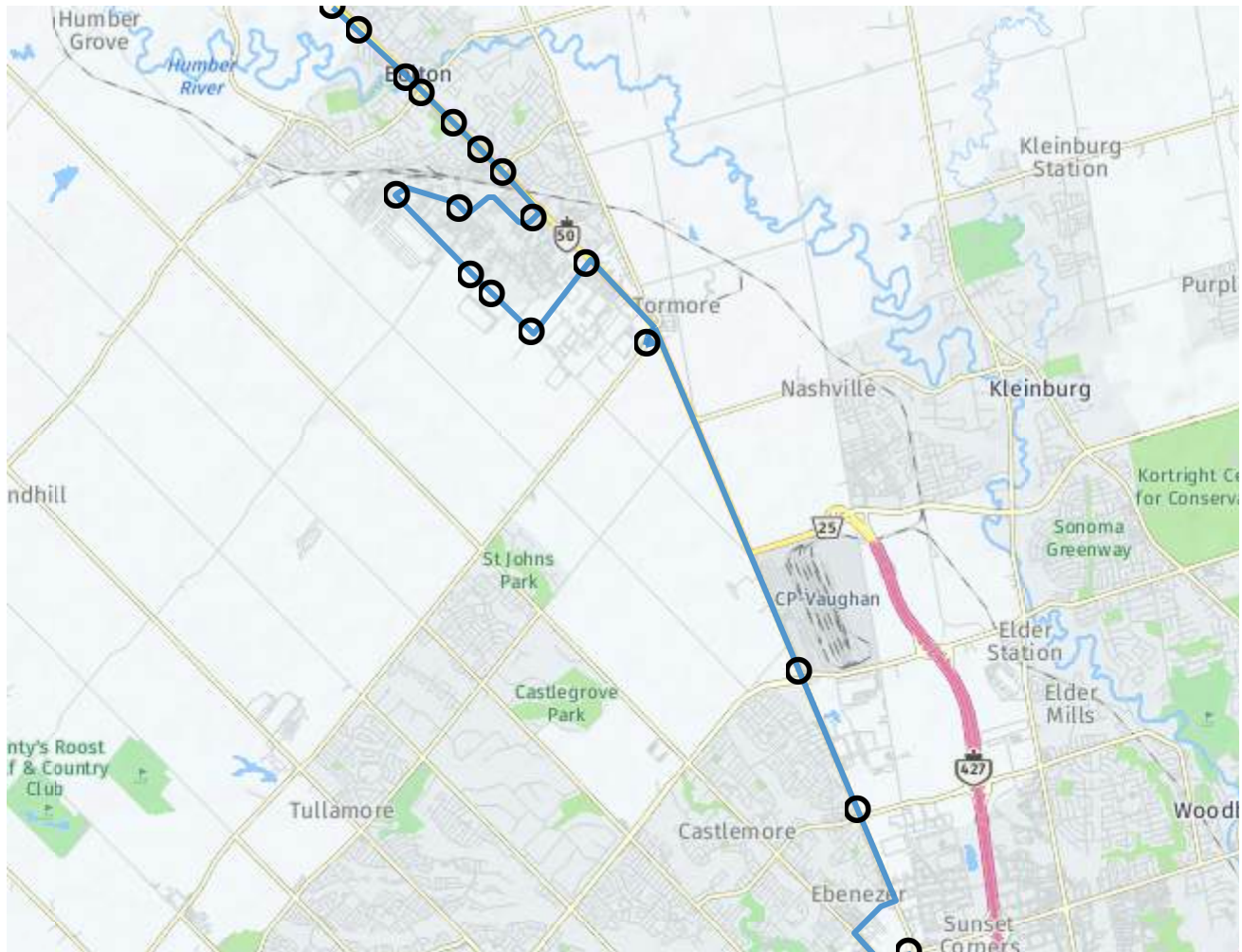


Drop off only



Boarding only

Route map



^ Legend



Real time



Bus Stop

Visit CALEDON



Scan the code for details about Caledon's trails and cycling routes



A HOFFMAN LIME KILN RUINS



B UPPER CREDIT CONSERVATION AREA



C ALBION HILLS CONSERVATION PARK



D GLEN HAFFY CONSERVATION AREA



E CHELTENHAM BADLANDS



F HUMBER RIVER HERITAGE PARK



HERITAGE WALKING TOURS

LEGEND

- Bruce Trail
- Caledon Trailway
- Trans Canada Trail
- Elora Cataract Trail
- Etobicoke Creek Trail
- Grand Valley Trail
- Greenbelt Route
- Humber Valley Heritage Trail
- New Tecumseth Trail
- Oak Ridges Trail
- Conservation Area Trails
- Etobicoke Creek Trail connector
- Settlement
- Lake/River
- Park/Open Space
- Conservation Area
- Toilet
- Hospital
- Provincial Park
- Parking
- Trail Kiosk
- Seasonal Bike Repair Stand



Trails & Cycling Routes

Caledon Maps

Layers

Layers... Filter

☐ Elora Cataract Trailway

☐ Grand Valley Trail

☒ Humber Valley Heritage Trail

☒ Humber Valley Heritage Side Trail

☐ Oak Ridges Trail

☐ Richard Whitehead Memorial Trail

☐ Etobicoke Creek Trail

☐ Etobicoke Creek Trail

☒ Cycling Network

- ☒ Cycling Network
 - Bike Lane
 - Multi-Use Path
 - On-Road Signed Cycling Route

☒ Parks & Recreation Facilities

☐ Tourist Attractions

☐ Amenities

☐ Community Works

☒ Airphoto 2023

ayers



APPENDIX D

Traffic Data & Signal Timing Plans



Turning Movement Count (1 . KING ST & EMIL KOLB PKWY) CustID: 00904510

Start Time	E Approach EMIL KOLB PKWY					S Approach KING ST					W Approach EMIL KOLB PKWY					Int. Total (15 min)	Int. Total (1 hr)
	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	UTurn W:W	Peds W:	Approach Total		
06:00:00	4	13	0	0	17	34	11	0	0	45	23	19	0	0	42	104	
06:15:00	10	26	0	0	36	59	9	0	0	68	30	47	0	0	77	181	
06:30:00	9	29	2	0	40	56	19	0	0	75	23	49	0	0	72	187	
06:45:00	10	33	0	0	43	93	18	0	0	111	28	74	1	0	103	257	729
07:00:00	14	47	0	0	61	54	12	0	0	66	30	54	1	0	85	212	837
07:15:00	19	48	0	0	67	63	12	0	0	75	38	60	0	0	98	240	896
07:30:00	20	55	0	0	75	61	20	0	0	81	50	58	1	0	109	265	974
07:45:00	22	34	0	0	56	75	32	0	0	107	43	73	0	0	116	279	996
08:00:00	14	35	0	0	49	56	30	0	0	86	40	65	0	0	105	240	1024
08:15:00	15	35	1	0	51	87	31	0	0	118	46	57	0	0	103	272	1056
08:30:00	11	37	1	0	49	54	17	1	0	72	37	69	0	0	106	227	1018
08:45:00	7	41	0	0	48	60	20	0	0	80	26	57	0	0	83	211	950
09:00:00	13	46	1	0	60	68	16	0	0	84	28	32	0	0	60	204	914
09:15:00	15	31	0	0	46	71	22	1	0	94	24	34	0	0	58	198	840
09:30:00	12	32	0	0	44	45	14	0	0	59	21	31	0	0	52	155	768
09:45:00	9	28	0	0	37	58	19	1	0	78	14	29	0	0	43	158	715
BREAK																	
15:00:00	46	79	1	1	126	43	27	0	0	70	20	18	0	0	38	234	
15:15:00	46	91	0	0	137	49	29	0	0	78	11	19	0	0	30	245	
15:30:00	69	78	0	0	147	58	32	0	0	90	25	25	0	0	50	287	
15:45:00	71	83	1	0	155	78	52	0	0	130	25	17	0	0	42	327	1093
16:00:00	73	121	0	0	194	65	64	0	0	129	13	10	0	0	23	346	1205
16:15:00	63	98	0	0	161	73	56	0	0	129	20	17	0	0	37	327	1287
16:30:00	74	113	0	0	187	62	41	0	0	103	19	18	0	0	37	327	1327
16:45:00	73	119	0	0	192	72	43	0	0	115	20	17	0	0	37	344	1344
17:00:00	95	110	0	0	205	69	61	0	0	130	38	12	0	0	50	385	1383
17:15:00	69	114	0	0	183	47	42	0	0	89	32	21	0	0	53	325	1381
17:30:00	52	106	0	0	158	66	53	0	0	119	27	28	0	0	55	332	1386
17:45:00	59	117	1	0	177	50	40	0	0	90	28	20	0	0	48	315	1357
18:00:00	50	80	0	0	130	45	26	0	0	71	22	14	0	0	36	237	1209
18:15:00	34	63	0	0	97	42	21	0	0	63	28	21	0	0	49	209	1093
18:30:00	20	62	0	0	82	43	24	0	1	67	17	30	0	1	47	196	957
18:45:00	34	50	0	0	84	30	23	0	0	53	18	21	0	0	39	176	818



Grand Total	1132	2054	8	1	3194	1886	936	3	1	2825	864	1116	3	1	1983	8002	-
Approach%	35.4%	64.3%	0.3%		-	66.8%	33.1%	0.1%		-	43.6%	56.3%	0.2%		-	-	-
Totals %	14.1%	25.7%	0.1%		39.9%	23.6%	11.7%	0%		35.3%	10.8%	13.9%	0%		24.8%	-	-
Heavy	105	153	1		-	132	55	2		-	56	96	3		-	-	-
Heavy %	9.3%	7.4%	12.5%		-	7%	5.9%	66.7%		-	6.5%	8.6%	100%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather:

Start Time	E Approach EMIL KOLB PKWY					S Approach KING ST					W Approach EMIL KOLB PKWY					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
07:30:00	20	55	0	0	75	61	20	0	0	81	50	58	1	0	109	265
07:45:00	22	34	0	0	56	75	32	0	0	107	43	73	0	0	116	279
08:00:00	14	35	0	0	49	56	30	0	0	86	40	65	0	0	105	240
08:15:00	15	35	1	0	51	87	31	0	0	118	46	57	0	0	103	272
Grand Total	71	159	1	0	231	279	113	0	0	392	179	253	1	0	433	1056
Approach%	30.7%	68.8%	0.4%		-	71.2%	28.8%	0%		-	41.3%	58.4%	0.2%		-	-
Totals %	6.7%	15.1%	0.1%		21.9%	26.4%	10.7%	0%		37.1%	17%	24%	0.1%		41%	-
PHF	0.81	0.72	0.25		0.77	0.8	0.88	0		0.83	0.9	0.87	0.25		0.93	-
Heavy	22	12	0		34	17	11	0		28	4	8	1		13	-
Heavy %	31%	7.5%	0%		14.7%	6.1%	9.7%	0%		7.1%	2.2%	3.2%	100%		3%	-
Lights	49	147	1		197	262	102	0		364	175	245	0		420	-
Lights %	69%	92.5%	100%		85.3%	93.9%	90.3%	0%		92.9%	97.8%	96.8%	0%		97%	-
Single-Unit Trucks	9	8	0		17	11	6	0		17	3	6	1		10	-
Single-Unit Trucks %	12.7%	5%	0%		7.4%	3.9%	5.3%	0%		4.3%	1.7%	2.4%	100%		2.3%	-
Buses	0	2	0		2	0	0	0		0	0	0	0		0	-
Buses %	0%	1.3%	0%		0.9%	0%	0%	0%		0%	0%	0%	0%		0%	-
Articulated Trucks	13	2	0		15	6	5	0		11	1	2	0		3	-
Articulated Trucks %	18.3%	1.3%	0%		6.5%	2.2%	4.4%	0%		2.8%	0.6%	0.8%	0%		0.7%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-

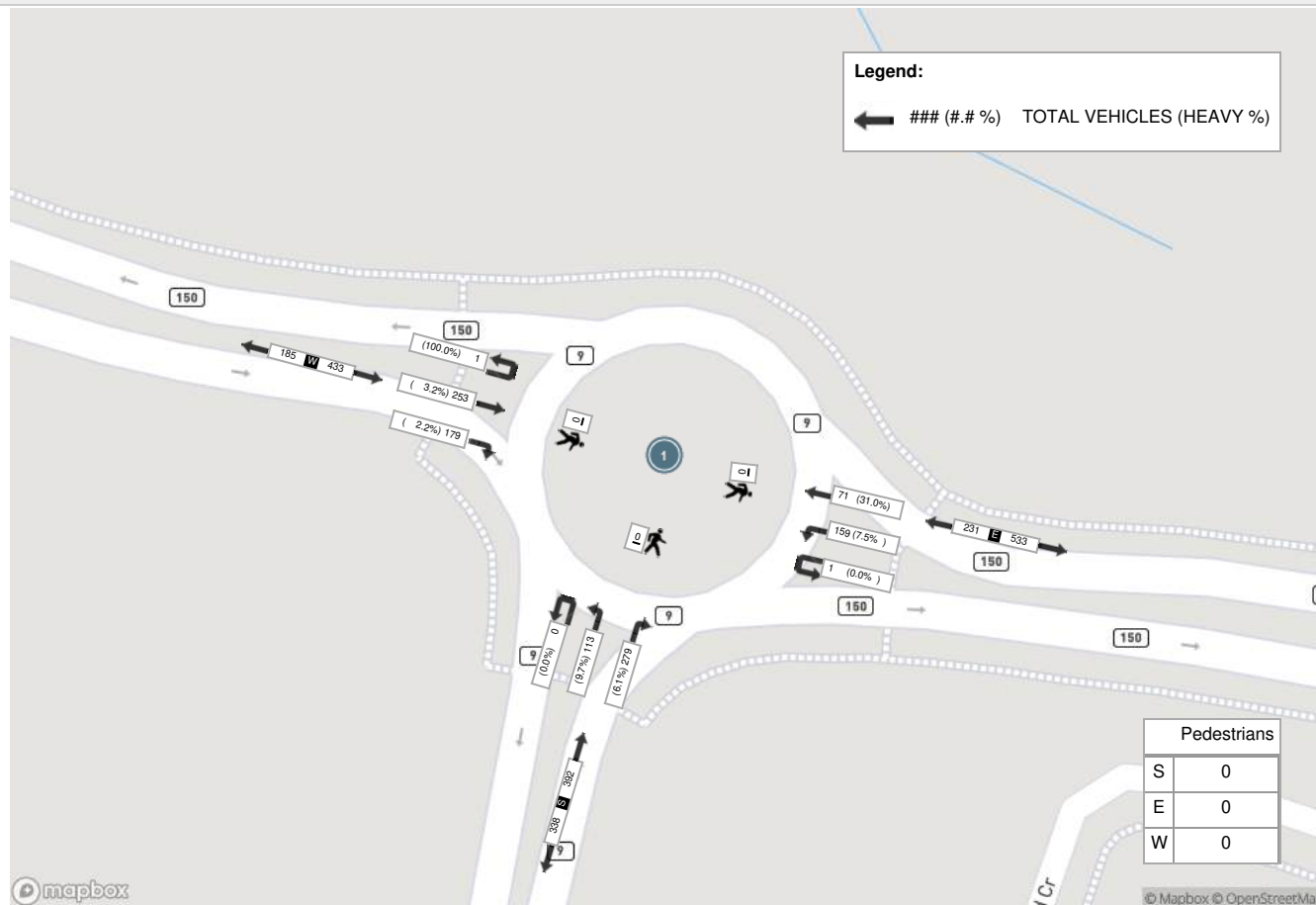


Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)

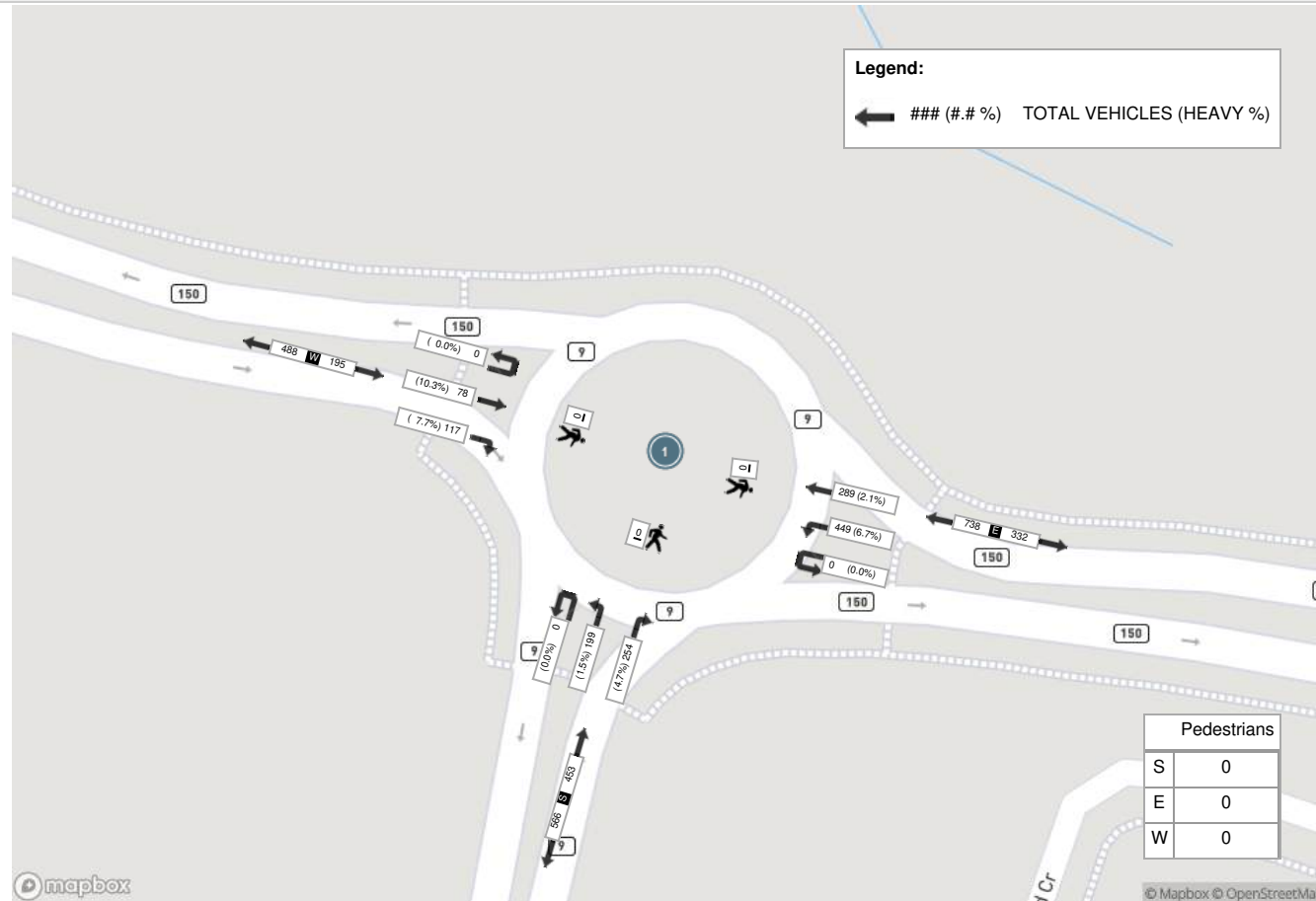
Start Time	E Approach EMIL KOLB PKWY					S Approach KING ST					W Approach EMIL KOLB PKWY					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
16:45:00	73	119	0	0	192	72	43	0	0	115	20	17	0	0	37	344
17:00:00	95	110	0	0	205	69	61	0	0	130	38	12	0	0	50	385
17:15:00	69	114	0	0	183	47	42	0	0	89	32	21	0	0	53	325
17:30:00	52	106	0	0	158	66	53	0	0	119	27	28	0	0	55	332
Grand Total	289	449	0	0	738	254	199	0	0	453	117	78	0	0	195	1386
Approach%	39.2%	60.8%	0%		-	56.1%	43.9%	0%		-	60%	40%	0%		-	-
Totals %	20.9%	32.4%	0%		53.2%	18.3%	14.4%	0%		32.7%	8.4%	5.6%	0%		14.1%	-
PHF	0.76	0.94	0		0.9	0.88	0.82	0		0.87	0.77	0.7	0		0.89	-
Heavy	6	30	0		36	12	3	0		15	9	8	0		17	-
Heavy %	2.1%	6.7%	0%		4.9%	4.7%	1.5%	0%		3.3%	7.7%	10.3%	0%		8.7%	-
Lights	283	419	0		702	242	196	0		438	108	70	0		178	-
Lights %	97.9%	93.3%	0%		95.1%	95.3%	98.5%	0%		96.7%	92.3%	89.7%	0%		91.3%	-
Single-Unit Trucks	5	20	0		25	5	1	0		6	3	1	0		4	-
Single-Unit Trucks %	1.7%	4.5%	0%		3.4%	2%	0.5%	0%		1.3%	2.6%	1.3%	0%		2.1%	-
Buses	0	0	0		0	1	0	0		1	0	0	0		0	-
Buses %	0%	0%	0%		0%	0.4%	0%	0%		0.2%	0%	0%	0%		0%	-
Articulated Trucks	1	10	0		11	6	2	0		8	6	7	0		13	-
Articulated Trucks %	0.3%	2.2%	0%		1.5%	2.4%	1%	0%		1.8%	5.1%	9%	0%		6.7%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather:



Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (2 . HWY 50 & EMIL KOLB PKWY) CustID: 05019685

Start Time	N Approach HWY 50					S Approach HWY 50					W Approach EMIL KOLB PKWY					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	UTurn N:N	Peds N:	Approach Total	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	39	58	0	0	97	15	8	0	0	23	3	13	0	0	16	136	
06:15:00	58	82	0	0	140	22	6	0	0	28	1	16	0	0	17	185	
06:30:00	67	95	0	0	162	33	11	0	0	44	3	21	0	0	24	230	
06:45:00	79	102	0	0	181	32	11	0	0	43	5	23	0	0	28	252	803
07:00:00	84	86	0	0	170	29	7	0	0	36	5	18	0	0	23	229	896
07:15:00	85	81	0	0	166	39	16	0	0	55	4	23	1	0	28	249	960
07:30:00	88	87	0	0	175	42	16	0	0	58	7	33	0	0	40	273	1003
07:45:00	76	95	0	0	171	48	27	0	0	75	9	34	0	0	43	289	1040
08:00:00	78	108	0	0	186	37	16	0	0	53	5	23	0	0	28	267	1078
08:15:00	89	104	0	0	193	47	15	0	0	62	10	28	0	0	38	293	1122
08:30:00	75	92	1	0	168	55	17	0	0	72	11	27	0	0	38	278	1127
08:45:00	63	74	0	0	137	64	6	0	0	70	7	15	0	0	22	229	1067
09:00:00	54	69	0	0	123	43	7	0	0	50	5	22	0	0	27	200	1000
09:15:00	47	65	0	0	112	28	10	0	0	38	6	22	0	0	28	178	885
09:30:00	34	68	0	0	102	36	6	0	0	42	8	18	0	0	26	170	777
09:45:00	28	62	0	0	90	46	7	0	0	53	7	13	0	0	20	163	711
BREAK																	
15:00:00	19	46	0	0	65	111	18	0	0	129	11	57	0	0	68	262	
15:15:00	24	66	0	0	90	106	6	0	0	112	8	56	0	0	64	266	
15:30:00	43	66	0	0	109	113	7	0	0	120	21	78	0	0	99	328	
15:45:00	25	58	0	0	83	90	7	1	0	98	20	76	0	0	96	277	1133
16:00:00	26	49	0	0	75	111	9	0	0	120	28	95	0	0	123	318	1189
16:15:00	25	51	0	0	76	105	4	1	0	110	18	87	0	0	105	291	1214
16:30:00	24	47	0	0	71	118	2	0	0	120	10	93	0	0	103	294	1180
16:45:00	27	56	0	0	83	118	4	0	0	122	26	87	0	0	113	318	1221
17:00:00	34	52	0	0	86	132	13	0	0	145	21	107	0	0	128	359	1262
17:15:00	41	67	0	0	108	112	10	2	0	124	18	84	0	0	102	334	1305
17:30:00	32	57	0	0	89	109	11	0	0	120	13	74	0	0	87	296	1307
17:45:00	32	43	0	0	75	113	8	0	0	121	19	77	0	0	96	292	1281
18:00:00	27	62	0	0	89	97	6	0	0	103	12	55	0	0	67	259	1181
18:15:00	20	48	0	0	68	99	12	1	0	112	10	44	0	0	54	234	1081
18:30:00	36	48	0	0	84	87	11	0	0	98	8	26	0	0	34	216	1001
18:45:00	31	45	0	0	76	79	5	0	0	84	12	41	0	0	53	213	922



Grand Total	1510	2189	1	0	3700	2316	319	5	0	2640	351	1486	1	0	1838	8178	-
Approach%	40.8%	59.2%	0%		-	87.7%	12.1%	0.2%		-	19.1%	80.8%	0.1%		-	-	-
Totals %	18.5%	26.8%	0%		45.2%	28.3%	3.9%	0.1%		32.3%	4.3%	18.2%	0%		22.5%	-	-
Heavy	142	32	1		-	42	10	1		-	15	138	1		-	-	-
Heavy %	9.4%	1.5%	100%		-	1.8%	3.1%	20%		-	4.3%	9.3%	100%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather:

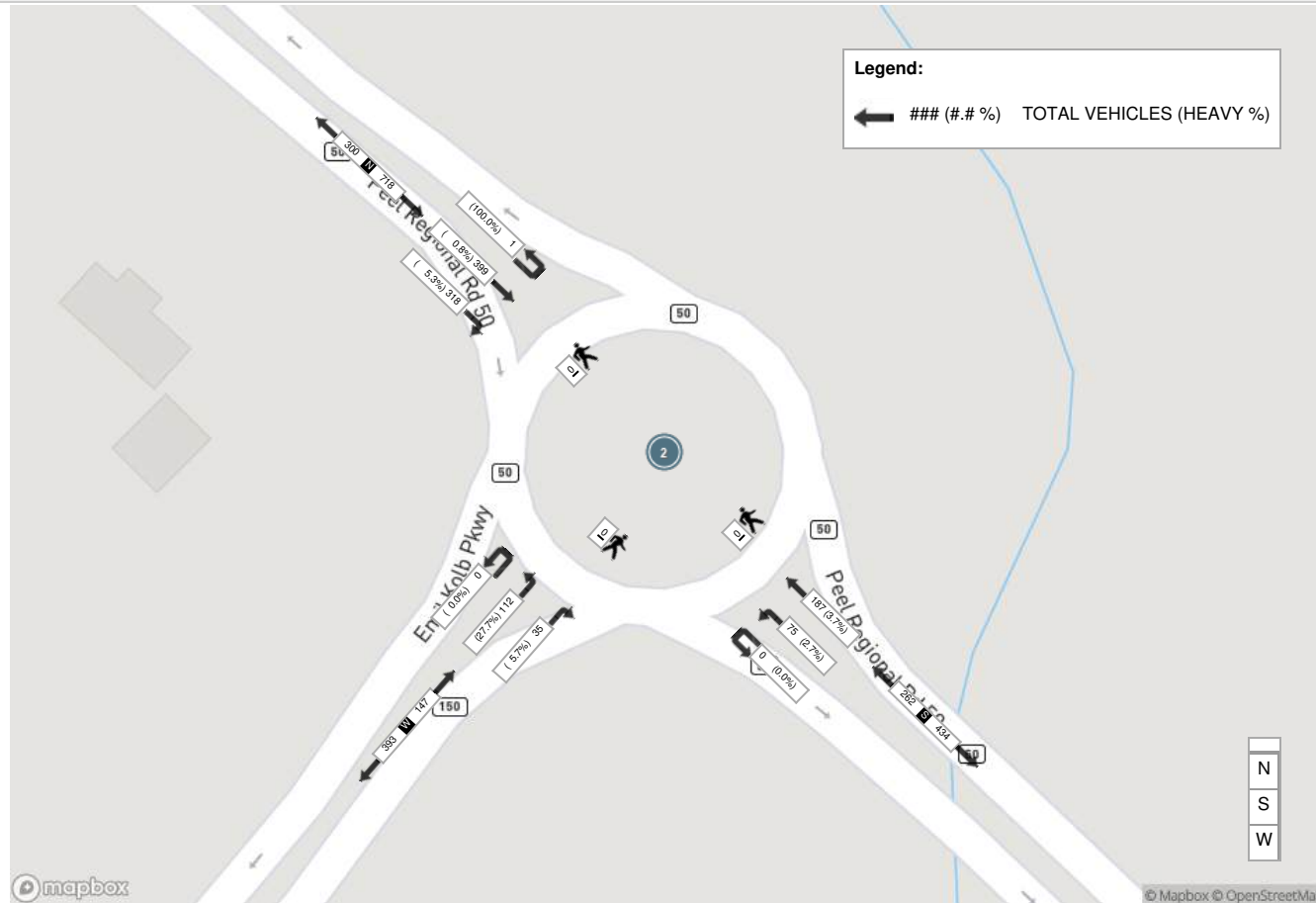
Start Time	N Approach HWY 50					S Approach HWY 50					W Approach EMIL KOLB PKWY					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
07:45:00	76	95	0	0	171	48	27	0	0	75	9	34	0	0	43	289
08:00:00	78	108	0	0	186	37	16	0	0	53	5	23	0	0	28	267
08:15:00	89	104	0	0	193	47	15	0	0	62	10	28	0	0	38	293
08:30:00	75	92	1	0	168	55	17	0	0	72	11	27	0	0	38	278
Grand Total	318	399	1	0	718	187	75	0	0	262	35	112	0	0	147	1127
Approach%	44.3%	55.6%	0.1%		-	71.4%	28.6%	0%		-	23.8%	76.2%	0%		-	-
Totals %	28.2%	35.4%	0.1%		63.7%	16.6%	6.7%	0%		23.2%	3.1%	9.9%	0%		13%	-
PHF	0.89	0.92	0.25		0.93	0.85	0.69	0		0.87	0.8	0.82	0		0.85	-
Heavy	17	3	1		21	7	2	0		9	2	31	0		33	-
Heavy %	5.3%	0.8%	100%		2.9%	3.7%	2.7%	0%		3.4%	5.7%	27.7%	0%		22.4%	-
Lights	301	396	0		697	180	73	0		253	33	81	0		114	-
Lights %	94.7%	99.2%	0%		97.1%	96.3%	97.3%	0%		96.6%	94.3%	72.3%	0%		77.6%	-
Single-Unit Trucks	10	3	1		14	4	2	0		6	1	12	0		13	-
Single-Unit Trucks %	3.1%	0.8%	100%		1.9%	2.1%	2.7%	0%		2.3%	2.9%	10.7%	0%		8.8%	-
Buses	0	0	0		0	1	0	0		1	1	0	0		1	-
Buses %	0%	0%	0%		0%	0.5%	0%	0%		0.4%	2.9%	0%	0%		0.7%	-
Articulated Trucks	7	0	0		7	2	0	0		2	0	19	0		19	-
Articulated Trucks %	2.2%	0%	0%		1%	1.1%	0%	0%		0.8%	0%	17%	0%		12.9%	-



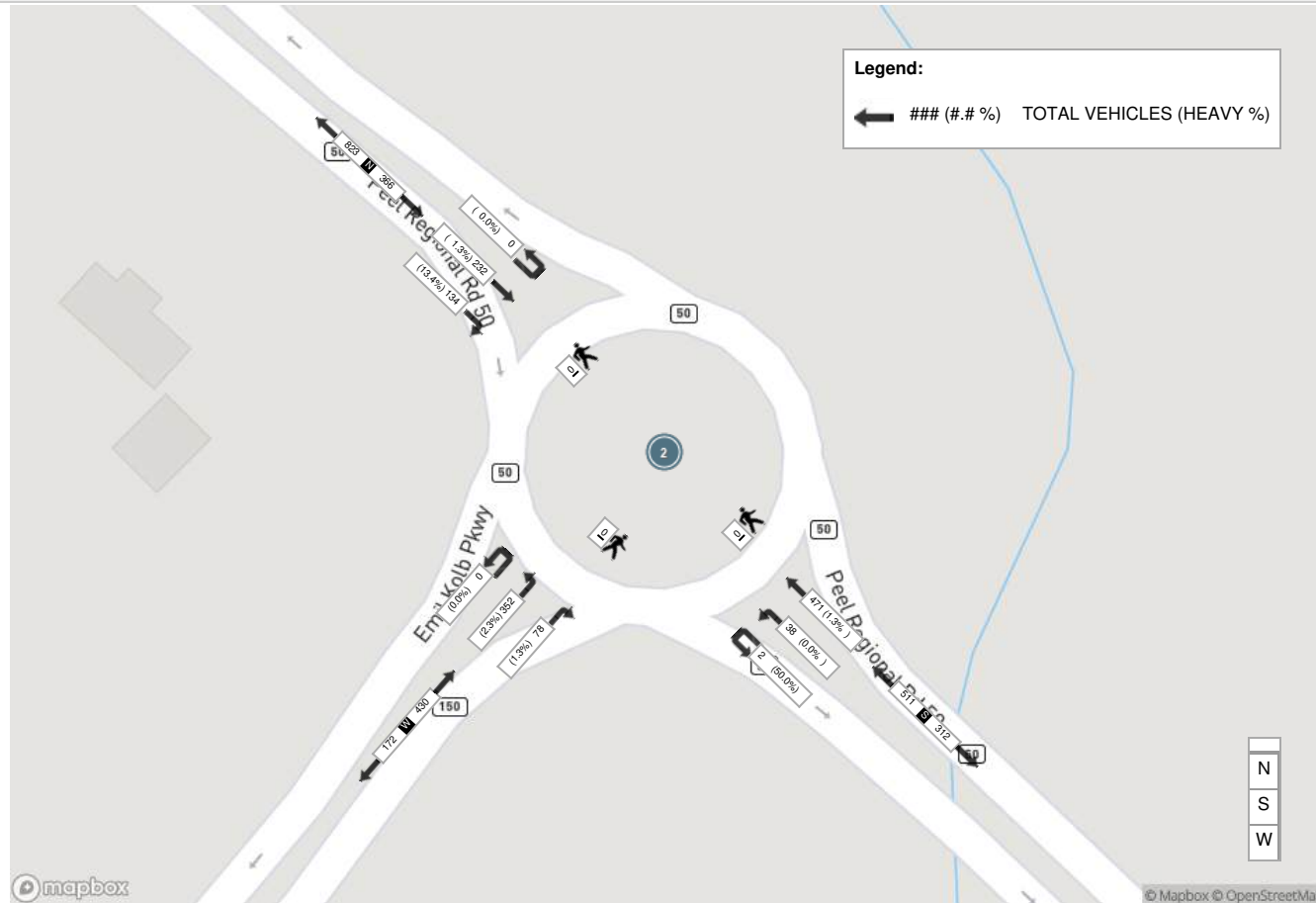
Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)

Start Time	N Approach HWY 50					S Approach HWY 50					W Approach EMIL KOLB PKWY					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
16:45:00	27	56	0	0	83	118	4	0	0	122	26	87	0	0	113	318
17:00:00	34	52	0	0	86	132	13	0	0	145	21	107	0	0	128	359
17:15:00	41	67	0	0	108	112	10	2	0	124	18	84	0	0	102	334
17:30:00	32	57	0	0	89	109	11	0	0	120	13	74	0	0	87	296
Grand Total	134	232	0	0	366	471	38	2	0	511	78	352	0	0	430	1307
Approach%	36.6%	63.4%	0%		-	92.2%	7.4%	0.4%		-	18.1%	81.9%	0%		-	-
Totals %	10.3%	17.8%	0%		28%	36%	2.9%	0.2%		39.1%	6%	26.9%	0%		32.9%	-
PHF	0.82	0.87	0		0.85	0.89	0.73	0.25		0.88	0.75	0.82	0		0.84	-
Heavy	18	3	0		21	6	0	1		7	1	8	0		9	-
Heavy %	13.4%	1.3%	0%		5.7%	1.3%	0%	50%		1.4%	1.3%	2.3%	0%		2.1%	-
Lights	116	229	0		345	465	38	1		504	77	344	0		421	-
Lights %	86.6%	98.7%	0%		94.3%	98.7%	100%	50%		98.6%	98.7%	97.7%	0%		97.9%	-
Single-Unit Trucks	4	1	0		5	4	0	0		4	1	5	0		6	-
Single-Unit Trucks %	3%	0.4%	0%		1.4%	0.8%	0%	0%		0.8%	1.3%	1.4%	0%		1.4%	-
Buses	0	2	0		2	2	0	1		3	0	0	0		0	-
Buses %	0%	0.9%	0%		0.5%	0.4%	0%	50%		0.6%	0%	0%	0%		0%	-
Articulated Trucks	14	0	0		14	0	0	0		0	0	3	0		3	-
Articulated Trucks %	10.4%	0%	0%		3.8%	0%	0%	0%		0%	0%	0.9%	0%		0.7%	-

Peak Hour: 07:45 AM - 08:45 AM Weather:



Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (3 . EMIL KOLB PKWY & DUFFYS LANE) CustID: 15011137

Start Time	N Approach EMIL KOLB PARKWAY					S Approach EMIL KOLB PARKWAY					W Approach DUFFYS LANE N					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	UTurn N:N	Peds N:	Approach Total	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	50	0	0	50	13	0	0	0	13	1	0	0	0	1	64	
06:15:00	1	58	0	0	59	19	1	0	0	20	2	0	0	0	2	81	
06:30:00	0	80	0	0	80	23	2	0	0	25	4	0	0	0	4	109	
06:45:00	1	88	0	0	89	26	0	0	0	26	4	0	0	0	4	119	373
07:00:00	0	89	0	0	89	27	2	0	0	29	4	0	0	0	4	122	431
07:15:00	0	98	0	0	98	28	2	0	0	30	5	0	0	0	5	133	483
07:30:00	0	105	0	0	105	38	2	0	0	40	8	1	0	0	9	154	528
07:45:00	1	104	0	0	105	46	2	0	0	48	10	1	0	0	11	164	573
08:00:00	0	95	0	0	95	25	7	0	0	32	13	1	0	0	14	141	592
08:15:00	2	87	0	0	89	36	5	0	0	41	3	0	0	0	3	133	592
08:30:00	0	101	0	0	101	36	2	0	0	38	5	0	0	0	5	144	582
08:45:00	0	77	0	0	77	23	1	0	0	24	5	0	0	0	5	106	524
09:00:00	2	54	0	0	56	26	5	0	0	31	3	0	0	0	3	90	473
09:15:00	0	61	0	0	61	30	5	0	0	35	4	0	0	0	4	100	440
09:30:00	1	43	0	0	44	23	4	0	0	27	3	0	0	0	3	74	370
09:45:00	1	32	0	0	33	23	0	0	0	23	6	1	0	0	7	63	327
BREAK																	
15:00:00	1	33	0	0	34	66	8	0	0	74	3	0	0	0	3	111	
15:15:00	0	29	0	0	29	67	6	0	0	73	5	0	0	0	5	107	
15:30:00	0	49	0	0	49	94	9	0	0	103	2	2	0	0	4	156	
15:45:00	0	36	0	0	36	98	16	0	0	114	5	1	0	0	6	156	530
16:00:00	0	26	0	0	26	125	11	0	0	136	0	1	0	0	1	163	582
16:15:00	0	34	0	0	34	107	10	0	0	117	5	0	0	0	5	156	631
16:30:00	1	28	0	0	29	101	10	0	0	111	5	0	0	0	5	145	620
16:45:00	0	29	0	0	29	113	15	0	0	128	4	1	0	0	5	162	626
17:00:00	0	48	0	0	48	130	18	0	0	148	3	2	0	0	5	201	664
17:15:00	0	50	0	0	50	97	11	0	0	108	3	0	0	0	3	161	669
17:30:00	4	39	0	0	43	86	15	0	0	101	5	0	0	0	5	149	673
17:45:00	2	40	0	0	42	89	8	0	0	97	6	1	0	0	7	146	657
18:00:00	0	33	0	0	33	69	10	0	0	79	5	0	0	0	5	117	573
18:15:00	0	34	0	0	34	51	4	0	0	55	6	1	0	0	7	96	508
18:30:00	0	45	0	0	45	42	2	0	0	44	5	0	0	0	5	94	453
18:45:00	0	38	0	0	38	50	6	0	0	56	6	0	0	0	6	100	407



Grand Total	17	1813	0	0	1830	1827	199	0	0	2026	148	13	0	0	161	4017	-
Approach%	0.9%	99.1%	0%		-	90.2%	9.8%	0%		-	91.9%	8.1%	0%		-	-	-
Totals %	0.4%	45.1%	0%		45.6%	45.5%	5%	0%		50.4%	3.7%	0.3%	0%		4%	-	-
Heavy	1	151	0		-	157	4	0		-	1	0	0		-	-	-
Heavy %	5.9%	8.3%	0%		-	8.6%	2%	0%		-	0.7%	0%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather:

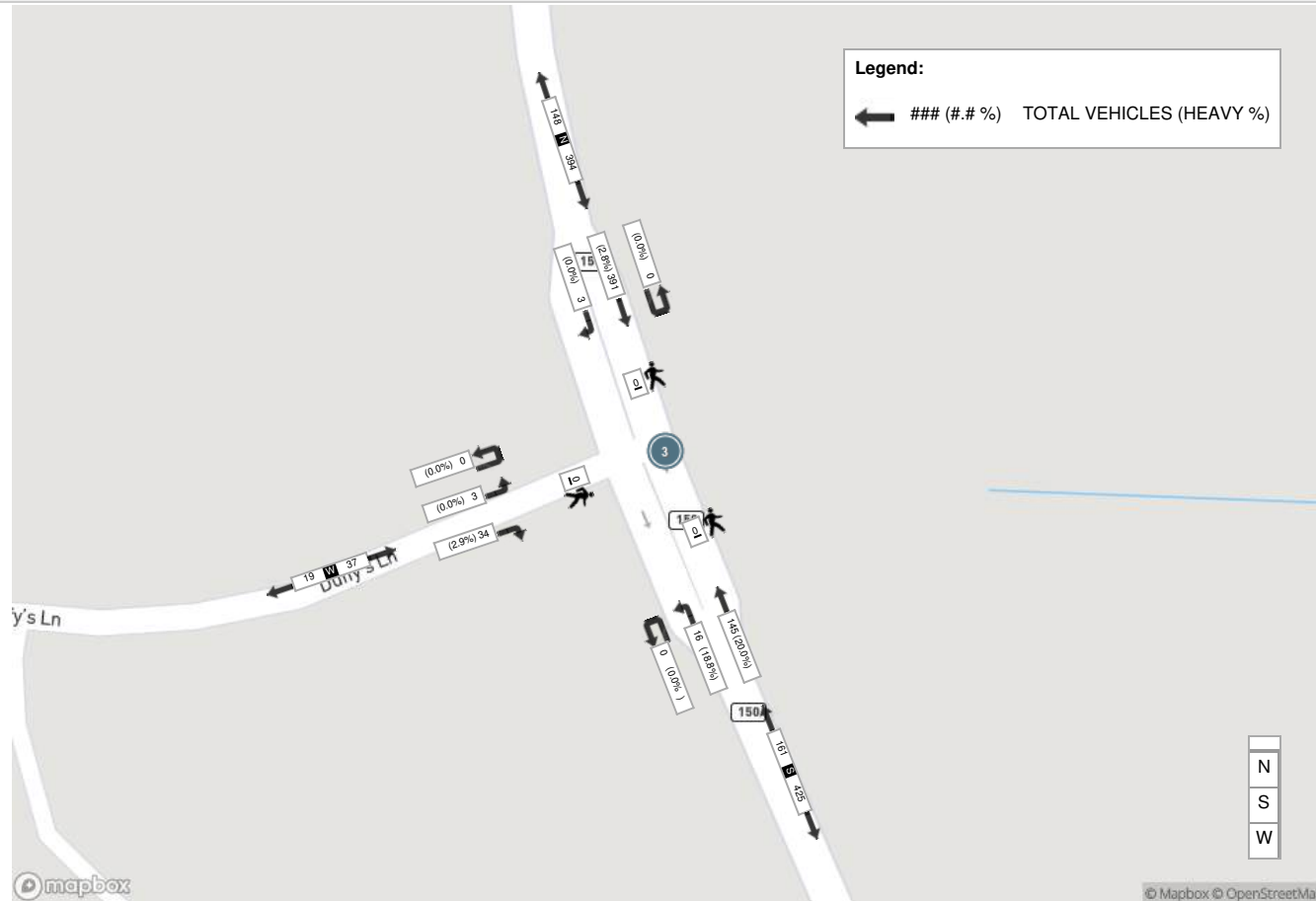
Start Time	N Approach EMIL KOLB PARKWAY					S Approach EMIL KOLB PARKWAY					W Approach DUFFYS LANE N					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
07:30:00	0	105	0	0	105	38	2	0	0	40	8	1	0	0	9	154
07:45:00	1	104	0	0	105	46	2	0	0	48	10	1	0	0	11	164
08:00:00	0	95	0	0	95	25	7	0	0	32	13	1	0	0	14	141
08:15:00	2	87	0	0	89	36	5	0	0	41	3	0	0	0	3	133
Grand Total	3	391	0	0	394	145	16	0	0	161	34	3	0	0	37	592
Approach%	0.8%	99.2%	0%		-	90.1%	9.9%	0%		-	91.9%	8.1%	0%		-	-
Totals %	0.5%	66%	0%		66.6%	24.5%	2.7%	0%		27.2%	5.7%	0.5%	0%		6.3%	-
PHF	0.38	0.93	0		0.94	0.79	0.57	0		0.84	0.65	0.75	0		0.66	-
Heavy	0	11	0		11	29	3	0		32	1	0	0		1	-
Heavy %	0%	2.8%	0%		2.8%	20%	18.8%	0%		19.9%	2.9%	0%	0%		2.7%	-
Lights	3	380	0		383	116	13	0		129	33	3	0		36	-
Lights %	100%	97.2%	0%		97.2%	80%	81.3%	0%		80.1%	97.1%	100%	0%		97.3%	-
Single-Unit Trucks	0	7	0		7	11	3	0		14	1	0	0		1	-
Single-Unit Trucks %	0%	1.8%	0%		1.8%	7.6%	18.8%	0%		8.7%	2.9%	0%	0%		2.7%	-
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	4	0		4	18	0	0		18	0	0	0		0	-
Articulated Trucks %	0%	1%	0%		1%	12.4%	0%	0%		11.2%	0%	0%	0%		0%	-
Bicycles on Road	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%	-



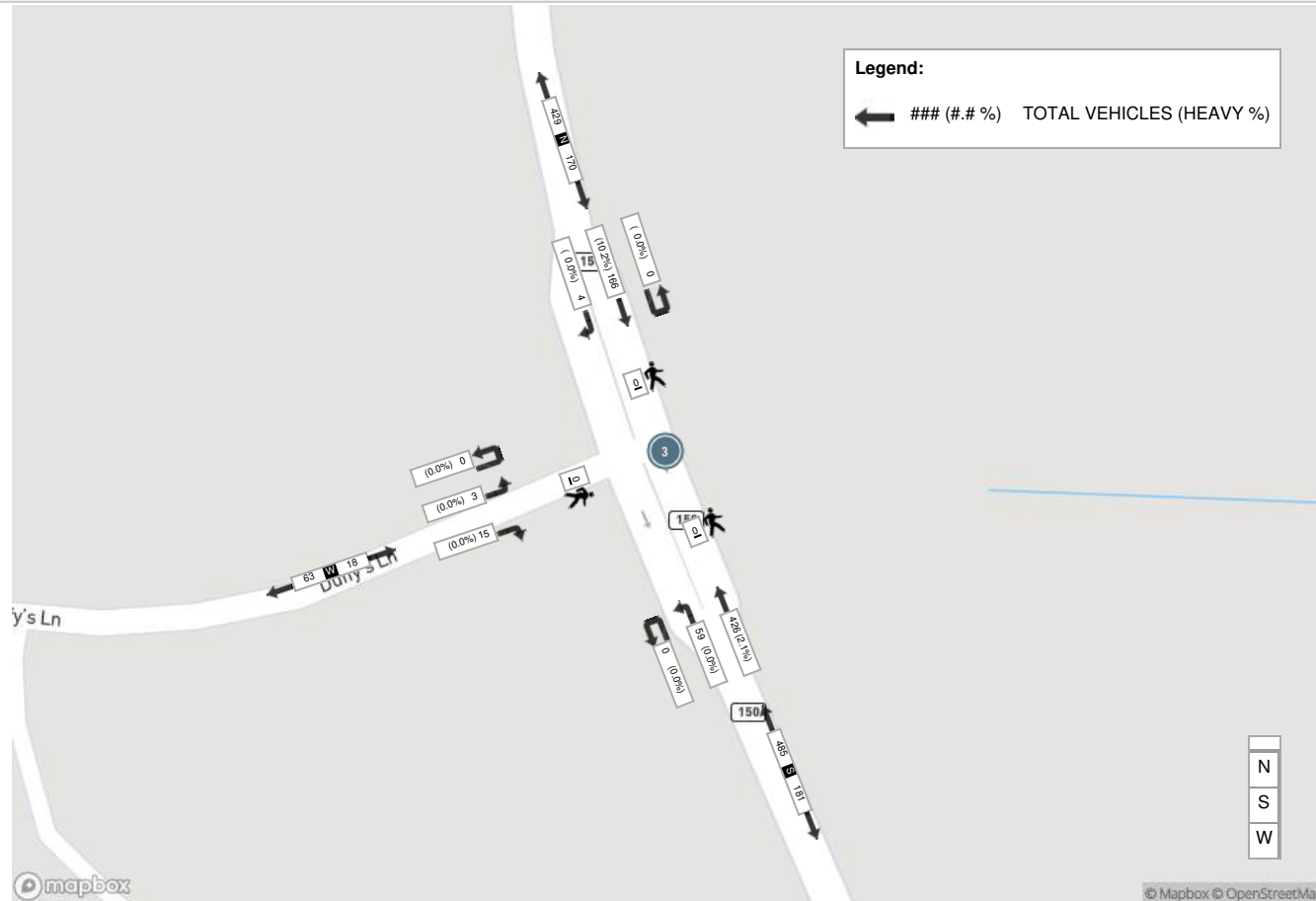
Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)

Start Time	N Approach EMIL KOLB PARKWAY					S Approach EMIL KOLB PARKWAY					W Approach DUFFYS LANE N					Int. Total (15 min)
	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	
16:45:00	0	29	0	0	29	113	15	0	0	128	4	1	0	0	5	162
17:00:00	0	48	0	0	48	130	18	0	0	148	3	2	0	0	5	201
17:15:00	0	50	0	0	50	97	11	0	0	108	3	0	0	0	3	161
17:30:00	4	39	0	0	43	86	15	0	0	101	5	0	0	0	5	149
Grand Total	4	166	0	0	170	426	59	0	0	485	15	3	0	0	18	673
Approach%	2.4%	97.6%	0%		-	87.8%	12.2%	0%		-	83.3%	16.7%	0%		-	-
Totals %	0.6%	24.7%	0%		25.3%	63.3%	8.8%	0%		72.1%	2.2%	0.4%	0%		2.7%	-
PHF	0.25	0.83	0		0.85	0.82	0.82	0		0.82	0.75	0.38	0		0.9	-
Heavy	0	17	0		17	9	0	0		9	0	0	0		0	-
Heavy %	0%	10.2%	0%		10%	2.1%	0%	0%		1.9%	0%	0%	0%		0%	-
Lights	4	149	0		153	417	59	0		476	15	3	0		18	-
Lights %	100%	89.8%	0%		90%	97.9%	100%	0%		98.1%	100%	100%	0%		100%	-
Single-Unit Trucks	0	4	0		4	6	0	0		6	0	0	0		0	-
Single-Unit Trucks %	0%	2.4%	0%		2.4%	1.4%	0%	0%		1.2%	0%	0%	0%		0%	-
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	13	0		13	3	0	0		3	0	0	0		0	-
Articulated Trucks %	0%	7.8%	0%		7.6%	0.7%	0%	0%		0.6%	0%	0%	0%		0%	-
Bicycles on Road	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%	-

Peak Hour: 07:30 AM - 08:30 AM Weather:



Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (4 . HWY 50 & COLUMBIA WAY) CustID: 05018520

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	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
06:00:00	2	68	1	0	0	71	9	0	14	0	0	23	3	13	0	0	0	16	1	0	1	0	0	2	112		
06:15:00	0	76	3	0	0	79	5	0	8	0	0	13	0	21	0	0	0	21	1	0	0	0	0	1	114		
06:30:00	0	85	7	0	0	92	10	0	12	0	0	22	3	34	0	0	0	37	0	0	0	0	0	0	151		
06:45:00	7	97	2	0	0	106	14	0	20	0	0	34	7	31	0	0	0	38	0	0	1	0	0	1	179	556	
07:00:00	2	82	1	0	0	85	6	1	19	0	0	26	10	29	1	0	0	40	0	0	0	0	0	0	151	595	
07:15:00	1	83	2	0	0	86	17	0	24	0	0	41	2	37	0	0	0	39	1	0	1	0	0	2	168	649	
07:30:00	0	86	6	0	0	92	19	0	26	0	0	45	10	39	0	0	0	49	0	0	2	0	0	2	188	686	
07:45:00	1	98	12	0	0	111	28	0	32	0	0	60	15	46	0	0	0	61	1	0	0	0	0	1	233	740	
08:00:00	0	94	10	0	0	104	19	0	19	0	0	38	16	35	0	0	0	51	3	0	0	0	0	3	196	785	
08:15:00	0	104	15	0	0	119	16	0	16	0	0	32	25	54	1	0	0	80	2	0	1	0	0	3	234	851	
08:30:00	0	87	10	0	0	97	10	1	14	0	0	25	12	62	0	0	0	74	1	0	1	0	0	2	198	861	
08:45:00	1	74	5	0	0	80	9	0	24	0	0	33	15	57	1	0	0	73	1	0	0	0	0	1	187	815	
09:00:00	0	69	5	0	0	74	7	0	14	0	0	21	12	43	0	0	0	55	3	0	1	0	0	4	154	773	
09:15:00	0	65	5	0	0	70	6	0	13	0	0	19	12	29	1	0	0	42	0	0	0	0	0	0	131	670	
09:30:00	0	62	8	0	0	70	5	1	15	0	0	21	7	38	0	0	0	45	0	0	0	0	0	0	136	608	
09:45:00	0	67	6	0	0	73	6	0	22	0	0	28	9	47	0	0	0	56	1	0	0	0	0	1	158	579	
BREAK																											
15:00:00	0	45	9	0	0	54	17	1	13	0	0	31	37	113	1	0	0	151	0	0	1	0	0	1	237		
15:15:00	0	61	14	0	0	75	9	0	15	0	0	24	21	96	1	0	0	118	0	0	4	0	0	4	221		
15:30:00	0	59	15	0	0	74	8	0	15	0	0	23	28	109	0	0	0	137	0	2	5	0	0	7	241		
15:45:00	1	71	11	0	0	83	10	0	22	0	0	32	37	86	0	0	0	123	0	0	0	0	0	0	238	937	
16:00:00	1	57	18	0	0	76	13	0	15	0	0	28	33	105	0	0	0	138	0	0	1	0	1	1	243	943	
16:15:00	0	51	21	0	0	72	5	0	23	0	0	28	30	107	0	0	0	137	0	0	1	0	0	1	238	960	
16:30:00	1	43	13	0	0	57	5	0	7	0	0	12	43	116	0	0	0	159	0	0	0	0	0	0	228	947	
16:45:00	0	62	18	0	0	80	10	0	18	0	0	28	38	117	0	0	0	155	0	0	0	0	0	0	263	972	
17:00:00	0	61	17	0	0	78	10	0	14	0	0	24	43	123	0	0	0	166	1	0	0	0	0	1	269	998	
17:15:00	0	67	21	0	0	88	14	0	18	0	0	32	36	98	0	0	0	134	0	0	0	0	0	0	254	1014	
17:30:00	1	58	14	0	0	73	13	0	13	0	0	26	39	107	0	0	0	146	0	0	0	0	0	0	245	1031	
17:45:00	0	50	14	0	0	64	11	0	11	0	0	22	27	108	1	0	2	136	0	0	1	0	0	1	223	991	
18:00:00	0	56	17	0	0	73	7	0	22	0	0	29	27	101	0	0	0	128	0	0	0	0	0	0	230	952	
18:15:00	0	52	13	0	0	65	9	0	13	0	0	22	39	98	0	0	0	137	0	0	0	0	0	0	224	922	
18:30:00	2	40	9	0	0	51	6	0	19	0	0	25	23	89	0	0	0	112	0	0	0	0	0	0	188	865	
18:45:00	0	47	15	0	0	62	3	0	23	0	0	26	15	77	0	0	0	92	2	0	0	0	0	2	182	824	
Grand Total	20	2177	337	0	0	2534	336	4	553	0	0	893	674	2265	7	0	2	2946	18	2	21	0	1	41	6414	-	
Approach%	0.8%	85.9%	13.3%	0%		-	37.6%	0.4%	61.9%	0%		-	22.9%	76.9%	0.2%	0%		-	43.9%	4.9%	51.2%	0%		-	-	-	
Totals %	0.3%	33.9%	5.3%	0%		39.5%	5.2%	0.1%	8.6%	0%		13.9%	10.5%	35.3%	0.1%	0%		45.9%	0.3%	0%	0.3%	0%		0.6%	-	-	
Heavy	6	29	6	0		-	5	2	8	0		-	7	41	2	0		-	10	0	5	0		-	-	-	
Heavy %	30%	1.3%	1.8%	0%		-	1.5%	50%	1.4%	0%		-	1%	1.8%	28.6%	0%		-	55.6%	0%	23.8%	0%		-	-	-	
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	



Peak Hour: 07:45 AM - 08:45 AM Weather:

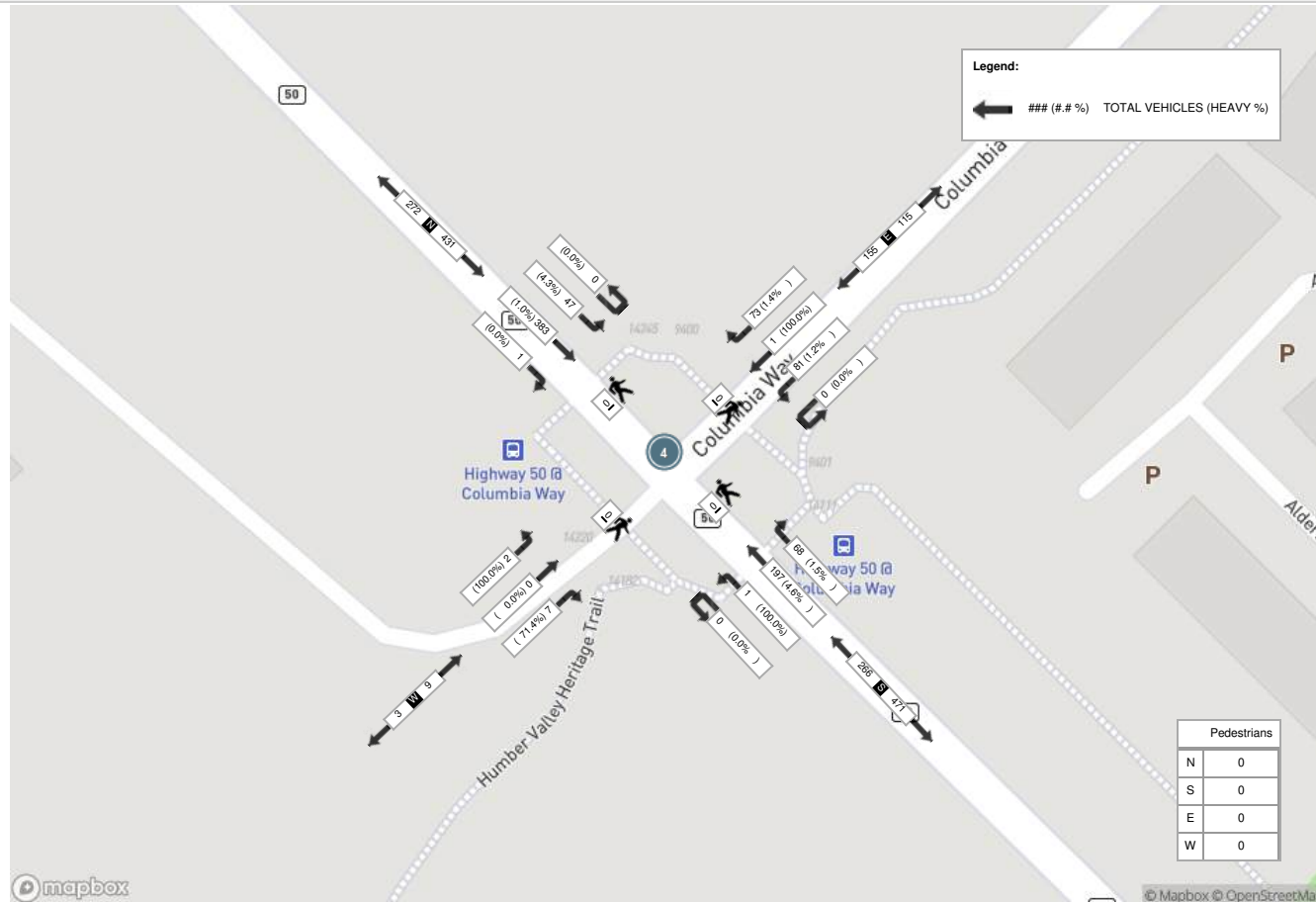
Start Time	N Approach HWY 50						E Approach COLUMBIA WAY						S Approach HWY 50						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	1	98	12	0	0	111	28	0	32	0	0	60	15	46	0	0	0	61	1	0	0	0	0	1	233
08:00:00	0	94	10	0	0	104	19	0	19	0	0	38	16	35	0	0	0	51	3	0	0	0	0	3	196
08:15:00	0	104	15	0	0	119	16	0	16	0	0	32	25	54	1	0	0	80	2	0	1	0	0	3	234
08:30:00	0	87	10	0	0	97	10	1	14	0	0	25	12	62	0	0	0	74	1	0	1	0	0	2	198
Grand Total	1	383	47	0	0	431	73	1	81	0	0	155	68	197	1	0	0	266	7	0	2	0	0	9	861
Approach%	0.2%	88.9%	10.9%	0%		-	47.1%	0.6%	52.3%	0%		-	25.6%	74.1%	0.4%	0%		-	77.8%	0%	22.2%	0%		-	-
Totals %	0.1%	44.5%	5.5%	0%		50.1%	8.5%	0.1%	9.4%	0%		18%	7.9%	22.9%	0.1%	0%		30.9%	0.8%	0%	0.2%	0%		1%	-
PHF	0.25	0.92	0.78	0		0.91	0.65	0.25	0.63	0		0.65	0.68	0.79	0.25	0		0.83	0.58	0	0.5	0		0.75	-
Heavy	0	4	2	0		6	1	1	1	0		3	1	9	1	0		11	5	0	2	0		7	-
Heavy %	0%	1%	4.3%	0%		1.4%	1.4%	100%	1.2%	0%		1.9%	1.5%	4.6%	100%	0%		4.1%	71.4%	0%	100%	0%		77.8%	-
Lights	1	379	45	0		425	72	0	80	0		152	67	188	0	0		255	2	0	0	0		2	-
Lights %	100%	99%	95.7%	0%		98.6%	98.6%	0%	98.8%	0%		98.1%	98.5%	95.4%	0%	0%		95.9%	28.6%	0%	0%	0%		22.2%	-
Single-Unit Trucks	0	4	1	0		5	1	1	0	0		2	0	6	1	0		7	4	0	1	0		5	-
Single-Unit Trucks %	0%	1%	2.1%	0%		1.2%	1.4%	100%	0%	0%		1.3%	0%	3%	100%	0%		2.6%	57.1%	0%	50%	0%		55.6%	-
Buses	0	0	1	0		1	0	0	1	0		1	1	2	0	0		3	0	0	0	0		0	-
Buses %	0%	0%	2.1%	0%		0.2%	0%	0%	1.2%	0%		0.6%	1.5%	1%	0%	0%		1.1%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	1	0	1	0		2	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	14.3%	0%	50%	0%		22.2%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-



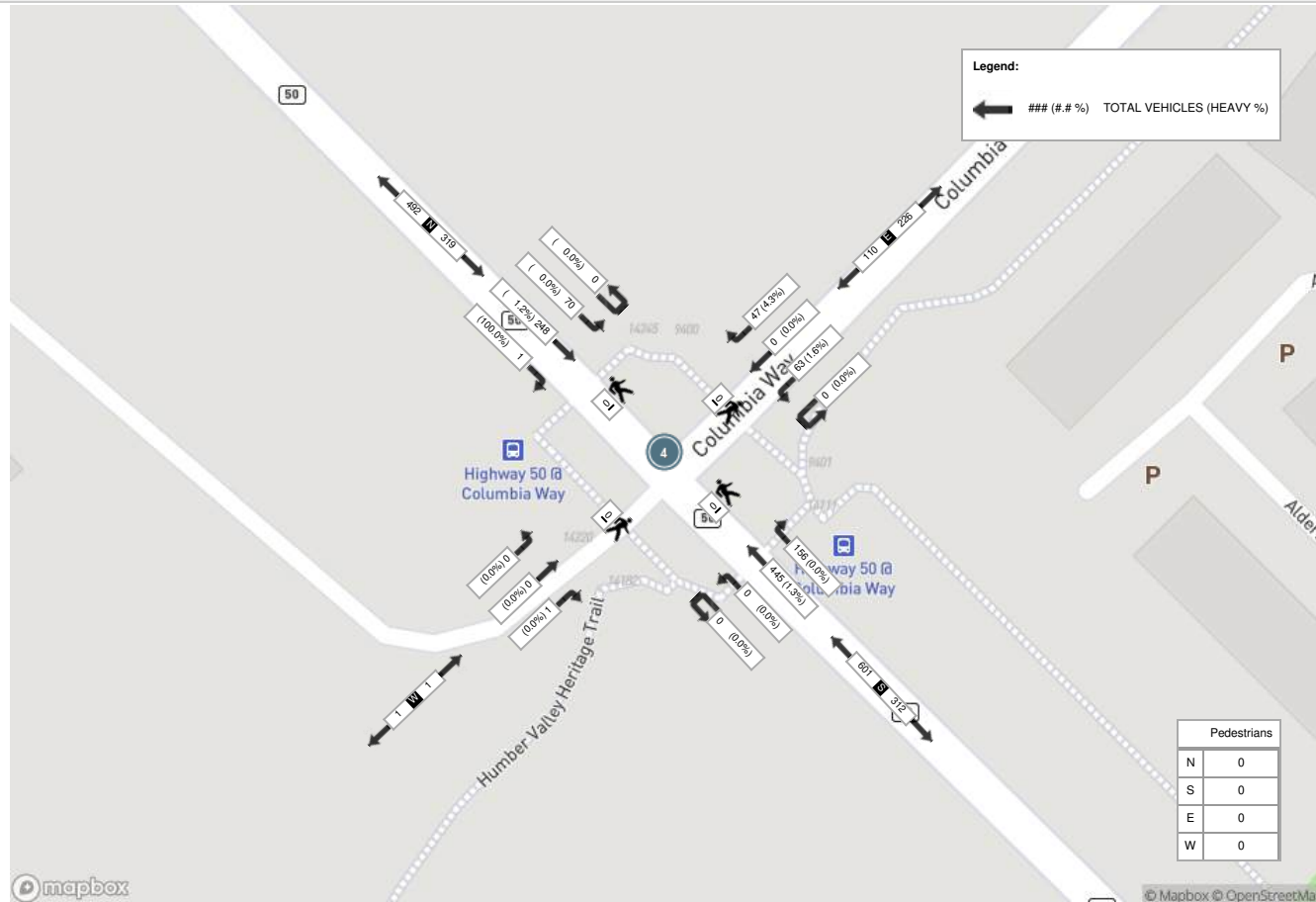
Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)

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	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	0	62	18	0	0	80	10	0	18	0	0	28	38	117	0	0	0	155	0	0	0	0	0	0	263
17:00:00	0	61	17	0	0	78	10	0	14	0	0	24	43	123	0	0	0	166	1	0	0	0	0	1	269
17:15:00	0	67	21	0	0	88	14	0	18	0	0	32	36	98	0	0	0	134	0	0	0	0	0	0	254
17:30:00	1	58	14	0	0	73	13	0	13	0	0	26	39	107	0	0	0	146	0	0	0	0	0	0	245
Grand Total	1	248	70	0	0	319	47	0	63	0	0	110	156	445	0	0	0	601	1	0	0	0	0	1	1031
Approach%	0.3%	77.7%	21.9%	0%		-	42.7%	0%	57.3%	0%		-	26%	74%	0%	0%		-	100%	0%	0%	0%		-	-
Totals %	0.1%	24.1%	6.8%	0%		30.9%	4.6%	0%	6.1%	0%		10.7%	15.1%	43.2%	0%	0%		58.3%	0.1%	0%	0%	0%		0.1%	-
PHF	0.25	0.93	0.83	0		0.91	0.84	0	0.88	0		0.86	0.91	0.9	0	0		0.91	0.25	0	0	0		0.25	-
Heavy	1	3	0	0		4	2	0	1	0		3	0	6	0	0		6	0	0	0	0		0	-
Heavy %	100%	1.2%	0%	0%		1.3%	4.3%	0%	1.6%	0%		2.7%	0%	1.3%	0%	0%		1%	0%	0%	0%	0%		0%	-
Lights	0	245	70	0		315	45	0	62	0		107	156	439	0	0		595	1	0	0	0		1	-
Lights %	0%	98.8%	100%	0%		98.7%	95.7%	0%	98.4%	0%		97.3%	100%	98.7%	0%	0%		99%	100%	0%	0%	0%		100%	-
Single-Unit Trucks	0	1	0	0		1	1	0	0	0		1	0	3	0	0		3	0	0	0	0		0	-
Single-Unit Trucks %	0%	0.4%	0%	0%		0.3%	2.1%	0%	0%	0%		0.9%	0%	0.7%	0%	0%		0.5%	0%	0%	0%	0%		0%	-
Buses	1	2	0	0		3	1	0	1	0		2	0	3	0	0		3	0	0	0	0		0	-
Buses %	100%	0.8%	0%	0%		0.9%	2.1%	0%	1.6%	0%		1.8%	0%	0.7%	0%	0%		0.5%	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	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather:



Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (5 . HWY 50 & CROSS COUNTRY BLVD / BOLTON HEIGHTS RD) CustID: 05017889

Start Time	N Approach QUEEN ST / HWY 50						E Approach BOLTON HEIGHTS						S Approach QUEEN ST / HWY 50						W Approach CROSS COUNTRY BLVD						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
06:00:00	0	80	3	0	1	83	3	0	12	0	0	15	1	17	0	0	0	18	6	0	0	0	0	6	122		
06:15:00	0	86	0	0	0	86	1	0	9	0	0	10	1	21	0	0	0	22	7	0	0	0	0	7	125		
06:30:00	1	93	4	0	0	98	1	2	8	0	0	11	1	40	3	0	0	44	3	0	3	0	0	6	159		
06:45:00	0	120	3	0	0	123	6	3	18	0	0	27	1	42	6	0	0	49	4	3	0	0	0	7	206	612	
07:00:00	2	97	1	0	0	100	3	0	14	0	0	17	2	41	2	0	0	45	6	1	2	0	0	9	171	661	
07:15:00	1	107	2	0	1	110	4	0	21	0	0	25	4	33	1	0	0	38	12	0	3	0	0	15	188	724	
07:30:00	2	110	9	0	0	121	5	0	20	0	0	25	5	43	1	0	0	49	11	2	3	0	0	16	211	776	
07:45:00	1	123	4	0	5	128	2	0	23	0	0	25	9	50	2	0	0	61	10	3	5	0	0	18	232	802	
08:00:00	1	114	17	0	0	132	8	2	10	0	0	20	20	54	3	0	0	77	6	4	3	1	3	14	243	874	
08:15:00	1	98	22	0	12	121	27	7	65	0	0	99	20	55	0	0	0	75	3	14	2	0	3	19	314	1000	
08:30:00	3	100	6	0	0	109	19	5	30	0	0	54	6	65	6	0	0	77	7	6	4	0	2	17	257	1046	
08:45:00	1	85	5	0	0	91	13	2	24	0	0	39	10	59	5	0	0	74	1	1	0	0	0	2	206	1020	
09:00:00	2	77	3	0	0	82	2	1	9	0	0	12	11	65	4	0	0	80	6	1	3	0	0	10	184	961	
09:15:00	1	71	2	0	0	74	4	1	9	0	1	14	5	54	5	0	1	64	6	2	3	0	0	11	163	810	
09:30:00	1	78	2	0	0	81	1	1	9	0	0	11	10	41	4	0	0	55	2	1	1	0	0	4	151	704	
09:45:00	1	97	1	0	0	99	1	1	14	0	0	16	8	55	4	0	0	67	5	1	2	0	0	8	190	688	
BREAK																											
15:00:00	1	58	3	0	13	62	39	11	40	0	0	90	12	118	16	0	0	146	3	0	2	0	8	5	303		
15:15:00	2	74	4	0	0	80	7	3	11	0	1	21	13	105	21	0	1	139	1	3	1	0	4	5	245		
15:30:00	3	66	5	0	0	74	6	0	9	0	0	15	15	133	11	0	0	159	1	0	1	0	0	2	250		
15:45:00	1	85	5	0	1	91	9	2	13	0	0	24	15	124	15	0	0	154	3	1	2	0	0	6	275	1073	
16:00:00	5	78	4	0	0	87	5	0	10	0	0	15	16	143	18	0	0	177	2	2	3	0	1	7	286	1056	
16:15:00	3	72	2	0	0	77	6	4	10	0	0	20	19	143	18	0	0	180	0	0	1	0	0	1	278	1089	
16:30:00	1	51	5	0	0	57	4	1	17	0	0	22	22	157	14	0	0	193	1	1	5	0	0	7	279	1118	
16:45:00	4	60	7	0	0	71	6	2	6	0	0	14	23	166	13	0	0	202	4	2	1	0	0	7	294	1137	
17:00:00	4	74	8	0	2	86	4	4	10	0	0	18	16	164	21	0	0	201	0	1	4	0	2	5	310	1161	
17:15:00	5	82	4	0	0	91	4	1	10	0	0	15	29	143	23	0	3	195	7	3	1	0	0	11	312	1195	
17:30:00	6	68	6	0	0	80	4	2	14	0	0	20	20	153	18	0	0	191	1	1	2	0	0	4	295	1211	
17:45:00	3	68	5	0	1	76	8	1	14	0	0	23	18	137	10	0	0	165	5	2	1	0	1	8	272	1189	
18:00:00	3	79	4	0	0	86	3	2	12	0	0	17	16	139	13	0	0	168	5	2	1	0	0	8	279	1158	
18:15:00	1	59	8	0	1	68	4	1	13	0	0	18	21	137	7	0	1	165	5	2	0	0	0	7	258	1104	
18:30:00	4	70	7	0	9	81	9	1	8	0	0	18	14	112	20	0	0	146	2	2	2	0	0	6	251	1060	
18:45:00	2	76	7	0	6	85	5	2	8	0	2	15	15	70	13	0	2	98	4	3	2	0	0	9	207	995	
Grand Total	66	2656	168	0	52	2890	223	62	500	0	4	785	398	2879	297	0	8	3574	139	64	63	1	24	267	7516	-	
Approach%	2.3%	91.9%	5.8%	0%		-	28.4%	7.9%	63.7%	0%		-	11.1%	80.6%	8.3%	0%		-	52.1%	24%	23.6%	0.4%		-	-	-	
Totals %	0.9%	35.3%	2.2%	0%		38.5%	3%	0.8%	6.7%	0%		10.4%	5.3%	38.3%	4%	0%		47.6%	1.8%	0.9%	0.8%	0%		3.6%	-	-	
Heavy	5	39	1	0		-	2	1	1	0		-	5	43	2	0		-	3	1	2	0		-	-	-	
Heavy %	7.6%	1.5%	0.6%	0%		-	0.9%	1.6%	0.2%	0%		-	1.3%	1.5%	0.7%	0%		-	2.2%	1.6%	3.2%	0%		-	-	-	
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	



Peak Hour: 07:45 AM - 08:45 AM Weather:

Start Time	N Approach QUEEN ST / HWY 50						E Approach BOLTON HEIGHTS						S Approach QUEEN ST / HWY 50						W Approach CROSS COUNTRY BLVD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	1	123	4	0	5	128	2	0	23	0	0	25	9	50	2	0	0	61	10	3	5	0	0	18	232
08:00:00	1	114	17	0	0	132	8	2	10	0	0	20	20	54	3	0	0	77	6	4	3	1	3	14	243
08:15:00	1	98	22	0	12	121	27	7	65	0	0	99	20	55	0	0	0	75	3	14	2	0	3	19	314
08:30:00	3	100	6	0	0	109	19	5	30	0	0	54	6	65	6	0	0	77	7	6	4	0	2	17	257
Grand Total	6	435	49	0	17	490	56	14	128	0	0	198	55	224	11	0	0	290	26	27	14	1	8	68	1046
Approach%	1.2%	88.8%	10%	0%		-	28.3%	7.1%	64.6%	0%		-	19%	77.2%	3.8%	0%		-	38.2%	39.7%	20.6%	1.5%		-	-
Totals %	0.6%	41.6%	4.7%	0%		46.8%	5.4%	1.3%	12.2%	0%		18.9%	5.3%	21.4%	1.1%	0%		27.7%	2.5%	2.6%	1.3%	0.1%		6.5%	-
PHF	0.5	0.88	0.56	0		0.93	0.52	0.5	0.49	0		0.5	0.69	0.86	0.46	0		0.94	0.65	0.48	0.7	0.25		0.89	-
Heavy	0	6	0	0		6	1	0	0	0		1	0	9	1	0		10	1	1	0	0		2	-
Heavy %	0%	1.4%	0%	0%		1.2%	1.8%	0%	0%	0%		0.5%	0%	4%	9.1%	0%		3.4%	3.8%	3.7%	0%	0%		2.9%	-
Lights	6	429	49	0		484	55	14	128	0		197	55	215	10	0		280	25	26	14	1		66	-
Lights %	100%	98.6%	100%	0%		98.8%	98.2%	100%	100%	0%		99.5%	100%	96%	90.9%	0%		96.6%	96.2%	96.3%	100%	100%		97.1%	-
Single-Unit Trucks	0	4	0	0		4	0	0	0	0		0	0	7	1	0		8	1	1	0	0		2	-
Single-Unit Trucks %	0%	0.9%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	3.1%	9.1%	0%		2.8%	3.8%	3.7%	0%	0%		2.9%	-
Buses	0	1	0	0		1	1	0	0	0		1	0	1	0	0		1	0	0	0	0		0	-
Buses %	0%	0.2%	0%	0%		0.2%	1.8%	0%	0%	0%		0.5%	0%	0.4%	0%	0%		0.3%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	1	0	0		1	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	-
Articulated Trucks %	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0.4%	0%	0%		0.3%	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 %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	17	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	8	-	-
Pedestrians%	-	-	-	-	68%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	32%	-	-



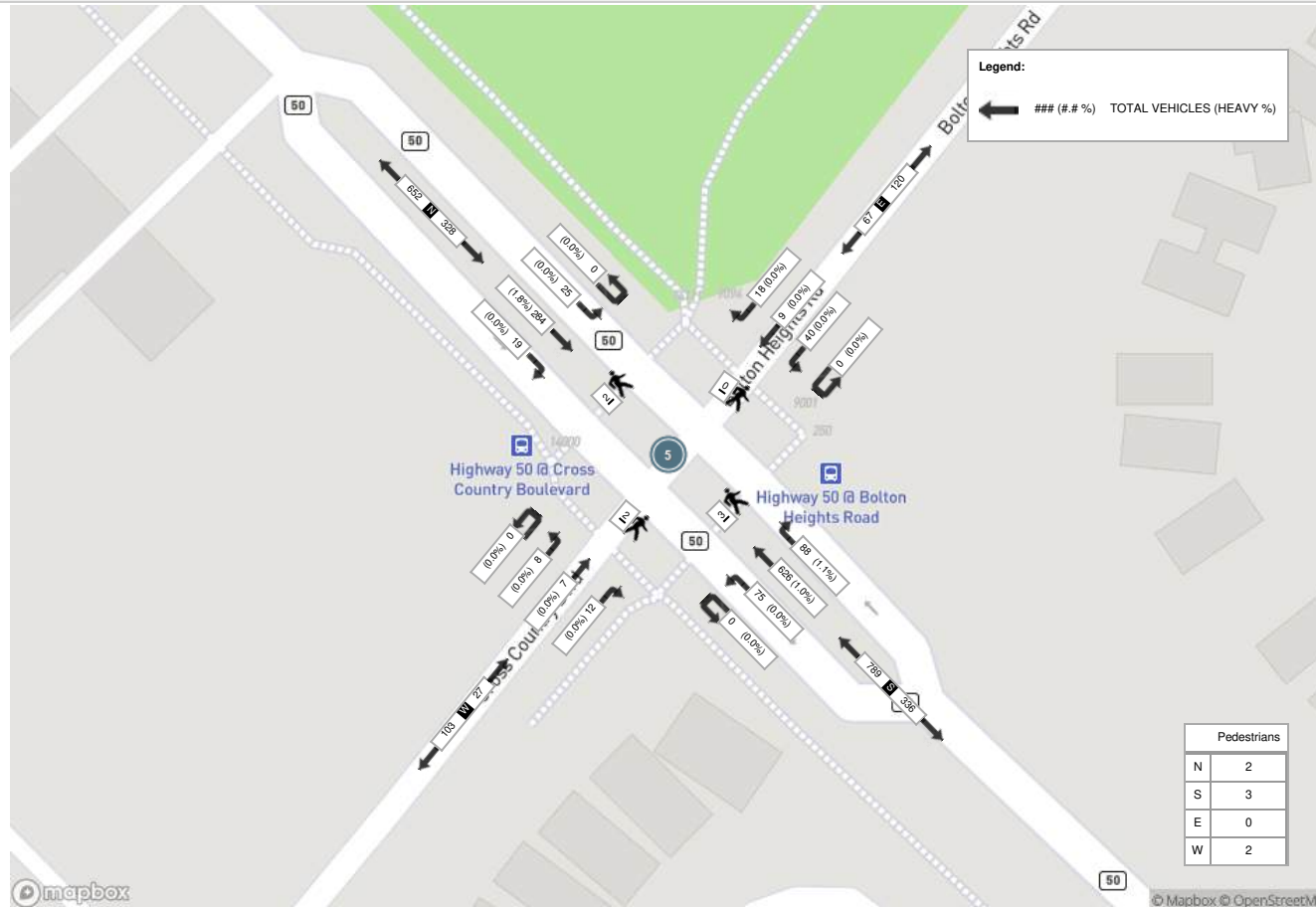
Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)

Start Time	N Approach QUEEN ST / HWY 50						E Approach BOLTON HEIGHTS						S Approach QUEEN ST / HWY 50						W Approach CROSS COUNTRY BLVD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	4	60	7	0	0	71	6	2	6	0	0	14	23	166	13	0	0	202	4	2	1	0	0	7	294
17:00:00	4	74	8	0	2	86	4	4	10	0	0	18	16	164	21	0	0	201	0	1	4	0	2	5	310
17:15:00	5	82	4	0	0	91	4	1	10	0	0	15	29	143	23	0	3	195	7	3	1	0	0	11	312
17:30:00	6	68	6	0	0	80	4	2	14	0	0	20	20	153	18	0	0	191	1	1	2	0	0	4	295
Grand Total	19	284	25	0	2	328	18	9	40	0	0	67	88	626	75	0	3	789	12	7	8	0	2	27	1211
Approach%	5.8%	86.6%	7.6%	0%		-	26.9%	13.4%	59.7%	0%		-	11.2%	79.3%	9.5%	0%		-	44.4%	25.9%	29.6%	0%		-	-
Totals %	1.6%	23.5%	2.1%	0%		27.1%	1.5%	0.7%	3.3%	0%		5.5%	7.3%	51.7%	6.2%	0%		65.2%	1%	0.6%	0.7%	0%		2.2%	-
PHF	0.79	0.87	0.78	0		0.9	0.75	0.56	0.71	0		0.84	0.76	0.94	0.82	0		0.98	0.43	0.58	0.5	0		0.61	-
Heavy	0	5	0	0		5	0	0	0	0		0	1	6	0	0		7	0	0	0	0		0	-
Heavy %	0%	1.8%	0%	0%		1.5%	0%	0%	0%	0%		0%	1.1%	1%	0%	0%		0.9%	0%	0%	0%	0%		0%	-
Lights	19	279	25	0		323	18	9	40	0		67	87	620	75	0		782	12	7	8	0		27	-
Lights %	100%	98.2%	100%	0%		98.5%	100%	100%	100%	0%		100%	98.9%	99%	100%	0%		99.1%	100%	100%	100%	0%		100%	-
Single-Unit Trucks	0	2	0	0		2	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	-
Single-Unit Trucks %	0%	0.7%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.4%	0%	0%	0%	0%		0%	-
Buses	0	3	0	0		3	0	0	0	0		0	1	3	0	0		4	0	0	0	0		0	-
Buses %	0%	1.1%	0%	0%		0.9%	0%	0%	0%	0%		0%	1.1%	0.5%	0%	0%		0.5%	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%	-
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%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	2	-	-
Pedestrians%	-	-	-	-	28.6%	-	-	-	-	-	0%	-	-	-	-	-	42.9%	-	-	-	-	-	28.6%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather:



Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (6 . HWY 50 & KING ST E) CustID: 00901958

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	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
06:00:00	3	100	5	0	0	108	3	16	16	0	0	35	8	22	2	0	0	32	7	15	2	0	0	24	199		
06:15:00	4	107	13	0	0	124	2	14	18	0	0	34	8	18	3	0	0	29	3	28	8	0	0	39	226		
06:30:00	5	93	7	0	0	105	5	18	31	0	0	54	10	38	5	0	0	53	6	33	4	0	0	43	255		
06:45:00	8	136	14	0	0	158	7	39	43	0	0	89	14	40	12	0	0	66	15	31	9	0	1	55	368	1048	
07:00:00	3	115	15	0	0	133	3	31	59	0	0	93	10	36	9	0	0	55	11	47	6	0	0	64	345	1194	
07:15:00	8	148	10	0	2	166	4	35	55	0	2	94	21	41	10	0	0	72	19	36	4	0	0	59	391	1359	
07:30:00	9	126	14	0	0	149	6	30	51	0	1	87	15	36	10	0	1	61	10	44	9	0	0	63	360	1464	
07:45:00	6	146	11	0	0	163	6	37	66	0	0	109	26	43	5	0	1	74	7	44	6	0	0	57	403	1499	
08:00:00	4	108	15	0	0	127	14	40	64	0	1	118	20	56	8	0	0	84	15	41	8	0	0	64	393	1547	
08:15:00	9	132	13	0	0	154	9	42	56	0	0	107	31	59	10	0	0	100	28	52	6	0	0	86	447	1603	
08:30:00	5	140	15	0	0	160	18	52	67	0	0	137	24	53	9	0	0	86	20	60	2	0	0	82	465	1708	
08:45:00	4	113	11	0	0	128	10	57	66	0	2	133	35	74	22	0	0	131	8	43	6	0	2	57	449	1754	
09:00:00	7	105	13	0	2	125	10	29	52	0	0	91	24	76	14	0	0	114	14	41	3	0	0	58	388	1749	
09:15:00	5	89	14	0	1	108	8	19	43	0	0	70	29	54	19	0	0	102	16	27	3	0	0	46	326	1628	
09:30:00	5	86	14	0	0	105	6	29	44	0	5	79	27	65	12	0	0	104	11	31	2	0	0	44	332	1495	
09:45:00	6	117	11	0	0	134	13	23	44	0	2	80	30	60	20	0	0	110	18	29	6	0	0	53	377	1423	
BREAK																											
15:00:00	7	90	17	0	8	114	6	57	56	0	4	119	80	129	27	0	0	236	17	38	11	0	2	66	535		
15:15:00	6	83	11	0	3	100	10	54	52	0	2	116	78	133	31	0	0	242	16	20	9	0	0	45	503		
15:30:00	6	82	10	0	2	98	10	55	45	0	0	110	67	133	21	0	3	221	17	46	9	0	0	72	501		
15:45:00	8	93	6	0	3	107	11	61	48	0	0	120	73	142	26	0	4	241	16	56	10	1	2	83	551	2090	
16:00:00	4	80	10	0	2	94	11	52	54	0	4	117	80	136	19	0	2	235	13	46	15	0	3	74	520	2075	
16:15:00	6	74	14	0	0	94	12	62	56	0	0	130	107	160	15	0	9	282	15	41	11	0	6	67	573	2145	
16:30:00	4	61	7	0	3	72	8	65	38	0	2	111	113	162	21	0	4	296	22	60	9	0	2	91	570	2214	
16:45:00	7	78	8	0	0	93	10	73	41	0	2	124	116	173	14	0	0	303	29	54	8	0	2	91	611	2274	
17:00:00	4	68	11	0	3	83	9	57	53	0	1	119	101	164	26	0	2	291	23	54	16	0	4	93	586	2340	
17:15:00	3	103	7	0	6	113	8	58	50	0	3	116	103	158	12	0	1	273	18	65	11	0	2	94	596	2363	
17:30:00	8	75	6	0	2	89	12	62	52	0	2	126	95	167	26	0	3	288	17	51	16	0	2	84	587	2380	
17:45:00	8	80	7	0	2	95	8	48	52	0	4	108	80	134	28	0	4	242	18	49	17	0	2	84	529	2298	
18:00:00	7	77	2	0	1	86	7	56	48	0	2	111	77	150	29	0	0	256	16	42	9	0	1	67	520	2232	
18:15:00	6	89	7	0	5	102	7	36	50	0	1	93	62	119	25	0	2	206	17	41	13	0	1	71	472	2108	
18:30:00	7	75	8	0	2	90	5	35	51	0	3	91	64	129	25	0	3	218	10	30	8	0	0	48	447	1968	
18:45:00	7	84	10	0	0	101	8	34	41	0	4	83	40	98	24	0	1	162	16	29	6	0	2	51	397	1836	
Grand Total	189	3153	336	0	47	3678	266	1376	1562	0	47	3204	1668	3058	539	0	40	5265	488	1324	262	1	34	2075	14222	-	
Approach%	5.1%	85.7%	9.1%	0%		-	8.3%	42.9%	48.8%	0%		-	31.7%	58.1%	10.2%	0%		-	23.5%	63.8%	12.6%	0%		-	-	-	
Totals %	1.3%	22.2%	2.4%	0%		25.9%	1.9%	9.7%	11%	0%		22.5%	11.7%	21.5%	3.8%	0%		37%	3.4%	9.3%	1.8%	0%		14.6%	-	-	
Heavy	5	31	5	0		-	1	19	8	0		-	9	36	6	0		-	6	16	6	0		-	-	-	
Heavy %	2.6%	1%	1.5%	0%		-	0.4%	1.4%	0.5%	0%		-	0.5%	1.2%	1.1%	0%		-	1.2%	1.2%	2.3%	0%		-	-	-	
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	



Peak Hour: 08:00 AM - 09:00 AM Weather:

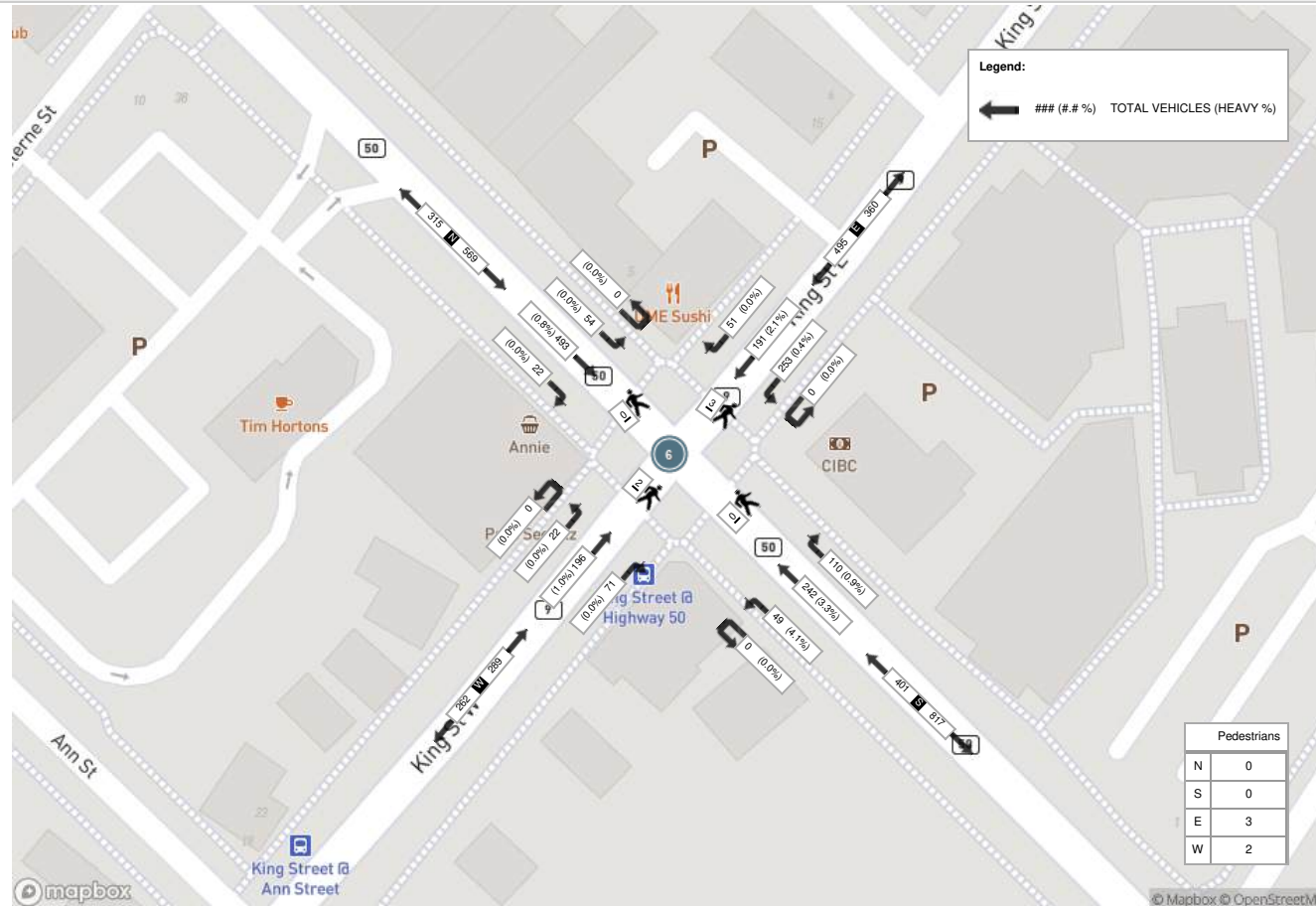
Start Time	N Approach HWY 50						E Approach KING ST						S Approach HWY 50						W Approach KING ST						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:00:00	4	108	15	0	0	127	14	40	64	0	1	118	20	56	8	0	0	84	15	41	8	0	0	64	393
08:15:00	9	132	13	0	0	154	9	42	56	0	0	107	31	59	10	0	0	100	28	52	6	0	0	86	447
08:30:00	5	140	15	0	0	160	18	52	67	0	0	137	24	53	9	0	0	86	20	60	2	0	0	82	465
08:45:00	4	113	11	0	0	128	10	57	66	0	2	133	35	74	22	0	0	131	8	43	6	0	2	57	449
Grand Total	22	493	54	0	0	569	51	191	253	0	3	495	110	242	49	0	0	401	71	196	22	0	2	289	1754
Approach%	3.9%	86.6%	9.5%	0%		-	10.3%	38.6%	51.1%	0%		-	27.4%	60.3%	12.2%	0%		-	24.6%	67.8%	7.6%	0%		-	-
Totals %	1.3%	28.1%	3.1%	0%		32.4%	2.9%	10.9%	14.4%	0%		28.2%	6.3%	13.8%	2.8%	0%		22.9%	4%	11.2%	1.3%	0%		16.5%	-
PHF	0.61	0.88	0.9	0		0.89	0.71	0.84	0.94	0		0.9	0.79	0.82	0.56	0		0.77	0.63	0.82	0.69	0		0.84	-
Heavy	0	4	0	0		4	0	4	1	0		5	1	8	2	0		11	0	2	0	0		2	-
Heavy %	0%	0.8%	0%	0%		0.7%	0%	2.1%	0.4%	0%		1%	0.9%	3.3%	4.1%	0%		2.7%	0%	1%	0%	0%		0.7%	-
Lights	22	489	54	0		565	51	187	252	0		490	109	234	47	0		390	71	194	22	0		287	-
Lights %	100%	99.2%	100%	0%		99.3%	100%	97.9%	99.6%	0%		99%	99.1%	96.7%	95.9%	0%		97.3%	100%	99%	100%	0%		99.3%	-
Single-Unit Trucks	0	3	0	0		3	0	4	1	0		5	1	6	1	0		8	0	1	0	0		1	-
Single-Unit Trucks %	0%	0.6%	0%	0%		0.5%	0%	2.1%	0.4%	0%		1%	0.9%	2.5%	2%	0%		2%	0%	0.5%	0%	0%		0.3%	-
Buses	0	1	0	0		1	0	0	0	0		0	0	0	1	0		1	0	1	0	0		1	-
Buses %	0%	0.2%	0%	0%		0.2%	0%	0%	0%	0%		0%	0%	0%	2%	0%		0.2%	0%	0.5%	0%	0%		0.3%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.8%	0%	0%		0.5%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	-	-	-	-	-	2	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	60%	-	-	-	-	-	0%	-	-	-	-	-	40%	-	-



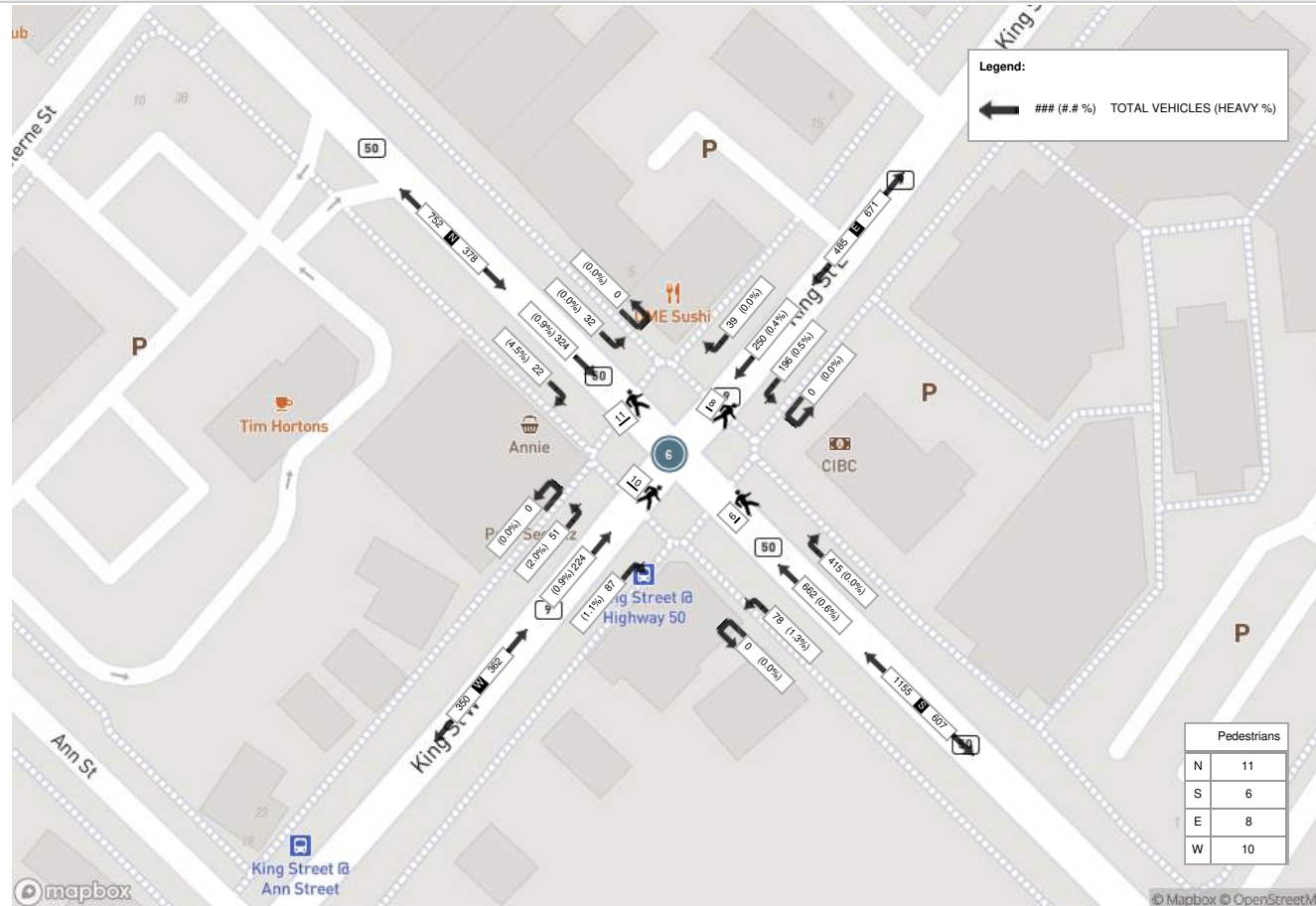
Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)

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	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	7	78	8	0	0	93	10	73	41	0	2	124	116	173	14	0	0	303	29	54	8	0	2	91	611
17:00:00	4	68	11	0	3	83	9	57	53	0	1	119	101	164	26	0	2	291	23	54	16	0	4	93	586
17:15:00	3	103	7	0	6	113	8	58	50	0	3	116	103	158	12	0	1	273	18	65	11	0	2	94	596
17:30:00	8	75	6	0	2	89	12	62	52	0	2	126	95	167	26	0	3	288	17	51	16	0	2	84	587
Grand Total	22	324	32	0	11	378	39	250	196	0	8	485	415	662	78	0	6	1155	87	224	51	0	10	362	2380
Approach%	5.8%	85.7%	8.5%	0%		-	8%	51.5%	40.4%	0%		-	35.9%	57.3%	6.8%	0%		-	24%	61.9%	14.1%	0%		-	-
Totals %	0.9%	13.6%	1.3%	0%		15.9%	1.6%	10.5%	8.2%	0%		20.4%	17.4%	27.8%	3.3%	0%		48.5%	3.7%	9.4%	2.1%	0%		15.2%	-
PHF	0.69	0.79	0.73	0		0.84	0.81	0.86	0.92	0		0.96	0.89	0.96	0.75	0		0.95	0.75	0.86	0.8	0		0.96	-
Heavy	1	3	0	0		4	0	1	1	0		2	0	4	1	0		5	1	2	1	0		4	-
Heavy %	4.5%	0.9%	0%	0%		1.1%	0%	0.4%	0.5%	0%		0.4%	0%	0.6%	1.3%	0%		0.4%	1.1%	0.9%	2%	0%		1.1%	-
Lights	21	321	32	0		374	39	249	195	0		483	415	658	77	0		1150	86	222	50	0		358	-
Lights %	95.5%	99.1%	100%	0%		98.9%	100%	99.6%	99.5%	0%		99.6%	100%	99.4%	98.7%	0%		99.6%	98.9%	99.1%	98%	0%		98.9%	-
Single-Unit Trucks	1	1	0	0		2	0	1	0	0		1	0	2	1	0		3	1	1	0	0		2	-
Single-Unit Trucks %	4.5%	0.3%	0%	0%		0.5%	0%	0.4%	0%	0%		0.2%	0%	0.3%	1.3%	0%		0.3%	1.1%	0.4%	0%	0%		0.6%	-
Buses	0	2	0	0		2	0	0	0	0		0	0	2	0	0		2	0	1	1	0		2	-
Buses %	0%	0.6%	0%	0%		0.5%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.2%	0%	0.4%	2%	0%		0.6%	-
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%	0.5%	0%		0.2%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	11	-	-	-	-	-	8	-	-	-	-	-	6	-	-	-	-	-	10	-	-
Pedestrians%	-	-	-	-	31.4%	-	-	-	-	-	22.9%	-	-	-	-	-	17.1%	-	-	-	-	-	28.6%	-	-

Peak Hour: 08:00 AM - 09:00 AM Weather:



Peak Hour: 04:45 PM - 05:45 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (7 . COLUMBIA WAY & KINGSVIEW DR) CustID: 99900026

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	UTurn E:E	Peds E:	Approach Total	Right S:E	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	UTurn W:W	Peds W:	Approach Total		
06:00:00	20	2	0	0	22	3	3	0	0	6	1	4	0	0	5	33	
06:15:00	16	1	0	0	17	9	4	0	0	13	3	3	0	1	6	36	
06:30:00	15	1	0	0	16	4	5	0	0	9	4	7	0	0	11	36	
06:45:00	28	3	0	0	31	1	5	0	0	6	1	8	0	0	9	46	151
07:00:00	22	3	1	0	26	7	2	0	0	9	3	8	0	0	11	46	164
07:15:00	31	3	0	0	34	9	8	0	0	17	0	4	0	0	4	55	183
07:30:00	37	4	0	0	41	5	13	0	0	18	1	14	0	0	15	74	221
07:45:00	45	10	0	2	55	4	10	1	2	15	2	26	0	0	28	98	273
08:00:00	29	34	0	3	63	13	8	0	1	21	4	22	0	0	26	110	337
08:15:00	25	30	0	0	55	20	9	0	0	29	11	29	0	0	40	124	406
08:30:00	18	16	0	0	34	14	8	0	0	22	6	16	0	0	22	78	410
08:45:00	22	7	0	0	29	4	7	0	0	11	3	17	0	0	20	60	372
09:00:00	14	7	0	0	21	7	8	0	0	15	9	9	0	0	18	54	316
09:15:00	16	5	0	0	21	6	5	0	0	11	3	13	0	0	16	48	240
09:30:00	16	5	0	0	21	7	6	0	0	13	5	9	0	0	14	48	210
09:45:00	20	1	0	0	21	4	7	0	1	11	5	13	0	0	18	50	200
BREAK																	
15:00:00	19	6	0	0	25	30	12	0	1	42	18	30	0	0	48	115	
15:15:00	12	3	0	0	15	6	12	0	0	18	12	22	0	0	34	67	
15:30:00	16	7	0	0	23	6	8	0	0	14	15	28	0	0	43	80	
15:45:00	25	7	0	0	32	8	8	0	0	16	21	30	0	0	51	99	361
16:00:00	10	5	0	0	15	9	18	0	0	27	16	34	0	0	50	92	338
16:15:00	17	8	0	0	25	5	7	0	0	12	15	36	0	0	51	88	359
16:30:00	11	5	0	0	16	7	3	0	0	10	18	38	0	0	56	82	361
16:45:00	24	6	0	0	30	2	4	0	0	6	21	36	0	0	57	93	355
17:00:00	18	12	0	0	30	6	4	0	0	10	14	46	0	0	60	100	363
17:15:00	26	12	0	0	38	9	7	0	1	16	18	38	0	0	56	110	385
17:30:00	21	7	0	0	28	11	4	0	0	15	13	39	0	0	52	95	398
17:45:00	16	19	0	0	35	9	7	0	2	16	8	35	0	0	43	94	399
18:00:00	23	11	0	0	34	8	7	0	0	15	11	33	0	0	44	93	392
18:15:00	19	11	0	0	30	8	2	0	0	10	19	33	0	0	52	92	374
18:30:00	22	3	0	0	25	12	5	0	2	17	9	20	0	0	29	71	350
18:45:00	19	6	0	0	25	5	4	0	0	9	12	21	0	0	33	67	323



Grand Total	672	260	1	5	933	258	220	1	10	479	301	721	0	1	1022	2434	-
Approach%	72%	27.9%	0.1%		-	53.9%	45.9%	0.2%		-	29.5%	70.5%	0%		-	-	-
Totals %	27.6%	10.7%	0%		38.3%	10.6%	9%	0%		19.7%	12.4%	29.6%	0%		42%	-	-
Heavy	9	3	0		-	4	4	0		-	2	10	0		-	-	-
Heavy %	1.3%	1.2%	0%		-	1.6%	1.8%	0%		-	0.7%	1.4%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather:

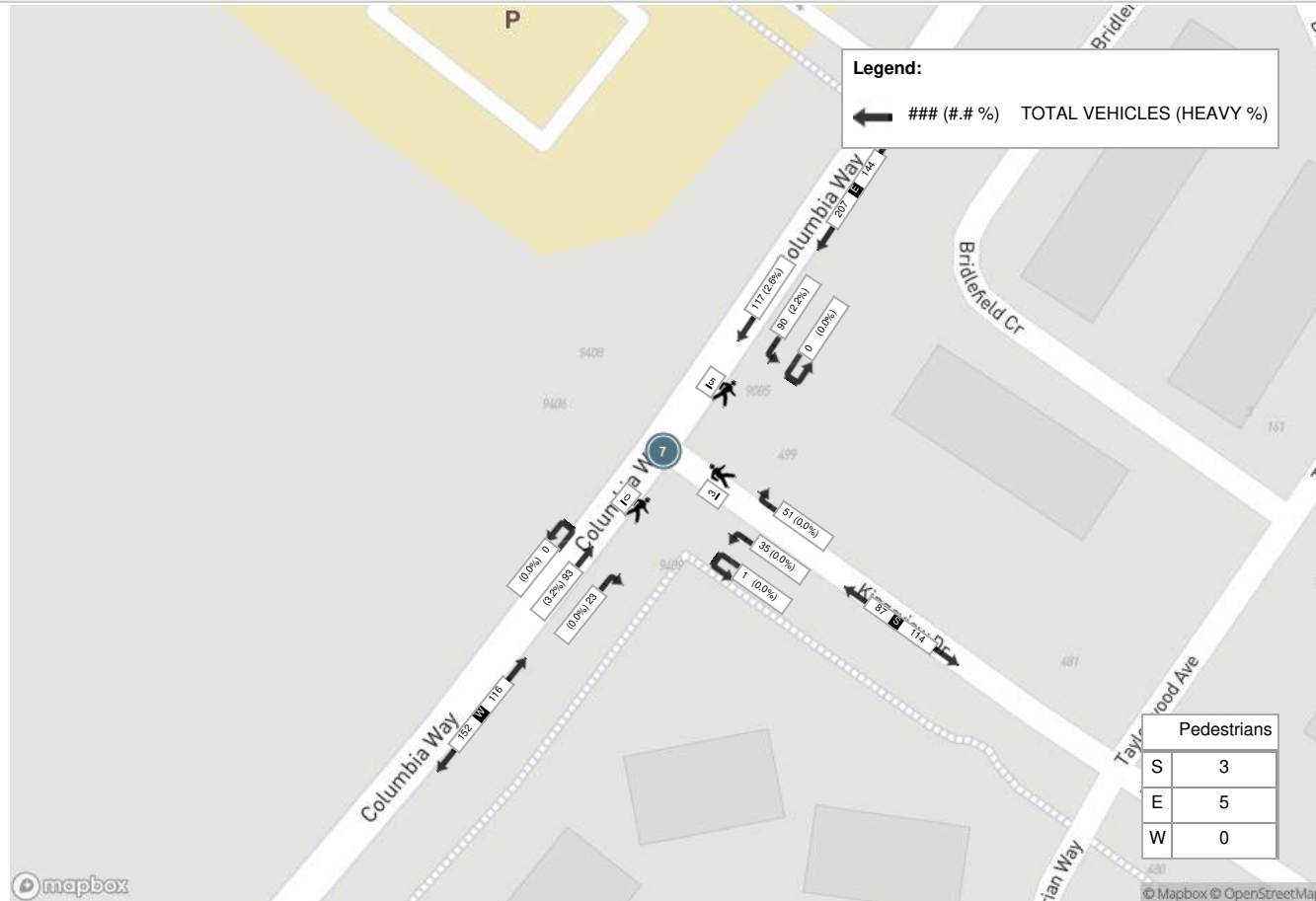
Start Time	E Approach COLUMBIA WAY					S Approach KINGSVIEW DR					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
07:45:00	45	10	0	2	55	4	10	1	2	15	2	26	0	0	28	98
08:00:00	29	34	0	3	63	13	8	0	1	21	4	22	0	0	26	110
08:15:00	25	30	0	0	55	20	9	0	0	29	11	29	0	0	40	124
08:30:00	18	16	0	0	34	14	8	0	0	22	6	16	0	0	22	78
Grand Total	117	90	0	5	207	51	35	1	3	87	23	93	0	0	116	410
Approach%	56.5%	43.5%	0%		-	58.6%	40.2%	1.1%		-	19.8%	80.2%	0%		-	-
Totals %	28.5%	22%	0%		50.5%	12.4%	8.5%	0.2%		21.2%	5.6%	22.7%	0%		28.3%	-
PHF	0.65	0.66	0		0.82	0.64	0.88	0.25		0.75	0.52	0.8	0		0.73	-
Heavy	3	2	0		5	0	0	0		0	0	3	0		3	-
Heavy %	2.6%	2.2%	0%		2.4%	0%	0%	0%		0%	0%	3.2%	0%		2.6%	-
Lights	114	88	0		202	51	35	1		87	23	90	0		113	-
Lights %	97.4%	97.8%	0%		97.6%	100%	100%	100%		100%	100%	96.8%	0%		97.4%	-
Single-Unit Trucks	2	1	0		3	0	0	0		0	0	1	0		1	-
Single-Unit Trucks %	1.7%	1.1%	0%		1.4%	0%	0%	0%		0%	0%	1.1%	0%		0.9%	-
Buses	1	1	0		2	0	0	0		0	0	2	0		2	-
Buses %	0.9%	1.1%	0%		1%	0%	0%	0%		0%	0%	2.2%	0%		1.7%	-
Pedestrians	-	-	-	5	-	-	-	-	3	-	-	-	-	0	-	-
Pedestrians%	-	-	-	62.5%	-	-	-	-	37.5%	-	-	-	-	0%	-	-



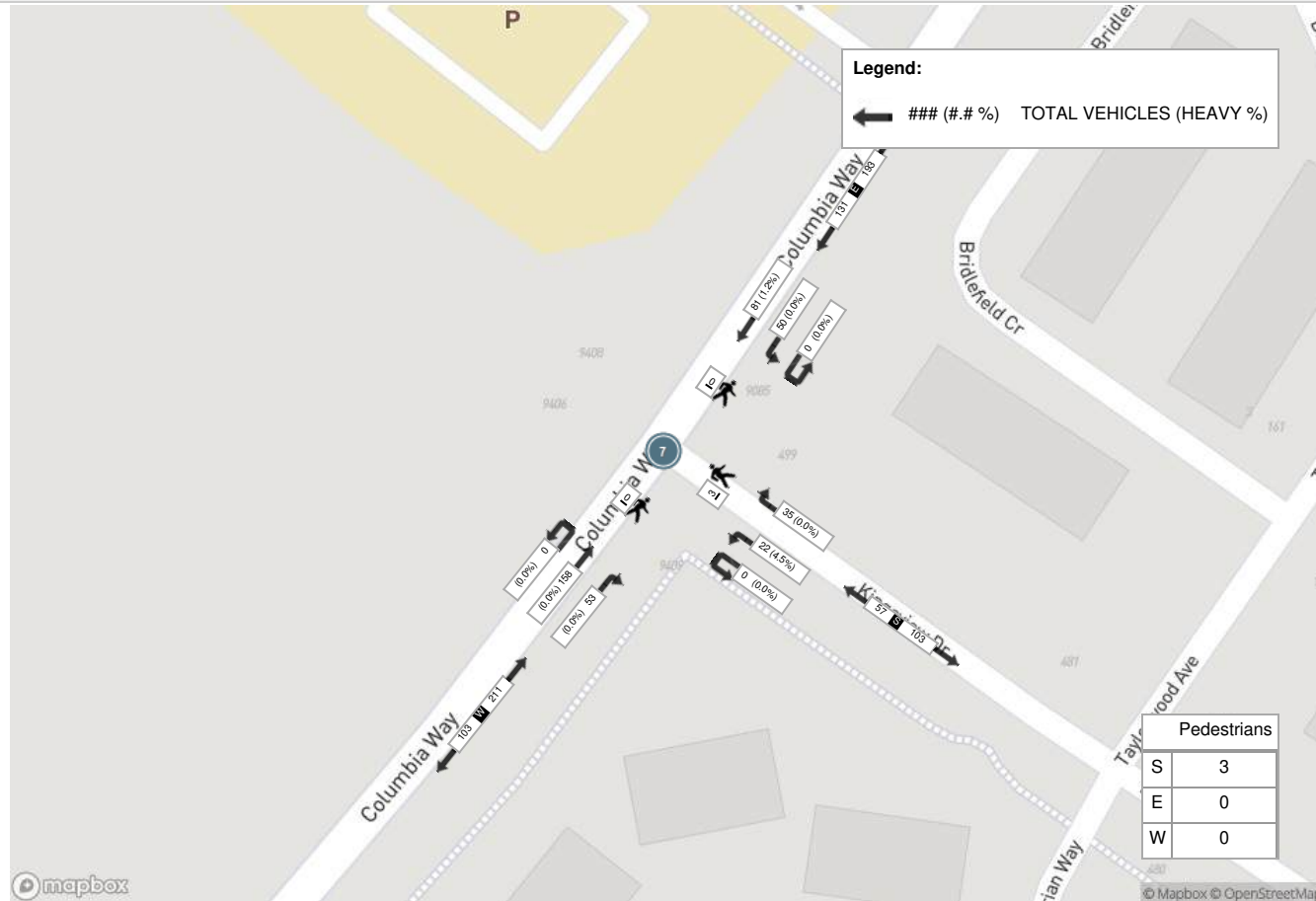
Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (2.15 °C)

Start Time	E Approach COLUMBIA WAY					S Approach KINGSVIEW DR					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
17:00:00	18	12	0	0	30	6	4	0	0	10	14	46	0	0	60	100
17:15:00	26	12	0	0	38	9	7	0	1	16	18	38	0	0	56	110
17:30:00	21	7	0	0	28	11	4	0	0	15	13	39	0	0	52	95
17:45:00	16	19	0	0	35	9	7	0	2	16	8	35	0	0	43	94
Grand Total	81	50	0	0	131	35	22	0	3	57	53	158	0	0	211	399
Approach%	61.8%	38.2%	0%		-	61.4%	38.6%	0%		-	25.1%	74.9%	0%		-	-
Totals %	20.3%	12.5%	0%		32.8%	8.8%	5.5%	0%		14.3%	13.3%	39.6%	0%		52.9%	-
PHF	0.78	0.66	0		0.86	0.8	0.79	0		0.89	0.74	0.86	0		0.88	-
Heavy	1	0	0		1	0	1	0		1	0	0	0		0	-
Heavy %	1.2%	0%	0%		0.8%	0%	4.5%	0%		1.8%	0%	0%	0%		0%	-
Lights	80	50	0		130	35	21	0		56	53	158	0		211	-
Lights %	98.8%	100%	0%		99.2%	100%	95.5%	0%		98.2%	100%	100%	0%		100%	-
Single-Unit Trucks	0	0	0		0	0	0	0		0	0	0	0		0	-
Single-Unit Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Buses	1	0	0		1	0	1	0		1	0	0	0		0	-
Buses %	1.2%	0%	0%		0.8%	0%	4.5%	0%		1.8%	0%	0%	0%		0%	-
Pedestrians	-	-	-	0	-	-	-	-	3	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather:



Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (8 . 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	UTurn E:E	Peds E:	Approach Total	Right S:E	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	UTurn W:W	Peds W:	Approach Total		
06:00:00	10	1	0	0	11	3	11	0	0	14	3	5	0	0	8	33	
06:15:00	10	1	0	0	11	3	6	0	0	9	2	7	0	0	9	29	
06:30:00	8	0	0	0	8	7	9	0	0	16	3	7	0	0	10	34	
06:45:00	19	3	0	0	22	6	13	0	0	19	2	6	0	0	8	49	145
07:00:00	13	3	0	0	16	12	14	0	0	26	3	11	0	0	14	56	168
07:15:00	19	3	0	0	22	12	14	0	0	26	1	8	0	0	9	57	196
07:30:00	26	0	0	0	26	11	17	0	0	28	4	9	0	0	13	67	229
07:45:00	32	8	0	0	40	9	19	0	0	28	7	8	0	0	15	83	263
08:00:00	44	9	0	0	53	13	13	0	0	26	5	11	0	0	16	95	302
08:15:00	37	4	0	0	41	12	19	0	0	31	15	27	0	0	42	114	359
08:30:00	21	3	1	0	25	6	11	0	0	17	9	20	0	0	29	71	363
08:45:00	17	2	0	0	19	4	9	0	0	13	9	12	0	0	21	53	333
09:00:00	12	4	0	0	16	3	11	0	0	14	5	10	0	0	15	45	283
09:15:00	12	1	0	0	13	7	8	0	0	15	4	12	0	0	16	44	213
09:30:00	13	3	0	0	16	2	6	0	0	8	6	12	0	0	18	42	184
09:45:00	12	2	0	0	14	5	9	0	2	14	5	12	0	0	17	45	176
BREAK																	
15:00:00	9	9	0	0	18	4	12	0	0	16	20	40	0	0	60	94	
15:15:00	7	8	0	0	15	8	8	0	0	16	12	15	0	0	27	58	
15:30:00	14	13	0	0	27	6	12	0	0	18	12	19	0	0	31	76	
15:45:00	19	6	0	0	25	8	5	0	0	13	8	34	0	0	42	80	308
16:00:00	11	8	0	0	19	6	5	0	0	11	12	27	0	0	39	69	283
16:15:00	23	10	0	0	33	3	3	0	0	6	16	28	0	0	44	83	308
16:30:00	10	7	0	0	17	8	7	0	1	15	13	31	0	0	44	76	308
16:45:00	15	11	0	0	26	9	13	0	0	22	14	24	0	0	38	86	314
17:00:00	22	12	0	0	34	3	11	0	0	14	24	31	0	0	55	103	348
17:15:00	24	8	0	0	32	4	11	0	0	15	16	30	0	0	46	93	358
17:30:00	22	5	0	0	27	7	7	0	0	14	19	31	0	0	50	91	373
17:45:00	24	9	0	0	33	8	8	0	0	16	15	30	0	0	45	94	381
18:00:00	18	8	0	0	26	1	10	0	0	11	11	23	0	0	34	71	349
18:15:00	21	8	0	0	29	4	11	0	0	15	10	32	0	0	42	86	342
18:30:00	18	9	0	0	27	1	5	0	0	6	11	19	0	0	30	63	314
18:45:00	17	9	0	0	26	2	9	0	2	11	8	20	0	0	28	65	285



Grand Total	579	187	1	0	767	197	326	0	5	523	304	611	0	0	915	2205	-
Approach%	75.5%	24.4%	0.1%		-	37.7%	62.3%	0%		-	33.2%	66.8%	0%		-	-	-
Totals %	26.3%	8.5%	0%		34.8%	8.9%	14.8%	0%		23.7%	13.8%	27.7%	0%		41.5%	-	-
Heavy	8	2	0		-	5	3	0		-	5	6	0		-	-	-
Heavy %	1.4%	1.1%	0%		-	2.5%	0.9%	0%		-	1.6%	1%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather:

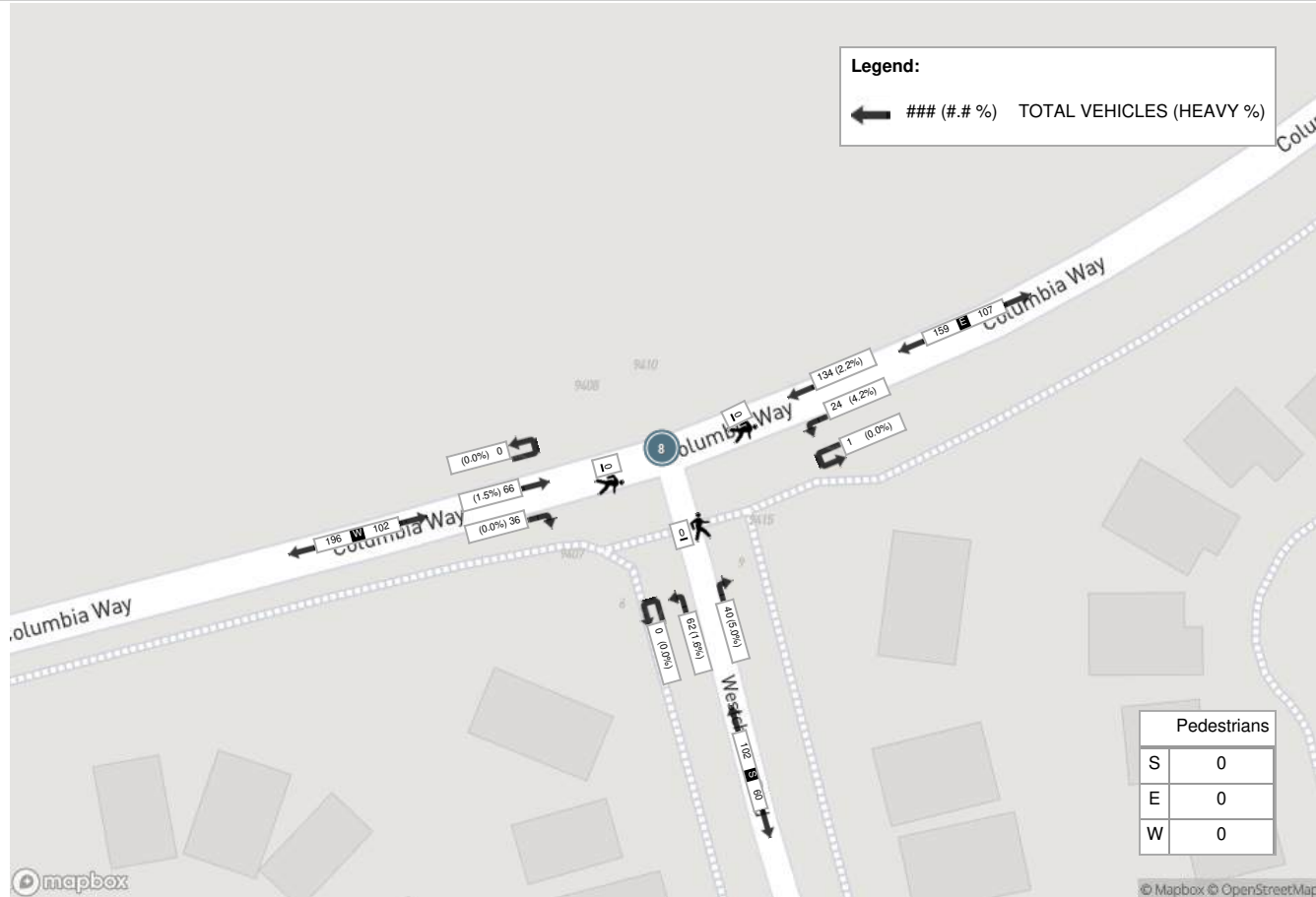
Start Time	E Approach COLUMBIA WAY					S Approach WESTCHESTER BLVD					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
07:45:00	32	8	0	0	40	9	19	0	0	28	7	8	0	0	15	83
08:00:00	44	9	0	0	53	13	13	0	0	26	5	11	0	0	16	95
08:15:00	37	4	0	0	41	12	19	0	0	31	15	27	0	0	42	114
08:30:00	21	3	1	0	25	6	11	0	0	17	9	20	0	0	29	71
Grand Total	134	24	1	0	159	40	62	0	0	102	36	66	0	0	102	363
Approach%	84.3%	15.1%	0.6%		-	39.2%	60.8%	0%		-	35.3%	64.7%	0%		-	-
Totals %	36.9%	6.6%	0.3%		43.8%	11%	17.1%	0%		28.1%	9.9%	18.2%	0%		28.1%	-
PHF	0.76	0.67	0.25		0.75	0.77	0.82	0		0.82	0.6	0.61	0		0.61	-
Heavy	3	1	0		4	2	1	0		3	0	1	0		1	-
Heavy %	2.2%	4.2%	0%		2.5%	5%	1.6%	0%		2.9%	0%	1.5%	0%		1%	-
Lights	131	23	1		155	38	61	0		99	36	65	0		101	-
Lights %	97.8%	95.8%	100%		97.5%	95%	98.4%	0%		97.1%	100%	98.5%	0%		99%	-
Single-Unit Trucks	2	1	0		3	2	0	0		2	0	0	0		0	-
Single-Unit Trucks %	1.5%	4.2%	0%		1.9%	5%	0%	0%		2%	0%	0%	0%		0%	-
Buses	1	0	0		1	0	1	0		1	0	1	0		1	-
Buses %	0.7%	0%	0%		0.6%	0%	1.6%	0%		1%	0%	1.5%	0%		1%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-



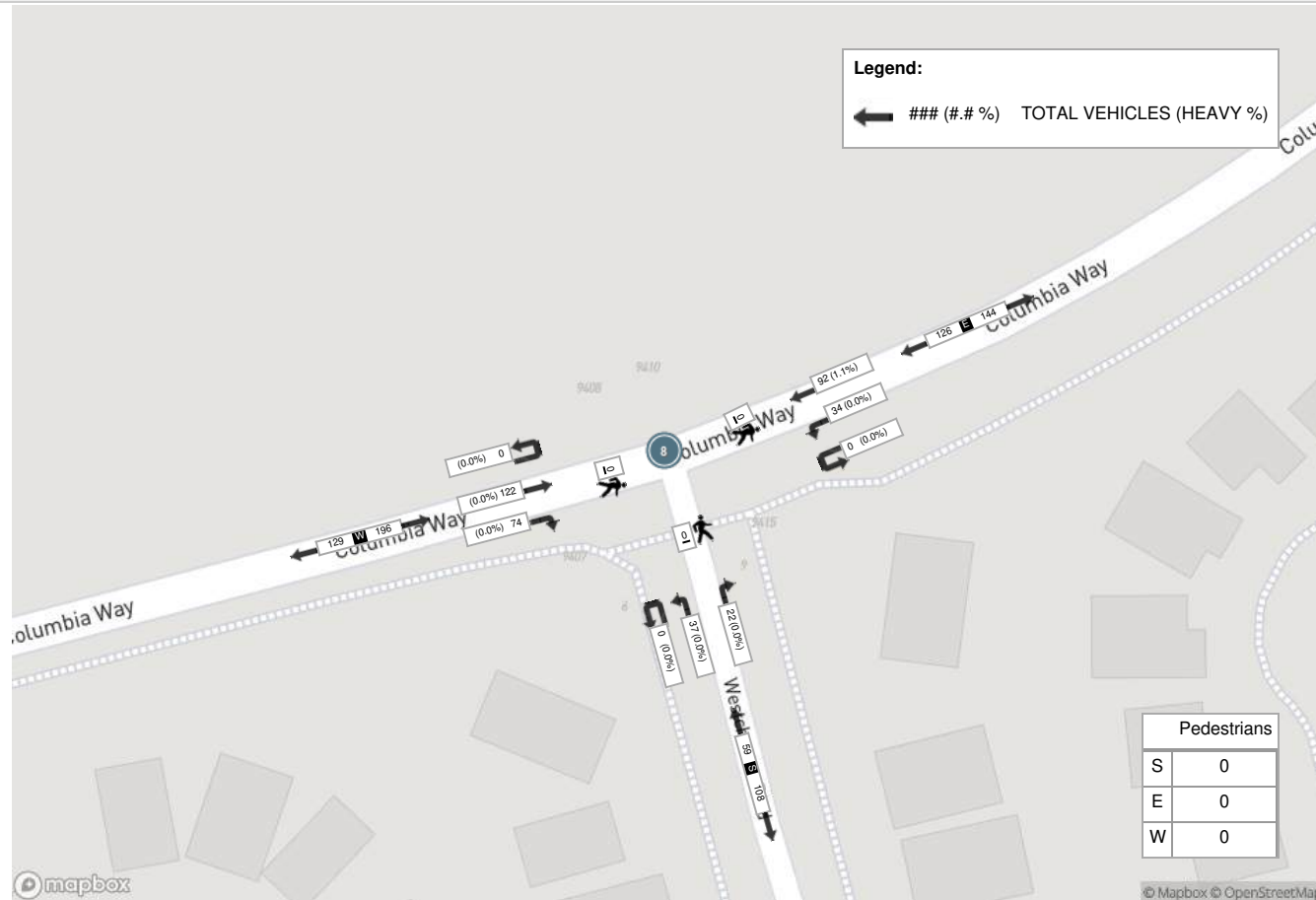
Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (2.15 °C)

Start Time	E Approach COLUMBIA WAY					S Approach WESTCHESTER BLVD					W Approach COLUMBIA WAY					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
17:00:00	22	12	0	0	34	3	11	0	0	14	24	31	0	0	55	103
17:15:00	24	8	0	0	32	4	11	0	0	15	16	30	0	0	46	93
17:30:00	22	5	0	0	27	7	7	0	0	14	19	31	0	0	50	91
17:45:00	24	9	0	0	33	8	8	0	0	16	15	30	0	0	45	94
Grand Total	92	34	0	0	126	22	37	0	0	59	74	122	0	0	196	381
Approach%	73%	27%	0%		-	37.3%	62.7%	0%		-	37.8%	62.2%	0%		-	-
Totals %	24.1%	8.9%	0%		33.1%	5.8%	9.7%	0%		15.5%	19.4%	32%	0%		51.4%	-
PHF	0.96	0.71	0		0.93	0.69	0.84	0		0.92	0.77	0.98	0		0.89	-
Heavy	1	0	0		1	0	0	0		0	0	0	0		0	-
Heavy %	1.1%	0%	0%		0.8%	0%	0%	0%		0%	0%	0%	0%		0%	-
Lights	91	34	0		125	22	37	0		59	74	122	0		196	-
Lights %	98.9%	100%	0%		99.2%	100%	100%	0%		100%	100%	100%	0%		100%	-
Single-Unit Trucks	0	0	0		0	0	0	0		0	0	0	0		0	-
Single-Unit Trucks %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Buses	1	0	0		1	0	0	0		0	0	0	0		0	-
Buses %	1.1%	0%	0%		0.8%	0%	0%	0%		0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather:



Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (9 . COLUMBIA WAY & MOUNT 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	UTurn N-N	Peds N:	Approach Total	Right E-N	Thru E-W	Left E-S	UTurn E-E	Peds E:	Approach Total	Right S-E	Thru S-N	Left S-W	UTurn S-S	Peds S:	Approach Total	Right W-S	Thru W-E	Left W-N	UTurn W-W	Peds W:	Approach Total			
06:00:00	0	0	1	1	0	2	0	6	0	0	0	6	2	0	3	0	0	5	0	6	1	0	0	7	20		
06:15:00	1	1	2	0	0	4	1	8	0	0	0	9	3	0	2	0	0	5	0	8	2	0	0	10	28		
06:30:00	0	0	1	0	0	1	0	7	1	0	0	8	4	2	1	0	0	7	1	12	0	0	0	13	29		
06:45:00	7	0	2	0	0	9	5	12	0	0	0	17	2	0	3	0	0	5	1	7	5	0	0	13	44	121	
07:00:00	3	0	1	0	0	4	1	9	0	0	0	10	3	1	4	0	0	8	2	17	3	0	0	22	44	145	
07:15:00	7	0	4	0	0	11	2	13	0	0	0	15	8	1	2	0	0	11	0	16	5	0	0	21	58	175	
07:30:00	4	1	2	0	0	7	0	18	0	0	0	18	3	4	4	0	0	11	1	15	4	0	0	20	56	202	
07:45:00	10	0	5	0	1	15	1	25	0	0	2	26	4	0	4	0	0	8	0	15	1	0	1	16	65	223	
08:00:00	16	0	4	0	0	20	0	29	1	0	0	30	1	1	8	0	0	10	0	19	5	1	0	25	85	264	
08:15:00	9	1	5	0	0	15	2	22	0	0	0	24	6	1	10	0	0	17	5	22	9	1	0	37	93	299	
08:30:00	8	2	3	0	0	13	4	12	1	0	0	17	0	2	3	0	0	5	5	17	5	0	0	27	62	305	
08:45:00	4	1	1	0	0	6	0	14	1	0	0	15	4	1	1	0	3	6	1	14	1	0	0	16	43	283	
09:00:00	4	1	2	0	0	7	2	8	0	0	0	10	1	2	4	0	0	7	1	11	1	0	0	13	37	235	
09:15:00	4	0	1	0	0	5	2	8	0	0	0	10	1	0	1	0	1	2	0	12	7	0	0	19	36	178	
09:30:00	4	0	3	0	0	7	0	9	2	0	0	11	1	0	3	0	1	4	4	7	3	0	0	14	36	152	
09:45:00	4	0	3	0	0	7	0	10	0	0	0	10	7	2	1	0	1	10	1	12	4	0	0	17	44	153	
BREAK																											
15:00:00	2	0	3	0	0	5	1	15	0	1	0	17	2	0	1	0	1	3	6	28	11	0	0	45	70		
15:15:00	2	1	4	0	0	7	2	13	3	0	0	18	1	0	0	0	2	1	1	16	6	0	2	23	49		
15:30:00	2	1	4	0	0	7	4	24	4	0	0	32	2	0	2	0	0	4	3	16	6	0	0	25	68		
15:45:00	4	5	2	0	0	11	3	17	5	0	0	25	3	0	4	0	0	7	8	29	5	0	0	42	85	272	
16:00:00	2	3	2	0	0	7	2	14	3	0	0	19	5	1	2	0	1	8	5	23	6	0	0	34	68	270	
16:15:00	3	1	1	0	0	5	1	28	1	0	0	30	1	1	3	0	2	5	6	18	5	0	0	29	69	290	
16:30:00	4	0	0	0	0	4	1	12	4	0	0	17	1	0	1	0	1	2	5	31	5	0	0	41	64	286	
16:45:00	8	1	1	0	0	10	1	16	5	0	0	22	6	0	3	0	0	9	5	25	3	0	0	33	74	275	
17:00:00	8	4	3	0	0	15	1	17	2	0	0	20	3	1	1	0	0	5	6	26	3	0	0	35	75	282	
17:15:00	8	1	4	0	0	13	1	19	6	0	0	26	1	1	5	0	0	7	6	24	4	0	0	34	80	293	
17:30:00	3	0	2	0	0	5	2	19	5	0	0	26	2	1	6	0	0	9	5	29	3	0	0	37	77	306	
17:45:00	5	1	4	0	0	10	1	26	3	0	0	30	1	1	2	0	0	4	10	21	8	0	0	39	83	315	
18:00:00	1	0	1	0	0	2	1	21	6	0	0	28	1	2	2	0	1	5	3	19	3	0	0	25	60	300	
18:15:00	8	1	0	0	0	9	4	17	3	0	0	24	2	1	4	0	0	7	7	25	4	0	0	36	76	296	
18:30:00	5	1	1	0	0	7	2	17	2	0	0	21	1	0	5	0	1	6	2	15	3	0	0	20	54	273	
18:45:00	6	0	1	0	0	7	5	17	3	0	0	25	3	1	3	0	2	7	2	17	3	0	0	22	61	251	
Grand Total	156	27	73	1	1	257	52	502	61	1	2	616	85	27	98	0	17	210	102	572	134	2	3	810	1893	-	
Approach%	60.7%	10.5%	28.4%	0.4%		-	8.4%	81.5%	9.9%	0.2%		-	40.5%	12.9%	46.7%	0%		-	12.6%	70.6%	16.5%	0.2%		-	-	-	
Totals %	8.2%	1.4%	3.9%	0.1%		13.6%	2.7%	26.5%	3.2%	0.1%		32.5%	4.5%	1.4%	5.2%	0%		11.1%	5.4%	30.2%	7.1%	0.1%		42.8%	-	-	
Heavy	2	1	1	1		-	2	7	0	0		-	1	0	0	0		-	0	8	3	0		-	-	-	
Heavy %	1.3%	3.7%	1.4%	100%		-	3.8%	1.4%	0%	0%		-	1.2%	0%	0%	0%		-	0%	1.4%	2.2%	0%		-	-	-	
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	



Peak Hour: 07:45 AM - 08:45 AM Weather:

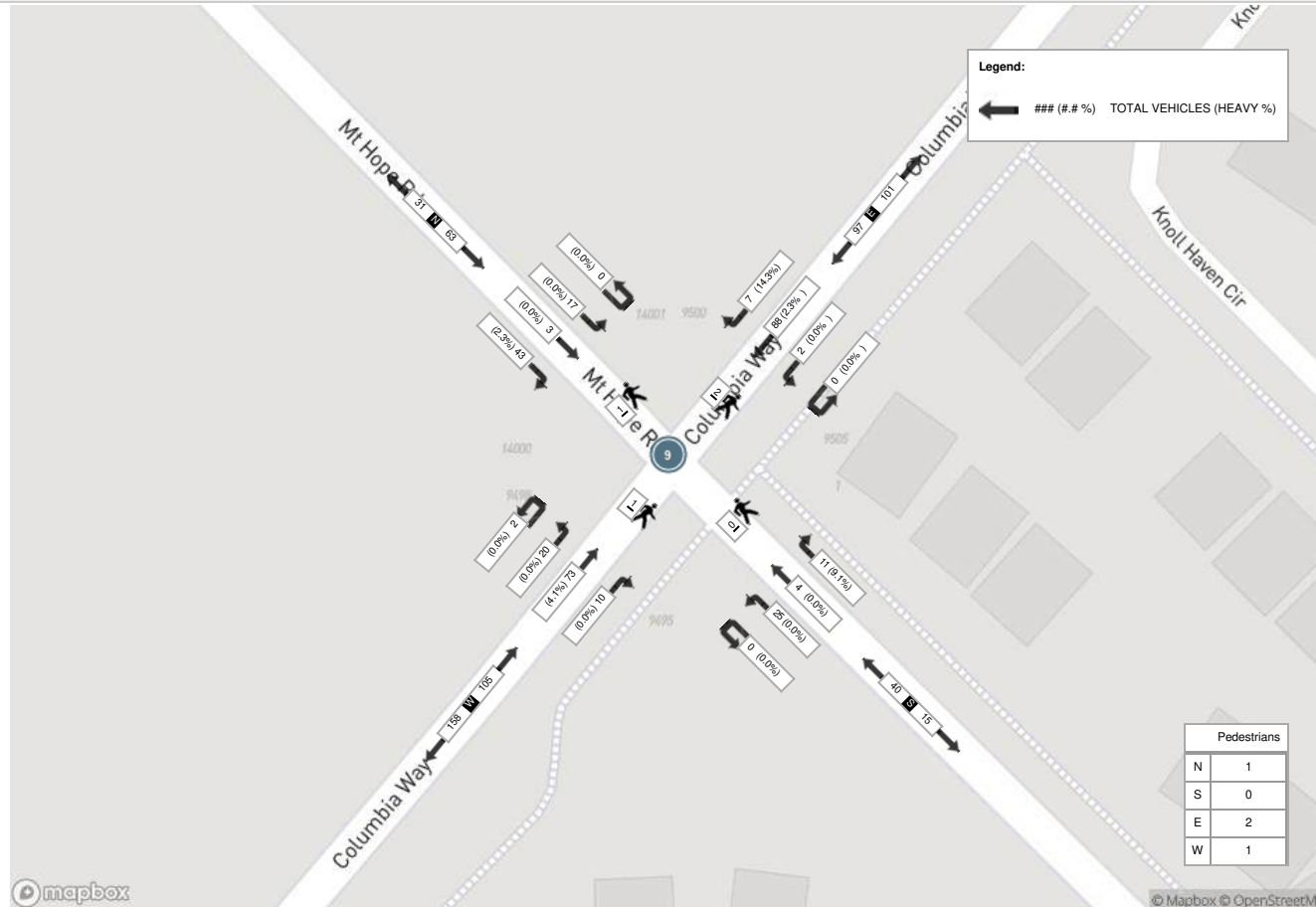
Start Time	N Approach MT HOPE RD						E Approach COLUMBIA WAY						S Approach MT HOPE RD						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:45:00	10	0	5	0	1	15	1	25	0	0	2	26	4	0	4	0	0	8	0	15	1	0	1	16	65
08:00:00	16	0	4	0	0	20	0	29	1	0	0	30	1	1	8	0	0	10	0	19	5	1	0	25	85
08:15:00	9	1	5	0	0	15	2	22	0	0	0	24	6	1	10	0	0	17	5	22	9	1	0	37	93
08:30:00	8	2	3	0	0	13	4	12	1	0	0	17	0	2	3	0	0	5	5	17	5	0	0	27	62
Grand Total	43	3	17	0	1	63	7	88	2	0	2	97	11	4	25	0	0	40	10	73	20	2	1	105	305
Approach%	68.3%	4.8%	27%	0%		-	7.2%	90.7%	2.1%	0%		-	27.5%	10%	62.5%	0%		-	9.5%	69.5%	19%	1.9%		-	-
Totals %	14.1%	1%	5.6%	0%		20.7%	2.3%	28.9%	0.7%	0%		31.8%	3.6%	1.3%	8.2%	0%		13.1%	3.3%	23.9%	6.6%	0.7%		34.4%	-
PHF	0.67	0.38	0.85	0		0.79	0.44	0.76	0.5	0		0.81	0.46	0.5	0.63	0		0.59	0.5	0.83	0.56	0.5		0.71	-
Heavy	1	0	0	0		1	1	2	0	0		3	1	0	0	0		1	0	3	0	0		3	-
Heavy %	2.3%	0%	0%	0%		1.6%	14.3%	2.3%	0%	0%		3.1%	9.1%	0%	0%	0%		2.5%	0%	4.1%	0%	0%		2.9%	-
Lights	42	3	17	0		62	6	86	2	0		94	10	4	25	0		39	10	70	20	2		102	-
Lights %	97.7%	100%	100%	0%		98.4%	85.7%	97.7%	100%	0%		96.9%	90.9%	100%	100%	0%		97.5%	100%	95.9%	100%	100%		97.1%	-
Single-Unit Trucks	0	0	0	0		0	1	2	0	0		3	1	0	0	0		1	0	2	0	0		2	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	14.3%	2.3%	0%	0%		3.1%	9.1%	0%	0%	0%		2.5%	0%	2.7%	0%	0%		1.9%	-
Buses	1	0	0	0		1	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
Buses %	2.3%	0%	0%	0%		1.6%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	1.4%	0%	0%		1%	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	1	-	-
Pedestrians%	-	-	-	-	25%	-	-	-	-	-	50%	-	-	-	-	-	0%	-	-	-	-	-	25%	-	-



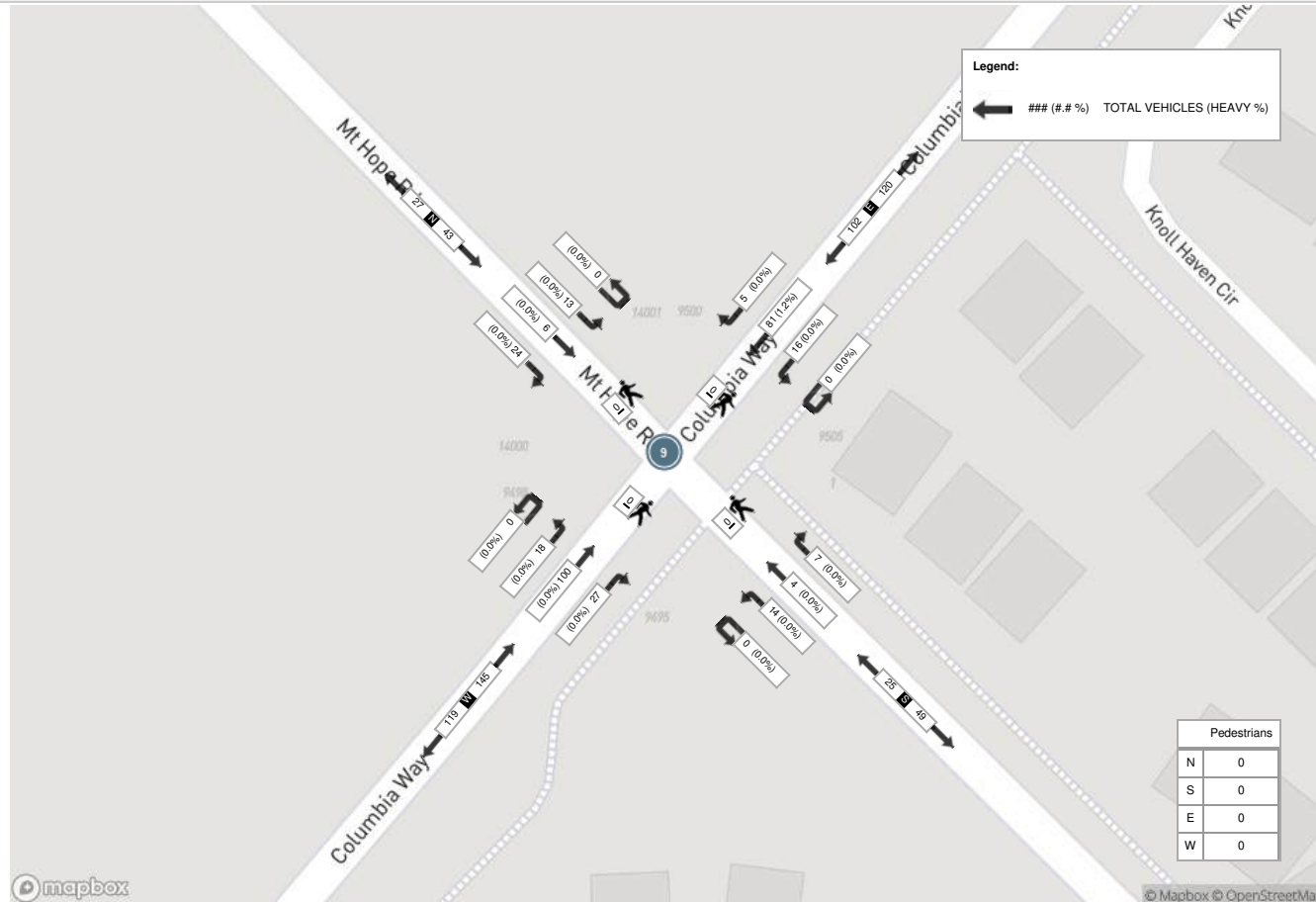
Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (2.15 °C)

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	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
17:00:00	8	4	3	0	0	15	1	17	2	0	0	20	3	1	1	0	0	5	6	26	3	0	0	35	75
17:15:00	8	1	4	0	0	13	1	19	6	0	0	26	1	1	5	0	0	7	6	24	4	0	0	34	80
17:30:00	3	0	2	0	0	5	2	19	5	0	0	26	2	1	6	0	0	9	5	29	3	0	0	37	77
17:45:00	5	1	4	0	0	10	1	26	3	0	0	30	1	1	2	0	0	4	10	21	8	0	0	39	83
Grand Total	24	6	13	0	0	43	5	81	16	0	0	102	7	4	14	0	0	25	27	100	18	0	0	145	315
Approach%	55.8%	14%	30.2%	0%		-	4.9%	79.4%	15.7%	0%		-	28%	16%	56%	0%		-	18.6%	69%	12.4%	0%		-	-
Totals %	7.6%	1.9%	4.1%	0%		13.7%	1.6%	25.7%	5.1%	0%		32.4%	2.2%	1.3%	4.4%	0%		7.9%	8.6%	31.7%	5.7%	0%		46%	-
PHF	0.75	0.38	0.81	0		0.72	0.63	0.78	0.67	0		0.85	0.58	1	0.58	0		0.69	0.68	0.86	0.56	0		0.93	-
Heavy	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	0	0	0		0	-
Heavy %	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Lights	24	6	13	0		43	5	80	16	0		101	7	4	14	0		25	27	100	18	0		145	-
Lights %	100%	100%	100%	0%		100%	100%	98.8%	100%	0%		99%	100%	100%	100%	0%		100%	100%	100%	100%	0%		100%	-
Single-Unit Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Single-Unit Trucks %	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	1	0	0		1	0	0	0	0		0	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		1%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather:



Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (2.15 °C)





Turning Movement Count (10 . COLUMBIA WAY & CALEDON KING TOWNLIN)

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	UTurn N-N	Peds N:	Approach Total	Right E-N	Thru E-W	Left E-S	UTurn E-E	Peds E:	Approach Total	Right S-E	Thru S-N	Left S-W	UTurn S-S	Peds S:	Approach Total	Right W-S	Thru W-E	Left W-N	UTurn W-W	Peds W:	Approach Total			
06:00:00	2	66	0	0	0	68	0	0	0	0	0	0	0	18	3	0	0	21	19	0	3	0	0	22	111		
06:15:00	0	67	0	1	0	68	0	0	0	0	0	0	0	13	3	0	0	16	22	0	3	0	0	25	109		
06:30:00	0	81	0	0	0	81	0	0	0	0	0	0	0	19	2	0	0	21	30	0	3	0	0	33	135		
06:45:00	2	120	0	0	0	122	0	0	0	0	0	0	0	23	2	0	0	25	23	0	3	0	0	26	173	528	
07:00:00	3	84	0	0	0	87	0	0	0	0	0	0	0	24	1	0	0	25	39	0	6	0	0	45	157	574	
07:15:00	0	109	0	0	0	109	0	0	0	0	0	0	0	21	3	0	0	24	55	0	2	0	0	57	190	655	
07:30:00	1	127	0	0	0	128	0	0	0	0	0	0	0	32	4	0	0	36	38	0	4	0	0	42	206	726	
07:45:00	4	110	0	0	0	114	0	0	0	0	0	0	0	16	4	0	0	20	48	0	2	0	0	50	184	737	
08:00:00	2	117	0	0	0	119	0	0	0	0	0	0	0	23	12	0	0	35	38	0	1	0	0	39	193	773	
08:15:00	4	111	0	0	0	115	0	0	0	0	0	0	0	31	11	0	0	42	34	0	3	0	0	37	194	777	
08:30:00	1	97	0	0	0	98	0	0	0	0	0	0	0	28	5	0	0	33	27	0	6	0	0	33	164	735	
08:45:00	1	77	0	0	0	78	0	0	0	0	0	0	0	27	9	0	0	36	26	0	2	0	0	28	142	693	
09:00:00	0	65	0	0	0	65	0	0	1	0	0	1	0	31	9	0	0	40	17	0	2	0	0	19	125	625	
09:15:00	2	56	0	0	0	58	0	0	0	0	0	0	0	19	11	0	0	30	15	0	0	0	0	15	103	534	
09:30:00	2	55	0	0	0	57	0	0	0	0	0	0	0	24	4	0	0	28	10	0	1	0	0	11	96	466	
09:45:00	1	62	0	0	0	63	0	0	0	0	0	0	0	23	4	0	0	27	22	0	5	0	0	27	117	441	
BREAK																											
15:00:00	1	40	0	0	0	41	0	0	0	0	0	0	0	84	19	0	0	103	16	0	4	0	0	20	164		
15:15:00	5	45	0	0	0	50	0	0	0	0	0	0	0	87	24	0	0	111	13	0	3	0	0	16	177		
15:30:00	4	40	0	0	0	44	0	0	0	0	0	0	0	85	35	0	0	120	15	0	2	0	0	17	181		
15:45:00	2	52	0	0	0	54	0	0	0	0	0	0	0	108	23	0	0	131	21	0	6	0	0	27	212	734	
16:00:00	10	35	0	0	0	45	0	0	0	0	0	0	0	84	26	0	0	110	18	0	5	0	0	23	178	748	
16:15:00	6	41	0	0	0	47	0	0	0	0	0	0	0	113	31	0	0	144	11	0	5	0	0	16	207	778	
16:30:00	6	43	0	0	0	49	0	0	0	0	0	0	0	110	26	0	0	136	15	0	2	0	0	17	202	799	
16:45:00	3	57	0	0	0	60	0	0	0	0	0	0	0	99	29	0	0	128	20	0	1	0	0	21	209	796	
17:00:00	6	45	0	0	0	51	0	0	0	0	0	0	0	109	31	0	0	140	20	0	4	0	0	24	215	833	
17:15:00	4	28	0	0	0	32	0	0	0	0	0	0	0	109	36	0	0	145	23	0	1	0	0	24	201	827	
17:30:00	5	41	0	0	0	46	0	0	0	0	0	0	0	114	29	1	0	144	15	0	0	0	0	15	205	830	
17:45:00	4	40	0	0	0	44	0	0	0	0	0	0	0	104	30	0	0	134	18	0	3	0	0	21	199	820	
18:00:00	4	24	0	0	0	28	0	0	0	0	0	0	0	73	27	0	0	100	8	0	5	0	0	13	141	746	
18:15:00	1	26	0	0	0	27	0	0	0	0	0	0	0	73	23	0	0	96	12	0	2	0	0	14	137	682	
18:30:00	5	31	0	0	0	36	0	0	0	0	0	0	1	71	17	0	0	89	9	0	1	0	0	10	135	612	
18:45:00	1	21	0	0	0	22	0	0	0	0	0	0	0	69	25	0	0	94	16	0	3	0	0	19	135	548	
Grand Total	92	2013	0	1	0	2106	0	0	1	0	0	1	1	1864	518	1	0	2384	713	0	93	0	0	806	5297	-	
Approach%	4.4%	95.6%	0%	0%		-	0%	0%	100%	0%		-	0%	78.2%	21.7%	0%		-	88.5%	0%	11.5%	0%		-	-	-	
Totals %	1.7%	38%	0%	0%		39.8%	0%	0%	0%	0%		0%	0%	35.2%	9.8%	0%		45%	13.5%	0%	1.8%	0%		15.2%	-	-	
Heavy	1	19	0	1		-	0	0	0	0		-	0	33	7	0		-	4	0	2	0		-	-	-	
Heavy %	1.1%	0.9%	0%	100%		-	0%	0%	0%	0%		-	0%	1.8%	1.4%	0%		-	0.6%	0%	2.2%	0%		-	-	-	
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	



Peak Hour: 07:30 AM - 08:30 AM Weather:

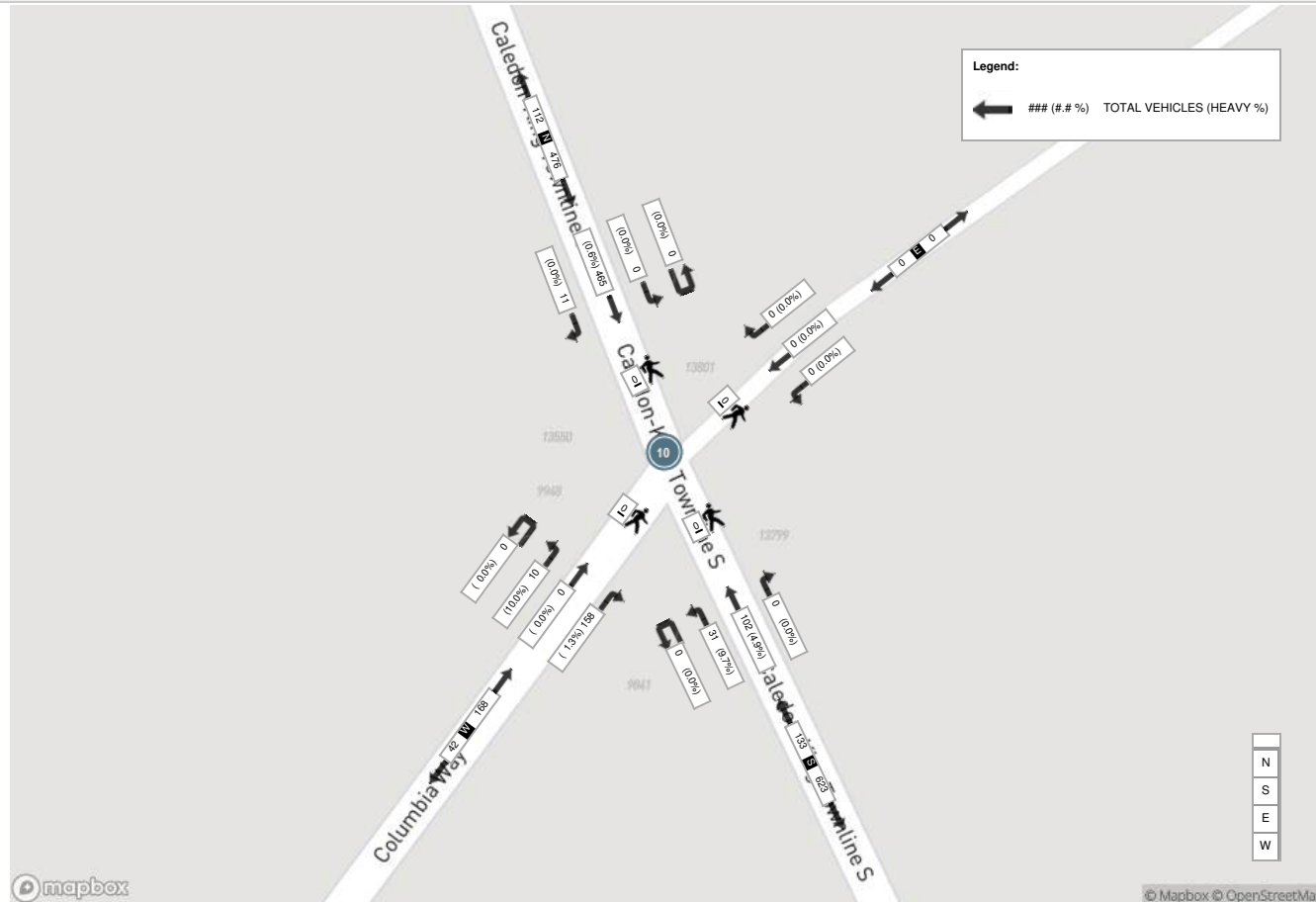
Start Time	N Approach CALEDON KING TOWNLIN						E Approach DUSTY ROAD						S Approach CALEDON KING TOWNLIN						W Approach COLUMBIA WAY						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	1	127	0	0	0	128	0	0	0	0	0	0	0	32	4	0	0	36	38	0	4	0	0	42	206
07:45:00	4	110	0	0	0	114	0	0	0	0	0	0	0	16	4	0	0	20	48	0	2	0	0	50	184
08:00:00	2	117	0	0	0	119	0	0	0	0	0	0	0	23	12	0	0	35	38	0	1	0	0	39	193
08:15:00	4	111	0	0	0	115	0	0	0	0	0	0	0	31	11	0	0	42	34	0	3	0	0	37	194
Grand Total	11	465	0	0	0	476	0	0	0	0	0	0	0	102	31	0	0	133	158	0	10	0	0	168	777
Approach%	2.3%	97.7%	0%	0%		-	0%	0%	0%	0%		-	0%	76.7%	23.3%	0%		-	94%	0%	6%	0%		-	-
Totals %	1.4%	59.8%	0%	0%		61.3%	0%	0%	0%	0%		0%	0%	13.1%	4%	0%		17.1%	20.3%	0%	1.3%	0%		21.6%	-
PHF	0.69	0.92	0	0		0.93	0	0	0	0		0	0	0.8	0.65	0		0.79	0.82	0	0.63	0		0.84	-
Heavy	0	3	0	0		3	0	0	0	0		0	0	5	3	0		8	2	0	1	0		3	-
Heavy %	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	4.9%	9.7%	0%		6%	1.3%	0%	10%	0%		1.8%	-
Lights	11	462	0	0		473	0	0	0	0		0	0	97	28	0		125	156	0	9	0		165	-
Lights %	100%	99.4%	0%	0%		99.4%	0%	0%	0%	0%		0%	0%	95.1%	90.3%	0%		94%	98.7%	0%	90%	0%		98.2%	-
Single-Unit Trucks	0	3	0	0		3	0	0	0	0		0	0	2	3	0		5	1	0	1	0		2	-
Single-Unit Trucks %	0%	0.6%	0%	0%		0.6%	0%	0%	0%	0%		0%	0%	2%	9.7%	0%		3.8%	0.6%	0%	10%	0%		1.2%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	1	0	0	0		1	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	1%	0%	0%		0.8%	0.6%	0%	0%	0%		0.6%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	2	0	0		2	0	0	0	0		0	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	2%	0%	0%		1.5%	0%	0%	0%	0%		0%	-



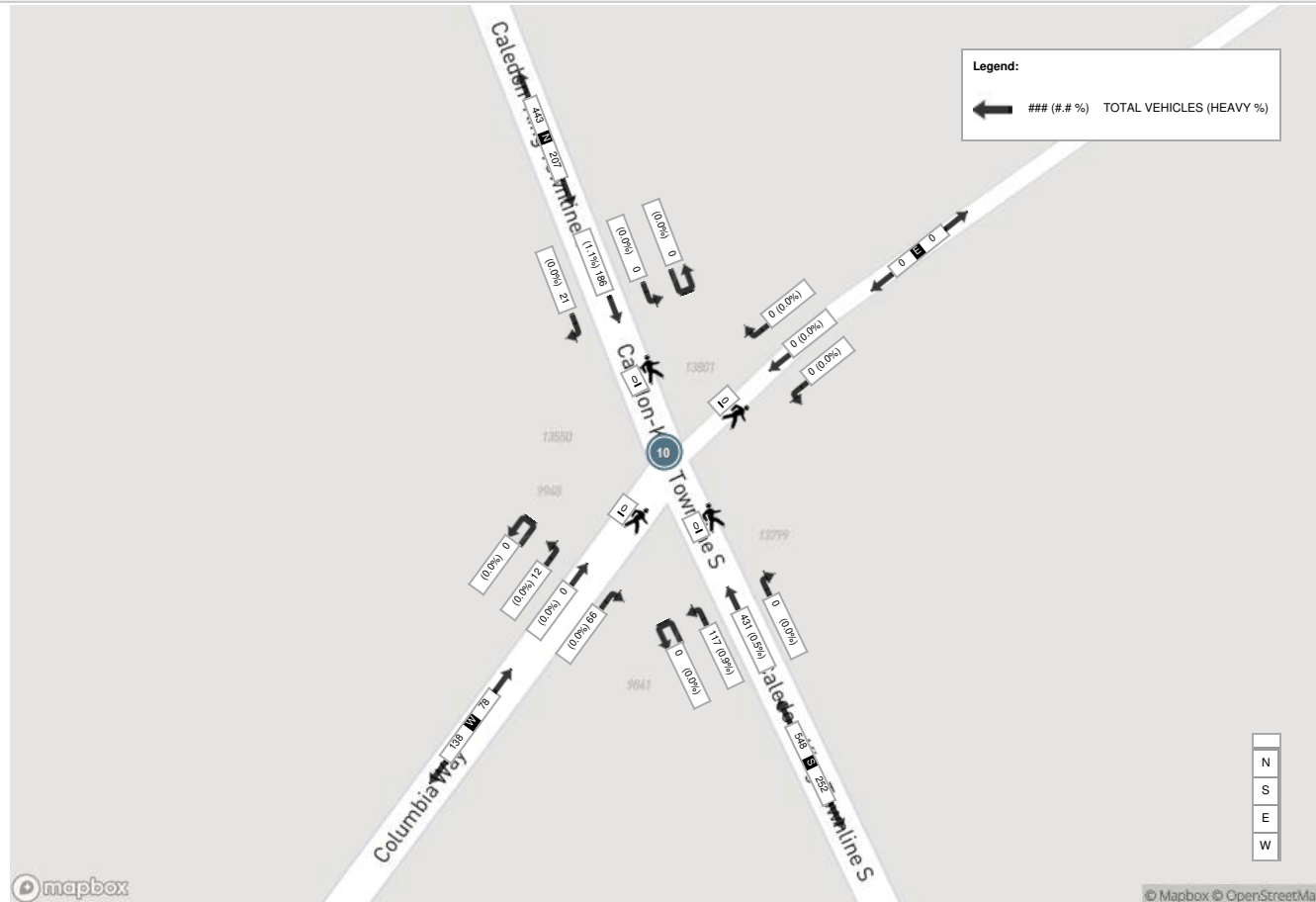
Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (2.15 °C)

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	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:15:00	6	41	0	0	0	47	0	0	0	0	0	0	0	113	31	0	0	144	11	0	5	0	0	16	207
16:30:00	6	43	0	0	0	49	0	0	0	0	0	0	0	110	26	0	0	136	15	0	2	0	0	17	202
16:45:00	3	57	0	0	0	60	0	0	0	0	0	0	0	99	29	0	0	128	20	0	1	0	0	21	209
17:00:00	6	45	0	0	0	51	0	0	0	0	0	0	0	109	31	0	0	140	20	0	4	0	0	24	215
Grand Total	21	186	0	0	0	207	0	0	0	0	0	0	0	431	117	0	0	548	66	0	12	0	0	78	833
Approach%	10.1%	89.9%	0%	0%		-	0%	0%	0%	0%		-	0%	78.6%	21.4%	0%		-	84.6%	0%	15.4%	0%		-	-
Totals %	2.5%	22.3%	0%	0%		24.8%	0%	0%	0%	0%		0%	0%	51.7%	14%	0%		65.8%	7.9%	0%	1.4%	0%		9.4%	-
PHF	0.88	0.82	0	0		0.86	0	0	0	0		0	0	0.95	0.94	0		0.95	0.83	0	0.6	0		0.81	-
Heavy	0	2	0	0		2	0	0	0	0		0	0	2	1	0		3	0	0	0	0		0	-
Heavy %	0%	1.1%	0%	0%		1%	0%	0%	0%	0%		0%	0%	0.5%	0.9%	0%		0.5%	0%	0%	0%	0%		0%	-
Lights	21	184	0	0		205	0	0	0	0		0	0	429	116	0		545	66	0	12	0		78	-
Lights %	100%	98.9%	0%	0%		99%	0%	0%	0%	0%		0%	0%	99.5%	99.1%	0%		99.5%	100%	0%	100%	0%		100%	-
Single-Unit Trucks	0	2	0	0		2	0	0	0	0		0	0	2	1	0		3	0	0	0	0		0	-
Single-Unit Trucks %	0%	1.1%	0%	0%		1%	0%	0%	0%	0%		0%	0%	0.5%	0.9%	0%		0.5%	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	-
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%	-

Peak Hour: 07:30 AM - 08:30 AM Weather:



Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (2.15 °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 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	May 28, 2024		Prepared Date	May 29, 2024
Database Rev	iNet		Completed By	N.R.L
Timing Card / Field rev	4		Checked By	S.A

Location	Columbia Way and Kingsview Drive								
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Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	OFF MAX	PM MAX
1	Not In Used	-	-	-	-	-	-	-	-
2	Columbia Way - Eastbound	8	8	7	4	2	70	43	43
3	Not In Used	-	-	-	-	-	-	-	-
4	Kingsview Drive - Northbound	8	8	7	4	2.9	30	31.9	31.9
5	Not In Used	-	-	-	-	-	-	-	-
6	Columbia Way - Westbound	8	8	7	4	2	70	43	43
7	Not In Used	-	-	-	-	-	-	-	-
8	Kingsview Drive - Ped Only (S/B Computer Phase)	8	8	7	4	2.9	30	31.9	31.9

System Control Yes Semi-Actuated Mode Yes	TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
	06:00 - 09:00	AM	100	0
	09:00 - 15:00	OFF	FREE	0
	15:00 - 00:00	PM	FREE	0

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	June 3, 2024		Prepared Date	June 3, 2024
Database Rev	iNET		Completed By	N.R.L
Timing Card / Field rev	8		Checked By	S.A

Location	Highway 50 and Bolton Heights Road / Cross Country Boulevard								
Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Not In Use	-	-	-	-	-	-	-	-
2	Highway 50 - Northbound / Southbound	10	10	18	4	2.7	45	45	60
3	Bolton Heights Road - WBLT Prot. Perm.	5	-	0	3	0	15	15	0
4	Bolton Heights Road/Cross Country Boulevard-EB/WB	10	10	29	4	4.1	60	50	50
5	Not In Use	-	-	-	-	-	-	-	-
6	Not In Use	-	-	-	-	-	-	-	-
7	Not In Use	-	-	-	-	-	-	-	-
8	Not In Use	-	-	-	-	-	-	-	-

System Control Yes Semi-Actuated Mode Yes	TIME (M-F)		PEAK	CYCLE LENGTH (s)	OFFSET (s)
	06:00 - 09:00		AM	120	39
	09:00 - 14:00		OFF	110	96
	14:00 - 16:00		PM	110	96

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	June 3, 2024		Prepared Date	June 3, 2024
Database Rev	iNET		Completed By	N.R.L
Timing Card / Field rev	43		Checked By	S.A

Location	King Street and Highway 50								
----------	----------------------------	--	--	--	--	--	--	--	--

Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Highway 50 - NBLT Prot. Perm.	5	0	0	3	0	8	12	22
2	Highway 50 -Southbound	10	10	15	4	3	62	46	55
3	King Street - EBLT Prot. Perm.	5	0	0	3	0	11	10	15
4	King Street - Westbound	10	10	15	4	2.9	39	42	48
5	Highway 50 - SBLT Prot. Perm.	5	0	0	3	0	11	10	10
6	Highway 50 - Northbound	10	10	15	4	3	59	48	67
7	King Street - WBLT Prot. Perm.	5	0	0	3	0	18	20	30
8	King Street - Eastbound	10	10	15	4	2.9	32	32	33

System Control Yes Semi-Actuated Mode No	TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
	06:00 - 09:00	AM	120	115
	09:00 - 14:00	OFF	110	24
	14:00 - 20:00	PM	140	62

APPENDIX E

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

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 F

Detailed Capacity Analysis Worksheets

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821.26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:12:08 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2024 Existing Traffic							
Emil Kolb Pkwy (North)	0.10	0.41	0.68	N/A	A	0.73	A
Emil Kolb Pkwy (South)	0.06	~1	0.71	N/A	A		
King Street	0.10	0.40	0.78	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 2:12:08 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	682984923	3625

(Default Analysis Set) - 2024 Existing Traffic, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2024 Existing Traffic, AM	2024 Existing Traffic	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	0,73	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0,00	99999,00
Emil Kolb Pkwy (North)	1	2		Infinity	0,00	99999,00
Emil Kolb Pkwy (South)	1	3		Infinity	0,00	99999,00
Emil Kolb Pkwy (South)	1	4		Infinity	0,00	99999,00
King Street	1	2		Infinity	0,00	99999,00
King Street	1	3		Infinity	0,00	99999,00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0,781	1415,507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0,781	1415,507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0,781	1415,507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0,781	1415,507
King Street	(calculated)	(calculated)	0,781	1415,507
King Street	(calculated)	(calculated)	0,781	1415,507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		

Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓	✓	
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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)	PHF	✓	432,00	100,000
Emil Kolb Pkwy (South)	PHF	✓	231,00	100,000
King Street	PHF	✓	392,00	100,000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	432,00	0,95	SecondQuarter
Emil Kolb Pkwy (South)	231,00	0,95	SecondQuarter
King Street	392,00	0,95	SecondQuarter

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	71,000	160,000
	Emil Kolb Pkwy (North)	253,000	0,000	179,000
	King Street	279,000	113,000	0,000

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

	To			
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0,00	0,31	0,69
	Emil Kolb Pkwy (North)	0,59	0,00	0,41
	King Street	0,71	0,29	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	1,310	1,075
	Emil Kolb Pkwy (North)	1,032	1,000	1,022
	King Street	1,061	1,097	1,000

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

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	To			
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0,0	31,0	7,5
	Emil Kolb Pkwy (North)	3,2	0,0	2,2
	King Street	6,1	9,7	0,0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	0,68	0,10	0,41	A	432,09	432,09	4,95	0,69	0,08
Emil Kolb Pkwy (South)	0,71	0,06	~1	A	231,10	231,10	3,02	0,78	0,05
King Street	0,78	0,10	0,40	A	391,20	391,20	5,45	0,84	0,09

Junctions 8

ARCADEY 8 - Roundabout Module

Version: 8.0.6.541 [19821.26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:10:12 PM

Summary of intersection performance

PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2024 Existing Traffic							
Emil Kolb Pkwy (North)	0.08	0.18	1.11	N/A	A	1.19	A
Emil Kolb Pkwy (South)	0.37	1.96	1.58	N/A	A		
King Street	0.08	0.22	0.59	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM " model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 2:10:12 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	1314866519	2495

(Default Analysis Set) - 2024 Existing Traffic, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2024 Existing Traffic, PM	2024 Existing Traffic	PM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.19	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

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

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		

Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓	✓	
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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)	PHF	✓	195.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	738.00	100.000
King Street	PHF	✓	453.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	195.00	1.00	SecondQuarter
Emil Kolb Pkwy (South)	738.00	1.00	SecondQuarter
King Street	453.00	1.00	SecondQuarter

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	289.000
		Emil Kolb Pkwy (North)	78.000	0.000
		King Street	254.000	199.000
				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	0.39
		Emil Kolb Pkwy (North)	0.40	0.00
		King Street	0.56	0.44
				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	1.021
		Emil Kolb Pkwy (North)	1.103	1.000
		King Street	1.047	1.015
				1.000

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

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From	To			
	Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street	
	Emil Kolb Pkwy (South)	0,0	2,1	6,7
	Emil Kolb Pkwy (North)	10,3	0,0	7,7
King Street		4,7	1,5	0,0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	1.11	0.08	0.18	A	195.99	195.99	3.98	1.22	0.07
Emil Kolb Pkwy (South)	1.58	0.37	1.96	A	738.54	738.54	20.44	1.66	0.34
King Street	0.59	0.08	0.22	A	453.25	453.25	4.68	0.62	0.08

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821.26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:26:06 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2024 Existing Traffic						
Emil Kolb Pkwy	0.06	~1	1.01	N/A	A	0.92	A
Highway 50 (North)	0.23	1.26	1.09	N/A	A		
Highway 50 (South)	0.04	~1	0.41	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Backgroun, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 2:26:05 PM

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

Entry Lane Analysis Options

Stop Criteria	Random	Results Refresh Speed	Individual Vehicle Animation Number Of	Time Step Size	Last Run Random	Last Run Number Of
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(%)	Seed	(s)	Trials	(s)	Seed	Trials
1.00	-1	3	1	10	1846875073	4421

(Default Analysis Set) - 2024 Existing Traffic, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2024 Existing Traffic, AM	2024 Existing Traffic	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	0.92	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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

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	PHF	✓	147.00	100.000
Highway 50 (North)	PHF	✓	717.00	100.000
Highway 50 (South)	PHF	✓	262.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	147.00	0.96	SecondQuarter
Highway 50 (North)	717.00	0.96	SecondQuarter
Highway 50 (South)	262.00	0.96	SecondQuarter

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	187.000	75.000
	Highway 50 (North)	399.000	0.000	318.000
	Emil Kolb Pkwy	35.000	112.000	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	0.71	0.29
	Highway 50 (North)	0.56	0.00	0.44
	Emil Kolb Pkwy	0.24	0.76	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	1.037	1.027
	Highway 50 (North)	1.008	1.000	1.053
	Emil Kolb Pkwy	1.057	1.277	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	3.7	2.7
	Highway 50 (North)	0.8	0.0	5.3
	Emil Kolb Pkwy	5.7	27.7	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy	1.01	0.06	~1	A	148.91	148.91	2.94	1.18	0.05
Highway 50 (North)	1.09	0.23	1.26	A	715.97	715.97	12.74	1.07	0.21
Highway 50 (South)	0.41	0.04	~1	A	262.30	262.30	1.89	0.43	0.03

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821.26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:30:31 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2024 Existing Traffic						
Emil Kolb Pkwy	0.09	0.33	0.71	N/A	A	0.79	A
Highway 50 (North)	0.07	0.05	0.64	N/A	A		
Highway 50 (South)	0.17	0.80	0.95	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM " model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 2:30:30 PM

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

Entry Lane Analysis Options

Stop Criteria	Random	Results Refresh Speed	Individual Vehicle Animation Number Of	Time Step Size	Last Run Random	Last Run Number Of
---------------	--------	-----------------------	--	----------------	-----------------	--------------------

(%)	Seed	(s)	Trials	(s)	Seed	Trials
1.00	-1	3	1	10	1723497484	5231

(Default Analysis Set) - 2024 Existing Traffic, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2024 Existing Traffic, PM	2024 Existing Traffic	PM		PHF	15:00	16:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	0.79	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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10,00
Highway 50 (North)	Evenly split	10,00
Highway 50 (South)	Evenly split	10,00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0,00	99999,00
Emil Kolb Pkwy	1	3		Infinity	0,00	99999,00
Highway 50 (North)	1	1		Infinity	0,00	99999,00
Highway 50 (North)	1	2		Infinity	0,00	99999,00
Highway 50 (South)	1	3		Infinity	0,00	99999,00
Highway 50 (South)	1	4		Infinity	0,00	99999,00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

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	PHF	✓	430,00	100,000
Highway 50 (North)	PHF	✓	366,00	100,000
Highway 50 (South)	PHF	✓	511,00	100,000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	430,00	0.91	SecondQuarter
Highway 50 (North)	366,00	0.91	SecondQuarter
Highway 50 (South)	511,00	0.91	SecondQuarter

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	471,000	40,000
	Highway 50 (North)	232,000	0,000	134,000
	Emil Kolb Pkwy	78,000	352,000	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	0,92	0,08
	Highway 50 (North)	0,63	0,00	0,37
	Emil Kolb Pkwy	0,18	0,82	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	1,013	1,000
	Highway 50 (North)	1,013	1,000	1,134
	Emil Kolb Pkwy	1,013	1,023	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	1.3	0.0
	Highway 50 (North)	1.3	0.0	13.4
	Emil Kolb Pkwy	1.3	2.3	0.0

Results

Results Summary for whole modelled period






















Name	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)
Emil Kolb Pkwy	0.71	0.09	0.33	A	430.29	430.29	4.76	0.66	0.08
Highway 50 (North)	0.64	0.07	0.05	A	365.58	365.58	3.92	0.64	0.07
Highway 50 (South)	0.95	0.17	0.80	A	512.96	512.96	7.23	0.85	0.12

Lanes, Volumes, Timings

3: Highway 50 & Columbia Way

2024 Existing AM

07-08-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	7	81	1	73	1	197	68	47	383	1
Future Volume (vph)	2	0	7	81	1	73	1	197	68	47	383	1
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	100.0		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		0.892			0.852				0.850			0.850
Frt Protected		0.990		0.950			0.950			0.950		
Satd. Flow (prot)	0	955	0	1750	1586	0	892	1830	1595	1700	1883	1591
Frt Permitted		0.945		0.751			0.513			0.624		
Satd. Flow (perm)	0	912	0	1383	1586	0	482	1830	1595	1117	1883	1591
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			79				74			30
Link Speed (k/h)		50			40			50			60	
Link Distance (m)		127.3			237.9			633.3			1152.0	
Travel Time (s)		9.2			21.4			45.6			69.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	0%	72%	2%	100%	2%	100%	5%	2%	5%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	1	0	0	0	1
Adj. Flow (vph)	2	0	8	88	1	79	1	214	74	51	416	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	88	80	0	1	214	74	51	416	1
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%
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?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		12.8			12.8		84.5	84.5	84.5	84.5	84.5	84.5
Actuated g/C Ratio		0.12		0.12	0.12		0.77	0.77	0.77	0.77	0.77	0.77
v/c Ratio		0.07		0.55	0.32		0.00	0.15	0.06	0.06	0.29	0.00
Control Delay		1.0		57.9	13.0		4.0	4.0	1.1	4.0	4.8	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		1.0		57.9	13.0		4.0	4.0	1.1	4.0	4.8	0.0
LOS		A		E	B		A	A	A	A	A	A
Approach Delay		1.0			36.5			3.3			4.7	

Synchro 11 Report

Page 5

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2024 Existing AM
07-08-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS	A			D			A			A		
Queue Length 50th (m)	0.0		19.1	0.2		0.1	10.4	0.0	2.3	22.9	0.0	
Queue Length 95th (m)	0.0		34.1	13.8		0.5	21.2	3.8	6.5	42.6	0.0	
Internal Link Dist (m)	103.3			213.9			609.3			1128.0		
Turn Bay Length (m)			70.0			140.0			100.0		30.0	
Base Capacity (vph)	347		490	613		370	1406	1242	858	1447	1229	
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		0.18	0.13		0.00	0.15	0.06	0.06	0.29	0.00	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 9.9

Intersection LOS: A

Intersection Capacity Utilization 60.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Columbia Way



Lanes, Volumes, Timings
4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2024 Existing AM
07-08-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	27	26	128	14	56	11	224	55	49	435	6
Future Volume (vph)	15	27	26	128	14	56	11	224	55	49	435	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)	0.0		0.0	85.0		0.0	85.0		75.0	65.0		50.0
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	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.98		1.00					0.96
Frt		0.949			0.880				0.850			0.850
Flt Protected		0.989		0.950			0.950			0.950		
Satd. Flow (prot)	0	1748	0	1785	1628	0	1623	3476	1591	1785	1883	1591
Flt Permitted		0.900		0.663			0.398			0.585		
Satd. Flow (perm)	0	1586	0	1246	1628	0	677	3476	1591	1099	1883	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			67				74			74
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			55.6			45.6	
Confl. Peds. (#/hr)	17					17	8					8
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	0%	4%	4%	0%	0%	2%	10%	5%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	33	31	154	17	67	13	270	66	59	524	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	154	84	0	13	270	66	59	524	7
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			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)	10.0	10.0		5.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	47.1	47.1		8.0	47.1		34.7	34.7	34.7	34.7	34.7	34.7
Total Split (s)	60.0	60.0		15.0	75.0		45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%		12.5%	62.5%		37.5%	37.5%	37.5%	37.5%	37.5%	37.5%
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)	4.1	4.1		0.0	4.1		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)		8.1		3.0	8.1		6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		16.1		33.2	28.1		77.1	77.1	77.1	77.1	77.1	77.1
Actuated g/C Ratio		0.13		0.28	0.23		0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio		0.34		0.38	0.19		0.03	0.12	0.06	0.08	0.43	0.01
Control Delay		31.5		34.4	10.1		28.5	22.2	15.7	13.0	15.3	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2024 Existing AM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		31.5		34.4	10.1		28.5	22.2	15.7	13.0	15.3	0.0
LOS		C		C	B		C	C	B	B	B	A
Approach Delay		31.5			25.8			21.2			14.9	
Approach LOS		C			C			C			B	
Queue Length 50th (m)		12.2		31.4	3.4		2.0	22.1	2.4	4.7	54.6	0.0
Queue Length 95th (m)		18.8		30.8	10.0		m7.6	39.6	14.9	16.4	124.8	0.0
Internal Link Dist (m)		88.1			177.9			747.8			609.3	
Turn Bay Length (m)				85.0			85.0		75.0	65.0		50.0
Base Capacity (vph)		703		401	937		435	2234	1048	706	1210	1011
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		0.12		0.38	0.09		0.03	0.12	0.06	0.08	0.43	0.01

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.43

Intersection Signal Delay: 19.8

Intersection LOS: B

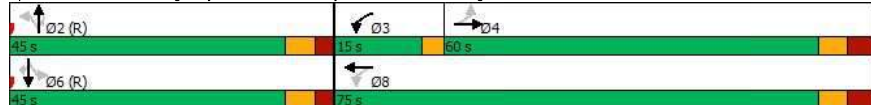
Intersection Capacity Utilization 71.4%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2024 Existing AM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	196	71	253	191	51	49	242	110	54	493	22
Future Volume (vph)	22	196	71	253	191	51	49	242	110	54	493	22
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							1.00		0.97	1.00		1.00
Frt			0.850		0.968				0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1606	1695	1437	1591	1635	0	1564	1662	1417	1643	1694	0
Flt Permitted	0.600			0.386			0.311			0.560		
Satd. Flow (perm)	1015	1695	1437	646	1635	0	512	1662	1379	964	1694	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			118		11				117		2	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)							2		3	3		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	0%	1%	3%	0%	5%	4%	1%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	23	209	76	269	203	54	52	257	117	57	524	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	209	76	269	257	0	52	257	117	57	547	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	11.0	32.0	32.0	18.0	39.0		8.0	59.0	59.0	11.0	62.0	
Total Split (%)	9.2%	26.7%	26.7%	15.0%	32.5%		6.7%	49.2%	49.2%	9.2%	51.7%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	30.1	19.6	19.6	41.5	31.4		69.4	60.2	60.2	70.9	61.0	
Actuated g/C Ratio	0.25	0.16	0.16	0.35	0.26		0.58	0.50	0.50	0.59	0.51	
v/c Ratio	0.08	0.76	0.23	0.79	0.59		0.15	0.31	0.16	0.09	0.64	
Control Delay	25.2	64.8	3.5	48.3	43.5		12.1	20.8	4.1	11.5	27.4	
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	64.8	3.5	48.3	43.5		12.1	20.8	4.1	11.5	27.4	

Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2024 Existing AM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	D	D		B	C	A	B	C	
Approach Delay		46.7			45.9			15.1			25.9	
Approach LOS		D			D			B			C	
Queue Length 50th (m)	3.8	49.8	0.0	51.9	55.4		5.0	37.9	0.0	7.1	116.9	
Queue Length 95th (m)	9.1	73.5	4.4	#74.3	81.6		11.8	63.6	11.1	7.1	118.6	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	305	354	393	341	453		350	833	749	618	861	
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	0.08	0.59	0.19	0.79	0.57		0.15	0.31	0.16	0.09	0.64	

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 115 (96%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 32.5 Intersection LOS: C

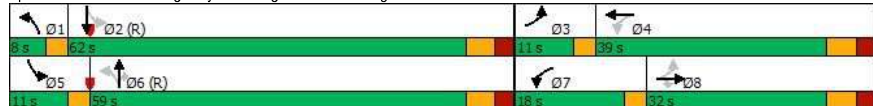
Intersection Capacity Utilization 79.8% ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Highway 50 & King Street West/King Street East



Lanes, Volumes, Timings

6: Kingsview Drive & Columbia Way

2024 Existing AM

07-08-2024

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations	↔	↔	↔	↔	↔	↔	
Traffic Volume (vph)	93	23	90	117	36	51	
Future Volume (vph)	93	23	90	117	36	51	
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	0.98		
Frt	0.973				0.921		
Flt Protected				0.979	0.980		
Satd. Flow (prot)	1858	0	0	1826	1697	0	
Flt Permitted				0.816	0.980		
Satd. Flow (perm)	1858	0	0	1517	1697	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	25				61		
Link Speed (k/h)	40			40	40		
Link Distance (m)	237.9			417.0	131.8		
Travel Time (s)	21.4			37.5	11.9		
Confl. Peds. (#/hr)		3	3			5	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	
Heavy Vehicles (%)	0%	0%	3%	3%	0%	0%	
Adj. Flow (vph)	112	28	108	141	43	61	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	140	0	0	249	104	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6		8	
Permitted Phases			6		4		
Detector Phases	2		6	6	4		
Switch Phase							
Minimum Initial (s)	8.0		8.0	8.0	8.0	8.0	
Minimum Split (s)	21.0		21.0	21.0	21.9	21.9	
Total Split (s)	70.0		70.0	70.0	30.0	30.0	
Total Split (%)	70.0%		70.0%	70.0%	30.0%	30%	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.9	2.9	
Lost Time Adjust (s)	0.0			0.0	0.0		
Total Lost Time (s)	6.0			6.0	6.9		
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Max		Max	Max	None	Ped	
Act Effct Green (s)	64.0			64.0	15.0		
Actuated g/C Ratio	0.70			0.70	0.16		
v/c Ratio	0.11			0.24	0.32		
Control Delay	4.0			5.7	19.2		
Queue Delay	0.0			0.0	0.0		
Total Delay	4.0			5.7	19.2		
LOS	A			A	B		
Approach Delay	4.0			5.7	19.2		
Approach LOS	A			A	B		
Queue Length 50th (m)	6.0			14.5	7.0		
Queue Length 95th (m)	10.4			21.4	18.9		

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

2024 Existing AM
07-08-2024

	→	↗	↖	←	↘	↙	↕
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Internal Link Dist (m)	213.9			393.0	107.8		
Turn Bay Length (m)							
Base Capacity (vph)	1301			1056	472		
Starvation Cap Reductn	0			0	0		
Spillback Cap Reductn	0			0	0		
Storage Cap Reductn	0			0	0		
Reduced v/c Ratio	0.11			0.24	0.22		

Intersection Summary

Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 91.9	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.32	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 36.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Kingsview Drive & Columbia Way

→ Ø2	↖ Ø4
70 s	30 s
↙ Ø6	↘ Ø8
70 s	30 s

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

2024 Existing AM
07-08-2024

	→	↗	↖	←	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↖
Traffic Volume (veh/h)	66	36	25	134	62	40
Future Volume (Veh/h)	66	36	25	134	62	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	82	45	31	168	78	50

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	127	334	104	
vC1, stage 1 conf vol				
vC2, stage 2 conf vol				
vCu, unblocked vol	127	334	104	
tC, single (s)	4.1	6.4	6.2	
tC, 2 stage (s)				
tF (s)	2.2	3.5	3.3	
p0 queue free %	98	88	95	
cM capacity (veh/h)	1447	647	942	

















Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	127	199	128
Volume Left	0	31	78
Volume Right	45	0	50
cSH	1700	1447	737
Volume to Capacity	0.07	0.02	0.17
Queue Length 95th (m)	0.0	0.5	5.0
Control Delay (s)	0.0	1.3	10.9
Lane LOS		A	B
Approach Delay (s)	0.0	1.3	10.9
Approach LOS			B

Intersection Summary

Average Delay	3.7		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		










HCM Unsignalized Intersection Capacity Analysis
8: Mount Hope Road & Columbia Way

2024 Existing AM
07-08-2024

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (veh/h)	22	73	10	2	88	7	25	4	11	17	3	43		
Future Volume (Veh/h)	22	73	10	2	88	7	25	4	11	17	3	43		
Sign Control	Free			Free			Stop			Stop				
Grade	0%			0%			0%			0%				
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82		
Hourly flow rate (vph)	27	89	12	2	107	9	30	5	13	21	4	52		
Pedestrians	1			2						1				
Lane Width (m)	3.7			3.7						3.7				
Walking Speed (m/s)	1.2			1.2						1.2				
Percent Blockage	0			0						0				
Right turn flare (veh)														
Median type	None			None										
Median storage (veh)														
Upstream signal (m)														
pX, platoon unblocked														
vC, conflicting volume	117				101				320	270	97	283	272	114
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	117				101				320	270	97	283	272	114
tC, single (s)	4.1				4.1				7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)														
tF (s)	2.2				2.2				3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	98				100				95	99	99	97	99	94
cM capacity (veh/h)	1483				1504				589	627	936	648	626	935
Direction, Lane #	EB 1	WB 1	NB 1	SB 1										
Volume Total	128	118	48	77										
Volume Left	27	2	30	21										
Volume Right	12	9	13	52										
cSH	1483	1504	659	816										
Volume to Capacity	0.02	0.00	0.07	0.09										
Queue Length 95th (m)	0.4	0.0	1.9	2.5										
Control Delay (s)	1.7	0.1	10.9	9.9										
Lane LOS	A	A	B	A										
Approach Delay (s)	1.7	0.1	10.9	9.9										
Approach LOS			B	A										
Intersection Summary														
Average Delay				4.1										
Intersection Capacity Utilization	24.3%			ICU Level of Service			A							
Analysis Period (min)	15													












HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2024 Existing AM
07-08-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	158	31	102	465	11
Future Volume (Veh/h)	10	158	31	102	465	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	168	33	109	495	12
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	676	501	507			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	676	501	507			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	97	71	97			
cM capacity (veh/h)	394	570	1018			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	179	142	507			
Volume Left	11	33	0			
Volume Right	168	0	12			
cSH	555	1018	1700			
Volume to Capacity	0.32	0.03	0.30			
Queue Length 95th (m)	11.1	0.8	0.0			
Control Delay (s)	14.5	2.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.5	2.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization		49.3%		ICU Level of Service		A
Analysis Period (min)		15				






















HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb Parkway & Duffy's Lane

2024 Existing AM
07-08-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	34	16	145	391	3
Future Volume (Veh/h)	3	34	16	145	391	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	38	18	161	434	3
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	631	434	437			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	631	434	437			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	99	94	98			
cM capacity (veh/h)	440	620	1038			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	41	18	161	434	3	
Volume Left	3	18	0	0	0	
Volume Right	38	0	0	0	3	
cSH	602	1038	1700	1700	1700	
Volume to Capacity	0.07	0.02	0.09	0.26	0.00	
Queue Length 95th (m)	1.7	0.4	0.0	0.0	0.0	
Control Delay (s)	11.4	8.5	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	11.4	0.9		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	0.9					
Intersection Capacity Utilization	30.6%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2024 Existing PM
07-08-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	1	63	0	47	0	445	156	70	248	1
Future Volume (vph)	0	0	1	63	0	47	0	445	156	70	248	1
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	100.0		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		0.865			0.850				0.850			0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	1662	0	1750	1555	0	1879	1883	1626	1785	1883	795
Flt Permitted				0.757						0.491		
Satd. Flow (perm)	0	1662	0	1394	1555	0	1879	1883	1626	923	1883	795
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		613			383				163			33
Link Speed (k/h)		40			40			50			60	
Link Distance (m)		127.3			237.9			633.3		1152.0		
Travel Time (s)		11.5			21.4			45.6		69.1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	100%	0%	0%	2%	0%	5%	0%	2%	0%	0%	2%	100%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	0	0	1	66	0	49	0	464	163	73	258	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	66	49	0	0	464	163	73	258	1
Turn Type		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		14.0	14.0		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%
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?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		10.7		10.7	10.7			80.7	80.7	80.7	80.7	80.7
Actuated g/C Ratio		0.11		0.11	0.11			0.81	0.81	0.81	0.81	0.81
v/c Ratio		0.00		0.44	0.10			0.31	0.12	0.10	0.17	0.00
Control Delay		0.0		50.6	0.4			4.2	0.8	3.8	3.5	0.0
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay		0.0		50.6	0.4			4.2	0.8	3.8	3.5	0.0
LOS		A		D	A			A	A	A	A	A
Approach Delay					29.2			3.3			3.6	

Lanes, Volumes, Timings

3: Highway 50 & Columbia Way

2024 Existing PM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS	C			A			A			A		
Queue Length 50th (m)	0.0	12.9	0.0	23.4	0.0	3.0	11.3	0.0				
Queue Length 95th (m)	0.0	25.5	0.0	42.9	4.9	7.9	22.3	0.0				
Internal Link Dist (m)	103.3		213.9	609.3		1128.0						
Turn Bay Length (m)		70.0				100.0						30.0
Base Capacity (vph)	927	418	734	1520	1344	745	1520	648				
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	0.16	0.07	0.31	0.12	0.10	0.17	0.00				

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 6.2

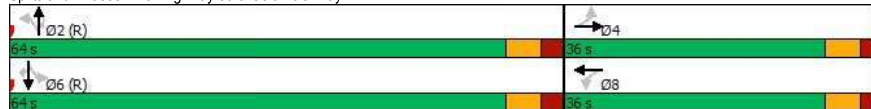
Intersection LOS: A

Intersection Capacity Utilization 66.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Columbia Way



Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2024 Existing PM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	7	12	40	9	18	75	626	88	25	284	19
Future Volume (vph)	8	7	12	40	9	18	75	626	88	25	284	19
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)	0.0	0.0	85.0	0.0	85.0	0.0	85.0	75.0	65.0	50.0		
Storage Lanes	0	0	1	0	1	1	1	1	1	1		
Taper Length (m)	7.5		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		0.99		1.00	0.99		1.00					0.98
Frt		0.940			0.898				0.850			0.850
Flt Protected		0.985		0.950			0.950			0.950		
Satd. Flow (prot)	0	1760	0	1785	1709	0	1785	3614	1559	1785	1883	1591
Flt Permitted		0.903		0.740			0.581			0.407		
Satd. Flow (perm)	0	1612	0	1385	1709	0	1089	3614	1559	765	1883	1553
Right Turn on Red			Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)		12		19				91				51
Link Speed (k/h)		40		40			50				50	
Link Distance (m)		112.1		201.9			771.8				633.3	
Travel Time (s)		10.1		18.2			55.6				45.6	
Confl. Peds. (#/hr)	2		3	3		2	2					2
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	1	0	0	0	1
Adj. Flow (vph)	8	7	12	41	9	19	77	645	91	26	293	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	41	28	0	77	645	91	26	293	20
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		8			2		2	6		6
Permitted Phases	4											
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	47.1	47.1		47.1	47.1		34.7	34.7	34.7	34.7	34.7	34.7
Total Split (s)	50.0	50.0		50.0	50.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	45.5%	45.5%		45.5%	45.5%		54.5%	54.5%	54.5%	54.5%	54.5%	54.5%
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)	4.1	4.1		4.1	4.1		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	0.0
Total Lost Time (s)		8.1		8.1	8.1		6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		15.9		15.9			84.3	84.3	84.3	84.3	84.3	84.3
Actuated g/C Ratio		0.14		0.14	0.14		0.77	0.77	0.77	0.77	0.77	0.77
v/c Ratio		0.11		0.21	0.11		0.09	0.23	0.07	0.04	0.20	0.02
Control Delay		24.0		39.9	18.6		7.6	6.7	2.4	8.2	7.2	0.3
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2024 Existing PM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		24.0		39.9	18.6		7.6	6.7	2.4	8.2	7.2	0.3
LOS		C		D	B		A	A	A	A	A	A
Approach Delay		24.0			31.2			6.3			6.8	
Approach LOS		C			C			A			A	
Queue Length 50th (m)		3.2		8.8	1.9		3.5	17.2	0.0	1.1	14.5	0.0
Queue Length 95th (m)		8.4		14.1	7.6		17.6	57.0	8.0	7.8	55.6	0.5
Internal Link Dist (m)		88.1			177.9			747.8			609.3	
Turn Bay Length (m)				85.0			85.0		75.0	65.0		50.0
Base Capacity (vph)		621		527	662		834	2769	1216	586	1442	1201
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		0.04		0.08	0.04		0.09	0.23	0.07	0.04	0.20	0.02

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 96 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.23

Intersection Signal Delay: 8.2

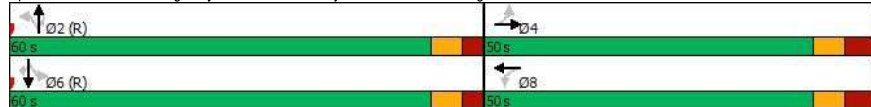
Intersection LOS: A

Intersection Capacity Utilization 60.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2024 Existing PM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	51	224	87	196	250	39	78	662	415	32	324	22
Future Volume (vph)	51	224	87	196	250	39	78	662	415	32	324	22
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.96	0.99	0.99		0.99		0.96		1.00	
Frt			0.850		0.980				0.850		0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1575	1712	1409	1591	1669	0	1610	1712	1432	1643	1679	0
Flt Permitted	0.537			0.316			0.441			0.228		
Satd. Flow (perm)	872	1712	1358	524	1669	0	740	1712	1372	394	1679	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125		6				311		3	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)	11		6	6		11	10		8	8		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	1%	1%	0%	2%	1%	0%	0%	1%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	53	231	90	202	258	40	80	682	428	33	334	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	231	90	202	298	0	80	682	428	33	357	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	15.0	33.0	33.0	30.0	48.0		22.0	67.0	67.0	10.0	55.0	
Total Split (%)	10.7%	23.6%	23.6%	21.4%	34.3%		15.7%	47.9%	47.9%	7.1%	39.3%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	35.9	23.5	23.5	49.7	36.1		83.9	74.3	74.3	79.2	68.7	
Actuated g/C Ratio	0.26	0.17	0.17	0.36	0.26		0.60	0.53	0.53	0.57	0.49	
v/c Ratio	0.20	0.81	0.27	0.61	0.69		0.16	0.75	0.49	0.12	0.43	
Control Delay	30.0	76.8	4.7	40.0	54.3		14.5	35.1	8.9	15.0	27.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	30.0	76.8	4.7	40.0	54.3		14.5	35.1	8.9	15.0	27.3	

Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2024 Existing PM

07-08-2024

	←	→	↙	↘	↖	↗	↕	↔	↕	↔	↕	↔
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	D	D		B	D	A	B	C	
Approach Delay		52.8			48.5			24.3			26.2	
Approach LOS		D			D			C			C	
Queue Length 50th (m)	10.2	65.2	0.0	42.9	78.2		9.4	161.6	18.3	3.8	65.8	
Queue Length 95th (m)	18.1	93.0	6.5	58.1	104.9		20.4	#268.0	55.6	10.2	111.2	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	305	328	361	391	497		563	908	873	287	825	
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	0.17	0.70	0.25	0.52	0.60		0.14	0.75	0.49	0.11	0.43	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 62 (44%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 33.9

Intersection LOS: C

Intersection Capacity Utilization 87.7%

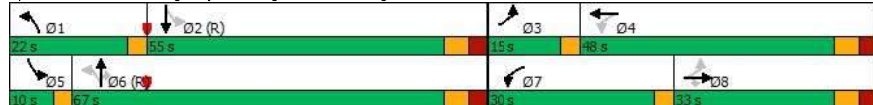
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Highway 50 & King Street West/King Street East



Lanes, Volumes, Timings

6: Kingsview Drive & Columbia Way

2024 Existing PM

07-08-2024

	→	↙	↘	↖	↗	↕	↔
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations	↔	↔	↔	↔	↔	↔	
Traffic Volume (vph)	158	53	50	81	22	35	
Future Volume (vph)	158	53	50	81	22	35	
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				0.917		
Flt Protected				0.981	0.981		
Satd. Flow (prot)	1842	0	0	1862	1695	0	
Flt Permitted				0.832	0.981		
Satd. Flow (perm)	1842	0	0	1574	1695	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	33				38		
Link Speed (k/h)	40			40	40		
Link Distance (m)	237.9			417.0	131.8		
Travel Time (s)	21.4			37.5	11.9		
Confl. Peds. (#/hr)		3	3				
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	
Heavy Vehicles (%)	0%	0%	0%	2%	5%	0%	
Adj. Flow (vph)	174	58	55	89	24	38	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	232	0	0	144	62	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6		8	
Permitted Phases			6		4		
Detector Phase	2		6	6	4		
Switch Phase							
Minimum Initial (s)	8.0		8.0	8.0	8.0	8.0	
Minimum Split (s)	21.0		21.0	21.0	21.9	21.9	
Total Split (s)	70.0		70.0	70.0	30.0	30.0	
Total Split (%)	70.0%		70.0%	70.0%	30.0%	30%	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.9	2.9	
Lost Time Adjust (s)	0.0			0.0	0.0		
Total Lost Time (s)	6.0			6.0	6.9		
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Max		Max	Max	None	Ped	
Act Effct Green (s)	64.0			64.0	15.0		
Actuated g/C Ratio	0.70			0.70	0.16		
v/c Ratio	0.18			0.13	0.20		
Control Delay	4.5			5.0	18.8		
Queue Delay	0.0			0.0	0.0		
Total Delay	4.5			5.0	18.8		
LOS	A			A	B		
Approach Delay	4.5			5.0	18.8		
Approach LOS	A			A	B		
Queue Length 50th (m)	10.9			7.7	3.9		
Queue Length 95th (m)	18.6			13.9	15.2		

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

2024 Existing PM
07-08-2024

	→	↗	↖	←	↘	↙	↕
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Internal Link Dist (m)	213.9			393.0	107.8		
Turn Bay Length (m)							
Base Capacity (vph)	1292			1096	454		
Starvation Cap Reductn	0			0	0		
Spillback Cap Reductn	0			0	0		
Storage Cap Reductn	0			0	0		
Reduced v/c Ratio	0.18			0.13	0.14		

Intersection Summary

Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 91.9	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.20	
Intersection Signal Delay: 6.7	Intersection LOS: A
Intersection Capacity Utilization 41.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Kingsview Drive & Columbia Way

→ Ø2	↖ Ø4
70 s	30 s
← Ø6	↘ Ø8
70 s	30 s

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

2024 Existing PM
07-08-2024

	→	↗	↖	←	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↘
Traffic Volume (veh/h)	122	74	34	92	37	22
Future Volume (Veh/h)	122	74	34	92	37	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	133	80	37	100	40	24

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	213	347	173	
vC1, stage 1 conf vol				
vC2, stage 2 conf vol				
vCu, unblocked vol	213	347	173	
tC, single (s)	4.1	6.4	6.2	
tC, 2 stage (s)				
tF (s)	2.2	3.5	3.3	
p0 queue free %	97	94	97	
cM capacity (veh/h)	1369	636	876	

















Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	213	137	64
Volume Left	0	37	40
Volume Right	80	0	24
cSH	1700	1369	709
Volume to Capacity	0.13	0.03	0.09
Queue Length 95th (m)	0.0	0.7	2.4
Control Delay (s)	0.0	2.2	10.6
Lane LOS		A	B
Approach Delay (s)	0.0	2.2	10.6
Approach LOS			B

Intersection Summary

Average Delay	2.4		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		










HCM Unsignalized Intersection Capacity Analysis
8: Mount Hope Road & Columbia Way

2024 Existing PM
07-08-2024

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (veh/h)	18	100	27	16	81	5	14	4	7	13	6	24		
Future Volume (Veh/h)	18	100	27	16	81	5	14	4	7	13	6	24		
Sign Control	Free			Free			Stop			Stop				
Grade	0%			0%			0%			0%				
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly flow rate (vph)	19	105	28	17	85	5	15	4	7	14	6	25		
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	90				133				306	281	119	288	292	88
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	90				133				306	281	119	288	292	88
tC, single (s)	4.1				4.1				7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)														
tF (s)	2.2				2.2				3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99				99				98	99	99	98	99	97
cM capacity (veh/h)	1518				1464				617	616	938	648	607	976
Direction, Lane #	EB 1	WB 1	NB 1	SB 1										
Volume Total	152	107	26	45										
Volume Left	19	17	15	14										
Volume Right	28	5	7	25										
cSH	1518	1464	679	788										
Volume to Capacity	0.01	0.01	0.04	0.06										
Queue Length 95th (m)	0.3	0.3	1.0	1.5										
Control Delay (s)	1.0	1.3	10.5	9.8										
Lane LOS	A	A	B	A										
Approach Delay (s)	1.0	1.3	10.5	9.8										
Approach LOS			B	A										
Intersection Summary														
Average Delay				3.0										
Intersection Capacity Utilization				19.9%	ICU Level of Service			A						
Analysis Period (min)				15										

HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2024 Existing PM
07-08-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	66	117	431	186	21
Future Volume (Veh/h)	12	66	117	431	186	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	12	68	121	444	192	22
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	889	203	214			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	889	203	214			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	92	91			
cM capacity (veh/h)	288	843	1362			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	80	565	214			
Volume Left	12	121	0			
Volume Right	68	0	22			
cSH	654	1362	1700			
Volume to Capacity	0.12	0.09	0.13			
Queue Length 95th (m)	3.3	2.3	0.0			
Control Delay (s)	11.3	2.4	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.3	2.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			55.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb Parkway & Duffy's Lane

2024 Existing PM
07-08-2024

	EBL	EBR	NBL	NBT	SBT	SBR
Movement						
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	3	15	59	426	166	4
Future Volume (Veh/h)	3	15	59	426	166	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	4	18	70	507	198	5
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	845	198	203			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	845	198	203			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	95			
cM capacity (veh/h)	319	848	1381			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	22	70	507	198	5	
Volume Left	4	70	0	0	0	
Volume Right	18	0	0	0	5	
cSH	651	1381	1700	1700	1700	
Volume to Capacity	0.03	0.05	0.30	0.12	0.00	
Queue Length 95th (m)	0.8	1.3	0.0	0.0	0.0	
Control Delay (s)	10.7	7.7	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	10.7	0.9		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		1.0				
Intersection Capacity Utilization		32.4%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
1: King Street & Emil Kolb Parkway

2031 Future Background AM
07-08-2024

	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group						
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	326	201	205	112	124	402
Future Volume (vph)	326	201	205	112	124	402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.88
Frt	0.948					0.850
Frt Protected				0.969	0.950	
Satd. Flow (prot)	1758	0	0	3046	0	2686
Frt Permitted				0.969	0.950	
Satd. Flow (perm)	1758	0	0	3046	0	2686
Link Speed (k/h)	70			70	60	
Link Distance (m)	2029.6			352.5	742.2	
Travel Time (s)	104.4			18.1	44.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	3%	8%	31%	10%	7%
Adj. Flow (vph)	343	212	216	118	131	423
Shared Lane Traffic (%)						
Lane Group Flow (vph)	555	0	0	334	131	423
Sign Control	Yield			Yield	Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization Err%	ICU Level of Service H					
Analysis Period (min)	15					

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:07:36 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2031 Future Background							
Emil Kolb Pkwy (North)	0.25	1.21	1.39	N/A	A	1.33	A
Emil Kolb Pkwy (South)	0.25	1.48	1.51	N/A	A		
King Street	0.18	0.95	1.09	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM " model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 2:07:38 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials

FUTURE BACKGROUND 2031

1.00	-1	3	1	10	557360487	2060
------	----	---	---	----	-----------	------

(Default Analysis Set) - 2031 Future Background, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.33	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3		✓	

Traffic Flows

Demand Set Data Options

[illegible]

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)	PHF	✓	527.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	522.00	100.000
King Street	PHF	✓	526.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	527.00	0.95	SecondQuarter
Emil Kolb Pkwy (South)	522.00	0.95	SecondQuarter
King Street	526.00	0.95	SecondQuarter

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	
	0.000	112.000	410.000	
	326.000	0.000	201.000	
	King Street	402.000	124.000	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	
	0.00	0.21	0.79	
	0.62	0.00	0.38	
	King Street	0.76	0.24	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	
	1.000	1.310	1.075	
	1.032	1.000	1.022	
	King Street	1.061	1.097	1.000

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

From	To			
	Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street	
	0.0	31.0	7.5	
	3.2	0.0	2.2	
	King Street	6.1	9.7	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	1.39	0.25	1.21	A	529.43	529.43	11.62	1.32	0.19
Emil Kolb Pkwy (South)	1.51	0.25	1.48	A	522.47	522.47	13.21	1.52	0.22
King Street	1.09	0.18	0.95	A	524.45	524.45	9.78	1.12	0.16

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 1:54:23 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2031 Future Background						
Emil Kolb Pkwy (North)	0.16	0.91	1.61	N/A	A	1.80	A
Emil Kolb Pkwy (South)	0.76	3.35	2.40	N/A	A		
King Street	0.14	0.74	0.83	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 1:54:23 PM

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	Crozler 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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials

1.00	-1	3	1	10	1417470609	2050
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(Default Analysis Set) - 2031 Future Background, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.80	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓		

Traffic Flows

Demand Set Data Options

[illegible]

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)	PHF	✓	318.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	988.00	100.000
King Street	PHF	✓	552.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	318.00	1.00	SecondQuarter
Emil Kolb Pkwy (South)	988.00	1.00	SecondQuarter
King Street	552.00	1.00	SecondQuarter

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	410.000	578.000
	Emil Kolb Pkwy (North)	187.000	0.000	131.000
	King Street	334.000	218.000	0.000

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

	To			
From		Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
	Emil Kolb Pkwy (South)	0.00	0.41	0.59
	Emil Kolb Pkwy (North)	0.59	0.00	0.41
	King Street	0.61	0.39	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	1.021	1.067
	Emil Kolb Pkwy (North)	1.103	1.000	1.077
	King Street	1.047	1.015	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	2,1	6,7
	Emil Kolb Pkwy (North)	10,3	0,0	7,7
	King Street	4,7	1,5	0,0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	1.61	0.16	0.91	A	317.63	317.63	9.29	1.76	0.15
Emil Kolb Pkwy (South)	2.40	0.76	3.35	A	990.82	990.82	41.12	2.49	0.69
King Street	0.83	0.14	0.74	A	549.71	549.71	7.95	0.87	0.13

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:45:56 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2031 Future Background						
Emil Kolb Pkwy	0.08	~1	1.13	N/A	A	1.03	A
Highway 50 (North)	0.29	1.56	1.22	N/A	A		
Highway 50 (South)	0.05	~1	0.52	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM " model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 2:45:57 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	1174534780	4396

(Default Analysis Set) - 2031 Future Background, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.03	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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

Traffic Flows

Demand Set Data Options

Default Vehicle	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Source	PCE Factor for a Truck	Default Turning	Estimate from entry/exit	Turning Proportions Vary	Turning Proportions Vary	Turning Proportions Vary
-----------------	-------------------------	-------------------------	-------------------------	--------------------	------------------------	-----------------	--------------------------	--------------------------	--------------------------	--------------------------

Mix	Time	Turn	Entry		(PCE)	Proportions	counts	Over Time	Over Turn	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	PHF	✓	206.00	100.000
Highway 50 (North)	PHF	✓	765.00	100.000
Highway 50 (South)	PHF	✓	316.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	206.00	0.96	SecondQuarter
Highway 50 (North)	765.00	0.96	SecondQuarter
Highway 50 (South)	316.00	0.96	SecondQuarter

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	220.000	96.000
	Highway 50 (North)	421.000	0.000	344.000
	Emil Kolb Pkwy	42.000	164.000	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	0,70	0,30
	Highway 50 (North)	0,55	0,00	0,45
	Emil Kolb Pkwy	0,20	0,80	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	1,037	1,027
	Highway 50 (North)	1,008	1,000	1,053
	Emil Kolb Pkwy	1,057	1,277	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	3,7	2,7
	Highway 50 (North)	0,8	0,0	5,3
	Emil Kolb Pkwy	5,7	27,7	0,0

Results

Results Summary for whole modelled period

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Name	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)
Emil Kolb Pkwy	1.13	0.08	~1	A	204.99	204.99	4.52	1.32	0.08
Highway 50 (North)	1.22	0.29	1.56	A	765.87	765.87	15.24	1.19	0.25
Highway 50 (South)	0.52	0.05	~1	A	317.20	317.20	2.78	0.53	0.05

Junctions 8	
ARCADY 8 - Roundabout Module	
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2024	
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk	
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution	

Filename: Highway 50 & Emil Kolb Pkwy.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2024_Analysis\Arcady
Report generation date: 2024-06-13 3:14:41 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2031 Future Background						
Emil Kolb Pkwy	0.14	0.70	0.82	N/A	A	0.93	A
Highway 50 (North)	0.11	0.45	0.75	N/A	A		
Highway 50 (South)	0.21	0.95	1.17	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 3:14:41 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	501201080	2938

(Default Analysis Set) - 2031 Future Background, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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		PHF	15:00	16:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	0.93	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

Traffic Flows

Demand Set Data Options

Default Vehicle	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Source	PCE Factor for a Truck	Default Turning	Estimate from entry/exit	Turning Proportions Vary	Turning Proportions Vary	Turning Proportions Vary
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Mix	Time	Turn	Entry		(PCE)	Proportions	counts	Over Time	Over Turn	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	PHF	✓	495.00	100.000
Highway 50 (North)	PHF	✓	434.00	100.000
Highway 50 (South)	PHF	✓	556.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	495.00	0.91	SecondQuarter
Highway 50 (North)	434.00	0.91	SecondQuarter
Highway 50 (South)	556.00	0.91	SecondQuarter

Turning Proportions

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.000	504.000	52.000
	Highway 50 (North)	256.000	0.000	178.000
	Emil Kolb Pkwy	92.000	403.000	0.000

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0,00	0,91	0,09
	Highway 50 (North)	0,59	0,00	0,41
	Emil Kolb Pkwy	0,19	0,81	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	1.013	1.000
	Highway 50 (North)	1.013	1.000	1.134
	Emil Kolb Pkwy	1.013	1.023	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	1.3	0.0
	Highway 50 (North)	1.3	0.0	13.4
	Emil Kolb Pkwy	1.3	2.3	0.0

Results

Results Summary for whole modelled period


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Name	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)
Emil Kolb Pkwy	0.82	0.14	0.70	A	496.15	496.15	6.31	0.76	0.11
Highway 50 (North)	0.75	0.11	0.45	A	432.71	432.71	5.33	0.74	0.09
Highway 50 (South)	1.17	0.21	0.95	A	555.59	555.59	9.48	1.02	0.16

Lanes, Volumes, Timings 3: Highway 50 & Columbia Way

2031 Future Background AM

07-08-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	8	183	2	79	2	218	100	60	397	2
Future Volume (vph)	3	0	8	183	2	79	2	218	100	60	397	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	100.0		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		0.899			0.853				0.850			0.850
Frt Protected		0.988		0.950			0.950			0.950		
Satd. Flow (prot)	0	953	0	1750	1572	0	892	1830	1595	1700	1883	1591
Frt Permitted		0.949		0.750			0.484			0.611		
Satd. Flow (perm)	0	916	0	1382	1572	0	455	1830	1595	1093	1883	1591
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			86				109			30
Link Speed (k/h)		50			40			50			60	
Link Distance (m)		127.3			237.9			633.3			1152.0	
Travel Time (s)		9.2			21.4			45.6			69.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	0%	72%	2%	100%	2%	100%	5%	2%	5%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	3	0	9	199	2	86	2	237	109	65	432	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	199	88	0	2	237	109	65	432	2
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%
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?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		21.5		21.5	21.5		75.8	75.8	75.8	75.8	75.8	75.8
Actuated g/C Ratio		0.20		0.20	0.20		0.69	0.69	0.69	0.69	0.69	0.69
v/c Ratio		0.06		0.74	0.23		0.01	0.19	0.10	0.09	0.33	0.00
Control Delay		0.5		57.1	8.9		7.5	7.5	1.8	7.4	8.7	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.5		57.1	8.9		7.5	7.5	1.8	7.4	8.7	0.0
LOS		A		E	A		A	A	A	A	A	A
Approach Delay		0.5			42.3			5.7			8.5	

Lanes, Volumes, Timings

3: Highway 50 & Columbia Way

2031 Future Background AM

07-08-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS	A			D			A			A		
Queue Length 50th (m)	0.0			42.6	0.4		0.1	17.0	0.0	4.3	35.2	0.0
Queue Length 95th (m)	0.7			63.0	12.5		1.2	34.4	6.6	11.7	65.6	0.0
Internal Link Dist (m)	103.3			213.9			609.3			1128.0		
Turn Bay Length (m)				70.0			140.0			100.0		30.0
Base Capacity (vph)	348			489	612		313	1261	1132	753	1297	1105
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			0.41	0.14		0.01	0.19	0.10	0.09	0.33	0.00

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 16.0

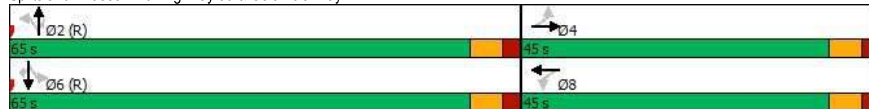
Intersection LOS: B

Intersection Capacity Utilization 70.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Columbia Way



Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2031 Future Background AM

07-08-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	27	26	128	14	56	12	275	57	51	547	7
Future Volume (vph)	15	27	26	128	14	56	12	275	57	51	547	7
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)	0.0			0.0	85.0		0.0	85.0		75.0	65.0	50.0
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	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.98							0.96
Frt		0.949			0.880				0.850			0.850
Flt Protected		0.989		0.950			0.950			0.950		
Satd. Flow (prot)	0	1748	0	1785	1628	0	1623	3476	1591	1785	1883	1591
Flt Permitted		0.900		0.663			0.310			0.552		
Satd. Flow (perm)	0	1586	0	1246	1628	0	530	3476	1591	1037	1883	1532
Right Turn on Red			Yes			Yes		Yes				Yes
Satd. Flow (RTOR)		31			67			74				74
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			55.6			45.6	
Confl. Peds. (#/hr)	17					17	8					8
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	0%	4%	4%	0%	0%	2%	10%	5%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	33	31	154	17	67	14	331	69	61	659	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	154	84	0	14	331	69	61	659	8
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			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)	10.0	10.0		5.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	47.1	47.1		8.0	47.1		34.7	34.7	34.7	34.7	34.7	34.7
Total Split (s)	60.0	60.0		15.0	75.0		45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%		12.5%	62.5%		37.5%	37.5%	37.5%	37.5%	37.5%	37.5%
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)	4.1	4.1		0.0	4.1		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)		8.1		3.0	8.1		6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		16.1		33.2	28.1		77.1	77.1	77.1	77.1	77.1	77.1
Actuated g/C Ratio		0.13		0.28	0.23		0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio		0.34		0.38	0.19		0.04	0.15	0.07	0.09	0.54	0.01
Control Delay		31.5		34.4	10.1		29.0	23.3	16.2	13.1	17.6	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings

2031 Future Background AM

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		31.5		34.4	10.1		29.0	23.3	16.2	13.1	17.6	0.0
LOS		C		C	B		C	C	B	B	B	A
Approach Delay		31.5			25.8			22.3			17.0	
Approach LOS		C			C			C			B	
Queue Length 50th (m)		12.2		31.4	3.4		2.4	30.5	4.2	4.9	76.2	0.0
Queue Length 95th (m)		18.8		30.8	10.0		m7.8	47.8	m16.2	17.0	169.9	0.0
Internal Link Dist (m)		88.1			177.9			747.8			609.3	
Turn Bay Length (m)				85.0			85.0		75.0	65.0		50.0
Base Capacity (vph)		703		401	937		340	2234	1048	666	1210	1011
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		0.12		0.38	0.09		0.04	0.15	0.07	0.09	0.54	0.01

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 20.8

Intersection LOS: C

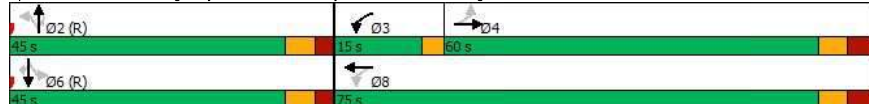
Intersection Capacity Utilization 76.6%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings

2031 Future Background AM

5: Highway 50 & King Street West/King Street East

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	211	77	272	205	55	51	294	114	56	607	23
Future Volume (vph)	24	211	77	272	205	55	51	294	114	56	607	23
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor									0.97	1.00	1.00	
Frt			0.850		0.968				0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1606	1695	1437	1591	1635	0	1564	1662	1417	1643	1696	0
Flt Permitted	0.589			0.364			0.208			0.501		
Satd. Flow (perm)	996	1695	1437	609	1635	0	343	1662	1379	863	1696	0
Right Turn on Red			Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)			118		11				121		2	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)							2		3	3		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	0%	1%	3%	0%	5%	4%	1%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	26	224	82	289	218	59	54	313	121	60	646	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	224	82	289	277	0	54	313	121	60	670	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	11.0	32.0	32.0	18.0	39.0		8.0	59.0	59.0	11.0	62.0	
Total Split (%)	9.2%	26.7%	26.7%	15.0%	32.5%		6.7%	49.2%	49.2%	9.2%	51.7%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	31.0	20.4	20.4	42.3	32.1		68.3	59.3	59.3	70.4	60.4	
Actuated g/C Ratio	0.26	0.17	0.17	0.35	0.27		0.57	0.49	0.49	0.59	0.50	
v/c Ratio	0.09	0.78	0.24	0.86	0.62		0.21	0.38	0.16	0.11	0.78	
Control Delay	25.0	65.9	4.3	55.7	44.3		13.4	22.4	4.1	10.1	31.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	25.0	65.9	4.3	55.7	44.3		13.4	22.4	4.1	10.1	31.3	

Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2031 Future Background AM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	E	D		B	C	A	B	C	
Approach Delay		47.5			50.1			16.9			29.6	
Approach LOS		D			D			B			C	
Queue Length 50th (m)	4.2	53.3	0.0	55.8	60.1		5.3	49.0	0.0	6.5	154.5	
Queue Length 95th (m)	10.1	78.9	6.1	#91.0	88.6		12.1	78.7	11.2	m5.8	#218.1	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	308	354	393	337	456		256	821	743	561	854	
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	0.08	0.63	0.21	0.86	0.61		0.21	0.38	0.16	0.11	0.78	

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 115 (96%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 34.9

Intersection LOS: C

Intersection Capacity Utilization 88.6%

ICU Level of Service E

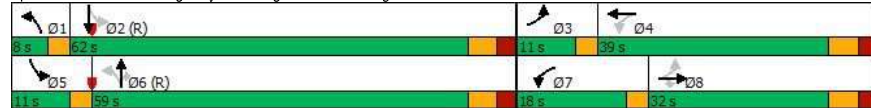
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 5: Highway 50 & King Street West/King Street East



Lanes, Volumes, Timings

6: Kingsview Drive & Columbia Way

2031 Future Background AM

07-08-2024

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations	↔	↔	↔	↔	↔	↔	Ø8
Traffic Volume (vph)	100	25	97	126	36	51	
Future Volume (vph)	100	25	97	126	36	51	
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	0.98		
Frt	0.973				0.921		
Flt Protected				0.979	0.980		
Satd. Flow (prot)	1858	0	0	1826	1697	0	
Flt Permitted				0.808	0.980		
Satd. Flow (perm)	1858	0	0	1502	1697	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	25				61		
Link Speed (k/h)	40			40	40		
Link Distance (m)	237.9			417.0	131.8		
Travel Time (s)	21.4			37.5	11.9		
Confl. Peds. (#/hr)		3	3			5	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	
Heavy Vehicles (%)	0%	0%	3%	3%	0%	0%	
Adj. Flow (vph)	120	30	117	152	43	61	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	150	0	0	269	104	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			8
Permitted Phases			6		4		
Detector Phase	2		6	6	4		
Switch Phase							
Minimum Initial (s)	8.0		8.0	8.0	8.0		8.0
Minimum Split (s)	21.0		21.0	21.0	21.9		21.9
Total Split (s)	70.0		70.0	70.0	30.0		30.0
Total Split (%)	70.0%		70.0%	70.0%	30.0%		30%
Yellow Time (s)	4.0		4.0	4.0	4.0		4.0
All-Red Time (s)	2.0		2.0	2.0	2.9		2.9
Lost Time Adjust (s)	0.0			0.0	0.0		
Total Lost Time (s)	6.0			6.0	6.9		
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Max		Max	Max	None		Ped
Act Effct Green (s)	64.0			64.0	15.0		
Actuated g/C Ratio	0.70			0.70	0.16		
v/c Ratio	0.12			0.26	0.32		
Control Delay	4.0			5.9	19.2		
Queue Delay	0.0			0.0	0.0		
Total Delay	4.0			5.9	19.2		
LOS	A			A	B		
Approach Delay	4.0			5.9	19.2		
Approach LOS	A			A	B		
Queue Length 50th (m)	6.5			15.9	7.0		
Queue Length 95th (m)	11.1			23.4	18.9		

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

2031 Future Background AM
07-08-2024

	→	↗	↖	←	↘	↙	↕
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Internal Link Dist (m)	213.9			393.0	107.8		
Turn Bay Length (m)							
Base Capacity (vph)	1301			1046	472		
Starvation Cap Reductn	0			0	0		
Spillback Cap Reductn	0			0	0		
Storage Cap Reductn	0			0	0		
Reduced v/c Ratio	0.12			0.26	0.22		

Intersection Summary

Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 91.9	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.32	
Intersection Signal Delay: 8.0	Intersection LOS: A
Intersection Capacity Utilization 47.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Kingsview Drive & Columbia Way

→ Ø2	↖ Ø4
70 s	30 s
↙ Ø6	↘ Ø8
70 s	30 s

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

2031 Future Background AM
07-08-2024

	→	↗	↖	←	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↘
Traffic Volume (veh/h)	97	39	27	162	62	40
Future Volume (Veh/h)	97	39	27	162	62	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	121	49	34	202	78	50

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	170	416	146	
vC1, stage 1 conf vol				
vC2, stage 2 conf vol				
vCu, unblocked vol	170	416	146	
tC, single (s)	4.1	6.4	6.2	
tC, 2 stage (s)				
tF (s)	2.2	3.5	3.3	
p0 queue free %	98	87	94	
cM capacity (veh/h)	1395	579	894	

















Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	170	236	128
Volume Left	0	34	78
Volume Right	49	0	50
cSH	1700	1395	671
Volume to Capacity	0.10	0.02	0.19
Queue Length 95th (m)	0.0	0.6	5.6
Control Delay (s)	0.0	1.3	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	1.3	11.6
Approach LOS			B

Intersection Summary

Average Delay	3.4		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		









HCM Unsignalized Intersection Capacity Analysis
8: Mount Hope Road & Columbia Way

2031 Future Background AM
07-08-2024

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	24	105	11	3	113	8	27	5	12	19	4	47	
Future Volume (Veh/h)	24	105	11	3	113	8	27	5	12	19	4	47	
Sign Control	Free			Free			Stop			Stop			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	
Hourly flow rate (vph)	29	128	13	4	138	10	33	6	15	23	5	57	
Pedestrians	1			2			1			1			
Lane Width (m)	3.7			3.7			3.7			3.7			
Walking Speed (m/s)	1.2			1.2			1.2			1.2			
Percent Blockage	0			0			0			0			
Right turn flare (veh)													
Median type	None			None									
Median storage (veh)													
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	149				141			404	350	136	364	351	145
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	149				141			404	350	136	364	351	145
tC, single (s)	4.1				4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)													
tF (s)	2.2				2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	98				100			94	99	98	96	99	94
cM capacity (veh/h)	1444				1455			512	564	890	569	563	898
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	170	152	54	85									
Volume Left	29	4	33	23									
Volume Right	13	10	15	57									
cSH	1444	1455	587	754									
Volume to Capacity	0.02	0.00	0.09	0.11									
Queue Length 95th (m)	0.5	0.1	2.4	3.0									
Control Delay (s)	1.4	0.2	11.8	10.4									
Lane LOS	A	A	B	B									
Approach Delay (s)	1.4	0.2	11.8	10.4									
Approach LOS			B	B									
Intersection Summary													
Average Delay	3.9												
Intersection Capacity Utilization	30.0%			ICU Level of Service			A						
Analysis Period (min)	15												







HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2031 Future Background AM
07-08-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	183	43	110	499	21
Future Volume (Veh/h)	24	183	43	110	499	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	26	195	46	117	531	22
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	751	542	553			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	751	542	553			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	93	64	95			
cM capacity (veh/h)	350	540	978			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	221	163	553			
Volume Left	26	46	0			
Volume Right	195	0	22			
cSH	508	978	1700			
Volume to Capacity	0.44	0.05	0.33			
Queue Length 95th (m)	17.4	1.2	0.0			
Control Delay (s)	17.4	2.8	0.0			
Lane LOS	C	A				
Approach Delay (s)	17.4	2.8	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			4.6			
Intersection Capacity Utilization		58.3%		ICU Level of Service		B
Analysis Period (min)		15				













HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb Parkway & Duffy's Lane

2031 Future Background AM
07-08-2024

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	37	18	203	452	4
Future Volume (Veh/h)	4	37	18	203	452	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	41	20	226	502	4
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	768	502	506			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	768	502	506			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	99	93	98			
cM capacity (veh/h)	365	567	977			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	45	20	226	502	4	
Volume Left	4	20	0	0	0	
Volume Right	41	0	0	0	4	
cSH	541	977	1700	1700	1700	
Volume to Capacity	0.08	0.02	0.13	0.30	0.00	
Queue Length 95th (m)	2.2	0.5	0.0	0.0	0.0	
Control Delay (s)	12.3	8.8	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	12.3	0.7		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization		33.8%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2031 Future Background PM
07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	2	131	0	51	0	492	224	102	251	2
Future Volume (vph)	0	0	2	131	0	51	0	492	224	102	251	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	0.0	70.0	0.0	0.0	140.0	0.0	0.0	100.0	0.0	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		0.865			0.850			0.850			0.850	
Frt Protected				0.950						0.950		
Satd. Flow (prot)	0	1662	0	1750	1555	0	1879	1883	1626	1785	1883	795
Frt Permitted				0.757						0.445		
Satd. Flow (perm)	0	1662	0	1394	1555	0	1879	1883	1626	836	1883	795
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		609			342				233			33
Link Speed (k/h)		50			40				50			60
Link Distance (m)		127.3			237.9				633.3			1152.0
Travel Time (s)		9.2			21.4				45.6			69.1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	100%	0%	0%	2%	0%	5%	0%	2%	0%	0%	2%	100%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	0	0	2	136	0	53	0	513	233	106	261	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	0	136	53	0	0	513	233	106	261	2
Turn Type	NA		Perm	NA		Perm	NA	Perm	Perm	Perm	NA	Perm
Protected Phases		4			8			2		2	6	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		14.0	14.0		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%
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?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		15.3		15.3	15.3		72.0	72.0	72.0	72.0	72.0	72.0
Actuated g/C Ratio		0.15		0.15	0.15		0.72	0.72	0.72	0.72	0.72	0.72
v/c Ratio		0.00		0.64	0.10		0.38	0.19	0.18	0.19	0.00	0.00
Control Delay		0.0		52.6	0.4		7.0	1.2	6.3	5.6	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		52.6	0.4		7.0	1.2	6.3	5.6	0.0	0.0
LOS		A		D	A		A	A	A	A	A	A
Approach Delay				38.0			5.2			5.8		

Lanes, Volumes, Timings

3: Highway 50 & Columbia Way

2031 Future Background PM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS					D			A			A	
Queue Length 50th (m)		0.0		26.4	0.0			34.5	0.0	6.0	14.8	0.0
Queue Length 95th (m)		0.0		43.4	0.0			64.6	7.7	15.2	29.9	0.0
Internal Link Dist (m)		103.3			213.9			609.3			1128.0	
Turn Bay Length (m)				70.0						100.0		30.0
Base Capacity (vph)		924		418	705			1356	1236	602	1356	581
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		0.33	0.08			0.38	0.19	0.18	0.19	0.00

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 10.1

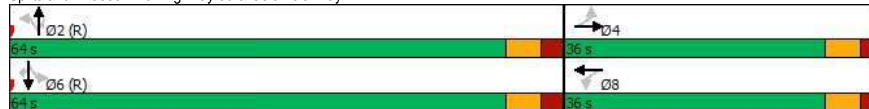
Intersection LOS: B

Intersection Capacity Utilization 72.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Columbia Way



Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2031 Future Background PM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	8	7	12	40	9	18	78	741	92	26	352	20
Future Volume (vph)	8	7	12	40	9	18	78	741	92	26	352	20
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)	0.0			85.0			0.0	85.0		75.0	65.0	50.0
Storage Lanes	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		0.99		1.00	0.99		1.00					0.98
Frt		0.940			0.898				0.850			0.850
Flt Protected		0.985		0.950			0.950			0.950		
Satd. Flow (prot)	0	1760	0	1785	1709	0	1785	3614	1559	1785	1883	1591
Flt Permitted		0.903		0.740			0.541			0.355		
Satd. Flow (perm)	0	1612	0	1385	1709	0	1014	3614	1559	667	1883	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			19				95			51
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			55.6			45.6	
Confl. Peds. (#/hr)	2		3	3		2	2					2
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	8	7	12	41	9	19	80	764	95	27	363	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	41	28	0	80	764	95	27	363	21
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2		6		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)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	47.1	47.1		47.1	47.1		34.7	34.7	34.7	34.7	34.7	34.7
Total Split (s)	50.0	50.0		50.0	50.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	45.5%	45.5%		45.5%	45.5%		54.5%	54.5%	54.5%	54.5%	54.5%	54.5%
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)	4.1	4.1		4.1	4.1		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)		8.1		8.1	8.1		6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		15.9		15.9	15.9		84.3	84.3	84.3	84.3	84.3	84.3
Actuated g/C Ratio		0.14		0.14	0.14		0.77	0.77	0.77	0.77	0.77	0.77
v/c Ratio		0.11		0.21	0.11		0.10	0.28	0.08	0.05	0.25	0.02
Control Delay		24.0		39.9	18.6		7.7	6.9	2.4	8.3	7.5	0.5
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings

2031 Future Background PM

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		24.0		39.9	18.6		7.7	6.9	2.4	8.3	7.5	0.5
LOS		C		D	B		A	A	A	A	A	A
Approach Delay		24.0			31.2			6.6			7.2	
Approach LOS		C			C			A			A	
Queue Length 50th (m)		3.2		8.8	1.9		3.6	21.3	0.0	1.2	18.9	0.0
Queue Length 95th (m)		8.4		14.1	7.6		18.4	69.3	8.1	8.0	70.0	0.7
Internal Link Dist (m)		88.1			177.9			747.8			609.3	
Turn Bay Length (m)				85.0			85.0		75.0	65.0		50.0
Base Capacity (vph)		621		527	662		777	2769	1216	511	1442	1201
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		0.04		0.08	0.04		0.10	0.28	0.08	0.05	0.25	0.02

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 96 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.28

Intersection Signal Delay: 8.2

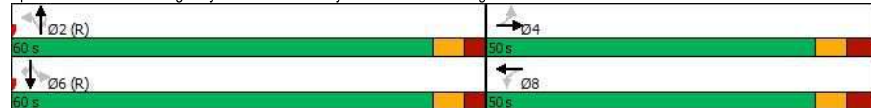
Intersection LOS: A

Intersection Capacity Utilization 60.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings

2031 Future Background PM

5: Highway 50 & King Street West/King Street East

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	241	94	211	269	42	81	778	430	34	393	23
Future Volume (vph)	55	241	94	211	269	42	81	778	430	34	393	23
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.96	0.99	0.99		0.99		0.96		1.00	
Frt			0.850		0.980				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1575	1712	1409	1591	1669	0	1610	1712	1432	1643	1683	0
Flt Permitted	0.514			0.297			0.369			0.105		
Satd. Flow (perm)	835	1712	1358	493	1669	0	621	1712	1372	182	1683	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125		6				273		2	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)	11		6	6		11	10		8	8		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	1%	1%	0%	2%	1%	0%	0%	1%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	57	248	97	218	277	43	84	802	443	35	405	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	248	97	218	320	0	84	802	443	35	429	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	15.0	33.0	33.0	30.0	48.0		22.0	67.0	67.0	10.0	55.0	
Total Split (%)	10.7%	23.6%	23.6%	21.4%	34.3%		15.7%	47.9%	47.9%	7.1%	39.3%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	37.2	24.6	24.6	51.9	38.1		81.5	70.3	70.3	76.8	66.3	
Actuated g/C Ratio	0.27	0.18	0.18	0.37	0.27		0.58	0.50	0.50	0.55	0.47	
v/c Ratio	0.21	0.82	0.28	0.64	0.70		0.20	0.93	0.54	0.21	0.54	
Control Delay	29.3	77.3	5.5	39.8	53.5		15.6	53.0	12.6	17.8	31.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	29.3	77.3	5.5	39.8	53.5		15.6	53.0	12.6	17.8	31.3	

Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2031 Future Background PM

07-08-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	D	D		B	D	B	B	C	
Approach Delay		53.2			48.0			37.1			30.3	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	10.6	69.7	0.0	45.4	83.2		10.5	224.3	32.0	4.2	87.8	
Queue Length 95th (m)	19.1	#102.0	8.7	62.6	113.9		21.1	#342.9	72.6	10.6	139.6	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	305	330	362	394	499		498	859	824	174	797	
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	0.19	0.75	0.27	0.55	0.64		0.17	0.93	0.54	0.20	0.54	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 62 (44%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 40.5 Intersection LOS: D

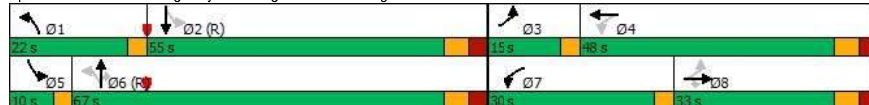
Intersection Capacity Utilization 96.2% ICU Level of Service F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Highway 50 & King Street West/King Street East



Lanes, Volumes, Timings

6: Kingsview Drive & Columbia Way

2031 Future Background PM

07-08-2024

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations	↔	↔	↔	↔	↔	↔	
Traffic Volume (vph)	165	57	54	85	22	35	
Future Volume (vph)	165	57	54	85	22	35	
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				0.917		
Flt Protected				0.981	0.981		
Satd. Flow (prot)	1840	0	0	1862	1695	0	
Flt Permitted				0.823	0.981		
Satd. Flow (perm)	1840	0	0	1558	1695	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	35				38		
Link Speed (k/h)	40			40	40		
Link Distance (m)	237.9			417.0	131.8		
Travel Time (s)	21.4			37.5	11.9		
Confl. Peds. (#/hr)		3	3				
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	
Heavy Vehicles (%)	0%	0%	0%	2%	5%	0%	
Adj. Flow (vph)	181	63	59	93	24	38	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	244	0	0	152	62	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6		8	
Permitted Phases			6		4		
Detector Phase	2		6	6	4		
Switch Phase							
Minimum Initial (s)	8.0		8.0	8.0	8.0	8.0	
Minimum Split (s)	21.0		21.0	21.0	21.9	21.9	
Total Split (s)	70.0		70.0	70.0	30.0	30.0	
Total Split (%)	70.0%		70.0%	70.0%	30.0%	30%	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.9	2.9	
Lost Time Adjust (s)	0.0			0.0	0.0		
Total Lost Time (s)	6.0			6.0	6.9		
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Max		Max	Max	None	Ped	
Act Effct Green (s)	64.0			64.0	15.0		
Actuated g/C Ratio	0.70			0.70	0.16		
v/c Ratio	0.19			0.14	0.20		
Control Delay	4.5			5.1	18.8		
Queue Delay	0.0			0.0	0.0		
Total Delay	4.5			5.1	18.8		
LOS	A			A	B		
Approach Delay	4.5			5.1	18.8		
Approach LOS	A			A	B		
Queue Length 50th (m)	11.5			8.2	3.9		
Queue Length 95th (m)	19.6			14.6	15.2		

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

2031 Future Background PM
07-08-2024










	→	↗	↖	←	↘	↙	Ø8
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Internal Link Dist (m)	213.9			393.0	107.8		
Turn Bay Length (m)							
Base Capacity (vph)	1292			1085	454		
Starvation Cap Reductn	0			0	0		
Spillback Cap Reductn	0			0	0		
Storage Cap Reductn	0			0	0		
Reduced v/c Ratio	0.19			0.14	0.14		
Intersection Summary							
Area Type:	Other						
Cycle Length: 100							
Actuated Cycle Length: 91.9							
Natural Cycle: 45							
Control Type: Semi Act-Uncoord							
Maximum v/c Ratio: 0.20							
Intersection Signal Delay: 6.6	Intersection LOS: A						
Intersection Capacity Utilization 42.4%	ICU Level of Service A						
Analysis Period (min) 15							

Splits and Phases: 6: Kingsview Drive & Columbia Way

→ Ø2	↖ Ø4
70 s	30 s
← Ø6	↘ Ø8
70 s	30 s

















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

2031 Future Background PM
07-08-2024

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	147	80	37	138	37	22
Future Volume (Veh/h)	147	80	37	138	37	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	160	87	40	150	40	24
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			247		434	204
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			247		434	204
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		93	97
cM capacity (veh/h)			1331		566	842
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	247	190	64			
Volume Left	0	40	40			
Volume Right	87	0	24			
cSH	1700	1331	645			
Volume to Capacity	0.15	0.03	0.10			
Queue Length 95th (m)	0.0	0.7	2.6			
Control Delay (s)	0.0	1.8	11.2			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.8	11.2			
Approach LOS			B			
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization	35.3%		ICU Level of Service		A	
Analysis Period (min)	15					










HCM Unsignalized Intersection Capacity Analysis
8: Mount Hope Road & Columbia Way













2031 Future Background PM
07-08-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	124	29	18	126	6	16	5	8	14	7	26
Future Volume (Veh/h)	20	124	29	18	126	6	16	5	8	14	7	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	131	31	19	133	6	17	5	8	15	7	27
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	139			162			393	366	146	373	378	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	139			162			393	366	146	373	378	136
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	99	99	97	99	97
cM capacity (veh/h)	1457			1429			536	550	906	566	542	918
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	183	158	30	49								
Volume Left	21	19	17	15								
Volume Right	31	6	8	27								
cSH	1457	1429	605	712								
Volume to Capacity	0.01	0.01	0.05	0.07								
Queue Length 95th (m)	0.4	0.3	1.3	1.8								
Control Delay (s)	1.0	1.0	11.3	10.4								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.0	1.0	11.3	10.4								
Approach LOS			B	B								
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			22.4%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2031 Future Background PM
07-08-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	79	146	463	200	43
Future Volume (Veh/h)	21	79	146	463	200	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	22	81	151	477	206	44
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	1007	228	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1007	228	250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	90	89			
cM capacity (veh/h)	238	816	1321			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	103	628	250			
Volume Left	22	151	0			
Volume Right	81	0	44			
cSH	538	1321	1700			
Volume to Capacity	0.19	0.11	0.15			
Queue Length 95th (m)	5.6	3.1	0.0			
Control Delay (s)	13.3	2.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.3	2.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			61.6%	ICU Level of Service		B
Analysis Period (min)			15			

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	17	64	490	227	5
Future Volume (Veh/h)	4	17	64	490	227	5
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	5	20	76	583	270	6
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	1005	270	276			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1005	270	276			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	94			
cM capacity (veh/h)	254	774	1299			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	25	76	583	270	6	
Volume Left	5	76	0	0	0	
Volume Right	20	0	0	0	6	
cSH	549	1299	1700	1700	1700	
Volume to Capacity	0.05	0.06	0.34	0.16	0.00	
Queue Length 95th (m)	1.1	1.5	0.0	0.0	0.0	
Control Delay (s)	11.9	7.9	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	11.9	0.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization		35.8%	ICU Level of Service		A	
Analysis Period (min)			15			

FUTURE BACKGROUND 2041

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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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\2024_Analysis\Arcady

Report generation date: 2024-06-13 2:02:35 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2041 Future Background						
Emil Kolb Pkwy (North)	0.19	0.94	0.97	N/A	A	1.07	A
Emil Kolb Pkwy (South)	0.10	0.30	0.92	N/A	A		
King Street	0.24	1.23	1.26	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 2:02:35 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials

1.00	-1	3	1	10	1190439983	2872
------	----	---	---	----	------------	------

(Default Analysis Set) - 2041 Future Background, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Background, AM	2041 Future Background	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.07	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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		86.00

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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Interaction	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓		

Traffic Flows

Demand Set Data Options

[illegible]

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)	PHF	✓	575.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	343.00	100.000
King Street	PHF	✓	569.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	575.00	0.95	SecondQuarter
Emil Kolb Pkwy (South)	343.00	0.95	SecondQuarter
King Street	569.00	0.95	SecondQuarter

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	120.000	223.000
	Emil Kolb Pkwy (North)	354.000	0.000	221.000
	King Street	433.000	136.000	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	0.35	0.65
	Emil Kolb Pkwy (North)	0.62	0.00	0.38
	King Street	0.76	0.24	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	1.310	1.075
	Emil Kolb Pkwy (North)	1.032	1.000	1.022
King Street	1.061	1.097	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	31.0	7.5
	Emil Kolb Pkwy (North)	3.2	0.0	2.2
	King Street	6.1	9.7	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	0.97	0.19	0.94	A	574.37	574.37	9.14	0.95	0.15
Emil Kolb Pkwy (South)	0.92	0.10	0.30	A	342.61	342.61	5.59	0.98	0.09
King Street	1.26	0.24	1.23	A	572.41	572.41	11.96	1.25	0.20

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 1:28:22 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2041 Future Background							
Emil Kolb Pkwy (North)	0.19	1.01	1.90	N/A	A	2.15	A
Emil Kolb Pkwy (South)	0.91	3.88	2.91	N/A	A		
King Street	0.18	1.06	0.95	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 1:28:22 PM

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	Crozler 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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials

1.00	-1	3	1	10	1167760222	1150
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(Default Analysis Set) - 2041 Future Background, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Background, PM	2041 Future Background	PM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	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 (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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓		

Traffic Flows

Demand Set Data Options

[illegible]

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)	PHF	✓	340.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	1071.00	100.000
King Street	PHF	✓	602.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	340.00	1.00	SecondQuarter
Emil Kolb Pkwy (South)	1071.00	1.00	SecondQuarter
King Street	602.00	1.00	SecondQuarter

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	
	0.000	443.000	628.000	
	196.000	0.000	144.000	
	King Street	362.000	240.000	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	
	0.00	0.41	0.59	
	0.58	0.00	0.42	
	King Street	0.60	0.40	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	
	1.000	1.021	1.067	
	1.103	1.000	1.077	
	King Street	1.047	1.015	1.000

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

From	To			
	Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street	
	0.0	2.1	6.7	
	10.3	0.0	7.7	
	King Street	4.7	1.5	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	1.90	0.19	1.01	A	339.89	339.89	11.70	2.07	0.20
Emil Kolb Pkwy (South)	2.91	0.91	3.88	A	1064.60	1064.60	53.33	3.01	0.89
King Street	0.95	0.18	1.06	A	601.80	601.80	9.55	0.95	0.16

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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:59:26 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2041 Future Background						
Emil Kolb Pkwy	0.10	0.42	1.20	N/A	A	1.10	A
Highway 50 (North)	0.33	1.72	1.31	N/A	A		
Highway 50 (South)	0.07	~1	0.54	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 2:59:26 PM

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	35.00	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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	860696877	3534

(Default Analysis Set) - 2041 Future Background, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Background, AM	2041 Future Background	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.10	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

Traffic Flows

Demand Set Data Options

Default Vehicle	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Source	PCE Factor for a Truck	Default Turning	Estimate from entry/exit	Turning Proportions Vary	Turning Proportions Vary	Turning Proportions Vary
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Mix	Time	Turn	Entry		(PCE)	Proportions	counts	Over Time	Over Turn	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	PHF	✓	222.00	100.000
Highway 50 (North)	PHF	✓	803.00	100.000
Highway 50 (South)	PHF	✓	330.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	222.00	0.96	SecondQuarter
Highway 50 (North)	803.00	0.96	SecondQuarter
Highway 50 (South)	330.00	0.96	SecondQuarter

Turning Proportions

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.000	230.000	100.000
	Highway 50 (North)	442.000	0.000	361.000
	Emil Kolb Pkwy	46.000	176.000	0.000

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0,00	0,70	0,30
	Highway 50 (North)	0,55	0,00	0,45
	Emil Kolb Pkwy	0,21	0,79	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	1,037	1,027
	Highway 50 (North)	1,008	1,000	1,053
	Emil Kolb Pkwy	1,057	1,277	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	3,7	2,7
	Highway 50 (North)	0,8	0,0	5,3
	Emil Kolb Pkwy	5,7	27,7	0,0

Results

Results Summary for whole modelled period

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Name	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)
Emil Kolb Pkwy	1.20	0.10	0.42	A	222.77	222.77	5.19	1.40	0.09
Highway 50 (North)	1.31	0.33	1.72	A	802.09	802.09	17.03	1.27	0.28
Highway 50 (South)	0.54	0.07	~1	A	328.57	328.57	3.02	0.55	0.05

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\2024_Analysis\Arcady
Report generation date: 2024-06-13 3:22:13 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2041 Future Background						
Emil Kolb Pkwy	0.16	0.81	0.92	N/A	A	1.03	A
Highway 50 (North)	0.12	0.65	0.77	N/A	A		
Highway 50 (South)	0.24	1.18	1.34	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM " model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 3:22:13 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	876591964	1853

(Default Analysis Set) - 2041 Future Background, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Background, PM	2041 Future Background	PM		PHF	15:00	16:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.03	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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V • Approach road half-width (m)	E • Entry width (m)	F • 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

Traffic Flows

Demand Set Data Options

Default Vehicle	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Varies Over	Vehicle Mix Source	PCE Factor for a Truck	Default Turning	Estimate from entry/exit	Turning Proportions Vary	Turning Proportions Vary	Turning Proportions Vary
-----------------	-------------------------	-------------------------	-------------------------	--------------------	------------------------	-----------------	--------------------------	--------------------------	--------------------------	--------------------------

Mix	Time	Turn	Entry		(PCE)	Proportions	counts	Over Time	Over Turn	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	PHF	✓	543.00	100.000
Highway 50 (North)	PHF	✓	453.00	100.000
Highway 50 (South)	PHF	✓	583.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	543.00	0.91	SecondQuarter
Highway 50 (North)	453.00	0.91	SecondQuarter
Highway 50 (South)	583.00	0.91	SecondQuarter

Turning Proportions

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.000	529.000	54.000
	Highway 50 (North)	268.000	0.000	185.000
	Emil Kolb Pkwy	101.000	442.000	0.000

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.00	0.91	0.09
	Highway 50 (North)	0.59	0.00	0.41
	Emil Kolb Pkwy	0.19	0.81	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	1.013	1.000
	Highway 50 (North)	1.013	1.000	1.134
	Emil Kolb Pkwy	1.013	1.023	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	1.3	0.0
	Highway 50 (North)	1.3	0.0	13.4
	Emil Kolb Pkwy	1.3	2.3	0.0

Results

Results Summary for whole modelled period

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Name	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)
Emil Kolb Pkwy	0.92	0.16	0.81	A	539.77	539.77	7.57	0.84	0.13
Highway 50 (North)	0.77	0.12	0.65	A	452.18	452.18	5.75	0.76	0.10
Highway 50 (South)	1.34	0.24	1.18	A	584.37	584.37	11.29	1.16	0.19

Lanes, Volumes, Timings

3: Highway 50 & Private Access/Columbia Way

2041 Future Background AM

07-08-2024

	↖	→	↘	↙	←	↖	↗	↘	↙	↖	↗	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕	
Traffic Volume (vph)	3	0	9	192	2	87	2	229	104	63	417	2	
Future Volume (vph)	3	0	9	192	2	87	2	229	104	63	417	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	0.0		0.0	140.0		30.0	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		0.896			0.853				0.850		0.999		
Flt Protected		0.989		0.950			0.950			0.950			
Satd. Flow (prot)	0	954	0	1750	1575	0	892	3476	1595	1700	3575	0	
Flt Permitted		0.941		0.749			0.490			0.597			
Satd. Flow (perm)	0	908	0	1380	1575	0	460	3476	1595	1068	3575	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		67			95			113			1		
Link Speed (k/h)		50			40			50			60		
Link Distance (m)		127.3			237.9			633.3			1152.0		
Travel Time (s)		9.2			21.4			45.6			69.1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	100%	0%	72%	2%	100%	2%	100%	5%	2%	5%	2%	0%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1	
Adj. Flow (vph)	3	0	10	209	2	95	2	249	113	68	453	2	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	13	0	209	97	0	2	249	113	68	455	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		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)	26.0	26.0		26.0	26.0		34.0	34.0	34.0	34.0	34.0		
Total Split (%)	43.3%	43.3%		43.3%	43.3%		56.7%	56.7%	56.7%	56.7%	56.7%		
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?													
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max		
Act Effct Green (s)		14.3			14.3		33.0	33.0	33.0	33.0	33.0		
Actuated g/C Ratio		0.24		0.24	0.24		0.55	0.55	0.55	0.55	0.55		
v/c Ratio		0.05		0.64	0.22		0.01	0.13	0.12	0.12	0.23		
Control Delay		0.3		28.6	5.5		5.5	6.7	3.4	8.9	8.2		
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0		
Total Delay		0.3		28.6	5.5		5.5	6.7	3.4	8.9	8.2		
LOS		A		C	A		A	A	A	A	A		
Approach Delay		0.3			21.3			5.7			8.3		

Lanes, Volumes, Timings

3: Highway 50 & Private Access/Columbia Way

2041 Future Background AM

07-08-2024

	↖	→	↘	↙	←	↖	↗	↘	↙	↖	↗	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Approach LOS		A			C			A			A		
Queue Length 50th (m)		0.0		21.7	0.2		0.2	21.7	9.7	3.4	12.8		
Queue Length 95th (m)		0.0		36.1	8.5		m0.4	5.6	0.1	10.8	25.0		
Internal Link Dist (m)		103.3			213.9			609.3			1128.0		
Turn Bay Length (m)						140.0			30.0	125.0			
Base Capacity (vph)		347		460	588		253	1910	927	587	1965		
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		0.04		0.45	0.16		0.01	0.13	0.12	0.12	0.23		

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 10.7

Intersection LOS: B

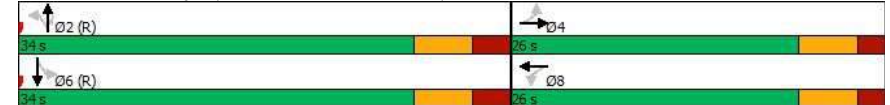
Intersection Capacity Utilization 66.8%

ICU Level of Service C

Analysis Period (min) 15

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

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



Lanes, Volumes, Timings

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

2041 Future Background AM

07-08-2024













	←	→	↙	↘	↖	↗	↕	↙	↘	↖	↗	↕
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	15	27	26	128	14	56	12	287	60	54	570	7
Future Volume (vph)	15	27	26	128	14	56	12	287	60	54	570	7
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	0.99				0.98		1.00				1.00	
Frt		0.927			0.880			0.850			0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1712	0	1785	1628	0	1623	3476	1591	1785	3571	0
Flt Permitted	0.702			0.588			0.364			0.544		
Satd. Flow (perm)	1301	1712	0	1105	1628	0	619	3476	1591	1022	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			67				74		1	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			55.6			45.6	
Confl. Peds. (#/hr)	17					17	8					8
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	0%	4%	4%	0%	0%	2%	10%	5%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	33	31	154	17	67	14	346	72	65	687	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	64	0	154	84	0	14	346	72	65	695	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	47.1	47.1		8.0	47.1		34.7	34.7	34.7	34.7	34.7	
Total Split (s)	60.0	60.0		15.0	75.0		45.0	45.0	45.0	45.0	45.0	
Total Split (%)	50.0%	50.0%		12.5%	62.5%		37.5%	37.5%	37.5%	37.5%	37.5%	
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)	4.1	4.1		0.0	4.1		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)	8.1	8.1		3.0	8.1		6.7	6.7	6.7	6.7	6.7	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Act Effct Green (s)	15.8	15.8		32.9	27.8		77.4	77.4	77.4	77.4	77.4	
Actuated g/C Ratio	0.13	0.13		0.27	0.23		0.64	0.64	0.64	0.64	0.64	
v/c Ratio	0.11	0.25		0.41	0.20		0.04	0.15	0.07	0.10	0.30	
Control Delay	41.7	26.4		35.2	10.2		28.3	23.1	16.4	14.3	13.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings

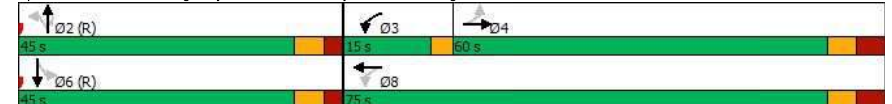
4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

2041 Future Background AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	41.7	26.4		35.2	10.2		28.3	23.1	16.4	14.3	13.9	
LOS	D	C		D	B		C	C	B	B	B	
Approach Delay		29.8			26.4			22.2			13.9	
Approach LOS		C			C			C			B	
Queue Length 50th (m)	4.2	7.8		31.4	3.4		2.4	33.0	5.3	6.7	41.2	
Queue Length 95th (m)	8.0	14.4		30.8	10.0		m7.2	49.5	m16.0	18.2	70.9	
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)	562	758		374	937		399	2242	1052	659	2303	
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	0.08		0.41	0.09		0.04	0.15	0.07	0.10	0.30	
Intersection Summary												
Area Type:	Other											
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 39 (33%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 90												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.41												
Intersection Signal Delay: 19.1						Intersection LOS: B						
Intersection Capacity Utilization 71.4%						ICU Level of Service C						
Analysis Period (min) 15												
m Volume for 95th percentile queue is metered by upstream signal.												

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



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

2041 Future Background AM
07-08-2024

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	→	↗	↖	↖	↖	↖	→	↗	↖	↖	↖
Traffic Volume (vph)	27	233	85	300	227	61	54	307	120	59	633	24
Future Volume (vph)	27	233	85	300	227	61	54	307	120	59	633	24
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor									0.97	1.00	1.00	
Frt			0.850		0.968				0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1606	1695	1437	1591	1635	0	1564	1662	1417	1643	1694	0
Flt Permitted	0.565			0.332			0.176			0.481		
Satd. Flow (perm)	955	1695	1437	556	1635	0	290	1662	1379	829	1694	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			118		11				128		2	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)							2		3	3		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	0%	1%	3%	0%	5%	4%	1%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	29	248	90	319	241	65	57	327	128	63	673	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	248	90	319	306	0	57	327	128	63	699	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	11.0	32.0	32.0	18.0	39.0		8.0	59.0	59.0	11.0	62.0	
Total Split (%)	9.2%	26.7%	26.7%	15.0%	32.5%		6.7%	49.2%	49.2%	9.2%	51.7%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	32.2	21.5	21.5	43.4	33.3		66.9	58.1	58.1	69.4	59.4	
Actuated g/C Ratio	0.27	0.18	0.18	0.36	0.28		0.56	0.48	0.48	0.58	0.50	
v/c Ratio	0.10	0.82	0.25	0.97	0.66		0.25	0.41	0.17	0.12	0.83	
Control Delay	24.6	68.0	5.1	74.6	45.4		14.7	23.5	4.1	11.7	39.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	24.6	68.0	5.1	74.6	45.4		14.7	23.5	4.1	11.7	39.7	

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

2041 Future Background AM
07-08-2024

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	E	D		B	C	A	B	D	
Approach Delay		49.2			60.3			17.6			37.4	
Approach LOS		D			E			B			D	
Queue Length 50th (m)	4.6	58.9	0.0	61.6	66.8		5.9	53.5	0.0	9.7	178.6	
Queue Length 95th (m)	10.9	87.5	8.1	#116.8	99.3		12.7	82.8	11.6	6.1	#241.8	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	309	354	393	330	464		224	805	734	536	839	
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	0.09	0.70	0.23	0.97	0.66		0.25	0.41	0.17	0.12	0.83	

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 115 (96%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 41.2 Intersection LOS: D

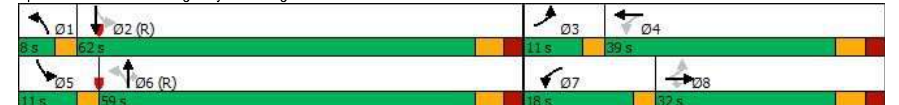
Intersection Capacity Utilization 93.2% ICU Level of Service F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Highway 50 & King St









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

2041 Future Background AM
07-08-2024

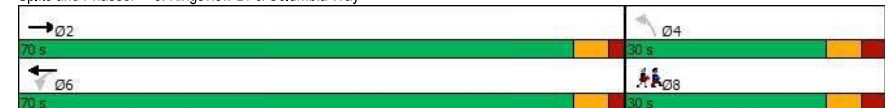
	→	↗	↖	←	↘	↙	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations	↑↑			↑↑	↖		
Traffic Volume (vph)	111	28	107	139	36	51	
Future Volume (vph)	111	28	107	139	36	51	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	0.99			1.00	0.99		
Frt	0.970				0.921		
Flt Protected				0.979	0.980		
Satd. Flow (prot)	3519	0	0	3469	1712	0	
Flt Permitted				0.755	0.980		
Satd. Flow (perm)	3519	0	0	2666	1712	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	34				61		
Link Speed (k/h)	40			40	40		
Link Distance (m)	237.9			417.0	131.8		
Travel Time (s)	21.4			37.5	11.9		
Confl. Peds. (#/hr)		3	3			5	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	
Heavy Vehicles (%)	0%	0%	3%	3%	0%	0%	
Adj. Flow (vph)	134	34	129	167	43	61	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	168	0	0	296	104	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			8
Permitted Phases			6		4		
Detector Phase	2		6	6	4		
Switch Phase							
Minimum Initial (s)	8.0		8.0	8.0	8.0		8.0
Minimum Split (s)	21.0		21.0	21.0	21.9		21.9
Total Split (s)	70.0		70.0	70.0	30.0		30.0
Total Split (%)	70.0%		70.0%	70.0%	30.0%		30%
Yellow Time (s)	4.0		4.0	4.0	4.0		4.0
All-Red Time (s)	2.0		2.0	2.0	2.9		2.9
Lost Time Adjust (s)	0.0			0.0	0.0		
Total Lost Time (s)	6.0			6.0	6.9		
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Max		Max	Max	None		Ped
Act Effct Green (s)	64.0			64.0	15.0		
Actuated g/C Ratio	0.70			0.70	0.16		
v/c Ratio	0.07			0.16	0.32		
Control Delay	3.6			5.0	19.1		
Queue Delay	0.0			0.0	0.0		
Total Delay	3.6			5.0	19.1		
LOS	A			A	B		
Approach Delay	3.6			5.0	19.1		
Approach LOS	A			A	B		
Queue Length 50th (m)	3.5			8.5	7.0		
Queue Length 95th (m)	5.8			11.8	18.9		

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

2041 Future Background AM
07-08-2024










							
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Internal Link Dist (m)	213.9			393.0	107.8		
Turn Bay Length (m)							
Base Capacity (vph)	2460			1856	475		
Starvation Cap Reductn	0			0	0		
Spillback Cap Reductn	0			0	0		
Storage Cap Reductn	0			0	0		
Reduced v/c Ratio	0.07			0.16	0.22		
Intersection Summary							
Area Type:	Other						
Cycle Length: 100							
Actuated Cycle Length: 91.9							
Natural Cycle: 45							
Control Type: Semi Act-Uncoord							
Maximum v/c Ratio: 0.32							
Intersection Signal Delay: 7.2				Intersection LOS: A			
Intersection Capacity Utilization 42.8%				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

2041 Future Background AM
07-08-2024

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	105	43	30	177	62	40
Future Volume (Veh/h)	105	43	30	177	62	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	131	54	38	221	78	50
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			185		344	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			185		344	92
tC, single (s)			4.2		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		87	95
cM capacity (veh/h)			1373		609	937
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	87	98	112	147	128	
Volume Left	0	0	38	0	78	
Volume Right	0	54	0	0	50	
cSH	1700	1700	1373	1700	705	
Volume to Capacity	0.05	0.06	0.03	0.09	0.18	
Queue Length 95th (m)	0.0	0.0	0.7	0.0	5.3	
Control Delay (s)	0.0	0.0	2.8	0.0	11.2	
Lane LOS			A	B		
Approach Delay (s)	0.0	1.2		11.2		
Approach LOS			B			
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			25.9%	ICU Level of Service		A
Analysis Period (min)			15			







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

2041 Future Background AM
07-08-2024

	↖	→	↗	↖	←	↙	↘	↑	↗	↖	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↖			↘	
Traffic Volume (veh/h)	27	113	12	3	123	9	30	5	14	21	4	51
Future Volume (Veh/h)	27	113	12	3	123	9	30	5	14	21	4	51
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	33	138	15	4	150	11	37	6	17	26	5	62
Pedestrians		1			2						1	
Lane Width (m)		3.7			3.7						3.7	
Walking Speed (m/s)		1.2			1.2						1.2	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	162			153			360	382	78	322	384	82
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	162			153			360	382	78	322	384	82
tC, single (s)	4.1			4.1			7.5	6.5	7.1	7.5	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	98			100			93	99	98	96	99	94
cM capacity (veh/h)	1428			1440			523	540	939	583	538	956
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	102	84	79	86	60	93						
Volume Left	33	0	4	0	37	26						
Volume Right	0	15	0	11	17	62						
cSH	1428	1700	1440	1700	601	783						
Volume to Capacity	0.02	0.05	0.00	0.05	0.10	0.12						
Queue Length 95th (m)	0.6	0.0	0.1	0.0	2.7	3.2						
Control Delay (s)	2.6	0.0	0.4	0.0	11.7	10.2						
Lane LOS	A		A		B	B						
Approach Delay (s)	1.4		0.2		11.7	10.2						
Approach LOS					B	B						
Intersection Summary												
Average Delay				3.9								
Intersection Capacity Utilization			24.5%		ICU Level of Service				A			
Analysis Period (min)			15									







HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2041 Future Background AM
07-08-2024

	EBL	EBR	NBL	NBT	SBT	SBR
Movement						
Lane Configurations						
Traffic Volume (veh/h)	25	201	46	121	551	23
Future Volume (Veh/h)	25	201	46	121	551	23
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	214	49	129	586	24
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	825	598	610			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	825	598	610			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	91	57	95			
cM capacity (veh/h)	314	502	931			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	27	214	49	129	610	
Volume Left	27	0	49	0	0	
Volume Right	0	214	0	0	24	
cSH	314	502	931	1700	1700	
Volume to Capacity	0.09	0.43	0.05	0.08	0.36	
Queue Length 95th (m)	2.2	16.8	1.3	0.0	0.0	
Control Delay (s)	17.5	17.4	9.1	0.0	0.0	
Lane LOS	C	C	A			
Approach Delay (s)	17.4		2.5		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			49.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb Parkway & Duffy's Lane

2041 Future Background AM
07-08-2024

	EBL	EBR	NBL	NBT	SBT	SBR
Movement						
Lane Configurations						
Traffic Volume (veh/h)	4	41	19	219	496	4
Future Volume (Veh/h)	4	41	19	219	496	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	46	21	243	551	4
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	716	278	555			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	716	278	555			
tC, single (s)	6.8	7.0	4.5			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	99	94	98			
cM capacity (veh/h)	360	717	903			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	50	21	122	122	367	188
Volume Left	4	21	0	0	0	0
Volume Right	46	0	0	0	0	4
cSH	664	903	1700	1700	1700	1700
Volume to Capacity	0.08	0.02	0.07	0.07	0.22	0.11
Queue Length 95th (m)	1.9	0.6	0.0	0.0	0.0	0.0
Control Delay (s)	10.9	9.1	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.9	0.7			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay				0.8		
Intersection Capacity Utilization				25.8%		ICU Level of Service
Analysis Period (min)				15		A

Lanes, Volumes, Timings

3: Highway 50 & Private Access/Columbia Way

2041 Future Background PM

07-08-2024

	↖	→	↘	↙	←	↖	↗	↘	↙	↖	↗	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕		↕	↕		↕	↕	↕	↕	↕	↕	
Traffic Volume (vph)	0	0	2	138	0	56	0	516	232	106	264	2	
Future Volume (vph)	0	0	2	138	0	56	0	516	232	106	264	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	0.0		0.0	140.0		30.0	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		0.865			0.850				0.850		0.999		
Flt Protected				0.950						0.950			
Satd. Flow (prot)	0	1662	0	1750	1555	0	1879	3579	1626	1785	3550	0	
Flt Permitted				0.757						0.452			
Satd. Flow (perm)	0	1662	0	1394	1555	0	1879	3579	1626	849	3550	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		516			247				242		2		
Link Speed (k/h)		50			40			50			60		
Link Distance (m)		127.3			237.9			633.3			1152.0		
Travel Time (s)		9.2			21.4			45.6			69.1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	100%	0%	0%	2%	0%	5%	0%	2%	0%	0%	2%	100%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1	
Adj. Flow (vph)	0	0	2	144	0	58	0	538	242	110	275	2	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	2	0	144	58	0	0	538	242	110	277	0	
Turn Type		NA		Perm	NA		Perm	NA	Perm	Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4			8			2		2		6		
Detector Phase	4	4		8	8		2	2	2		6	6	
Switch Phase													
Minimum Initial (s)	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		14.0	14.0		30.7	30.7	30.7	30.7	30.7		
Total Split (s)	25.0	25.0		25.0	25.0		35.0	35.0	35.0	35.0	35.0		
Total Split (%)	41.7%	41.7%		41.7%	41.7%		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?													
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max		
Act Effct Green (s)		11.9			11.9			39.6	39.6	39.6	39.6		
Actuated g/C Ratio		0.20		0.20	0.20			0.66	0.66	0.66	0.66		
v/c Ratio		0.00		0.52	0.11			0.23	0.21	0.20	0.12		
Control Delay		0.0		27.7	0.5			6.4	1.7	8.1	6.0		
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0		
Total Delay		0.0		27.7	0.5			6.4	1.7	8.1	6.0		
LOS		A		C	A			A	A	A	A		
Approach Delay					19.9			4.9			6.6		

Lanes, Volumes, Timings

3: Highway 50 & Private Access/Columbia Way

2041 Future Background PM

07-08-2024

	↖	→	↘	↙	←	↖	↗	↘	↙	↖	↗	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Approach LOS					B			A				A	
Queue Length 50th (m)		0.0		15.1	0.0			13.5	0.0	5.2	6.3		
Queue Length 95th (m)		0.0		27.6	0.0			25.7	8.8	15.3	13.6		
Internal Link Dist (m)		103.3			213.9			609.3			1128.0		
Turn Bay Length (m)								30.0	125.0				
Base Capacity (vph)		878		441	661			2359	1154	559	2341		
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		0.00		0.33	0.09			0.23	0.21	0.20	0.12		

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 7.6

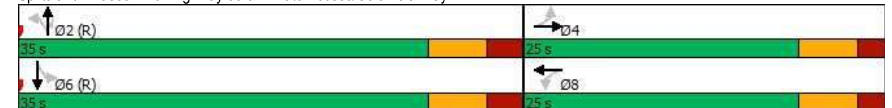
Intersection LOS: A

Intersection Capacity Utilization 63.8%

ICU Level of Service B

Analysis Period (min) 15

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



Lanes, Volumes, Timings

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

2041 Future Background PM

07-08-2024













	←	→	↙	↘	↖	↗	↕	↖	↗	↕	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	8	7	12	40	9	18	82	774	96	28	367	21
Future Volume (vph)	8	7	12	40	9	18	82	774	96	28	367	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		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	0.98		1.00	0.99		1.00				1.00	
Frt		0.905			0.898				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1712	0	1785	1709	0	1785	3614	1559	1785	3549	0
Flt Permitted	0.739			0.745			0.516			0.341		
Satd. Flow (perm)	1386	1712	0	1394	1709	0	967	3614	1559	641	3549	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			19				99		7	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			55.6			45.6	
Confl. Peds. (#/hr)	2		3	3		2	2					2
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	8	7	12	41	9	19	85	798	99	29	378	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	19	0	41	28	0	85	798	99	29	400	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2		2	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	47.1	47.1		47.1	47.1		34.7	34.7	34.7	34.7	34.7	
Total Split (s)	50.0	50.0		50.0	50.0		60.0	60.0	60.0	60.0	60.0	
Total Split (%)	45.5%	45.5%		45.5%	45.5%		54.5%	54.5%	54.5%	54.5%	54.5%	
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)	4.1	4.1		4.1	4.1		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)	8.1	8.1		8.1	8.1		6.7	6.7	6.7	6.7	6.7	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Act Effct Green (s)	15.9	15.9		15.9	15.9		84.3	84.3	84.3	84.3	84.3	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.77	0.77	0.77	0.77	0.77	
v/c Ratio	0.04	0.07		0.20	0.11		0.11	0.29	0.08	0.06	0.15	
Control Delay	33.9	20.4		39.8	18.6		7.8	7.0	2.4	8.4	6.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings

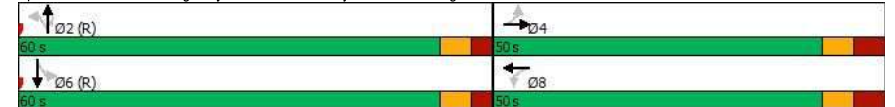
4: Highway 50 & Cross Country Blvd/Bolton Heights Dr

2041 Future Background PM

07-08-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	33.9	20.4		39.8	18.6		7.8	7.0	2.4	8.4	6.2	
LOS	C	C		D	B		A	A	A	A	A	
Approach Delay		24.4			31.2			6.6			6.3	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	1.7	1.5		8.8	1.9		3.9	22.5	0.0	1.3	9.7	
Queue Length 95th (m)	4.7	6.2		14.1	7.6		19.6	72.8	8.4	8.6	34.2	
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)	527	659		530	662		740	2769	1217	491	2720	
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		0.08	0.04		0.11	0.29	0.08	0.06	0.15	
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 96 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 85												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.29												
Intersection Signal Delay: 8.0						Intersection LOS: A						
Intersection Capacity Utilization 60.2%						ICU Level of Service B						
Analysis Period (min) 15												

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



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

2041 Future Background PM
07-08-2024

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↙	↖	↗	↖	↗	↘	↙	↖	↗
Traffic Volume (vph)	61	266	104	233	297	47	85	813	452	35	410	24
Future Volume (vph)	61	266	104	233	297	47	85	813	452	35	410	24
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.96	0.99	0.99				0.96		1.00	
Frt			0.850		0.980				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1575	1712	1409	1591	1668	0	1610	1712	1432	1643	1683	0
Flt Permitted	0.478			0.262			0.338			0.064		
Satd. Flow (perm)	778	1712	1358	435	1668	0	573	1712	1372	111	1683	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125		6				275		2	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)	11		6	6		11	10		8	8		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	1%	1%	0%	2%	1%	0%	0%	1%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	63	274	107	240	306	48	88	838	466	36	423	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	63	274	107	240	354	0	88	838	466	36	448	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	15.0	33.0	33.0	30.0	48.0		22.0	67.0	67.0	10.0	55.0	
Total Split (%)	10.7%	23.6%	23.6%	21.4%	34.3%		15.7%	47.9%	47.9%	7.1%	39.3%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	38.9	26.1	26.1	54.6	40.6		78.9	67.6	67.6	73.7	63.2	
Actuated g/C Ratio	0.28	0.19	0.19	0.39	0.29		0.56	0.48	0.48	0.53	0.45	
v/c Ratio	0.24	0.86	0.30	0.69	0.73		0.23	1.01	0.58	0.28	0.59	
Control Delay	28.7	79.9	7.4	40.6	53.5		16.8	71.9	14.4	21.2	34.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	28.7	79.9	7.4	40.6	53.5		16.8	71.9	14.4	21.2	34.4	

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

2041 Future Background PM
07-08-2024

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	D	D		B	E	B	C	C	
Approach Delay		55.2			48.3			49.2			33.4	
Approach LOS		E			D			D			C	
Queue Length 50th (m)	11.2	76.1	0.0	48.0	90.5		11.9	~275.6	40.4	4.7	99.5	
Queue Length 95th (m)	20.6	#127.8	12.2	69.0	129.1		21.9	#365.3	80.9	10.8	148.3	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	301	333	365	392	500		465	826	804	135	761	
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	0.21	0.82	0.29	0.61	0.71		0.19	1.01	0.58	0.27	0.59	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 62 (44%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 47.3 Intersection LOS: D

Intersection Capacity Utilization 100.8% ICU Level of Service G

Analysis Period (min) 15

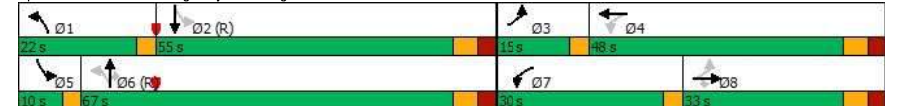
~ Volume exceeds capacity, queue is theoretically infinite.

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



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

2041 Future Background PM
07-08-2024

	→	↗	↖	←	↘	↙	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations	↑↑			↑↑	↖		
Traffic Volume (vph)	183	63	60	94	22	35	
Future Volume (vph)	183	63	60	94	22	35	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	0.99			1.00			
Frt	0.962				0.917		
Fit Protected				0.981	0.981		
Satd. Flow (prot)	3485	0	0	3538	1695	0	
Fit Permitted				0.772	0.981		
Satd. Flow (perm)	3485	0	0	2776	1695	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	69				38		
Link Speed (k/h)	40			40	40		
Link Distance (m)	237.9			417.0	131.8		
Travel Time (s)	21.4			37.5	11.9		
Confl. Peds. (#/hr)		3	3				
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	
Heavy Vehicles (%)	0%	0%	0%	2%	5%	0%	
Adj. Flow (vph)	201	69	66	103	24	38	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	270	0	0	169	62	0	
Turn Type	NA		Perm	NA	Perm		
Protected Phases	2			6			8
Permitted Phases			6		4		
Detector Phase	2		6	6	4		
Switch Phase							
Minimum Initial (s)	8.0		8.0	8.0	8.0		8.0
Minimum Split (s)	21.0		21.0	21.0	21.9		21.9
Total Split (s)	70.0		70.0	70.0	30.0		30.0
Total Split (%)	70.0%		70.0%	70.0%	30.0%		30%
Yellow Time (s)	4.0		4.0	4.0	4.0		4.0
All-Red Time (s)	2.0		2.0	2.0	2.9		2.9
Lost Time Adjust (s)	0.0			0.0	0.0		
Total Lost Time (s)	6.0			6.0	6.9		
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	Max		Max	Max	None		Ped
Act Effct Green (s)	64.0			64.0	15.0		
Actuated g/C Ratio	0.70			0.70	0.16		
v/c Ratio	0.11			0.09	0.20		
Control Delay	3.5			4.6	18.8		
Queue Delay	0.0			0.0	0.0		
Total Delay	3.5			4.6	18.8		
LOS	A			A	B		
Approach Delay	3.5			4.6	18.8		
Approach LOS	A			A	B		
Queue Length 50th (m)	5.4			4.6	3.9		
Queue Length 95th (m)	9.2			7.7	15.2		

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

2041 Future Background PM
07-08-2024

	→	↗	↖	←	↘	↙	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Internal Link Dist (m)	213.9			393.0	107.8		
Turn Bay Length (m)							
Base Capacity (vph)	2447			1933	454		
Starvation Cap Reductn	0			0	0		
Spillback Cap Reductn	0			0	0		
Storage Cap Reductn	0			0	0		
Reduced v/c Ratio	0.11			0.09	0.14		










Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 91.9	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.20	
Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 41.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Kingsview Dr & Columbia Way

→ Ø2		↖ Ø4
70 s		30 s
← Ø6		↘ Ø8
70 s		30 s

















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

2041 Future Background PM
07-08-2024

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	161	88	41	148	37	22		
Future Volume (Veh/h)	161	88	41	148	37	22		
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	175	96	45	161	40	24		
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			271		394	136		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			271		394	136		
tC, single (s)			4.1		6.8	6.9		
tC, 2 stage (s)								
tF (s)			2.2		3.5	3.3		
p0 queue free %			97		93	97		
cM capacity (veh/h)			1304		568	895		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1			
Volume Total	117	154	99	107	64			
Volume Left	0	0	45	0	40			
Volume Right	0	96	0	0	24			
cSH	1700	1700	1304	1700	658			
Volume to Capacity	0.07	0.09	0.03	0.06	0.10			
Queue Length 95th (m)	0.0	0.0	0.9	0.0	2.6			
Control Delay (s)	0.0	0.0	3.7	0.0	11.1			
Lane LOS			A	B				
Approach Delay (s)	0.0		1.8		11.1			
Approach LOS					B			
Intersection Summary								
Average Delay					2.0			
Intersection Capacity Utilization			25.9%		ICU Level of Service	A		
Analysis Period (min)	15							













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

2041 Future Background PM
07-08-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	135	32	19	135	6	17	5	9	16	8	29
Future Volume (Veh/h)	22	135	32	19	135	6	17	5	9	16	8	29
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	23	142	34	20	142	6	18	5	9	17	8	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	148			176			351	393	88	314	407	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	148			176			351	393	88	314	407	74
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			97	99	99	97	98	97
cM capacity (veh/h)	1446			1412			546	530	959	597	521	979
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	94	105	91	77	32	56						
Volume Left	23	0	20	0	18	17						
Volume Right	0	34	0	6	9	31						
cSH	1446	1700	1412	1700	618	742						
Volume to Capacity	0.02	0.06	0.01	0.05	0.05	0.08						
Queue Length 95th (m)	0.4	0.0	0.3	0.0	1.3	2.0						
Control Delay (s)	1.9	0.0	1.8	0.0	11.1	10.3						
Lane LOS	A	A		B		B						
Approach Delay (s)	0.9	1.0		11.1		10.3						
Approach LOS					B	B						
Intersection Summary												
Average Delay				2.8								
Intersection Capacity Utilization	23.2%			ICU Level of Service			A					
Analysis Period (min)	15											











HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2041 Future Background PM
07-08-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	87	159	511	221	45
Future Volume (Veh/h)	23	87	159	511	221	45
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	24	90	164	527	228	46
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	1106	251	274			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1106	251	274			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	89	87			
cM capacity (veh/h)	205	793	1295			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	24	90	164	527	274	
Volume Left	24	0	164	0	0	
Volume Right	0	90	0	0	46	
cSH	205	793	1295	1700	1700	
Volume to Capacity	0.12	0.11	0.13	0.31	0.16	
Queue Length 95th (m)	3.1	3.1	3.5	0.0	0.0	
Control Delay (s)	24.8	10.1	8.2	0.0	0.0	
Lane LOS	C	B	A			
Approach Delay (s)	13.2		1.9	0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	2.6					
Intersection Capacity Utilization	36.9%			ICU Level of Service		A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb Parkway & Duffy's Lane

2041 Future Background PM
07-08-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	18	70	538	246	5
Future Volume (Veh/h)	4	18	70	538	246	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	5	21	83	640	293	6
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	782	150	299			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	782	150	299			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	93			
cM capacity (veh/h)	313	877	1274			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	26	83	320	320	195	104
Volume Left	5	83	0	0	0	0
Volume Right	21	0	0	0	0	6
cSH	651	1274	1700	1700	1700	1700
Volume to Capacity	0.04	0.07	0.19	0.19	0.11	0.06
Queue Length 95th (m)	1.0	1.7	0.0	0.0	0.0	0.0
Control Delay (s)	10.8	8.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.8	0.9	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.9					
Intersection Capacity Utilization	24.9%			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, 2024							
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 2:00:16 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2031 Future Total							
Emil Kolb Pkwy (North)	0.18	0.88	0.96	N/A	A	1.03	A
Emil Kolb Pkwy (South)	0.10	0.42	0.87	N/A	A		
King Street	0.19	0.97	1.20	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 2:00:16 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1,00	-1	3	1	10	58340790	2606

(Default Analysis Set) - 2031 Future Total, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 (Entry Lane Simulation)	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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, AM	2031 Future Total	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.03	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓

Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓	✓	

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)	PHF	✓	583.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	326.00	100.000
King Street	PHF	✓	536.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	583.00	0.95	SecondQuarter
Emil Kolb Pkwy (South)	326.00	0.95	SecondQuarter
King Street	536.00	0.95	SecondQuarter

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	121.000	205.000
	Emil Kolb Pkwy (North)	354.000	0.000	229.000
	King Street	402.000	134.000	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	0.37	0.63
	Emil Kolb Pkwy (North)	0.61	0.00	0.39
	King Street	0.75	0.25	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	1.310	1.075
	Emil Kolb Pkwy (North)	1.032	1.000	1.022
	King Street	1.061	1.097	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	31.0	7.5
	Emil Kolb Pkwy (North)	3.2	0.0	2.2
	King Street	6.1	9.7	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	0.96	0.18	0.88	A	583.56	583.56	9.07	0.93	0.15
Emil Kolb Pkwy (South)	0.87	0.10	0.42	A	326.16	326.16	5.12	0.94	0.09
King Street	1.20	0.19	0.97	A	538.69	538.69	10.82	1.21	0.18

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\2024_Analysis\Arcady
Report generation date: 2024-06-13 1:19:15 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2031 Future Total							
Emil Kolb Pkwy (North)	0.19	1.04	1.70	N/A	A	1.92	A
Emil Kolb Pkwy (South)	0.77	3.51	2.57	N/A	A		
King Street	0.17	0.87	0.93	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 1:19:15 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	50579601	3045

(Default Analysis Set) - 2031 Future Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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, PM	2031 Future Total	PM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.92	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓

Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓	✓	

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)	PHF	✓	354.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	1015.00	100.000
King Street	PHF	✓	580.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	354.00	1.00	SecondQuarter
Emil Kolb Pkwy (South)	1015.00	1.00	SecondQuarter
King Street	580.00	1.00	SecondQuarter

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	437.000	578.000
		Emil Kolb Pkwy (North)	205.000	0.000	149.000
		King Street	334.000	246.000	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	0.43	0.57
		Emil Kolb Pkwy (North)	0.58	0.00	0.42
		King Street	0.58	0.42	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	1.021	1.067
		Emil Kolb Pkwy (North)	1.103	1.000	1.077
		King Street	1.047	1.015	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	2.1	6.7
	Emil Kolb Pkwy (North)	10.3	0.0	7.7
King Street	4.7	1.5	0.0	

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	1.70	0.19	1.04	A	355.86	355.86	10.93	1.94	0.18
Emil Kolb Pkwy (South)	2.57	0.77	3.51	A	1014.86	1014.86	44.90	2.65	0.75
King Street	0.93	0.17	0.87	A	580.39	580.39	9.31	0.96	0.16

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821.26/11/2015]
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 3:03:21 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2031 Future Total						
Emil Kolb Pkwy	0.11	0.49	1.17	N/A	A	1.14	A
Highway 50 (North)	0.31	1.70	1.40	N/A	A		
Highway 50 (South)	0.08	0.17	0.63	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 3:03:21 PM

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

Entry Lane Analysis Options

--	--	--	--	--	--	--	--

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	484435030	3199

(Default Analysis Set) - 2031 Future Total, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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, AM	2031 Future Total	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.14	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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-	E - Entry	I' - Effective flare	R - Entry	D - Inscribed circle	PHI - Conflict (entry)	Exit
------	-------------------------	-----------	----------------------	-----------	----------------------	------------------------	------

	width (m)	width (m)	length (m)	radius (m)	diameter (m)	angle (deg)	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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		

Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

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	PHF	✓	225.00	100.000
Highway 50 (North)	PHF	✓	775.00	100.000
Highway 50 (South)	PHF	✓	400.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	225.00	0.96	SecondQuarter
Highway 50 (North)	775.00	0.96	SecondQuarter
Highway 50 (South)	400.00	0.96	SecondQuarter

Turning Proportions

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.000	248.000	152.000
	Highway 50 (North)	431.000	0.000	344.000
	Emil Kolb Pkwy	61.000	164.000	0.000

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.00	0.62	0.38
	Highway 50 (North)	0.56	0.00	0.44
	Emil Kolb Pkwy	0.27	0.73	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	1.037	1.027
	Highway 50 (North)	1.008	1.000	1.053
	Emil Kolb Pkwy	1.057	1.277	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	3.7	2.7
	Highway 50 (North)	0.8	0.0	5.3
	Emil Kolb Pkwy	5.7	27.7	0.0






















Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy	1.17	0.11	0.49	A	223.61	223.61	5.11	1.37	0.09
Highway 50 (North)	1.40	0.31	1.70	A	776.22	776.22	17.44	1.35	0.29
Highway 50 (South)	0.63	0.08	0.17	A	401.68	401.68	4.22	0.63	0.07

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2031 Future Total AM
07-15-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	8	218	2	79	2	221	112	60	404	2
Future Volume (vph)	3	0	8	218	2	79	2	221	112	60	404	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	100.0		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		0.899			0.853				0.850			0.850
Frt Protected		0.988		0.950			0.950			0.950		
Satd. Flow (prot)	0	953	0	1750	1572	0	892	1830	1595	1700	1883	1591
Frt Permitted		0.953		0.750			0.471			0.610		
Satd. Flow (perm)	0	920	0	1382	1572	0	442	1830	1595	1092	1883	1591
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			86				122			30
Link Speed (k/h)		40			40			50			60	
Link Distance (m)		127.3			237.9			633.3			400.2	
Travel Time (s)		11.5			21.4			45.6			24.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	0%	72%	2%	100%	2%	100%	5%	2%	5%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	3	0	9	237	2	86	2	240	122	65	439	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	237	88	0	2	240	122	65	439	2
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%
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?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		24.5		24.5	24.5		72.8	72.8	72.8	72.8	72.8	72.8
Actuated g/C Ratio		0.22		0.22	0.22		0.66	0.66	0.66	0.66	0.66	0.66
v/c Ratio		0.05		0.77	0.21		0.01	0.20	0.11	0.09	0.35	0.00
Control Delay		0.5		55.9	7.9		9.0	8.8	2.0	8.8	10.3	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.5		55.9	7.9		9.0	8.8	2.0	8.8	10.3	0.0
LOS		A		E	A		A	A	A	A	B	A
Approach Delay		0.5			42.9			6.5			10.0	

Lanes, Volumes, Timings

3: Highway 50 & Columbia Way

2031 Future Total AM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS	A			D			A			B		
Queue Length 50th (m)	0.0			50.5	0.4		0.1	19.2	0.0	4.8	39.9	0.0
Queue Length 95th (m)	0.6			71.8	11.9		1.3	38.1	7.6	12.8	73.3	0.0
Internal Link Dist (m)	103.3			213.9			609.3			376.2		
Turn Bay Length (m)				70.0			140.0			100.0		30.0
Base Capacity (vph)	350			489	612		292	1210	1096	722	1245	1062
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			0.48	0.14		0.01	0.20	0.11	0.09	0.35	0.00

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 17.7

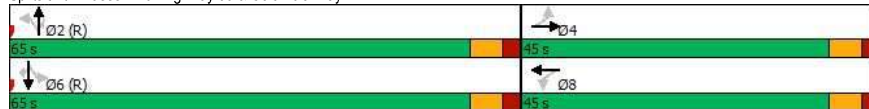
Intersection LOS: B

Intersection Capacity Utilization 72.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Columbia Way



Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2031 Future Total AM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	27	26	128	14	56	12	289	57	51	589	7
Future Volume (vph)	15	27	26	128	14	56	12	289	57	51	589	7
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)	0.0			85.0			0.0	85.0		75.0	65.0	50.0
Storage Lanes	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							0.96
Frt		0.949			0.880				0.850			0.850
Flt Protected		0.989		0.950			0.950			0.950		
Satd. Flow (prot)	0	1748	0	1785	1628	0	1623	3476	1591	1785	1883	1591
Flt Permitted		0.900		0.663			0.279			0.543		
Satd. Flow (perm)	0	1586	0	1246	1628	0	477	3476	1591	1020	1883	1532
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			67				74			74
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			55.6			45.6	
Confl. Peds. (#/hr)	17					17	8					8
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	0%	4%	4%	0%	0%	2%	10%	5%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	33	31	154	17	67	14	348	69	61	710	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	154	84	0	14	348	69	61	710	8
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			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)	10.0	10.0		5.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	47.1	47.1		8.0	47.1		34.7	34.7	34.7	34.7	34.7	34.7
Total Split (s)	60.0	60.0		15.0	75.0		45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%		12.5%	62.5%		37.5%	37.5%	37.5%	37.5%	37.5%	37.5%
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)	4.1	4.1		0.0	4.1		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)		8.1		3.0	8.1		6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)		16.1		33.2	28.1		77.1	77.1	77.1	77.1	77.1	77.1
Actuated g/C Ratio		0.13		0.28	0.23		0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio		0.34		0.38	0.19		0.05	0.16	0.07	0.09	0.59	0.01
Control Delay		31.5		34.4	10.1		29.8	23.5	16.4	13.2	18.6	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2031 Future Total AM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		31.5		34.4	10.1		29.8	23.5	16.4	13.2	18.6	0.0
LOS		C		C	B		C	C	B	B	B	A
Approach Delay		31.5			25.8			22.6			17.9	
Approach LOS		C			C			C			B	
Queue Length 50th (m)		12.2		31.4	3.4		2.4	32.6	4.4	4.9	85.6	0.0
Queue Length 95th (m)		18.8		30.8	10.0		m7.5	50.3	m16.1	17.0	189.6	0.0
Internal Link Dist (m)		88.1			177.9			747.8			609.3	
Turn Bay Length (m)				85.0			85.0		75.0	65.0		50.0
Base Capacity (vph)		703		401	937		306	2234	1048	655	1210	1011
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		0.12		0.38	0.09		0.05	0.16	0.07	0.09	0.59	0.01

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 39 (33%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 21.2

Intersection LOS: C

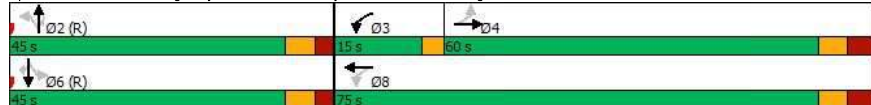
Intersection Capacity Utilization 76.6%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2031 Future Total AM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	211	77	272	205	55	51	308	114	56	649	23
Future Volume (vph)	24	211	77	272	205	55	51	308	114	56	649	23
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor									0.97	1.00	1.00	
Frt			0.850		0.968				0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1606	1695	1437	1591	1635	0	1579	1695	1363	1643	1696	0
Flt Permitted	0.589			0.364			0.172			0.487		
Satd. Flow (perm)	996	1695	1437	609	1635	0	286	1695	1327	839	1696	0
Right Turn on Red			Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)			118		11				121		2	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)							2		3	3		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	0%	1%	3%	0%	4%	2%	5%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	26	224	82	289	218	59	54	328	121	60	690	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	224	82	289	277	0	54	328	121	60	714	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	11.0	32.0	32.0	18.0	39.0		8.0	59.0	59.0	11.0	62.0	
Total Split (%)	9.2%	26.7%	26.7%	15.0%	32.5%		6.7%	49.2%	49.2%	9.2%	51.7%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	31.0	20.4	20.4	42.3	32.1		68.3	59.3	59.3	70.4	60.4	
Actuated g/C Ratio	0.26	0.17	0.17	0.35	0.27		0.57	0.49	0.49	0.59	0.50	
v/c Ratio	0.09	0.78	0.24	0.86	0.62		0.24	0.39	0.17	0.11	0.84	
Control Delay	25.0	65.9	4.3	55.7	44.3		14.0	22.6	4.1	9.5	33.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	25.0	65.9	4.3	55.7	44.3		14.0	22.6	4.1	9.5	33.8	

Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2031 Future Total AM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	E	D		B	C	A	A	C	
Approach Delay		47.5			50.1			17.2			32.0	
Approach LOS		D			D			B			C	
Queue Length 50th (m)	4.2	53.3	0.0	55.8	60.1		5.3	51.7	0.0	6.1	169.0	
Queue Length 95th (m)	10.1	78.9	6.1	#91.0	88.6		12.1	82.4	11.3	m5.2	#242.8	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	308	354	393	337	456		228	838	717	549	854	
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	0.08	0.63	0.21	0.86	0.61		0.24	0.39	0.17	0.11	0.84	

Intersection Summary

Area Type: CBD

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 115 (96%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 35.6 Intersection LOS: D

Intersection Capacity Utilization 91.0% ICU Level of Service F

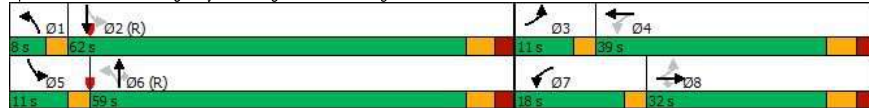
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 5: Highway 50 & King Street West/King Street East



Lanes, Volumes, Timings

6: Kingsview Drive/Street G & Columbia Way

2031 Future Total AM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	52	100	25	97	126	23	36	4	51	40	9	131
Future Volume (vph)	52	100	25	97	126	23	36	4	51	40	9	131
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	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.98		1.00		
Frt		0.981			0.987			0.924		0.902		
Flt Protected		0.985			0.981			0.981		0.989		
Satd. Flow (prot)	0	1839	0	0	1808	0	0	1712	0	0	1680	0
Flt Permitted		0.794			0.779			0.804		0.893		
Satd. Flow (perm)	0	1482	0	0	1433	0	0	1403	0	0	1514	0
Right Turn on Red		Yes			Yes			Yes		Yes		Yes
Satd. Flow (RTOR)		15			10			61		158		
Link Speed (k/h)		40			40			40		50		
Link Distance (m)		237.9			417.0			131.8		93.0		
Travel Time (s)		21.4			37.5			11.9		6.7		
Confl. Peds. (#/hr)			3	3					5	5		
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	2%	0%	0%	3%	3%	2%	0%	2%	0%	2%	2%	2%
Adj. Flow (vph)	63	120	30	117	152	28	43	5	61	48	11	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	213	0	0	297	0	0	109	0	0	217	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	21.9	21.9		21.9	21.9		9.5	21.0		21.0	21.0	
Total Split (s)	23.0	23.0		23.0	23.0		9.5	32.0		22.5	22.5	
Total Split (%)	41.8%	41.8%		41.8%	41.8%		17.3%	58.2%		40.9%	40.9%	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	4.0		4.0	4.0	
All-Red Time (s)	2.9	2.9		2.9	2.9		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.9			6.9			6.0			6.0	
Lead/Lag							Lead			Lag		
Lead-Lag Optimize?							Yes			Yes		Yes
Recall Mode	None	None		None	None		None	None		None	None	
Act Effct Green (s)		12.0			12.0			9.7			9.7	
Actuated g/C Ratio		0.37			0.37			0.30			0.30	
v/c Ratio		0.38			0.55			0.23			0.38	
Control Delay		10.6			13.7			7.3			6.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		10.6			13.7			7.3			6.3	
LOS		B			B			A			A	
Approach Delay		10.6			13.7			7.3			6.3	
Approach LOS		B			B			A			A	
Queue Length 50th (m)		7.6			11.9			2.1			2.5	
Queue Length 95th (m)		21.6			32.0			9.1			12.1	

Lanes, Volumes, Timings

6: Kingsview Drive/Street G & Columbia Way

2031 Future Total AM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		213.9			393.0			107.8			69.0	
Turn Bay Length (m)												
Base Capacity (vph)		803			774			1128			904	
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			0.38			0.10			0.24	

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 32.3

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 10.1

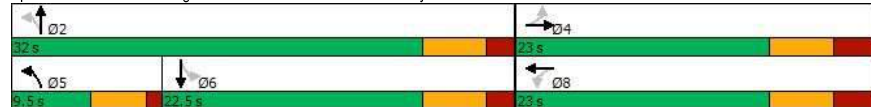
Intersection LOS: B

Intersection Capacity Utilization 42.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Kingsview Drive/Street G & Columbia Way



HCM Unsignalized Intersection Capacity Analysis

7: Westchester Boulevard & Columbia Way

2031 Future Total AM

07-15-2024

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Traffic Volume (veh/h)	111	39	27	167	62	40
Future Volume (Veh/h)	111	39	27	167	62	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	139	49	34	209	78	50

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

188

440

164

vC1, stage 1 conf vol

vC2, stage 2 conf vol

vCu, unblocked vol

188

440

164

tC, single (s)

4.1

6.4

6.2

tC, 2 stage (s)

tF (s)

2.2

3.5

3.3

p0 queue free %

98

86

94

cM capacity (veh/h)

1374

560

873

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	188	243	128
Volume Left	0	34	78
Volume Right	49	0	50
cSH	1700	1374	651
Volume to Capacity	0.11	0.02	0.20
Queue Length 95th (m)	0.0	0.6	5.8
Control Delay (s)	0.0	1.3	11.9
Lane LOS		A	B
Approach Delay (s)	0.0	1.3	11.9
Approach LOS			B

Intersection Summary

Average Delay

3.3

Intersection Capacity Utilization

34.4%

ICU Level of Service

















A

Analysis Period (min)

15










HCM Unsignalized Intersection Capacity Analysis
8: Mount Hope Road & Columbia Way

2031 Future Total AM
07-15-2024

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (veh/h)	24	119	11	3	118	8	27	5	12	19	4	47		
Future Volume (Veh/h)	24	119	11	3	118	8	27	5	12	19	4	47		
Sign Control	Free			Free			Stop			Stop				
Grade	0%			0%			0%			0%				
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82		
Hourly flow rate (vph)	29	145	13	4	144	10	33	6	15	23	5	57		
Pedestrians	1			2						1				
Lane Width (m)	3.7			3.7						3.7				
Walking Speed (m/s)	1.2			1.2						1.2				
Percent Blockage	0			0						0				
Right turn flare (veh)														
Median type	None			None										
Median storage (veh)														
Upstream signal (m)														
pX, platoon unblocked														
vC, conflicting volume	155				158				427	372	154	388	374	151
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	155				158				427	372	154	388	374	151
tC, single (s)	4.1				4.1				7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)														
tF (s)	2.2				2.2				3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	98				100				93	99	98	96	99	94
cM capacity (veh/h)	1436				1434				494	548	870	549	547	891
Direction, Lane #	EB 1	WB 1	NB 1	SB 1										
Volume Total	187	158	54	85										
Volume Left	29	4	33	23										
Volume Right	13	10	15	57										
cSH	1436	1434	568	739										
Volume to Capacity	0.02	0.00	0.10	0.12										
Queue Length 95th (m)	0.5	0.1	2.5	3.1										
Control Delay (s)	1.3	0.2	12.0	10.5										
Lane LOS	A	A	B	B										
Approach Delay (s)	1.3	0.2	12.0	10.5										
Approach LOS			B	B										
Intersection Summary														
Average Delay	3.8													
Intersection Capacity Utilization	31.0%			ICU Level of Service			A							
Analysis Period (min)	15													

HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2031 Future Total AM
07-15-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	197	48	110	499	21
Future Volume (Veh/h)	24	197	48	110	499	21
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	26	210	51	117	531	22
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	761	542	553			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	761	542	553			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	92	61	95			
cM capacity (veh/h)	343	540	978			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	236	168	553			
Volume Left	26	51	0			
Volume Right	210	0	22			
cSH	508	978	1700			
Volume to Capacity	0.46	0.05	0.33			
Queue Length 95th (m)	19.4	1.3	0.0			
Control Delay (s)	18.1	3.0	0.0			
Lane LOS	C	A				
Approach Delay (s)	18.1	3.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay	5.0					
Intersection Capacity Utilization	59.5%			ICU Level of Service		B
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb Parkway & Duffy's Lane

2031 Future Total AM
07-15-2024

	EBL	EBR	NBL	NBT	SBT	SBR
Movement						
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	4	37	18	221	507	4
Future Volume (Veh/h)	4	37	18	221	507	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	41	20	246	563	4
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	849	563	567			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	849	563	567			
tC, single (s)	6.4	6.2	4.3			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.4			
p0 queue free %	99	92	98			
cM capacity (veh/h)	327	524	926			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	45	20	246	563	4	
Volume Left	4	20	0	0	0	
Volume Right	41	0	0	0	4	
cSH	497	926	1700	1700	1700	
Volume to Capacity	0.09	0.02	0.14	0.33	0.00	
Queue Length 95th (m)	2.4	0.5	0.0	0.0	0.0	
Control Delay (s)	13.0	9.0	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	13.0	0.7		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization		36.7%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
16: Highway 50 & Street D

2031 Future Total AM
07-15-2024

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (veh/h)	7	84	277	3	28	459
Future Volume (Veh/h)	7	84	277	3	28	459
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)	7	84	277	3	28	459
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			400			
pX, platoon unblocked						
vC, conflicting volume	794	140			280	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	794	140			280	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	90			98	
cM capacity (veh/h)	318	882			1280	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	91	185	95	28	459	
Volume Left	7	0	0	28	0	
Volume Right	84	0	3	0	0	
cSH	777	1700	1700	1280	1700	
Volume to Capacity	0.12	0.11	0.06	0.02	0.27	
Queue Length 95th (m)	3.2	0.0	0.0	0.5	0.0	
Control Delay (s)	10.2	0.0	0.0	7.9	0.0	
Lane LOS	B			A		
Approach Delay (s)	10.2	0.0		0.5		
Approach LOS	B					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			36.4%		ICU Level of Service	A
Analysis Period (min)			15			

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\2024_Analysis\Arcady
Report generation date: 2024-06-13 1:19:15 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2031 Future Total						
Emil Kolb Pkwy (North)	0.19	1.04	1.70	N/A	A	1.92	A
Emil Kolb Pkwy (South)	0.77	3.51	2.57	N/A	A		
King Street	0.17	0.87	0.93	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 1:19:15 PM

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	kmh	PCE	PCE	perHour	s	-Min	perMin

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	50579601	3045

(Default Analysis Set) - 2031 Future Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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, PM	2031 Future Total	PM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.92	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓

Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓	✓	

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)	PHF	✓	354.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	1015.00	100.000
King Street	PHF	✓	580.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	354.00	1.00	SecondQuarter
Emil Kolb Pkwy (South)	1015.00	1.00	SecondQuarter
King Street	580.00	1.00	SecondQuarter

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	437.000
		Emil Kolb Pkwy (North)	205.000	0.000
		King Street	334.000	246.000

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	0.43
		Emil Kolb Pkwy (North)	0.58	0.00
		King Street	0.58	0.42

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	1.021
		Emil Kolb Pkwy (North)	1.103	1.000
		King Street	1.047	1.015

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	2.1	6.7	
Emil Kolb Pkwy (North)	10.3	0.0	7.7	
King Street	4.7	1.5	0.0	

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	1.70	0.19	1.04	A	355.86	355.86	10.93	1.94	0.18
Emil Kolb Pkwy (South)	2.57	0.77	3.51	A	1014.86	1014.86	44.90	2.65	0.75
King Street	0.93	0.17	0.87	A	580.39	580.39	9.31	0.96	0.16

Junctions 8						
ARCADY 8 - Roundabout Module						
Version: 8.0.6.541 [19821.26/11/2015] © Copyright TRL Limited, 2024						
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 3:24:45 PM

Summary of intersection performance

PM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2031 Future Total							
Emil Kolb Pkwy	0.19	0.95	1.02	N/A	A	1.08	A
Highway 50 (North)	0.10	0.41	0.84	N/A	A		
Highway 50 (South)	0.24	1.10	1.31	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 3:00 PM - 4:00 PM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D8 - 2041 Future Background, PM" model duration: 3:00 PM - 4:00 PM
"D9 - 2031 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-13 3:24:44 PM

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

Entry Lane Analysis Options

--	--	--	--	--	--	--	--

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	1126389043	2198

(Default Analysis Set) - 2031 Future Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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, PM	2031 Future Total	PM		PHF	15:00	16:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	1.08	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)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-	E - Entry	I' - Effective flare	R - Entry	D - Inscribed circle	PHI - Conflict (entry)	Exit
------	-------------------------	-----------	----------------------	-----------	----------------------	------------------------	------

	width (m)	width (m)	length (m)	radius (m)	diameter (m)	angle (deg)	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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.781	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓		

Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓	✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	

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	PHF	✓	550.00	100.000
Highway 50 (North)	PHF	✓	462.00	100.000
Highway 50 (South)	PHF	✓	610.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	550.00	0.91	SecondQuarter
Highway 50 (North)	462.00	0.91	SecondQuarter
Highway 50 (South)	610.00	0.91	SecondQuarter

Turning Proportions

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.000	522.000	88.000
	Highway 50 (North)	284.000	0.000	178.000
	Emil Kolb Pkwy	147.000	403.000	0.000

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

From	To			
		Highway 50 (South)	Highway 50 (North)	Emil Kolb Pkwy
	Highway 50 (South)	0.00	0.86	0.14
	Highway 50 (North)	0.61	0.00	0.39
	Emil Kolb Pkwy	0.27	0.73	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	1.013	1.000
	Highway 50 (North)	1.013	1.000	1.134
	Emil Kolb Pkwy	1.013	1.023	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	2.1	6.7	
Emil Kolb Pkwy (North)	10.3	0.0	7.7	
King Street	4.7	1.5	0.0	

Results


Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	1.70	0.19	1.04	A	355.86	355.86	10.93	1.84	0.18
Emil Kolb Pkwy (South)	2.57	0.77	3.51	A	1014.86	1014.86	44.90	2.65	0.75
King Street	0.93	0.17	0.87	A	580.39	580.39	9.31	0.96	0.16

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2031 Future Total PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	0	0	2	154	0	51	0	499	259	102	256	2
Future Volume (vph)	0	0	2	154	0	51	0	499	259	102	256	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	0.0	140.0	0.0	100.0	0.0	100.0	0.0	30.0
Storage Lanes	0	0	1	0	0	1	0	1	0	1	0	1
Taper Length (m)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	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	0.865	0.865	0.865	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850
Frt Protected				0.950						0.950		
Satd. Flow (prot)	0	1662	0	1750	1555	0	1879	1883	1626	1785	1883	795
Frt Permitted				0.757						0.435		
Satd. Flow (perm)	0	1662	0	1394	1555	0	1879	1883	1626	817	1883	795
Right Turn on Red			Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)		601		336				270				33
Link Speed (k/h)		50		40				50				60
Link Distance (m)		127.3		237.9				633.3				400.2
Travel Time (s)		9.2		21.4				45.6				24.0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	100%	0%	0%	2%	0%	5%	0%	2%	0%	0%	2%	100%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	0	0	2	160	0	53	0	520	270	106	267	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	0	160	53	0	0	520	270	106	267	2
Turn Type	NA	NA	Perm	NA	NA	Perm	NA	Perm	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	2	6	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	20.0	20.0
Minimum Split (s)	25.0	25.0	14.0	14.0	30.7	30.7	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	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%	64.0%	64.0%
Yellow Time (s)	4.0	4.0	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	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	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	17.0	17.0	17.0	17.0	70.3	70.3	70.3	70.3	70.3	70.3	70.3	70.3
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
v/c Ratio	0.00	0.68	0.10	0.10	0.39	0.22	0.18	0.20	0.00	0.00	0.00	0.00
Control Delay	0.0	52.6	0.4	0.4	7.9	1.3	7.1	6.3	0.0	0.0	0.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	52.6	0.4	0.4	7.9	1.3	7.1	6.3	0.0	0.0	0.0	0.0
LOS	A	D	A	A	A	A	A	A	A	A	A	A
Approach Delay				39.6			5.6			6.5		

Lanes, Volumes, Timings

3: Highway 50 & Columbia Way

2031 Future Total PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Approach LOS	D					A					A		
Queue Length 50th (m)	0.0			30.9	0.0	37.8			0.0	6.4	16.4	0.0	
Queue Length 95th (m)	0.0			49.2	0.0	70.8			8.7	16.5	32.8	0.0	
Internal Link Dist (m)	103.3			213.9			609.3			376.2			
Turn Bay Length (m)				70.0						100.0	30.0		
Base Capacity (vph)	919			418	701	1324			1223	574	1324	568	
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			0.38	0.08	0.39			0.22	0.18	0.20	0.00	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 11.1

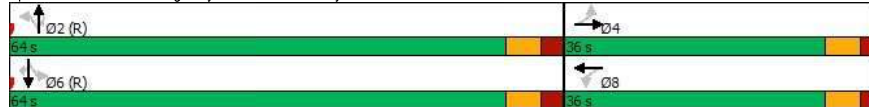
Intersection LOS: B

Intersection Capacity Utilization 74.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Highway 50 & Columbia Way



Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2031 Future Total PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	7	12	40	9	18	78	782	92	26	379	20
Future Volume (vph)	8	7	12	40	9	18	78	782	92	26	379	20
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)	0.0	0.0	0.0	85.0	0.0	85.0	0.0	85.0	75.0	65.0	50.0	50.0
Storage Lanes	0	0	0	1	0	1	0	1	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	0.95	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor							0.98					
Frt	0.897			0.900			0.850					0.850
Flt Protected	0.994			0.950			0.950			0.950		
Satd. Flow (prot)	0	1713	0	1785	1729	0	1785	3614	1559	1785	1883	1591
Flt Permitted	0.956			0.716			0.530			0.348		
Satd. Flow (perm)	0	1647	0	1345	1729	0	996	3614	1522	654	1883	1591
Right Turn on Red			Yes			Yes		Yes			Yes	
Satd. Flow (RTOR)		48			18				368			51
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			55.6			45.6	
Confl. Peds. (#/hr)									2			
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	0.25	1.00	1.00	1.00	1.00	1.00	0.25	0.25	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	8	7	48	40	9	18	78	782	368	104	379	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	63	0	40	27	0	78	782	368	104	379	20
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2		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)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	47.1	47.1		47.1	47.1		34.7	34.7	34.7	34.7	34.7	34.7
Total Split (s)	50.0	50.0		50.0	50.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	45.5%	45.5%		45.5%	45.5%		54.5%	54.5%	54.5%	54.5%	54.5%	54.5%
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)	4.1	4.1		4.1	4.1		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	0.0
Total Lost Time (s)		8.1		8.1	8.1		6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		15.9			15.9		84.3	84.3	84.3	84.3	84.3	84.3
Actuated g/C Ratio		0.14		0.14	0.14		0.77	0.77	0.77	0.77	0.77	0.77
v/c Ratio		0.23		0.21	0.10		0.10	0.28	0.29	0.21	0.26	0.02
Control Delay		15.3		39.9	19.0		7.8	7.0	1.8	9.2	7.6	0.2
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2031 Future Total PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay		15.3		39.9	19.0		7.8	7.0	1.8	9.2	7.6	0.2
LOS		B		D	B		A	A	A	A	A	A
Approach Delay		15.3			31.5			5.5			7.6	
Approach LOS		B			C			A			A	
Queue Length 50th (m)		3.2		8.6	1.9		3.5	22.0	0.0	5.2	19.8	0.0
Queue Length 95th (m)		11.5		13.9	7.4		18.0	71.1	0.0	5.8	73.5	0.5
Internal Link Dist (m)		88.1			177.9			747.8			609.3	
Turn Bay Length (m)				85.0			85.0		75.0	65.0		50.0
Base Capacity (vph)		657		512	669		762	2768	1251	501	1442	1230
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		0.10		0.08	0.04		0.10	0.28	0.29	0.21	0.26	0.02

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 96 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.29

Intersection Signal Delay: 7.3

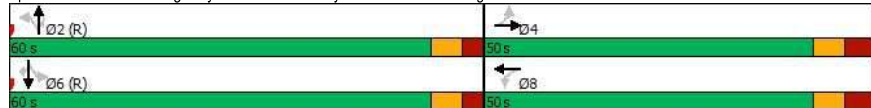
Intersection LOS: A

Intersection Capacity Utilization 57.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2031 Future Total PM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	55	241	94	211	269	42	81	819	430	34	420	23
Future Volume (vph)	55	241	94	211	269	42	81	819	430	34	420	23
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.96	0.99	0.99				0.96		1.00	
Frt			0.850		0.980				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1575	1712	1409	1591	1669	0	1579	1695	1432	1643	1688	0
Flt Permitted	0.514			0.297			0.344			0.071		
Satd. Flow (perm)	835	1712	1358	493	1669	0	572	1695	1372	123	1688	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125		6				260		2	
Link Speed (k/h)		40			40			50			50	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			37.3			2.4	
Confl. Peds. (#/hr)	11		6	6		11	10		8	8		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	1%	1%	0%	4%	2%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	57	248	97	218	277	43	84	844	443	35	433	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	248	97	218	320	0	84	844	443	35	457	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	15.0	33.0	33.0	30.0	48.0		22.0	67.0	67.0	10.0	55.0	
Total Split (%)	10.7%	23.6%	23.6%	21.4%	34.3%		15.7%	47.9%	47.9%	7.1%	39.3%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	None	C-Max	
Act Effct Green (s)	37.2	24.6	24.6	51.9	38.1		81.6	70.3	70.3	76.7	66.2	
Actuated g/C Ratio	0.27	0.18	0.18	0.37	0.27		0.58	0.50	0.50	0.55	0.47	
v/c Ratio	0.21	0.82	0.28	0.64	0.70		0.21	0.99	0.54	0.25	0.57	
Control Delay	29.3	77.3	5.5	39.8	53.5		15.8	64.8	13.4	19.4	32.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	29.3	77.3	5.5	39.8	53.5		15.8	64.8	13.4	19.4	32.4	

Lanes, Volumes, Timings

5: Highway 50 & King Street West/King Street East

2031 Future Total PM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	E	A	D	D		B	E	B	B	C	
Approach Delay		53.2			48.0			45.2			31.5	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	10.6	69.7	0.0	45.4	83.2		10.5	~264.7	35.1	4.2	95.7	
Queue Length 95th (m)	19.1	#102.0	8.7	62.6	113.9		21.1	#371.2	76.5	10.6	151.6	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	305	330	362	394	499		472	850	818	144	798	
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	0.19	0.75	0.27	0.55	0.64		0.18	0.99	0.54	0.24	0.57	

Intersection Summary

Area Type: CBD

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 62 (44%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 44.5 Intersection LOS: D

Intersection Capacity Utilization 98.6% ICU Level of Service F

Analysis Period (min) 15

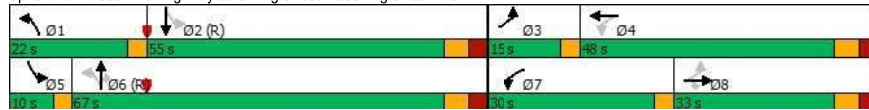
~ Volume exceeds capacity, queue is theoretically infinite.

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 Street West/King Street East



Lanes, Volumes, Timings

6: Kingsview Drive/Street G & Columbia Way

2031 Future Total PM

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	131	165	57	54	85	55	22	8	35	30	5	88
Future Volume (vph)	131	165	57	54	85	55	22	8	35	30	5	88
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	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.978			0.917			0.889			0.903	
Flt Protected		0.982			0.993			0.994			0.988	
Satd. Flow (prot)	0	1831	0	0	1720	0	0	1685	0	0	1680	0
Flt Permitted		0.733			0.884			0.932			0.864	
Satd. Flow (perm)	0	1367	0	0	1531	0	0	1579	0	0	1469	0
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		19			152			140			88	
Link Speed (k/h)		40			40			40			50	
Link Distance (m)		237.9			417.0			131.8			93.0	
Travel Time (s)		21.4			37.5			11.9			6.7	
Confl. Peds. (#/hr)							5					
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	0.25	1.00	1.00	0.25	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	0%	0%	2%	2%	5%	2%	0%	2%	2%	2%
Adj. Flow (vph)	131	165	57	54	85	220	22	8	140	30	5	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	353	0	0	359	0	0	170	0	0	123	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	21.9	21.9		21.9	21.9		9.5	21.0		21.0	21.0	
Total Split (s)	24.5	24.5		24.5	24.5		9.5	30.5		21.0	21.0	
Total Split (%)	44.5%	44.5%		44.5%	44.5%		17.3%	55.5%		38.2%	38.2%	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	4.0		4.0	4.0	
All-Red Time (s)	2.9	2.9		2.9	2.9		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.9			6.9			6.0			6.0	
Lead/Lag							Lead			Lag		
Lead-Lag Optimize?							Yes			Yes		
Recall Mode	None	None		None	None		None	None		None	None	
Act Effct Green (s)		17.9			17.9			10.3			10.3	
Actuated g/C Ratio		0.53			0.53			0.30			0.30	
v/c Ratio		0.48			0.41			0.29			0.24	
Control Delay		12.0			6.8			5.6			6.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		12.0			6.8			5.6			6.7	
LOS		B			A			A			A	
Approach Delay		12.0			6.8			5.6			6.7	
Approach LOS		B			A			A			A	
Queue Length 50th (m)		14.7			8.0			1.5			1.8	
Queue Length 95th (m)		#49.2			29.4			11.4			10.4	

Lanes, Volumes, Timings

6: Kingsview Drive/Street G & Columbia Way

2031 Future Total PM

07-15-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Internal Link Dist (m)		213.9			393.0			107.8			69.0	
Turn Bay Length (m)												
Base Capacity (vph)		788			938			1169			796	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.45			0.38			0.15			0.15	

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 33.8

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 8.4 Intersection LOS: A

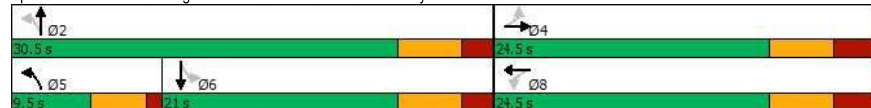
Intersection Capacity Utilization 48.5% ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: Kingsview Drive/Street G & Columbia Way



HCM Unsignalized Intersection Capacity Analysis

7: Westchester Boulevard & Columbia Way

2031 Future Total PM

07-15-2024

	EBT	EBR	WBL	WBT	NBL	NBR
Movement						
Lane Configurations						
Traffic Volume (veh/h)	156	80	37	152	37	22
Future Volume (Veh/h)	156	80	37	152	37	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	170	87	40	165	40	24

Pedestrians

Lane Width (m)

Walking Speed (m/s)

Percent Blockage

Right turn flare (veh)

Median type

Median storage (veh)

Upstream signal (m)

pX, platoon unblocked

vC, conflicting volume

vC1, stage 1 conf vol

vC2, stage 2 conf vol

vCu, unblocked vol

tC, single (s)

tC, 2 stage (s)

tF (s)

p0 queue free %

cM capacity (veh/h)

















Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	257	205	64
Volume Left	0	40	40
Volume Right	87	0	24
cSH	1700	1320	625
Volume to Capacity	0.15	0.03	0.10
Queue Length 95th (m)	0.0	0.7	2.7
Control Delay (s)	0.0	1.7	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	1.7	11.4
Approach LOS			B

Intersection Summary

Average Delay	2.1		
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		










HCM Unsignalized Intersection Capacity Analysis
8: Mount Hope Road & Columbia Way

2031 Future Total PM
07-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	133	29	18	140	6	16	5	8	14	7	26
Future Volume (Veh/h)	20	133	29	18	140	6	16	5	8	14	7	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	21	140	31	19	147	6	17	5	8	15	7	27
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	153			171			416	388	156	396	401	150
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	153			171			416	388	156	396	401	150
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 %	98			99			97	99	99	97	99	97
cM capacity (veh/h)	1398			1278			517	533	896	535	525	902
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	192	172	30	49								
Volume Left	21	19	17	15								
Volume Right	31	6	8	27								
cSH	1398	1278	586	687								
Volume to Capacity	0.02	0.01	0.05	0.07								
Queue Length 95th (m)	0.4	0.4	1.3	1.8								
Control Delay (s)	0.9	1.0	11.5	10.6								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.9	1.0	11.5	10.6								
Approach LOS			B	B								
Intersection Summary												
Average Delay	2.7											
Intersection Capacity Utilization	23.1%			ICU Level of Service			A					
Analysis Period (min)	15											













HCM Unsignalized Intersection Capacity Analysis
9: Caledon King Townline & Columbia Way

2031 Future Total PM
07-15-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	21	88	160	463	200	43
Future Volume (Veh/h)	21	88	160	463	200	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	22	91	165	477	206	44
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	1035	228	250			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1035	228	250			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	89	88			
cM capacity (veh/h)	227	814	1321			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	113	642	250			
Volume Left	22	165	0			
Volume Right	91	0	44			
cSH	541	1321	1700			
Volume to Capacity	0.21	0.12	0.15			
Queue Length 95th (m)	6.2	3.4	0.0			
Control Delay (s)	13.4	3.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	13.4	3.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization	62.9%		ICU Level of Service		B	
Analysis Period (min)	15					













HCM Unsignalized Intersection Capacity Analysis
10: Emil Kolb Parkway & Duffy's Lane

2031 Future Total PM
07-15-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	17	64	544	262	5
Future Volume (Veh/h)	4	17	64	544	262	5
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	5	20	76	648	312	6
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	1112	312	318			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1112	312	318			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %						
p0 queue free %	98	97	94			
cM capacity (veh/h)						
cM capacity (veh/h)	217	728	1242			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	25	76	648	312	6	
Volume Left	5	76	0	0	0	
Volume Right	20	0	0	0	6	
cSH	495	1242	1700	1700	1700	
Volume to Capacity	0.05	0.06	0.38	0.18	0.00	
Queue Length 95th (m)	1.3	1.6	0.0	0.0	0.0	
Control Delay (s)	12.7	8.1	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	12.7	0.8	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			38.6%		ICU Level of Service	
Analysis Period (min)			15		A	

HCM Unsignalized Intersection Capacity Analysis
16: Highway 50 & Street D

2031 Future Total PM
07-15-2024

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	54	520	7	82	349
Future Volume (Veh/h)	5	54	520	7	82	349
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)	5	54	520	7	82	349
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage veh						
Upstream signal (m)			400			
pX, platoon unblocked						
vC, conflicting volume		1036	264		527	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		1036	264		527	
tC, single (s)		6.8	6.9		4.1	
tC, 2 stage (s)						
tF (s)		3.5	3.3		2.2	
p0 queue free %		98	93		92	
cM capacity (veh/h)		209	735		1036	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	59	347	180	82	349	
Volume Left	5	0	0	82	0	
Volume Right	54	0	7	0	0	
cSH	606	1700	1700	1036	1700	
Volume to Capacity	0.10	0.20	0.11	0.08	0.21	
Queue Length 95th (m)	2.6	0.0	0.0	2.1	0.0	
Control Delay (s)	11.6	0.0	0.0	8.8	0.0	
Lane LOS	B			A		
Approach Delay (s)	11.6	0.0		1.7		
Approach LOS	B					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			32.8%		ICU Level of Service	
Analysis Period (min)			15			
					A	

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821.26/11/2015] © Copyright TRL Limited, 2024							
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 1:56:51 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2041 Future Total							
Emil Kolb Pkwy (North)	1.18	4.58	3.01	N/A	A	3.04	A
Emil Kolb Pkwy (South)	0.18	1.10	1.29	N/A	A		
King Street	0.90	3.58	4.26	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 1:56:51 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1,00	-1	3	1	10	1987520217	1913

(Default Analysis Set) - 2041 Future Total, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Total, AM	2041 Future Total	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	3,04	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	F - 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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓

Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓	✓	

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)	PHF	✓	1262.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	466.00	100.000
King Street	PHF	✓	692.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	1262.00	0.95	SecondQuarter
Emil Kolb Pkwy (South)	466.00	0.95	SecondQuarter
King Street	692.00	0.95	SecondQuarter

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	243.000	223.000
	Emil Kolb Pkwy (North)	697.000	0.000	565.000
	King Street	433.000	259.000	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	0.52	0.48
	Emil Kolb Pkwy (North)	0.55	0.00	0.45
	King Street	0.63	0.37	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	1.310	1.075
	Emil Kolb Pkwy (North)	1.032	1.000	1.022
	King Street	1.061	1.097	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	31.0	7.5
	Emil Kolb Pkwy (North)	3.2	0.0	2.2
	King Street	6.1	9.7	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	3.01	1.18	4.58	A	1256.40	1256.40	57.85	2.75	0.96
Emil Kolb Pkwy (South)	1.29	0.18	1.10	A	465.68	465.68	10.56	1.36	0.18
King Street	4.26	0.90	3.58	A	690.60	690.60	44.53	3.87	0.74

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821.26/11/2015]
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Filename: Highway 50 & Emil Kolb Pkwy Future Total.arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2024_Analysis\Arcady
Report generation date: 2024-06-27 2:38:13 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 [Entry Lane Simulation] - 2041 Future Total						
Emil Kolb Pkwy	0.75	3.20	4.42	N/A	A	3.39	A
Highway 50 (North)	1.47	5.50	4.04	N/A	A		
Highway 50 (South)	0.44	2.00	1.72	N/A	A		
Street B	0.06	0.03	3.97	N/A	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.

"D6 - 2041 Future Total, AM " model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-27 2:38:13 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	901643361	4369

(Default Analysis Set) - 2041 Future Total, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Total, AM	2041 Future Total	AM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3,4		✓	3.39	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)	4	Highway 50 (South)	
Street B	1	Street B	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00
Street B	0.00	99999.00

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	60.00	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	
Street B	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
Street B	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
Street B	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)	1.489	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857
Street B		(calculated)	(calculated)	1.505	2853.857

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

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00
Street B	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00
Street B	1	3		Infinity	0.00	99999.00
Street B	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.745	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.745	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Street B	(calculated)	(calculated)	0.753	1426.929
Street B	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg			
				Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
Highway 50 & Emil Kolb Pkwy	Street B	1	3		✓	✓	
Highway 50 & Emil Kolb Pkwy	Street B	1	4	✓		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓			✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3	✓	✓		
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓	✓

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	PHF	✓	540.00	100.000
Highway 50 (North)	PHF	✓	1243.00	100.000
Highway 50 (South)	PHF	✓	820.00	100.000
Street B	PHF	✓	55.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	540.00	0.96	SecondQuarter
Highway 50 (North)	1243.00	0.96	SecondQuarter
Highway 50 (South)	820.00	0.96	SecondQuarter
Street B	55.00	0.96	SecondQuarter

Turning Proportions

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	0.000	11.000	22.000	22.000
	Highway 50 (North)	10.000	0.000	507.000	726.000
	Emil Kolb Pkwy	20.000	270.000	0.000	250.000
	Highway 50 (South)	20.000	434.000	366.000	0.000

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	0.00	0.20	0.40	0.40
	Highway 50 (North)	0.01	0.00	0.41	0.58
	Emil Kolb Pkwy	0.04	0.50	0.00	0.46

	Highway 50 (South)	0.02	0.53	0.45	0.00
--	--------------------	------	------	------	------

Vehicle Mix

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	1.000	1.037	1.027	1.000
	Highway 50 (North)	1.008	1.000	1.053	1.000
	Emil Kolb Pkwy	1.057	1.277	1.000	1.000
	Highway 50 (South)	1.000	1.037	1.027	1.000

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	0.0	3.7	2.7	0.0
	Highway 50 (North)	0.8	0.0	5.3	0.0
	Emil Kolb Pkwy	5.7	27.7	0.0	0.0
	Highway 50 (South)	0.0	3.7	2.7	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy	4.42	0.75	3.20	A	539.79	539.79	38.26	4.25	0.64
Highway 50 (North)	4.04	1.47	5.50	A	1243.55	1243.55	75.50	3.64	1.26
Highway 50 (South)	1.72	0.44	2.00	A	822.98	822.98	22.49	1.64	0.37
Street B	3.97	0.06	0.03	A	55.45	55.45	3.16	3.42	0.05

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2041 Future Total AM Recommendations

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	3	0	9	255	2	170	2	394	125	224	866	2
Future Volume (vph)	3	0	9	255	2	170	2	394	125	224	866	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	0.0		0.0	140.0		30.0	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		0.896			0.852				0.850			
Frt Protected		0.989		0.950			0.950			0.950		
Satd. Flow (prot)	0	954	0	1750	1588	0	892	3476	1595	1700	3579	0
Frt Permitted		0.947		0.749			0.265			0.503		
Satd. Flow (perm)	0	913	0	1380	1588	0	249	3476	1595	900	3579	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			185				136			
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		127.3			237.9			633.3			400.2	
Travel Time (s)		9.2			21.4			38.0			24.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	0%	72%	2%	100%	2%	100%	5%	2%	5%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	3	0	10	277	2	185	2	428	136	243	941	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	13	0	277	187	0	2	428	136	243	943	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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

2041 Future Total AM Recommendations

3: Highway 50 & Columbia Way

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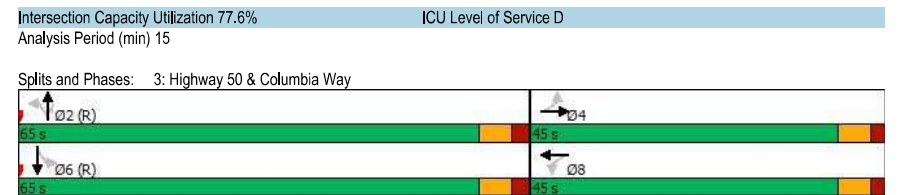
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		8			2		2	6	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	
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		C-Max	C-Max	C-Max	C-Max	C-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 Effct Green (s)		27.8		27.8	27.8		69.5	69.5	69.5	69.5	69.5	
Actuated g/C Ratio		0.25		0.25	0.25		0.63	0.63	0.63	0.63	0.63	
v/c Ratio		0.05		0.80	0.35		0.01	0.19	0.13	0.43	0.42	
Control Delay		1.0		54.4	5.9		11.0	9.8	2.3	15.1	11.7	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		1.0		54.4	5.9		11.0	9.8	2.3	15.1	11.7	
LOS		A		D	A		B	A	A	B	B	
Approach Delay		1.0			34.9			8.0			12.4	
Approach LOS		A			C			A			B	
Queue Length 50th (m)		0.0		58.6	0.4		0.2	19.7	0.0	26.3	52.9	
Queue Length 95th (m)		0.8		80.5	15.6		1.5	34.6	8.9	67.6	106.0	
Internal Link Dist (m)		103.3			213.9			609.3			376.2	
Turn Bay Length (m)							140.0		30.0	125.0		
Base Capacity (vph)		347		489	682		157	2196	1057	568	2261	
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		0.04		0.57	0.27		0.01	0.19	0.13	0.43	0.42	
Intersection Summary												
Area Type:	Other											
Cycle Length:	110											
Actuated Cycle Length:	110											
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green											
Natural Cycle:	60											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.80											
Intersection Signal Delay:	15.9											
Intersection LOS: B												

Lanes, Volumes, Timings

2041 Future Total AM Recommendations

3: Highway 50 & Columbia Way

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Lanes, Volumes, Timings
4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2041 Future Total AM Recommendations













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	←	→	↙	↘	↖	↗	↕	↖	↗	↕	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	15	27	26	128	14	56	12	472	60	54	1082	7
Future Volume (vph)	15	27	26	128	14	56	12	472	60	54	1082	7
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		0.0
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	0.95	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.99				0.98					1.00		
Frt		0.927			0.880				0.850		0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1712	0	1785	1628	0	1623	3476	1591	1785	3575	0
Flt Permitted	0.702			0.588			0.152			0.426		
Satd. Flow (perm)	1301	1712	0	1105	1628	0	260	3476	1591	800	3575	0
Right Turn on Red			Yes			Yes		Yes			Yes	
Satd. Flow (RTOR)		31			67				74		1	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			46.3			38.0	
Confl. Peds. (#/hr)	17					17	8					8
Confl. Bikes (#/hr)					2							
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	0%	4%	4%	0%	0%	2%	10%	5%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	18	33	31	154	17	67	14	569	72	65	1304	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	64	0	154	84	0	14	569	72	65	1312	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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
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	

Lanes, Volumes, Timings
4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2041 Future Total AM Recommendations

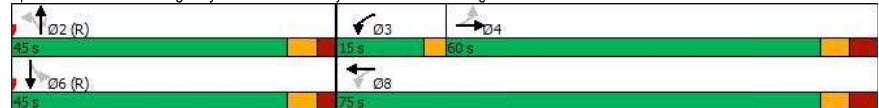
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	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)	10.0	10.0		5.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	47.1	47.1		8.0	47.1		34.7	34.7	34.7	34.7	34.7	
Total Split (s)	60.0	60.0		15.0	75.0		45.0	45.0	45.0	45.0	45.0	
Total Split (%)	50.0%	50.0%		12.5%	62.5%		37.5%	37.5%	37.5%	37.5%	37.5%	
Maximum Green (s)	51.9	51.9		12.0	66.9		38.3	38.3	38.3	38.3	38.3	
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)	4.1	4.1		0.0	4.1		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)	8.1	8.1		3.0	8.1		6.7	6.7	6.7	6.7	6.7	
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		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	10.0	10.0			10.0		10.0	10.0	10.0	10.0	10.0	
Flash Dont Walk (s)	29.0	29.0			29.0		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)	15.8	15.8		32.9	27.8		77.4	77.4	77.4	77.4	77.4	
Actuated g/C Ratio	0.13	0.13		0.27	0.23		0.64	0.64	0.64	0.64	0.64	
v/c Ratio	0.11	0.25		0.41	0.20		0.08	0.25	0.07	0.13	0.57	
Control Delay	41.7	26.4		35.2	10.2		16.0	11.9	3.8	13.6	16.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	41.7	26.4		35.2	10.2		16.0	11.9	3.8	13.6	16.2	
LOS	D	C		D	B		B	B	A	B	B	
Approach Delay	29.8			26.4			11.1			16.1		
Approach LOS	C			C			B			B		
Queue Length 50th (m)	4.2	7.8		31.4	3.4		1.1	26.8	0.0	5.3	82.0	
Queue Length 95th (m)	8.0	14.4		30.8	10.0		6.6	58.8	7.1	18.8	161.3	
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)	562	758		374	937		167	2242	1052	515	2306	
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	0.08		0.41	0.09		0.08	0.25	0.07	0.13	0.57	
Intersection Summary												
Area Type:	Other											
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 39 (33%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 90												

Lanes, Volumes, Timings 2041 Future Total AM Recommendations
4: Highway 50 & Cross Country Boulevard/Bolton Heights Road 07-15-2024

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 78.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings 2041 Future Total AM Recommendations
5: Highway 50 & King Street West/King Street East 07-15-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	27	233	85	300	227	61	54	492	120	59	1145	24
Future Volume (vph)	27	233	85	300	227	61	54	492	120	59	1145	24
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor									0.97	1.00	1.00	
Frt			0.850		0.968				0.850		0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1606	1695	1437	1591	1635	0	1579	1695	1363	1643	1699	0
Flt Permitted	0.424			0.262			0.046			0.371		
Satd. Flow (perm)	717	1695	1437	439	1635	0	76	1695	1324	640	1699	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95		8				128		1	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			31.1			2.0	
Confl. Peds. (#/hr)							2		3	3		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	0%	1%	3%	0%	4%	2%	5%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	29	248	90	319	241	65	57	523	128	63	1218	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	248	90	319	306	0	57	523	128	63	1244	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			3.7			3.7	
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	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	

Lanes, Volumes, Timings

2041 Future Total AM Recommendations

5: Highway 50 & King Street West/King Street East

07-15-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
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	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	8.0	31.9	31.9	16.0	39.9		8.0	94.1	94.1	8.0	94.1	
Total Split (%)	5.3%	21.3%	21.3%	10.7%	26.6%		5.3%	62.7%	62.7%	5.3%	62.7%	
Maximum Green (s)	5.0	25.0	25.0	13.0	33.0		5.0	87.1	87.1	5.0	87.1	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	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		None	C-Max	C-Max	None	C-Max	
Walk Time (s)		10.0	10.0		10.0			10.0	10.0		10.0	
Flash Dont Walk (s)		15.0	15.0		15.0			15.0	15.0		15.0	
Pedestrian Calls (#/hr)		4	4		4			8	8		8	
Act Effct Green (s)	33.0	24.1	24.1	44.0	35.3		97.6	89.6	89.6	97.6	89.6	
Actuated g/C Ratio	0.22	0.16	0.16	0.29	0.24		0.65	0.60	0.60	0.65	0.60	
v/c Ratio	0.16	0.91	0.29	1.40	0.78		0.56	0.52	0.15	0.14	1.23	
Control Delay	40.1	97.4	11.2	238.7	67.8		37.7	20.5	2.5	9.7	139.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.1	97.4	11.2	238.7	67.8		37.7	20.5	2.5	9.7	139.6	
LOS	D	F	B	F	E		D	C	A	A	F	
Approach Delay		71.7			155.0			18.6			133.4	
Approach LOS		E			F			B			F	
Queue Length 50th (m)	6.5	76.9	0.0	~101.0	90.3		5.9	95.6	0.0	6.6	~489.3	
Queue Length 95th (m)	14.9	#127.7	14.9	#164.1	#140.4		#21.4	128.7	9.2	12.2	#575.5	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	187	282	318	228	390		101	1012	842	450	1014	
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	0.16	0.88	0.28	1.40	0.78		0.56	0.52	0.15	0.14	1.23	

Intersection Summary

Area Type: CBD

Cycle Length: 150

Actuated Cycle Length: 150

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Lanes, Volumes, Timings

2041 Future Total AM Recommendations

5: Highway 50 & King Street West/King Street East

07-15-2024

Maximum v/c Ratio: 1.40

Intersection Signal Delay: 103.3

Intersection LOS: F

Intersection Capacity Utilization 115.6%

ICU Level of Service H

Analysis Period (min) 15

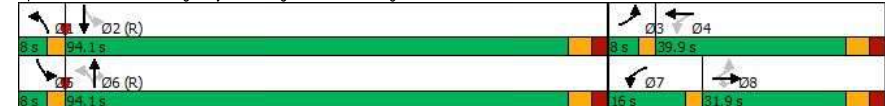
~ Volume exceeds capacity, queue is theoretically infinite.

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 Street West/King Street East























Lanes, Volumes, Timings

2041 Future Total AM Recommendations

6: Kingsview Drive/Street G & Columbia Way

07-15-2024













												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	272	33	107	232	25	41	4	51	46	9	145
Future Volume (vph)	56	272	33	107	232	25	41	4	51	46	9	145
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
Ped Bike Factor		1.00			1.00			0.99			1.00	
Frt		0.986			0.990			0.928			0.902	
Flt Protected		0.992			0.986			0.979			0.989	
Satd. Flow (prot)	0	3551	0	0	3462	0	0	1728	0	0	1680	0
Flt Permitted		0.808			0.735			0.814			0.888	
Satd. Flow (perm)	0	2892	0	0	2578	0	0	1437	0	0	1507	0
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		20			14			61			175	
Link Speed (k/h)		40			40			40			50	
Link Distance (m)		237.9			417.0			131.8			93.0	
Travel Time (s)		21.4			37.5			11.9			6.7	
Confl. Peds. (#/hr)			3	3					5	5		
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	2%	0%	0%	3%	3%	2%	0%	2%	0%	2%	2%	2%
Adj. Flow (vph)	67	328	40	129	280	30	49	5	61	55	11	175
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	435	0	0	439	0	0	115	0	0	241	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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8			5			2	
Permitted Phases	4			8			2			6		

Lanes, Volumes, Timings

2041 Future Total AM Recommendations

6: Kingsview Drive/Street G & Columbia Way

07-15-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	21.9	21.9		21.9	21.9		9.5	21.0		21.0	21.0	
Total Split (s)	23.0	23.0		23.0	23.0		9.5	32.0		22.5	22.5	
Total Split (%)	41.8%	41.8%		41.8%	41.8%		17.3%	58.2%		40.9%	40.9%	
Maximum Green (s)	16.1	16.1		16.1	16.1		5.0	26.0		16.5	16.5	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	4.0		4.0	4.0	
All-Red Time (s)	2.9	2.9		2.9	2.9		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.9			6.9			6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
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	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0			8.0		8.0	8.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		3	3	
Act Effct Green (s)		14.4			14.4			10.2			10.2	
Actuated g/C Ratio		0.47			0.47			0.33			0.33	
v/c Ratio		0.32			0.36			0.22			0.39	
Control Delay		8.9			9.5			7.0			6.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		8.9			9.5			7.0			6.0	
LOS		A			A			A			A	
Approach Delay		8.9			9.5			7.0			6.0	
Approach LOS		A			A			A			A	
Queue Length 50th (m)		8.4			8.8			2.1			2.7	
Queue Length 95th (m)		19.3			20.4			9.7			13.0	
Internal Link Dist (m)		213.9			393.0			107.8			69.0	
Turn Bay Length (m)												
Base Capacity (vph)		1685			1501			1180			960	
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		0.26			0.29			0.10			0.25	
Intersection Summary												
Area Type:	Other											
Cycle Length: 55												
Actuated Cycle Length: 30.7												
Natural Cycle: 55												
Control Type: Semi Act-Uncoord												
Maximum v/c Ratio: 0.39												
Intersection Signal Delay: 8.4							Intersection LOS: A					
Intersection Capacity Utilization 50.4%							ICU Level of Service A					
Analysis Period (min) 15												

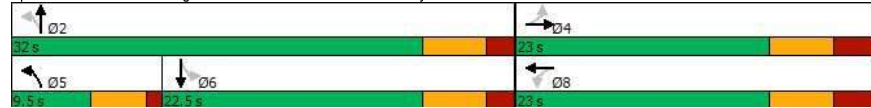
Lanes, Volumes, Timings

6: Kingsview Drive/Street G & Columbia Way

2041 Future Total AM Recommendations

07-15-2024

Splits and Phases: 6: Kingsview Drive/Street G & Columbia Way



HCM Unsignalized Intersection Capacity Analysis



















7: Westchester Boulevard & Columbia Way

2041 Future Total AM Recommendations











07-15-2024

	→	↗	↖	←	↙	↘
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑	↑
Traffic Volume (veh/h)	281	48	30	272	67	40
Future Volume (Veh/h)	281	48	30	272	67	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	351	60	38	340	84	50
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			411		627	206
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			411		627	206
tC, single (s)			4.2		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		79	94
cM capacity (veh/h)			1130		402	792
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	234	177	151	227	134	
Volume Left	0	0	38	0	84	
Volume Right	0	60	0	0	50	
cSH	1700	1700	1130	1700	492	
Volume to Capacity	0.14	0.10	0.03	0.13	0.27	
Queue Length 95th (m)	0.0	0.0	0.8	0.0	8.8	
Control Delay (s)	0.0	0.0	2.3	0.0	15.0	
Lane LOS			A		C	
Approach Delay (s)	0.0		0.9		15.0	
Approach LOS					C	
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			33.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total AM Recommendations
8: Mount Hope Road & Columbia Way 07-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	286	12	3	208	9	30	5	14	21	4	61
Future Volume (Veh/h)	31	286	12	3	208	9	30	5	14	21	4	61
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	38	349	15	4	254	11	37	6	17	26	5	74
Pedestrians	1			2						1		
Lane Width (m)	3.7			3.7						3.7		
Walking Speed (m/s)	1.2			1.2						1.2		
Percent Blockage	0			0						0		
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	266	364			645			706	184	541	708	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	266	364			645			706	184	541	708	134
tC, single (s)	4.1	4.1			7.5			6.5	7.1	7.5	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.2	2.2			3.5			4.0	3.4	3.5	4.0	3.3
p0 queue free %	97	100			88			98	98	94	99	92
cM capacity (veh/h)	1308	1206			319			351	801	402	350	885
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	38	233	131	4	169	96	60	105				
Volume Left	38	0	0	4	0	0	37	26				
Volume Right	0	0	15	0	0	11	17	74				
cSH	1308	1700	1700	1206	1700	1700	389	646				
Volume to Capacity	0.03	0.14	0.08	0.00	0.10	0.06	0.15	0.16				
Queue Length 95th (m)	0.7	0.0	0.0	0.1	0.0	0.0	4.3	4.6				
Control Delay (s)	7.8	0.0	0.0	8.0	0.0	0.0	15.9	11.6				
Lane LOS	A	A			C			B				
Approach Delay (s)	0.7	0.1			15.9			11.6				
Approach LOS				C			B					
Intersection Summary												
Average Delay	3.0											
Intersection Capacity Utilization	28.2%			ICU Level of Service					A			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total AM Recommendations
9: Caledon King Townline & Columbia Way 07-15-2024

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	368	100	121	551	23
Future Volume (Veh/h)	25	368	100	121	551	23
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	391	106	129	586	24
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	939	598	610			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	939	598	610			
tC, single (s)	6.5	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.3			
p0 queue free %	89	22	89			
cM capacity (veh/h)	251	502	931			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	27	391	106	129	610	
Volume Left	27	0	106	0	0	
Volume Right	0	391	0	0	24	
cSH	251	502	931	1700	1700	
Volume to Capacity	0.11	0.78	0.11	0.08	0.36	
Queue Length 95th (m)	2.9	56.1	3.1	0.0	0.0	
Control Delay (s)	21.1	33.0	9.4	0.0	0.0	
Lane LOS	C	D	A			
Approach Delay (s)	32.2		4.2		0.0	
Approach LOS	D					
Intersection Summary						
Average Delay	11.5					
Intersection Capacity Utilization	59.8%			ICU Level of Service		B
Analysis Period (min)	15					

Lanes, Volumes, Timings 2041 Future Total AM Recommendations
10: Emil Kolb Parkway & Duffy's Lane 07-15-2024

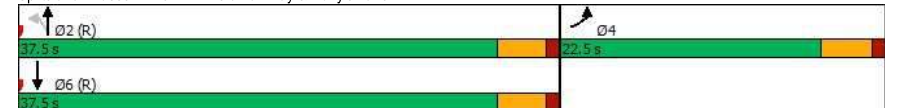
	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	76	113	42	442	1111	27
Future Volume (vph)	76	113	42	442	1111	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	115.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.919			0.996		
Flt Protected	0.980		0.950			
Satd. Flow (prot)	1700	0	1534	3042	3532	0
Flt Permitted	0.980		0.145			
Satd. Flow (perm)	1700	0	234	3042	3532	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	54				6	
Link Speed (k/h)	50			70	50	
Link Distance (m)	426.7			2029.6	656.7	
Travel Time (s)	30.7			104.4	47.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	3%	19%	20%	3%	0%
Adj. Flow (vph)	84	126	47	491	1234	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	210	0	47	491	1264	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
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	25			15
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	22.5		37.5	37.5	37.5	
Total Split (%)	37.5%		62.5%	62.5%	62.5%	
Maximum Green (s)	18.0		33.0	33.0	33.0	
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?						
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)	18.0		33.0	33.0	33.0	
Actuated g/C Ratio	0.30		0.55	0.55	0.55	

Lanes, Volumes, Timings 2041 Future Total AM Recommendations
10: Emil Kolb Parkway & Duffy's Lane 07-15-2024
















	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.38		0.37	0.29	0.65	
Control Delay	14.6		17.8	7.8	11.4	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	14.6		17.8	7.8	11.4	
LOS	B		B	A	B	
Approach Delay	14.6			8.7	11.4	
Approach LOS	B			A	B	
Queue Length 50th (m)	13.8		2.8	14.3	48.1	
Queue Length 95th (m)	29.7		11.7	22.2	67.3	
Internal Link Dist (m)	402.7			2005.6	632.7	
Turn Bay Length (m)			115.0			
Base Capacity (vph)	547		128	1673	1945	
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		0.37	0.29	0.65	

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 11.0	Intersection LOS: B
Intersection Capacity Utilization 53.6%	ICU Level of Service A
Analysis Period (min) 15	



















Splits and Phases: 10: Emil Kolb Parkway & Duffy's Lane



HCM Unsignalized Intersection Capacity Analysis 2041 Future Total AM Recommendations
11: Duffy's Lane & Street A 07-15-2024

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Traffic Volume (veh/h)	0	41	32	3	35	12	34	13	4	14	12	0								
Future Volume (Veh/h)	0	41	32	3	35	12	34	13	4	14	12	0								
Sign Control	Stop			Stop			Free			Free										
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)	0	41	32	3	35	12	34	13	4	14	12	0								
Pedestrians																				
Lane Width (m)																				
Walking Speed (m/s)																				
Percent Blockage																				
Right turn flare (veh)																				
Median type	None						None													
Median storage (veh)																				
Upstream signal (m)																				
pX, platoon unblocked																				
vC, conflicting volume	152	125	12	176	123	15	12			17										
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	152	125	12	176	123	15	12			17										
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1										
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2										
p0 queue free %	100	94	97	100	95	99	98			99										
cM capacity (veh/h)	759	743	1069	715	745	1065	1607			1600										
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	73	50	51	26																
Volume Left	0	3	34	14																
Volume Right	32	12	4	0																
cSH	857	800	1607	1600																
Volume to Capacity	0.09	0.06	0.02	0.01																
Queue Length 95th (m)	2.2	1.6	0.5	0.2																
Control Delay (s)	9.6	9.8	4.9	3.9																
Lane LOS	A	A	A	A																
Approach Delay (s)	9.6	9.8	4.9	3.9																
Approach LOS	A	A																		
Intersection Summary																				
Average Delay				7.7																
Intersection Capacity Utilization				15.6%	ICU Level of Service			A												
Analysis Period (min)				15																

Lanes, Volumes, Timings 2041 Future Total AM Recommendations
12: Street E & Emil Kolb Parkway 07-15-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	449	31	7	966	7	71	55	22	20	47	100
Future Volume (vph)	38	449	31	7	966	7	71	55	22	20	47	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	15.0		0.0	15.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.999			0.980			0.919	
Flt Protected	0.950			0.950				0.977			0.994	
Satd. Flow (prot)	1789	3543	0	1789	3575	0	0	1803	0	0	1720	0
Flt Permitted	0.239			0.476				0.821			0.960	
Satd. Flow (perm)	450	3543	0	897	3575	0	0	1515	0	0	1662	0
Right Turn on Red	Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)	18			2				14			100	
Link Speed (k/h)	70			50				50			50	
Link Distance (m)	656.7			298.1				132.6			132.1	
Travel Time (s)	33.8			21.5				9.5			9.5	
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)	38	449	31	7	966	7	71	55	22	20	47	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	480	0	7	973	0	0	148	0	0	167	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)	3.7			3.7				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
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	41.0	41.0		41.0	41.0		24.0	24.0		24.0	24.0	
Total Split (%)	63.1%	63.1%		63.1%	63.1%		36.9%	36.9%		36.9%	36.9%	
Maximum Green (s)	36.5	36.5		36.5	36.5		19.5	19.5		19.5	19.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
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 Efect Green (s)	36.5	36.5		36.5	36.5			19.5			19.5	
Actuated g/C Ratio	0.56	0.56		0.56	0.56			0.30			0.30	
v/c Ratio	0.15	0.24		0.01	0.48			0.32			0.29	

Lanes, Volumes, Timings

12: Street E & Emil Kolb Parkway

2041 Future Total AM Recommendations

07-15-2024

	←	→	↙	↘	←	↙	↘	↑	↙	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	8.7	7.3		6.4	9.6			18.2			9.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	8.7	7.3		6.4	9.6			18.2			9.5	
LOS	A	A		A	A			B			A	
Approach Delay		7.4			9.6			18.2			9.5	
Approach LOS		A			A			B			A	
Queue Length 50th (m)	2.1	13.9		0.4	35.1			12.9			6.1	
Queue Length 95th (m)	6.6	21.1		1.8	48.6			26.7			19.2	
Internal Link Dist (m)		632.7			274.1			108.6			108.1	
Turn Bay Length (m)	15.0			15.0								
Base Capacity (vph)	252	1997		503	2008			464			568	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.15	0.24		0.01	0.48			0.32			0.29	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 65

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

Natural Cycle: 45

Control Type: Pretimed

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 9.7

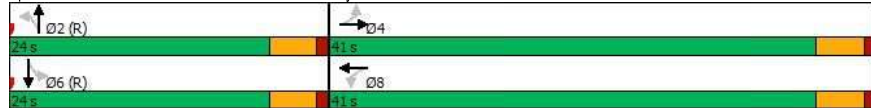
Intersection LOS: A

Intersection Capacity Utilization 60.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 12: Street E & Emil Kolb Parkway





















HCM Unsignalized Intersection Capacity Analysis

13: Street F & Emil Kolb Parkway

2041 Future Total AM Recommendations

07-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	464	7	17	900	15	22	28	36	40	24	58
Future Volume (Veh/h)	19	464	7	17	900	15	22	28	36	40	24	58
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)	19	464	7	17	900	15	22	28	36	40	24	58
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)	298											
pX, platoon unblocked				1.00			1.00			1.00		
vC, conflicting volume	915			471			1060			1454		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	915			467			1057			1452		
tC, single (s)	4.1			4.1			7.5			6.5		
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5			4.0		
p0 queue free %	97			98			83			77		
cM capacity (veh/h)	741			1089			132			124		

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	19	309	162	17	600	315	86	122
Volume Left	19	0	0	17	0	0	22	40
Volume Right	0	0	7	0	0	15	36	58
cSH	741	1700	1700	1089	1700	1700	196	172
Volume to Capacity	0.03	0.18	0.10	0.02	0.35	0.19	0.44	0.71
Queue Length 95th (m)	0.6	0.0	0.0	0.4	0.0	0.0	16.3	34.7
Control Delay (s)	10.0	0.0	0.0	8.4	0.0	0.0	37.0	65.4
Lane LOS	A			A			E	F
Approach Delay (s)	0.4			0.2			37.0	
Approach LOS							E	

Intersection Summary

Average Delay 7.0

Intersection Capacity Utilization 42.4%

ICU Level of Service

A

Analysis Period (min) 15

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

2041 Future Total AM Recommendations
07-15-2024

	←	→	↙	↘	←	↙	↘	↗	↖	↗	↖	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘					
Traffic Volume (vph)	95	0	118	252	0	63	43	555	81	21	872	33				
Future Volume (vph)	95	0	118	252	0	63	43	555	81	21	872	33				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900				
Storage Length (m)	25.0		0.0	50.0		0.0	20.0		0.0	20.0		0.0				
Storage Lanes	1		0	1		0	1		0	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	0.95	1.00	0.95	0.95				
Frt		0.850			0.850			0.981			0.995					
Flt Protected	0.950			0.950			0.950			0.950						
Satd. Flow (prot)	1789	1601	0	1789	1601	0	1789	3511	0	1789	3561	0				
Flt Permitted	0.716			0.681			0.257			0.384						
Satd. Flow (perm)	1349	1601	0	1283	1601	0	484	3511	0	723	3561	0				
Right Turn on Red			Yes			Yes			Yes			Yes				
Satd. Flow (RTOR)		122			276			40			9					
Link Speed (k/h)		50			50			60			60					
Link Distance (m)		531.2			178.5			146.2			128.1					
Travel Time (s)		38.2			12.9			8.8			7.7					
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)	95	0	118	252	0	63	43	555	81	21	872	33				
Shared Lane Traffic (%)																
Lane Group Flow (vph)	95	118	0	252	63	0	43	636	0	21	905	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)		3.7			3.7			3.7			3.7					
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)	100		100	100		100	100		100	100		100				
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA					
Protected Phases		4			8			2			6					
Permitted Phases	4			8			2			6						
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5					
Total Split (s)	24.0	24.0		24.0	24.0		36.0	36.0		36.0	36.0					
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%					
Maximum Green (s)	19.5	19.5		19.5	19.5		31.5	31.5		31.5	31.5					
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5					
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0					
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0					
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5					
Lead/Lag																
Lead-Lag Optimize?																
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0					
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0					
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0					
Act Effct Green (s)	19.5	19.5		19.5	19.5		31.5	31.5		31.5	31.5					
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.52	0.52		0.52	0.52					
v/c Ratio	0.22	0.20		0.61	0.09		0.17	0.34		0.06	0.48					

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

2041 Future Total AM Recommendations
07-15-2024

	←	→	↙	↘	←	↙	↘	↗	↖	↗	↖	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
Control Delay	16.5	4.3		24.4	0.3		9.6	8.3		7.6	10.1					
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0					
Total Delay	16.5	4.3		24.4	0.3		9.6	8.3		7.6	10.1					
LOS	B	A		C	A		A	A		A	B					
Approach Delay		9.8			19.6			8.4			10.0					
Approach LOS		A			B			A			B					
Queue Length 50th (m)	7.9	0.0		24.1	0.0		2.4	18.9		1.1	31.6					
Queue Length 95th (m)	17.9	9.0		46.1	0.0		7.5	28.3		4.0	44.7					
Internal Link Dist (m)		507.2			154.5			122.2			104.1					
Turn Bay Length (m)	25.0			50.0			20.0			20.0						
Base Capacity (vph)	438	602		416	706		254	1862		379	1873					
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	0.22	0.20		0.61	0.09		0.17	0.34		0.06	0.48					

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 45

Control Type: Pretimed

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 10.9

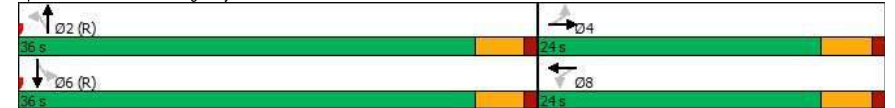
Intersection LOS: B

Intersection Capacity Utilization 61.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 14: Highway 50 & Street A















Lanes, Volumes, Timings
15: Highway 50 & Street C

2041 Future Total AM Recommendations
07-15-2024

	←	→	↙	↘	↖	↗	↕	↔	↕	↔	↕	↔
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↘		↙	↘		↙	↘		↙	↘	
Traffic Volume (vph)	12	0	69	123	0	184	28	629	40	59	927	5
Future Volume (vph)	12	0	69	123	0	184	28	629	40	59	927	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	15.0		0.0	25.0		0.0	15.0		0.0	75.0		0.0
Storage Lanes	1		0	1		0	1		0	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	0.95	1.00	0.95	0.95
Frt		0.850			0.850			0.991			0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1601	0	1789	1601	0	1789	3546	0	1789	3575	0
Flt Permitted	0.605			0.712			0.282			0.331		
Satd. Flow (perm)	1139	1601	0	1341	1601	0	531	3546	0	623	3575	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		253			304			13			1	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		127.4			264.3			467.7			284.2	
Travel Time (s)		9.2			19.0			28.1			17.1	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	12	0	69	123	0	184	28	629	40	59	927	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	69	0	123	184	0	28	669	0	59	932	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)		3.7			3.7			3.7			3.7	
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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		

Lanes, Volumes, Timings
15: Highway 50 & Street C

2041 Future Total AM Recommendations
07-15-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		9.5	23.0		9.5	23.0	
Total Split (%)	40.9%	40.9%		40.9%	40.9%		17.3%	41.8%		17.3%	41.8%	
Maximum Green (s)	18.0	18.0		18.0	18.0		5.0	18.5		5.0	18.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	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	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)	10.3	10.3		10.3	10.3		32.7	29.0		35.0	33.5	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.59	0.53		0.64	0.61	
v/c Ratio	0.06	0.14		0.49	0.34		0.06	0.36		0.11	0.43	
Control Delay	16.8	0.6		25.8	2.0		4.0	8.4		5.1	8.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.8	0.6		25.8	2.0		4.0	8.4		5.1	8.3	
LOS	B	A		C	A		A	A		A	A	
Approach Delay		3.0			11.5			8.2			8.1	
Approach LOS		A			B			A			A	
Queue Length 50th (m)	1.0	0.0		11.7	0.0		0.9	31.8		1.8	19.5	
Queue Length 95th (m)	4.2	0.0		22.7	1.9		2.6	32.3		6.2	61.4	
Internal Link Dist (m)		103.4			240.3			443.7			260.2	
Turn Bay Length (m)	15.0			25.0			15.0			75.0		
Base Capacity (vph)	372	694		438	728		450	1873		529	2176	
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	0.03	0.10		0.28	0.25		0.06	0.36		0.11	0.43	
Intersection Summary												
Area Type:	Other											
Cycle Length: 55												
Actuated Cycle Length: 55												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 55												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.49												
Intersection Signal Delay: 8.5						Intersection LOS: A						
Intersection Capacity Utilization 54.7%						ICU Level of Service A						
Analysis Period (min) 15												

Lanes, Volumes, Timings
15: Highway 50 & Street C

2041 Future Total AM Recommendations
07-15-2024

Splits and Phases: 15: Highway 50 & Street C












HCM Unsignalized Intersection Capacity Analysis
16: Highway 50 & Street D




















2041 Future Total AM Recommendations
07-15-2024

	WBL	WBR	NBT	NBR	SBL	SBT
Movement						
Lane Configurations	↔	↔	↕	↕	↕	↕
Traffic Volume (veh/h)	10	117	535	4	38	1081
Future Volume (Veh/h)	10	117	535	4	38	1081
Sign Control	Stop	Stop	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	117	535	4	38	1081
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			400			
pX, platoon unblocked						
vC, conflicting volume	1154	270			539	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1154	270			539	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	84			96	
cM capacity (veh/h)	184	728			1025	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	127	357	182	38	540	540
Volume Left	10	0	0	38	0	0
Volume Right	117	0	4	0	0	0
cSH	590	1700	1700	1025	1700	1700
Volume to Capacity	0.22	0.21	0.11	0.04	0.32	0.32
Queue Length 95th (m)	6.5	0.0	0.0	0.9	0.0	0.0
Control Delay (s)	12.8	0.0	0.0	8.6	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	12.8	0.0		0.3		
Approach LOS	B					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			44.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total AM Recommendations
17: Mount Hope Road & Street H 07-15-2024

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	0	33	4	0	63
Future Volume (Veh/h)	10	0	33	4	0	63
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)	10	0	33	4	0	63
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	98	35			37	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	98	35			37	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	901	1038			1574	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	10	37	63			
Volume Left	10	0	0			
Volume Right	0	4	0			
cSH	901	1700	1574			
Volume to Capacity	0.01	0.02	0.00			
Queue Length 95th (m)	0.3	0.0	0.0			
Control Delay (s)	9.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	9.0	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		0.8				
Intersection Capacity Utilization		13.3%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total AM Recommendations
18: Forest Gate Avenue/Street I & Columbia Way 07-15-2024

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	11	307	2	3	118	2	68	0	81	5	0	34	
Future Volume (Veh/h)	11	307	2	3	118	2	68	0	81	5	0	34	
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)	11	307	2	3	118	2	68	0	81	5	0	34	
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	120			309			429	456	154	382	456	60	
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	120			309			429	456	154	382	456	60	
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9	
tC, 2 stage (s)													
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3	
p0 queue free %	99			100			86	100	91	99	100	97	
cM capacity (veh/h)	1466			1248			489	494	864	496	494	993	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	11	205	104	3	79	41	149	39					
Volume Left	11	0	0	3	0	0	68	5					
Volume Right	0	0	2	0	0	2	81	34					
cSH	1466	1700	1700	1248	1700	1700	640	880					
Volume to Capacity	0.01	0.12	0.06	0.00	0.05	0.02	0.23	0.04					
Queue Length 95th (m)	0.2	0.0	0.0	0.1	0.0	0.0	7.2	1.1					
Control Delay (s)	7.5	0.0	0.0	7.9	0.0	0.0	12.3	9.3					
Lane LOS	A			A			B	A					
Approach Delay (s)	0.3			0.2			12.3	9.3					
Approach LOS							B	A					
Intersection Summary													
Average Delay			3.7										
Intersection Capacity Utilization			30.6%				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, 2024							
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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\2024_Analysis\Arcady
Report generation date: 2024-06-13 1:07:38 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2041 Future Total							
Emil Kolb Pkwy (North)	1.04	4.33	4.28	N/A	A	6.20	A
Emil Kolb Pkwy (South)	3.76	12.27	9.03	N/A	A		
King Street	0.99	4.05	3.60	N/A	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 - 2024 Existing Traffic, AM" model duration: 8:00 AM - 9:00 AM
"D2 - 2024 Existing Traffic, PM" model duration: 8:00 AM - 9:00 AM
"D3 - 2031 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D4 - 2041 Future Background, AM" model duration: 8:00 AM - 9:00 AM
"D5 - 2031 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D7 - 2031 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D8 - 2041 Future Background, PM" model duration: 8:00 AM - 9:00 AM
"D9 - 2031 Future Total, PM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 8:00 AM - 9:00 AM

Run using Junctions 8.0.6.541 at 2024-06-13 1:07:38 PM

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

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	1914776726	1369

(Default Analysis Set) - 2041 Future Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Total, PM	2041 Future Total	PM		PHF	08:00	09:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3		✓	6,20	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)
Emil Kolb Pkwy (North)	0.00	99999.00
Emil Kolb Pkwy (South)	0.00	99999.00
King Street	0.00	99999.00

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.

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy (North)	Evenly split	10.00
Emil Kolb Pkwy (South)	Evenly split	10.00
King Street	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy (North)	1	1		Infinity	0.00	99999.00
Emil Kolb Pkwy (North)	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	3		Infinity	0.00	99999.00
Emil Kolb Pkwy (South)	1	4		Infinity	0.00	99999.00
King Street	1	2		Infinity	0.00	99999.00
King Street	1	3		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (North)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
Emil Kolb Pkwy (South)	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507
King Street	(calculated)	(calculated)	0.781	1415.507

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg		
				Emil Kolb Pkwy (South)	Emil Kolb Pkwy (North)	King Street
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	3		✓	
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (South)	1	4		✓	✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	1	✓		✓

Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy (North)	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	2	✓		
Highway 50 & Emil Kolb Pkwy	King Street	1	3	✓	✓	

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)	PHF	✓	799.00	100.000
Emil Kolb Pkwy (South)	PHF	✓	1386.00	100.000
King Street	PHF	✓	918.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy (North)	799.00	1.00	SecondQuarter
Emil Kolb Pkwy (South)	1386.00	1.00	SecondQuarter
King Street	918.00	1.00	SecondQuarter

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	
		0.000	758.000	628.000	
		425.000	0.000	374.000	
		362.000	556.000	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	
		0.00	0.55	0.45	
		0.53	0.00	0.47	
		0.39	0.61	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	
		1.000	1.021	1.067	
		1.103	1.000	1.077	
		1.047	1.015	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	2.1	6.7	
Emil Kolb Pkwy (North)	10.3	0.0	7.7	
King Street	4.7	1.5	0.0	

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy (North)	4.28	1.04	4.33	A	801.92	801.92	58.03	4.34	0.97
Emil Kolb Pkwy (South)	9.03	3.76	12.27	A	1392.79	1392.79	207.47	8.94	3.46
King Street	3.60	0.99	4.05	A	920.46	920.46	54.67	3.56	0.91

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821.26/11/2015] © Copyright TRL Limited, 2024							
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk							
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution							

Filename: Highway 50 & Emil Kolb Pkwy Future Total arc8
Path: N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Design\Traffic\2024_Analysis\Arcady
Report generation date: 2024-06-27 2:32:54 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 [Entry Lane Simulation] - 2041 Future Total							
Emil Kolb Pkwy	2.74	9.10	8.10	N/A	A	15.88	C
Highway 50 (North)	0.66	2.91	2.28	N/A	A		
Highway 50 (South)	2.98	10.44	7.82	N/A	A		
Street B	11.91	29.23	164.21	N/A	F		

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.

"D6 - 2041 Future Total, AM" model duration: 8:00 AM - 9:00 AM
"D10 - 2041 Future Total, PM" model duration: 3:00 PM - 4:00 PM

Run using Junctions 8.0.6.541 at 2024-06-27 2:32:54 PM

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	Crozler 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	mph	PCE	PCE	perHour	s	-Min	perMin

Entry Lane Analysis Options

Stop Criteria (%)	Random Seed	Results Refresh Speed (s)	Individual Vehicle Animation Number Of Trials	Time Step Size (s)	Last Run Random Seed	Last Run Number Of Trials
1.00	-1	3	1	10	1478866853	3089

(Default Analysis Set) - 2041 Future Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Entry Lane Analysis	A1 [Entry Lane Simulation]	This analysis set uses entry lane simulation mode. This is provided as an investigative tool and the user should apply judgement when interpreting the results.

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)	Entry Lane Simulation		✓				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
2041 Future Total, PM	2041 Future Total	PM		PHF	15:00	16:00	60	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Highway 50 & Emil Kolb Pkwy	Roundabout	1,2,3,4		✓	15,88	C

Intersection Network Options

Driving Side	Lighting
Right	Normal/Unknown

Legs

Name	Leg	Name	Description
Emil Kolb Pkwy	3	Emil Kolb Pkwy	
Highway 50 (North)	2	Highway 50 (North)	
Highway 50 (South)	4	Highway 50 (South)	
Street B	1	Street B	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	0.00	99999.00
Highway 50 (North)	0.00	99999.00
Highway 50 (South)	0.00	99999.00
Street B	0.00	99999.00

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	60.00	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	
Street B	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
Street B	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
Street B	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)	1.489	2831.014
Highway 50 (North)		(calculated)	(calculated)	1.505	2853.857
Highway 50 (South)		(calculated)	(calculated)	1.505	2853.857
Street B		(calculated)	(calculated)	1.505	2853.857

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

Entry Lane Analysis: Leg options

Name	Lane Capacity Source	Traffic Considering Secondary Lanes (%)
Emil Kolb Pkwy	Evenly split	10.00
Highway 50 (North)	Evenly split	10.00
Highway 50 (South)	Evenly split	10.00
Street B	Evenly split	10.00

Lanes

Name	Lane Level	Lane	Has Limited Storage	Storage (PCE)	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Emil Kolb Pkwy	1	2		Infinity	0.00	99999.00
Emil Kolb Pkwy	1	3		Infinity	0.00	99999.00
Highway 50 (North)	1	1		Infinity	0.00	99999.00
Highway 50 (North)	1	2		Infinity	0.00	99999.00
Highway 50 (South)	1	3		Infinity	0.00	99999.00
Highway 50 (South)	1	4		Infinity	0.00	99999.00
Street B	1	3		Infinity	0.00	99999.00
Street B	1	4		Infinity	0.00	99999.00

Entry Lane slope and intercept

Name	Slope	Intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Emil Kolb Pkwy	(calculated)	(calculated)	0.745	1415.507
Emil Kolb Pkwy	(calculated)	(calculated)	0.745	1415.507
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (North)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Highway 50 (South)	(calculated)	(calculated)	0.753	1426.929
Street B	(calculated)	(calculated)	0.753	1426.929
Street B	(calculated)	(calculated)	0.753	1426.929

Lane Movements

Intersection	Leg	Lane Level	Lane	Leg			
				Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
Highway 50 & Emil Kolb Pkwy	Street B	1	3		✓	✓	
Highway 50 & Emil Kolb Pkwy	Street B	1	4	✓		✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	1			✓	✓
Highway 50 & Emil Kolb Pkwy	Highway 50 (North)	1	2	✓	✓		✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	2	✓			✓
Highway 50 & Emil Kolb Pkwy	Emil Kolb Pkwy	1	3		✓	✓	
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	3	✓	✓		
Highway 50 & Emil Kolb Pkwy	Highway 50 (South)	1	4		✓	✓	✓

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	PHF	✓	1015.00	100.000
Highway 50 (North)	PHF	✓	849.00	100.000
Highway 50 (South)	PHF	✓	1149.00	100.000
Street B	PHF	✓	195.00	100.000

Peak Hour Factor Data

Name	Hourly Volume (PCE/hr)	Peak Hour Factor	Peak Time Segment
Emil Kolb Pkwy	1015.00	0.91	SecondQuarter
Highway 50 (North)	849.00	0.91	SecondQuarter
Highway 50 (South)	1149.00	0.91	SecondQuarter
Street B	195.00	0.91	SecondQuarter

Turning Proportions

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	0.000	86.000	41.000	68.000
	Highway 50 (North)	25.000	0.000	308.000	516.000
	Emil Kolb Pkwy	50.000	574.000	0.000	391.000
	Highway 50 (South)	50.000	793.000	306.000	0.000

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	0.00	0.44	0.21	0.35
	Highway 50 (North)	0.03	0.00	0.36	0.61
	Emil Kolb Pkwy	0.05	0.57	0.00	0.39

	Highway 50 (South)	0,04	0,69	0,27	0,00
--	--------------------	------	------	------	------

Vehicle Mix

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	1,000	1,000	1,000	1,000
	Highway 50 (North)	1,013	1,000	1,134	1,000
	Emil Kolb Pkwy	1,013	1,023	1,000	1,000
	Highway 50 (South)	1,000	1,013	1,000	1,000

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

		To			
		Street B	Highway 50 (North)	Emil Kolb Pkwy	Highway 50 (South)
From	Street B	0.0	0.0	0.0	0.0
	Highway 50 (North)	1.3	0.0	13.4	0.0
	Emil Kolb Pkwy	1.3	2.3	0.0	0.0
	Highway 50 (South)	0.0	1.3	0.0	0.0

Results

Results Summary for whole modelled period

Name	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)
Emil Kolb Pkwy	8.10	2.74	9.10	A	1016.01	1016.01	104.46	6.17	1.74
Highway 50 (North)	2.28	0.66	2.91	A	846.78	846.78	29.86	2.12	0.50
Highway 50 (South)	7.82	2.98	10.44	A	1152.85	1152.85	107.78	5.61	1.80
Street B	164.21	11.91	29.23	F	193.59	193.59	312.21	96.76	5.20

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2041 Future Total PM Recommendations
07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	2	175	0	208	0	931	291	246	560	2
Future Volume (vph)	0	0	2	175	0	208	0	931	291	246	560	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	0.0		0.0	140.0		30.0	125.0	0.0	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		0.865			0.850			0.850		0.999		
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	1662	0	1750	1555	0	1879	3579	1626	1785	3563	0
Flt Permitted				0.757						0.271		
Satd. Flow (perm)	0	1662	0	1394	1555	0	1879	3579	1626	509	3563	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		291			116				237		1	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		127.3			237.9			633.3			400.2	
Travel Time (s)		9.2			21.4			38.0			24.0	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	100%	0%	0%	2%	0%	5%	0%	2%	0%	0%	2%	100%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	0	0	2	182	0	217	0	970	303	256	583	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2	0	182	217	0	0	970	303	256	585	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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
3: Highway 50 & Columbia Way

2041 Future Total PM Recommendations
07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type		NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2		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		14.0	14.0		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		C-Max	C-Max	C-Max	C-Max	C-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)		18.7		18.7			68.6	68.6	68.6	68.6	68.6	
Actuated g/C Ratio		0.19		0.19			0.69	0.69	0.69	0.69	0.69	
v/c Ratio		0.00		0.70	0.57		0.40	0.25	0.74	0.24		
Control Delay		0.0		51.6	22.0		8.0	2.5	27.9	6.9		
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0		
Total Delay		0.0		51.6	22.0		8.0	2.5	27.9	6.9		
LOS		A		D	C		A	A	C	A		
Approach Delay				35.5			6.7			13.3		
Approach LOS				D			A			B		
Queue Length 50th (m)		0.0		35.1	18.1		39.4	3.9	29.0	20.6		
Queue Length 95th (m)		0.0		53.4	37.8		65.8	16.0	#93.3	36.4		
Internal Link Dist (m)		103.3			213.9		609.3			376.2		
Turn Bay Length (m)							30.0	125.0				
Base Capacity (vph)		702		418	547		2455	1190	348	2445		
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		0.00		0.44	0.40		0.40	0.25	0.74	0.24		
Intersection Summary												
Area Type:		Other										
Cycle Length:		100										
Actuated Cycle Length:		100										
Offset:		15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green										
Natural Cycle:		80										
Control Type:		Actuated-Coordinated										
Maximum v/c Ratio:		0.74										
Intersection Signal Delay:		13.5										

Lanes, Volumes, Timings

3: Highway 50 & Columbia Way

2041 Future Total PM Recommendations

07-15-2024

Intersection Capacity Utilization 74.9%

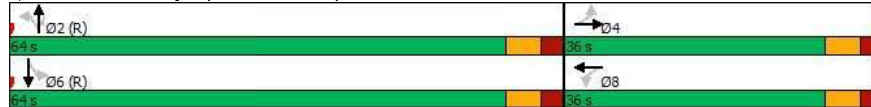
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Highway 50 & Columbia Way



Lanes, Volumes, Timings

4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2041 Future Total PM Recommendations

07-15-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↲	↰	↱	↲	↰	↱	↲	↰	↱	↲
Traffic Volume (vph)	8	7	12	40	9	18	82	1247	96	28	700	21
Future Volume (vph)	8	7	12	40	9	18	82	1247	96	28	700	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		0.0
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								0.98				
Frt		0.869			0.900			0.850			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1669	0	1785	1729	0	1785	3614	1559	1785	3566	0
Flt Permitted	0.740			0.721			0.373			0.197		
Satd. Flow (perm)	1390	1669	0	1355	1729	0	701	3614	1522	370	3566	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			18				384		4	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		112.1			201.9			771.8			633.3	
Travel Time (s)		10.1			18.2			46.3			38.0	
Confl. Peds. (#/hr)									2			
Confl. Bikes (#/hr)					2							
Peak Hour Factor	1.00	1.00	0.25	1.00	1.00	1.00	1.00	1.00	0.25	0.25	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	0	1
Adj. Flow (vph)	8	7	48	40	9	18	82	1247	384	112	700	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	55	0	40	27	0	82	1247	384	112	721	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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
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	

Lanes, Volumes, Timings
4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2041 Future Total PM Recommendations

07-15-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
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)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	47.1	47.1		47.1	47.1		34.7	34.7	34.7	34.7	34.7	
Total Split (s)	50.0	50.0		50.0	50.0		60.0	60.0	60.0	60.0	60.0	
Total Split (%)	45.5%	45.5%		45.5%	45.5%		54.5%	54.5%	54.5%	54.5%	54.5%	
Maximum Green (s)	41.9	41.9		41.9	41.9		53.3	53.3	53.3	53.3	53.3	
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)	4.1	4.1		4.1	4.1		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)	8.1	8.1		8.1	8.1		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		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0	10.0	10.0	10.0	
Flash Dont Walk (s)	29.0	29.0		29.0	29.0		18.0	18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)	4	4		4	4		2	2	2	2	2	
Act Effct Green (s)	15.9	15.9		15.9	15.9		84.3	84.3	84.3	84.3	84.3	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.77	0.77	0.77	0.77	0.77	
v/c Ratio	0.04	0.20		0.21	0.10		0.15	0.45	0.31	0.40	0.26	
Control Delay	33.9	12.8		39.9	19.0		8.6	8.6	1.9	15.8	6.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	33.9	12.8		39.9	19.0		8.6	8.6	1.9	15.8	6.8	
LOS	C	B		D	B		A	A	A	B	A	
Approach Delay	15.5			31.5			7.1			8.0		
Approach LOS	B			C			A			A		
Queue Length 50th (m)	1.7	1.5		8.6	1.9		3.9	41.9	0.0	6.7	19.7	
Queue Length 95th (m)	4.7	9.8		13.9	7.4		20.3	131.0	0.0	6.6	64.7	
Internal Link Dist (m)	88.1			177.9			747.8			609.3		
Turn Bay Length (m)	30.0			85.0			90.0			75.0		
Base Capacity (vph)	529	665		516	669		537	2769	1256	283	2732	
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	0.08		0.08	0.04		0.15	0.45	0.31	0.40	0.26	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 96 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 105

Lanes, Volumes, Timings
4: Highway 50 & Cross Country Boulevard/Bolton Heights Road

2041 Future Total PM Recommendations

07-15-2024

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 8.2

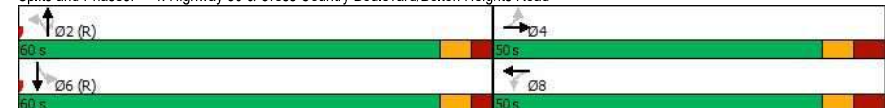
Intersection LOS: A

Intersection Capacity Utilization 69.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Lanes, Volumes, Timings

2041 Future Total PM Recommendations

5: Highway 50 & King Street West/King Street East

07-15-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	61	266	104	233	297	47	85	1286	452	35	743	24
Future Volume (vph)	61	266	104	233	297	47	85	1286	452	35	743	24
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	55.0		0.0	20.0		0.0
Storage Lanes	1		1	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	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.96	0.99	0.99				0.96		1.00	
Frt			0.850		0.980				0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1575	1712	1409	1591	1668	0	1579	1695	1432	1643	1694	0
Flt Permitted	0.177			0.210			0.204			0.044		
Satd. Flow (perm)	290	1712	1356	349	1668	0	339	1695	1369	76	1694	0
Right Turn on Red			Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)			95		5			236			2	
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		535.7			353.4			517.9			32.8	
Travel Time (s)		48.2			31.8			31.1			2.0	
Confl. Peds. (#/hr)	11		6	6		11	10		8	8		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	1%	1%	0%	4%	2%	0%	0%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	1	0	1	0
Adj. Flow (vph)	63	274	107	240	306	48	88	1326	466	36	766	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	63	274	107	240	354	0	88	1326	466	36	791	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			3.7			3.7	
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	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	

Lanes, Volumes, Timings

2041 Future Total PM Recommendations

5: Highway 50 & King Street West/King Street East

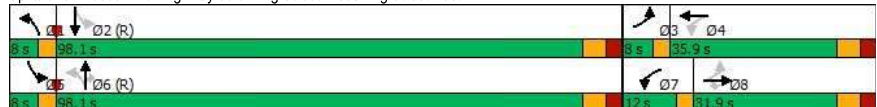
07-15-2024

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9		8.0	32.0	32.0	8.0	32.0	
Total Split (s)	8.0	31.9	31.9	12.0	35.9		8.0	98.1	98.1	8.0	98.1	
Total Split (%)	5.3%	21.3%	21.3%	8.0%	23.9%		5.3%	65.4%	65.4%	5.3%	65.4%	
Maximum Green (s)	5.0	25.0	25.0	9.0	29.0		5.0	91.1	91.1	5.0	91.1	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	0.0	2.9	2.9	0.0	2.9		0.0	3.0	3.0	0.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	7.0	7.0	3.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	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		None	C-Max	C-Max	None	C-Max	
Walk Time (s)		10.0	10.0		10.0			10.0	10.0		10.0	
Flash Dont Walk (s)		15.0	15.0		15.0			15.0	15.0		15.0	
Pedestrian Calls (#/hr)		4	4		4			8	8		8	
Act Effct Green (s)	33.9	25.0	25.0	40.9	30.6		100.7	92.7	92.7	100.1	91.1	
Actuated g/C Ratio	0.23	0.17	0.17	0.27	0.20		0.67	0.62	0.62	0.67	0.61	
v/c Ratio	0.58	0.96	0.35	1.42	1.03		0.33	1.27	0.50	0.35	0.77	
Control Delay	65.8	105.5	16.2	255.9	112.7		11.1	155.3	9.3	17.5	28.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	65.8	105.5	16.2	255.9	112.7		11.1	155.3	9.3	17.5	28.0	
LOS	E	F	B	F	F		B	F	A	B	C	
Approach Delay		78.3			170.5			112.4			27.5	
Approach LOS		E			F			F			C	
Queue Length 50th (m)	15.1	86.3	3.2	~76.1	~122.7		8.5	~526.6	36.3	3.4	174.0	
Queue Length 95th (m)	#30.1	#145.0	21.6	#133.4	#189.2		14.9	#611.7	63.6	7.8	233.9	
Internal Link Dist (m)		511.7			329.4			493.9			8.8	
Turn Bay Length (m)	30.0		35.0	30.0			55.0			20.0		
Base Capacity (vph)	108	285	305	169	344		268	1047	936	102	1029	
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	0.58	0.96	0.35	1.42	1.03		0.33	1.27	0.50	0.35	0.77	
Intersection Summary												
Area Type:		CBD										
Cycle Length: 150												
Actuated Cycle Length: 150												
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green												
Natural Cycle: 150												
Control Type: Actuated-Coordinated												

Lanes, Volumes, Timings 2041 Future Total PM Recommendations
5: Highway 50 & King Street West/King Street East 07-15-2024

Maximum v/c Ratio: 1.42	
Intersection Signal Delay: 98.8	Intersection LOS: F
Intersection Capacity Utilization 124.3%	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 Street West/King Street East



Lanes, Volumes, Timings 2041 Future Total PM Recommendations
6: Kingsview Drive/Street G & Columbia Way 07-15-2024

	↖	→	↗	↖	←	↖	↗	↑	↖	↗	↓	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑↓				↑↓
Traffic Volume (vph)	142	321	78	60	253	60	24	8	35	33	5	94
Future Volume (vph)	142	321	78	60	253	60	24	8	35	33	5	94
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
Ped Bike Factor								1.00				
Frt		0.978			0.935			0.890			0.904	
Fit Protected		0.987			0.995			0.993			0.988	
Satd. Flow (prot)	0	3505	0	0	3336	0	0	1685	0	0	1682	0
Fit Permitted		0.715			0.823			0.925			0.860	
Satd. Flow (perm)	0	2539	0	0	2760	0	0	1568	0	0	1464	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36			240			140			94	
Link Speed (k/h)		40			40			40			50	
Link Distance (m)		237.9			417.0			131.8			93.0	
Travel Time (s)		21.4			37.5			11.9			6.7	
Confl. Peds. (#/hr)							5					
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	0.25	1.00	1.00	0.25	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	0%	0%	2%	2%	5%	2%	0%	2%	2%	2%
Adj. Flow (vph)	142	321	78	60	253	240	24	8	140	33	5	94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	541	0	0	553	0	0	172	0	0	132	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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
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		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		

Lanes, Volumes, Timings
6: Kingsview Drive/Street G & Columbia Way

2041 Future Total PM Recommendations

07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	21.9	21.9		21.9	21.9		9.5	21.0		21.0	21.0	
Total Split (s)	24.0	24.0		24.0	24.0		9.5	31.0		21.5	21.5	
Total Split (%)	43.6%	43.6%		43.6%	43.6%		17.3%	56.4%		39.1%	39.1%	
Maximum Green (s)	17.1	17.1		17.1	17.1		5.0	25.0		15.5	15.5	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	4.0		4.0	4.0	
All-Red Time (s)	2.9	2.9		2.9	2.9		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.9			6.9			6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
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	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)	8.0	8.0		8.0	8.0			8.0		8.0	8.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		3	3	
Act Effct Green (s)		15.6			15.6			10.2			10.2	
Actuated g/C Ratio		0.49			0.49			0.32			0.32	
v/c Ratio		0.43			0.37			0.29			0.25	
Control Delay		9.3			5.7			5.3			6.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		9.3			5.7			5.3			6.2	
LOS		A			A			A			A	
Approach Delay		9.3			5.7			5.3			6.2	
Approach LOS		A			A			A			A	
Queue Length 50th (m)		11.0			6.1			1.3			1.6	
Queue Length 95th (m)		28.0			18.4			11.5			10.8	
Internal Link Dist (m)		213.9			393.0			107.8			69.0	
Turn Bay Length (m)												
Base Capacity (vph)		1511			1725			1293			851	
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		0.36			0.32			0.13			0.16	

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 31.7

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.43

Intersection Signal Delay: 7.1

Intersection LOS: A

Intersection Capacity Utilization 51.9%

ICU Level of Service A

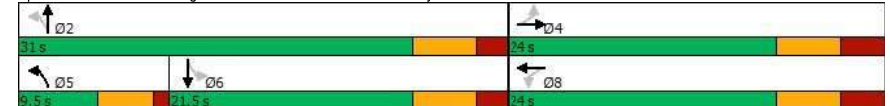
Analysis Period (min) 15

Lanes, Volumes, Timings
6: Kingsview Drive/Street G & Columbia Way










2041 Future Total PM Recommendations

07-15-2024



















Splits and Phases: 6: Kingsview Drive/Street G & Columbia Way



HCM Unsignalized Intersection Capacity Analysis 2041 Future Total PM Recommendations
7: Westchester Boulevard & Columbia Way 07-15-2024

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	296	103	41	324	39	22
Future Volume (Veh/h)	296	103	41	324	39	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	322	112	45	352	42	24
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			434		644	217
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			434		644	217
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		89	97
cM capacity (veh/h)			1136		394	781
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	215	219	162	235	66	
Volume Left	0	0	45	0	42	
Volume Right	0	112	0	0	24	
cSH	1700	1700	1136	1700	480	
Volume to Capacity	0.13	0.13	0.04	0.14	0.14	
Queue Length 95th (m)	0.0	0.0	1.0	0.0	3.8	
Control Delay (s)	0.0	0.0	2.6	0.0	13.7	
Lane LOS			A	B		
Approach Delay (s)	0.0	1.0		13.7		
Approach LOS			B			
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization	35.1%		ICU Level of Service			A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total PM Recommendations
8: Mount Hope Road & Columbia Way 07-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	261	32	19	305	6	17	5	9	16	8	35
Future Volume (Veh/h)	31	261	32	19	305	6	17	5	9	16	8	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	33	275	34	20	321	6	18	5	9	17	8	37
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	327			309			600	725	154	579	739	164
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	327			309			600	725	154	579	739	164
tC, single (s)	4.2			4.6			7.5	6.5	6.9	7.6	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.3			2.5			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	97			98			95	99	99	95	98	96
cM capacity (veh/h)	1194			1098			353	338	870	368	332	859
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	33	183	126	20	214	113	32	62				
Volume Left	33	0	0	20	0	0	18	17				
Volume Right	0	0	34	0	0	6	9	37				
cSH	1194	1700	1700	1098	1700	1700	420	547				
Volume to Capacity	0.03	0.11	0.07	0.02	0.13	0.07	0.08	0.11				
Queue Length 95th (m)	0.7	0.0	0.0	0.4	0.0	0.0	2.0	3.0				
Control Delay (s)	8.1	0.0	0.0	8.3	0.0	0.0	14.3	12.4				
Lane LOS	A			A			B	B				
Approach Delay (s)	0.8			0.5			14.3	12.4				
Approach LOS							B	B				
Intersection Summary												
Average Delay	2.1											
Intersection Capacity Utilization	25.6%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total PM Recommendations
 9: Caledon King Townline & Columbia Way 07-15-2024

	EBL	EBR	NBL	NBT	SBT	SBR
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (veh/h)	23	185	314	511	221	45
Future Volume (Veh/h)	23	185	314	511	221	45
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	24	191	324	527	228	46
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	1426	251	274			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1426	251	274			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	76	75			
cM capacity (veh/h)	113	790	1295			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	
Volume Total	24	191	324	527	274	
Volume Left	24	0	324	0	0	
Volume Right	0	191	0	0	46	
cSH	113	790	1295	1700	1700	
Volume to Capacity	0.21	0.24	0.25	0.31	0.16	
Queue Length 95th (m)	6.1	7.6	7.9	0.0	0.0	
Control Delay (s)	45.3	11.0	8.7	0.0	0.0	
Lane LOS	E	B	A			
Approach Delay (s)	14.8		3.3		0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			45.1%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings 2041 Future Total PM Recommendations
 10: Emil Kolb Parkway & Duffy's Lane 07-15-2024

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Volume (vph)	49	63	139	1100	660	75
Future Volume (vph)	49	63	139	1100	660	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0	115.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt	0.924				0.985	
Flt Protected	0.979		0.950			
Satd. Flow (prot)	1704	0	1789	3544	3266	0
Flt Permitted	0.979		0.277			
Satd. Flow (perm)	1704	0	522	3544	3266	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	75				32	
Link Speed (k/h)	50			70	50	
Link Distance (m)	426.7			2029.6	656.7	
Travel Time (s)	30.7			104.4	47.3	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	3%	11%	2%
Adj. Flow (vph)	58	75	165	1310	786	89
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	0	165	1310	875	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
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	25			15
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Minimum Split (s)	22.5		22.5	22.5	22.5	
Total Split (s)	22.5		37.5	37.5	37.5	
Total Split (%)	37.5%		62.5%	62.5%	62.5%	
Maximum Green (s)	18.0		33.0	33.0	33.0	
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?						
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)	18.0		33.0	33.0	33.0	
Actuated g/C Ratio	0.30		0.55	0.55	0.55	

Lanes, Volumes, Timings

10: Emil Kolb Parkway & Duffy's Lane

2041 Future Total PM Recommendations

07-15-2024

	↗	↘	↖	↗	↘	↖
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
v/c Ratio	0.24		0.57	0.67	0.48	
Control Delay	9.3		19.1	11.8	9.1	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	9.3		19.1	11.8	9.1	
LOS	A		B	B	A	
Approach Delay	9.3			12.6	9.1	
Approach LOS	A			B	A	
Queue Length 50th (m)	4.8		11.3	51.1	28.0	
Queue Length 95th (m)	14.1		27.4	63.1	36.6	
Internal Link Dist (m)	402.7			2005.6	632.7	
Turn Bay Length (m)			115.0			
Base Capacity (vph)	563		287	1949	1810	
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	0.24		0.57	0.67	0.48	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 11.2

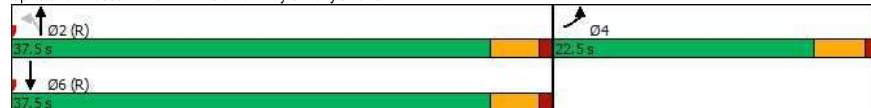
Intersection LOS: B

Intersection Capacity Utilization 46.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Emil Kolb Parkway & Duffy's Lane



















HCM Unsignalized Intersection Capacity Analysis

11: Duffy's Lane & Street A

2041 Future Total PM Recommendations

07-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	8	92	9	9	3	95	35	9	3	34	0
Future Volume (Veh/h)	0	8	92	9	9	3	95	35	9	3	34	0
Sign Control		Stop			Stop			Free			Free	
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)	0	8	92	9	9	3	95	35	9	3	34	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	277	274	34	366	270	40	34			44		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	277	274	34	366	270	40	34			44		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	91	98	98	100	94			100		
cM capacity (veh/h)	634	594	1039	508	597	1032	1578			1564		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	100	21	139	37
Volume Left	0	9	95	3
Volume Right	92	3	9	0
cSH	980	588	1578	1564
Volume to Capacity	0.10	0.04	0.06	0.00
Queue Length 95th (m)	2.7	0.9	1.5	0.0
Control Delay (s)	9.1	11.3	5.2	0.6
Lane LOS	A	B	A	A
Approach Delay (s)	9.1	11.3	5.2	0.6
Approach LOS	A	B		

Intersection Summary

Average Delay

6.4

Intersection Capacity Utilization

28.8%

ICU Level of Service

A

Analysis Period (min)

15

Lanes, Volumes, Timings

12: Street E & Emil Kolb Parkway

2041 Future Total PM Recommendations

07-15-2024

	←	→	↙	↘	↖	↗	↕	↖	↗	↕	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗			↖↗			↖↗	
Traffic Volume (vph)	91	994	64	20	608	18	58	10	13	12	12	72
Future Volume (vph)	91	994	64	20	608	18	58	10	13	12	12	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	15.0		0.0	15.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.996			0.978			0.899	
Flt Protected	0.950			0.950				0.965			0.994	
Satd. Flow (prot)	1789	3546	0	1789	3564	0	0	1778	0	0	1683	0
Flt Permitted	0.401			0.227				0.763			0.968	
Satd. Flow (perm)	755	3546	0	428	3564	0	0	1405	0	0	1639	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			8			12			72	
Link Speed (k/h)		70			50			50			50	
Link Distance (m)		656.7			298.1			132.6			132.1	
Travel Time (s)		33.8			21.5			9.5			9.5	
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)	91	994	64	20	608	18	58	10	13	12	12	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	1058	0	20	626	0	0	81	0	0	96	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)		3.7			3.7			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
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	52.4	52.4		52.4	52.4		22.6	22.6		22.6	22.6	
Total Split (%)	69.9%	69.9%		69.9%	69.9%		30.1%	30.1%		30.1%	30.1%	
Maximum Green (s)	47.9	47.9		47.9	47.9		18.1	18.1		18.1	18.1	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	47.9	47.9		47.9	47.9			18.1			18.1	
Actuated g/C Ratio	0.64	0.64		0.64	0.64			0.24			0.24	
v/c Ratio	0.19	0.47		0.07	0.27			0.23			0.21	

Lanes, Volumes, Timings

12: Street E & Emil Kolb Parkway

2041 Future Total PM Recommendations

07-15-2024

	←	→	↙	↘	↖	↗	↕	↖	↗	↕	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	6.8	7.7		6.0	6.2			22.1			10.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	6.8	7.7		6.0	6.2			22.1			10.3	
LOS	A	A		A	A			C			B	
Approach Delay		7.6			6.2			22.1			10.3	
Approach LOS		A			A			C			B	
Queue Length 50th (m)	4.9	36.5		1.0	18.4			8.2			2.8	
Queue Length 95th (m)	11.1	49.0		3.5	26.0			19.6			14.0	
Internal Link Dist (m)		632.7			274.1			108.6			108.1	
Turn Bay Length (m)	15.0			15.0								
Base Capacity (vph)	482	2270		273	2279			348			450	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.19	0.47		0.07	0.27			0.23			0.21	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

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

Natural Cycle: 45

Control Type: Pretimed

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 7.9

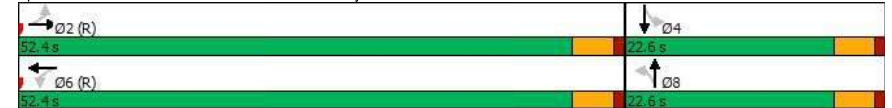
Intersection LOS: A

Intersection Capacity Utilization 56.1%




















ICU Level of Service B

Analysis Period (min) 15






















Splits and Phases: 12: Street E & Emil Kolb Parkway



HCM Unsignalized Intersection Capacity Analysis 2041 Future Total PM Recommendations
13: Street F & Emil Kolb Parkway 07-15-2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	915	36	43	569	57	24	5	48	44	6	56
Future Volume (Veh/h)	68	915	36	43	569	57	24	5	48	44	6	56
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)	68	915	36	43	569	57	24	5	48	44	6	56
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)	298											
pX, platoon unblocked				0.87			0.87			0.87		
vC, conflicting volume	626				951	1498			1781	476	1328	1770
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	626				650	1278			1602	105	1082	1590
tC, single (s)	4.1				4.1	7.5			6.5	6.9	7.5	6.5
tC, 2 stage (s)												
tF (s)	2.2				2.2	3.5			4.0	3.3	3.5	4.0
p0 queue free %	93				95	72			94	94	64	93
cM capacity (veh/h)	952				813	85			80	810	122	82
683												
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	68	610	341	43	379	247	77	106				
Volume Left	68	0	0	43	0	0	24	44				
Volume Right	0	0	36	0	0	57	48	56				
cSH	952	1700	1700	813	1700	1700	190	205				
Volume to Capacity	0.07	0.36	0.20	0.05	0.22	0.15	0.41	0.52				
Queue Length 95th (m)	1.8	0.0	0.0	1.3	0.0	0.0	14.5	21.1				
Control Delay (s)	9.1	0.0	0.0	9.7	0.0	0.0	36.3	39.9				
Lane LOS	A				A				E	E		
Approach Delay (s)	0.6				0.6				36.3	39.9		
Approach LOS							E			E		
Intersection Summary												
Average Delay				4.3								
Intersection Capacity Utilization	49.0%			ICU Level of Service			A					
Analysis Period (min)	15											

Lanes, Volumes, Timings 2041 Future Total PM Recommendations
14: Highway 50 & Street A 07-15-2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	0	84	148	0	37	110	1051	235	59	603	92
Future Volume (vph)	63	0	84	148	0	37	110	1051	235	59	603	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0		0.0	50.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	1		0	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	0.95	1.00	0.95	0.95
Frt	0.850			0.850			0.973			0.980		
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1601	0	1789	1601	0	1789	3482	0	1789	3507	0
Flt Permitted	0.733			0.702			0.372			0.174		
Satd. Flow (perm)	1381	1601	0	1322	1601	0	701	3482	0	328	3507	0
Right Turn on Red	Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)	356			150			70			44		
Link Speed (k/h)	50			50			60			60		
Link Distance (m)	531.2			178.5			146.2			128.1		
Travel Time (s)	38.2			12.9			8.8			7.7		
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)	63	0	84	148	0	37	110	1051	235	59	603	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	63	84	0	148	37	0	110	1286	0	59	695	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)	3.7			3.7			3.7			3.7		
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)	100		100	100		100	100		100	100		100
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.8	22.8		22.8	22.8		67.2	67.2		67.2	67.2	
Total Split (%)	25.3%	25.3%		25.3%	25.3%		74.7%	74.7%		74.7%	74.7%	
Maximum Green (s)	18.3	18.3		18.3	18.3		62.7	62.7		62.7	62.7	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	18.3	18.3		18.3	18.3		62.7	62.7		62.7	62.7	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.70	0.70		0.70	0.70	
v/c Ratio	0.23	0.14		0.55	0.08		0.23	0.53		0.26	0.28	

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

2041 Future Total PM Recommendations
07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	32.5	0.5		41.1	0.4		6.3	7.0		8.5	5.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.5	0.5		41.1	0.4		6.3	7.0		8.5	5.1	
LOS	C	A		D	A		A	A		A	A	
Approach Delay	14.2			32.9			7.0			5.4		
Approach LOS	B			C			A			A		
Queue Length 50th (m)	9.6	0.0		24.4	0.0		6.2	47.3		3.4	19.8	
Queue Length 95th (m)	21.2	0.0		44.6	0.0		13.0	61.2		9.6	27.1	
Internal Link Dist (m)	507.2			154.5			122.2			104.1		
Turn Bay Length (m)	25.0			50.0			20.0			20.0		
Base Capacity (vph)	280	609		268	445		488	2447		228	2456	
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	0.23	0.14		0.55	0.08		0.23	0.53		0.26	0.28	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

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

Natural Cycle: 60

Control Type: Pretimed

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 8.9

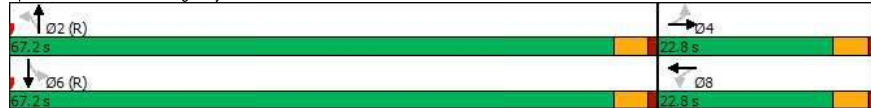
Intersection LOS: A

Intersection Capacity Utilization 66.8%

ICU Level of Service C









Analysis Period (min) 15

Splits and Phases: 14: Highway 50 & Street A



Lanes, Volumes, Timings
15: Highway 50 & Street C

2041 Future Total PM Recommendations
07-15-2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	0	56	72	0	108	85	999	115	172	777	13
Future Volume (vph)	34	0	56	72	0	108	85	999	115	172	777	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	15.0		0.0	25.0		0.0	15.0		0.0	75.0		0.0
Storage Lanes	1		0	1		0	1		0	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	0.95	1.00	0.95	0.95
Frt	0.850			0.850			0.985			0.998		
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1601	0	1789	1601	0	1789	3525	0	1789	3571	0
Flt Permitted	0.687			0.720			0.329			0.179		
Satd. Flow (perm)	1294	1601	0	1356	1601	0	620	3525	0	337	3571	0
Right Turn on Red	Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)	278			245			23			3		
Link Speed (k/h)	50			50			60			60		
Link Distance (m)	127.4			264.3			467.7			284.2		
Travel Time (s)	9.2			19.0			28.1			17.1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	0	56	72	0	108	85	999	115	172	777	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	56	0	72	108	0	85	1114	0	172	790	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)	3.7			3.7			3.7			3.7		
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	
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	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
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	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		

Lanes, Volumes, Timings
15: Highway 50 & Street C

2041 Future Total PM Recommendations
07-15-2024

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	22.6	22.6		22.6	22.6		10.2	26.8		10.6	27.2	
Total Split (%)	37.7%	37.7%		37.7%	37.7%		17.0%	44.7%		17.7%	45.3%	
Maximum Green (s)	18.1	18.1		18.1	18.1		5.7	22.3		6.1	22.7	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	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	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)	8.6	8.6		8.6	8.6		39.5	35.1		42.0	36.3	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.66	0.58		0.70	0.60	
v/c Ratio	0.18	0.12		0.37	0.25		0.16	0.54		0.41	0.37	
Control Delay	23.6	0.5		27.8	1.3		4.4	12.3		6.4	9.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.6	0.5		27.8	1.3		4.4	12.3		6.4	9.3	
LOS	C	A		C	A		A	B		A	A	
Approach Delay		9.2			11.9			11.7			8.8	
Approach LOS		A			B			B			A	
Queue Length 50th (m)	3.5	0.0		7.7	0.0		2.3	43.3		4.9	26.3	
Queue Length 95th (m)	9.8	0.0		17.1	0.0		6.8	79.3		12.4	46.4	
Internal Link Dist (m)		103.4			240.3			443.7			260.2	
Turn Bay Length (m)	15.0			25.0			15.0			75.0		
Base Capacity (vph)	390	677		409	654		535	2070		425	2163	
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	0.09	0.08		0.18	0.17		0.16	0.54		0.40	0.37	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 10.5

Intersection LOS: B

Intersection Capacity Utilization 62.7%

ICU Level of Service B

Analysis Period (min) 15











Lanes, Volumes, Timings
15: Highway 50 & Street C

2041 Future Total PM Recommendations
07-15-2024










Splits and Phases: 15: Highway 50 & Street C





















HCM Unsignalized Intersection Capacity Analysis 2041 Future Total PM Recommendations
16: Highway 50 & Street D 07-15-2024

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	69	1104	10	109	796
Future Volume (Veh/h)	6	69	1104	10	109	796
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)	6	69	1104	10	109	796
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			400			
pX, platoon unblocked	0.91	0.91			0.91	
vC, conflicting volume	1725	557			1114	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1596	310			923	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	89			84	
cM capacity (veh/h)	74	623			668	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	75	736	378	109	398	398
Volume Left	6	0	0	109	0	0
Volume Right	69	0	10	0	0	0
cSH	391	1700	1700	668	1700	1700
Volume to Capacity	0.19	0.43	0.22	0.16	0.23	0.23
Queue Length 95th (m)	5.6	0.0	0.0	4.6	0.0	0.0
Control Delay (s)	16.4	0.0	0.0	11.4	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	16.4	0.0	1.4			
Approach LOS	C					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			51.5%		ICU Level of Service	
Analysis Period (min)			15		A	

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total PM Recommendations
17: Mount Hope Road & Street H 07-15-2024

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	27	9	0	43
Future Volume (Veh/h)	6	0	27	9	0	43
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)	6	0	27	9	0	43
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	74	32			36	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	74	32			36	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	929	1043			1575	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	6	36	43			
Volume Left	6	0	0			
Volume Right	0	9	0			
cSH	929	1700	1575			
Volume to Capacity	0.01	0.02	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.9	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.9	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 2041 Future Total PM Recommendations
 18: Forest Gate Avenue/Street I & Columbia Way 07-15-2024

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Traffic Volume (veh/h)	32	194	60	46	309	5	3	0	10	3	0	20								
Future Volume (Veh/h)	32	194	60	46	309	5	3	0	10	3	0	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)	32	194	60	46	309	5	3	0	10	3	0	20								
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	314			254			554	694	127	574	722	157								
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	314			254			554	694	127	574	722	157								
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9								
tC, 2 stage (s)																				
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3								
p0 queue free %	97			96			99	100	99	99	100	98								
cM capacity (veh/h)	1243			1308			387	343	900	379	331	861								
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1												
Volume Total	32	129	125	46	206	108	13	23												
Volume Left	32	0	0	46	0	0	3	3												
Volume Right	0	0	60	0	0	5	10	20												
cSH	1243	1700	1700	1308	1700	1700	689	738												
Volume to Capacity	0.03	0.08	0.07	0.04	0.12	0.06	0.02	0.03												
Queue Length 95th (m)	0.6	0.0	0.0	0.9	0.0	0.0	0.5	0.8												
Control Delay (s)	8.0	0.0	0.0	7.9	0.0	0.0	10.3	10.0												
Lane LOS	A			A			B	B												
Approach Delay (s)	0.9			1.0			10.3	10.0												
Approach LOS							B	B												
Intersection Summary																				
Average Delay	1.4																			
Intersection Capacity Utilization	25.4%			ICU Level of Service				A												
Analysis Period (min)	15																			

APPENDIX G

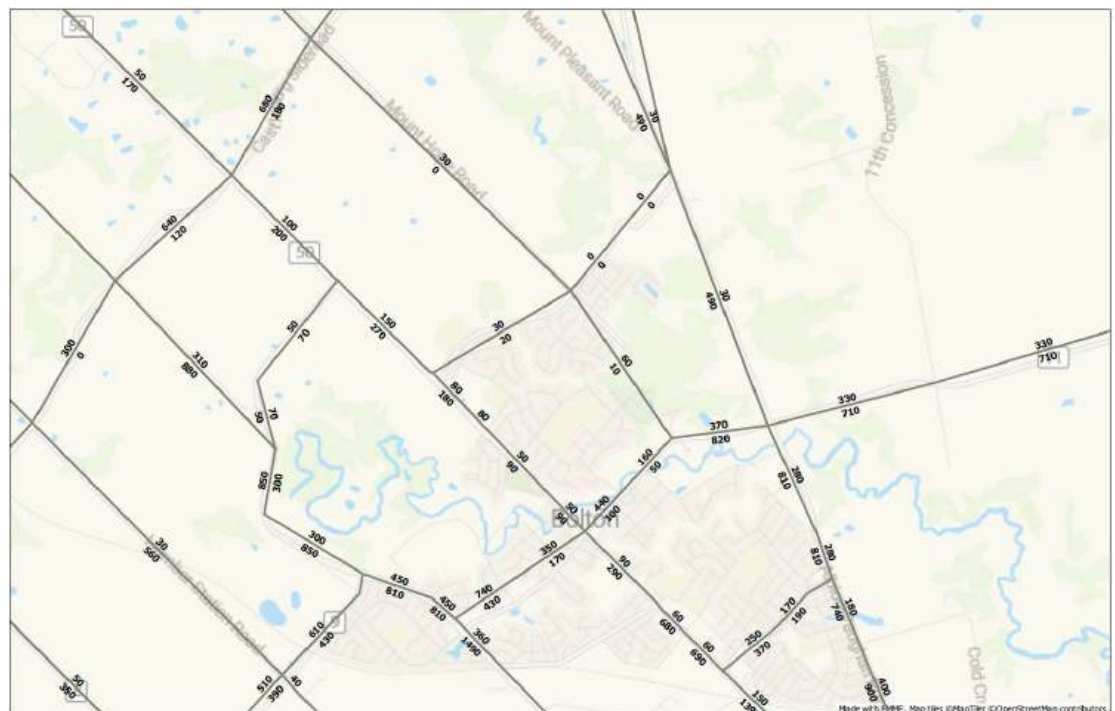
EMME Modelling and Development Mapping

Date: May 10, 2024
From: Kerianne Hagan, Crozier
Re: EMME Plots from TDM for Regional Road 50 and Regional Road 150

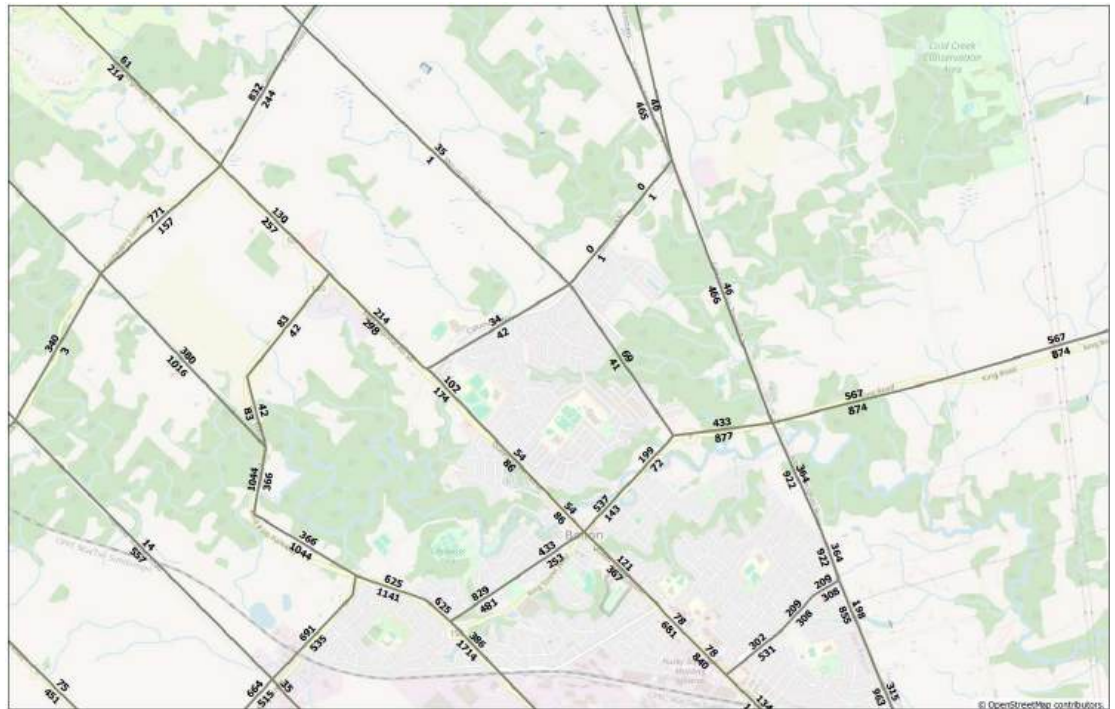
Kerianne,

As requested, attached are the two plots from the Region's Travel Demand Forecasting Models (TDM) for the AM peak hours in two horizon periods – 2031 and 2041, covering areas of interest from Regional Road 50 and Regional Road 150. Please note that these are forecasted model results based on the Region's 2011 base model. Kindly also note that these plots should be used as references only.

Traffic Volumes from the 2031 AM peak hour TDM



Traffic Volumes from the 2041 AM peak hour TDM



If you require further assistance, please don't hesitate to contact me at
karan.bedi@peelregion.ca.

Thanks,

Karan Bedi

Intermediate Planner, Transportation Planning
Transportation Division, Public Works
Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor.
Brampton, ON L6T 4B9

Date: May 16, 2024
Requestor: Kerianne Hagan, Crozier
Request Type: Growth Rate Data Request
Location: Emil Kolb Parkway at RR 50

Kerianne Hagan,

See below the forecasted compound annual growth rate values for Emil Kolb Parkway at RR 50.

2011 to 2021	2021 to 2031	2031 to 2041
1.0%	1.0%	1.0%

These growth rates are estimated using several sources including socioeconomic data and results from the Region of Peel's Travel Demand Forecasting Model. It is important to exercise professional judgment when using these values.

If you require further assistance, please contact me at transportationplanningdata@peelregion.ca

Regards,

Karan Bedi

Intermediate Planner, Transportation Planning
Transportation Division | Public Works | Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON L6T 4B9

Date: May 16, 2024
Requestor: Kerianne Hagan, Crozier
Request Type: Growth Rate Data Request
Location: RR 50 at Emil Kolb Parkway

Kerianne Hagan,

See below the forecasted compound annual growth rate values for RR 50 at Emil Kolb Parkway.

2011 to 2021	2021 to 2031	2031 to 2041
0.5%	0.5%	0.5%

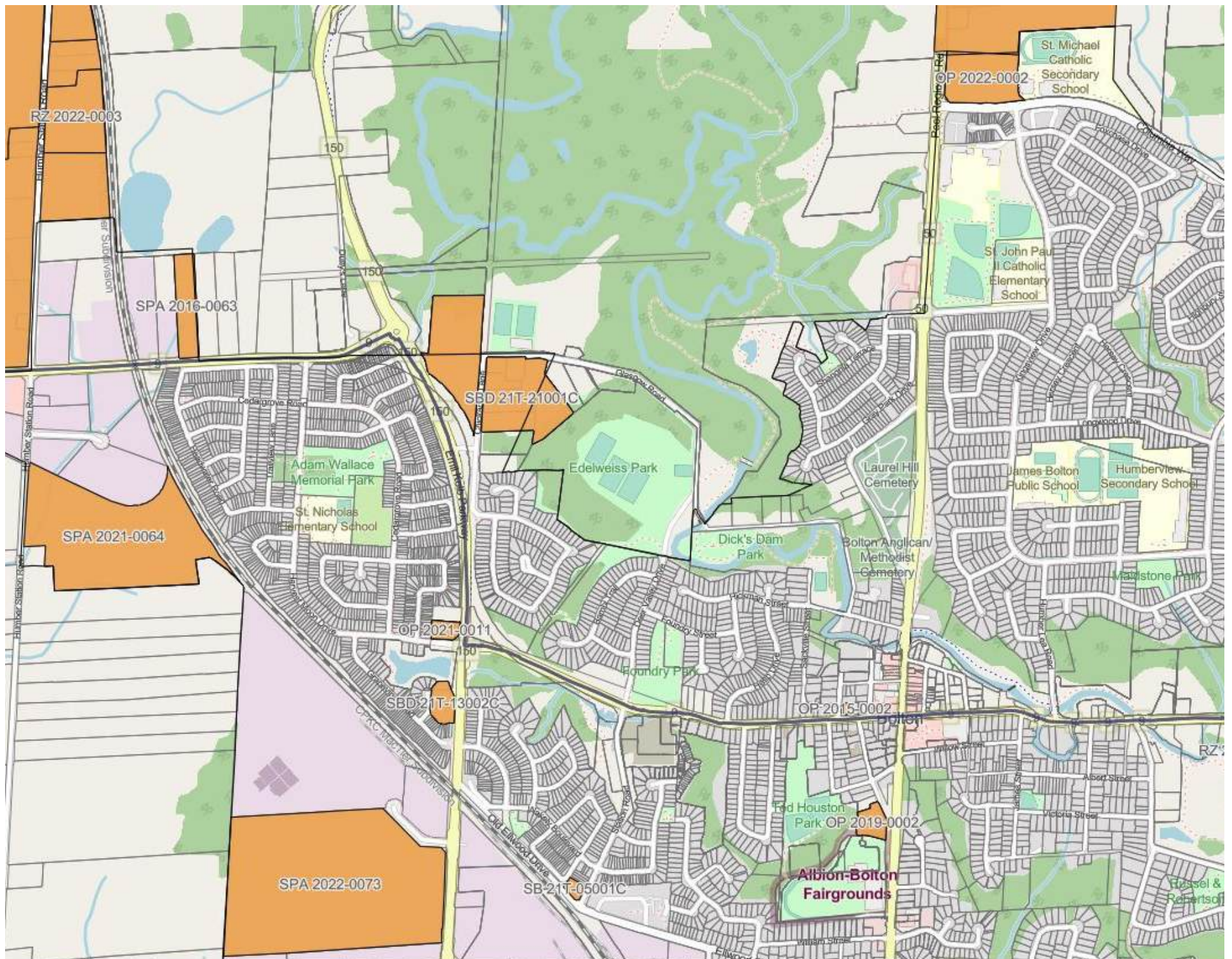
These growth rates are estimated using several sources including socioeconomic data and results from the Region of Peel's Travel Demand Forecasting Model. It is important to exercise professional judgment when using these values.

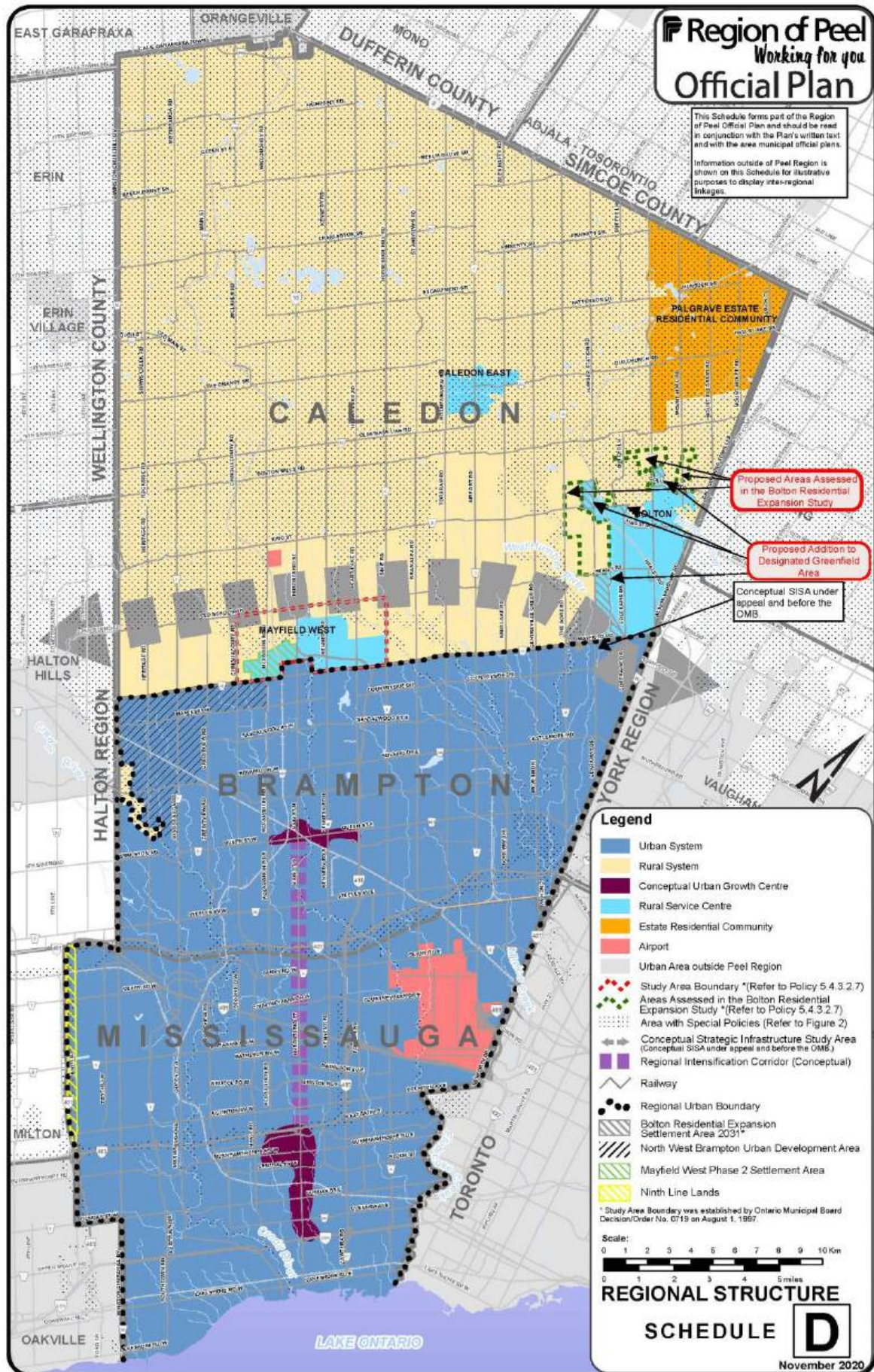
If you require further assistance, please contact me at transportationplanningdata@peelregion.ca

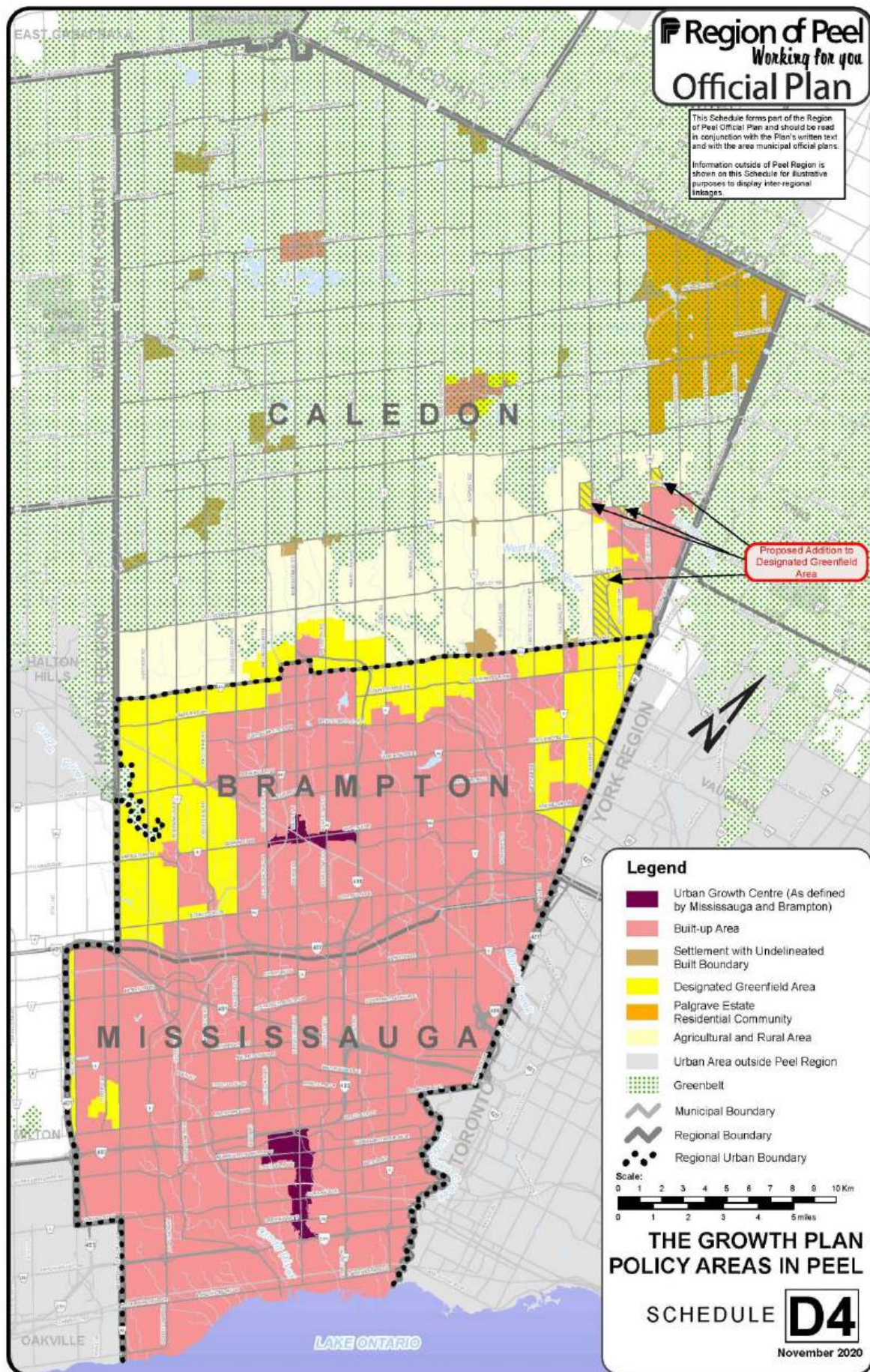
Regards,

Karan Bedi

Intermediate Planner, Transportation Planning
Transportation Division | Public Works | Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON L6T 4B9







APPENDIX H

Background Development Excerpts

TOWN OF CALEDON
PLANNING
RECEIVED

Jan. 31, 2022

Columbia Square Inc.

Columbia Square—14245 Highway 50

Transportation Impact Study

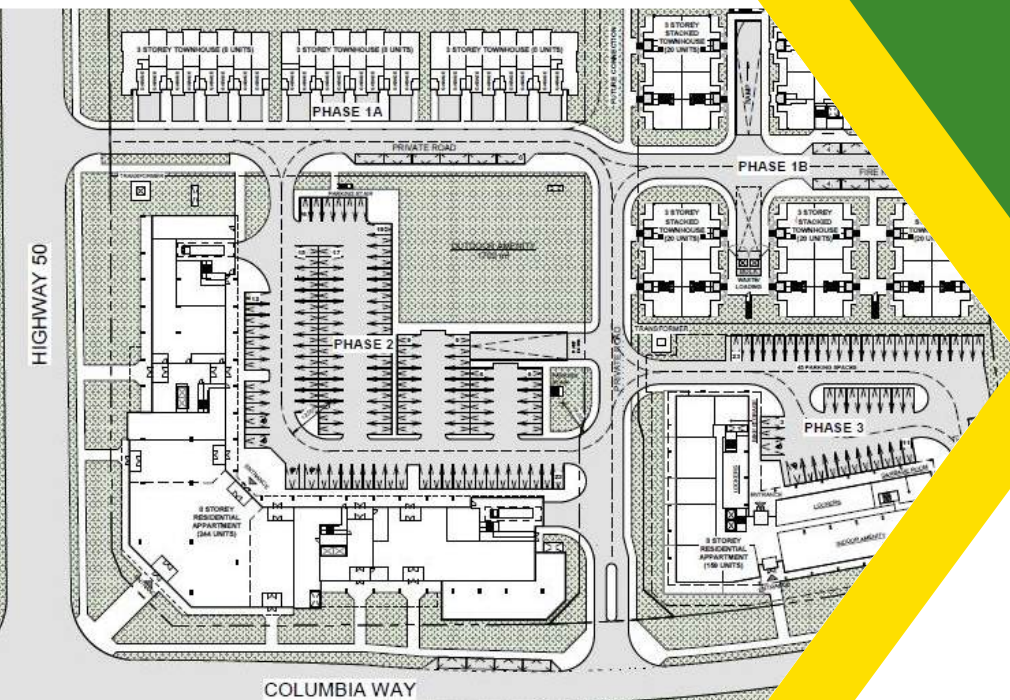
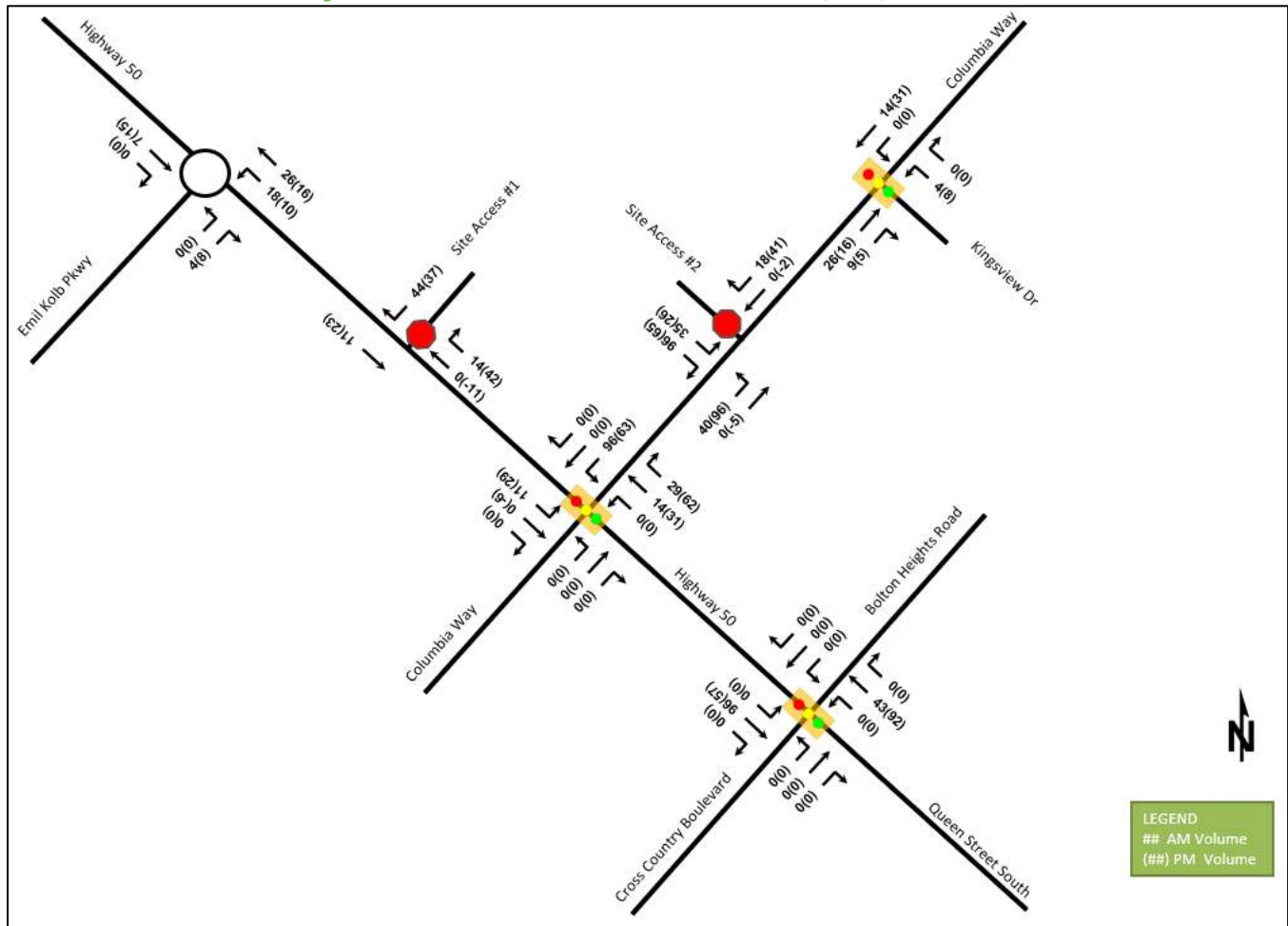


Figure 16: Net New Site Generated Auto Volumes - 2028, 2031, and 2033



4.1.4 Future Total Travel Demands

The site generated traffic has been combined with the 2026, 2028, 2031, and 2033 future background traffic volumes to estimate the future total traffic volumes. The configuration of Site Access #1 is a right-in / right-out access with stop-control on the east leg, and Site Access #2 is a full movement access with stop-control on the north leg. Access configuration details are discussed further in Section 6.1. The 2026 future total traffic volumes are illustrated in Figure 17, the 2028 future total traffic volumes are illustrated in Figure 18, the 2031 future total traffic volumes are illustrated in Figure 19, and the 2033 future total traffic volumes are illustrated in Figure 20.



BA Group

CALEDON STATION SECONDARY PLAN

Transportation Study – Update

Prepared For: Caledon Community Partners

February 11, 2021 (formerly Macville Secondary Plan)

Updated: January 21, 2022

Updated: May 17, 2023

**MOVEMENT
IN URBAN
ENVIRONMENTS**

BAGROUP.COM



TABLE 12 SITE ELEMENTARY SCHOOL TRIP GENERATION

Land Use	Number	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Elementary School		0.40	0.34	0.74	0.07	0.09	0.16
Base Vehicle Trip Generation	1500 students¹	599	511	1,110	110	130	240
To/From Internal Residential (Walking Trips) ²	85%	509	434	943	93	111	204
Total Vehicle Trips	15%	90	77	167	17	19	36
<i>Pass-by Internal Residential to External Work AM & Pass-by External work to Internal Residential PM (Vehicle Trips)³</i>	<i>0% In & 60% Out AM 60% In & 0% Out PM</i>	0	45	45	9	0	9
<i>To/from Internal Residential (Vehicle Trips)⁴</i>	<i>100% In & 40% Out AM 40% In & 100% Out PM</i>	90	32	122	8	19	27
Total Internal Vehicle Trips		90	32	122	8	19	27
Total External Vehicle Trips		0	45	45	9	0	9

Notes:

1. Assume 1,500 students for the purpose of this assessment
2. Assumes 100% of school trips are associated with internal residential as either direct or pass-by trips and in the order of 85% of trips will walk
3. Assumes 60% of outbound trips during the AM peak will be a drop off then continues onto work external to the Site and 60% of inbound trips during the PM peak will be a pick up on the way home from work external to the Site
4. Assumes remainder of vehicle trips are to/from internal residential

5.4.2 Site Vehicle Trip Distribution

5.4.2.1 Residential

Residential site traffic was assigned onto the area road network based on the results of the 2016 Transportation Tomorrow Survey (TTS), prevailing traffic patterns and area turn restrictions. General direction of approach percentages was based on the results of the TTS and is summarized in **Table 17**.

TABLE 17 RESIDENTIAL SITE TRAFFIC DISTRIBUTION

Direction	Roadway	Inbound/Outbound
North	The Gore Road	2.5%
	Humber Station Road	2.5%
	Emil Kolb Parkway	5%
South	The Gore Road	25%
	Humber Station Road	30%
	Emil Kolb Parkway	25%
West	King Street	10%
Total		100%

Notes:

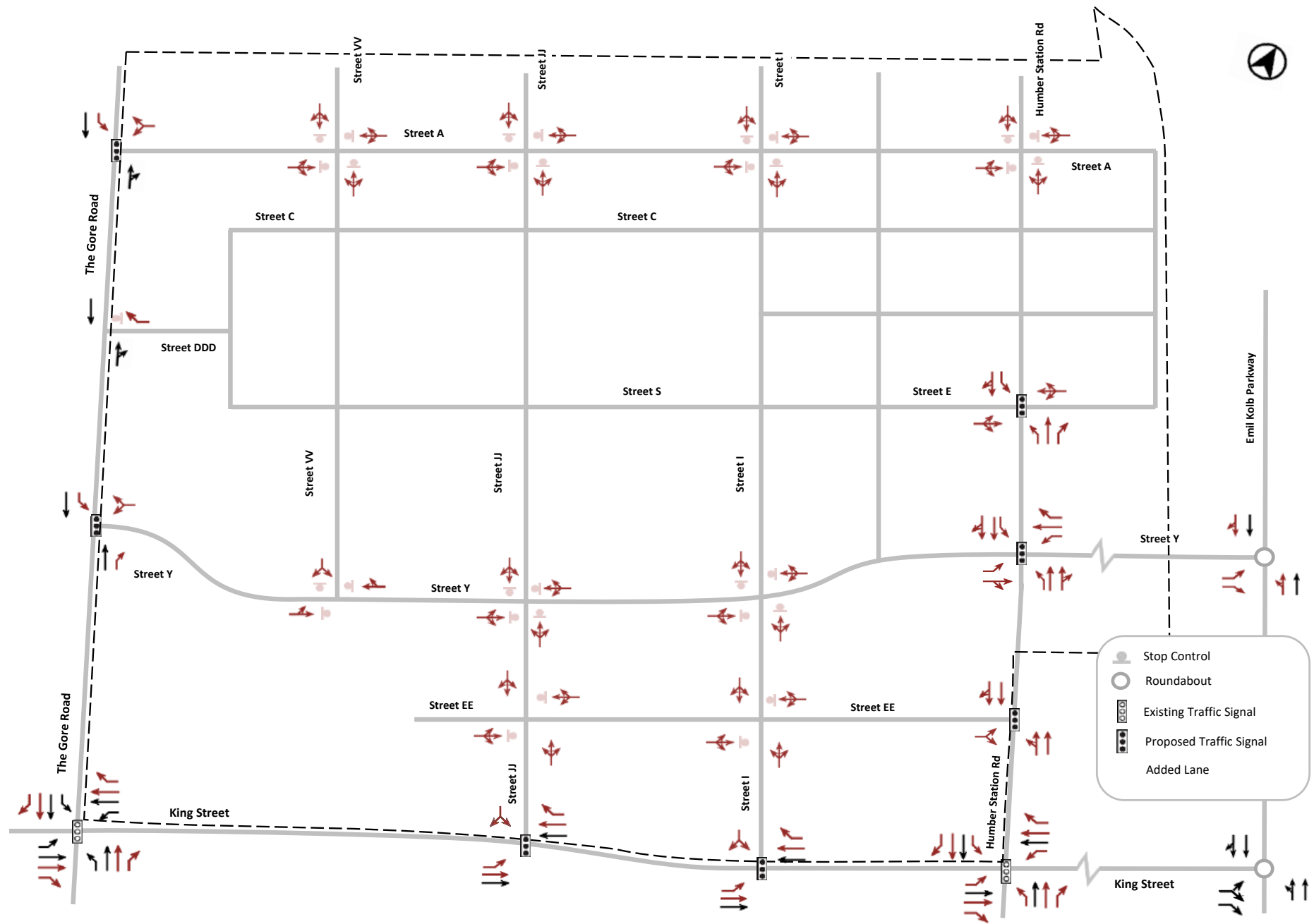
1. Based on TTS zones 3153, 3190, 3191, 3192, 3193, and 3194

5.4.2.2 Retail External Distribution

Retail site traffic was assigned onto the area road network based on the distribution of existing and future residential population within Bolton and is summarized in **Table 18**. The distribution for local retail is specific to nearby future development, while the distribution for destination retail is based on broader Bolton.

TABLE 18 RETAIL SITE TRAFFIC DISTRIBUTION

Direction	Roadway	Destination Retail Inbound/Outbound	Local Retail Inbound/Outbound
North	The Gore Road	5%	29%
	Humber Station Road	2%	12%
	Emil Kolb Parkway	12%	0%
South	The Gore Road	8%	25%
	Humber Station Road	24%	17%
	Emil Kolb Parkway	46%	0%
West	King Street	3%	17%
Total		100%	100%



APPENDIX I

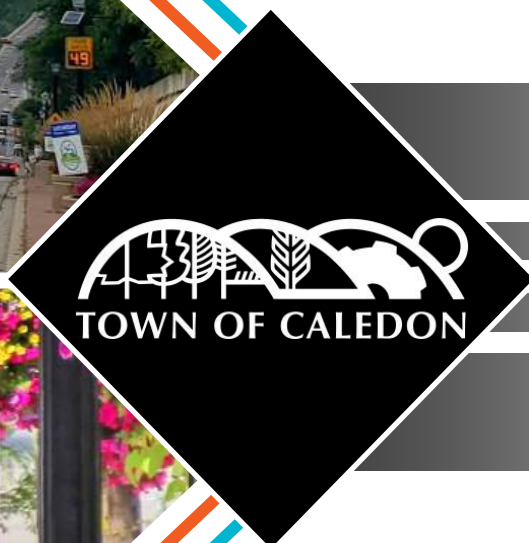
Town of Caledon Multi-Modal Transportation Master Plan Excerpts



Town of Caledon

Multi-Modal Transportation Master Plan

June 2024



**FUTURE
CALEDON**

In Collaboration with
R.J. Burnside & Associates Ltd.



BURNSIDE

ID	Road	From	To	Recommendation
3	Albion Vaughan Road	Mayfield Road	King Street	Urbanization and widening from 2 to 4 lanes
4	Humber Station Road	Mayfield Road	North of King Street (Settlement Area Limits)	Urbanization and widening from 2 to 4 lanes
5	Abbotside Way	Bonnieglen Farm Boulevard	Heart Lake Road	Extension (4 Lanes)
6	Healey Road	The Gore Road	Coleraine Drive	Urbanization and widening from 2 to 4 lanes
7	Torbram Road	Mayfield Road	Old School Road	Urbanization and widening from 2 to 4 lanes
8	George Bolton Parkway	West of Coleraine Drive	Humber Station Road	Extension (4 Lanes)
9	Kennedy Road	Newhouse Boulevard	Old School Road	Urbanization and widening from 2 to 4 lanes

Table ES-2: Road Improvement Recommendations (2041)

ID	Road	From	To	Recommendation
10	Innis Lake Road	Mayfield Road	Old School Road	Urbanization and widening from 2 to 4 lanes
11	Centreville Creek Road	Mayfield Road	Old School Road	Urbanization and widening from 2 to 4 lanes
12	Old School Road	Winston Churchill Boulevard	Airport Road	Urbanization and widening from 2 to 4 lanes
13	Healey Road	Airport Road	The Gore Road	Urbanization and widening from 2 to 4 lanes
14	Kennedy Road	Old School Road	King Street	Urbanization and widening from 2 to 4 lanes
15	Caledon King Townline	King Street	Columbia Way	Urbanization and widening from 2 to 4 lanes
16	Columbia Way	Regional Road 50	Caledon King Townline	Urbanization and widening from 2 to 4 lanes

Table ES-3: Road Improvement Recommendations (2051)

ID	Road	From	To	Recommendation
17	Chinguacousy Road	Old School Road	King Street	Urbanization and widening from 2 to 4 lanes
18	McLaughlin Road	Old School Road	King Street	Urbanization and widening from 2 to 4 lanes
19	Bramalea Road	Mayfield Road	King Street	Urbanization and widening from 2 to 4 lanes
20	Heritage Road	Mayfield Road	Old School Road	Urbanization and widening from 2 to 4 lanes
21	Creditview Road	Mayfield Road	Old School Road	Urbanization and widening from 2 to 4 lanes
22	Heart Lake Road	Mayfield Road	Old School Road	Urbanization and widening from 2 to 4 lanes

Town of Caledon

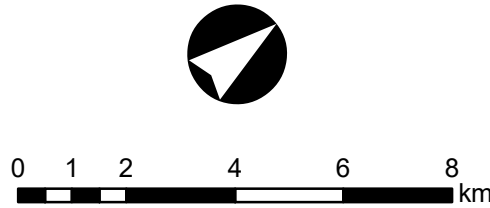
Transportation Master Plan

FIGURE ES-1

Road Network Improvements

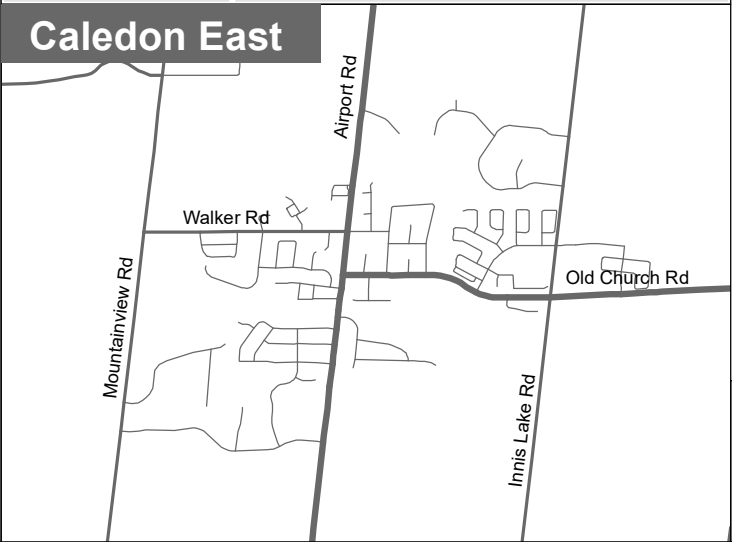
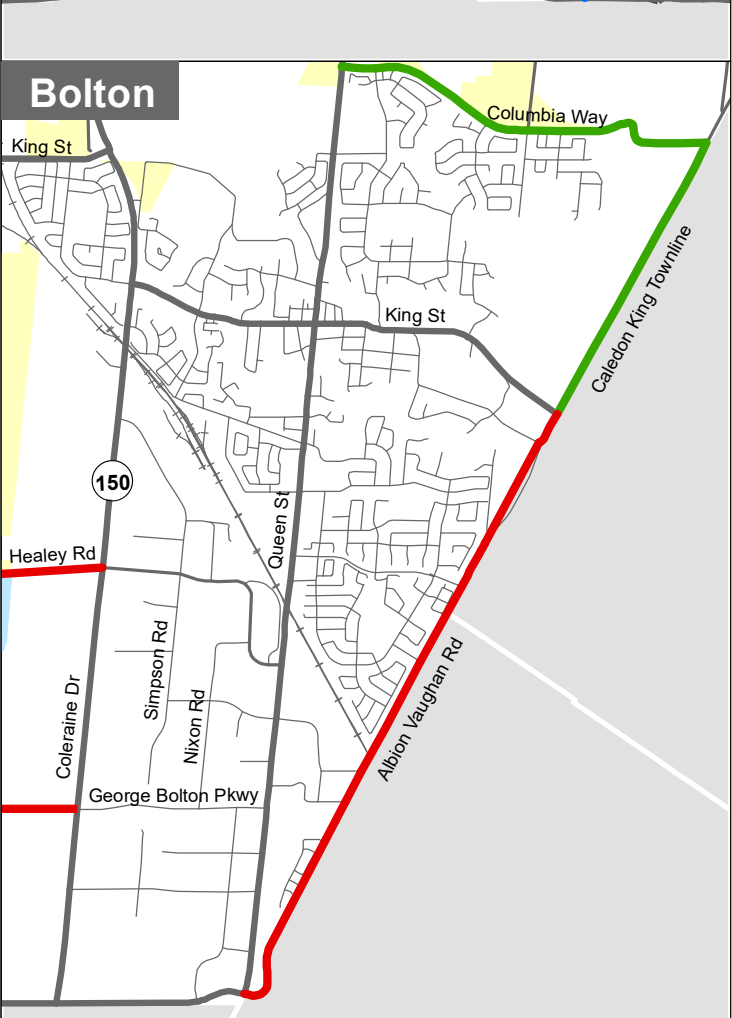
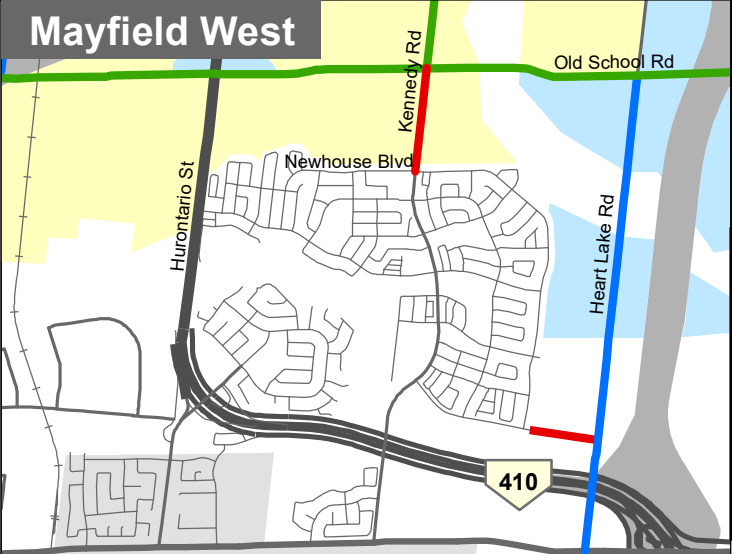
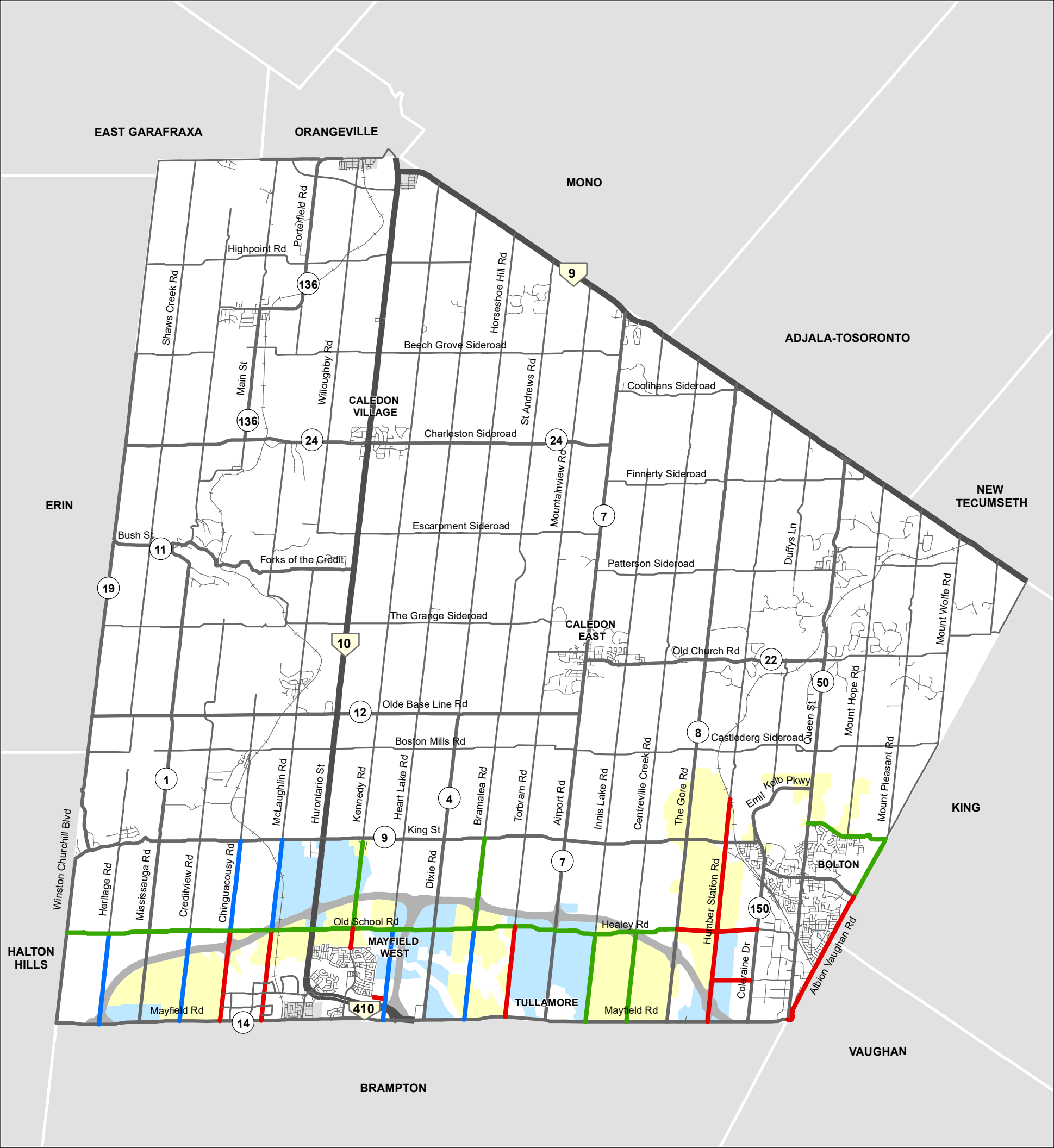
- Road Improvements (Phasing)**
- Widening to 4 lanes (by 2031)
 - Widening to 4 lanes (by 2041)
 - Widening to 4 lanes (by 2051)

- Future Land Uses**
- Community
 - Employment



R.J. Burnside & Associates Limited is not responsible for the accuracy of the spatial, temporal, or other aspects of the data represented on this map. It is recommended that users confirm the accuracy of the information represented.

This map is the product of a Geographic Information System (GIS). As such, the data represented on this map may be subject to updates and future reproductions may not be identical.



Active Transportation Plan

Active transportation strategies were developed based on the following objectives:

1. **Continuity:** Continuity within active transportation networks is important in establishing a reliable, “low-stress” active transportation network. Missing links should be identified in a network to identify and address continuity gaps.
2. **Connectivity:** Connectivity to proposed active transportation facilities in surrounding municipalities, existing and planned Regional routes and infrastructure, and key destinations should be considered in establishing a seamless inter-municipal network within and beyond Town boundaries.
3. **Policy framework for development and new infrastructure:** Opportunities will exist for the planning and implementation of active transportation infrastructure through the development review process. This will include active transportation strategies of new Secondary Plans in the SABLE area and with individual developments. A policy framework guides the continuous development of the active transportation network within the Town of Caledon.

The MMTMP recommends regularly updating the Town’s Active Transportation Plan to focus on the following objectives:

- Establish comprehensive walking and cycling networks that connect existing and new settlement areas and rural communities
- Establish a trail system that is integrated with the pedestrian and cycling network and includes connections to open spaces
- Identify opportunities and locations for safe pedestrian and cycling crossings, including strategically located grade-separated crossings
- Promotes bicycle amenities at major employment / residential / institutional developments
- Engages community groups

The Town’s AT Plan should provide a network implementation plan for facility selection, timing and costing of: paved shoulders on rural arterial and collector roads, separated facilities on urban arterial and collector roads and shared facilities on local roads and projects that enhance continuity within the Town and connectivity to adjacent municipalities. The active transportation plan is illustrated in **Figure ES-2**.

Town of Caledon

Transportation Master Plan

FIGURE ES-2

Future Active Transportation Network

Proposed Facility Type

- Multi-use Trail
- Painted Bike Lane
- Physically Separated
- Shared
- Visually Separated

Future Land Uses

- Community
- Employment

Source: Town of Caledon ATMP

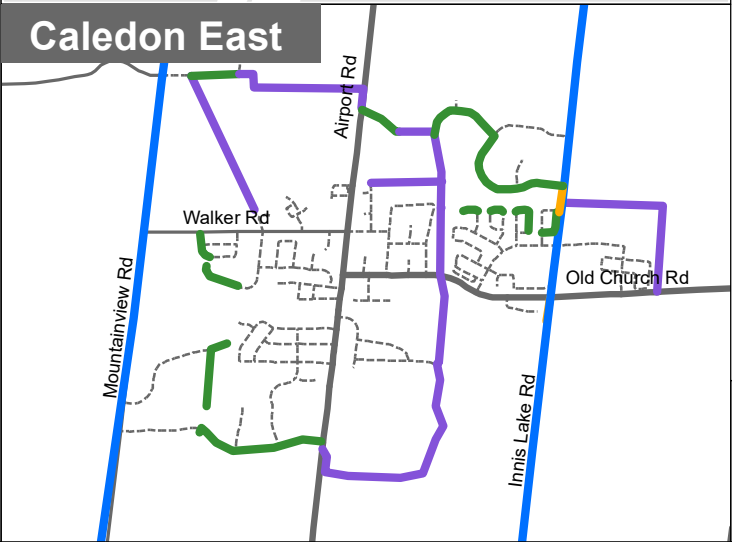
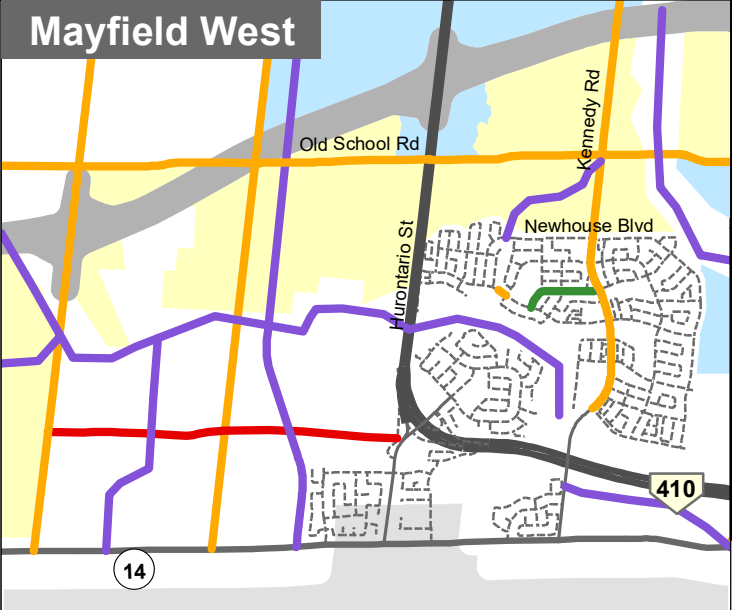
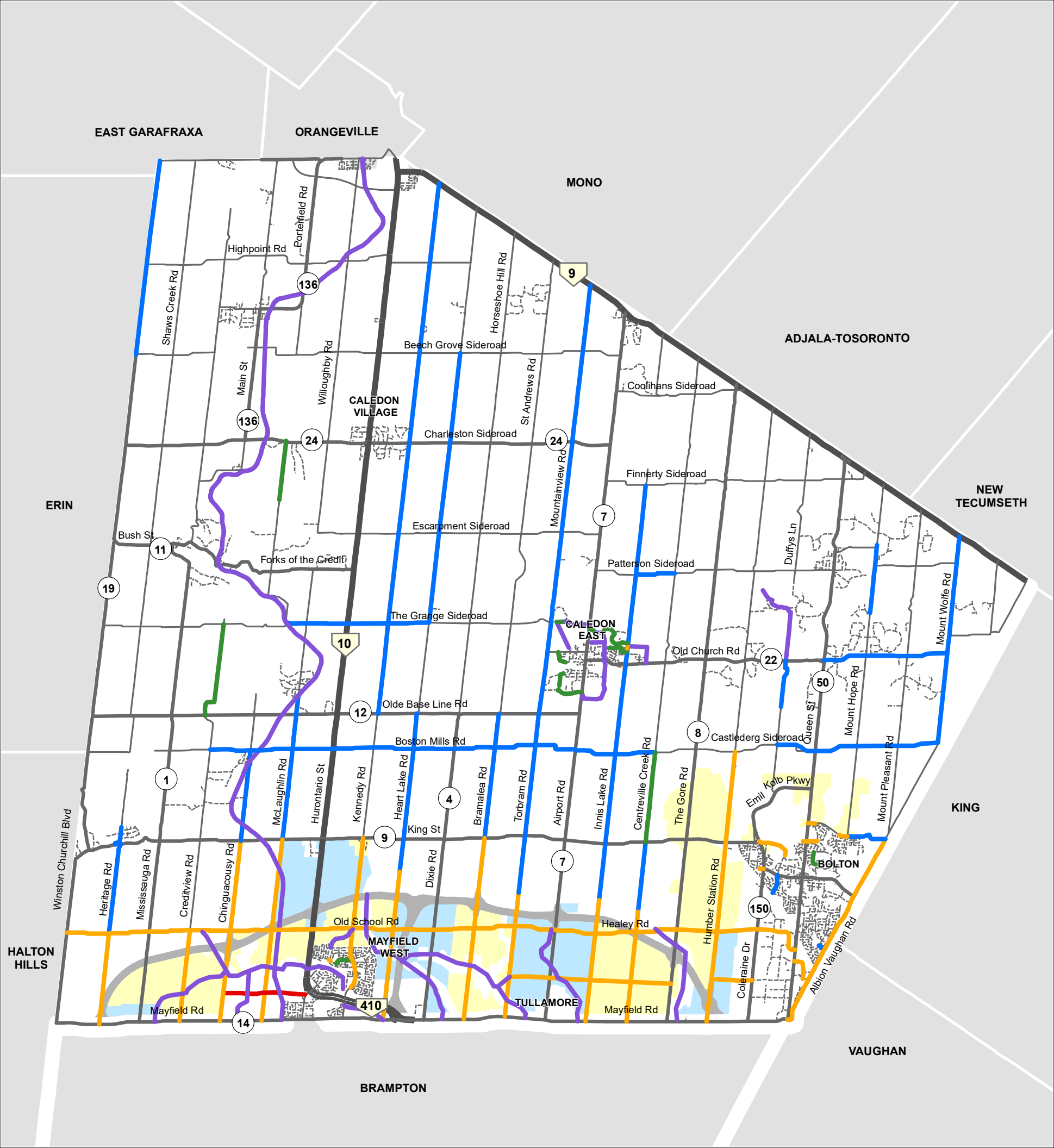


0 1 2 4 6 8 km



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Transit Network Plan

Given the trip characteristics, population, growth and phasing within the town's secondary plans, along with origin and destination patterns, the MMTMP recommends that the Town leverage Brampton Transit by 2035. Leveraging the existing Brampton Transit system will allow for benefits from economies of scale, fare integration and connectivity with a seamless transit service.

Beyond 2035 and following the completion of all Secondary Plans in the SABE area and the Highway 413 Environmental Assessment and Detailed Design, it is recommended that the Town revisit and undertake a transit strategy study to develop a service plan over a longer time horizon. In the meantime, it is also recommended that, as part of the secondary plan's approval process, the Town review and have developers submit and develop the transit plans, which will inform jurisdiction, implications, and connection to existing transit services, and also be reviewed by municipal partners. Transit planning can be informed by the needs and strategies at the secondary plan level, in which internal collector road networks, connections to external networks, and land use will be identified that will assess the efficiencies and merits of specific routing. Therefore, in addition to the proposed fixed-route transit corridors outlined in this MMTMP, the transit strategy study should take all transit plans from secondary plans as input for revisiting the transit plan at a larger scale to improve efficiency.

Proposed fixed-route transit corridors are illustrated in **Figure ES-3**. The fixed-route corridors serve as conceptual high-level recommendations for consideration in future studies to investigate further the feasibility of the proposed corridors, as well as internal connections to secondary plans.

Town of Caledon

Transportation Master Plan

FIGURE ES-3

Proposed Transit Network

Existing

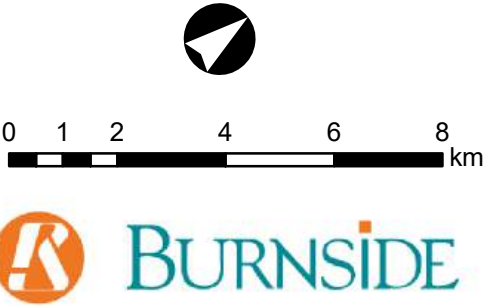
- GO Transit
- Brampton Transit
- Orangeville Transit

Future

- Proposed Corridors
- Bolton GO Rail
- Caledon GO Station
- Potential Second GO Station
- Mayfield Transit Hub
- GTA West Preferred Route

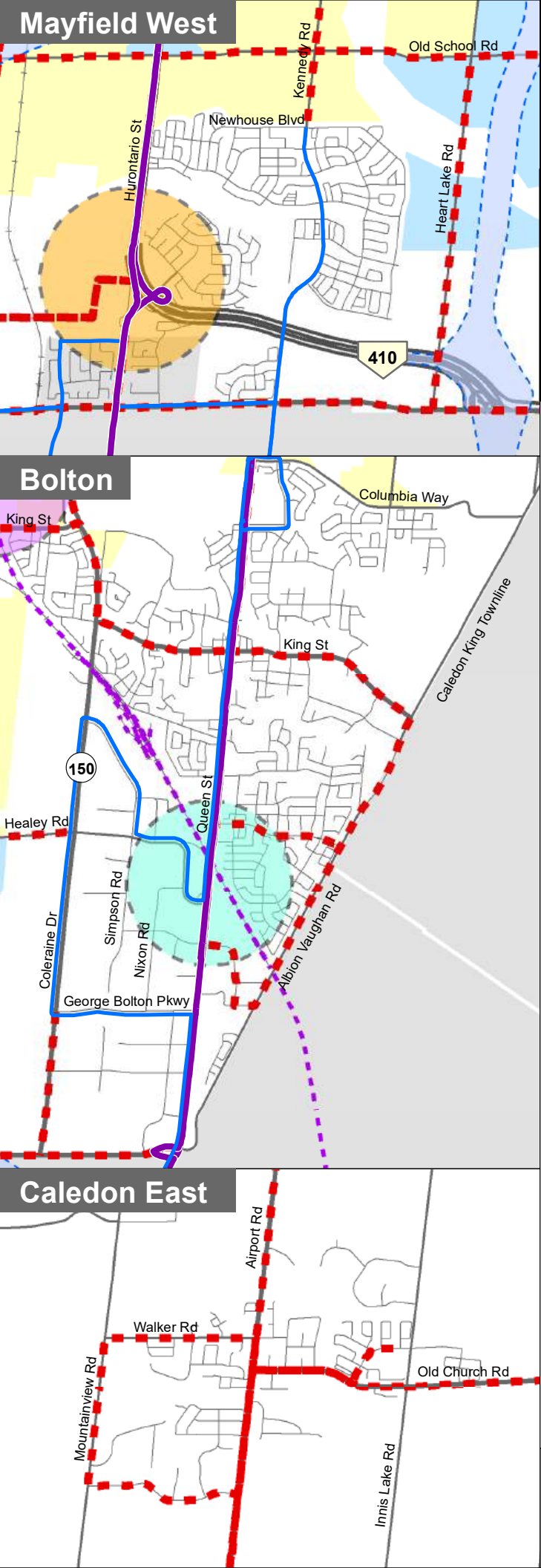
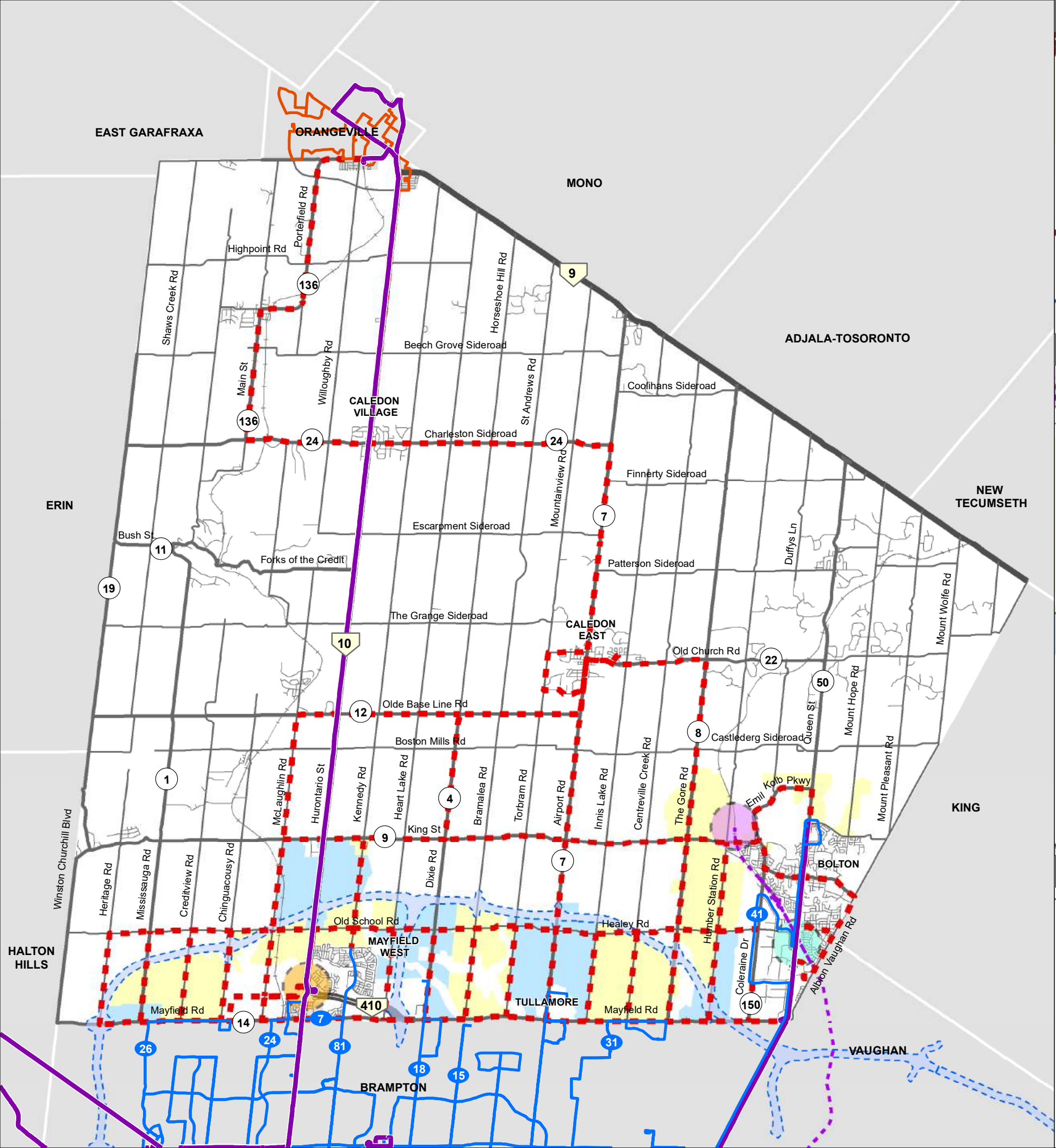
Future Land Uses

- Community
- Employment



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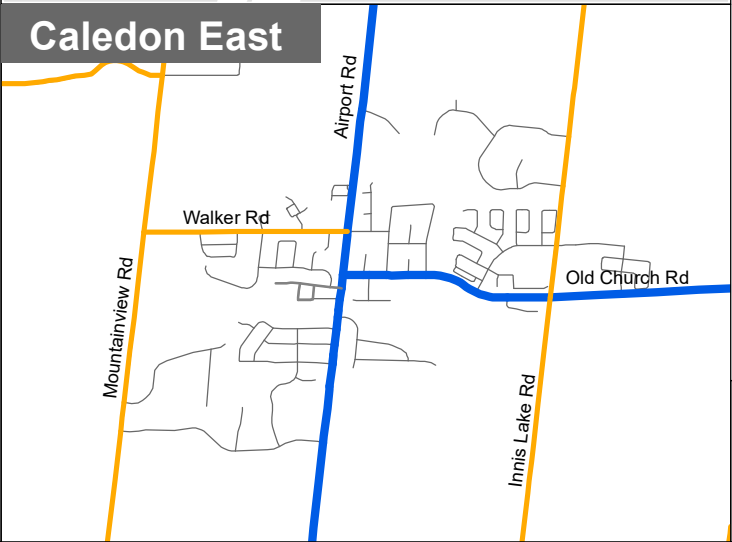
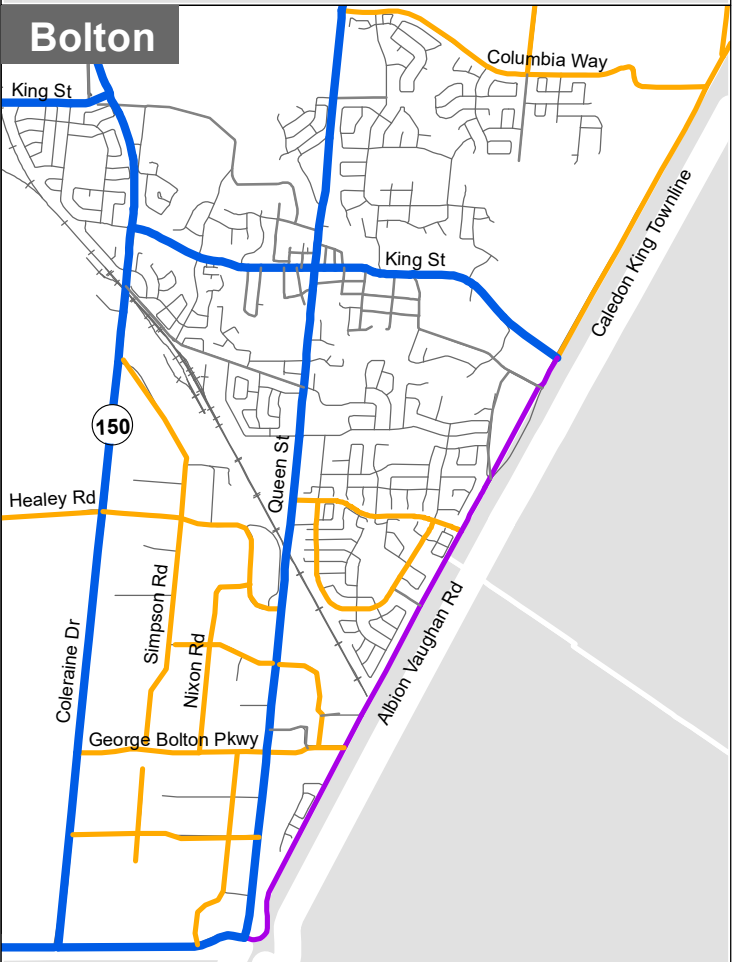
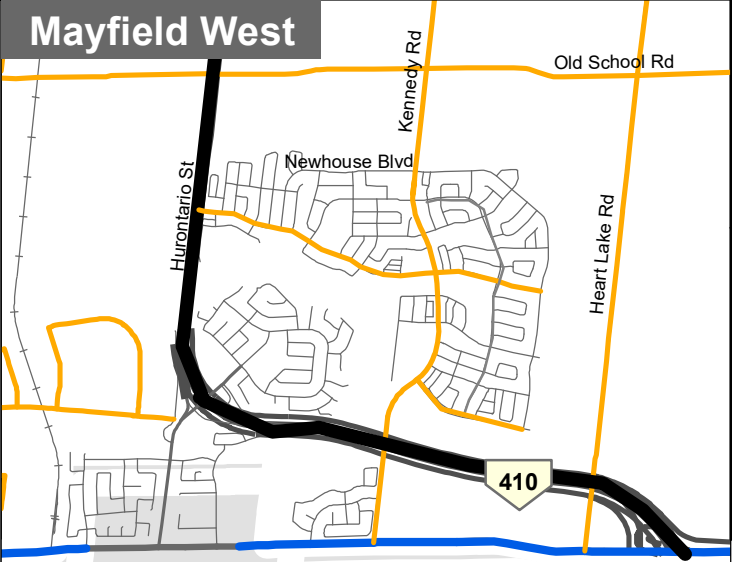
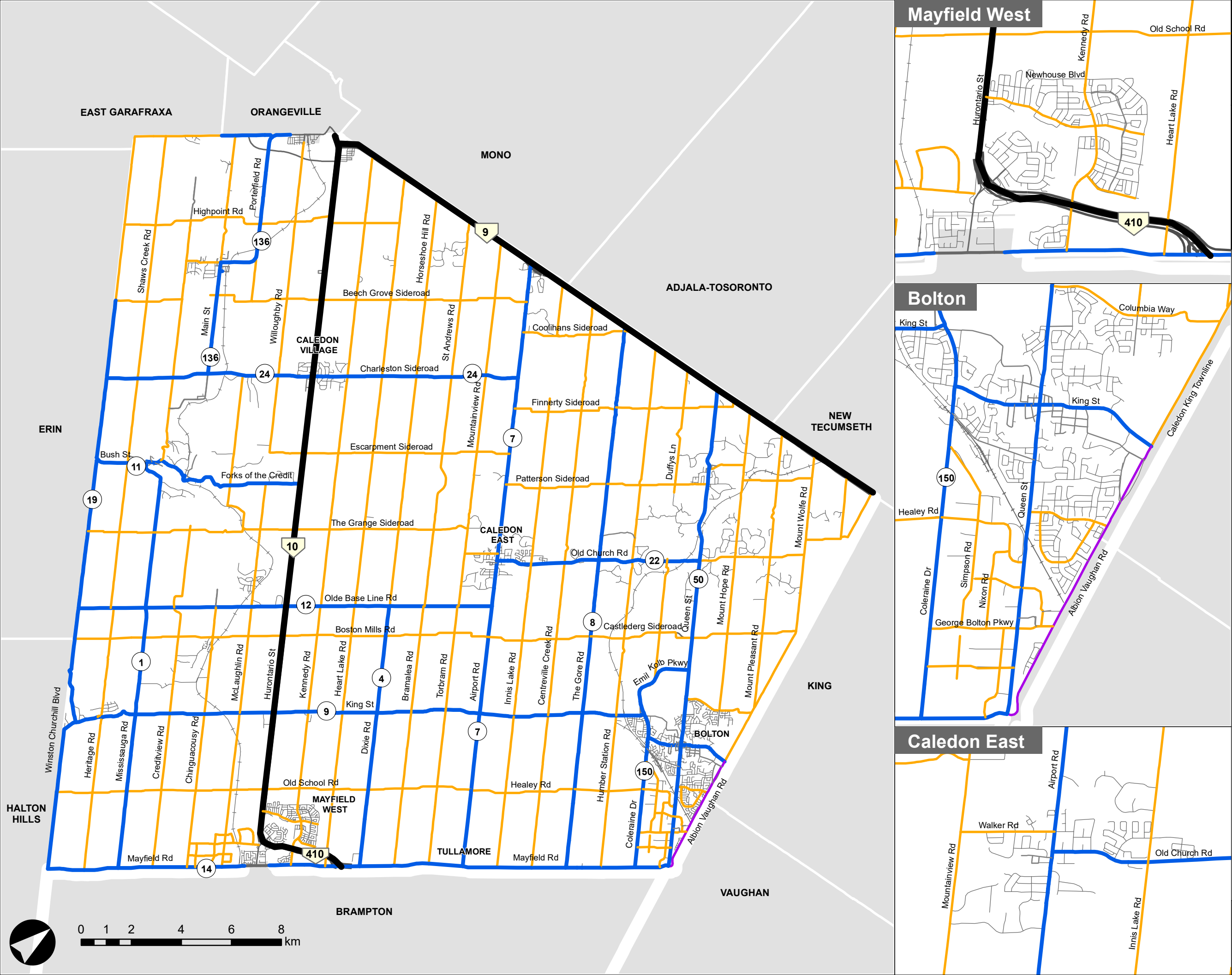


Town of Caledon

Transportation Master Plan

FIGURE 3-7
Existing Road Network

- Provincial Highway / Freeway
- Regional Arterial
- Town Arterial
- Town Collector
- Town Local



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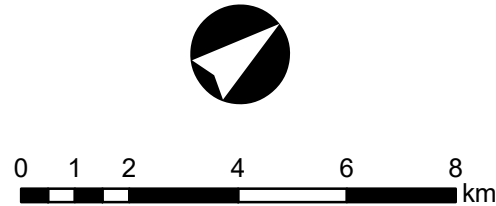
Town of Caledon

Transportation Master Plan

FIGURE 3-8

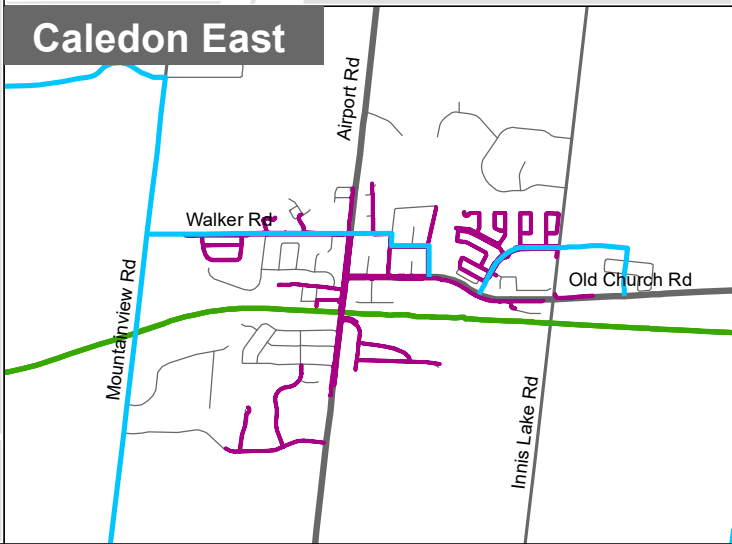
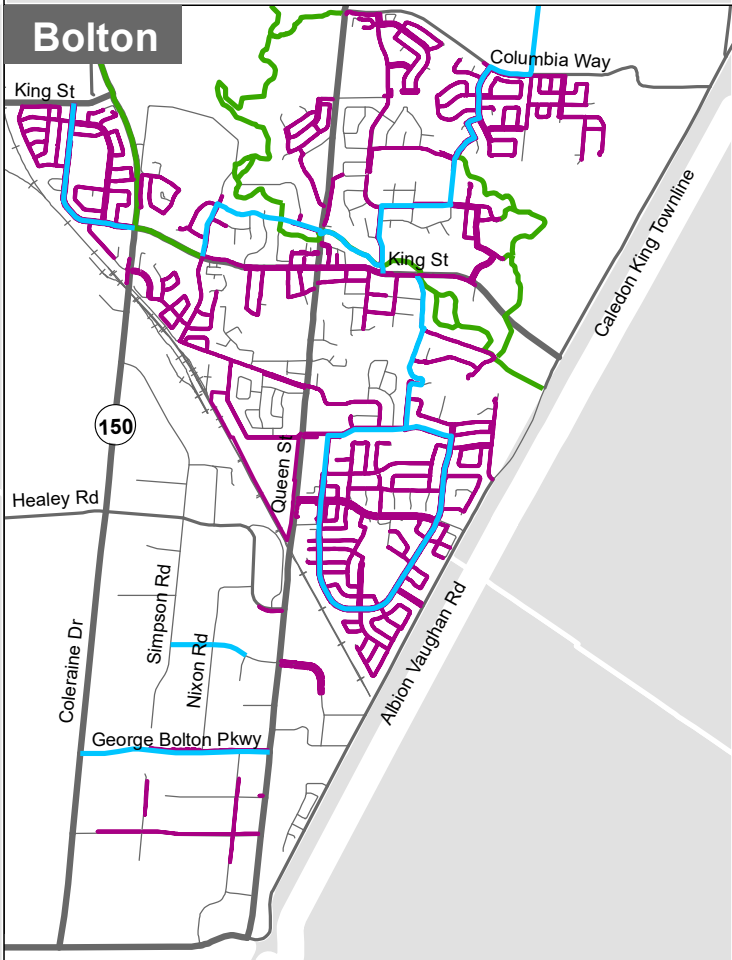
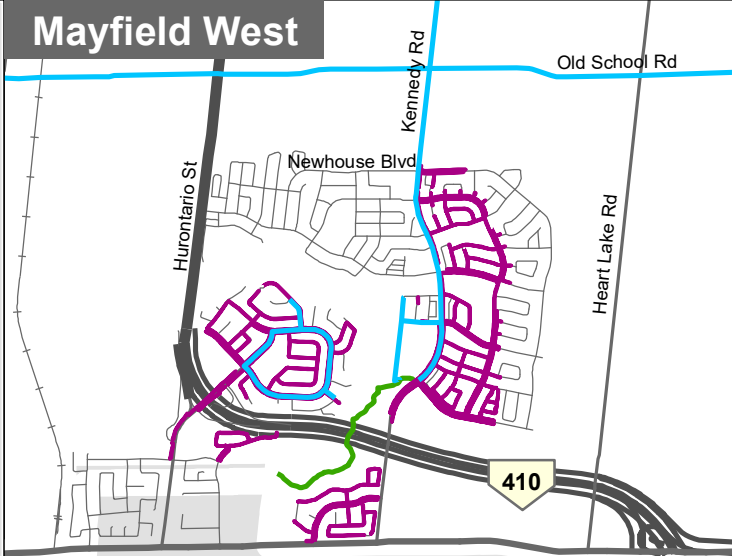
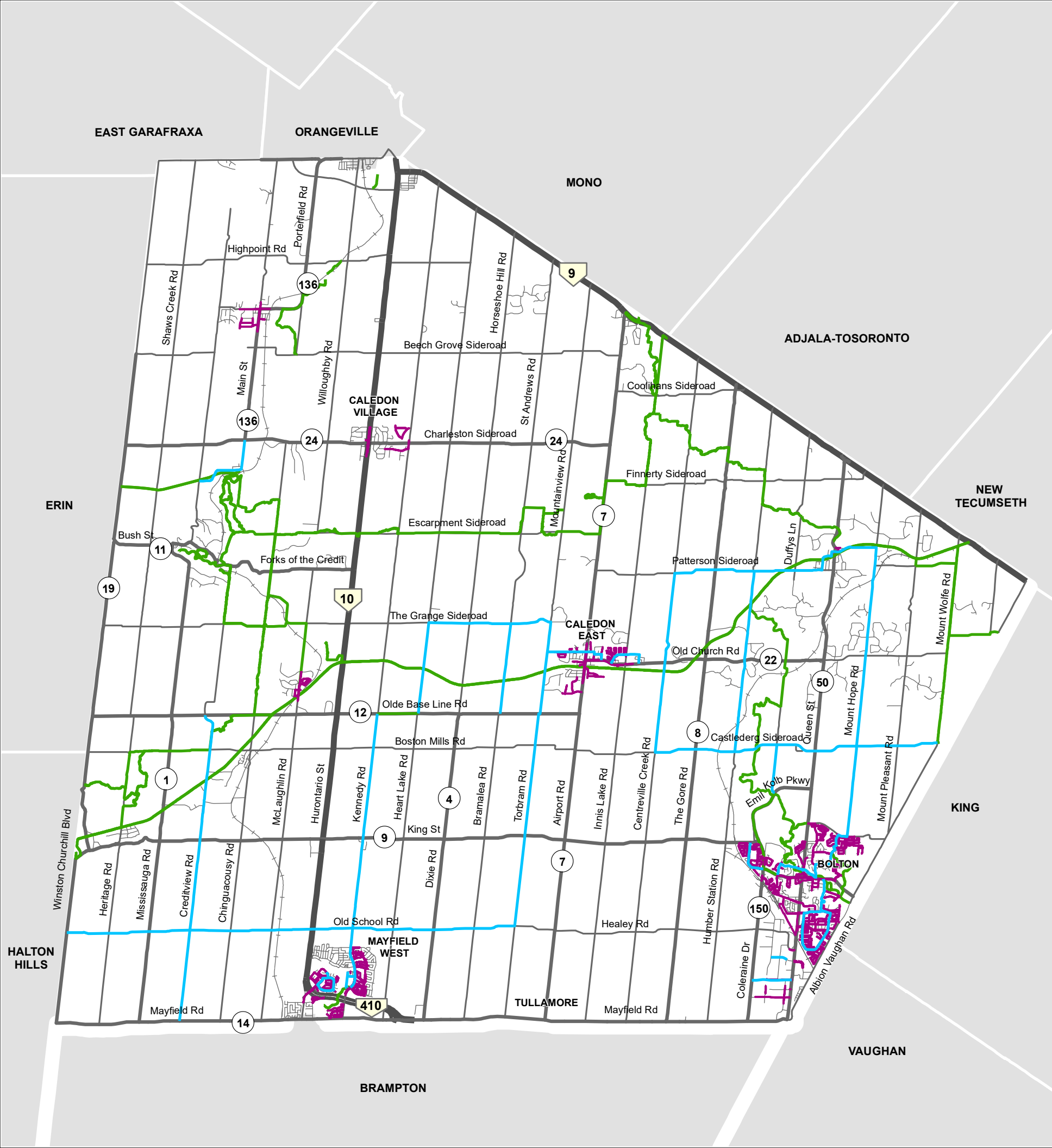
Existing Active Transportation Network

- Cycling Routes
- Trails
- Sidewalk



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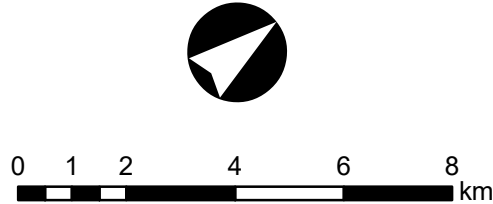


Town of Caledon

Transportation Master Plan

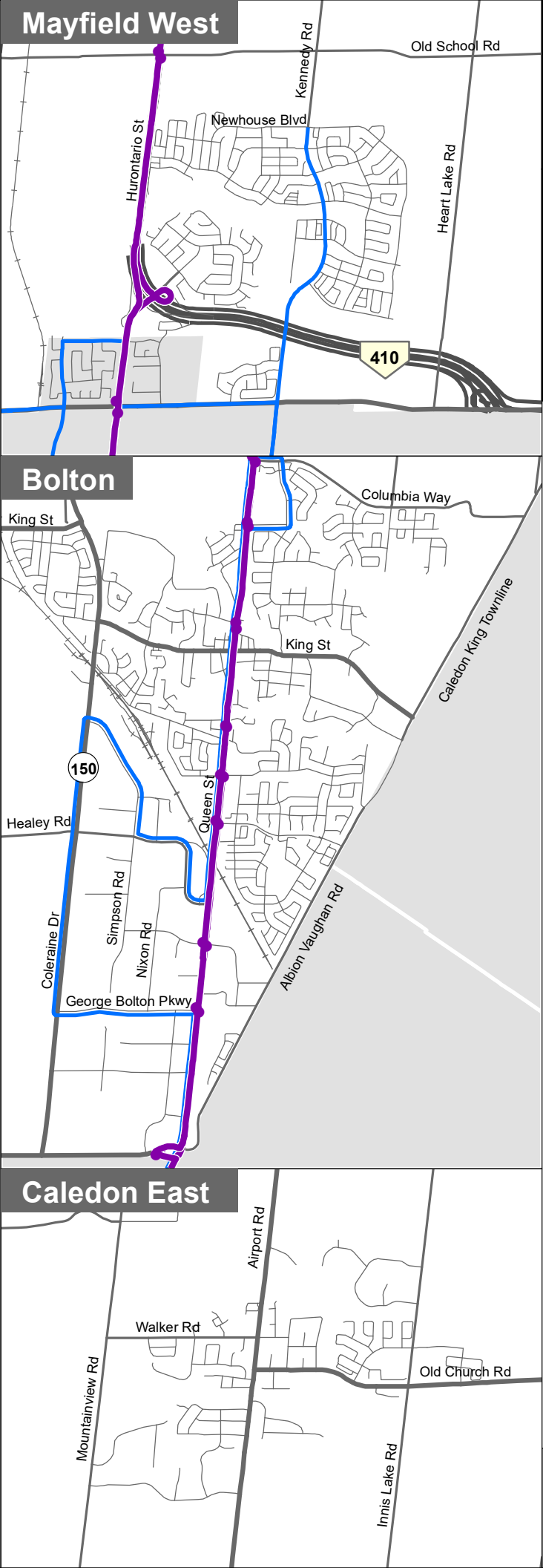
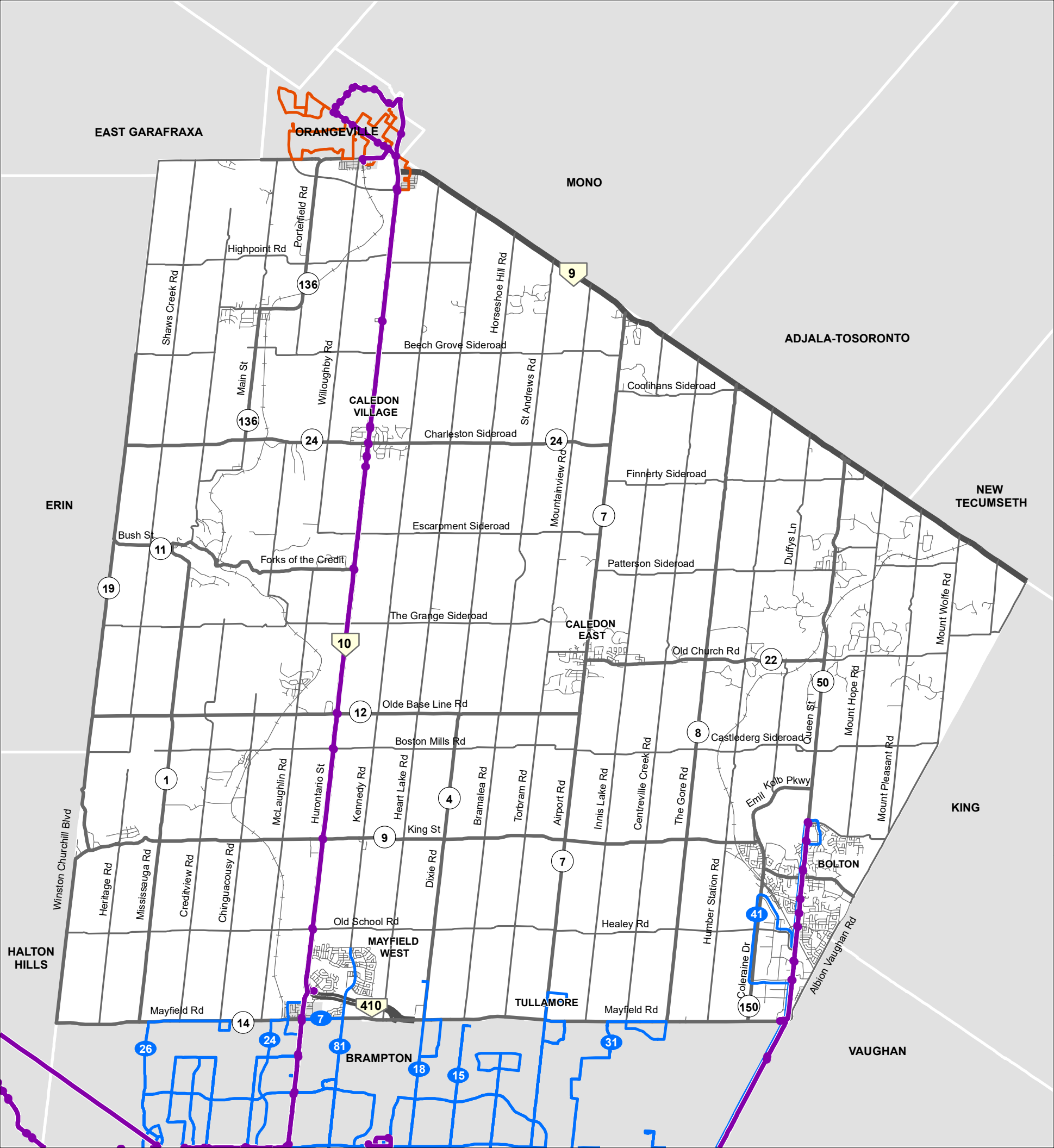
FIGURE 3-9
Existing Transit Network

- Brampton Transit
- GO Bus Transit
- Orangeville Transit



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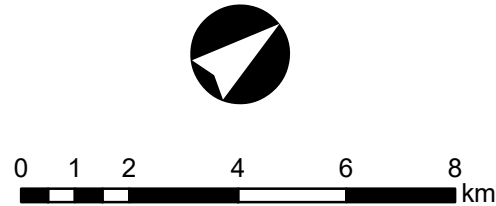
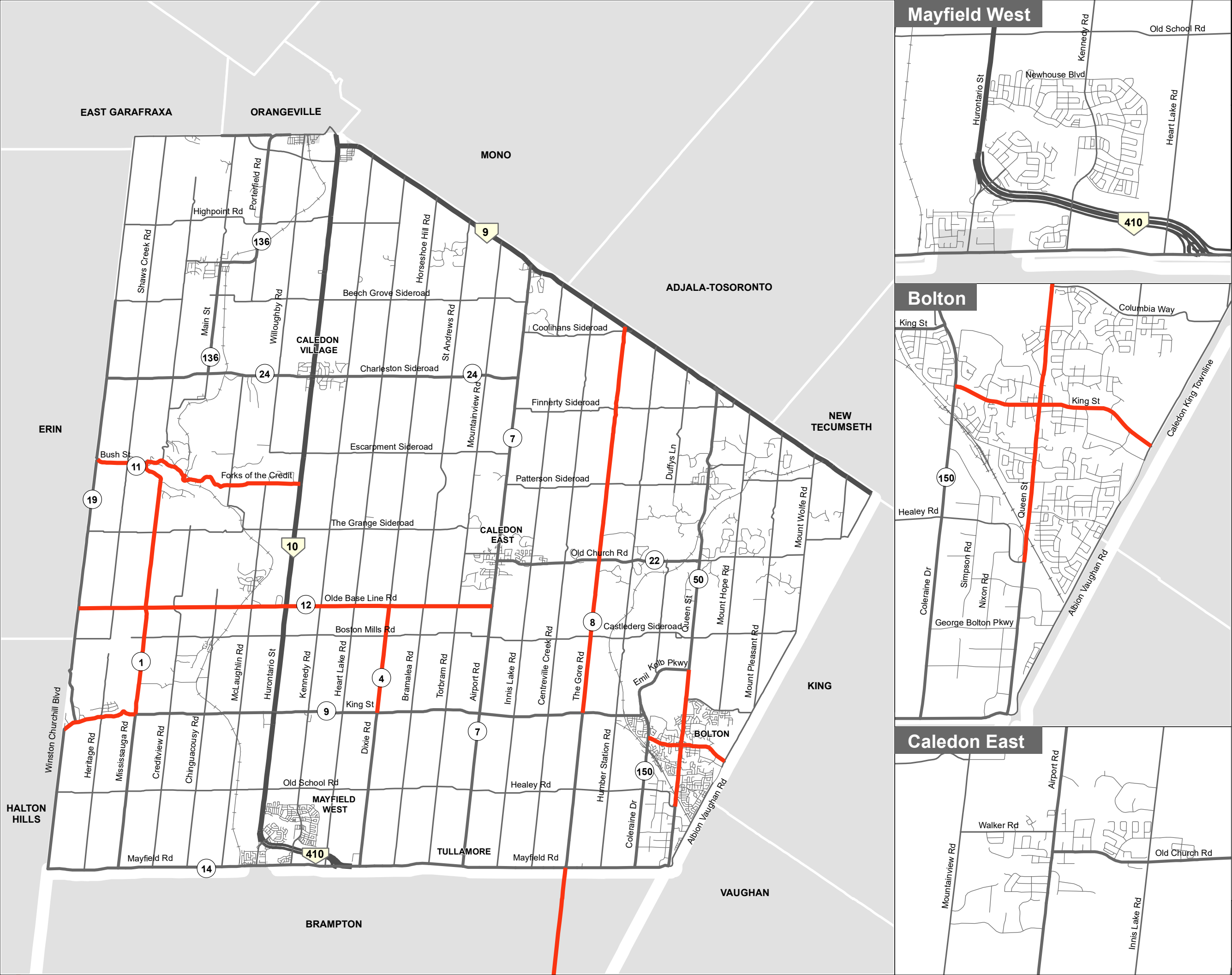


Town of Caledon

Transportation Master Plan

FIGURE 5-2
Truck Restrictions on
Regional Roads
within Caledon

Trucks Prohibited



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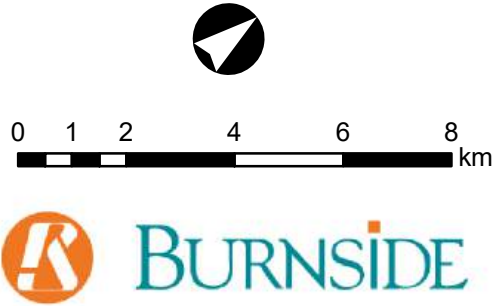
This map is the product of a Geographic Information System (GIS). As such, the data represented on this map may be subject to updates and future reproductions may not be identical.

Town of Caledon

Transportation Master Plan

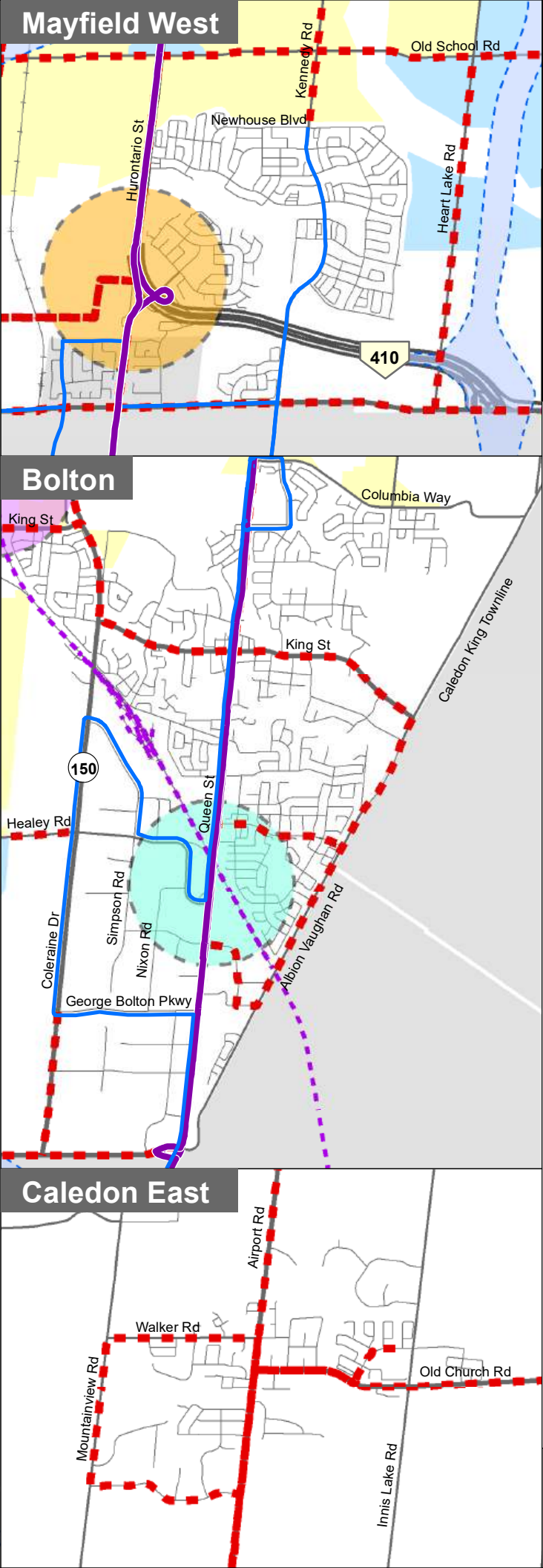
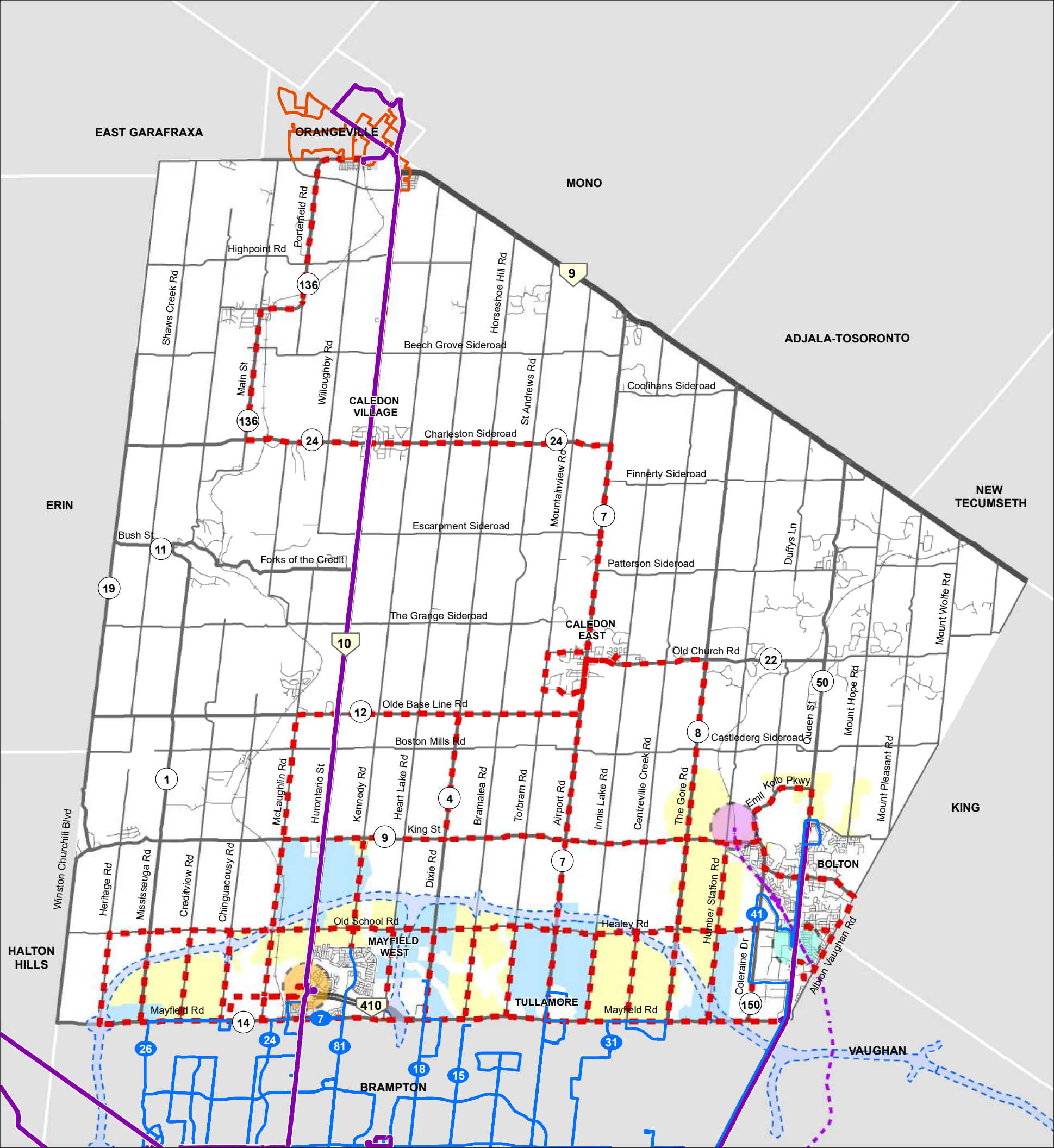
FIGURE 6-5
Transit Network Opportunities

- Existing**
- GO Transit
 - Brampton Transit
 - Orangeville Transit
- Future**
- Proposed Corridors
 - Bolton GO Rail
 - Caledon GO Station
 - Potential Second GO Station
 - Mayfield Transit Hub
 - GTA West Preferred Route
- Future Land Uses**
- Community
 - Employment



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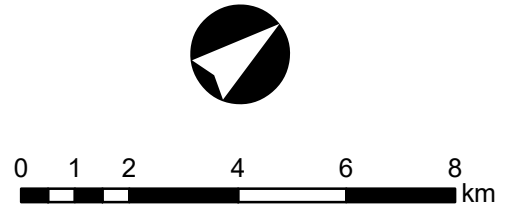


Town of Caledon

Transportation Master Plan

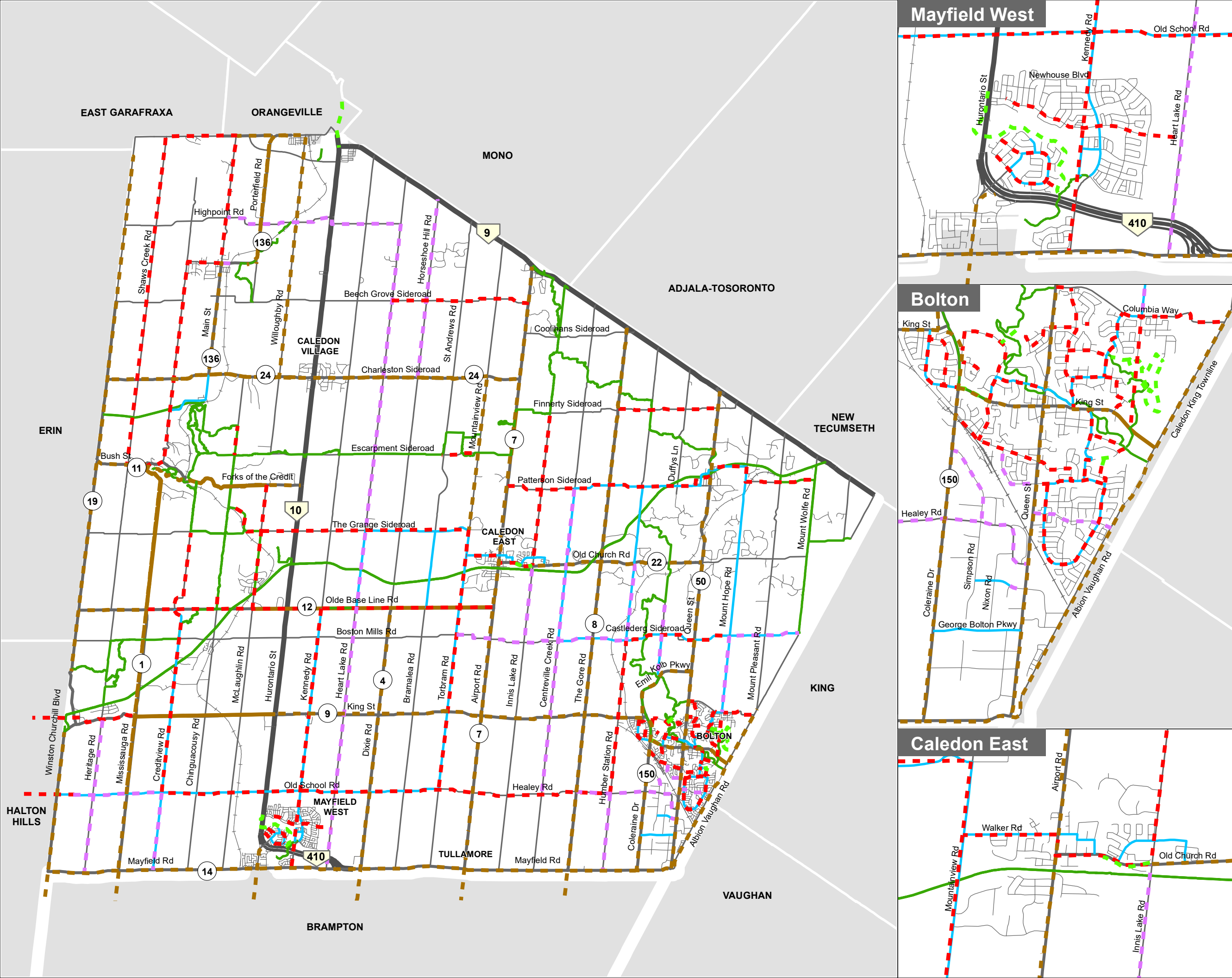
FIGURE 7-1
Previous (2017) Active
Transportation
Recommendations

- Proposed**
- Multi-Use Route
 - Separated On-Road
 - Shared On-Road
 - Regional
- Existing**
- Cycling Route
 - Trails
 - Regional



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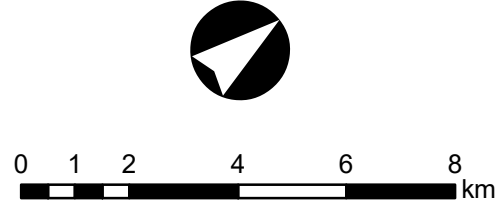
Town of Caledon

Transportation Master Plan

FIGURE 7-4
Proposed Active
Transportation
Network

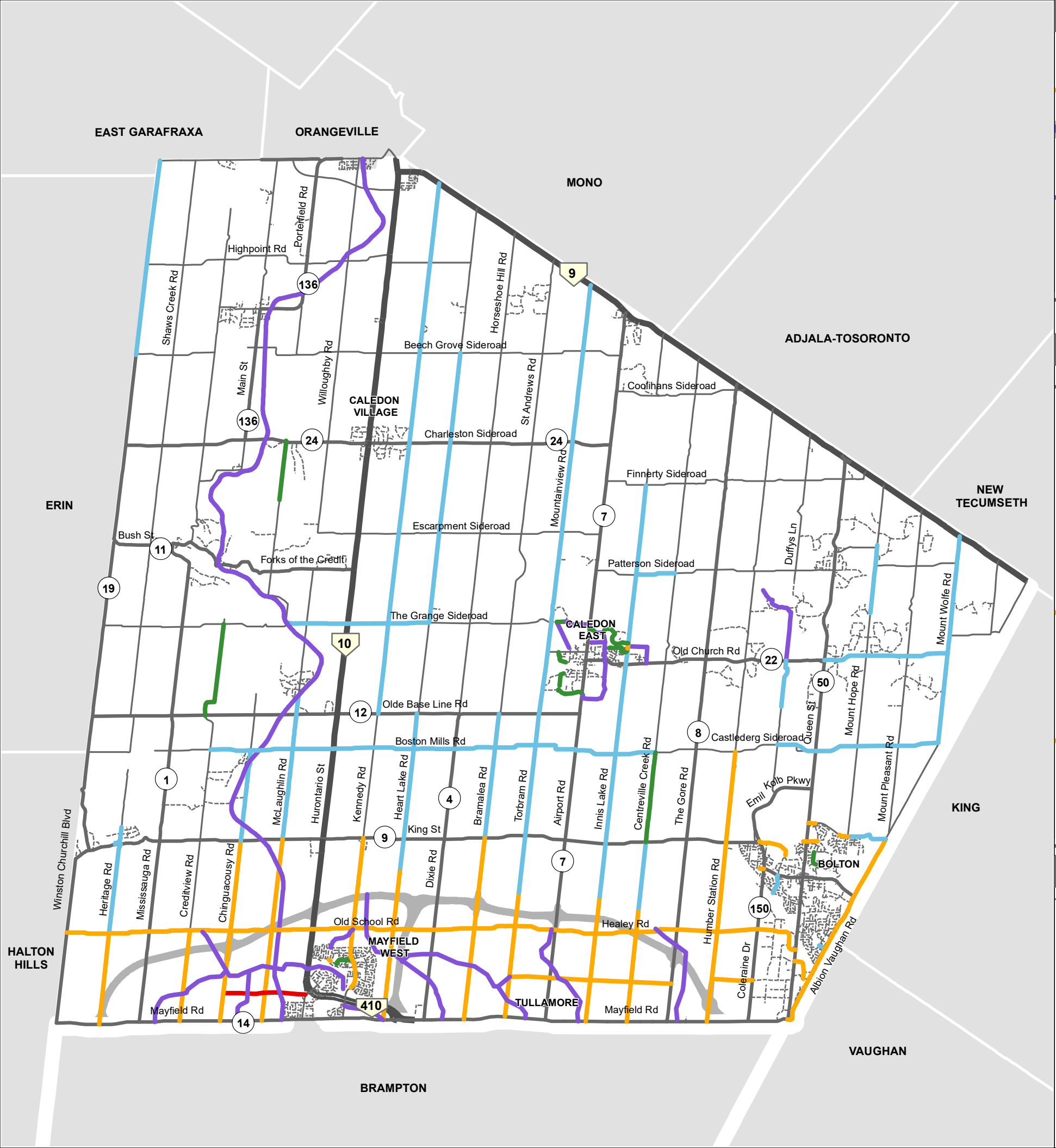
- Proposed Facility Type**
- Multi-use Trail
 - Painted Bike Lane
 - Physically Separated
 - Shared
 - Visually Separated

Source: Town of Caledon ATMP



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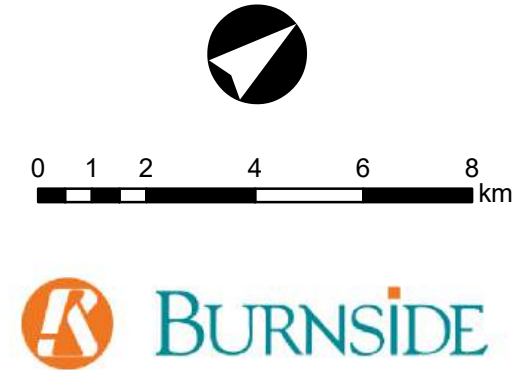
Town of Caledon

Transportation Master Plan

FIGURE 9-1

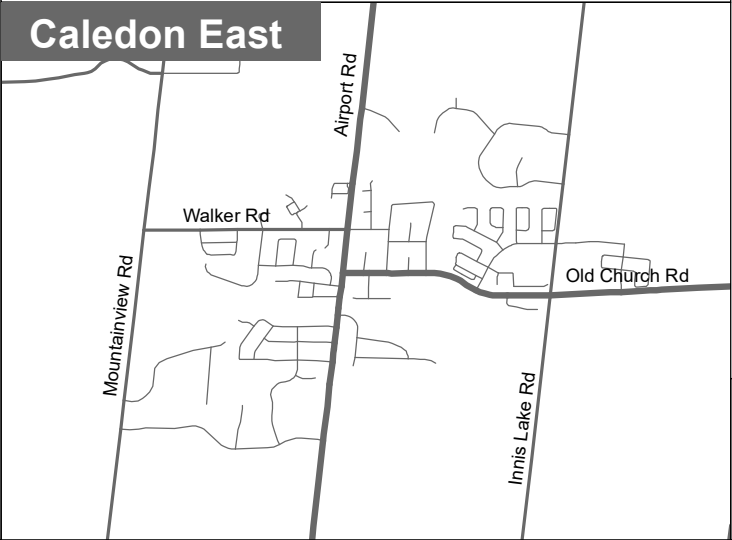
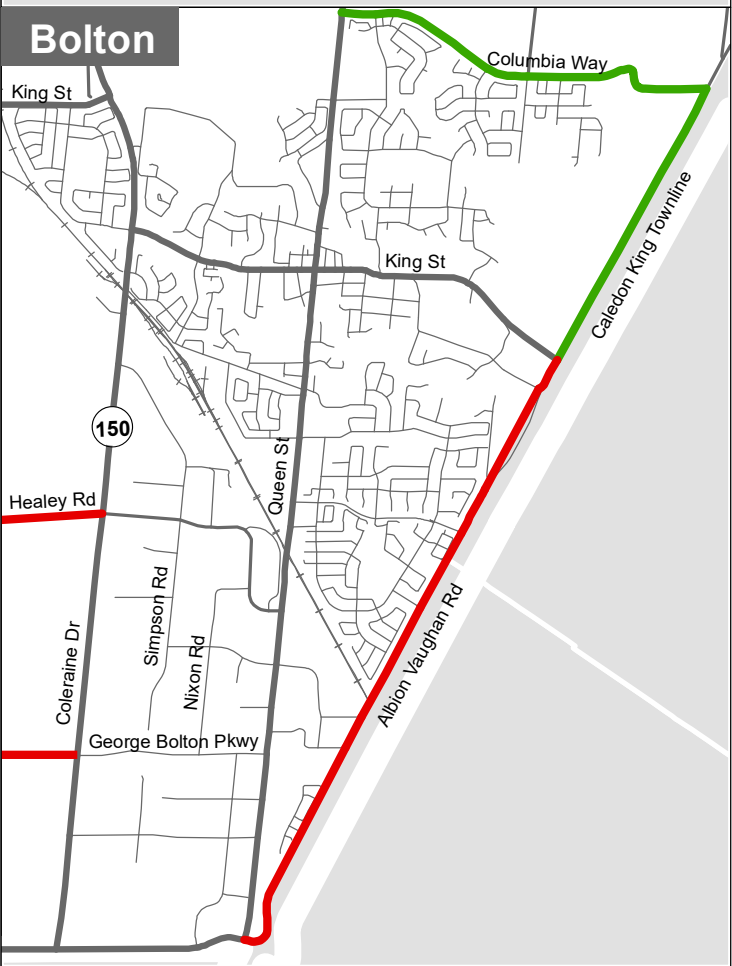
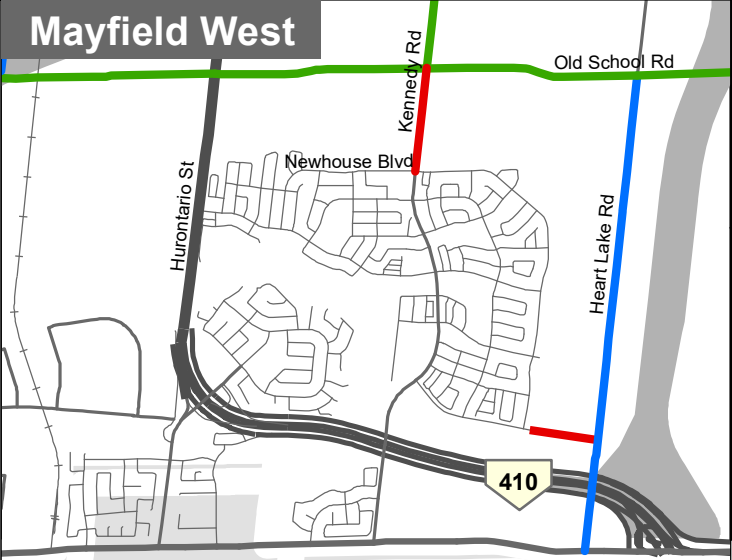
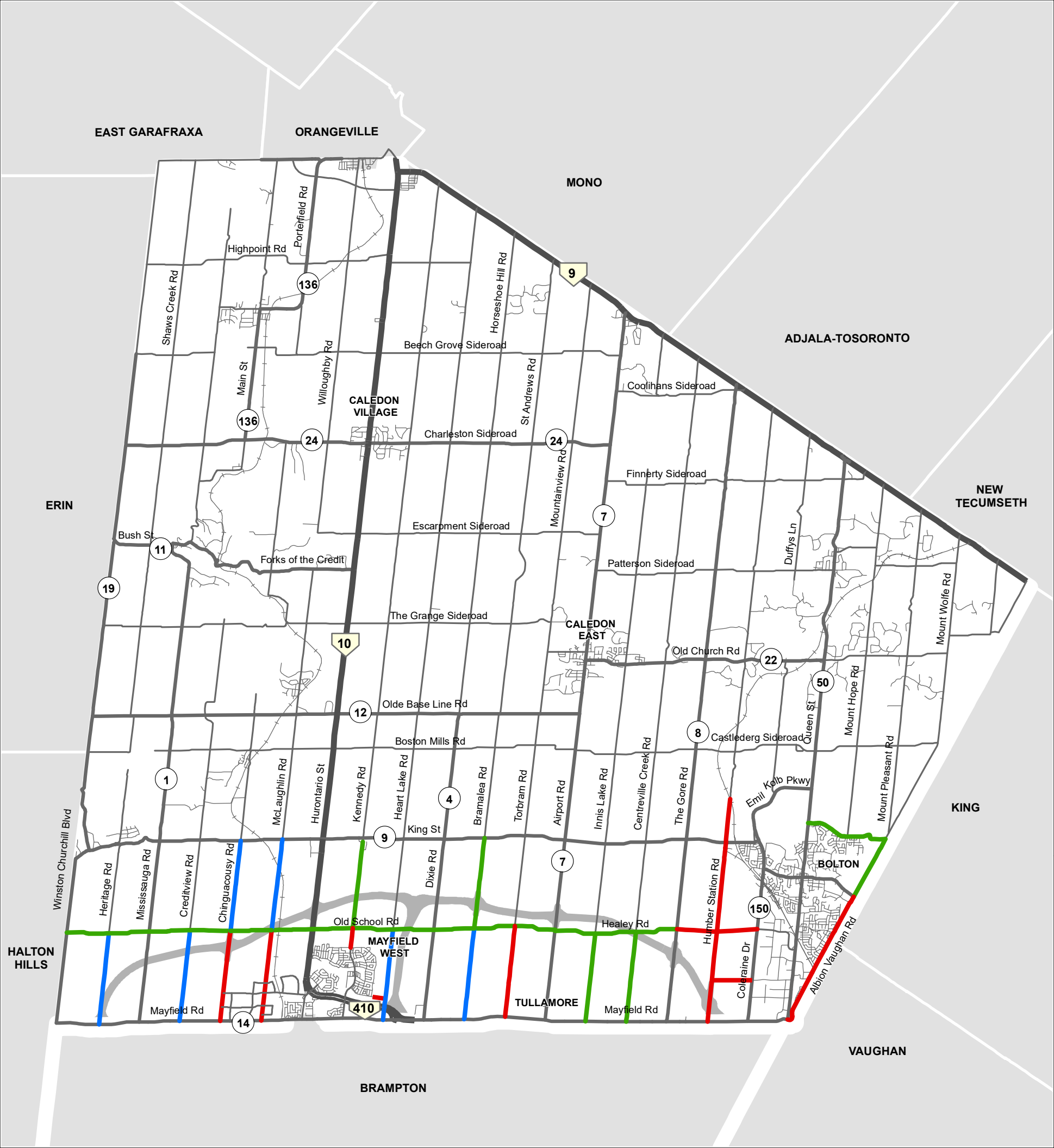
Proposed Travel Lanes
for Town Roads by 2051

- Road Improvements (Phasing)**
- Widening to 4 lanes (by 2031)
 - Widening to 4 lanes (by 2041)
 - Widening to 4 lanes (by 2051)



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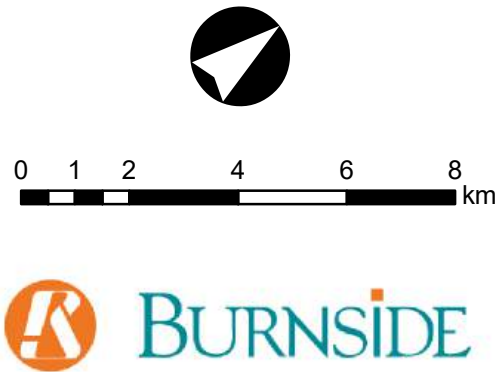


Town of Caledon

Transportation Master Plan

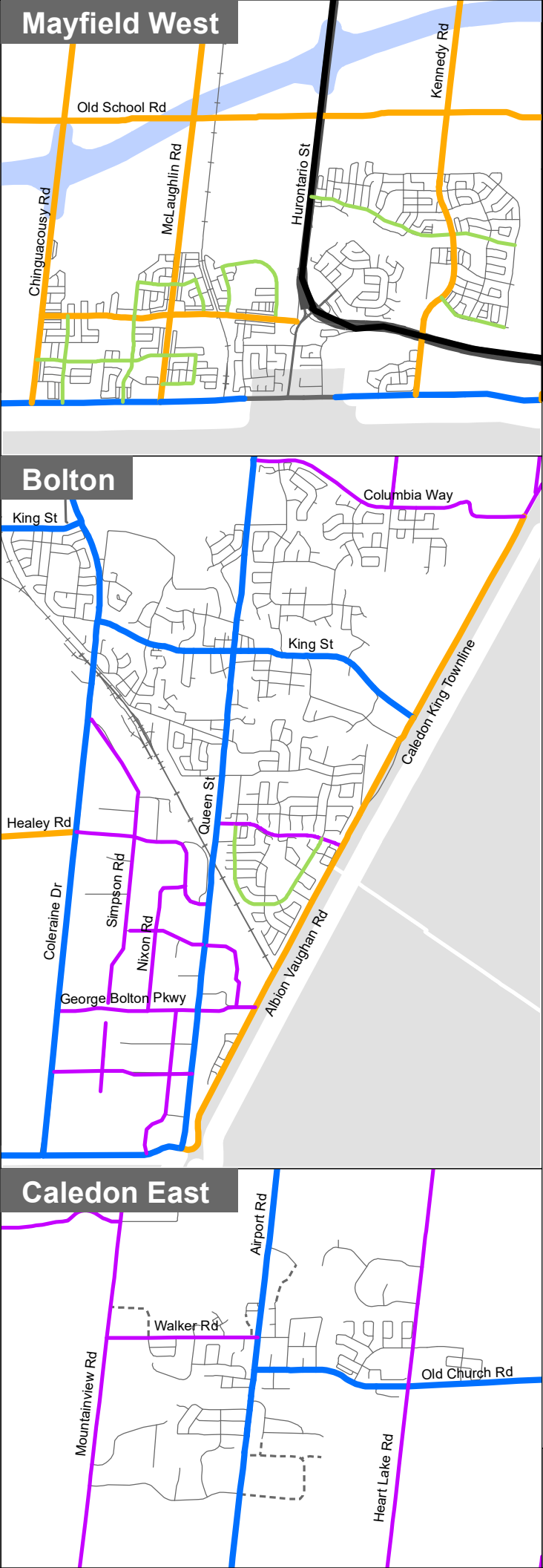
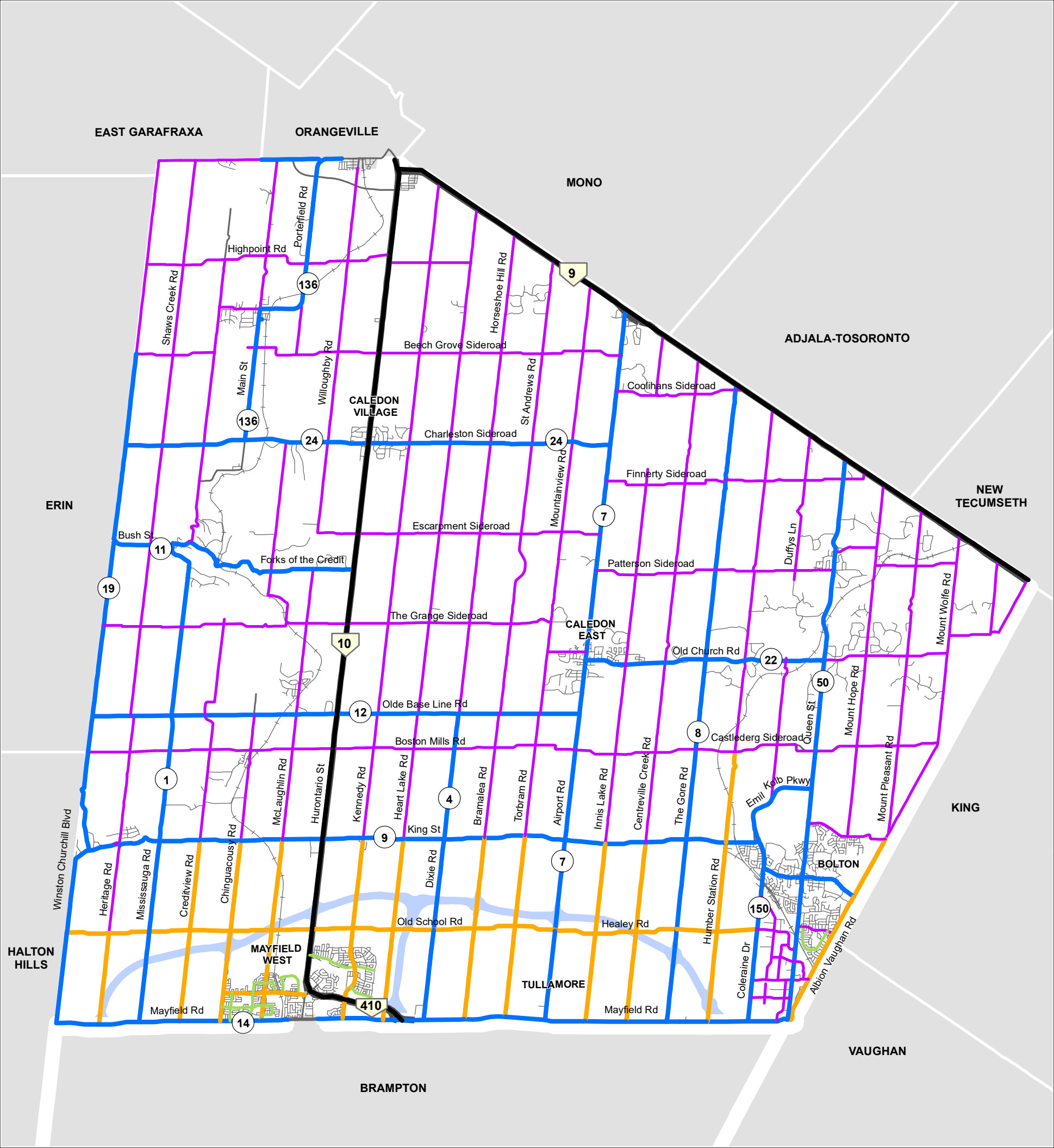
FIGURE 9-2
Road Classifications

- Provincial Highway / Freeway
- Regional Arterial
- Town Arterial
- Major Collector
- Minor Collector
- Local
- GTA West Corridor



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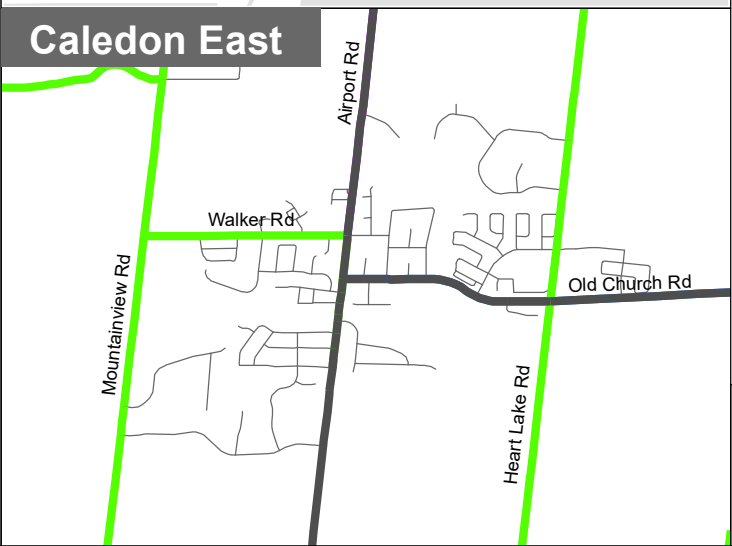
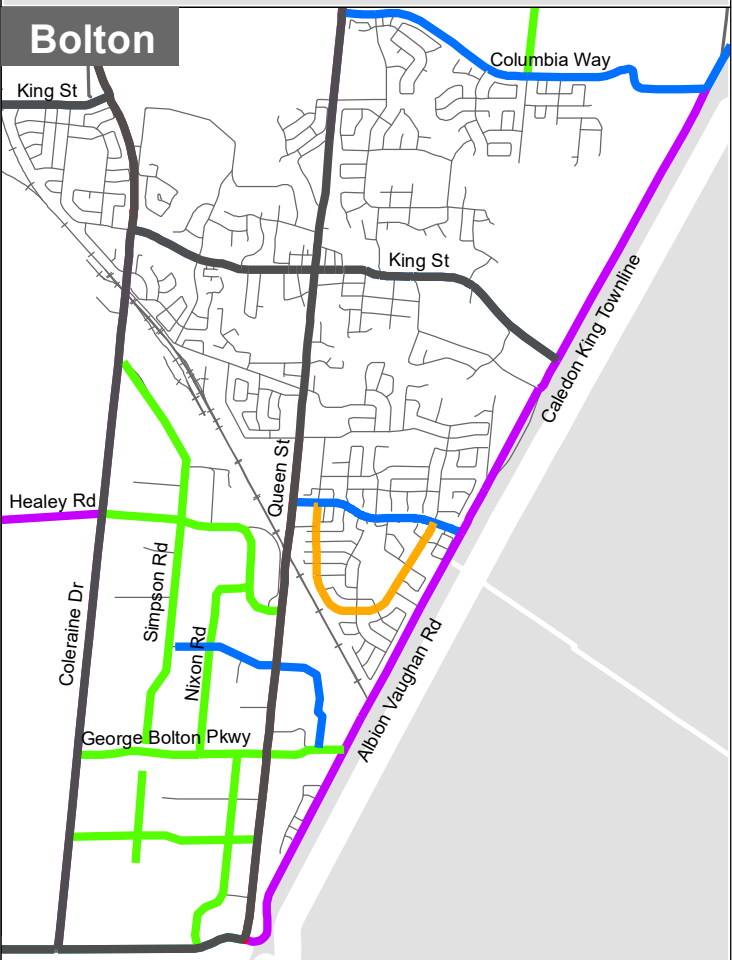
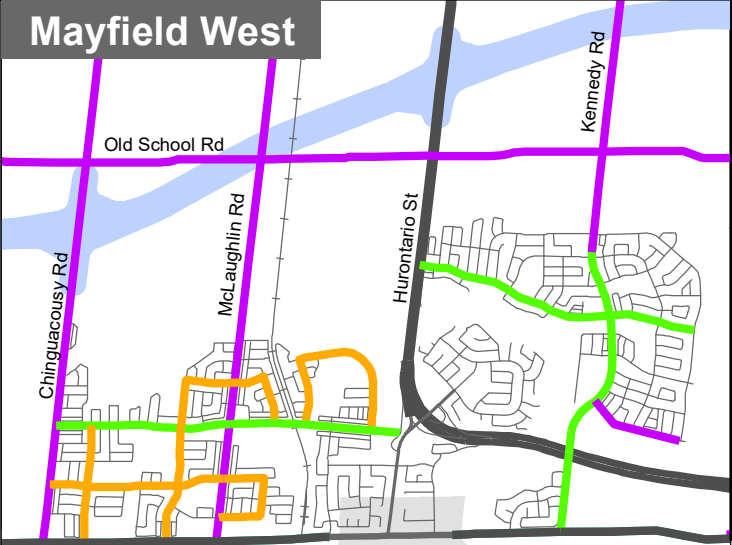
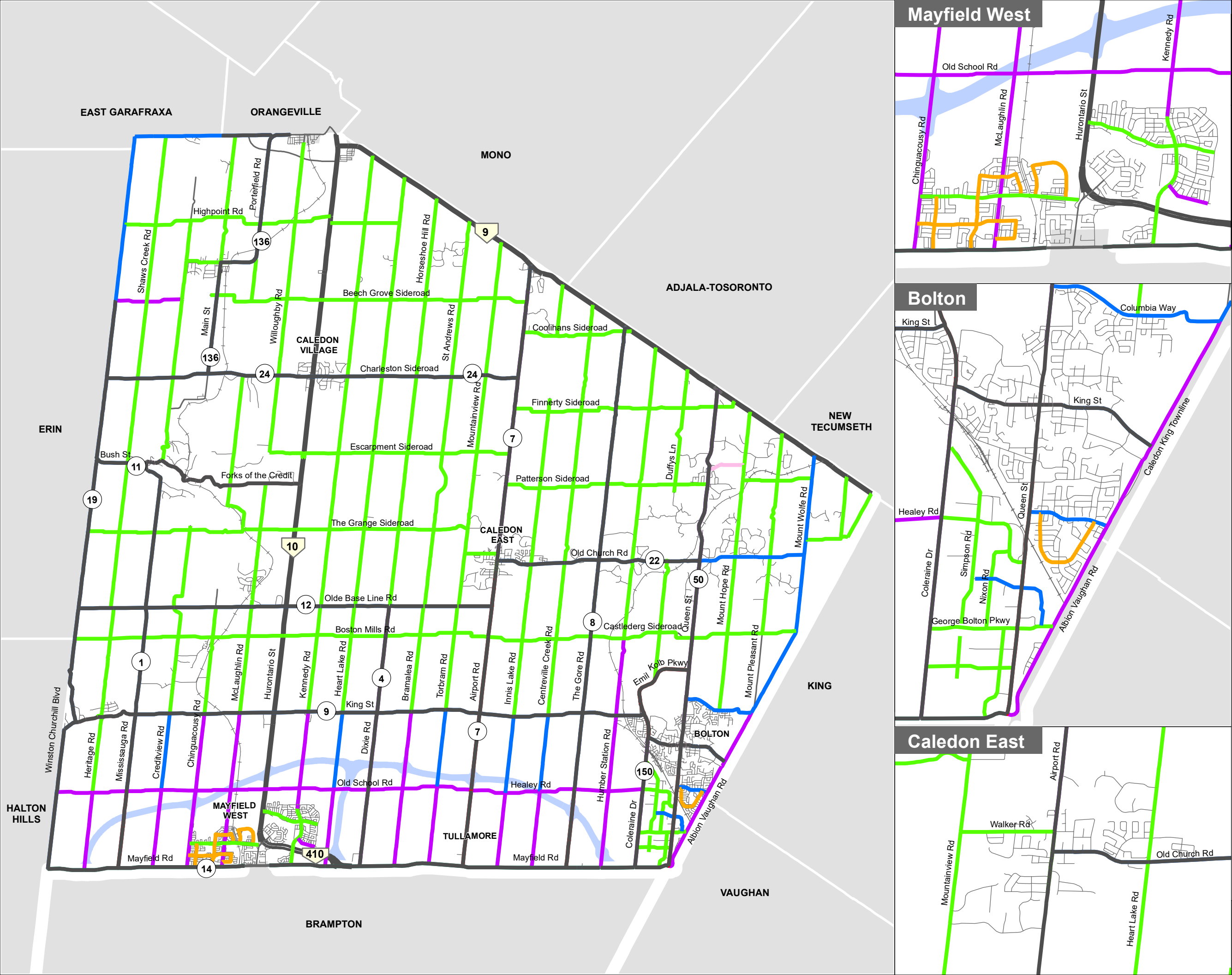
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Town of Caledon

Transportation Master Plan

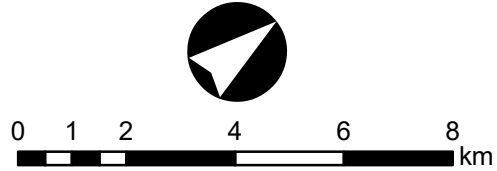
FIGURE 9-3
Right of Way (ROW) Widths



ROW Width (m)

- 20
- 22
- 26
- 30
- 36
- Regional Roads
- GTA West Corridor

*** Note: ROW widths along Regional roads are based on the Region's 2019 Long Range Transportation Plan. Refer to Region for latest Regional Road ROWs.**

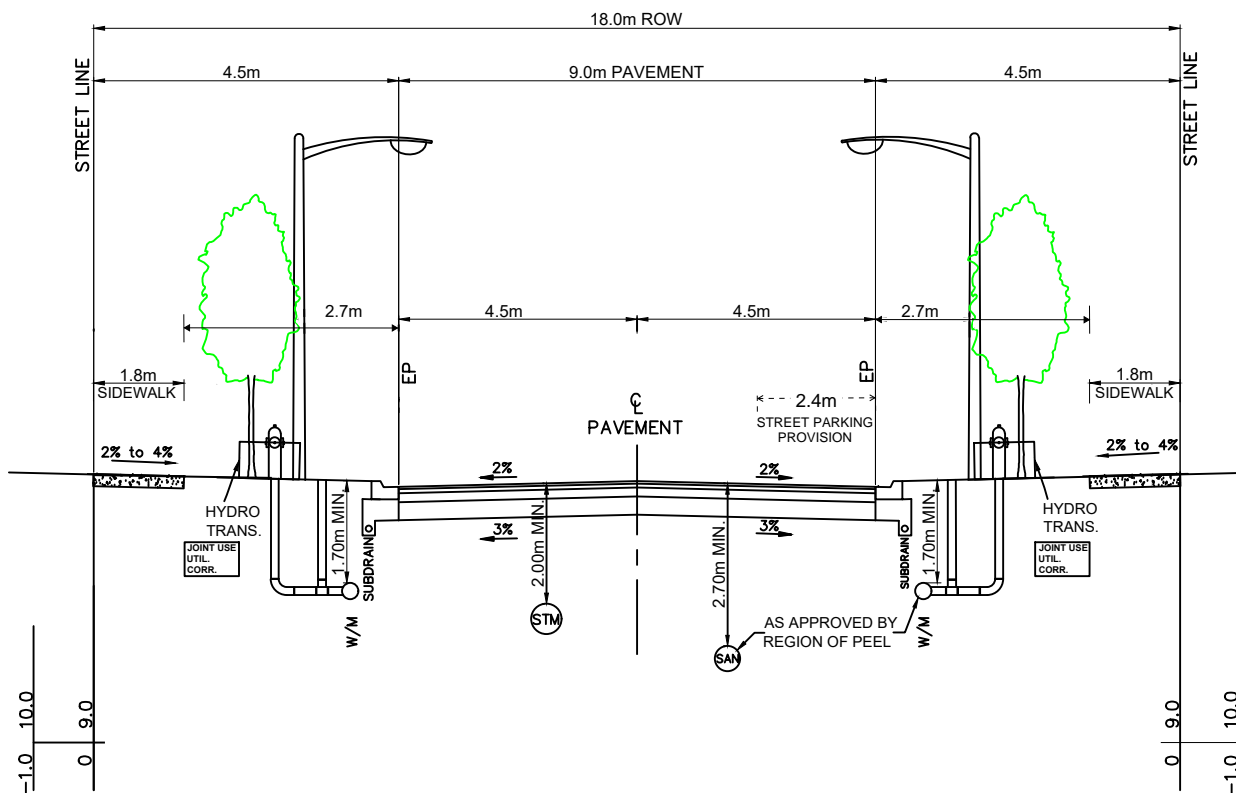


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APPENDIX J

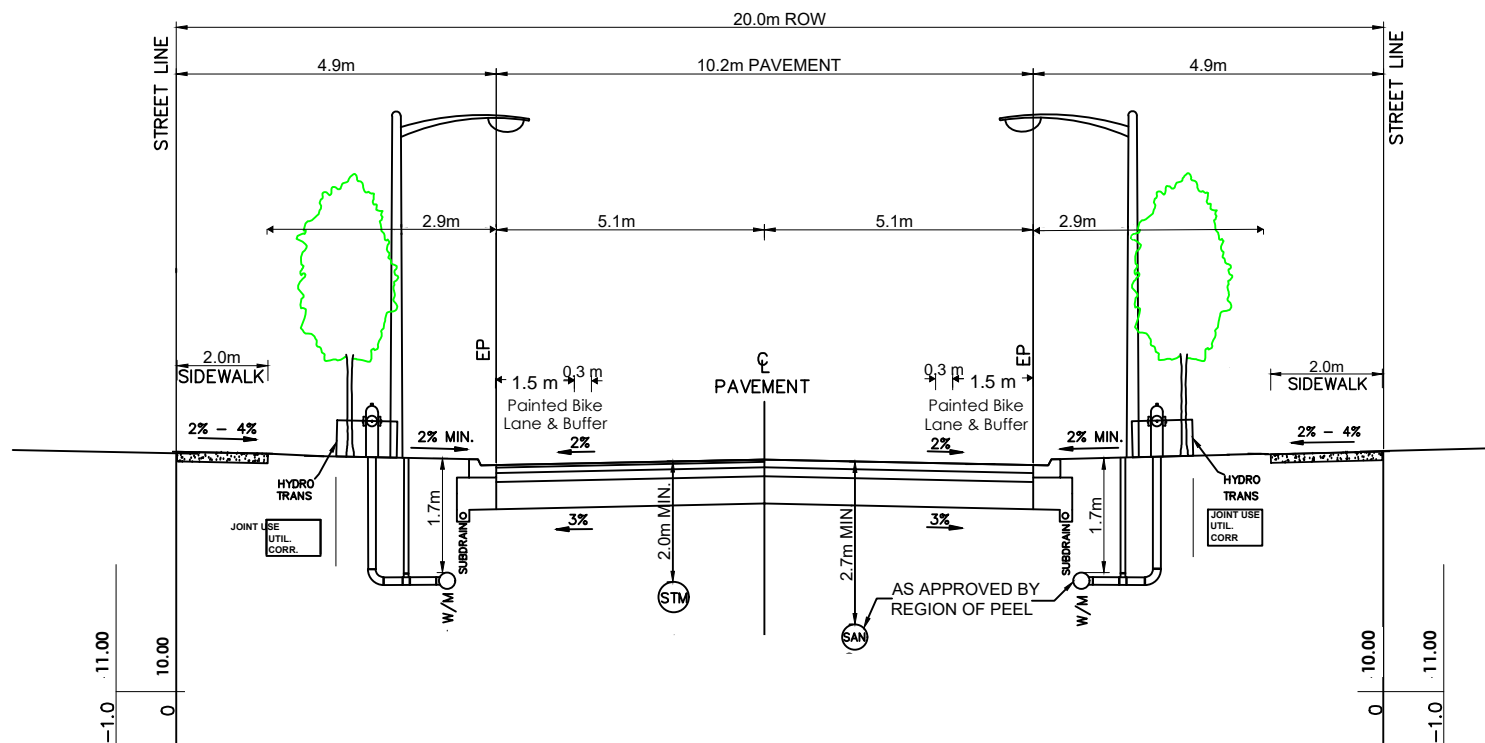
Sample Cross Sections



DRAFT FOR DISCUSSION

18.0m LOCAL ROAD
9.4 m PAVEMENT

				DRAWN: K.H.	DATE: JUNE 24
				DRAWN:	SCALE: N.T.S.
1	DRAFT FOR DISCUSSION		JUNE 24	STANDARD DRAFT	
NO.	REVISION	APR'D	DATE		



DRAFT FOR DISCUSSION

20.0m NEIGHBOURHOOD COLLECTOR
10m PAVEMENT

				DRAWN: K.H.	DATE: JUNE 24
				DRAWN:	SCALE: N.T.S.
1	DRAFT FOR DISCUSSION		JUNE 24	STANDARD DRAFT	
NO.	REVISION	APR'D	DATE		

STANDARD DRAFT

APPENDIX K

Trip Distribution and Assignment Analysis

Trip Distribution per Bolton TMP

AM Peak

OUTBOUND TRIPS

Bolton	5925	37%
Wellington	65	0%
Dufferin	222	1%
Caledon	638	4%
Simcoe	171	1%
York	2279	15%
Durham	18	0%
Toronto	2979	19%
Mississauga	1493	10%
Brampton	1690	11%
Halton	327	2%
Hamilton	51	0%
Total	15858	100%

PM Peak

INBOUND TRIPS

Bolton	5925	37%
Wellington	65	0%
Dufferin	222	1%
Caledon	638	4%
Simcoe	171	1%
York	2279	15%
Durham	18	0%
Toronto	2979	19%
Mississauga	1493	10%
Brampton	1690	11%
Halton	327	2%
Hamilton	51	0%
Total	15858	100%

INBOUND TRIPS

Bolton	5925	43%
Wellington	37	0%
Dufferin	489	4%
Caledon	1459	11%
Simcoe	841	6%
York	1294	9%
Durham	73	0%
Toronto	862	6%
Mississauga	553	4%
Brampton	1949	14%
Halton	217	2%
Hamilton	65	1%
Total	13764	100%

OUTBOUND TRIPS

Bolton	5925	43%
Wellington	37	0%
Dufferin	489	4%
Caledon	1459	11%
Simcoe	841	6%
York	1294	9%
Durham	73	0%
Toronto	862	6%
Mississauga	553	4%
Brampton	1949	14%
Halton	217	2%
Hamilton	65	1%
Total	13764	100%

Municipality	% Breakdown		
	South via Hwy 50	West via Emil Kolb Parkway	North via Hwy 50
Bolton	75%	25%	
Wellington			100%
Dufferin			100%
Caledon		20%	80%
Simcoe			100%
York	50%		50%
Durham	100%		
Toronto	60%	40%	
Mississauga	40%	60%	
Brampton	30%	70%	
Halton	60%	40%	
Hamilton	60%	40%	

*raw

	AM IN	AM OUT	PM IN	PM OUT	
South via Hwy 50		48%	48%	55%	55%
West via Emil Kolb Parkway		29%	29%	32%	32%
North via Hwy 50		23%	23%	13%	13%
		100%	100%	100%	100%

Adjusted

	AM IN	AM OUT	PM IN	PM OUT	
South via Hwy 50		40%	40%	40%	40%
West via Emil Kolb Parkway		40%	40%	40%	40%
North via Hwy 50		20%	20%	20%	20%
		100%	100%	100%	100%

TTS Query Results	
Distribution:	AM IN

Field	Selection	Value
Row variable:	2006 GTA zone of origin	-
Column variable:	2006 GTA zone of destination	-
Filter 1:	2006 GTA zone of destination	3192,3193,3194
Filter 2:	Start time of trip	0630-0930
Filter 3:	Trip purpose of destination	Home (H)

AM IN	Internal										External								Totals
Direction	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	External	External	External	External	External	External	External	External	
	I	NW	N	NE	E	SE	S	SW	W		NW	N	NE	E	SE	S	SW	W	
Trips	420	27	31	0	0	0	0	18	0	0	0	0	0	0	0	59	26	0	581
%	72.29%	4.65%	5.34%	0.00%	0.00%	0.00%	0.00%	3.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.15%	4.48%	0.00%	100.00%
% w/o trips in subject TAZ	0.00%	16.77%	19.25%	0.00%	0.00%	0.00%	0.00%	11.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	36.65%	16.15%	0.00%	100.00%

Thu May 30 2024 09:20:34 GMT-0400 (Eastern Daylight Time) - Run Time: 2729ms

Cross Tabulation Query Form - Trip - 2016

Row: 2006 GTA zone of origin - gta06_orig

Column: 2006 GTA zone of destination - gta06_dest

Filters:

(2006 GTA zone of destination - gta06_dest In 3192,3193,3194

and

Start time of trip - start_time In 0630-0930

and

Trip purpose of destination - purp_dest In H,)

Trip 2016

Table:

,3192,3193,3194

168,14,0,0

415,18,0,0

2023,0,0,27

3003,0,31,0

3189,0,0,27

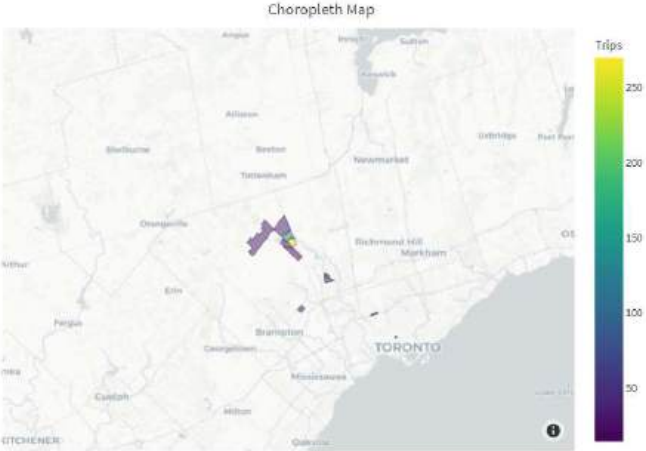
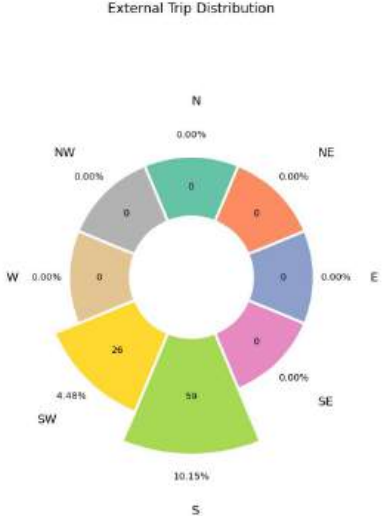
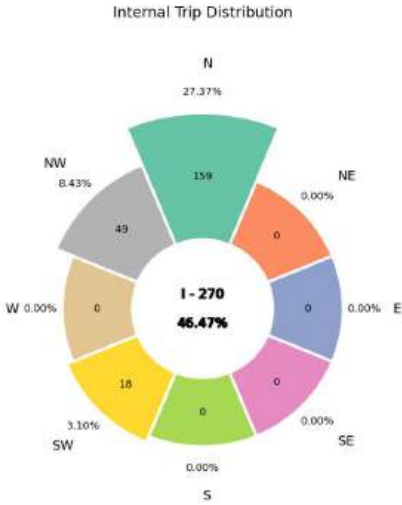
3191,0,0,18

3192,111,62,97

3193,60,45,23

3194,0,0,22

3331,0,0,26



TTS Query Results	
Distribution:	AM OUT

Field	Selection	Value
Row variable:	2006 GTA zone of destination	-
Column variable:	2006 GTA zone of origin	-
Filter 1:	2006 GTA zone of origin	3192,3193,3194
Filter 2:	Start time of trip	630-930
Filter 3:	Trip purpose of origin	Home (H)

AM OUT	Internal										External								Totals
	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	External	External	External	External	External	External	External	External	
Direction	I	NW	N	NE	E	SE	S	SW	W		NW	N	NE	E	SE	S	SW	W	
Trips	2229	100	525	0	0	0	194	557	155		82	87	151	360	558	2273	1093	34	8398
%	26.54%	1.19%	6.25%	0.00%	0.00%	0.00%	2.31%	6.63%	1.85%		0.98%	1.04%	1.80%	4.29%	6.64%	27.07%	13.02%	0.40%	100.00%
% w/o trips in subject TAZ	0.00%	1.62%	8.51%	0.00%	0.00%	0.00%	3.14%	9.03%	2.51%		1.33%	1.41%	2.45%	5.84%	9.05%	36.85%	17.72%	0.55%	100.00%

Thu May 30 2024 09:24:06 GMT-0400 (Eastern Daylight Time) - Run Time: 2589ms

Cross Tabulation Query Form - Trip - 2016

Row: 2006 GTA zone of destination - gta06_dest

Column: 2006 GTA zone of origin - gta06_orig

Filters:

(2006 GTA zone of origin - gta06_orig In 3192,3193,3194

and

Start time of trip - start_time In 0630-0930

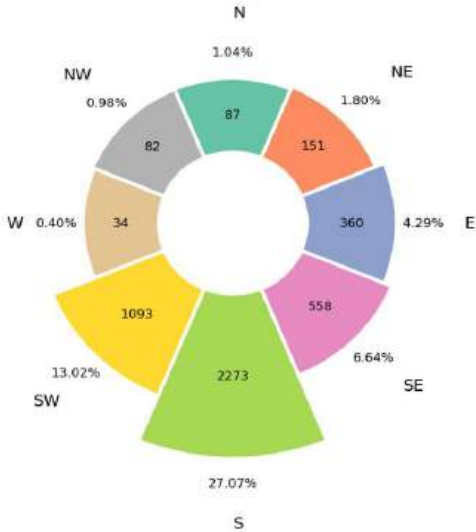
and

Trip purpose of origin - purp_orig In H.)

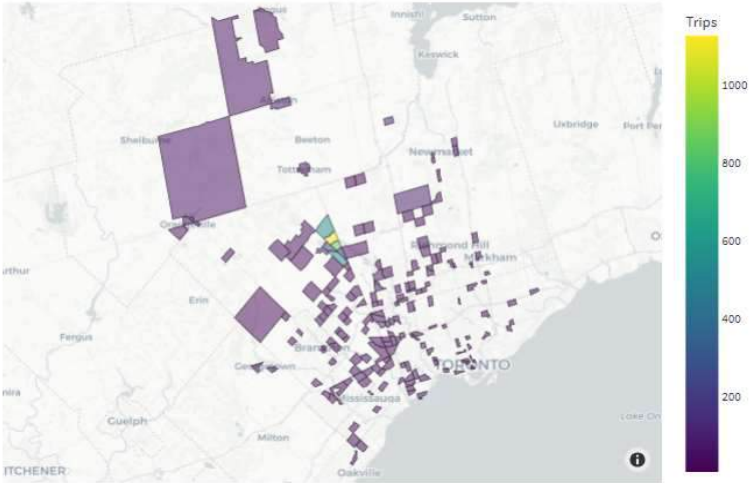
Trip 2016

3192,3193,3194	379,0,21,0	2558,0,11,0	3443,0,0,9	8663,0,13,0
38,0,23,0	388,0,22,0	2604,0,22,0	3447,0,10,0	
46,0,0,24	392,0,47,0	2606,30,0,0	3458,36,0,0	
55,0,9,0	415,11,0,0	2623,0,22,0	3474,11,0,0	
57,0,0,9	443,0,16,0	2624,0,13,0	3475,0,0,16	
58,13,0,0	460,0,22,0	2653,0,10,0	3480,0,21,23	
68,0,13,0	472,15,0,0	2654,0,10,0	3516,0,48,0	
69,0,22,24	487,0,0,14	2656,0,39,0	3519,0,0,10	
74,0,15,0	525,0,0,30	2659,0,0,28	3609,29,26,0	
89,0,0,10	529,0,8,0	2667,18,65,0	3611,8,0,0	
113,0,12,0	578,15,0,0	2669,0,23,0	3612,0,8,10	
125,0,11,0	1209,0,22,0	2672,17,0,0	3628,23,0,0	
126,0,33,0	2003,0,22,30	2674,27,0,0	3656,9,0,0	
131,0,31,0	2005,34,0,0	3001,0,32,0	3662,0,0,17	
133,0,8,0	2017,0,25,0	3003,107,20,62,12	3674,0,0,37	
135,0,17,0	2021,0,10,0	3005,0,0,16	3690,15,0,0	
143,17,0,0	2022,41,0,23	3014,0,0,10	3693,71,0,0	
168,14,0,0	2023,43,0,27	3017,0,0,18	3694,0,0,25	
180,18,0,0	2031,12,0,0	3103,0,0,32	3695,0,0,31	
185,0,0,24	2039,15,0,0	3153,36,0,56	3696,0,6,10	
187,21,0,0	2045,0,16,0	3189,0,0,27	3699,9,0,17	
204,0,33,0	2058,39,0,0	3190,62,83,49	3701,20,35,0	
210,0,31,8	2062,0,44,10	3191,21,120,51,13	3702,0,0,24	
221,0,0,18	2064,0,0,11	3192,42,42,43,176	3704,0,0,23	
236,0,0,10	2069,21,0,0	3193,34,66,66,115	3705,0,0,10	
290,42,0,0	2070,16,27,17	3194,62,47,150	3709,0,8,10	
296,0,21,0	2081,24,0,0	3196,15,0,0	3710,0,8,0	
298,0,22,0	2083,0,24,17	3197,0,41,0	3717,0,14,0	
299,0,39,0	2084,16,0,0	3325,14,0,0	3815,0,31,0	
301,0,22,0	2091,39,0,10	3330,21,0,0	3836,0,12,0	
307,0,14,0	2092,24,0,0	3331,20,0,0	3853,21,0,0	
308,40,0,0	2098,0,0,20	3337,0,38,0	4023,0,0,10	
310,0,35,0	2104,34,0,0	3338,0,0,24	4024,0,20,0	
322,0,47,0	2106,0,29,9	3340,0,0,29	4027,0,0,10	
330,20,0,0	2110,0,21,0	3342,0,8,0	4081,20,0,0	
335,0,19,0	2111,21,0,26	3348,0,0,7	4159,0,16,0	
354,0,22,0	2113,0,8,8	3351,0,11,0	4163,18,0,0	
355,0,30,0	2132,20,0,0	3356,14,0,0	8402,0,0,14	
356,10,25,0	2133,12,0,0	3357,0,13,0	8403,17,13,0	
357,0,35,8	2205,0,0,7	3385,34,14,0	8405,0,14,24	
358,0,20,0	2210,0,0,13	3417,0,71,0	8415,30,14,0	
359,0,0,8	2249,0,0,7	3418,10,0,0	8509,0,14,0	
361,28,0,0	2253,40,0,0	3419,0,14,0	8553,0,43,0	
371,59,85,66		3369,0,12,0	8562,0,60,0	
372,0,12,13		2375,23,29,0	8571,0,0,13	
373,45,30,14		2377,0,16,0	8592,0,9,0	
374,8,0,0		2393,0,15,0	8619,0,0,22	
378,9,50,0	2551,20,0,0	3442,0,0,16	8640,84,0,10	

External Trip Distribution



Choropleth Map



TTS Query Results	
Distribution:	PM IN

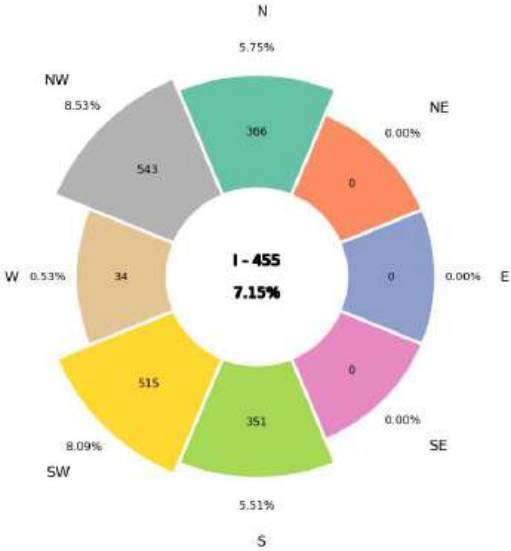
Field	Selection	Value
Row variable:	2006 GTA zone of origin	-
Column variable:	2006 GTA zone of destination	-
Filter 1:	2006 GTA zone of destination	3192,3193,3194
Filter 2:	Start time of trip	1530-1830
Filter 3:	Trip purpose of destination	Home (H)

PM IN	Internal									External								Totals
	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	External	External	External	External	External	External	External		
Direction	I	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	
Trips	1062	167	0	0	0	0	351	525	159	30	43	139	278	574	1929	1051	59	
%	16.68%	2.62%	0.00%	0.00%	0.00%	0.00%	5.51%	8.25%	2.50%	0.47%	0.68%	2.18%	4.37%	9.02%	30.30%	16.51%	0.93%	
% w/o trips in subject TAZ	0.00%	3.15%	0.00%	0.00%	0.00%	0.00%	6.62%	9.90%	3.00%	0.57%	0.81%	2.62%	5.24%	10.82%	36.36%	19.81%	1.11%	

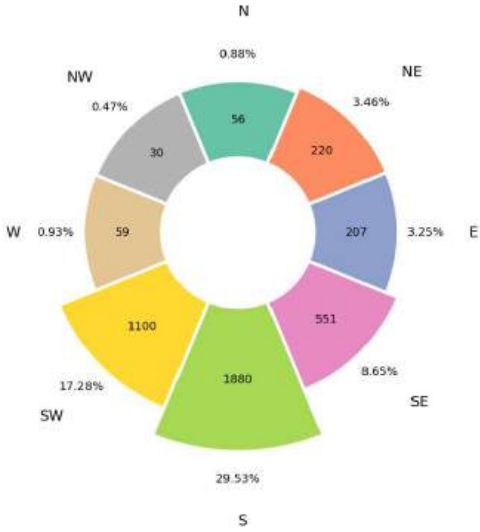
Thu May 30 2024 09:22:26 GMT-0400 (Eastern Daylight Time) - Run Time: 2774ms
Cross Tabulation Query Form - Trip - 2016
Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest
Filters:
(2006 GTA zone of destination - gta06_dest In 3192,3193,3194
and
Start time of trip - start_time In 1530-1830
and
Trip purpose of destination - purp_dest In H,)
Trip 2016

Table:				
,3192,3193,3194	385,18,0,0	2092,24,0,0	3190,156,134,61	3693,71,0,0
17,11,0,0	388,0,22,0	2098,0,0,20	3191,177,203,96	3694,0,0,25
38,0,23,0	391,20,0,0	2104,34,0,0	3192,280,97,78	3695,0,0,31
46,0,0,24	392,0,47,0	2106,0,0,9	3193,151,163,52	3699,0,0,17
51,0,22,0	393,21,0,0	2110,0,21,0	3194,52,100,89	3701,20,35,0
55,58,9,0	402,0,27,0	2111,21,0,26	3197,0,108,0	3702,0,0,24
57,27,0,9	409,0,19,0	2112,0,8,0	3324,0,21,0	3704,0,0,10
58,13,0,0	443,0,16,0	2113,0,8,8	3325,70,0,0	3705,0,0,10
59,0,8,0	472,15,0,0	2114,35,0,0	3330,21,0,0	3709,0,15,34
68,0,13,0	476,0,14,0	2131,12,0,0	3331,20,0,0	3710,34,0,0
69,0,22,24	487,0,0,14	2132,20,0,0	3333,32,0,0	3712,24,0,0
126,0,33,0	525,0,0,30	2249,0,0,7	3334,24,0,0	3815,0,43,0
204,0,33,0	1043,27,0,0	2253,40,0,0	3337,0,38,0	3836,0,12,0
210,0,31,8	1209,0,22,0	2373,0,0,22	3340,0,0,29	3853,21,0,0
221,0,0,18	1224,0,43,0	2375,0,29,0	3342,0,8,0	4024,0,20,18
224,15,0,0	2003,0,0,30	2377,0,16,0	3348,0,0,7	4081,20,0,0
228,0,8,0	2005,34,0,0	2393,0,15,0	3351,0,0,25	4159,0,16,0
298,0,22,0	2008,0,0,25	2551,20,0,0	3357,0,34,37	7234,0,22,0
299,0,17,0	2015,0,23,12	2609,0,0,12	3385,34,0,0	7568,21,0,0
307,0,14,0	2017,0,37,0	2621,13,0,0	3417,20,0,0	8403,17,0,0
308,26,0,0	2021,0,10,0	2623,0,22,0	3418,10,0,0	8413,0,0,13
310,0,35,0	2022,0,0,23	2624,0,13,0	3422,15,27,0	8415,30,0,13
322,0,47,0	2023,21,0,0	2654,0,10,0	3443,0,0,9	8527,21,0,0
330,20,0,0	2031,0,0,22	2656,0,39,0	3474,11,14,0	8560,72,0,0
335,0,11,0	2040,19,0,0	2659,0,0,26	3475,0,0,18	8599,21,0,0
354,0,11,0	2041,0,8,0	2667,18,0,0	3480,0,0,23	8620,0,0,23
355,0,15,0	2058,39,0,0	2669,0,23,0	3516,0,48,0	8640,84,0,10
356,10,25,0	2062,21,44,10	2670,0,9,0	3517,0,20,0	8663,0,13,0
357,0,8,8	2063,21,0,0	3001,0,48,0	3519,0,0,10	9998,0,25,0
359,0,0,8	2070,16,0,17	3005,0,0,16	3606,36,0,0	
361,28,0,0	2071,0,19,0	3014,0,0,10	3609,29,15,0	
367,0,15,0	2081,24,11,0	3017,21,0,18	3611,8,0,0	
372,14,0,0	2082,0,0,40	3103,0,0,32	3612,0,0,10	
373,0,30,14	2083,0,23,17	3151,0,8,0	3656,9,0,0	
376,0,39,0	2084,16,0,0	3153,0,31,56	3662,0,0,17	
378,9,50,6	2091,39,0,10	3189,0,0,27	3674,0,0,37	

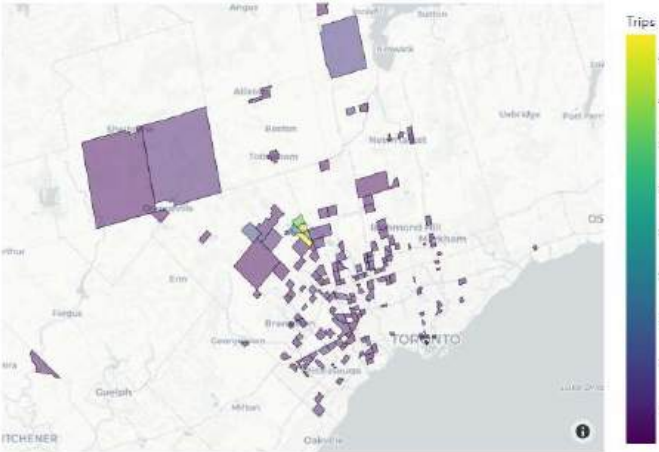
Internal Trip Distribution



External Trip Distribution



Choropleth Map



TTS Query Results	
Distribution:	PM OUT

Field	Selection	Value
Row variable:	2006 GTA zone of destination	-
Column variable:	2006 GTA zone of origin	-
Filter 1:	2006 GTA zone of origin	3192,3193,3194
Filter 2:	Start time of trip	1530-1830
Filter 3:	Trip purpose of origin	Home (H)

PM OUT	Internal									External								Totals
	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	External	External	External	External	External	External	External	External	
Direction	I	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	
Trips	458	127	13	0	0	0	235	109	0	68	24	15	0	288	242	85	0	1664
%	27.52%	7.63%	0.78%	0.00%	0.00%	0.00%	14.12%	6.55%	0.00%	4.09%	1.44%	0.90%	0.00%	17.31%	14.54%	5.11%	0.00%	100.00%
% w/o trips in subject TAZ	0.00%	10.53%	1.08%	0.00%	0.00%	0.00%	19.49%	9.04%	0.00%	5.64%	1.99%	1.24%	0.00%	23.88%	20.07%	7.05%	0.00%	100.00%

Thu May 30 2024 09:24:35 GMT-0400 (Eastern Daylight Time) - Run Time: 2574ms

Cross Tabulation Query Form - Trip - 2016

Row: 2006 GTA zone of destination - gta06_dest

Column: 2006 GTA zone of origin - gta06_orig

Filters:

(2006 GTA zone of origin - gta06_orig In 3192,3193,3194

and

Start time of trip - start_time In 1530-1830

and

Trip purpose of origin - purp_orig In H,)

Trip 2016

Table:

,3192,3193,3194

58,34,0,0

66,0,12,0

232,0,0,17

242,0,0,23

355,0,31,0

403,19,0,0

476,0,14,0

2034,0,25,0

2040,19,0,0

2069,34,0,0

2070,0,8,0

2081,274,0,0

3189,0,0,13

3190,86,123,26

3191,17,28,64

3192,14,43,0

3193,0,115,53

3194,35,165,33

3195,13,0,0

3197,0,114,0

3325,0,8,0

3333,30,0,0

3357,0,17,0

3611,0,30,0

3709,0,20,0

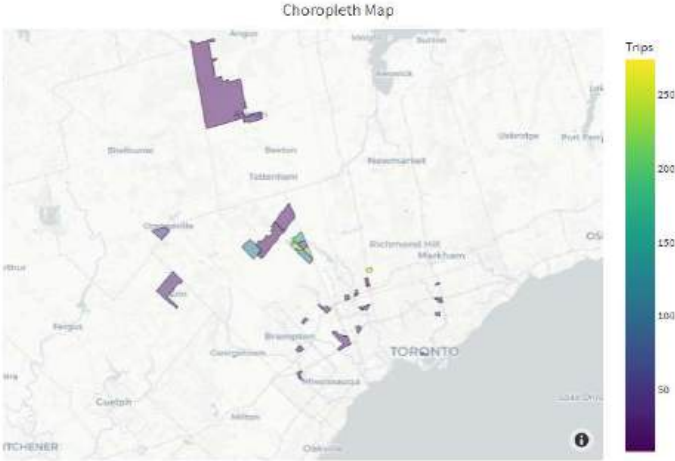
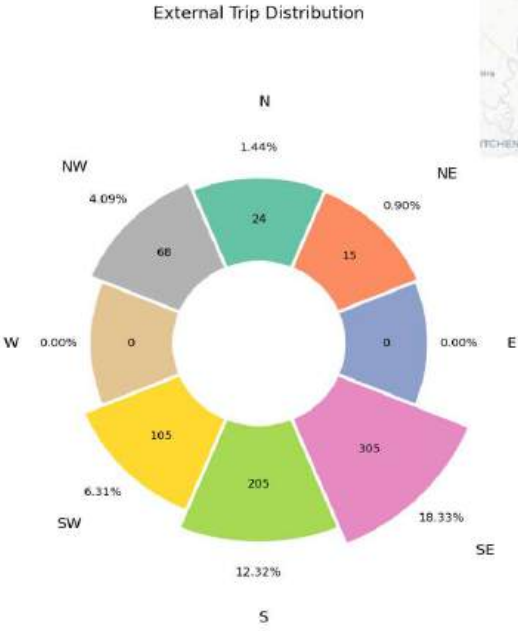
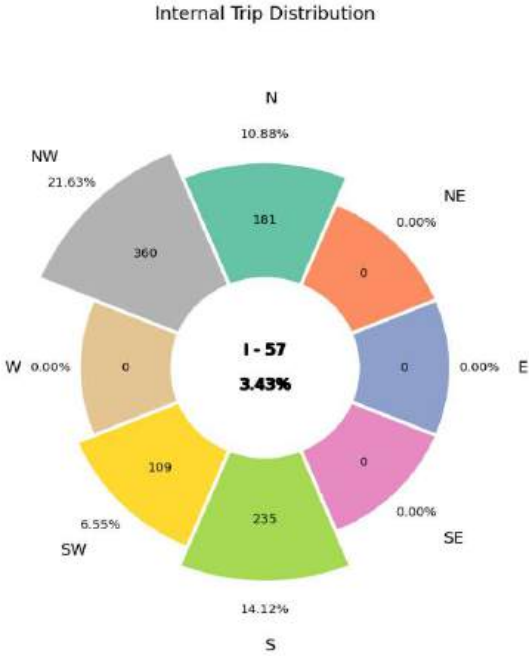
8372,0,25,0

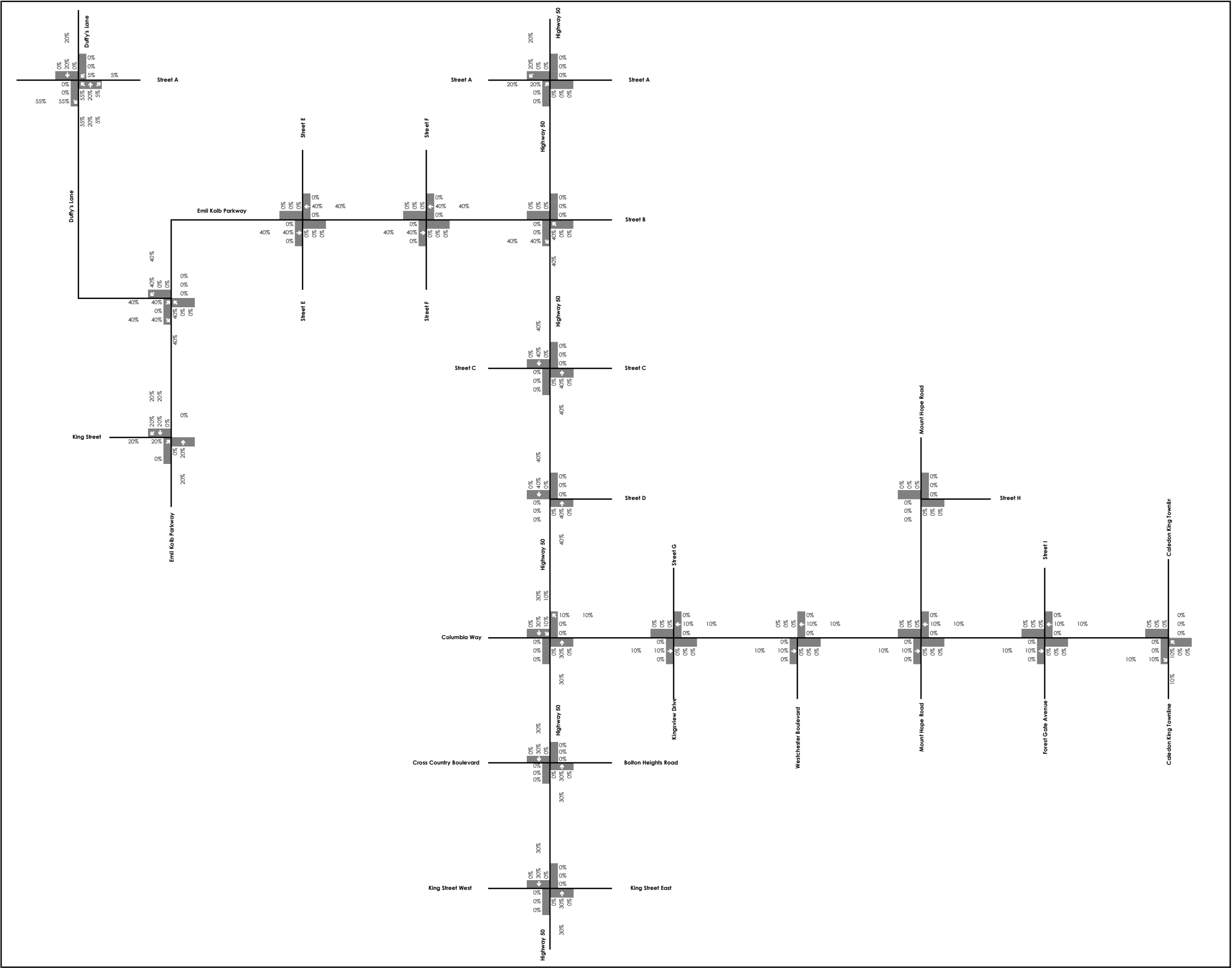
8403,0,43,0

8553,0,0,13

8562,0,15,0

8568,11,0,0





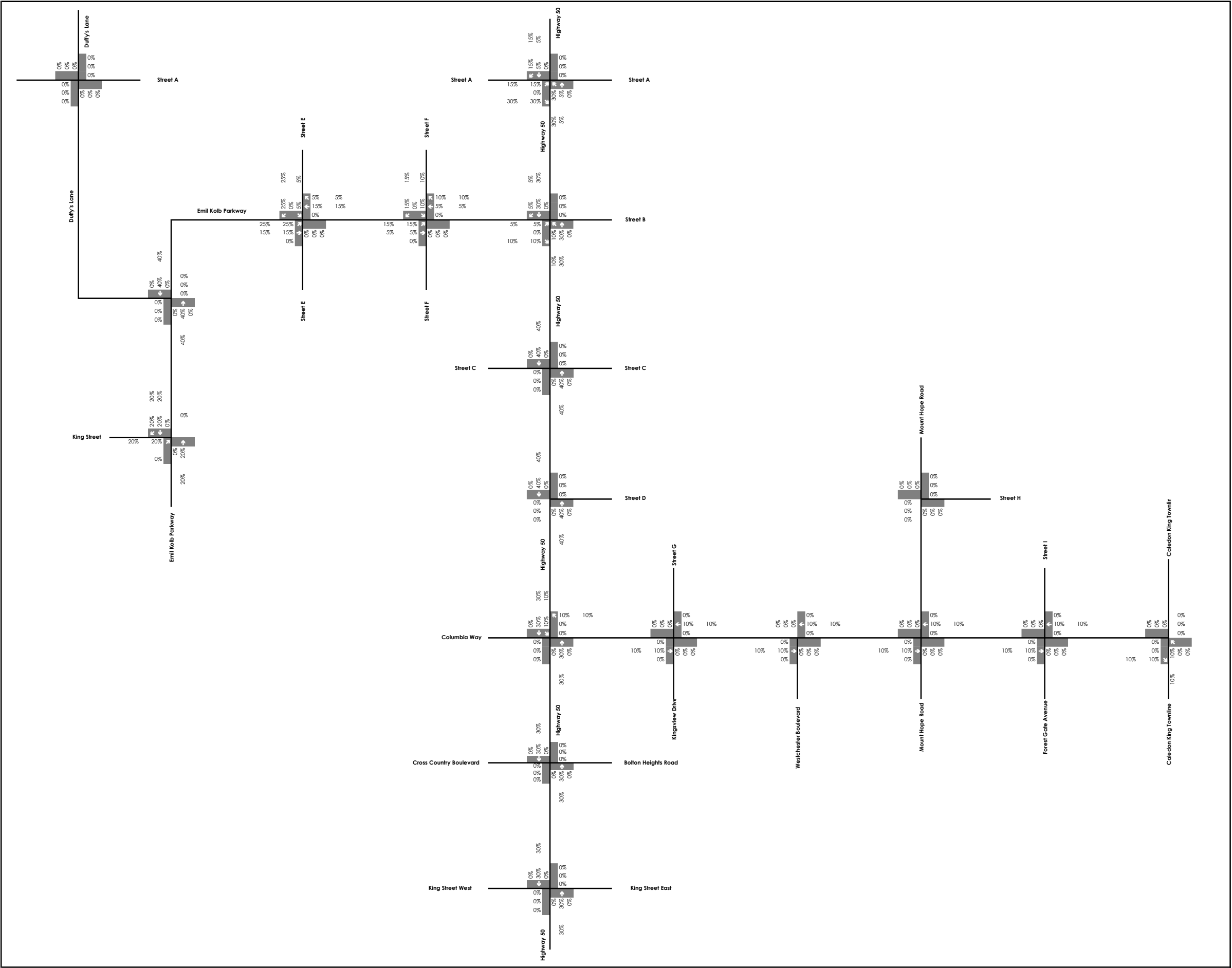
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone A Trip Distribution



Appendix K1
Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

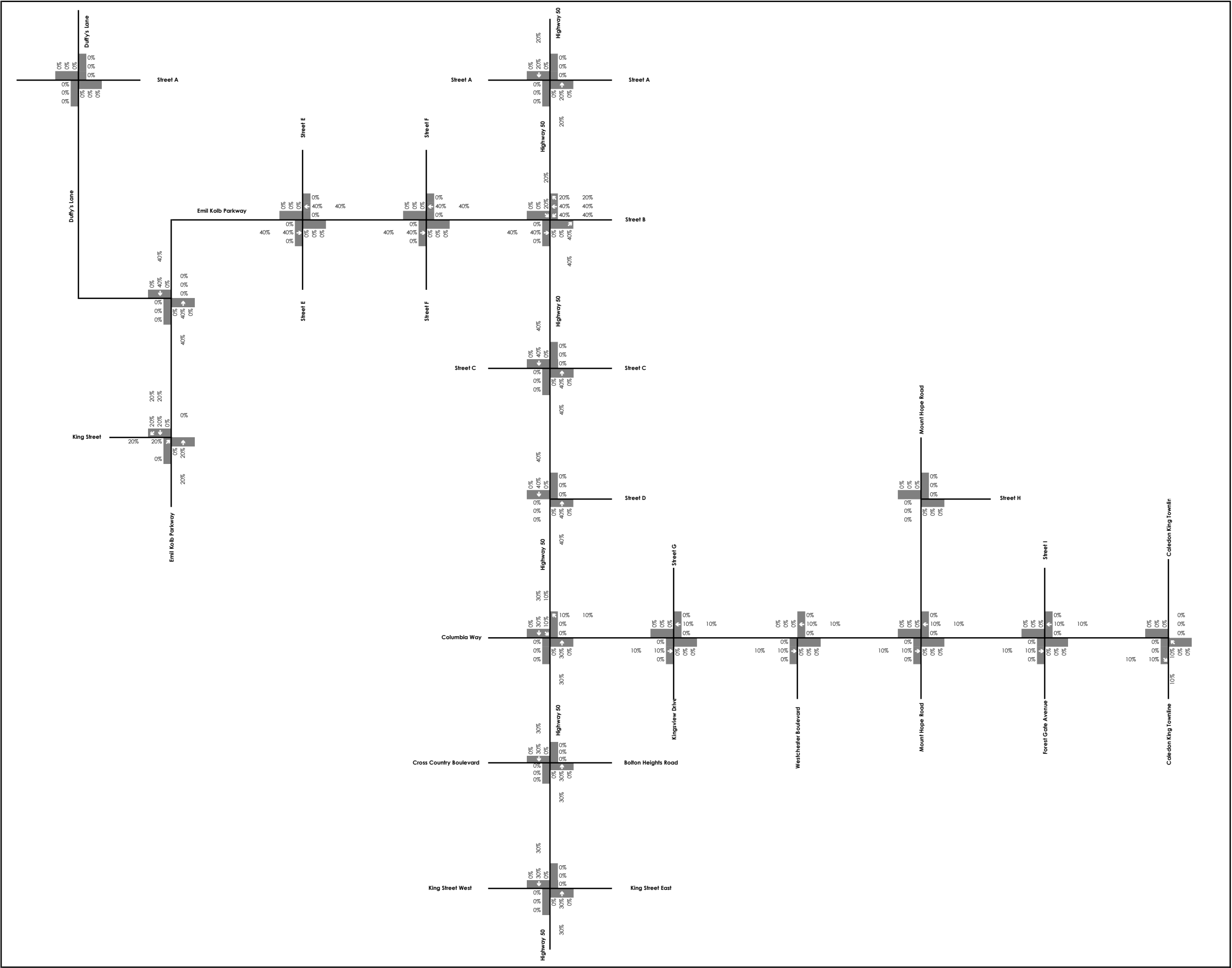
Bolton North Hill

Traffic Analysis Zone B Trip Distribution



Appendix K2

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

- xx A.M. Peak Hour Traffic Volumes
- [xx] P.M. Peak Hour Traffic Volumes

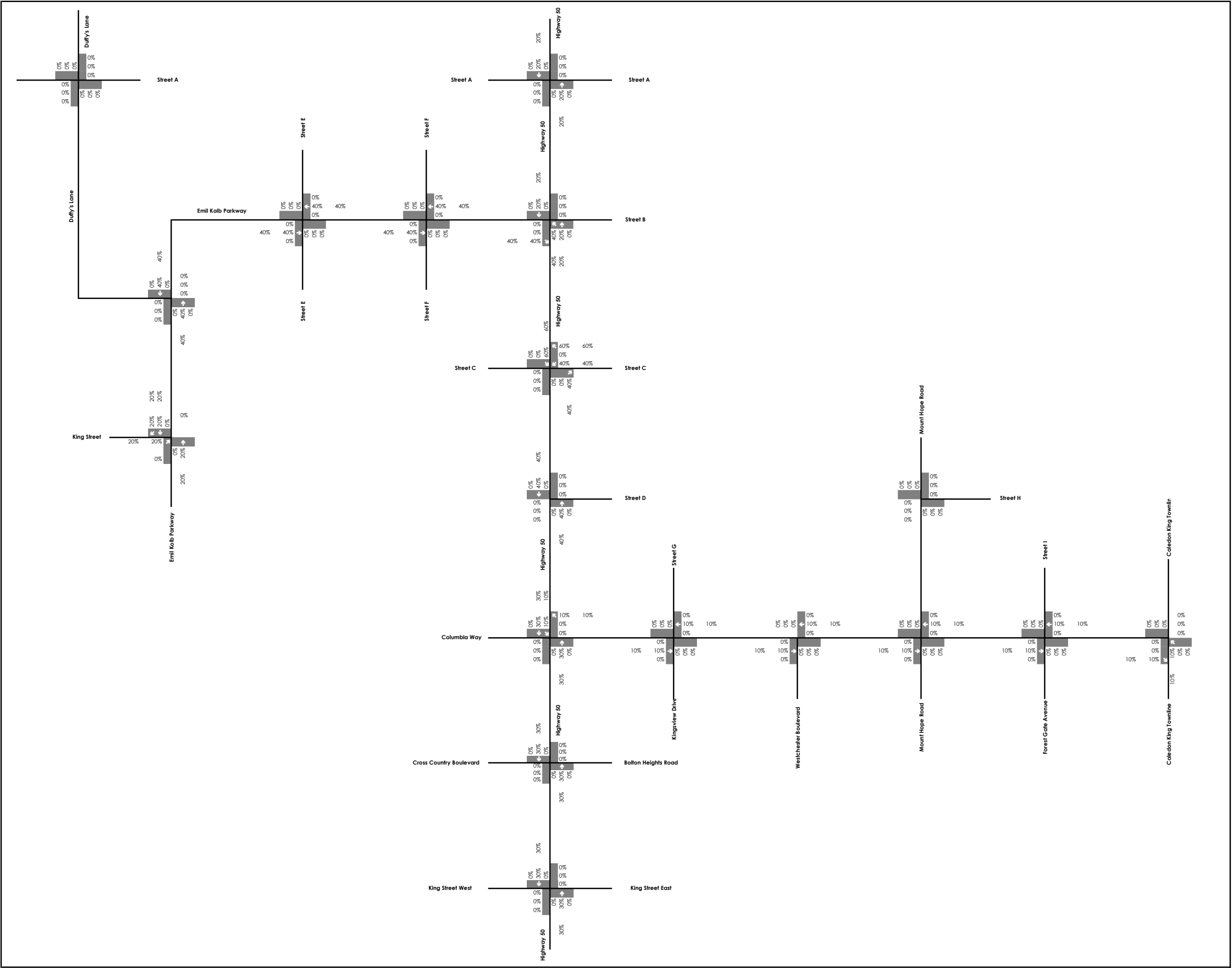
Bolton North Hill

Traffic Analysis Zone D Trip Distribution



Appendix K4

Project No. 708-3446
Date: June 2024
Analyst: AK



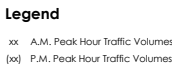
Legend
xx A.M. Peak Hour Traffic Volumes
xx P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone E Trip Distribution



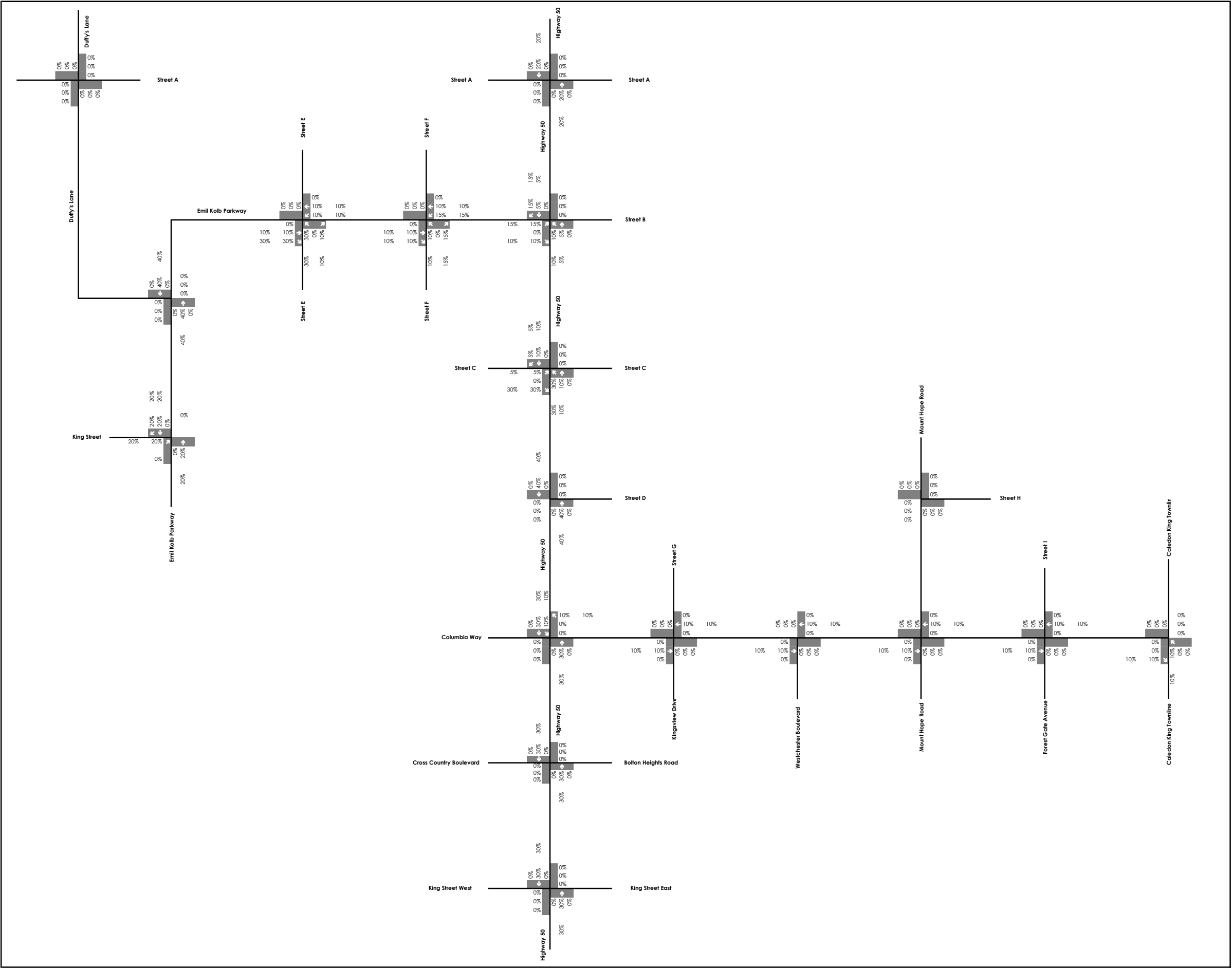
Appendix K5
Project No. 708-3446
Date: June 2024
Analyst: AK



Bolton North Hill



Project No. 708-3446
Date, June 2024
Analyst, AK



Legend

xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

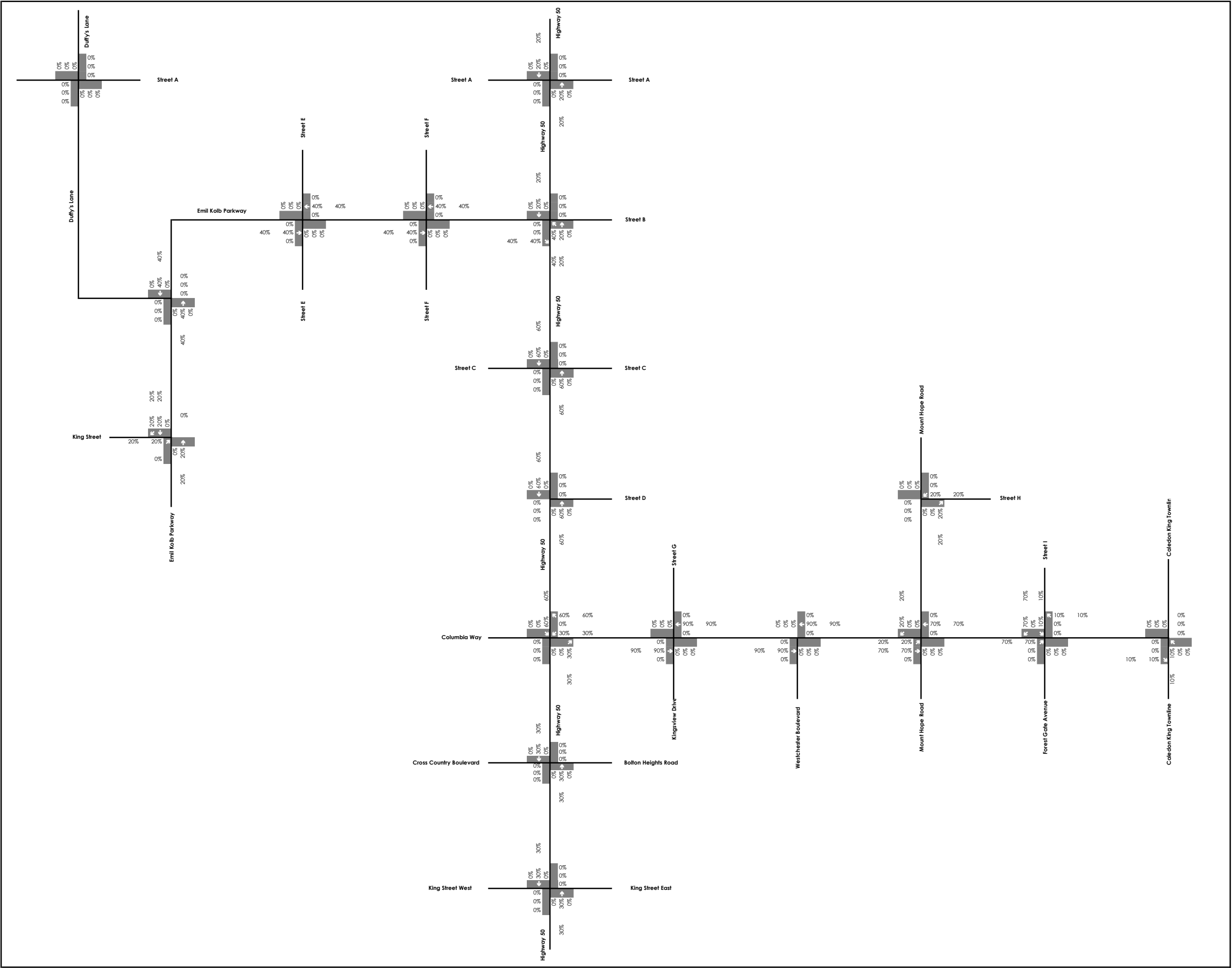
Bolton North Hill

Traffic Analysis Zone G Trip Distribution



Appendix K7

Project No. 708-3446
Date: June 2024
Analyst: AK



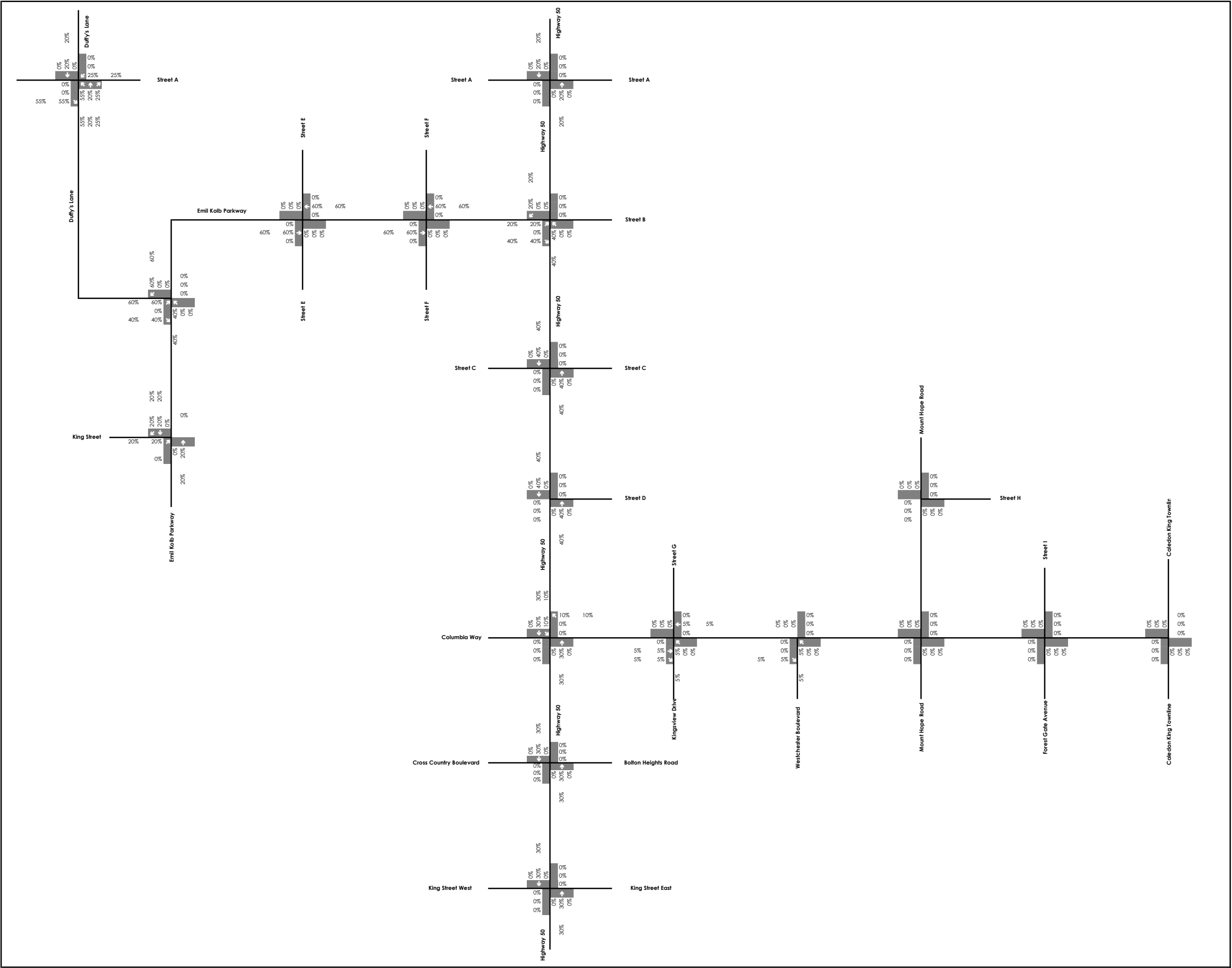
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone H Trip Distribution



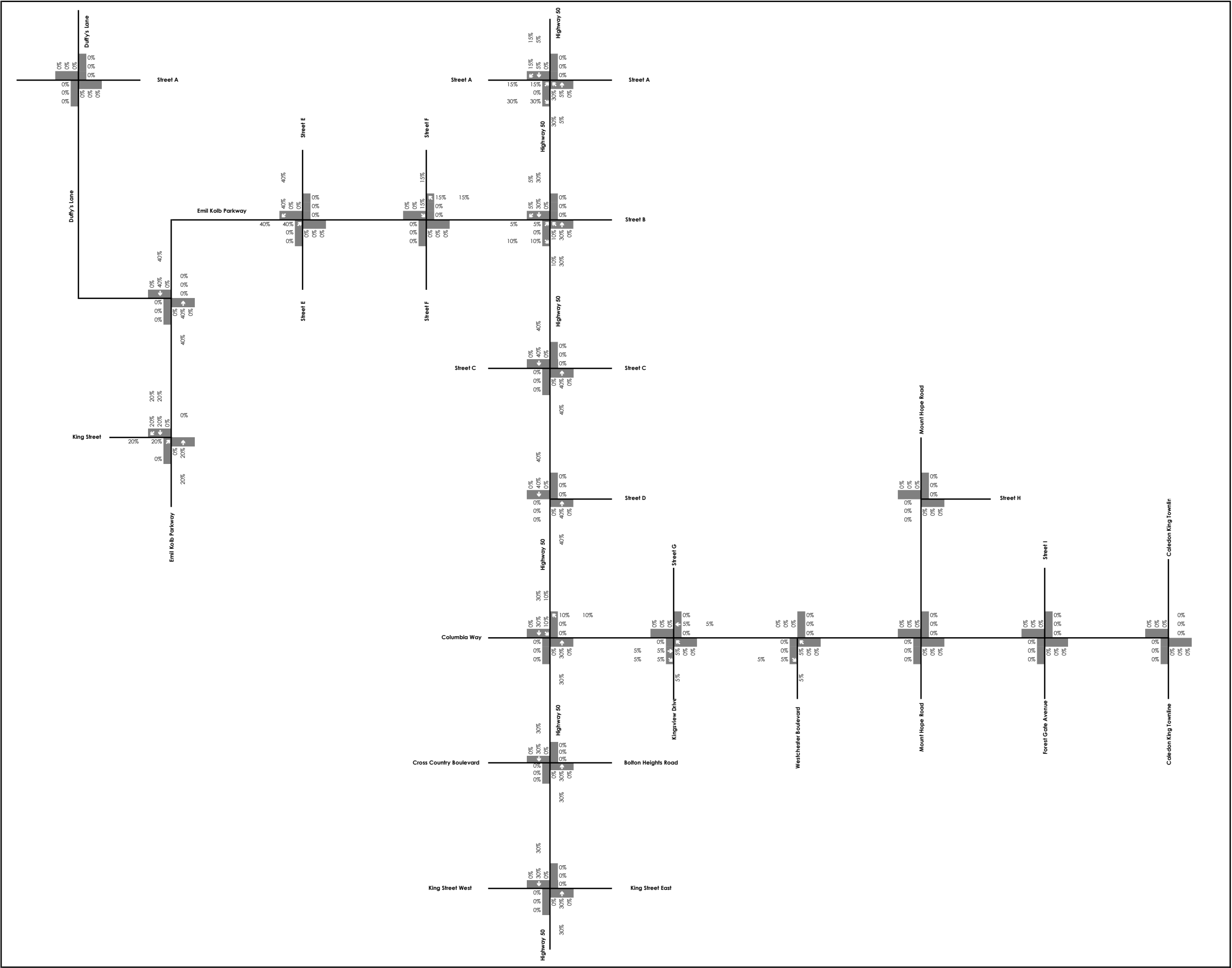
Appendix K8
Project No. 708-3446
Date: June 2024
Analyst: AK



Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone A Commercial Trip Distribution



Legend

- xx A.M. Peak Hour Traffic Volumes
- [xx] P.M. Peak Hour Traffic Volumes

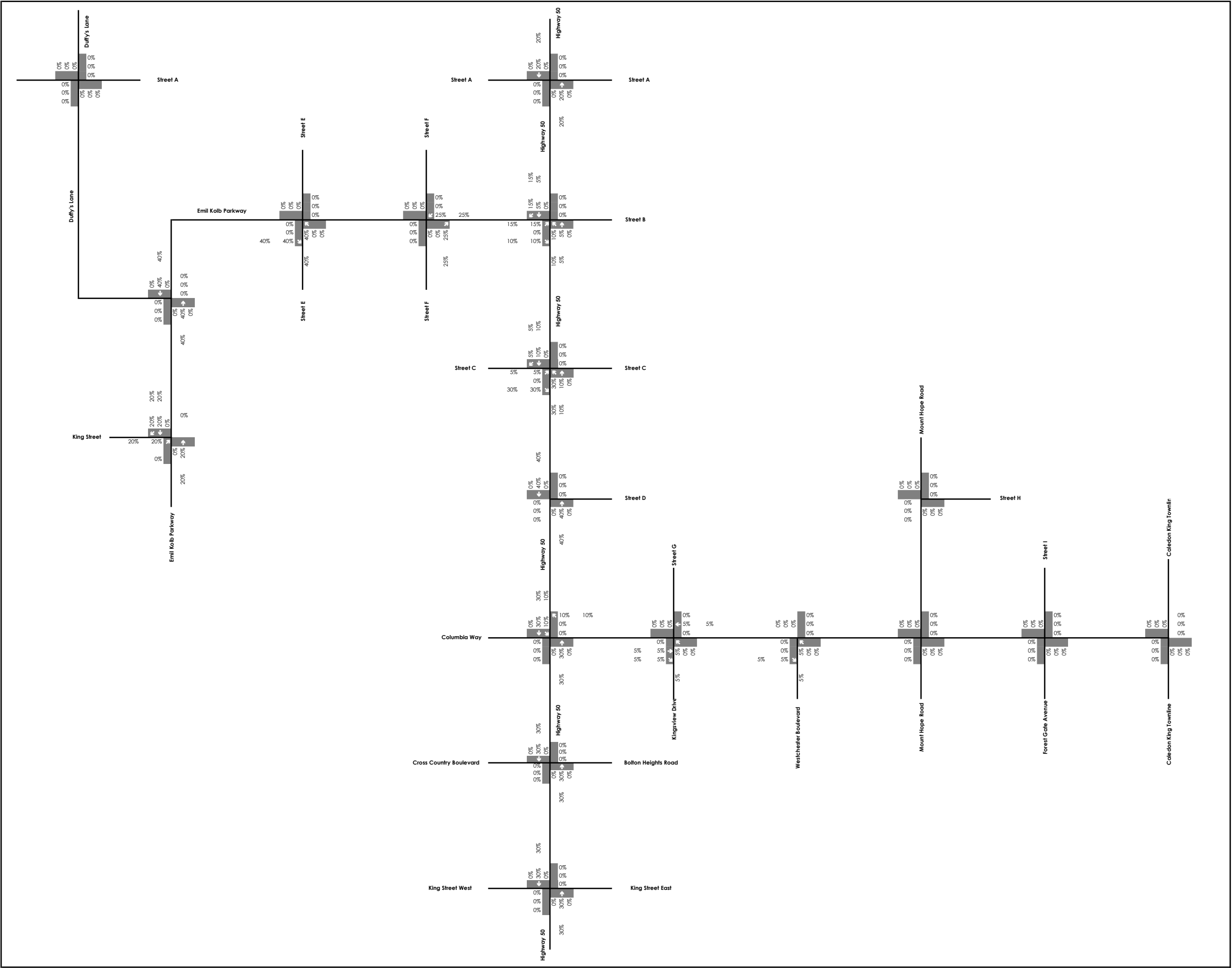
Bolton North Hill

Traffic Analysis Zone B Commercial Trip Distribution



Appendix K10

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

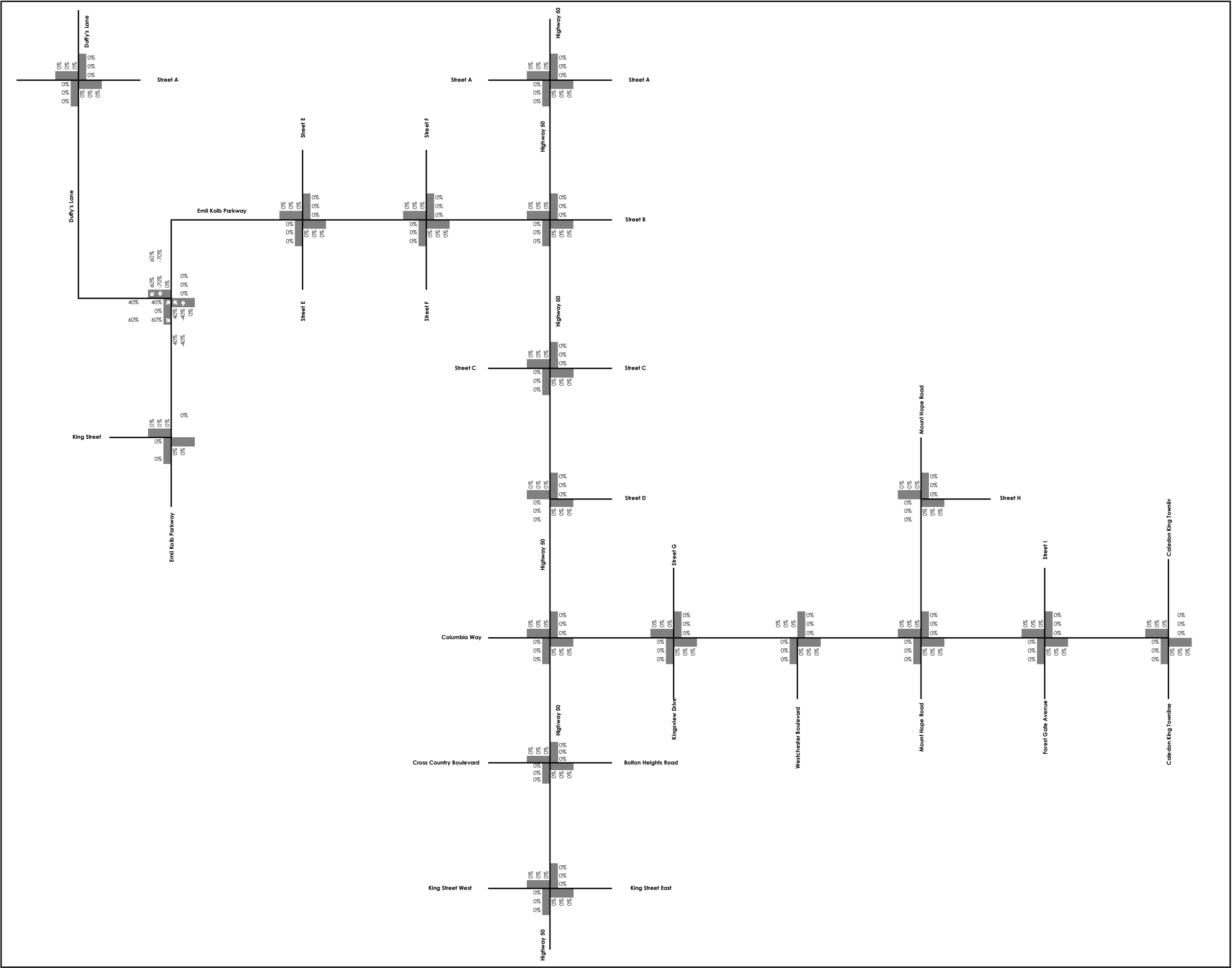
Bolton North Hill

Traffic Analysis Zone G Commercial Trip Distribution

**CROZIER**
CONSULTING ENGINEERS

Appendix K11

Project No. 708-3446
Date: June 2024
Analyst: AK



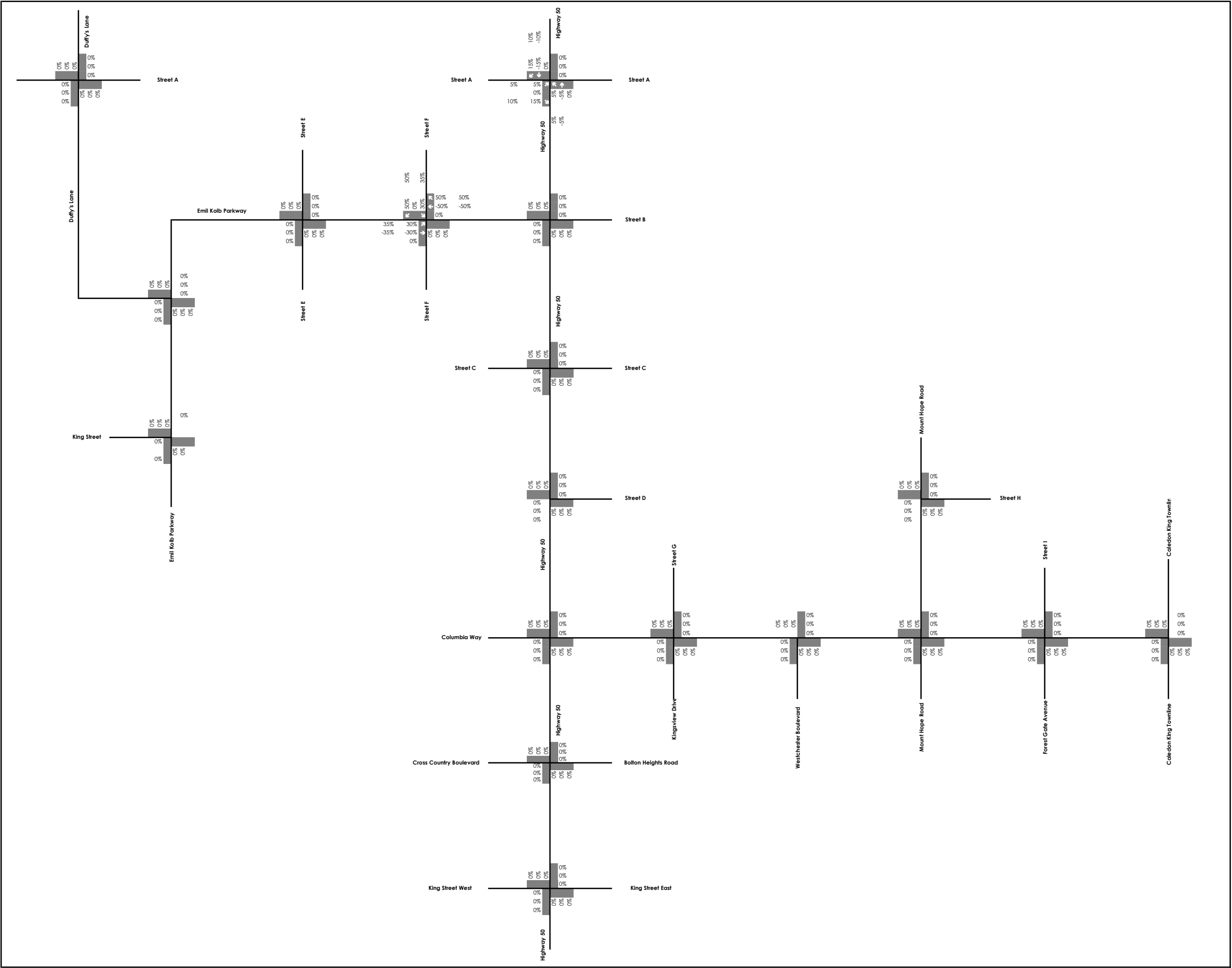
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone B Trip Distribution



Appendix K12
Project No. 708-3446
Date: June 2024
Analyst: AK



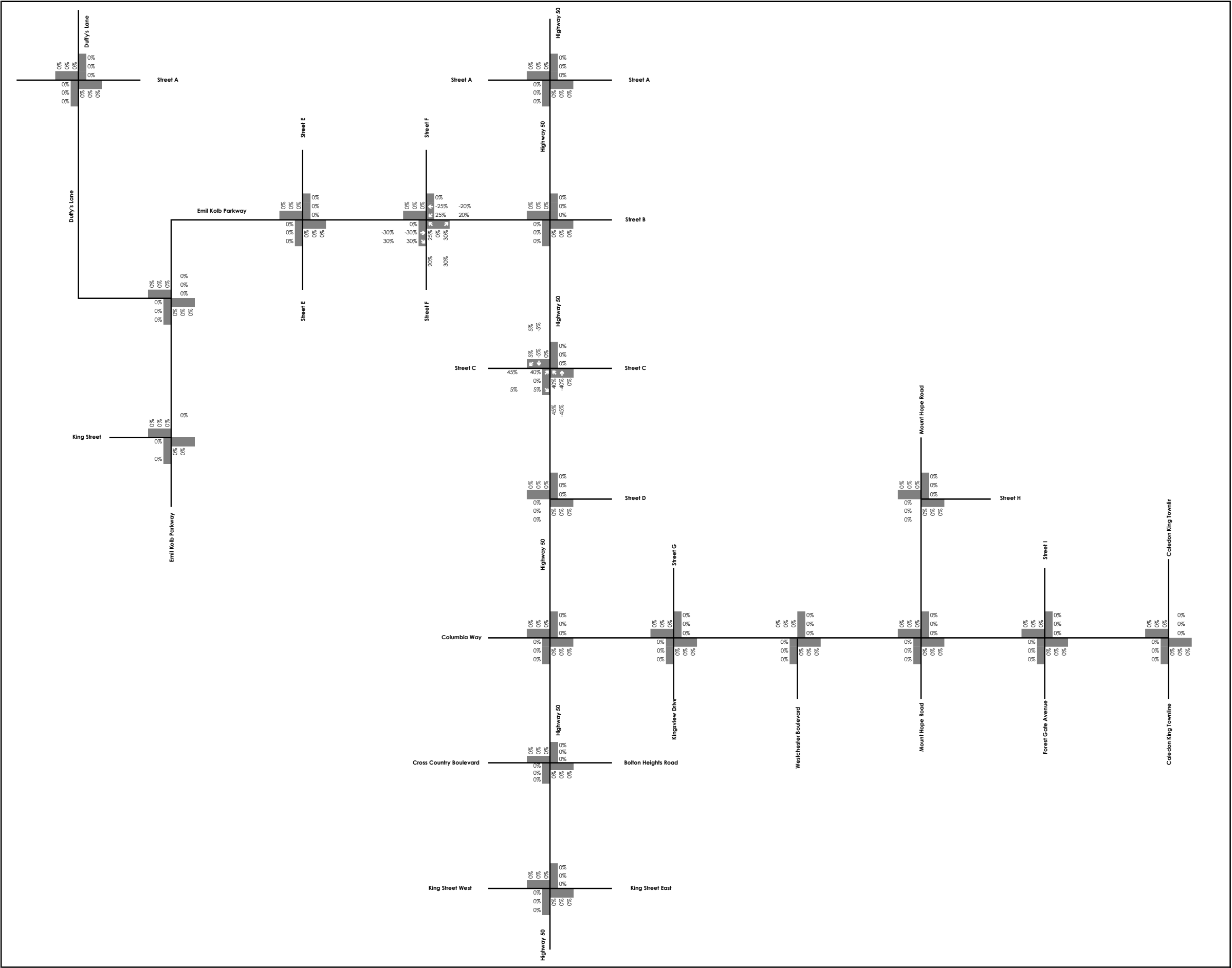
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone B Pass-By Trip Distribution



Appendix K13
Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

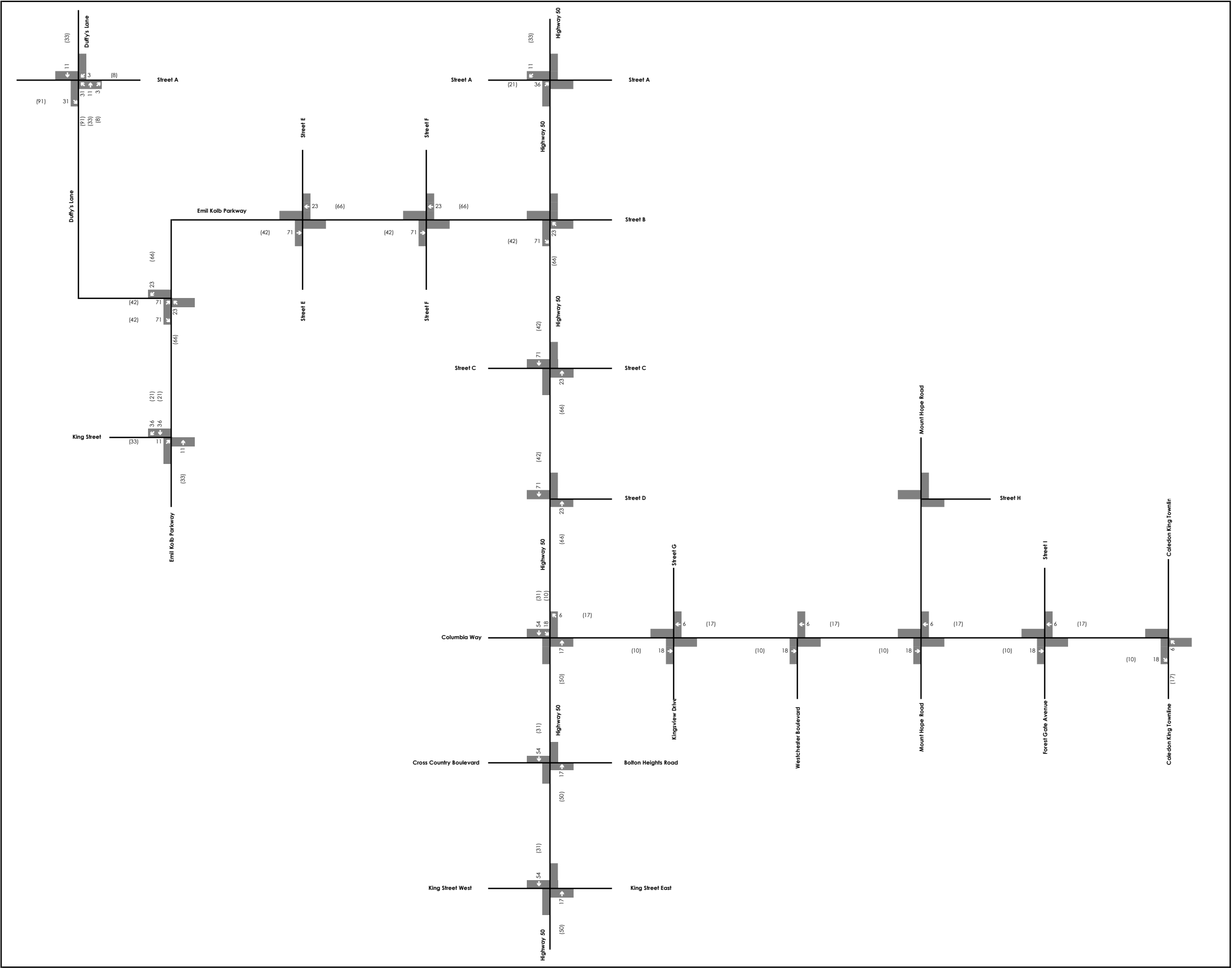
Bolton North Hill

Traffic Analysis Zone G Pass-By Trip Distribution



Appendix K15

Project No. 708-3446
Date: June 2024
Analyst: AK



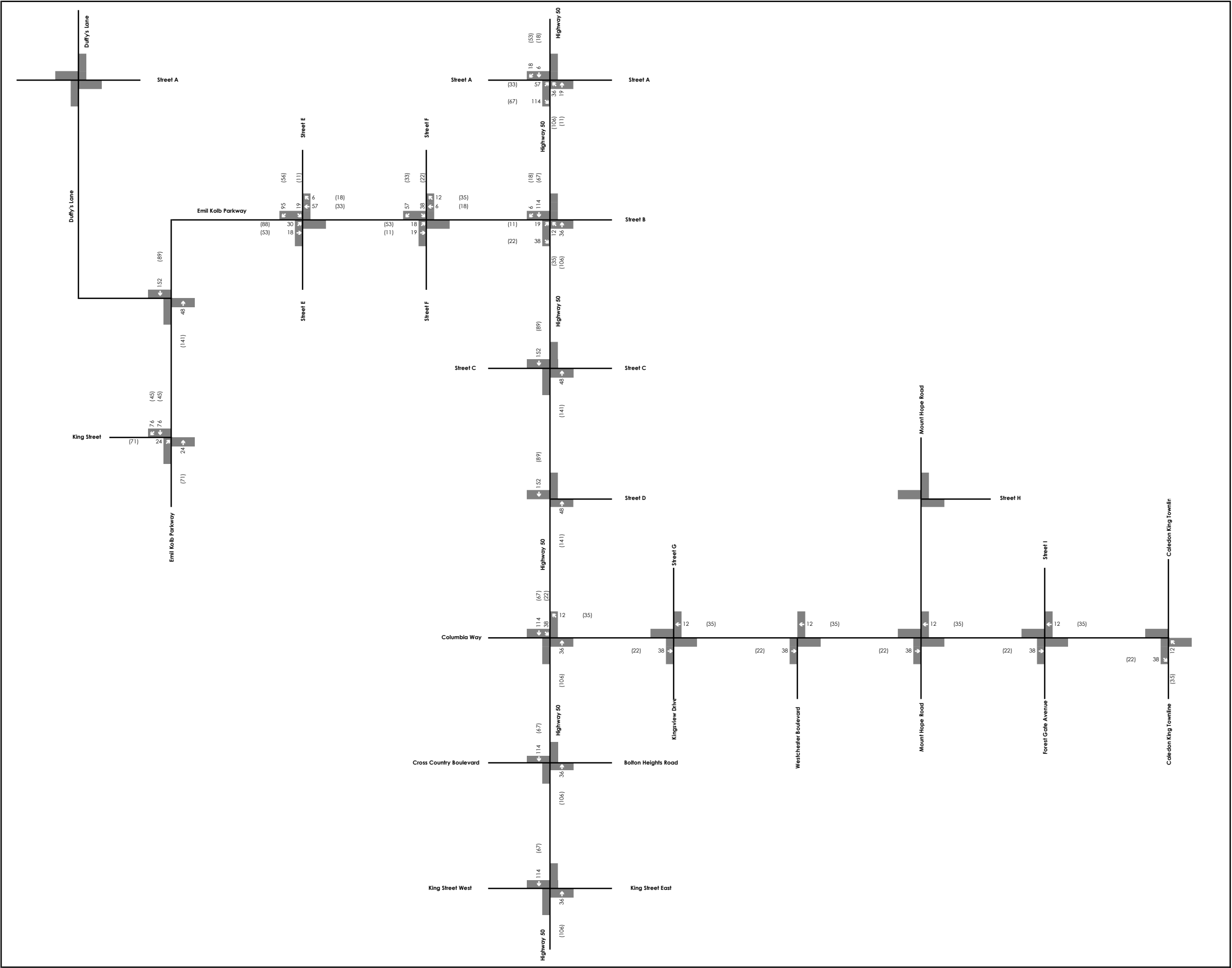
Legend
xx A.M. Peak Hour Traffic Volumes
(xx) P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone A Trip Assignment



Appendix K16
Project No. 708-3446
Date: June 2024
Analyst: AK



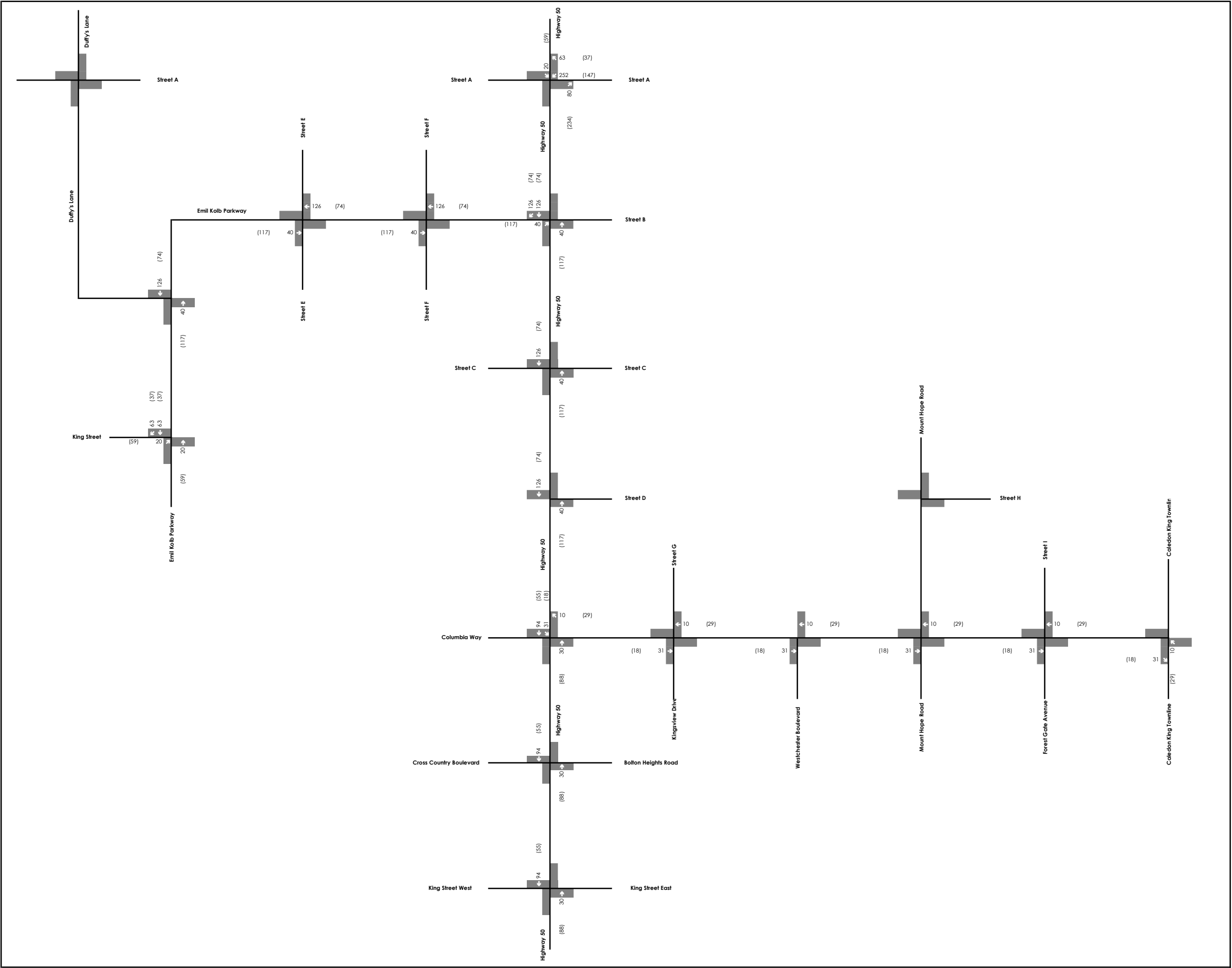
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone B Trip Assignment



Appendix K17
Project No. 708-3446
Date: June 2024
Analyst: AK



Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

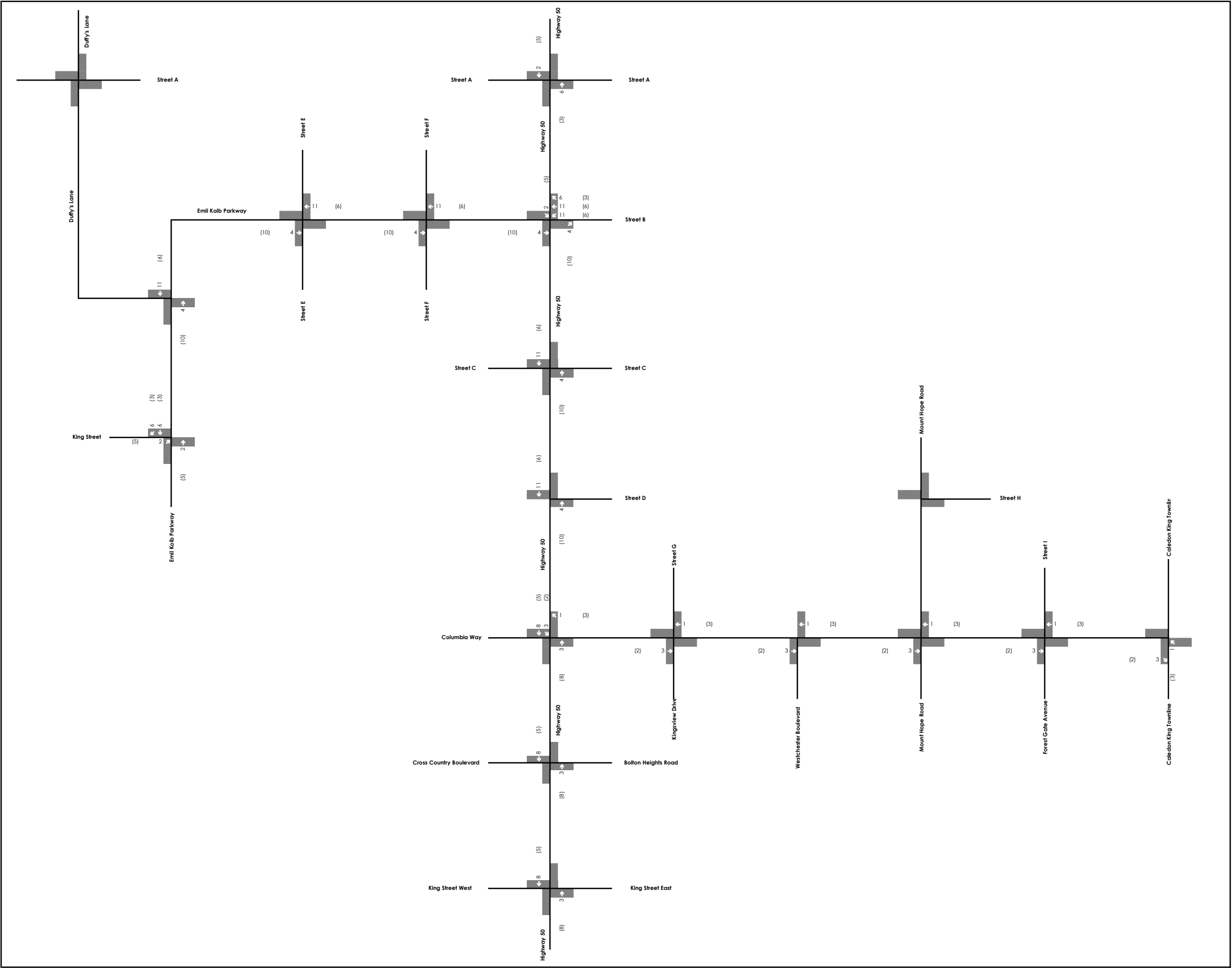
Traffic Analysis Zone C Trip Assignment



CROZIER
CONSULTING ENGINEERS

Appendix K18

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

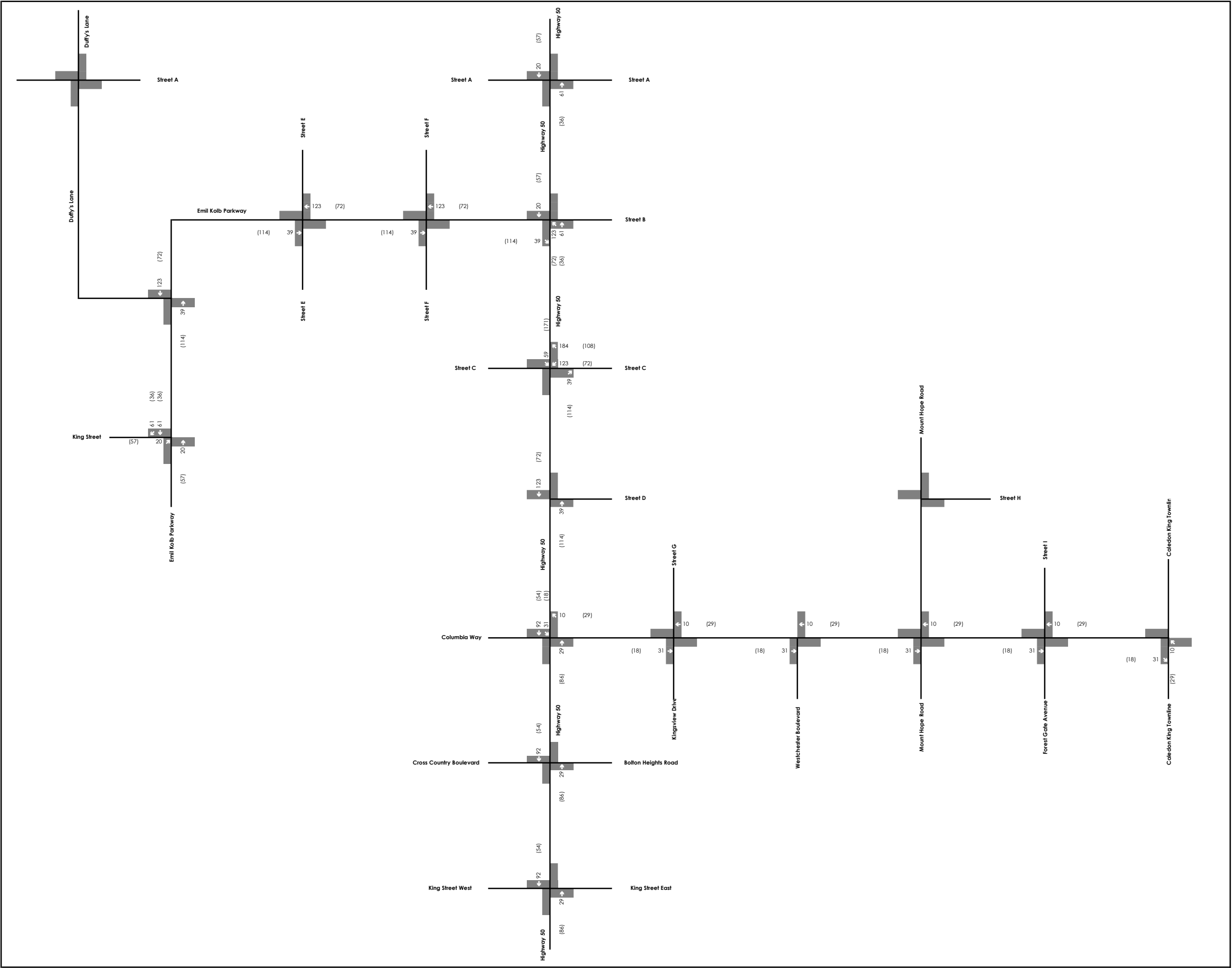
Traffic Analysis Zone D Trip Assignment



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Appendix K19

Project No. 708-3446
Date: June 2024
Analyst: AK



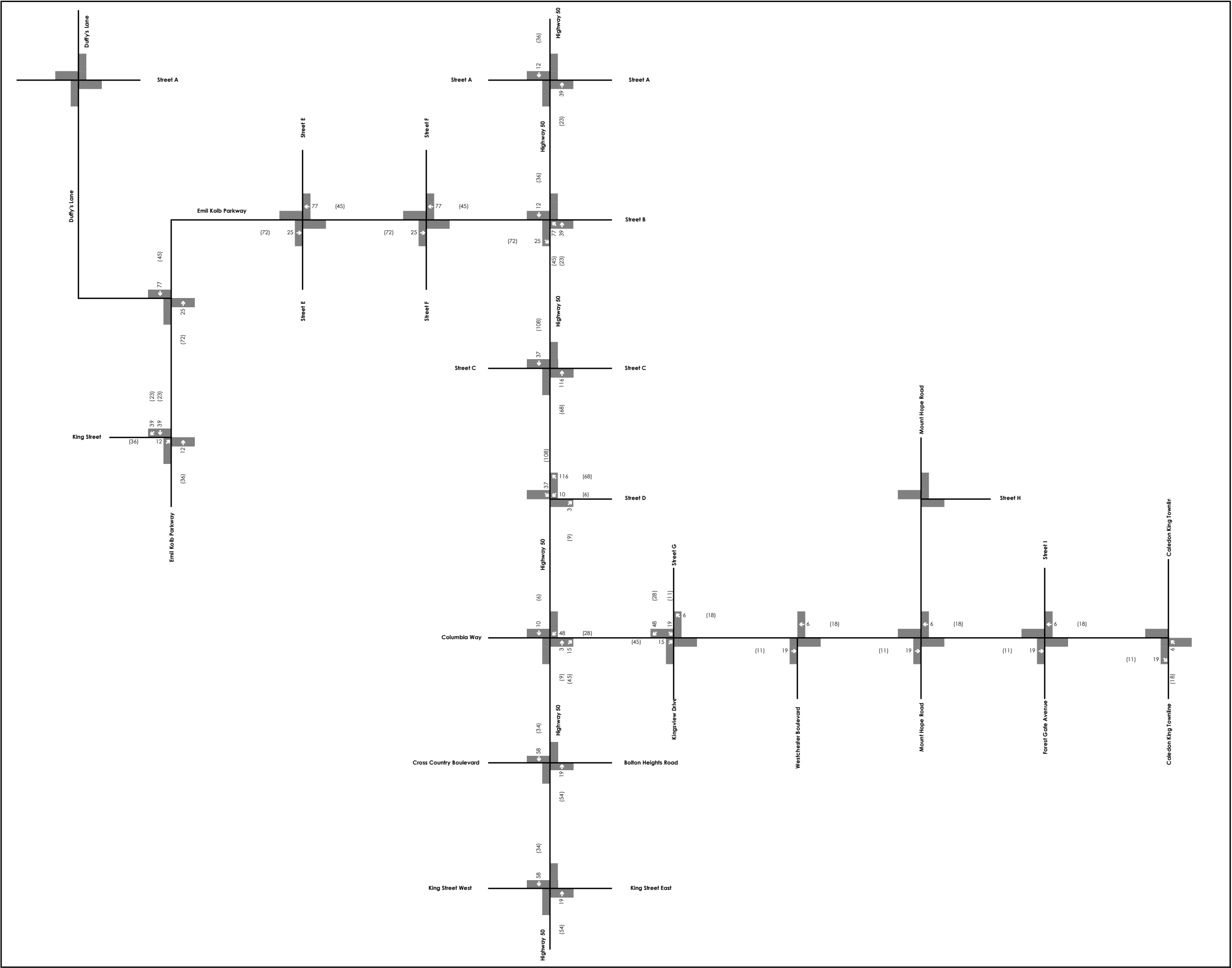
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone E Trip Assignment



Appendix K20
Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

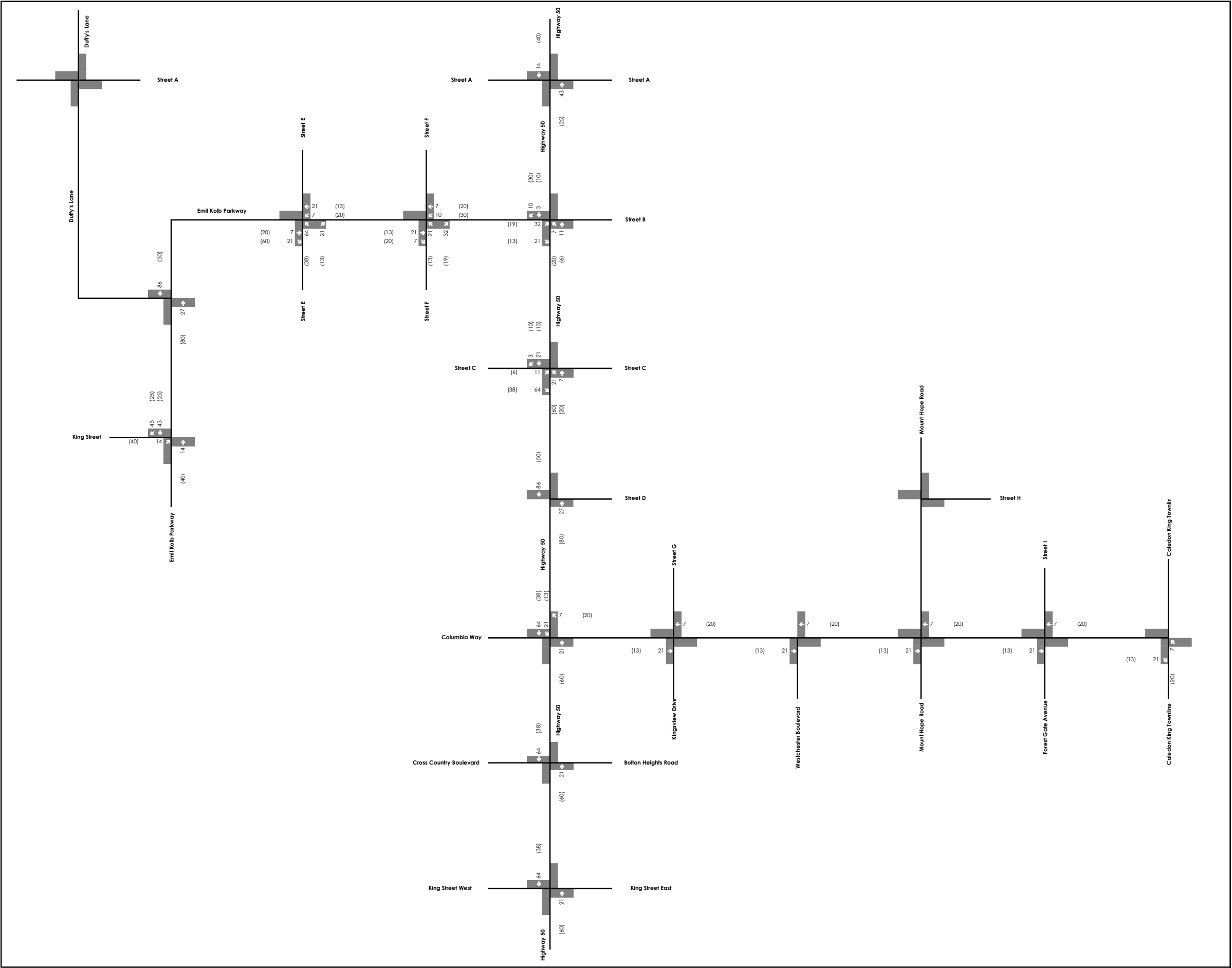
Bolton North Hill

Traffic Analysis Zone F Trip Assignment



Appendix K21

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

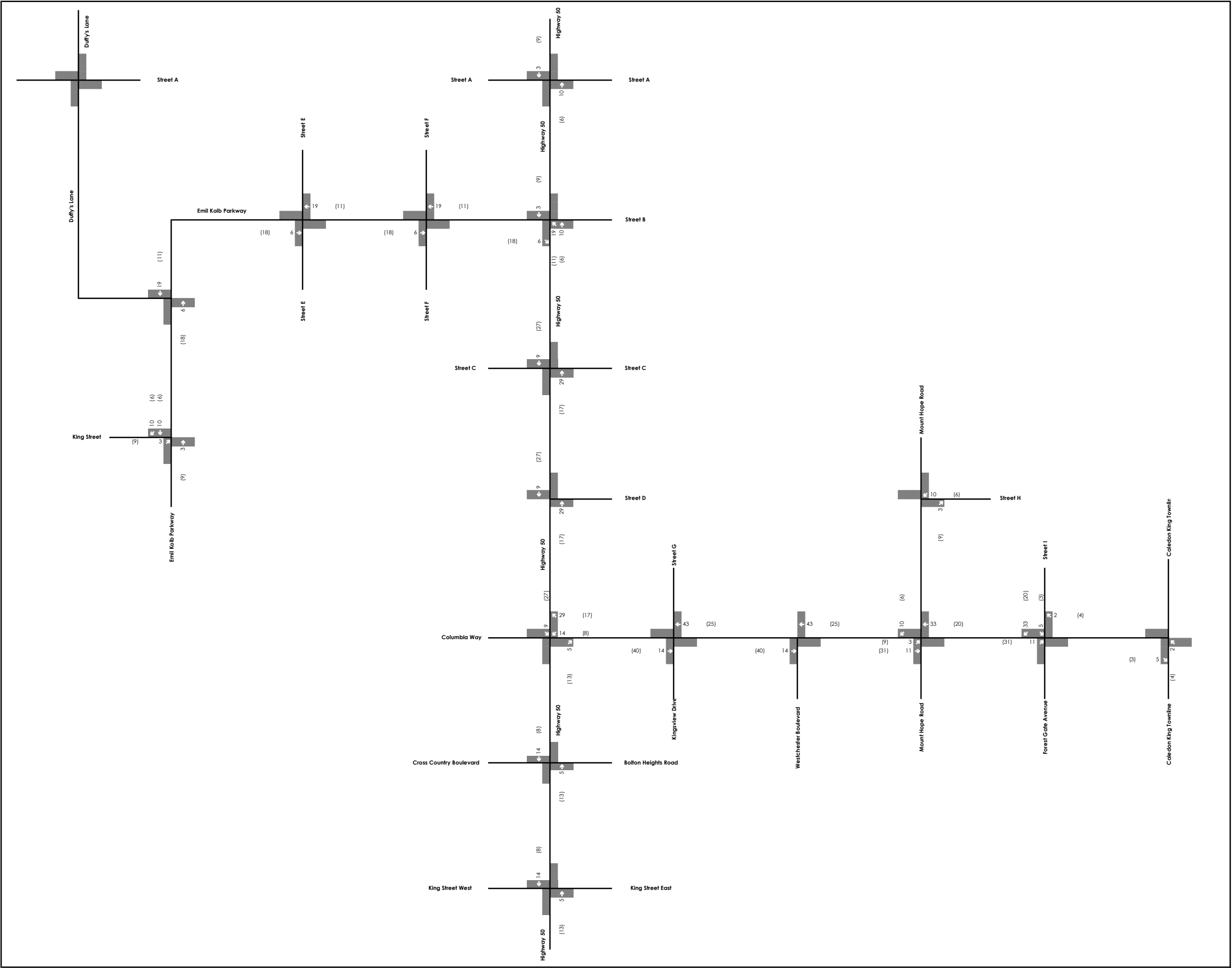
Traffic Analysis Zone G Trip Assignment



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Appendix K22

Project No. 708-3446
Date: June 2024
Analyst: AK



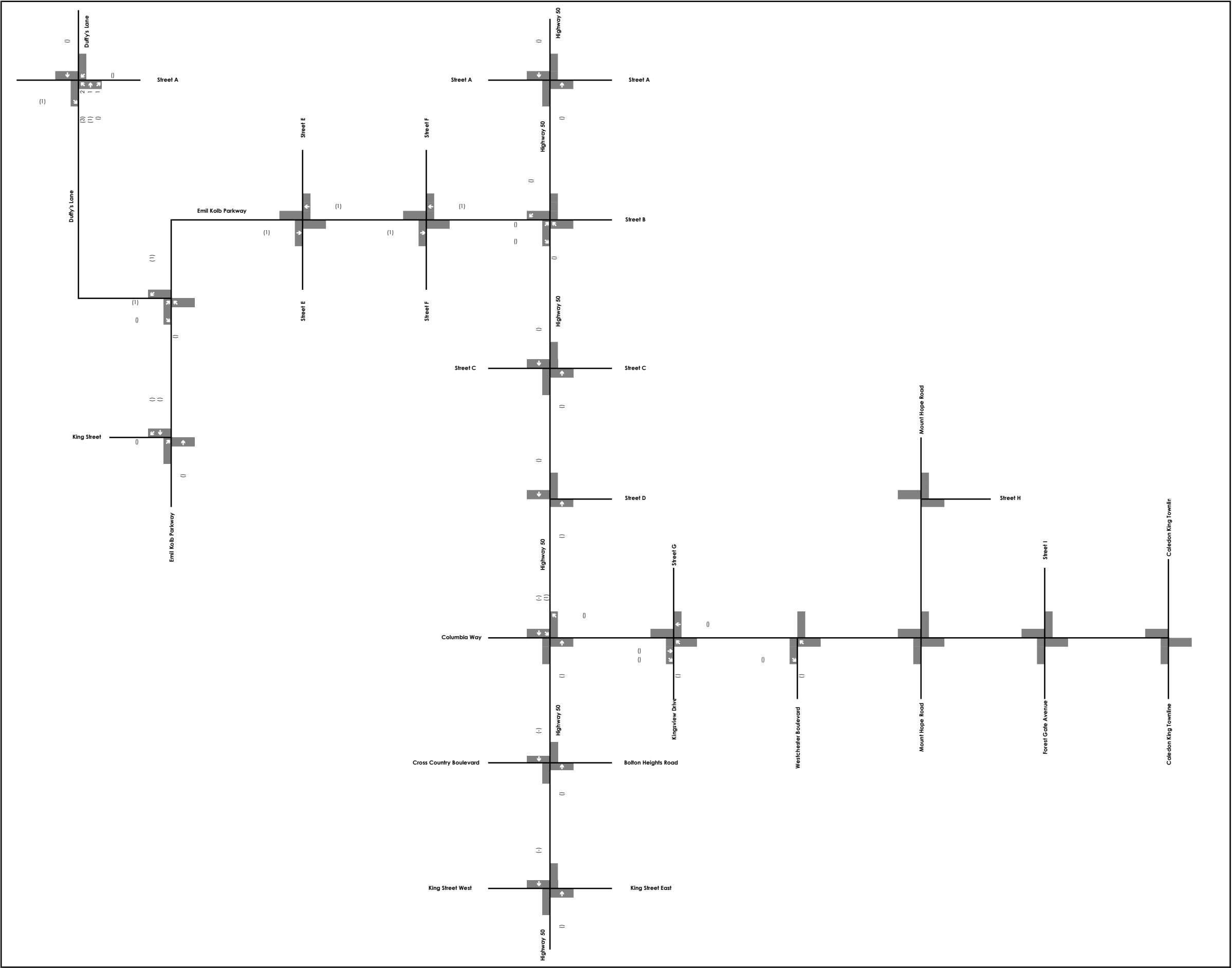
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone H Trip Assignment



Appendix K23
Project No. 708-3446
Date: June 2024
Analyst: AK



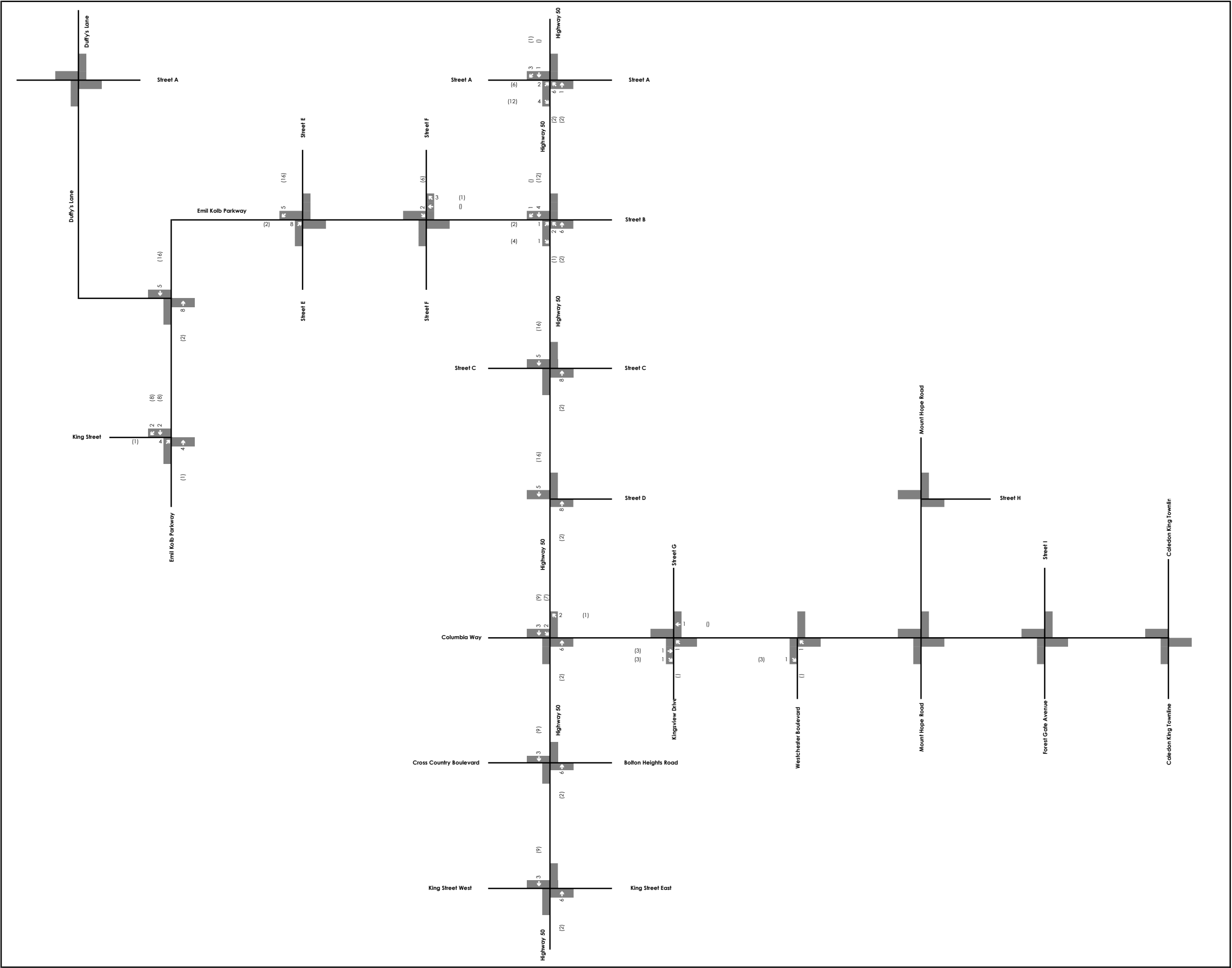
Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone A Commercial Trip Assignment

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Appendix K24
Project No. 708-3446
Date: June 2024
Analyst: AK




Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

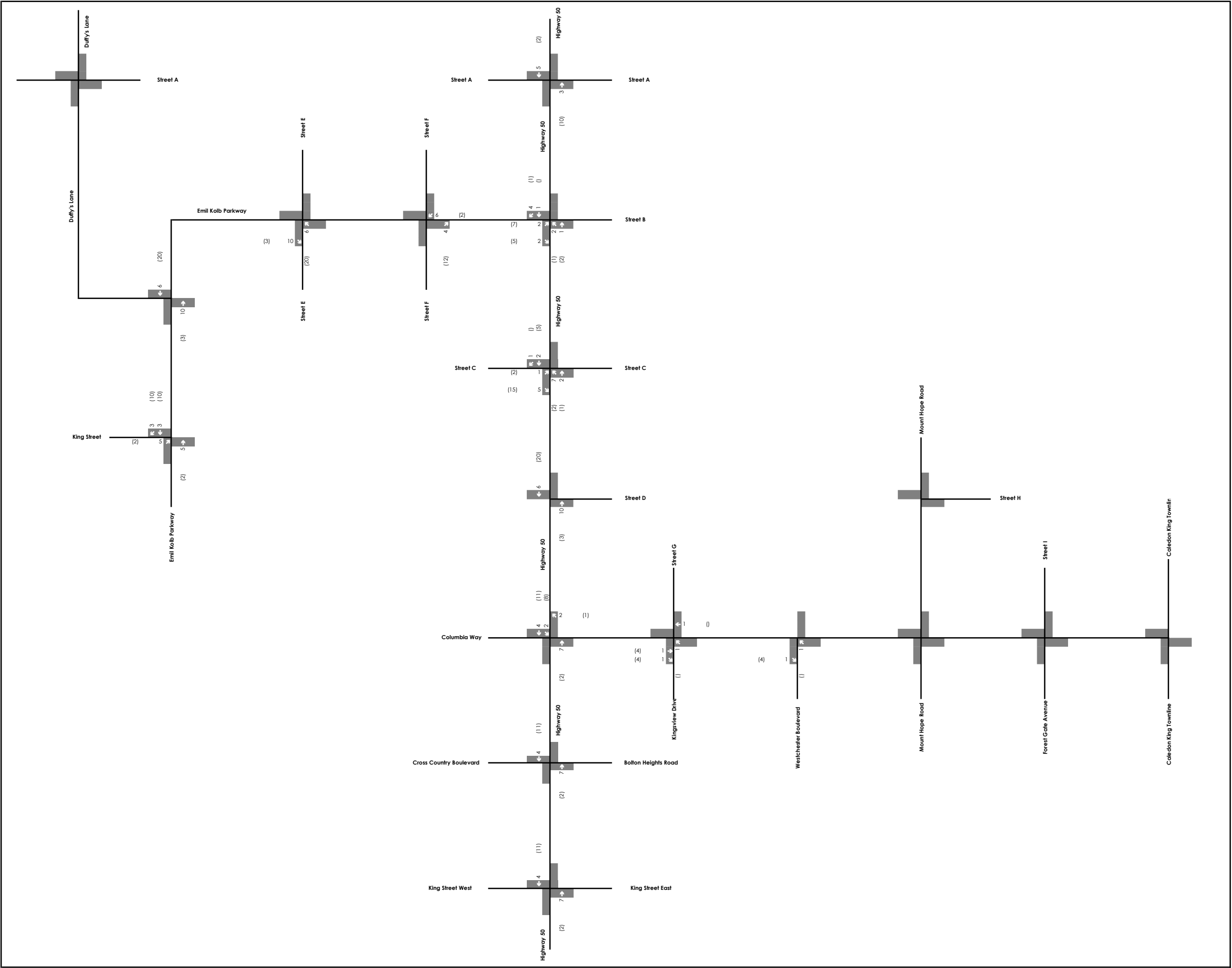
Traffic Analysis Zone B Commercial Trip Assignment



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Appendix K25

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

xx A.M. Peak Hour Traffic Volumes

xx P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone G Commercial Trip Assignment

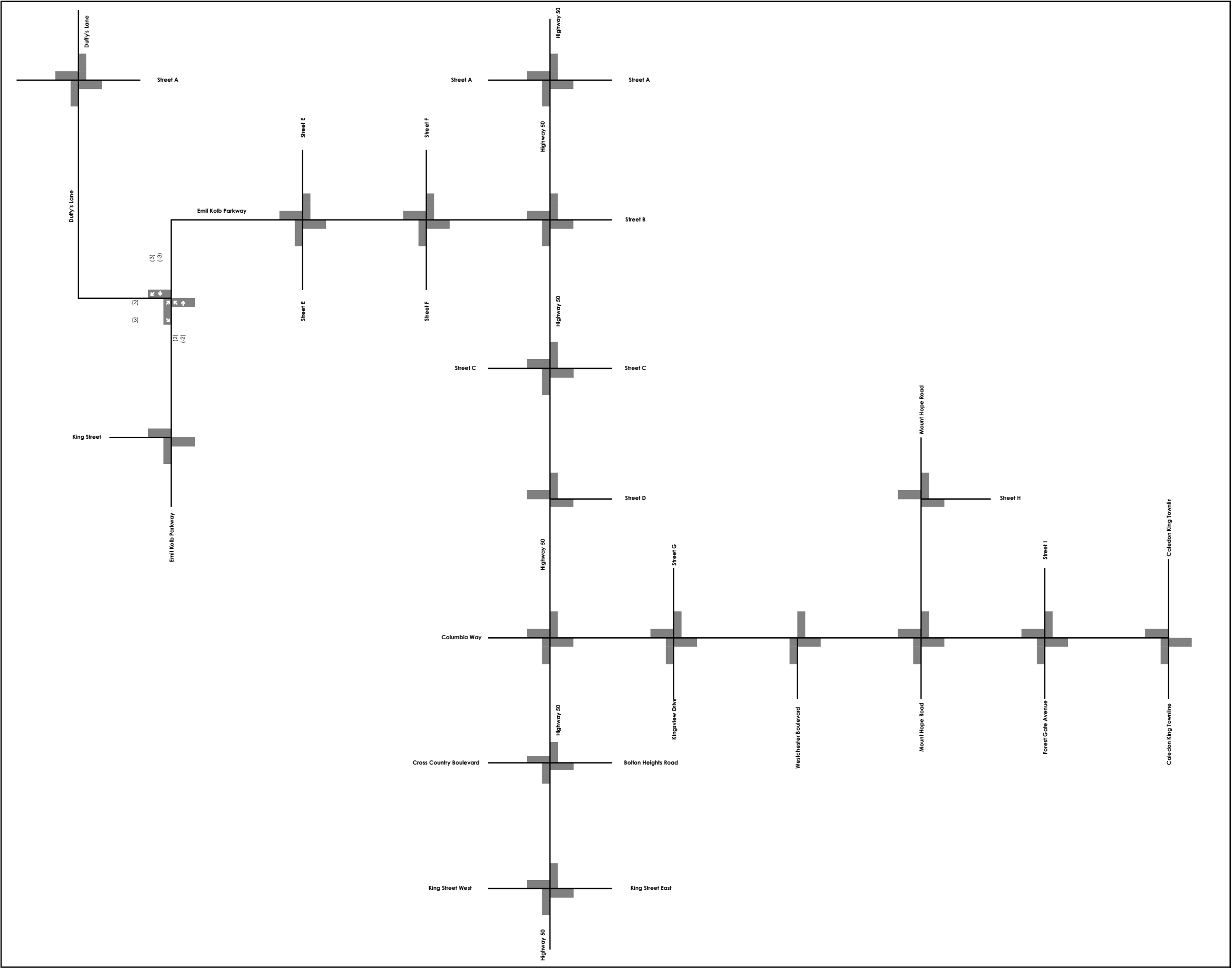


Appendix K26

Project No. 708-3446

Date: June 2024

Analyst: AK



Legend
xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

Bolton North Hill

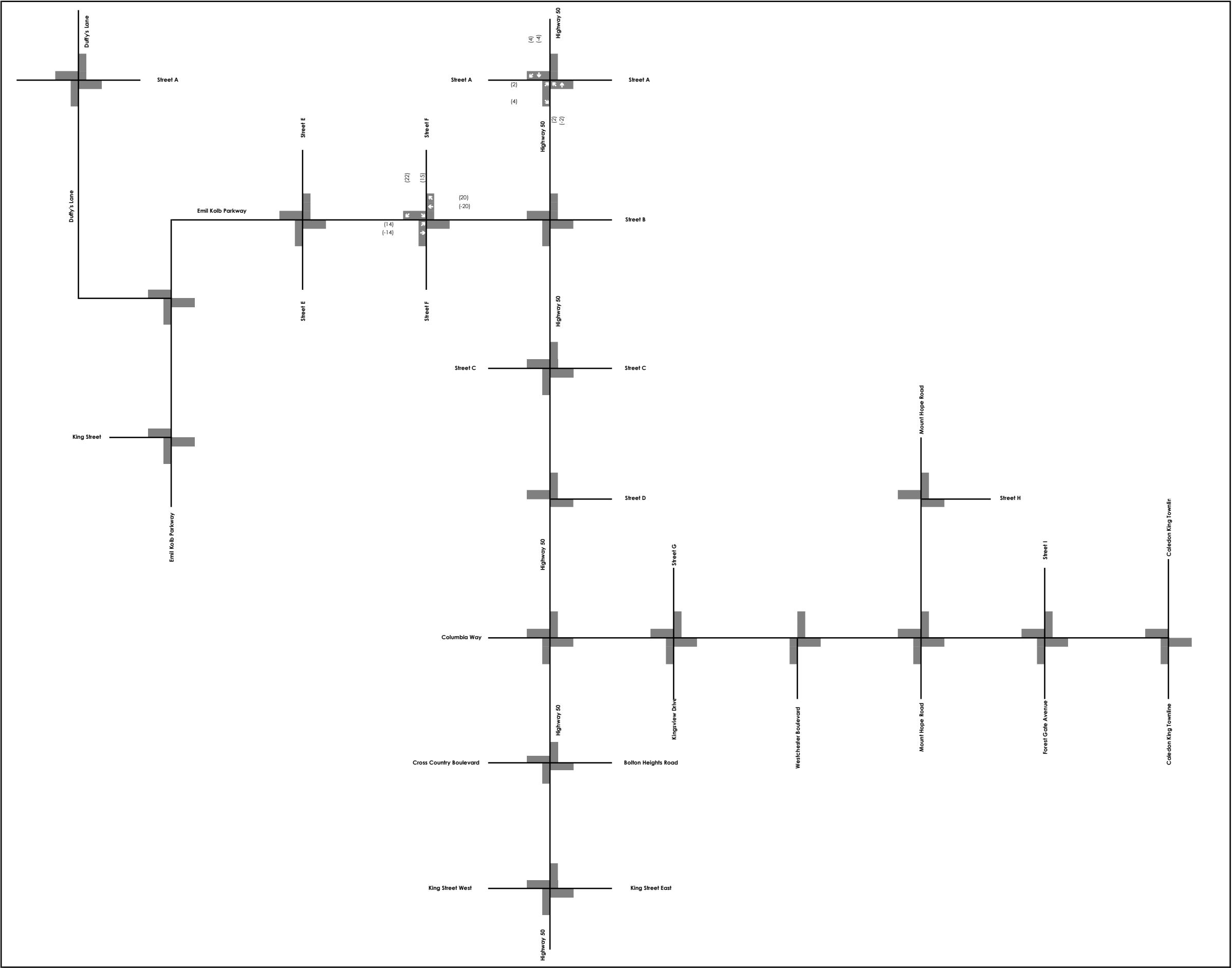
Traffic Analysis Zone B Trip Assignment



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Appendix K27

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

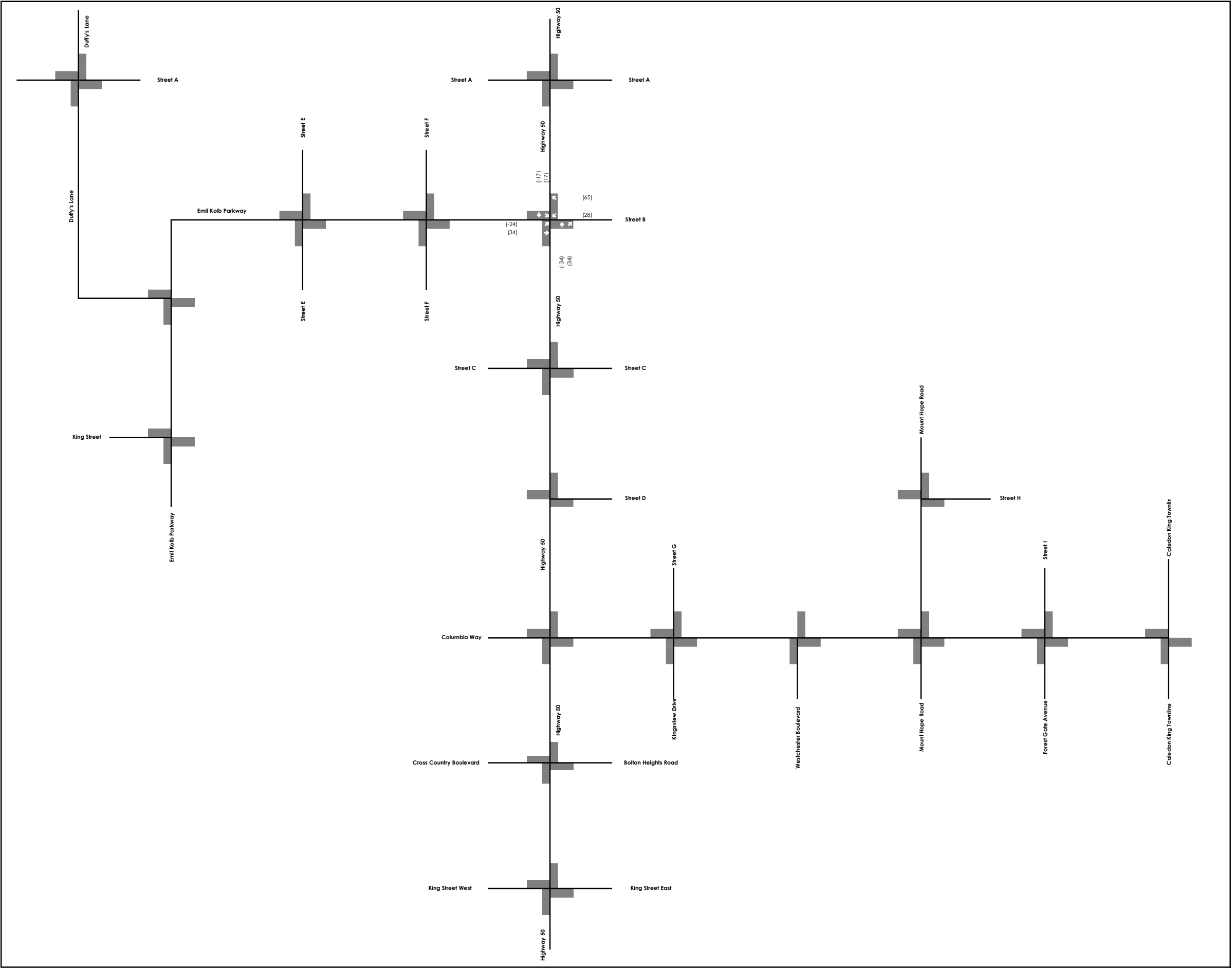
Bolton North Hill

Traffic Analysis Zone B Pass-By Trip Assignment



Appendix K28

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

xx A.M. Peak Hour Traffic Volumes
[xx] P.M. Peak Hour Traffic Volumes

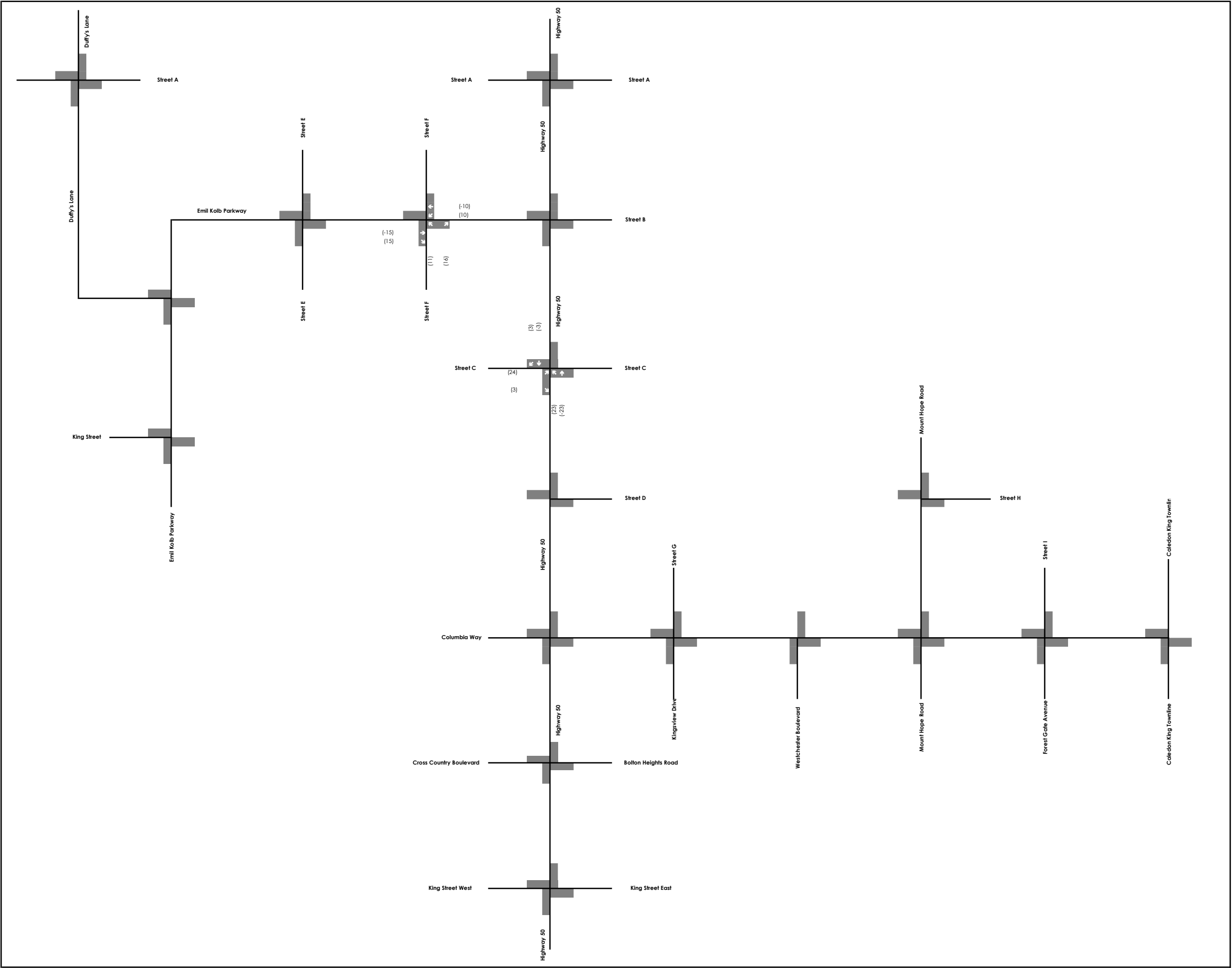
Bolton North Hill

Traffic Analysis Zone D Pass-By Trip Assignment



Appendix K29

Project No. 708-3446
Date: June 2024
Analyst: AK



Legend

xx A.M. Peak Hour Traffic Volumes
[x] P.M. Peak Hour Traffic Volumes

Bolton North Hill

Traffic Analysis Zone G Pass-By Trip Assignment



Appendix K30

Project No. 708-3446
Date: June 2024
Analyst: AK

APPENDIX L

Signal Warrant Analysis Worksheets



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TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Duffy's Lane	Direction	North/South
Minor Street	Street A	Direction	East/West

Intersection Details for Warrant Parameters

Flow Conditions	Restricted Flow (Urban)	Number of Lanes	1
T-Intersection?	No	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Duffy's Lane						Minor: Street A						Pedestrians Crossing Major Street
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
AM	34	13	4	14	12	0	0	41	32	3	35	12	0
PM	95	35	9	3	34	0	0	8	92	9	9	3	0
AHV	32	12	3	4	12	0	0	12	31	3	11	4	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	124	17.2%	17.2%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	61	35.9%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	63	8.8%	8.8%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	15	20.0%	
Applicable Threshold			X					

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 17.2%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No

**CROZIER****TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12****Project and Scenario Summary**

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Emil Kolb Parkway	Direction	North/South
Minor Street	Duffy's Lane	Direction	East/West

Intersection Details for Warrant Parameters

Flow Conditions	Free Flow (Rural)	Number of Lanes	2+
T-Intersection?	Yes	Intersection Type	Existing

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Emil Kolb Parkway						Minor: Duffy's Lane						Pedestrians Crossing Major Street
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
AM	42	442	0	0	1111	27	76	0	113	0	0	0	0
PM	137	1101	0	0	662	73	47	0	61	0	0	0	0
AHV	45	386	0	0	443	25	31	0	44	0	0	0	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	974	162.3%	41.7%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	180	255	180	255	75	41.7%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	899	149.8%	62.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	31	62.0%	
Applicable Threshold				X				

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 62.0%
Percentage Required to be Justified: 120%

Signal Justification 7 Met:☐ Yes☒ No



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TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Emil Kolb Parkway	Direction	East/West
Minor Street	Street E	Direction	North/South

Intersection Details for Warrant Parameters

Flow Conditions	Free Flow (Rural)	Number of Lanes	2+
T-Intersection?	No	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Emil Kolb Parkway						Minor: Street E						Pedestrians Crossing Major Street
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
AM	38	449	31	7	966	7	71	55	22	20	47	100	0
PM	91	994	64	20	608	18	58	10	13	12	12	72	0
AHV	32	361	24	7	394	6	32	16	9	8	15	43	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	947	157.8%	102.5%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	123	102.5%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	824	137.3%	112.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	56	112.0%	
Applicable Threshold				X				

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 112.0%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No



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TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Highway 50	Direction	North/South
Minor Street	Street A	Direction	East/West

Intersection Details for Warrant Parameters

Flow Conditions	Free Flow (Rural)	Number of Lanes	2+
T-Intersection?	No	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Highway 50						Minor: Street A						Pedestrians Crossing Major Street
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
AM	43	555	81	21	872	33	95	0	118	252	0	63	0
PM	108	1053	235	59	607	88	61	0	79	148	0	37	0
AHV	38	402	79	20	370	30	39	0	49	100	0	25	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	1152	192.0%	177.5%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	213	177.5%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	939	156.5%	156.5%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	139	278.0%	
Applicable Threshold				X				

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 177.5%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☒ Yes

☐ No



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TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Highway 50	Direction	North/South
Minor Street	Street C	Direction	East/West

Intersection Details for Warrant Parameters

Flow Conditions	Free Flow (Rural)	Number of Lanes	2+
T-Intersection?	No	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Highway 50						Minor: Street C						Pedestrians Crossing Major Street
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
AM	28	629	40	59	927	5	12	0	69	123	0	184	0
PM	63	1021	115	172	780	11	9	0	53	72	0	108	0
AHV	23	413	39	58	427	4	5	0	31	49	0	73	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	1122	187.0%	131.7%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	158	131.7%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	964	160.7%	108.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	54	108.0%	
Applicable Threshold				X				

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 131.7%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No



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TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Highway 50	Direction	North/South
Minor Street	Street D	Direction	East/West

Intersection Details for Warrant Parameters

Flow Conditions	Free Flow (Rural)	Number of Lanes	2+
T-Intersection?	Yes	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Highway 50						Minor: Street D						Pedestrians Crossing Major Street
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
AM	0	535	4	38	1081	0	0	0	0	10	0	117	0
PM	0	1104	10	109	796	0	0	0	0	6	0	69	0
AHV	0	410	4	37	469	0	0	0	0	4	0	47	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	971	161.8%	28.3%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	180	255	180	255	51	28.3%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	920	153.3%	8.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	4	8.0%	
Applicable Threshold				X				

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 28.3%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No



CROZIER

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Columbia Way	Direction	East/West
Minor Street	Mount Hope Road	Direction	North/South

Intersection Details for Warrant Parameters

Flow Conditions	Restricted Flow (Urban)	Number of Lanes	2+
T-Intersection?	No	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Columbia Way						Minor: Mount Hope Road						Pedestrians Crossing Major Street
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
AM	31	286	12	3	208	9	30	5	14	21	4	61	0
PM	31	261	32	19	305	6	17	5	9	16	8	35	0
AHV	16	137	11	6	128	4	12	3	6	9	3	24	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	359	39.9%	33.5%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	57	33.5%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	302	33.6%	32.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	24	32.0%	
Applicable Threshold					X			

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 33.5%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No



CROZIER

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Emil Kolb Parkway	Direction	East/West
Minor Street	Street F	Direction	North/South

Intersection Details for Warrant Parameters

Flow Conditions	Free Flow (Rural)	Number of Lanes	2+
T-Intersection?	No	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Emil Kolb Parkway						Minor: Street F						Pedestrians Crossing Major Street
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
AM	19	464	7	17	900	15	22	28	36	40	24	58	0
PM	54	944	20	32	600	37	13	5	32	29	6	34	0
AHV	18	352	7	12	375	13	9	8	17	17	8	23	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	859	143.2%	68.3%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	82	68.3%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	777	129.5%	68.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	34	68.0%	
Applicable Threshold				X				

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 68.3%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No



CROZIER

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Columbia Way	Direction	East/West
Minor Street	Westchester Boulevard	Direction	North/South

Intersection Details for Warrant Parameters

Flow Conditions	Restricted Flow (Urban)	Number of Lanes	2+
T-Intersection?	Yes	Intersection Type	Existing

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Columbia Way						Minor: Westchester Boulevard						Pedestrians Crossing Major Street
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
AM	0	281	48	30	272	0	67	0	40	0	0	0	0
PM	0	296	103	41	324	0	39	0	22	0	0	0	0
AHV	0	144	38	18	149	0	27	0	16	0	0	0	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	392	43.6%	16.9%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	180	255	180	255	43	16.9%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	349	38.8%	36.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	27	36.0%	
Applicable Threshold					X			

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 36.0%
Percentage Required to be Justified: 120%

Signal Justification 7 Met:

☐ Yes

☒ No



CROZIER

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Mount Hope Road	Direction	North/South
Minor Street	Street H	Direction	East/West

Intersection Details for Warrant Parameters

Flow Conditions	Restricted Flow (Urban)	Number of Lanes	1
T-Intersection?	Yes	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Mount Hope Road						Minor: Street H						Pedestrians Crossing Major Street
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
AM	0	33	4	0	63	0	0	0	0	10	0	0	0
PM	0	27	9	0	43	0	0	0	0	6	0	0	0
AHV	0	15	3	0	27	0	0	0	0	4	0	0	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	49	6.8%	1.6%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	180	255	180	255	4	1.6%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	45	6.3%	5.3%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	4	5.3%	
Applicable Threshold			X					

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 5.3%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No



CROZIER

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)
PER OTM BOOK 12

Project and Scenario Summary

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Columbia Way	Direction	East/West
Minor Street	Street I/Forest Gate Avenue	Direction	North/South

Intersection Details for Warrant Parameters

Flow Conditions	Restricted Flow (Urban)	Number of Lanes	2+
T-Intersection?	No	Intersection Type	New

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Columbia Way						Minor: Street I/Forest Gate Avenue						Pedestrians Crossing Major Street
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
AM	11	307	2	3	118	2	68	0	81	5	0	34	0
PM	32	194	60	46	309	5	3	0	10	3	0	20	0
AHV	11	125	16	12	107	2	18	0	23	2	0	14	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	330	36.7%	33.5%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	120	170	120	170	57	33.5%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	273	30.3%	26.7%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	20	26.7%	
Applicable Threshold					X			

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

Percent Compliance: 33.5%
Percentage Required to be Justified: 150%

Signal Justification 7 Met:

☐ Yes

☒ No

**CROZIER****TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)**
PER OTM BOOK 12**Project and Scenario Summary**

Project	Bolton North Hill	Project Number	708-3446
		Date	2024-06-26
Horizon	2041 Future Total	Analyst	AK

Study Intersection Summary

Major Street	Caledon King Townline	Direction	North/South
Minor Street	Columbia Way	Direction	East/West

Intersection Details for Warrant Parameters

Flow Conditions	Free Flow (Rural)	Number of Lanes	2+
T-Intersection?	Yes	Intersection Type	Existing

Notes: Free Flow (Rural) is used when the operating speed is greater than or equal to 70km/h. Restricted Flow (Urban) is used otherwise.
The Number of Lanes greater than 1 only needs to be for one direction along the major road.
An intersection is considered New if at least 1-leg is added to an existing intersection.

Input Volumes and Average Hourly Volume Determination

Peak Hour	Major: Caledon King Townline						Minor: Columbia Way						Pedestrians Crossing Major Street
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
AM	100	121	0	0	551	23	25	0	368	0	0	0	0
PM	314	511	0	0	221	45	23	0	185	0	0	0	0
AHV	104	158	0	0	193	17	12	0	138	0	0	0	0

The AHV is determined by the availability of the peak hour estimates. If both Peak 1 and Peak 2 Peak Hour Volume estimates are available then $AHV = (Peak1phv + Peak2phv)/4$. In only the case that one estimate is available then $AHV = Peak1phv/2$ or $Peak2phv/2$.

Justification 7 - OTM Book 12

JUSTIFICATION	DESCRIPTION	MINIMUM REQUIREMENT 1 LANE HIGHWAYS		MINIMUM REQUIREMENT 2 OR MORE LANE HIGHWAYS		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)	480	720	600	900	622	103.7%	83.3%
	B. Vehicle Volume, Along Minor Streets (Avg. Hour)	180	255	180	255	150	83.3%	
2. Delay to Cross Traffic	A. Vehicle Volume, Major Street (Avg. Hour)	480	720	600	900	472	78.7%	24.0%
	B. Combined Vehicle and Pedestrian Volume Crossing Artery From Minor Streets (Avg. Hour)	50	75	50	75	12	24.0%	
Applicable Threshold				X				

Note: For T-intersections the thresholds for 1B have been increased by 50% per OTM Book 12.
Existing Intersections Require 120% Justification
New/Proposed Intersections Require 150% Justification

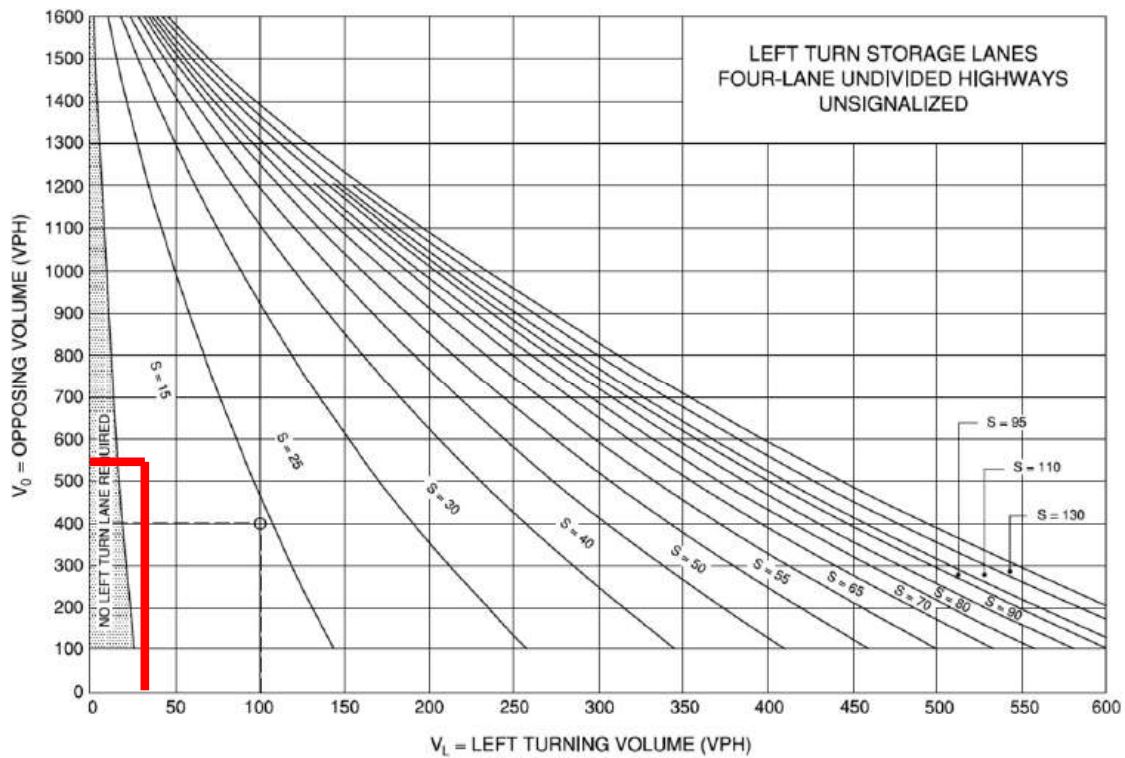
Percent Compliance: 83.3%
Percentage Required to be Justified: 120%

Signal Justification 7 Met:☐ Yes☒ No

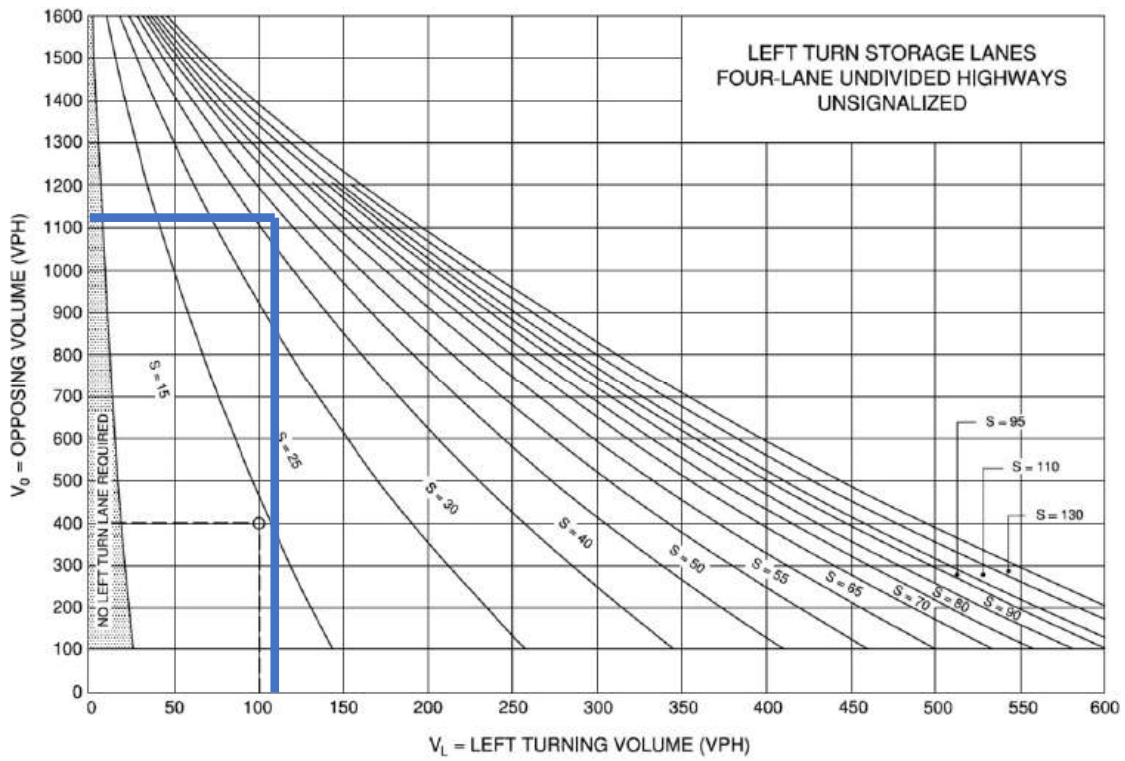
APPENDIX M

Left-Turn Lane Warrant Analysis Worksheets

AM Peak Hour



PM Peak Hour

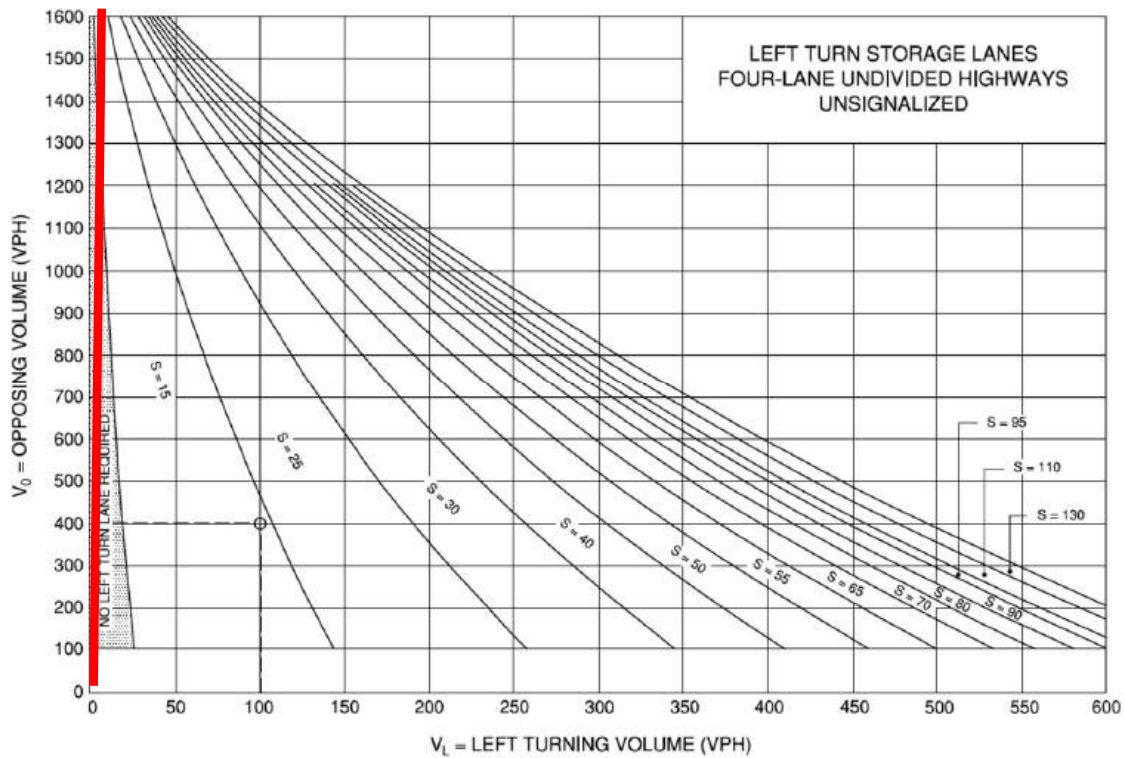


Southbound Left-Turn Lane Warrant

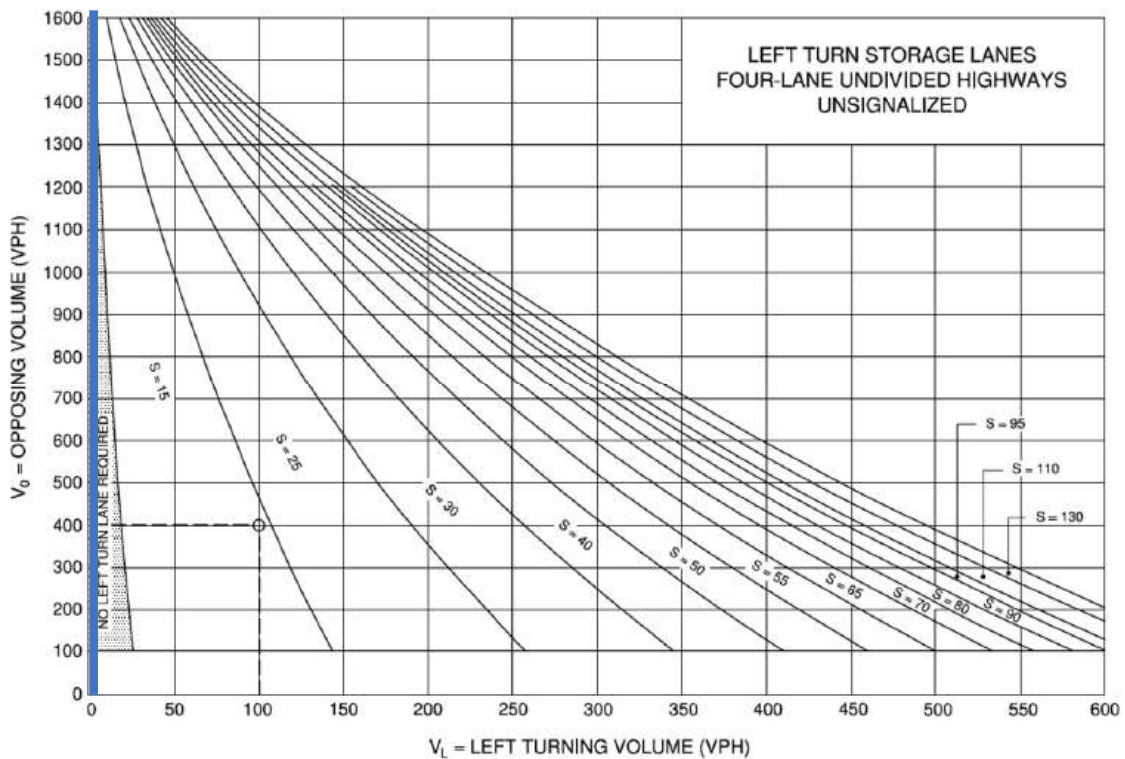
2041 Horizon Year

Street F & Emil Kolb Parkway

AM Peak Hour

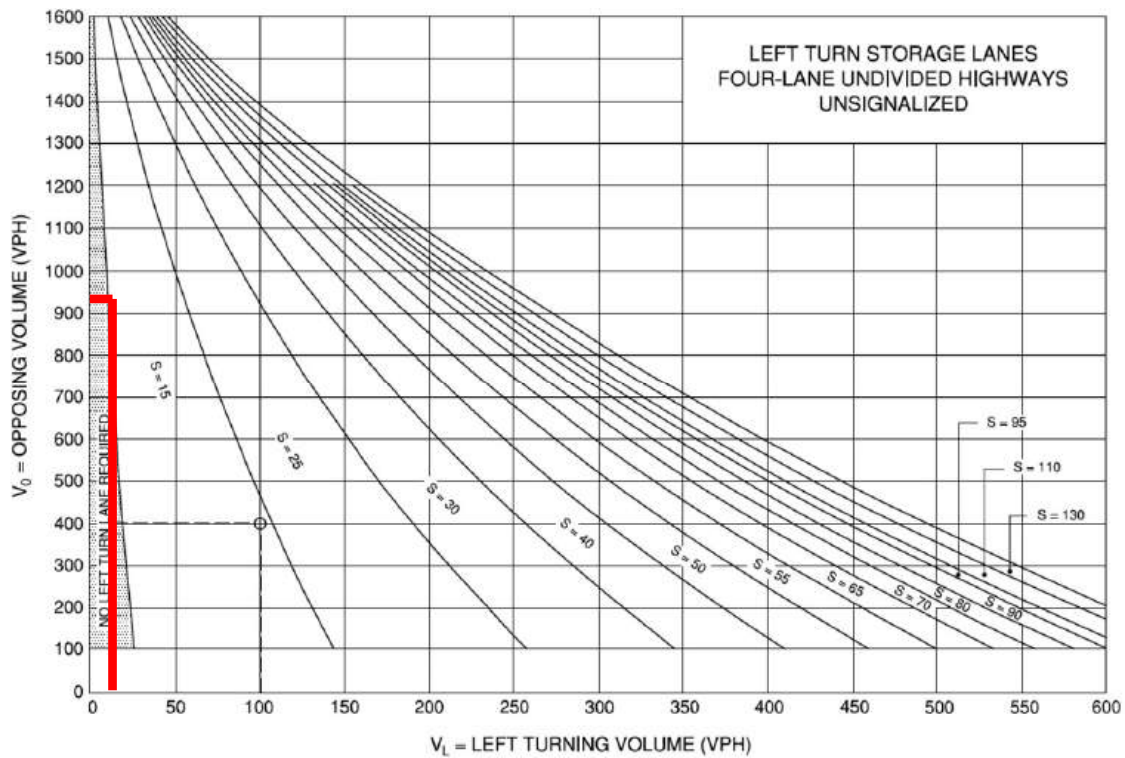


PM Peak Hour

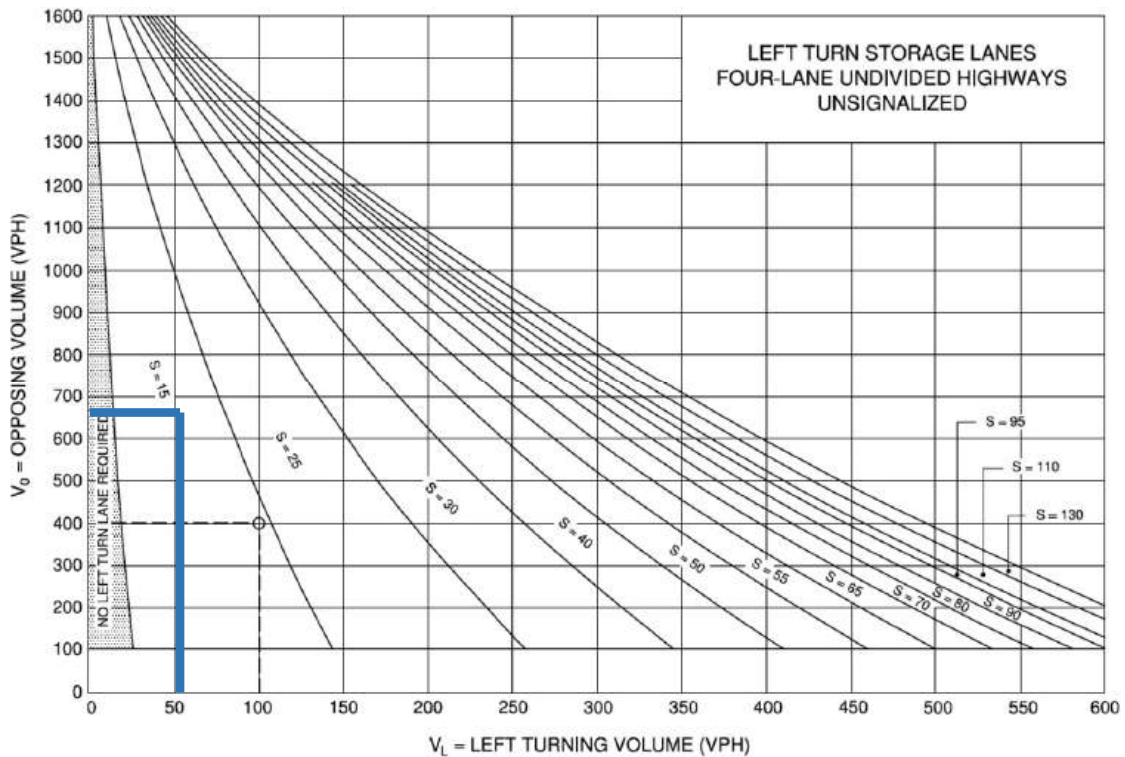


Westbound Left-Turn Lane Warrant
2041 Horizon Year
Street F & Emil Kolb Parkway

AM Peak Hour



PM Peak Hour

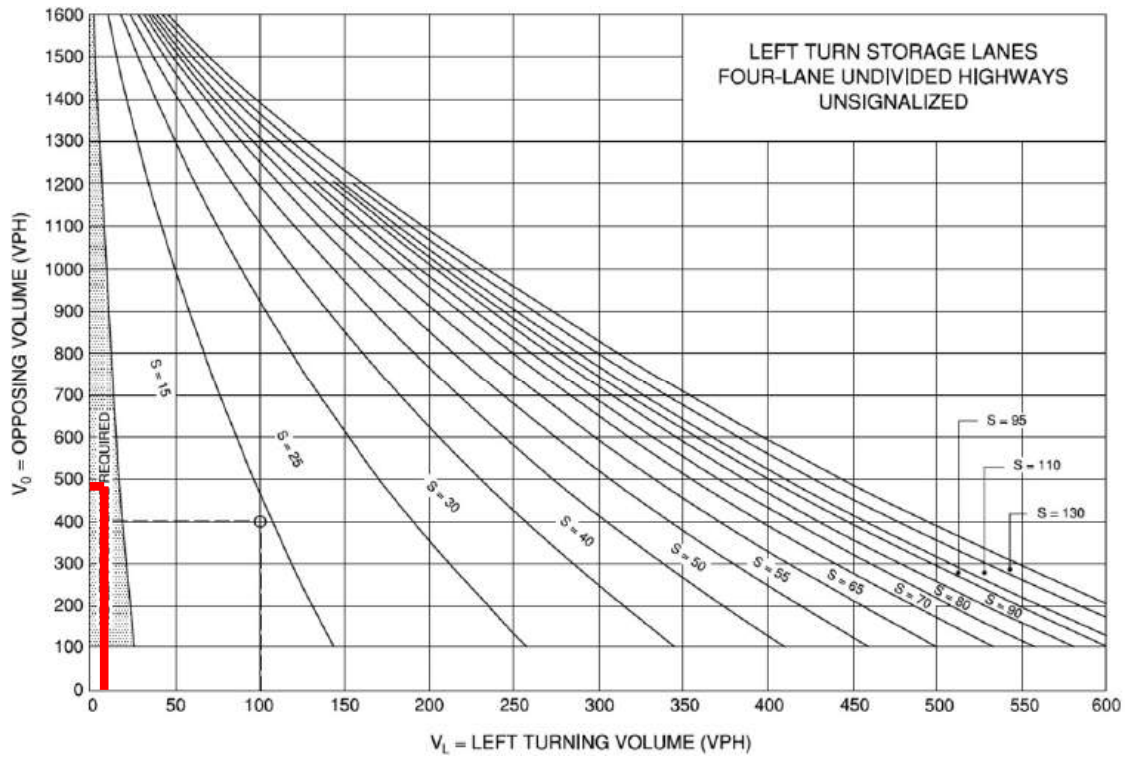


Eastbound Left-Turn Lane Warrant

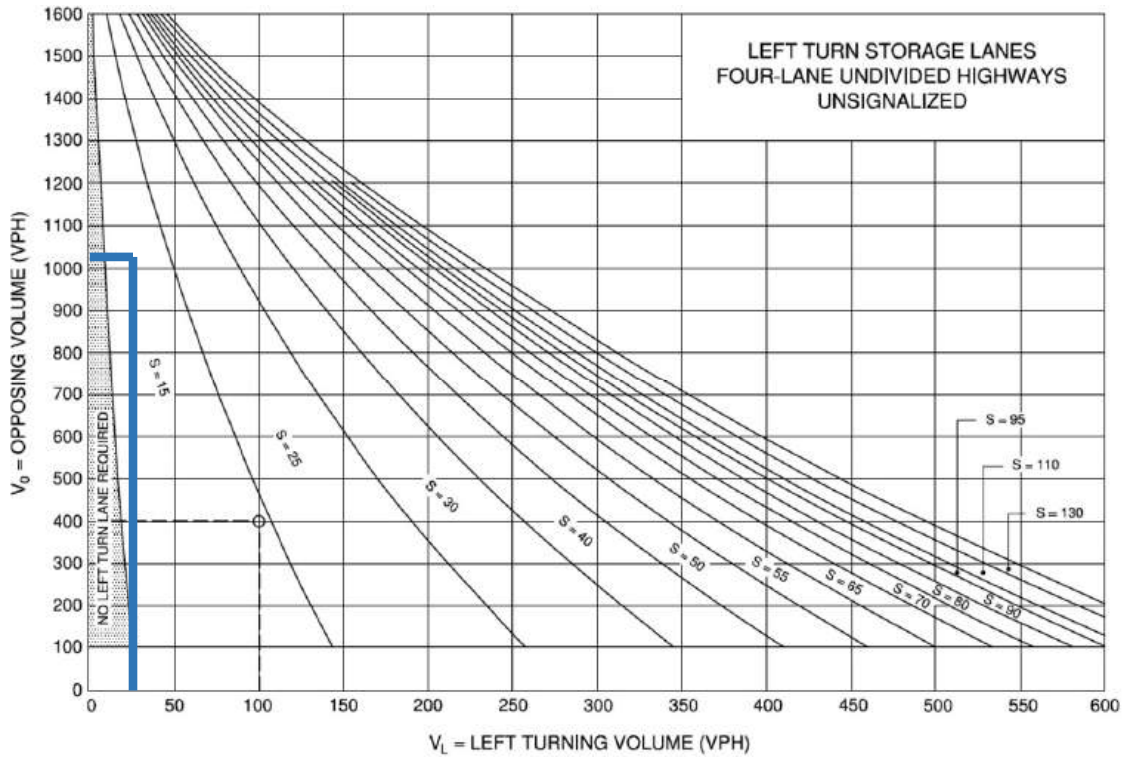
2041 Horizon Year

Street F & Emil Kolb Parkway

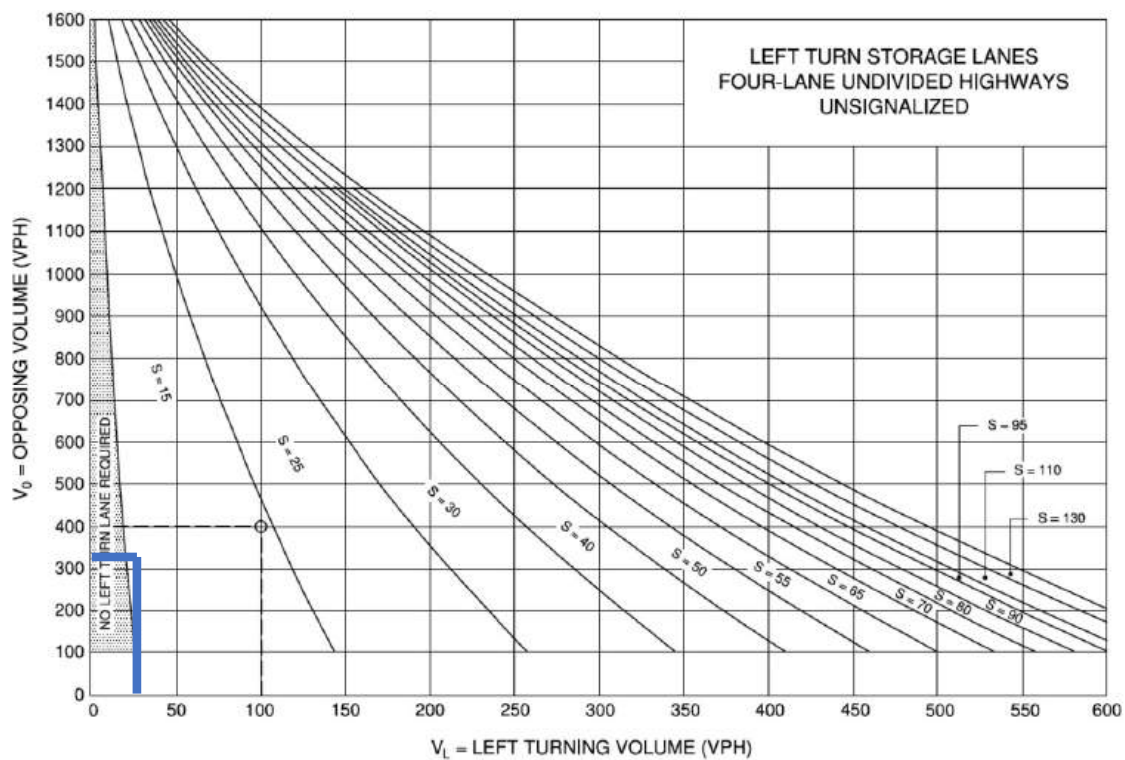
AM Peak Hour



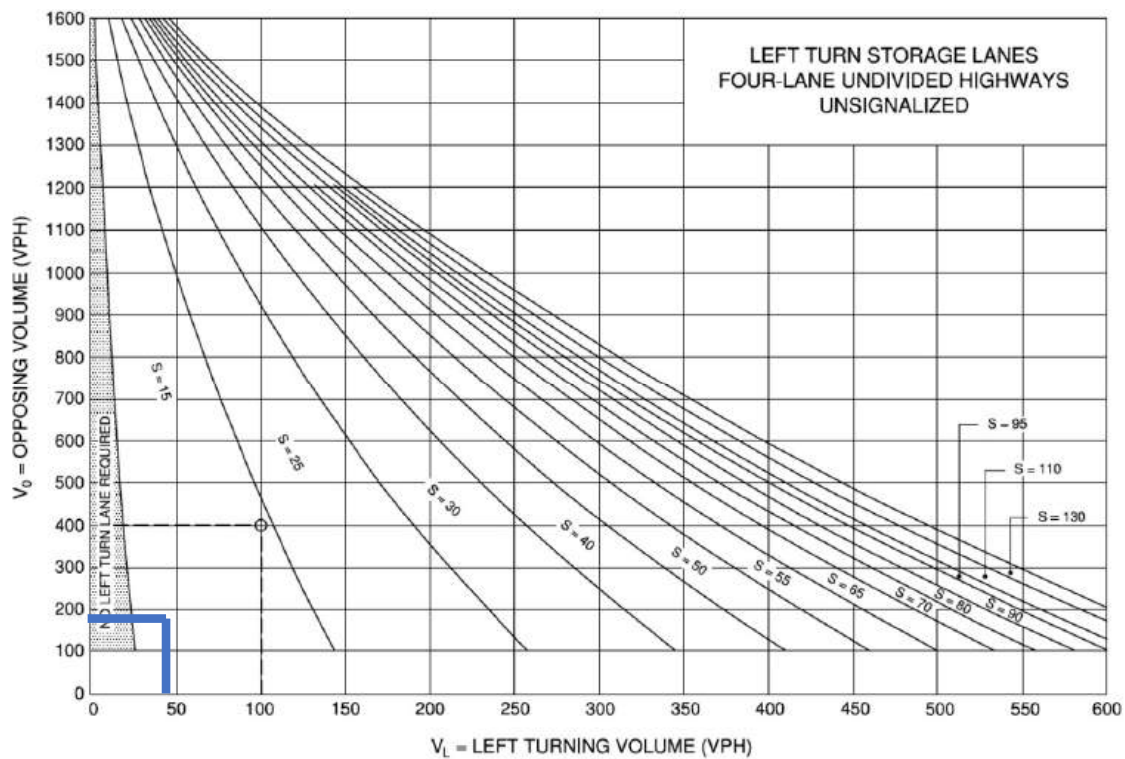
PM Peak Hour



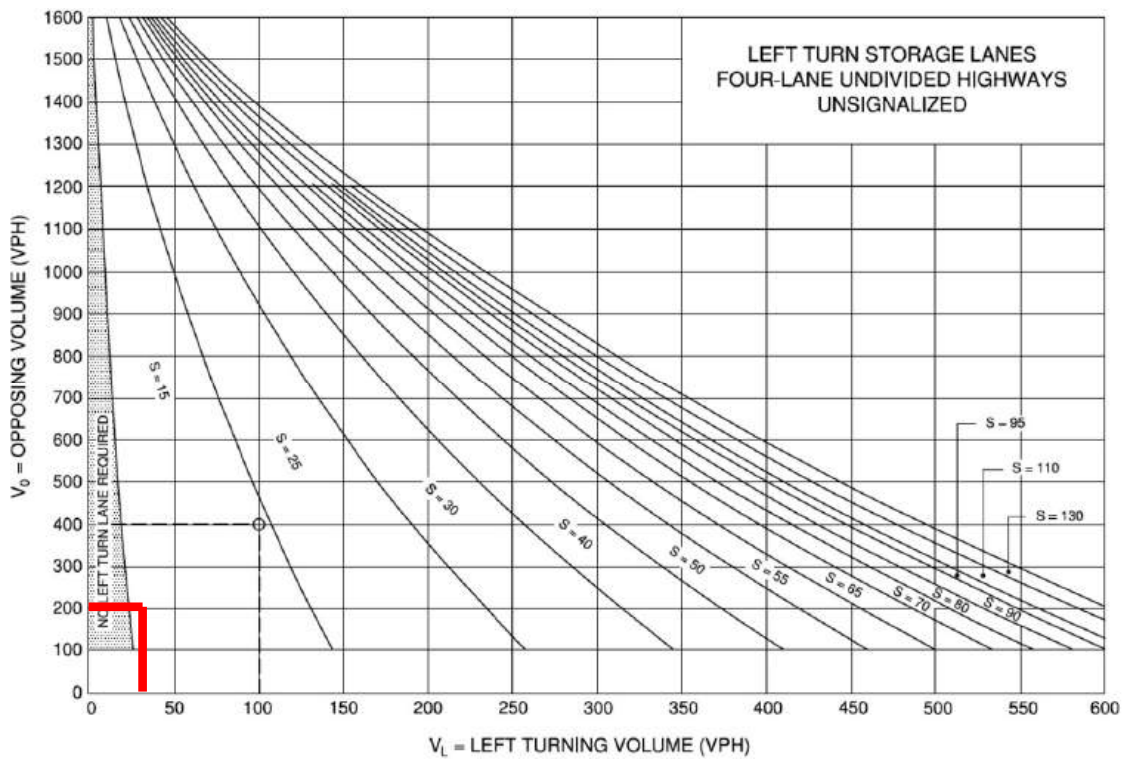
Westbound Left-Turn Lane Warrant
2041 Horizon Year
Street F & Emil Kolb Parkway



Eastbound P.M. Left-Turn Lane Warrant
2041 Horizon Year
Street I & Columbia Way



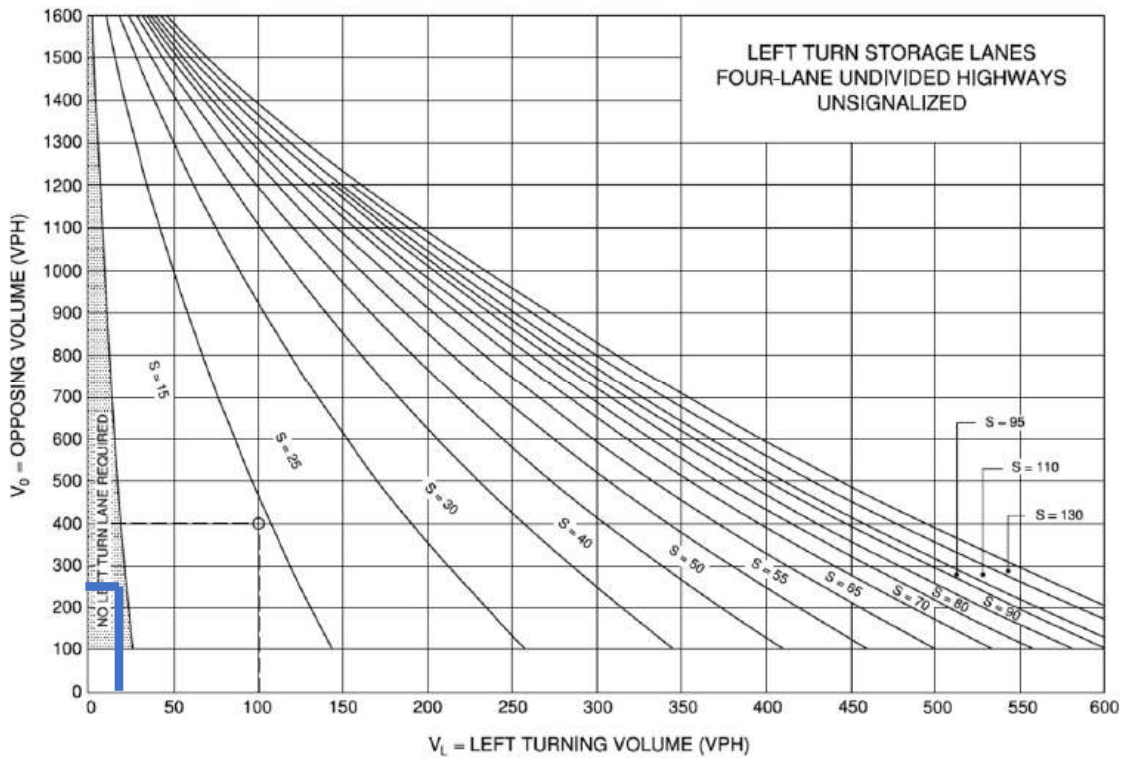
Westbound P.M. Left-Turn Lane Warrant
2041 Horizon Year
Street I & Columbia Way



Eastbound A.M. Left-Turn Lane Warrant

2041 Horizon Year

Mount Hope Road & Columbia Way



Westbound P.M. Left-Turn Lane Warrant

2041 Horizon Year

Mount Hope Road & Columbia Way

APPENDIX N

Town of Caledon Active Transportation Master Plan Excepts



Town of Caledon

Active Transportation Master Plan

June 2024



Pedestrian Network Policies

Generator	Pedestrian Facility Implementation Policy
Urban Arterial Road	On both sides of urban arterial roads.
Urban Collector Road	On both sides of all urban collector roads.
Urban Local Road	On one side of all urban local roads, except for the following generator instances:
Transit	On both sides of every street that serves a transit route.
Intensification/Urban Area	On both sides of the road in the intensification areas.
School	On both sides of every street within 800 metres of a school.
Community Facilities/Local Amenities	On both sides of every street within 400 metres of a community facility or local amenity.
Parks and Trails	On both sides of every street within 500 metres of a community facility or local amenity.
Pedestrian and Cycling network	To minimize gaps in the street, providing pathway connections, as well as the multi-use trails network.



Map 1. Existing conditions

Existing Conditions

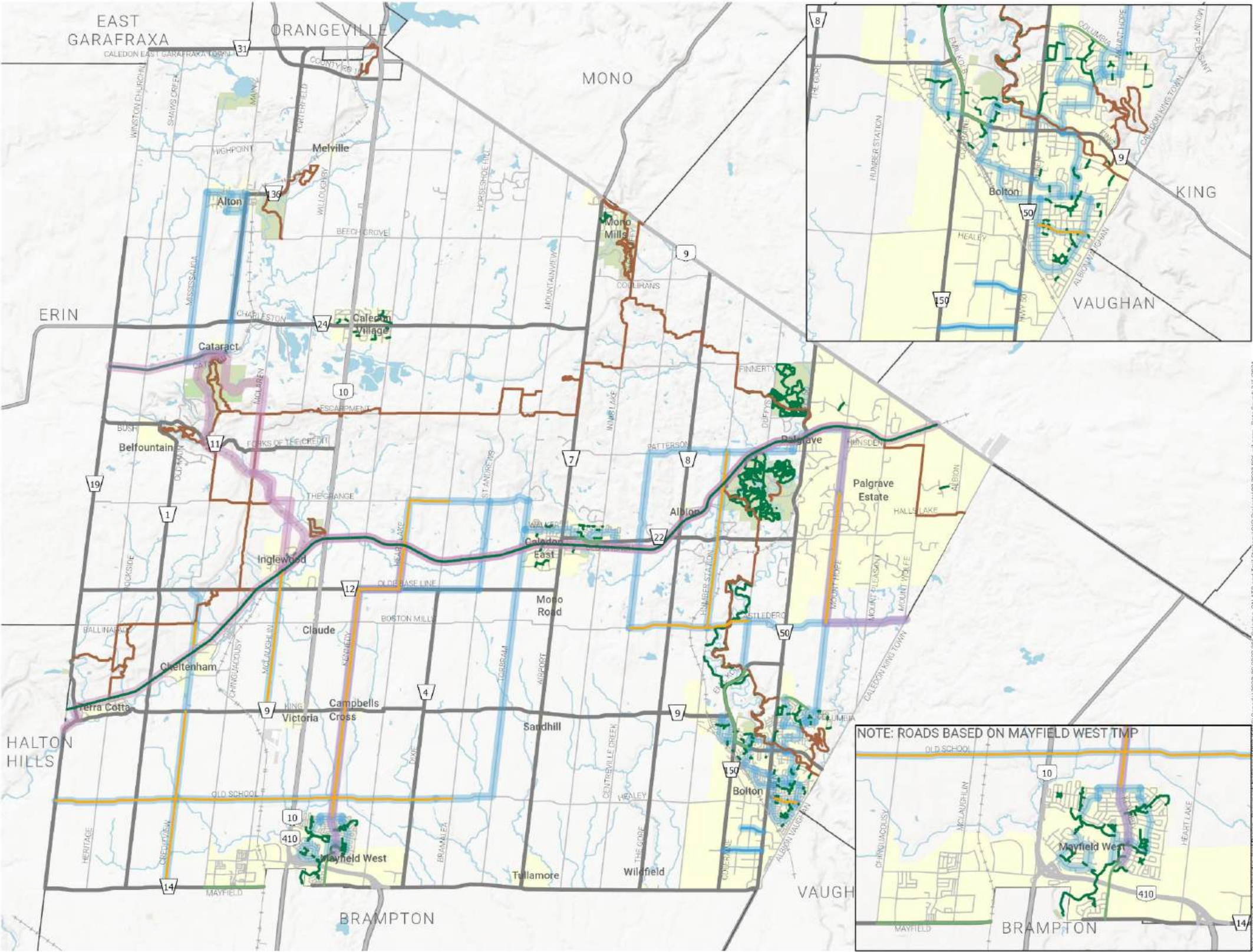
Town of Caledon
Active Transportation
Master Plan

Existing Network

- Multi-use Path
- Painted Bike Lane
- Paved Shoulder
- Signed Cycling Routes
- Multi-use Trail
- Walking Trail
- Designated Trail

Features

- Regional Road
- Provincial Highway
- Railway
- Settlement Area
- Provincial Park
- Park
- Municipal Boundaries



Multi-use Paths

Multi-use paths are bidirectional facilities physically separated from the roadway that can be used by people walking and cycling. These are the existing multi-use paths in Caledon:

- Columbia Way
- Kennedy Road
- Emil Kolb Parkway (Regional)
- Old Church Road (Regional)
- Mayfield Road (Regional)

Picture 19. Multi-use path on Kennedy Road



Painted Bike Lanes

Painted bike lanes are designated spaces for people cycling at the edge of the roadway. They are delineated with a white line, bicycle and diamond pavement markings, and signage. There are three roads with painted bike lanes:

- McEwan Drive W
- Bolton Heights Road
- George Bolton Parkway



3.3.3 Trails (Facilities Outside Road Right-of-Way)

The Town has a range of existing and proposed trails in their network, including trails owned by the Town, as well as other organizations. For this plan, the trails have been organized into the following types along with their lengths. The trails are presented by type on Map 1.

Table 4. Existing trails

Trail Type	Existing Kilometres
Multi-use Trail	149
Hiking Trail	144
Designated Trail	94

Multi-use Trail

Multi-use trails have either a paved or packed unpaved surface and are wider to accommodate different uses such as cycling, walking, and horseback riding. Examples of existing multi-use trails in Caledon include:

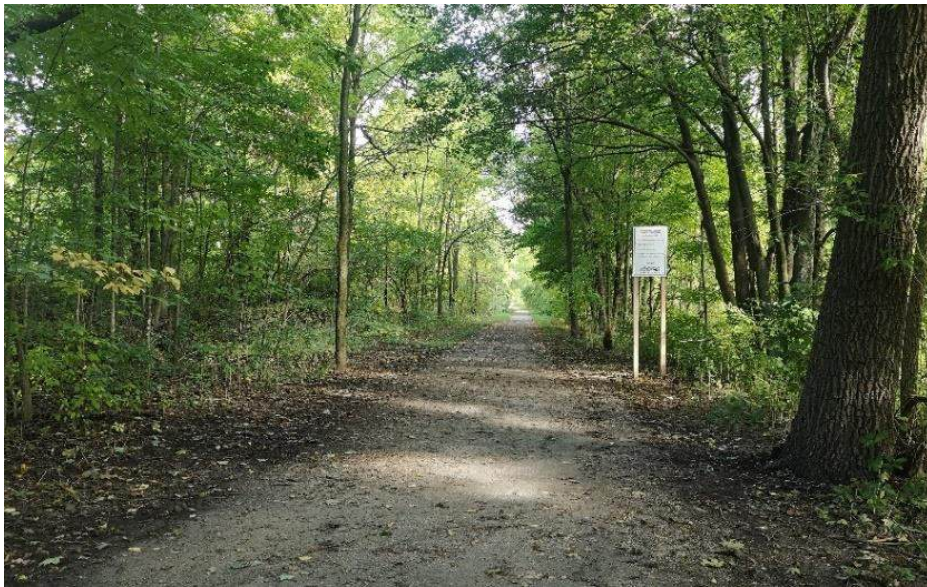
- Caledon Trailway (packed gravel; hiking, biking, horseback riding).
- Elora Cataract Trailway (packed gravel; hiking, biking, horseback riding).
- Etobicoke Creek Trail (paved, hiking, biking).

Picture 24. Trail sign



The Caledon Trailway runs east-west across the Town, from Terra Cotta to Palgrave on repurposed rail line. The trail is also used as part of the Greenbelt Cycling Route and Trans Canada Trail designated trail routes. There is parking located at most road crossings, with larger parking areas found within settlement areas such as East Caledon, Inglewood, and Terra Cotta. There are a few grade-separated road crossings along the trailway, with a bridge over Hurontario/Highway 10, a reused trestle bridge at Mill Road, and at Duffy's Lane. Some road crossings are controlled, for example at Airport Road, there is a separated crossride treatment at a dedicated signal to cross the road. Most road crossings are uncontrolled, where trail users yield to oncoming traffic.

Picture 25. Caledon Trailway



Hiking Trail

There are many examples of trails that have a dirt surface and are often narrower in width. They may have rules around permitted use, such as walking only. Examples of hiking trails in Caledon include:

- Albion Hills Conservation Area (hiking trail loops).
- Humber Valley Heritage Trail (hiking only – link from Bolton to Albion Hills).
- Ken Whillans Conservation Area (loop trails).
- Oak Ridges Trail (hiking only – link to Palgrave Forest).
- Palgrave Forest Management Area (looped hiking trails).
- Humber Valley Heritage Side Trail (hiking only).
- Bruce Trail (Hiking trail, alignment across town, partially designated, includes following Escarpment Road).



Designated Trail

There are a few trails that exist in Caledon that are part of larger initiatives and use a mixture of roads and trails. These are not additional physical trails, but rather apply the trail initiative designation onto the roadway or existing trail. Examples of designated trails in Caledon are:

- Trans Canada Trail (follows trails – Elora-Cataract Trailway, McLaren, McLaughlin, then Caledon Trailway to boundary).
- Greenbelt Cycling Route (uses the Caledon Trailway, Mount Hope Rd., and Castlederg Rd.).

Picture 26. On road section of the Trans Canada Trail designated trail route



3.3.4 Trail Jurisdiction

Trails Owned by Town

The Town owns and manages the existing Caledon Trailway, and planned north-south rail trail, which provide routes across Caledon using abandoned rail line corridors. The ATMP identifies opportunities to improve and connect with these trails as well as opportunities for new trail routes in Caledon, with specific focus on opportunities to use unopened road allowances, securing corridors in greenfield developments, and on Town-owned lands.



Map 2. Network expansion opportunities

Network Expansion Opportunities

Town of Caledon
Active Transportation
Master Plan

Network Considerations

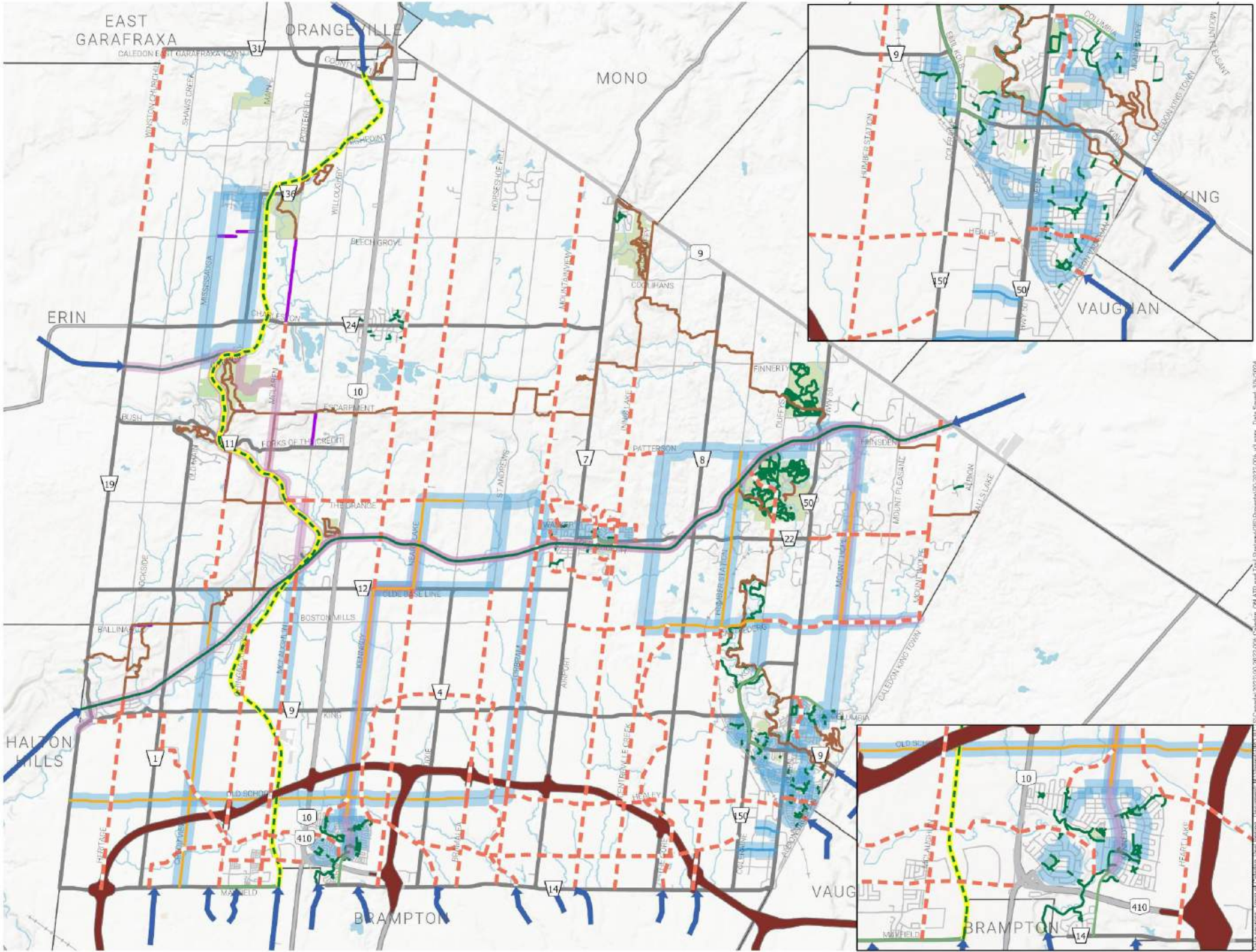
- Network Opportunity
- Neighbouring Connection
- Existing/Planned Facilities
 - Multi-use Trail
 - Walking Trail
 - Designated Trail
 - Multi-use Path
 - Painted Bike Lane
 - Paved Shoulder
 - Caledon Rail Trail
 - Signed Cycling Routes

Other Features

- Unopened Road Allowance
- GTA West Preferred Route
- Regional Road
- Railway
- Park
- Provincial Park
- Municipal Boundaries

0 1.5 3 KILOMETRES

alta



Map 3. Future regional improvements

Future Regional Improvements

Town of Caledon
Active Transportation
Master Plan

Network Considerations

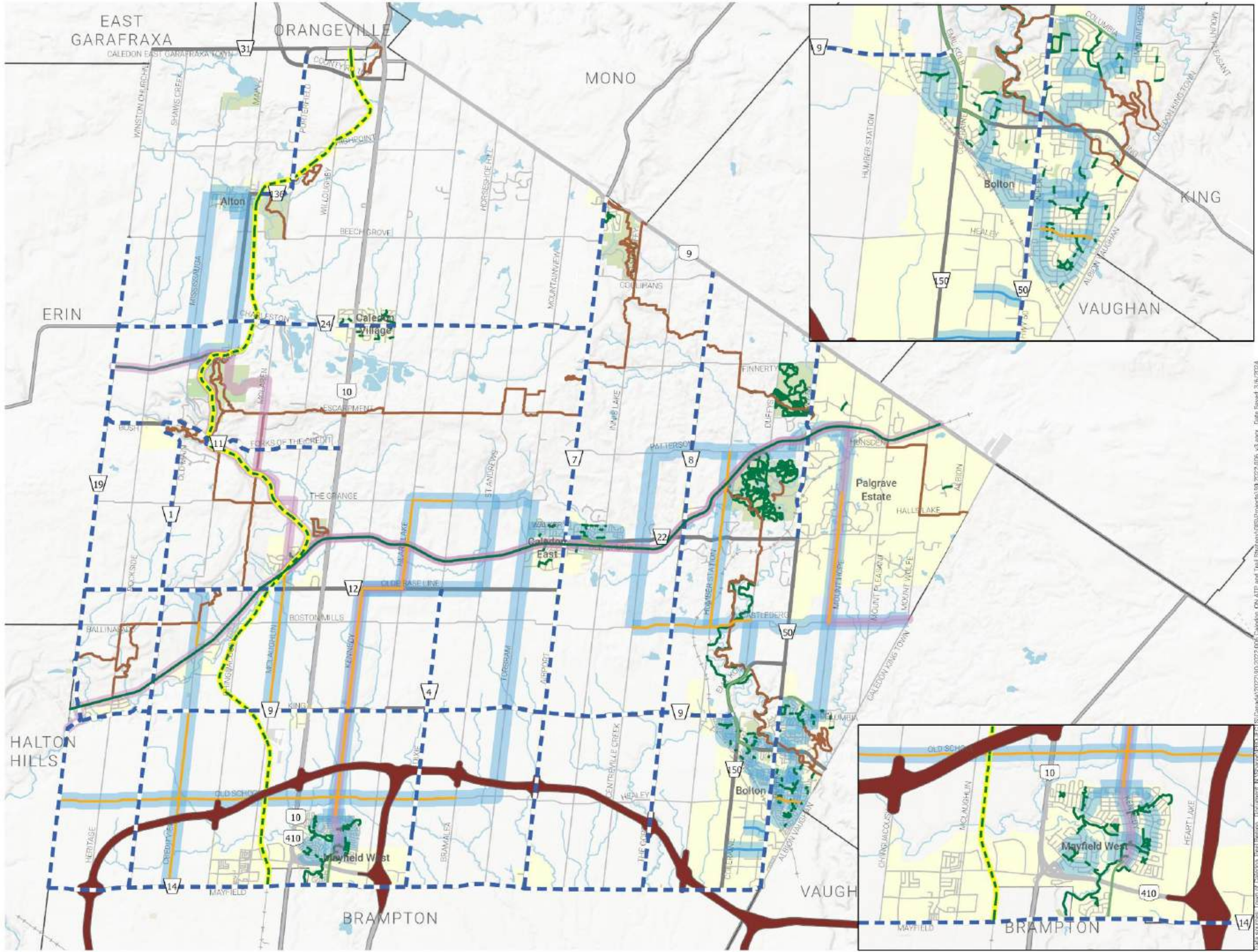
- Future Planned Regional Improvements
- Existing/Planned Facilities
 - Multi-use Trail
 - Walking Trail
 - Designated Trail
 - Multi-use Path
 - Painted Bike Lane
 - Paved Shoulder
 - Caledon Rail Trail
 - Signed Cycling Routes

Other Features

- GTA West Preferred Route
- Regional Road
- Railway
- Settlements
- Park
- Provincial Park
- Municipal Boundaries

0 1.5 3 KILOMETRES

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Map 4. Network assessment

Network Assessment

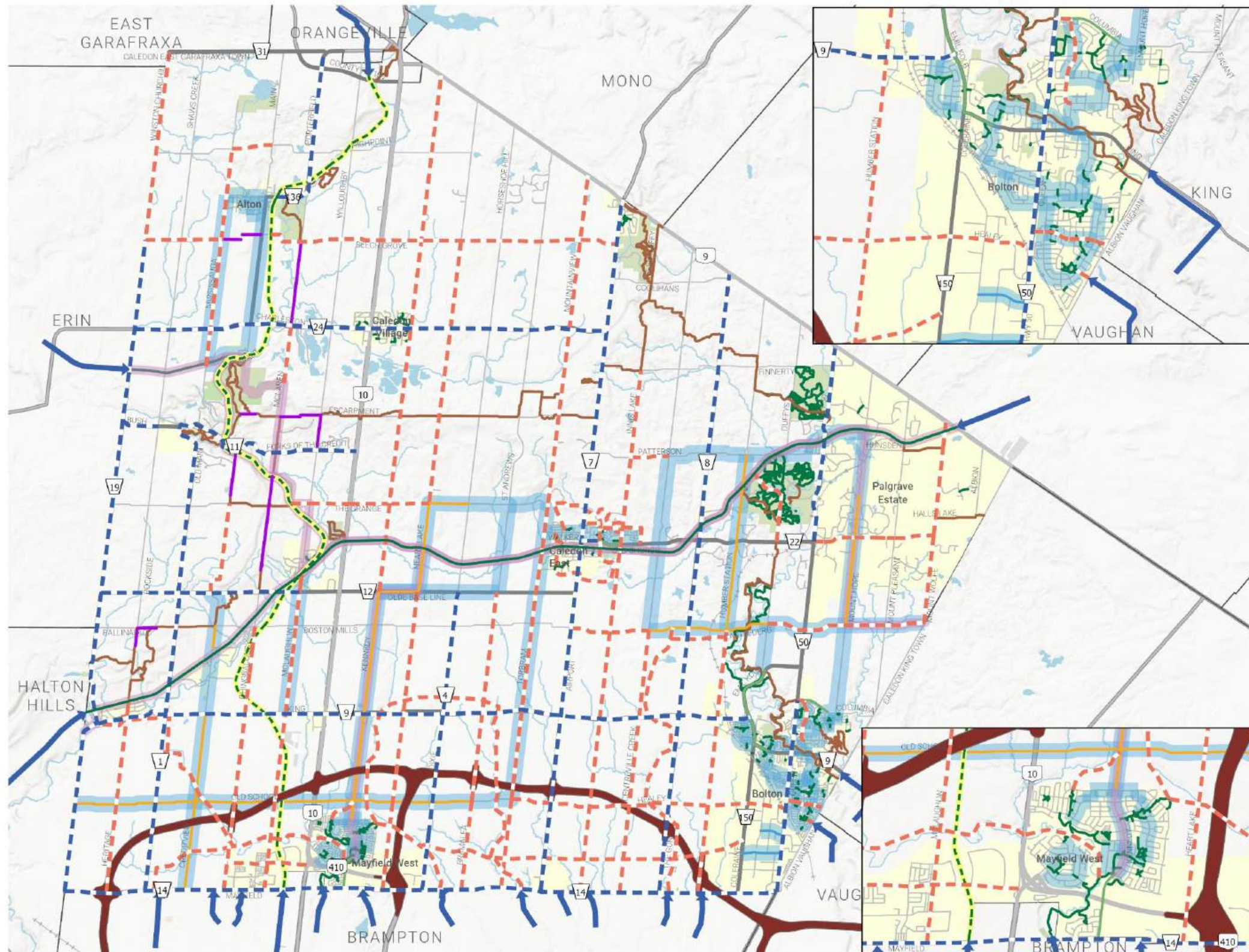
**Town of Caledon
Active Transportation
Master Plan**

Network Considerations

-  Network Opportunity
-  Future Planned Regional Improvements
-  Neighbouring Connection
- Existing/Planned Facilities
 -  Multi-use Trail
 -  Walking Trail
 -  Designated Trail
 -  Multi-use Path
 -  Painted Bike Lane
 -  Paved Shoulder
 -  Caledon Rail Trail
 -  Signed Cycling Routes

Other Features

-  Unopened Road Allowance
-  GTA West Preferred Route
-  Regional Road
-  Railway
-  Settlements
-  Park
-  Provincial Park
-  Municipal Boundaries



Map 5. Network recommendations

Network Recommendations

Town of Caledon
Active Transportation
Master Plan

Network Recommendations

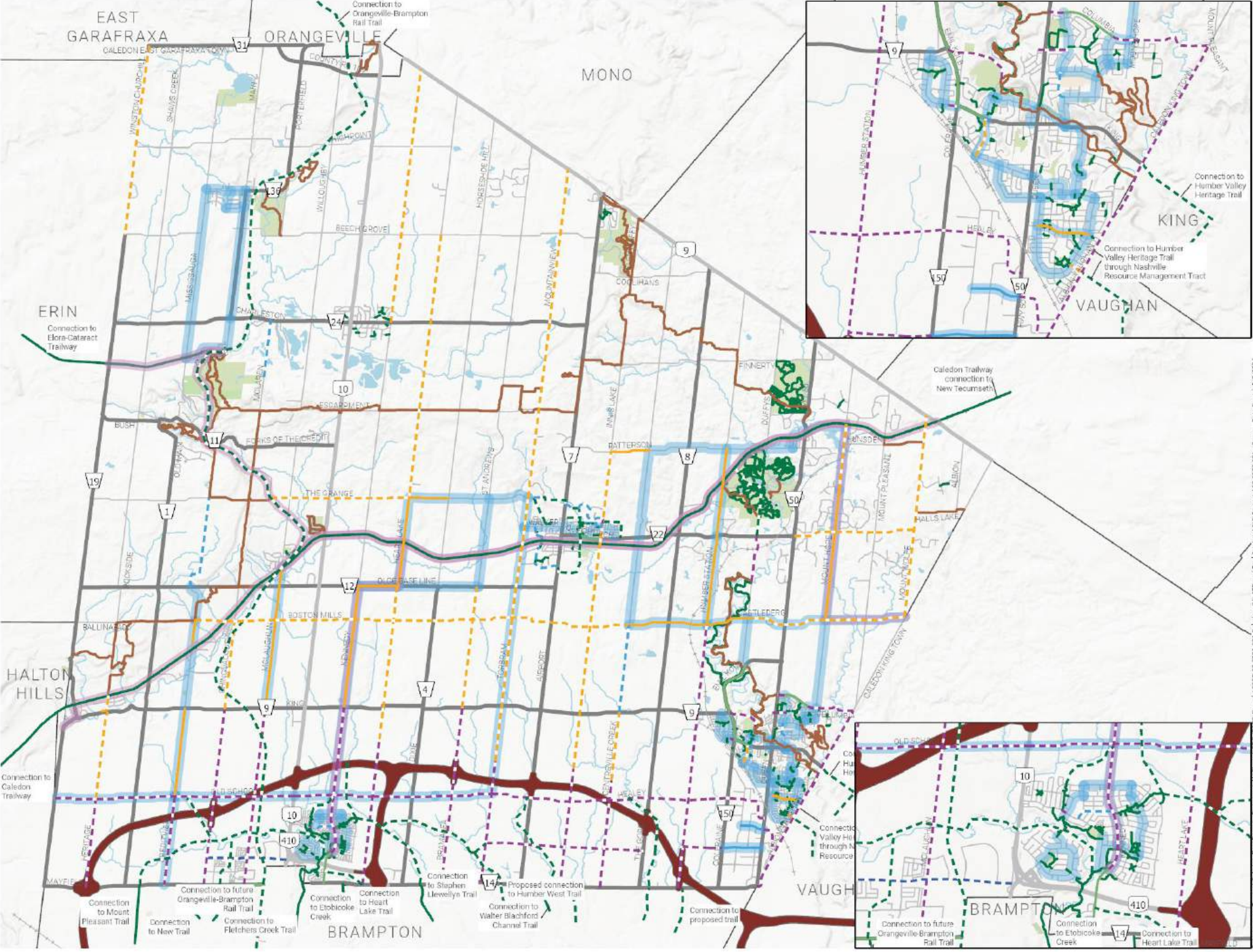
- Multi-use Trail
- Multi-use Path
- Paved Shoulder
- Painted Bike Lane
- Shared Cycling Facility

Existing/Planned Facilities

- Multi-use Trail
- Walking Trail
- Designated Trail
- Multi-use Path
- Painted Bike Lane
- Paved Shoulder
- Signed Cycling Routes

Other Features

- GTA West Preferred Route
- Regional Road
- Railway
- Park
- Provincial Park
- Municipal Boundaries



Map 7. Network implementation

Network Implementation

Town of Caledon
Active Transportation
Master Plan

Implementation Opportunity

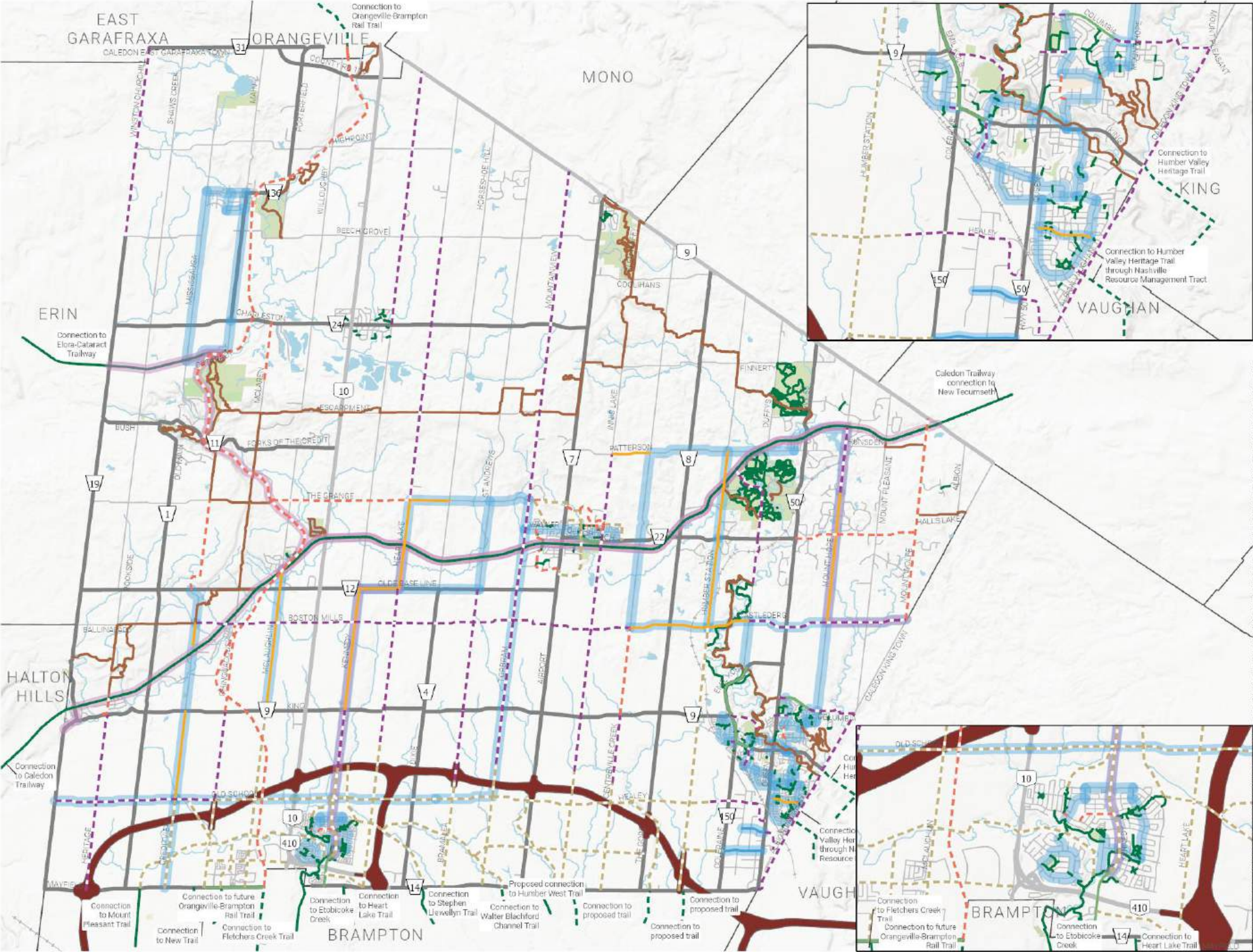
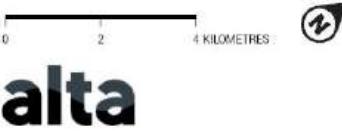
- Routine Accommodation
- Development-driven
- Standalone

Existing/Planned Facilities

- Multi-use Trail
- Walking Trail
- Designated Trail
- Multi-use Path
- Painted Bike Lane
- Paved Shoulder
- Signed Cycling Routes

Other Features

- GTA West Preferred Route
- Regional Road
- Railway
- Park
- Provincial Park
- Municipal Boundaries



5.4.3 Intersections and Crossings

Where active transportation facilities meet roads at intersections, midblock crossings, and driveway crossings is where there is more potential for conflict between active transportation users and automobile traffic. These locations should include design elements to remove, mitigate, or manage conflict points as much as possible.

OTM Book 18 chapter 6 provides clear design guidance for treatment options at these locations for cycling users, in addition to guidance on cycling facilities at roundabouts, interchanges and highway ramp crossings, railway crossings, and grade-separated crossings. The guidance includes selection tools to identify appropriate treatment options based on roadway characteristics. The OTM Protected Intersection Guide provides guidance on the design of protected intersections within Ontario municipalities.

OTM Book 15 outlines planning and design treatment options for pedestrian crossings at controlled and uncontrolled locations as well as selection guidance.

Acknowledging that intersections pose the greatest danger to vulnerable road users, pedestrians and cyclists, intersection treatments that provide more separation between active transportation users and motor vehicles are preferred. Continuous sidewalk and cycling facility treatments are preferred where active transportation facilities cross driveways. This treatment has shown to improve street level interactions, making them a more comfortable and predictable experience for all users including motorists.

Picture 38. Examples of protected intersections



Picture 39. Examples of protected intersections





5.4.4 Trailheads

Trailheads are located at trail entrances or access points. They can vary in scale and amenities provided depending on their context and available facilities. Trailheads act as a meeting area or gathering space for people who are travelling the trail together. Trailheads should include accessible paths connecting the trail to the parking area and site amenities. The Town should integrate trailhead amenities with existing or planned infrastructure such as parking, benches, etc. wherever feasible and appropriate. Trailheads should be designed to minimize negative impacts on the trail experience, such as trail crossings and introducing conflicts to the trail route.

Major trailhead locations often include automobile parking with accessible spaces, seating, waste receptacles, bike parking, an information kiosk, washrooms and drinking water fountains. Major trailheads should be implemented along primary trail classifications, at strategic points where parking can be provided and there is a high demand for trail use. Minor trailheads should include some seating, waste receptacle, and wayfinding signage. Minor trailheads should be implemented along primary trail classifications at all road entrances that are considered non-major trailheads.

Trailheads should be planned at key locations along a trail to provide access to users coming from different areas. They should also be considered with some frequency to provide amenities to trail users who are travelling along a trail.

