CGH TRANSPORTATION

APRIL 5, 2024

Columbia Square
14245 Highway 50
Transportation Impact Study

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Transportation Impact Study

Prepared for:

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PN: 2021-020

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Response to Comments

CGH has previously prepared a Transportation Impact Study to support the Official Plan and Zoning By-Law Amendment for 14245 Highway 50 in Caledon. As part of the second submission comments, the Town of Caledon, Region of Peel, and the public have provided comments pertaining to the transportation components of the proposed development. This cover letter includes the responses to the review authorities' comments.

Region of Peel Transportation Comments

Traffic Development

Comment 1:
The Region requests that a functional design be included as part of the next submission due to the new development consisting of over 100 veh/hr in the peak hour according to the RCS we will require an auxiliary turn lane for the access proposed off of Highway 50 and must meet the TAC requirements.

Response: A Functional Design for the northbound right-turn lane at Site Access #1 has been prepared as part of the first resubmission package.

Comment 2:
The Region finds the growth rates and trip generation rates satisfactory and meet the ITE requirements.

Response: Noted.

Comment 3:
The Region of Peel will require one (1) copy to be in electronic format and one (1) hard copy complete with the appropriate supporting documentation. This shall be submitted to the Traffic and Transportation Engineering section of Public Works Department for our review, comment and approval.

Response: Noted.

Sustainable Transportation and Public Health Comments

Comment 4:
Consider further parking reductions applied by providing an incentive to commercial staff to provide Transit Discount cards to promote the use of local transit.

Response: Providing Transit Discount cards has been recommended as one of the Transportation Demand Management measures for the proposed development within the revised TIS.

Comment 5:
Consider providing showers and changing facilities for the use of active commuters, regarding commercial use properties.

Response: While the provision of showers and changing facilities within the commercial buildings for active commuters is a good TDM measure for specific land uses, such as an office, it is not a viable option for the proposed development, as the specific type of commercial land use is still being considered. Additionally, there is a small number of active transportation trips estimated to be generated by the proposed development.

Comment 6:

It is suggested to sell/lease parking spaces separately from units. This ensures less of an incentive for residents to own/use a vehicle. The Peel Healthy Development Assessment guide suggests providing unbundled parking for 50% of dwellings within 400 m (about 1312.34 ft) of a transit stop.

Response: Noted. This will be confirmed as part of the Site Plan Approval stage.

Comment 7:
Consider short term bicycle parking near building entrances and long-term secure bicycle parking for residents.

Response: Details pertaining short term bike parking will be provided as part of the SPA stage of the proposed development. A total of 213 long-term bicycle parking spaces are proposed for the development. The TIS has been revised accordingly for the first resubmission package and has been carried through in the revised TIS.

Town of Caledon Transportation Comments

Comment 1:
Please provide lane configuration figures for existing and future conditions.

Response: Existing, future background, and future total lane configuration figures have been provided.

Comment 2:
In Section 2.5 of the Transportation Impact Study (TIS), the 2021 TMCs have been developed by applying growth factors to older counts, developing adjustment factors for the counts collected during COVID and then finally balancing. Please provide a volume diagram for every step for our review. The diagram should also show the approach volumes. Similarly, please include necessary details in Appendix C so we are able to follow the workflow.

Response: As part of the first resubmission package, new 2023 counts were undertaken. As a result, no growth rates were applied to the counts to arrive at the existing 2023 horizon. Please refer to the updated TIS for details.

Comment 3:
Please note that traffic data should be collected outside of the summer break, especially since the site is adjacent an elementary school. Table 2: Turning Volume Count Data Dates notes the traffic data for the Kingsview Drive at Columbia Way was collected on July 13, 2021.

Response: New 2023 counts were collected as part of the first resubmission. The data was collected on June 27th, 2023. On June 27th, school was still in session, with principal days being June 28th, 29th and 30th. On this day, an afternoon peak at Kingsview Drive and Columbia Way intersection was observed at 2:15 to 3:15 PM, which aligns with the end of school day. This peak was analyzed separately as part of a sensitivity scenario for Kingsview Drive and Columbia Way intersection, in addition to the AM and PM peak analyses undertaken as part of a larger study area assessment.

Comment 4:
Section 2.6 of the TIS only provides descriptive statistics without any inferences. At the intersection of Highway 50 and Columbia Way out of 13 collisions, 11 are rear-end type. The trend needs to be investigated further. The final conclusion that no mitigation measures are required as the number of collisions is relatively low is very generic without determining criteria for a “low number” of collisions. Please revise accordingly.

Response: The rear end collisions at Highway 50 and Columbia Way have been analyzed in greater depth and it was determined that majority of the collisions involved drivers following too close, or speeding. The rest of the collisions have not been attributed to a specific cause. Amber times have been reviewed at this intersection using OTM Book 12 guidelines and the amber times currently provided for the north and south approaches of the Highway 50 and Columbia Way intersection align with the OTM recommended amber times for the posted speed limit of 60 km/hr. The final conclusion has been expanded to clarify out findings that the collisions could be primarily attributed to human behaviour. As a result, no mitigation measures have been proposed.

Comment 5:
The 2028 future background traffic should include traffic from phase 1 of the development to show the incremental impact of phases.

Response: Excluding site-generated volumes from future background analysis scenarios ensures a distinct separation between capacity constraints resulting from a proposed development and capacity constraints induced by background conditions, such as background developments and corridor growth. For this reason, each future analysis horizon includes a future background, as well as a future total scenario, where the future background scenarios include all projected study area trips, except the trips generated by the proposed development.

Comment 6:
Please provide detailed explanation (including sources) for using a factor of 1.28 to convert vehicle trips to person trips.

Response: A factor of 1.28 was used as it is commonly accepted by review authorities across GTHA to convert the ITE vehicle trip generation to person trip generation. It is calculated from a default 10% non-auto mode share and an average vehicle occupancy rate of 1.15 (i.e. 1.15/0.90 = 1.28). The updated TIS analysis does not include a 1.28 factor conversion, and instead utilizes existing study area mode shares to project total person trips. Please refer to the updated TIS for details.

Comment 7:
Please provide the rationale for using the LUC 822 Strip Retail Plaza for the ground floor commercial. Apparently, the description of Strip Retail Plaza doesn't apply to a ground floor commercial land use.

Response: The applicability of the land uses and the GFA of surveyed sites compared to the proposed GFA were considered when selecting an ITE Trip Generation Manual land use code. Businesses that are unlikely to be located at a ground floor commercial space of a residential building, such as a hardware store, were not considered. Further, the remaining land use data was examined to ensure that the proposed commercial GFA falls within the data range of the ITE survey. As a result, the comparable land uses were narrowed down to a Strip Retail Plaza, a Convenience Store, a Supermarket, and a Variety Store. A Strip Retail Plaza was selected as the most appropriate land use, as tenants of the proposed commercial space could include a variety of commercial establishments, some with higher and some with lower trip generation. Thus, compared to other homogenous short-listed land uses, a Strip Retail Plaza dataset provides a more sensible representation of a multi-tenant commercial space. Further, considering that a Strip Retail Plaza is described as an open-air plaza in ITE, the resulting vehicle trip generation is likely conservative, as commercial units in mixed-use buildings are likely to have a higher number of non-auto trips. Thus, a Strip Retail Plaza was considered as an appropriate and conservative land use category for the site's vehicle trip generation calculations.

Comment 8:

For the horizon 2028 and beyond, the site has been considered as a mixed-use development and accordingly internal trips capture has been calculated in accordance with the methodology in the ITE Trip Generation handbook 3rd Edition. Please include a discussion on suitability of the site as a mixed-use development in terms of the ITE handbook and include, with the report, the internal trip calculation spreadsheet tool provided in the handbook.

Response: To ensure conservative analysis, internal capture rates were only applied to the trip generation of the mixed-use building (Phase 3) within the updated TIS. In a mixed-use building, internal capture rates do not need to be adjusted by proximity, and thus, the internal capture rates from table 6.1 and 6.2 in the ITE Trip Generation Manual, 3d edition, were used directly. Tables 6.1 and 6.2 of the ITE Trip Generation Manual are attached in Appendix F of the updated TIS.

Comment 9:
Application of a shopping center pass-by trip rates to a ground floor commercial land-use is not appropriate and significantly overestimates the pass-by trips. Please remove the shopping center pass-by trips or use the pass-by trips from a similar land-use. Also, the pass-by trip rates are for vehicle trips whereas in the TIS the rates have been applied to person trips.

Response: Although some pass-by trips are expected to be generated by the ground-floor commercial land uses, shopping pass-by trips have been removed from the analysis as part of the updated TIS to ensure a conservative analysis.

Comment 10:
Mode shares from TTS 2016 have been used for Ward 4 instead of the Peel Region Sustainable Mode share targets for 2041. Please provide a comparison of TTS 2016 and the Peel mode share targets and add a discussion as to why the TTS 2016 mode shares are the most appropriate to use.

Response: A comparison between 2011 and 2041 Peel target mode shares as well as the 2016 TTS mode shares has been provided in the updated TIS. The 2016 TTS mode shares have been used in the analysis to ensure a conservative approach. The study area currently has minimal non-auto infrastructure with limited plans to expand active transportation networks in the area. However, the transit mode share has been increased to account for the introduction of transit in Bolton after 2016 TTS data was collected. Please see the updated TIS for details.

Comment 11:
In Table 15: Mode Share Assumptions, please identify what is included in the "Other" category.

Response: Modes of travel included in the "Other" category include motorcycle, taxi and school bus trips.

Comment 12:
The Columbia Way & Kingsview Drive intersection is signalized under existing conditions. Please revise all the LOS and Queue tables in the TIS to reflect this.

Response: The intersection label has been corrected in the updated TIS.

Comment 13:
The Queue Tables in the TIS should include link distances as well to determine if the proposed development will result in any blocked intersections.

Response: Link distances have been included in queue tables as part of the updated TIS.

Comment 14:
Please also include average queue lengths in the Queue Tables when the 95th percentile queues exceed the available storage lengths/link distances.

Response: Average queues have been included where 95th percentile queues exceed available storage lengths.

Comment 15:
Considering the proposed development is located adjacent to an Elementary school, the walking speed should be reduced to 1.0 m/s according to the OTM Book 12.

Response: Noted. Flash Don't Walk times at the intersection of Kingsview Drive and Columbia Way have been adjusted to account for 1.0 m/s pedestrian walking speeds.

Comment 16:
Please relocate the Mississauga shared parking reduction calculation from Table 40: Parking Statistics Summary - Town of Caledon Zoning By-law to the parking justification in the sections below. Table 40 should focus only on the Town's Zoning By-law requirements.

Response: The shared parking reduction was removed from Town of Caledon Zoning By-Law Requirements table in the first resubmission package.

Comment 17:
Please provide more details on the shared parking reduction calculation from Mississauga's Parking, Loading and Stacking Lane Regulations.

Response: Please note that the shared parking reduction calculations have been removed as part of the first resubmission package. Please refer to the TIS for the updated parking reduction justification.

Comment 18:
Please provide a final parking rate recommendation in Section 6.2.4 for easier review.

Response: The final parking provision rates have been recommended for each development phase as part of the updated TIS. Please note that proposed parking is section 6.4.4 in the updated TIS.

Comment 19:
Please provide bicycle parking facilities based on the best practices of municipalities of similar size and context.

Response: Details pertaining to short term bicycle parking will be provided as part of the SPA stage of the proposed development. A total of 213 long-term bicycle parking spaces are proposed for the development.

Comment 20:
The TIS should include an Active Transportation section highlighting the proposed cycling and walking provisions, including a map illustrating the connections to the existing and future boundary networks and priority destinations such as transit stops, community services, local commercial establishments, etc. and dimensions of the proposed facilities.

Response: Noted. Additional information has been provided as part of the updated TIS.

Comment 21:

Please note that the proposed development should account for the recommended Multi-Use Paths along both sides of Columbia Way recommended in the Town's EA.

Response: Noted.

Comment 22:
Please note that the Town will require that Kingsview Drive extend north of Columbia Way through this parcel to provide connectivity to the lands to the north and a full-movement access.

Response: Noted.

Comment 23:
The proposed access on Highway 50 will be deferred for the Region's review.

Response: Noted.

Comment 24:
The Town does not support the proposed on-street parking along Columbia Way.

Response: The on-street parking has been removed from Columbia Way as part of the updated Site Plan.

Comment 25:
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 Towns comments in order and including details for how each comment has been addressed.

Response: Noted.

Comment 26:
The PJR and TIS speak to a Shared Parking regulation. The TIS speaks further about the Brampton and Mississauga shared parking regulations. Please note that the Town does not have shared parking at this time. Further justification is required as to why shared parking is appropriate for this site should be provided in the PJR.

Response: Please note that the shared parking reduction calculations have been removed as part of the first resubmission package. Please refer to the TIS for the updated parking reduction justification.

Comment 27:
Comments received from the Region of Peel dated August 31, 2022, note that an auxiliary turn lane is required for access proposed off of Highway 50. Please show this turn lane on updated drawings. (Town of Caledon, Planning Department, Development Planning)

Response: A Functional Design for the northbound right-turn lane at Site Access #1 has been prepared as part of the first resubmission package.

Public Traffic and Parking Comments

Comment 1:
With the addition of over 545 units, how is the increase in traffic going to be managed?

Response: The proposed development is anticipated to generate 93 inbound and 249 outbound AM peak hour vehicle trips, and 257 inbound and 170 outbound PM peak hour vehicle trips. On average, this is equivalent to

approximately 2 inbound and 4 outbound vehicles per minute during the AM peak hour, and 4 inbound and 3 outbound vehicles per minute during the PM peak hour. The site trips generated were added to the background network volumes and Synchro analysis results indicate that the study area intersections operate within acceptable levels of service with the proposed development in place. Signal phasing adjustment may be required to optimize traffic flow; however, the analysis shows that no substantial signal timing modifications such as addition of new phases or extension of signal cycle time is required to accommodate the proposed site due to sufficient residual capacity currently available in the network.

Comment 2:
How does the traffic patterns differentiate between a residential and commercial development?

Response: The trip generation was completed using ITE rates. The trip generation was calculated for each phase and land use separately. ITE rates account for different traffic patterns between different land uses, such as residential and commercial. ITE also considers the inbound and outbound percentages for each land use for each period (i.e., weekday AM and weekday PM).

Comment 3:
Has the traffic study taken into account the neighbouring high school? If so, how?

Response: The updated TIS includes 2023 Turning Movement Counts from June 27th. On June 27th the school was still in session, with principal days being June 28th, 29th and 30th. On this day, an AM peak hour was observed at 7:45 AM to 8:45 AM and an afternoon peak at Kingsview Drive and Columbia Way intersection was observed at 2:15 to 3:15 PM, which align with the beginning and the end of a school day. Additionally, a PM peak hour of 4:45 PM to 5:45 PM was observed. The afternoon peak was observed to have 24 more hourly intersection trips when compared to the PM peak hour and as a result, a sensitivity scenario was created to analyze the afternoon peak (2:15 to 3:15 PM) at Kingsview Drive and Columbia Way, in addition to AM and PM peak hour analysis undertaken at this intersection as part of the larger study area network evaluation. The sensitivity scenario combines the afternoon peak traffic with the PM peak hour trip generation of the proposed development, which is conservative. Both the AM and PM peak hour, as well as the afternoon peak hour future total intersection analyses indicate sufficient residual capacity and an acceptable level of service at Kingsview Drive and Columbia Way.

Comment 4:
How will you keep it safe for bus drivers, commuters, and pedestrians as Columbia Way is a busy street?

Response: The planned changes to Columbia within the vicinity of the subject development include an urban reconstruction of Columbia Way, and a multi-use pathway along the south side of the road. The sidewalk along the north side of Columbia Way, east of Kingsview Drive will remain, and will be extended west towards Highway 50. Pedestrian crossings are present at the intersection of Highway 50 and Columbia Way, and Columbia Way at Kingsview Drive. Columbia Way adjacent to the site is within a "Community Safety Zone" and has a posted speed limit of 40km/h. This will encourage for bus drivers and commuters to travel at lower speeds. The on-street parking along Columbia Way which was proposed as part of the original submission has been removed to reduce number of parking maneuvers and, as a result, potential conflicts. Additionally, Site Access #2, originally proposed along Columbia Way, has been moved from Columbia Way to the extension of Kingsview Drive.

Comment 5:
Are there any changes required to the lane configuration of Columbia Way based on this proposal?

Response: No changes to the lane configuration of Columbia Way are required as part of this proposal, beyond what has been previously proposed within the Columbia Way EA future roadway improvement design.

Comment 6:
The proposed plan has a roadway entrance heading north into the development halfway between Highway 50 and Kingsview Dr. The intersection at Kingsview is already signalized, why not use this for the entrance? Additionally, most of the traffic studies were done when normal traffic volumes for St Michael's High School were not present.

Response: The north-south site access along Columbia Way, which was proposed as part of the original submission, has been moved to the future extension of Kingsview Drive. Please see the proposed Site Plan for details. Additionally, as part of the first resubmission package, new 2023 traffic counts were undertaken in June, when school was still in session. This included AM, PM, as well as the afternoon peak hour counts at Columbia Way and Kingsview Drive, with the afternoon peak analysed as part of a conservative sensitivity scenario. All future total analysis results indicate sufficient residual capacity within the study area and acceptable traffic operations.

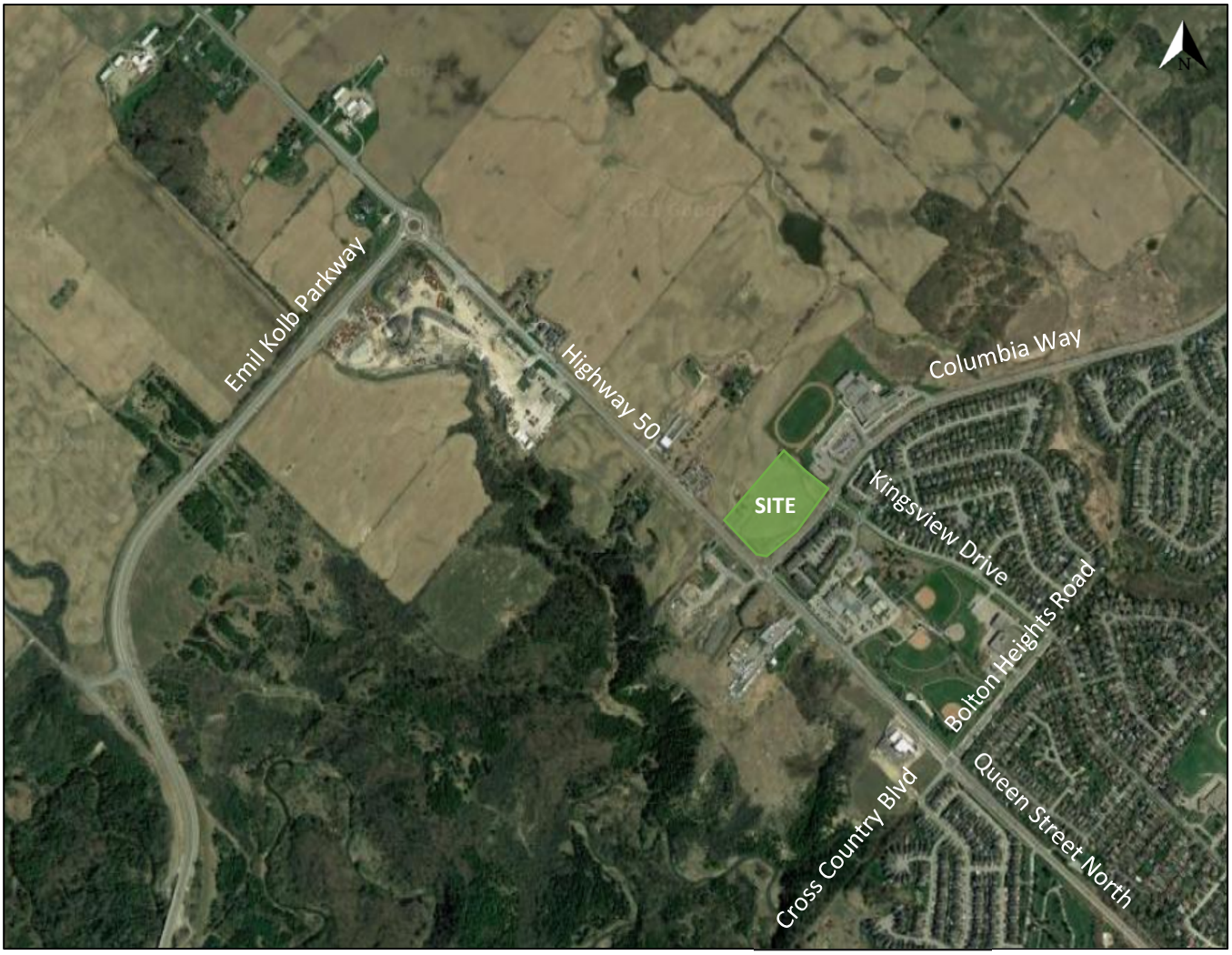
Comment 7:
How are you planning on dealing with parking? There are existing issues in the neighbourhood causes by a shortage of parking spaces.

Response: The parking provisions at the proposed development are expected to meet the demands of future residents and patrons based on the parking justification outlined in the updated TIS. Additionally, the proposed development includes a number of Transportation Demand Management measures which are expected to incentivise non-auto travel to the proposed development. These include a comprehensive network of on-site pedestrian facilities, long-term weather-protected bike parking, short-term bike parking, transit discount cards for commercial staff, and online information on transit and active modes.

1 Introduction

This Transportation Impact Study has been prepared to support the Official Plan Amendment and Zoning By-law Amendment application for the Columbia Square Inc. property located at 14245 Highway 50 in Caledon. The subject site is currently a greenfield property and is planned as a mixed-use development including residential and commercial uses. The residential land uses are a mix of mid-rise and townhouse style buildings. The retail space will be located on the ground floor of the building located on the northeast corner of Highway 50 and Columbia Way. A total of 228 townhouse units, 534 mid-rise apartment units, and 1,726 square metres of retail space is proposed. A total of 1,099 parking spaces is proposed, located at grade and across two underground parking levels. The full-build-out and occupancy of the proposed development will occur in phases, with completion of Phase 1 expected to occur in 2028, and the full build-out of Phase 2 and Phase 3 expected by 2030. Therefore, the analysis presented herein includes 2023 existing, 2028 future background, 2028 total future, 2030 future background, 2030 total future, 2033 future background, 2033 total future, 2035 future background, and 2035 total future conditions. Figure 1 illustrates the site context. Figure 2 illustrates the proposed development concept plan.

Figure 1: Site Context

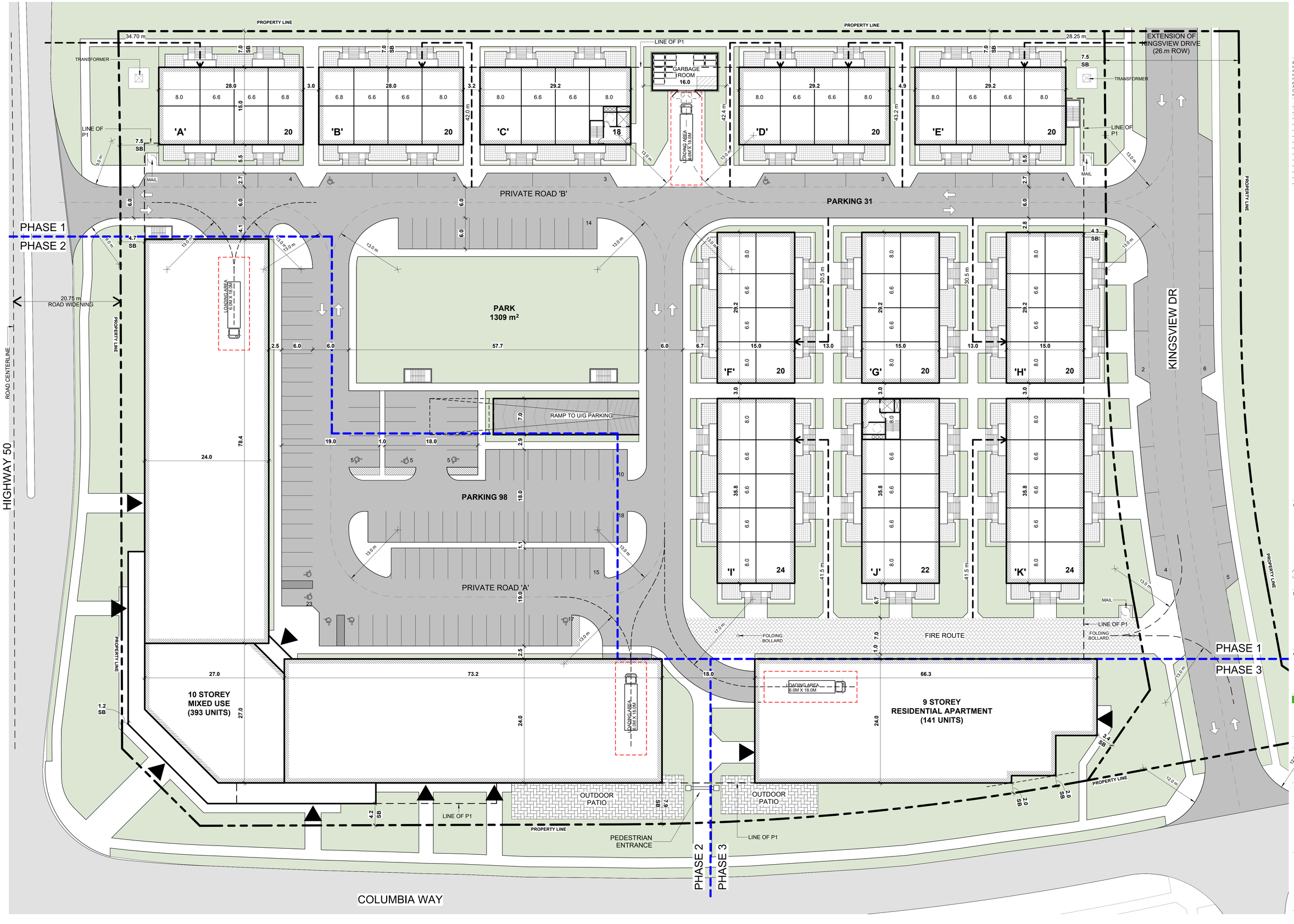


The proposed development will have two unsignalized accesses; one access onto Highway 50 (Site Access #1) and one onto the future Kingsview Drive extension (Site Access #2). Site Access #1 will be a right-in / right-out access, with a stop control on the westbound approach, and Site Access #2 is proposed as a full-movement access, with

a stop control on the eastbound approach. Site Access #1 is located on Highway 50, approximately 125 metres north of Columbia Way, and Site Access #2 is located along the future extension of Kingsview Drive, approximately 115 metres north of Columbia Way, measured curb to curb. Access configurations will be confirmed through analysis in this study. Site Access #1, Site Access #2, and the Kingsview Drive extension to site Access #2 will be built-out in conjunction with Phase 1.

The scope of this TIS has been confirmed with transportation staff from the Town of Caledon and the Region of Peel. Email correspondence regarding the scope can be found in Appendix A.

Figure 2: Concept Plan



COLUMBIA SQUARE

BOLTON, ONTARIO

No.	Description	Date
1	ISSUED FOR OPA	2023/12/15
16	ISSUED FOR OPA/ZBA	2024/03/25

Context Plan

Project North

Stamp

Clients

Columbia Square Inc.

KFA architects + planners inc.
197 SPADINA AVE + SUITE 500
TORONTO + ON + M5T 2C8
416.633.6226 – telephone
www.kfarchitecture.com

Project No.:	20065
Scale:	1 : 300
Issue Date:	12/15/2023
Drawn By:	

Title

SITE PLAN PHASES 1, 2, 3

No.

A100

2 Existing Conditions

2.1 Area Road Network

Highway 50/Queen Street North

Highway 50 / Queen Street North (Regional Road 50) is an arterial road under the jurisdiction of the Region of Peel and has a posted speed limit of 60 km/h. It has a two-lane, cross-section north of Columbia Way, and a three-lane cross-section to the south of Columbia Way. Highway 50 / Queen Street North has paved shoulders on both sides of the road, and a sidewalk on the east Highway 50 / Queen Street between Columbia Way and Bolton Heights Road / Cross Country Boulevard, and a sidewalk on the west side of Highway 50 / Queen Street North to the south of Bolton Heights Road / Cross Country Boulevard. The Regional Official Plan protects a 36-metre right-of-way for Highway 50 / Queen Street North. Heavy truck restrictions are present on Highway 50 / Queen Street North between Healey Road and Emil Kolb Parkways.

Columbia Way

Columbia Way is a Town of Caledon collector road with a two-lane cross-section. East of Highway 50 / Queen Street North, Columbia Way has gravel shoulders on both sides of the road and a sidewalk on the south side of the road. West of Highway 50, Columbia Way has grass shoulders on both side of the road. The posted speed limit is 40 km/h for Columbia Way, east of Highway 50 and as no speed limit is posted west of Highway 50, a speed limit of 40 km/hr has been assumed. Within the Study Area, Columbia Way is noted as a Community Safety Zone east of Highway 50. The Town of Caledon Official Plan protects a 30-metre right-of-way for Columbia Way.

Emil Kolb Parkway

Emil Kolb Parkway (Regional Road 150) is an arterial road under the jurisdiction of the Region of Peel and has a posted speed limit of 70 km/h. Emil Kolb Parkway has a two-lane cross-section with curbs and gutters as well as paved shoulders. The Regional Official Plan protects a 45-metre right-of-way for the road.

Kingsview Drive

Kingsview Drive is a Town of Caledon local road with a two-lane cross-section and a posted speed limit of 40 km/h. Kingsview Drive has curbs and gutters as well as sidewalks on both sides of the road. The Town of Caledon Transportation Master Plan indicates a 17 to 20-metre right-of-way for Kingsview Drive.

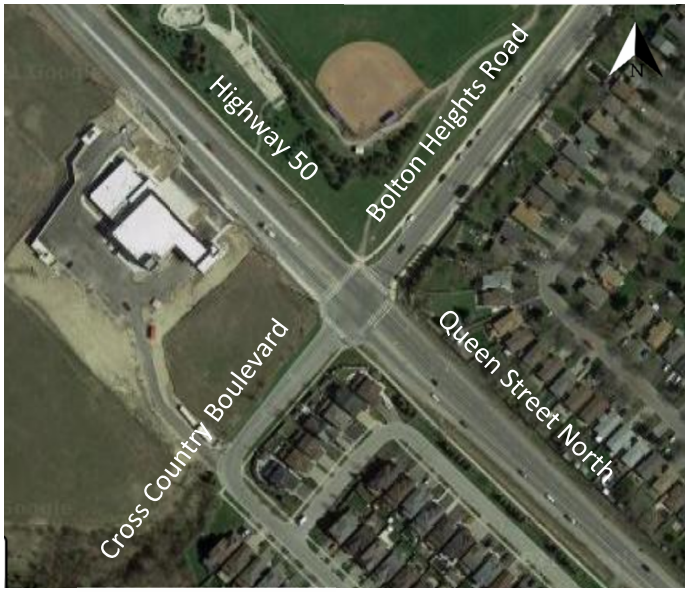
Bolton Heights Road/Cross Country Boulevard

Bolton Heights / Cross Country Boulevard Road is a Town of Caledon collector road east of Highway 50 / Queen Street North and a local road to the west of Highway 50 / Queen Street North. Bolton Heights / Cross Country Boulevard has a two-lane cross-section and a posted speed limit of 40 km/h. Bolton Heights Road has bike lanes, on-street parking, curbs and gutters, and sidewalks on both sides on the road. Cross Country Boulevard has curbs and gutters on both sides of the road, and a sidewalk on the south side of the road. The Town of Caledon Official Plan protects a 26-metre right-of-way for Bolton Heights Road, and The Town of Caledon Transportation Master Plan indicates a 17 to 20-metre right-of-way for Cross Country Boulevard.

2.2 Existing Intersections

Highway 50 / Queen Street North at Bolton Heights Road / Cross Country Boulevard

The intersection of Highway 50 / Queen Street North at Bolton Heights Road / Cross Country Boulevard is a signalized intersection with an auxiliary left-turn lane, two through lanes, and an auxiliary right-turn lane on the northbound approach. The southbound approach consists of an auxiliary left-turn lane, a through lane, and an auxiliary right-turn lane on the southbound approach. Both the eastbound and westbound approaches have auxiliary left-turn lanes and shared through / right-turn lanes. While no general turn restrictions are present at this intersection, no trucks are permitted on any of the intersection legs.



Highway 50 at Columbia Way

The intersection of Highway 50 at Columbia Way is a signalized intersection. Both the northbound and southbound approaches consist of auxiliary left-turn lanes, through lanes, and auxiliary right-turn lanes. Both the eastbound and westbound approaches have an auxiliary left-turn lane, and a shared through / right-turn lane. Trucks are prohibited on the north, south, and east leg of the intersection. Signage indicating trucks, with the exception of local deliveries, are prohibited from performing a westbound left-turn at the intersection is noted.

Columbia Way at Kingsview Drive

The intersection of Columbia Way at Kingsview Drive is a signalized intersection with three approaches. The southbound approach consists of a shared left-turn /right-turn lane. The eastbound approach consists of a shared through / right-turn lane, and the westbound approach has a shared left-turn / through lane. While no general turn restrictions are present at this intersection, no trucks are permitted on any of the intersection legs.

Emil Kolb Parkway at Highway 50

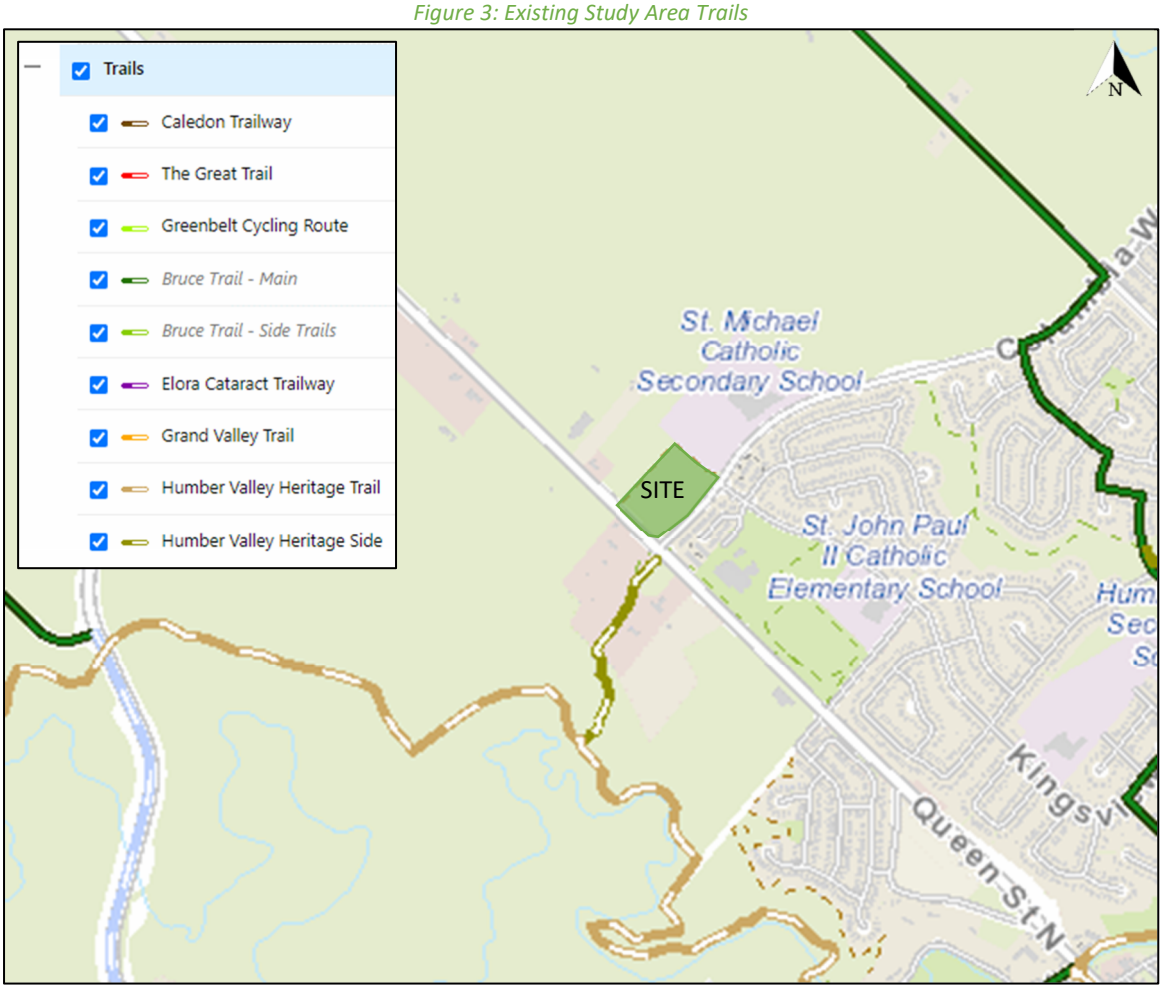
The intersection of Emil Kolb Parkway at Highway 50 is a three-legged roundabout. The eastbound approach consists of a left-turn lane, and an auxiliary shared left-turn / right-turn lane. The northbound approach has a shared left-turn / through lane, and an auxiliary through lane. The southbound approach consists of a through lane, and an auxiliary right-turn lane. While no general turn restrictions are present at this intersection, no trucks are permitted on the south leg of the intersection.

2.3 Cycling and Pedestrian Facilities

As discussed in Section 2.1, sidewalks are provided on one side of Columbia Way, Cross Country Boulevard, and on Highway 50 / Queen Street North south of Columbia Way. Sidewalks are provided on both sides of Kingsview Drive and Bolton Heights Road in the Study Area.

Additionally, the Humber Valley Heritage Side Trail is present within the Study Area as shown in Figure 3 below.

Figure 3: Existing Study Area Trails



Note: Capture from the Town of Caledon's Trails and Cycling Routes Online Map. Accessed on: July 21, 2021. Accessed at: https://maps.caledon.ca/h5/index.html?viewer=Trails.Trails

Within the Study Area limited cycling infrastructure is provided with paved shoulders on the majority of Highway 50 / Queen Street North, and on-street bike lanes area provided on Bolton Heights Road.

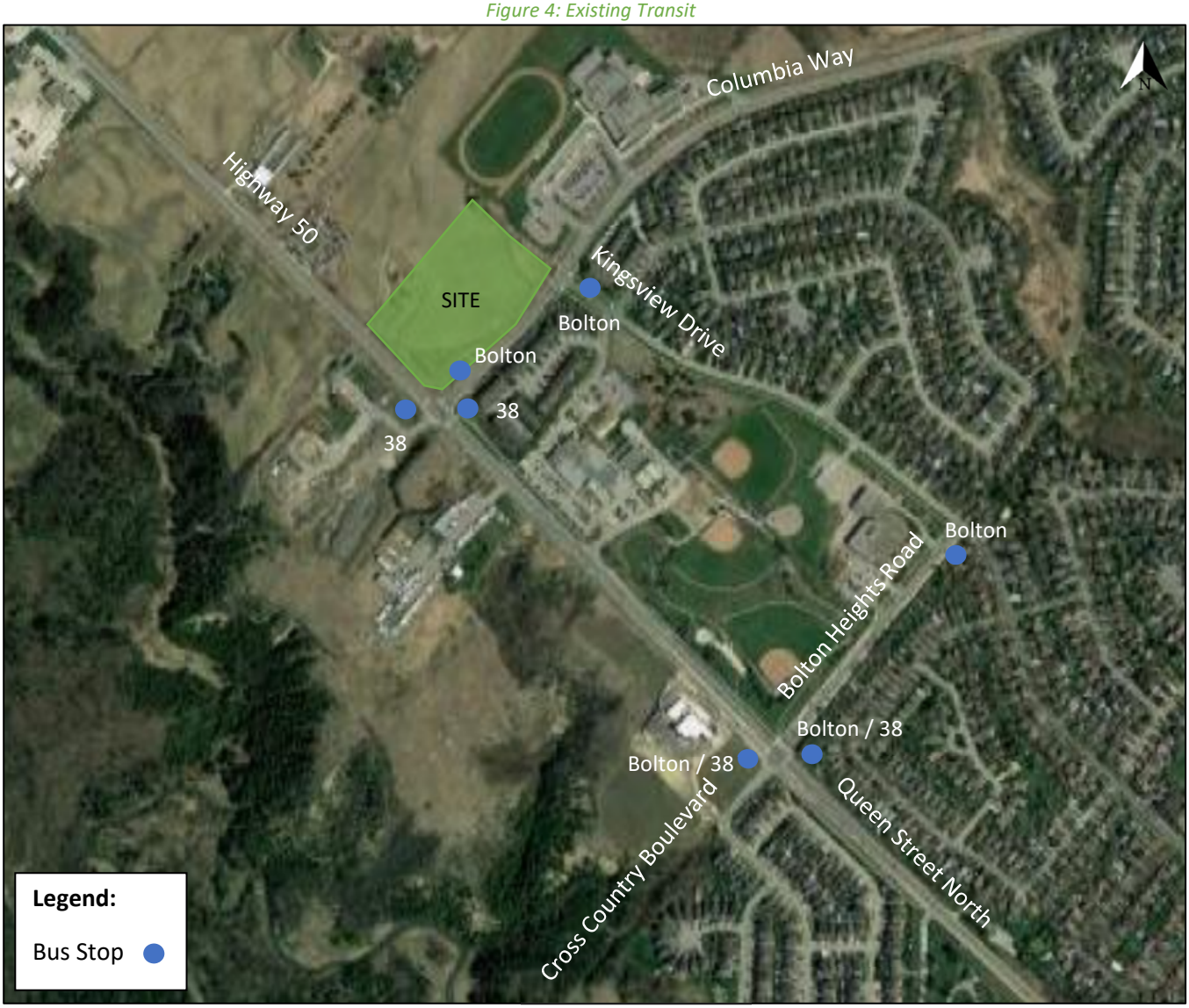
2.4 Existing Transit

Transit service within the Study Area includes both local and inter-regional transit. The local Bolton Line provides peak period services along Highway 50 between Queen Street and Columbia Way. Five stops are located within the Study Area, servicing Highway 50, Columbia Way, Kingsview Drive, and Bolton Heights Road. This bus route includes a transfer point to Brampton Transit at Highway 50 and Queen Street that includes connections to York University, Downtown Brampton, and Mount Pleasant GO Station. GO Transit Bus Route 38 provides one-way peak period service between Malton GO Station and the Bolton area. Four stops are present within the Study Area, with two at the intersection of Highway 50 / Queen Street and Bolton Heights Road, and two at the intersection of Highway 50 and Columbia Way. Accessing the Malton GO Station via this route provides connections to Toronto Union Station and Mount Pleasant GO Station. Table 1 below summarizes the existing schedule for transit services and the stop locations within the Study Area can be seen in Figure 4.

Table 1: Transit Routes Information

Route	Location	Direction	Time
Bolton Line	Highway 50 @ Bolton Heights Road	Bolton to Queen Street	6:00 AM
		Queen Street to Bolton	3:00 PM
	Bolton Heights Road @ Kingsview Drive	Bolton to Queen Street	6:01 AM
		Queen Street to Bolton	3:01 PM
	Kingsview Drive @ Columbia Way	Bolton to Queen Street	6:02 AM
		Queen Street to Bolton	3:02 PM
	Highway 50 @ Columbia Way	Bolton to Queen Street	6:02 AM
		Queen Street to Bolton	3:02 PM
38	Highway 50 @ Bolton Heights Road	Bolton to Malton GO	5:06 AM
		Malton GO to Bolton	5:08 PM
	Highway 50 @ Columbia Way	Bolton to Malton GO	5:05 AM
		Malton GO to Bolton	5:17 PM

Figure 4: Existing Transit



2.5 Existing Peak Hour Travel Demand

To understand the existing AM and PM peak hour traffic volumes, turning movement counts for the Study Area intersections have been collected. Table 2 summarizes the date and source of the most recent turning movement count at each Study Area intersection.

Table 2: Turning Volume Count Data Dates

Location	Count Date	Data Source
Bolton Heights Drive / Cross Country Boulevard at Highway 50 / Queen Street South	Tuesday June 27, 2023	Ontario Traffic Inc.
Columbia Way at Highway 50	Tuesday June 27, 2023	Ontario Traffic Inc.
Kingsview Drive at Columbia Way	Tuesday June 27, 2023	Ontario Traffic Inc.
Emil Kolb Parkway at Highway 50	Tuesday June 27, 2023	Ontario Traffic Inc.

Due to scheduling, June 27th was the only day when the TMCs could be counted. On June 27th the school was still in session, with principal days being June 28th, 29th and 30th. On this day, an afternoon peak at Kingsview Drive and Columbia Way intersection was observed at 2:15 to 3:15 PM, which aligns with the end of school day. This peak was analyzed separately as part of a sensitivity scenario analysis for Kingsview Drive and Columbia Way intersection, in addition to the AM and PM peak analysis undertaken as part of a larger study area assessment.

The existing lane configurations are shown in Figure 5 and 2023 traffic volumes can be seen in Figure 6. Detailed turning movement count data, and the signal timing plans are provided in Appendix B. Additionally, pedestrian and cycling volume figures have been developed using the collected turning movement counts and are shown in Figure 7 and Figure 8, respectively. As expected, these volumes are relatively low given the limited active mode facilities within the Study Area, and the general area context.

Figure 5: Existing Lane Configuration

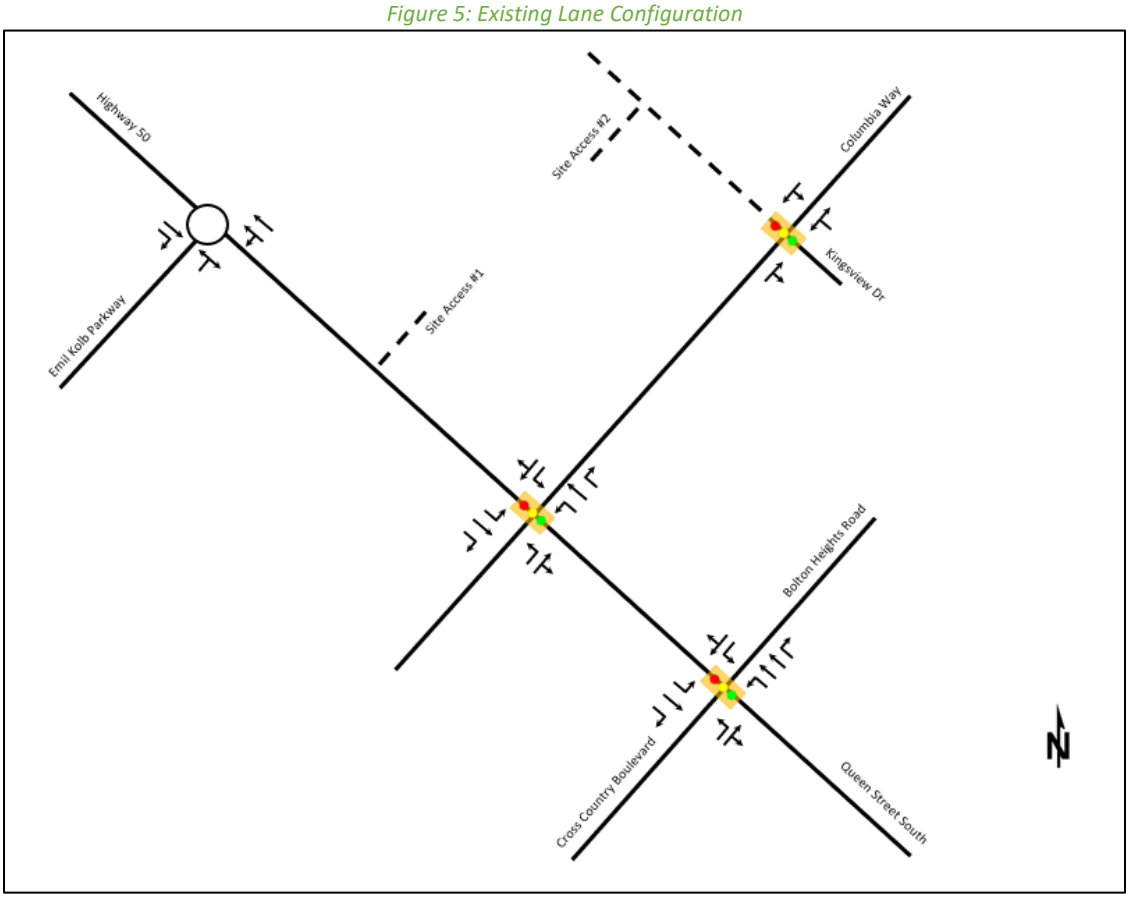


Figure 6: 2023 Traffic Volumes

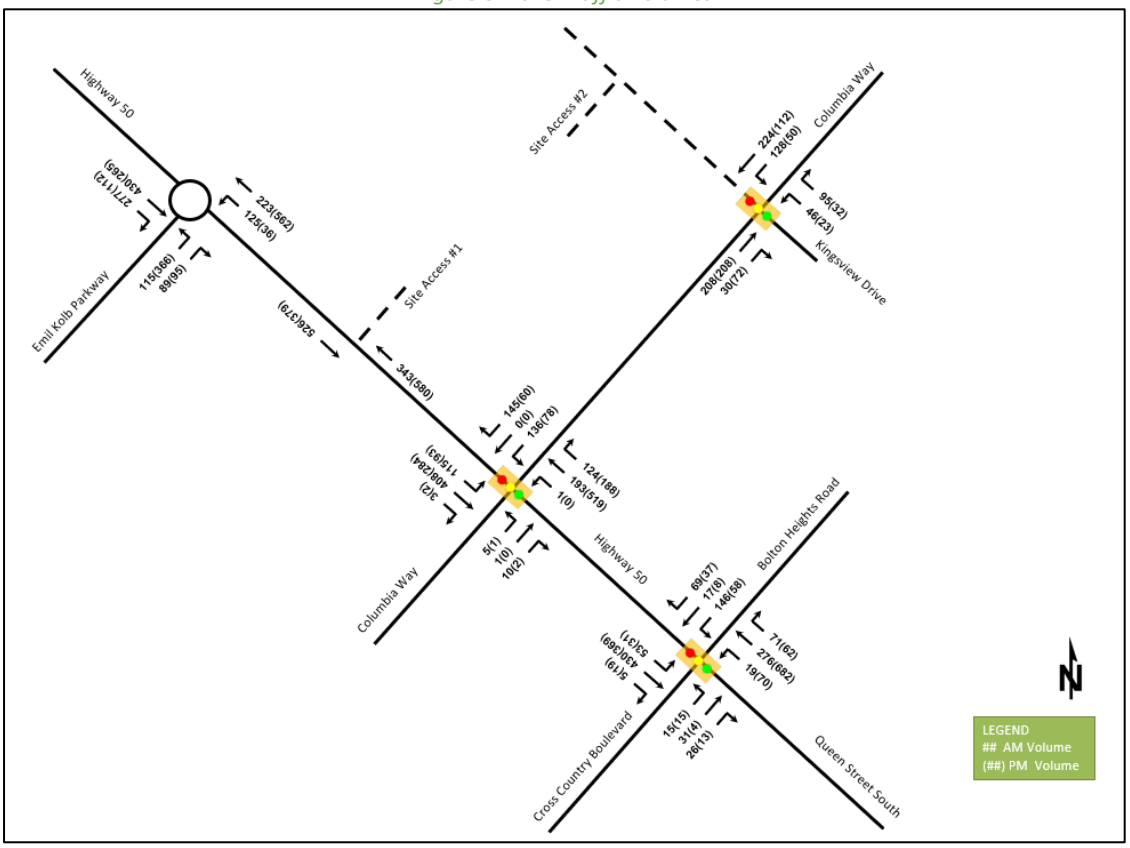


Figure 7: Existing Pedestrian Volumes

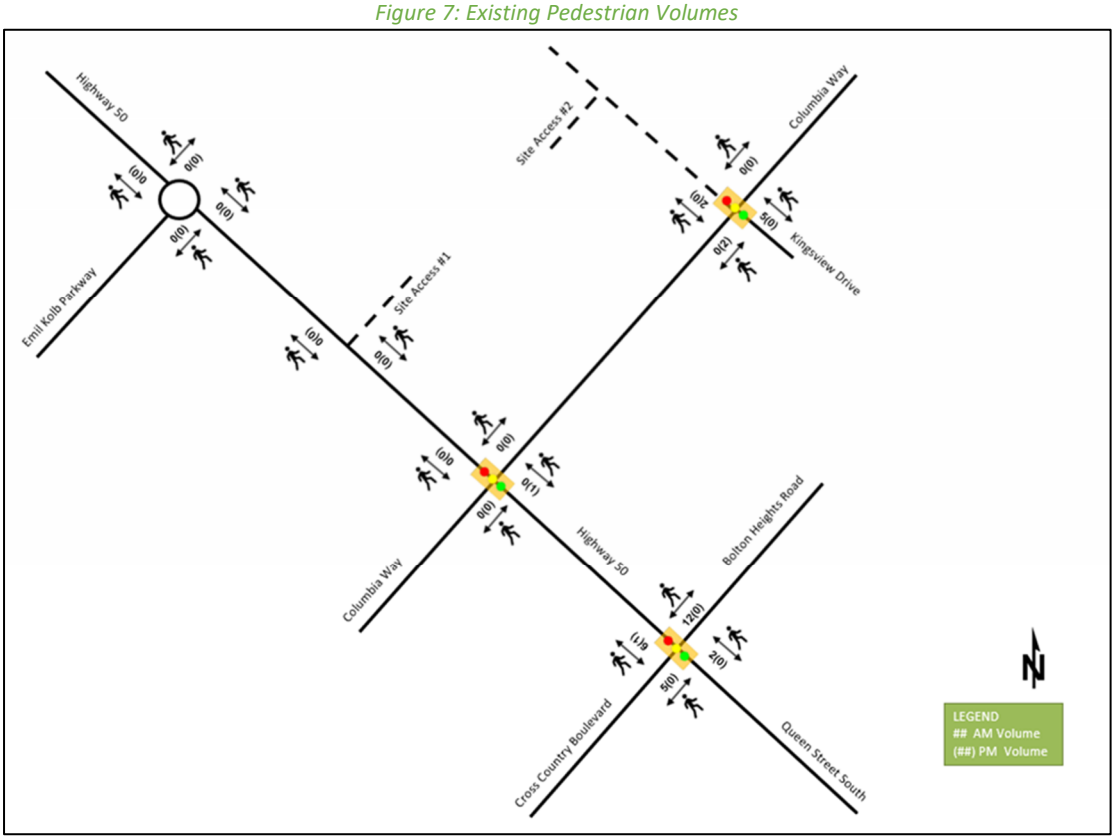
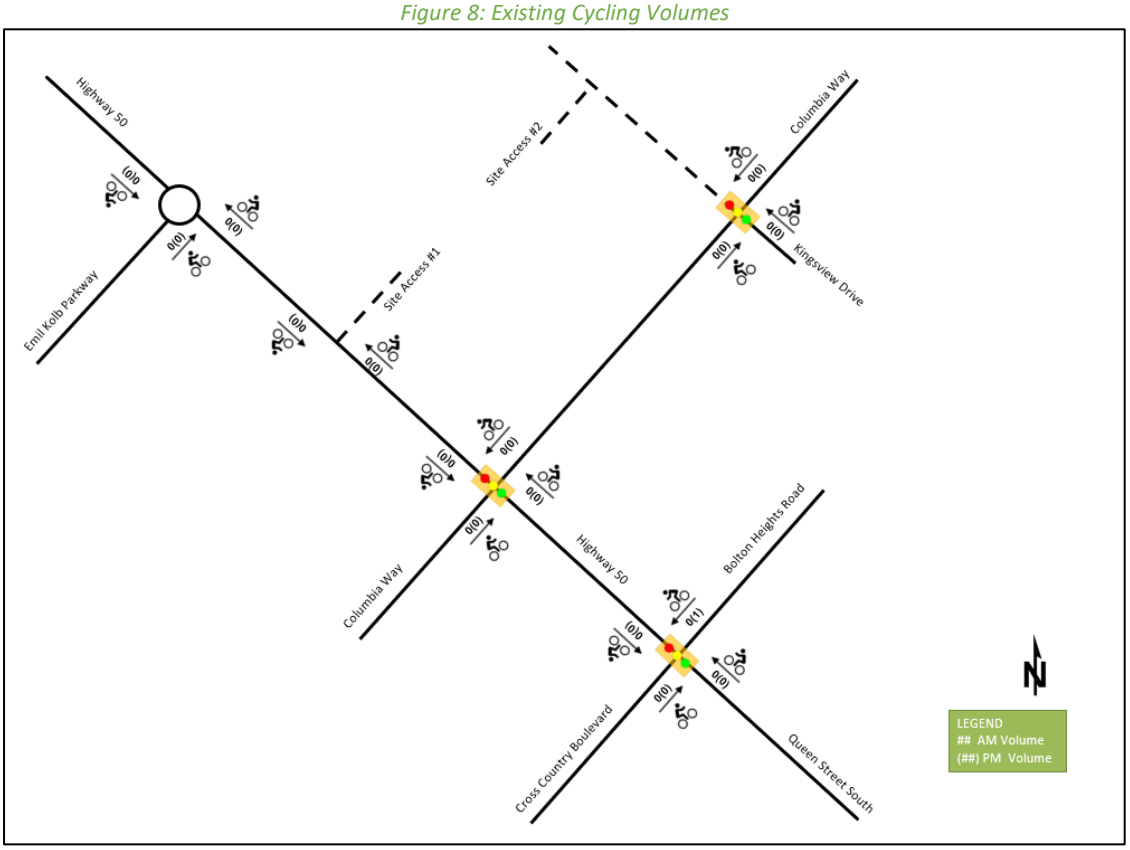


Figure 8: Existing Cycling Volumes



2.6 Collisions

Collision data has been provided for the Study Area intersections and road network by Peel Region and the City of Caledon. Data for five years (2015-2019) prior to the commencement of this TIS has been analyzed. Figure 9 illustrates the Study Area analyzed as part of the collision analysis, and Table 3 summarizes the total collisions for the intersections and road segments of interest. Collision data is included in Appendix C.

Figure 9: Study Area Analyzed for Collisions

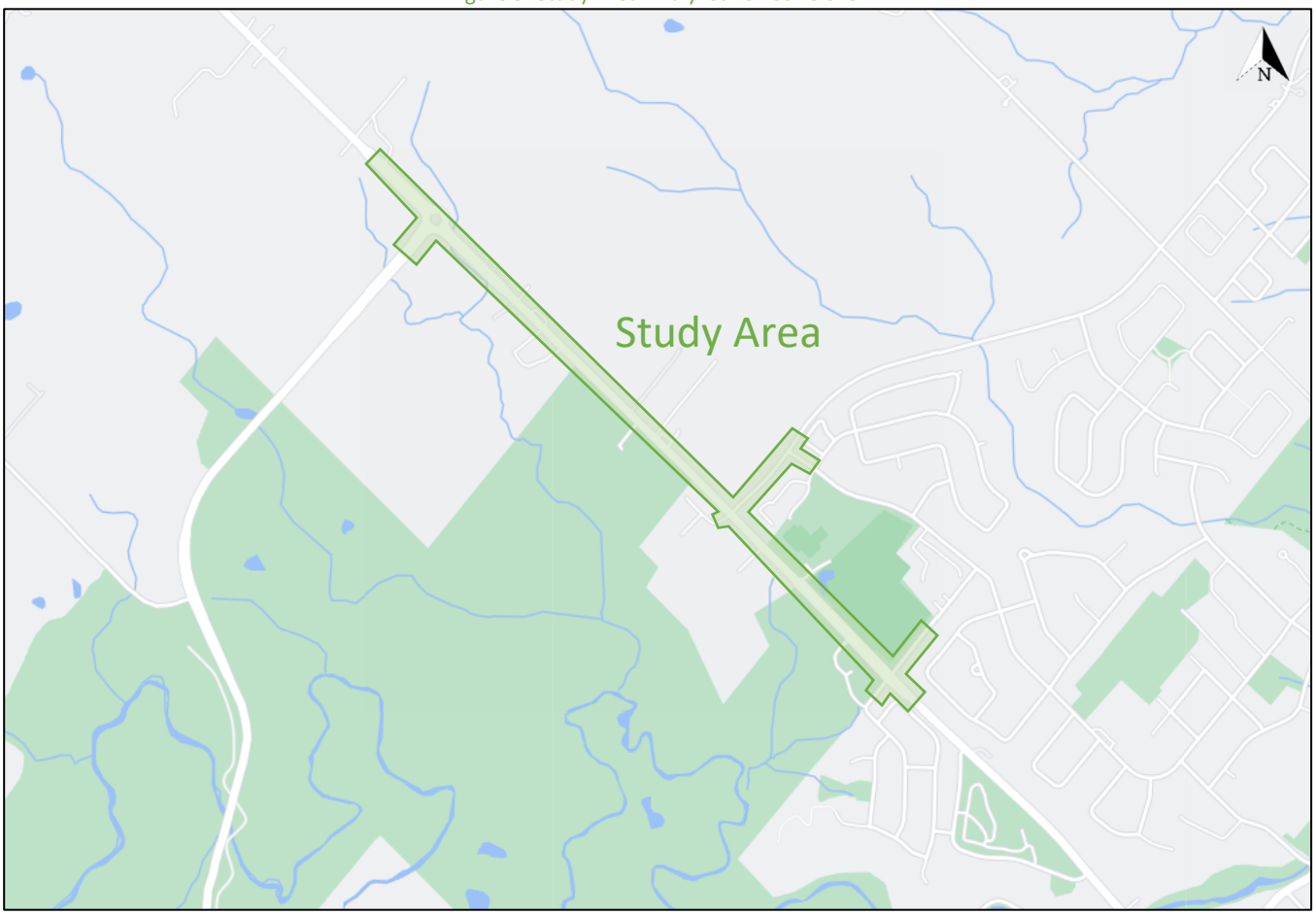


Table 3: Summary of Collision Locations

Intersections / Segments	Number	%
	21	**100%**
50 HY btwn COLUMBIA WAY/CAL WORKS YARD & EMIL KOLB PY	6	29%
50 HY @ COLUMBIA WAY/CAL WORKS YARD	13	62%
COLUMBIA WY @ KINGSVIEW DR	2	10%

Overall, 21 collisions have been noted within the Study Area, with the majority of these collisions occurring at the intersection of Highway 50 at Columbia Way. Table 4, Table 5, and Table 6, summarize the collision types and conditions at the intersections of Highway 50 at Columbia Way, Highway 50 and Emil Kolb Parkway, and Columbia Way at Kingsview Drive, respectively.

The intersection of Highway 50 at Columbia Way experienced 13 collisions between 2015-2019 with 11 involving property damage only, and the remaining two having non-fatal injuries. The majority these collisions occurred in daylight (54%) with most collisions categorized as rear end types (85%). Further analysis of rear end collisions showed that 58% were a result of drivers following too close, 17% were due to speeding, and 25% were not attributed to a specific cause. The amber times currently provided for the north and south approaches (4 seconds) aligns with the OTM Book 12 recommended amber time for a posted speed limit of 60 km/h (3.7 seconds). As the causes of these collisions were primarily attributed to human behaviour, no mitigation measures are proposed.

Table 4: Highway 50 at Columbia Way Collision Summary

		Number	%
Total Collisions		**13**	**100%**
Classification	Fatality	0	0%
	Non-Fatal Injury	2	15%
	Property Damage Only	11	85%
Light	Daylight	7	54%
	Dusk	1	8%
	Dark	3	23%
	Dark – artificial	2	15%
Initial Impact Type	Rear end	11	85%
	Turning Movement	2	15%
Environment	Clear	9	69%
	Rain	4	31%

The intersection of Highway 50 at Emil Kolb Parkway experienced six collisions between 2015-2019 with five involving property damage only, and the remaining collision having non-fatal injuries. Approximately 33% of collisions occurred in daylight with 50% collisions categorized as SMV Other. SMV Other collision type may be reflective of the drivers unsure of how to navigate the newly constructed roundabout intersection. Weather conditions are not considered a potential contributing factor for the reported collisions.

Table 5: Highway 50 at Emil Kolb Parkway Collision Summary

		Number	%
Total Collisions		**6**	**100%**
Classification	Fatality	0	0%
	Non-Fatal Injury	1	17%
	Property Damage Only	5	83%
Light	Daylight	2	33%
	Dusk	1	17%
	Dark	3	50%
Initial Impact Type	Rear end	1	17%
	Turning Movement	1	17%
	SMV Other	3	50%
	Other	1	17%
Environment	Clear	6	100%

The intersection of Columbia Way at Kingsview Drive experienced two collisions between 2015-2019 with both involving property damage only. One collision has been categorized as a rear end collision and the other as a turning movement collision. Weather conditions are considered a potential contributing factor for one of the reported collisions.

Table 6: Columbia Way at Kingsview Drive Collision Summary

		Number	%
Total Collisions		**2**	**100%**
Classification	Fatality	0	0%
	Non-Fatal Injury	0	0%
	Property Damage Only	2	100%
Light	No information available		
Initial Impact Type	Rear end	1	50%
	Turning Movement	1	50%
Environment	Clear	1	50%
	Rain	1	50%

The collision analysis above shows a relatively low number of incidents in the study area. The collision data shows that majority of the collisions can be attributed to driver error, such as following too close, failing to yield to right-of-way traffic, and disobeying traffic controls, or poor weather conditions. No collisions resulted in fatalities and the three collisions that resulted non-fatal injuries are due driver errors. Therefore, no mitigation measures are required. As the collisions do not show patterns or trends linked to poor traffic control operations or intersection configurations, no improvements are recommended.

3 Future Background Conditions

3.1 Changes to the Area Transportation Network

3.1.1 Columbia Way Improvements

Columbia Way is a Town of Caledon east-west collector road within the Study Area. A segment of Columbia Way between Highway 50 and Caledon King Townline is the subject of an Environmental Assessment to examine improvements to Columbia Way with the goal of improving traffic conditions as well as the safety of all road users. The completed EA report posted on October 13, 2021 indicates that the project is planned to start in 2023. As such, it has been assumed that the planned changes to Columbia Way and the resulting changes to the intersection of Columbia Way at Highway 50 and Columbia Way at Kingsview Drive will occur prior to all future analysis horizons and will therefore be considered in all future analyses.

Within the Study Area, an urban reconstruction including curbs and gutters, as well as a multi-use pathway on the south side of the road is planned in addition to intersection configuration changes. The Columbia Way Road design depicting these improvements can be seen in Appendix D.

3.1.2 Bolton Transportation Master Plan Study (2015)

The Bolton Transportation Master Plan Study indicates future active transportation improvements within the Study Area. Proposed buffered paved shoulders are shown on Highway 50, north of Columbia Way, proposed signed-only bike routes are shown on Bolton Heights Road / Cross Country Boulevard, and Kingsview Drive within the Study Area, and proposed in-boulevard multi-use trails are shown on Columbia Way between Highway 50 and Kingsview Drive.

The proposed in-boulevard multi-use trails on Columbia Way will be implemented as part of the Columbia Way improvements discussed above. All other proposed active mode improvements do not have indicated dates of construction or completion.

3.2 Other Study Area Developments

No proposed developments within close proximity to 14245 Highway 50 have been identified. Additionally, Town of Caledon staff have indicated that no surrounding proposed developments are required to be considered, as shown in Appendix A.

3.2.1 Background Growth

Town of Caledon staff provided AADT data for Bolton Heights Drive, Columbia Way, and Kingsview Drive, which was used to calculate the compound annual growth rates for these roads. The calculated compound growth rates are shown to vary drastically by year with negative growth rates in some instances, as a result of the overall low volumes on these roads. In order to produce a conservative analysis, a growth rate of 2% has been applied to Bolton Heights, and Columbia Way for all future analysis horizons. This is in accordance with instruction from Town staff in the event that no data is available for non-local town roads. No growth rate is required for Town of Caledon local roads, and as such, no growth rate will be applied to the tuning movements in and out of Kingsview Drive. As Cross Country Boulevard is a Town of Caledon local road but Bolton Heights is not, no growth rate has been applied to the eastbound left-turn, eastbound right-turn, northbound left-turn, and southbound right-turn

movements at the intersection of Bolton Heights Drive / Cross Country Boulevard at Highway 50 / Queen Street South.

A compound annual growth rate of 1.5% was provided by the Region of Peel for Highway 50 within the Study Area between 2021 and 2031. Region of Peel staff have indicated that no growth rate is available for Emil Kolb Parkway as it is a relatively new road and therefore a growth rate of 1.5% has also been applied to match the growth rate applied to Highway 50. Therefore, the compound annual growth rate of 1.5% will be applied at Highway 50 and Emil Kolb Parkway for all future analysis horizons. As stated in Section 2.5, correspondence with Region and Town staff regarding growth rates, as well as growth rate calculations can be seen in Appendix E.

3.3 Future Background Traffic Volumes

Combining the background growth rate discussed in Section 3.1.3 above, and the 2023 existing traffic volumes, the future background traffic volumes were projected. Figure 10 illustrates future background lane configuration. Figure 11 illustrates the 2028 future background traffic volumes, Figure 12 illustrates the 2030 future background traffic volumes, Figure 13 illustrates the 2033 future background traffic volumes, and Figure 14 and illustrates the 2035 future background traffic volumes.

Figure 10: Future Background Lane Configuration

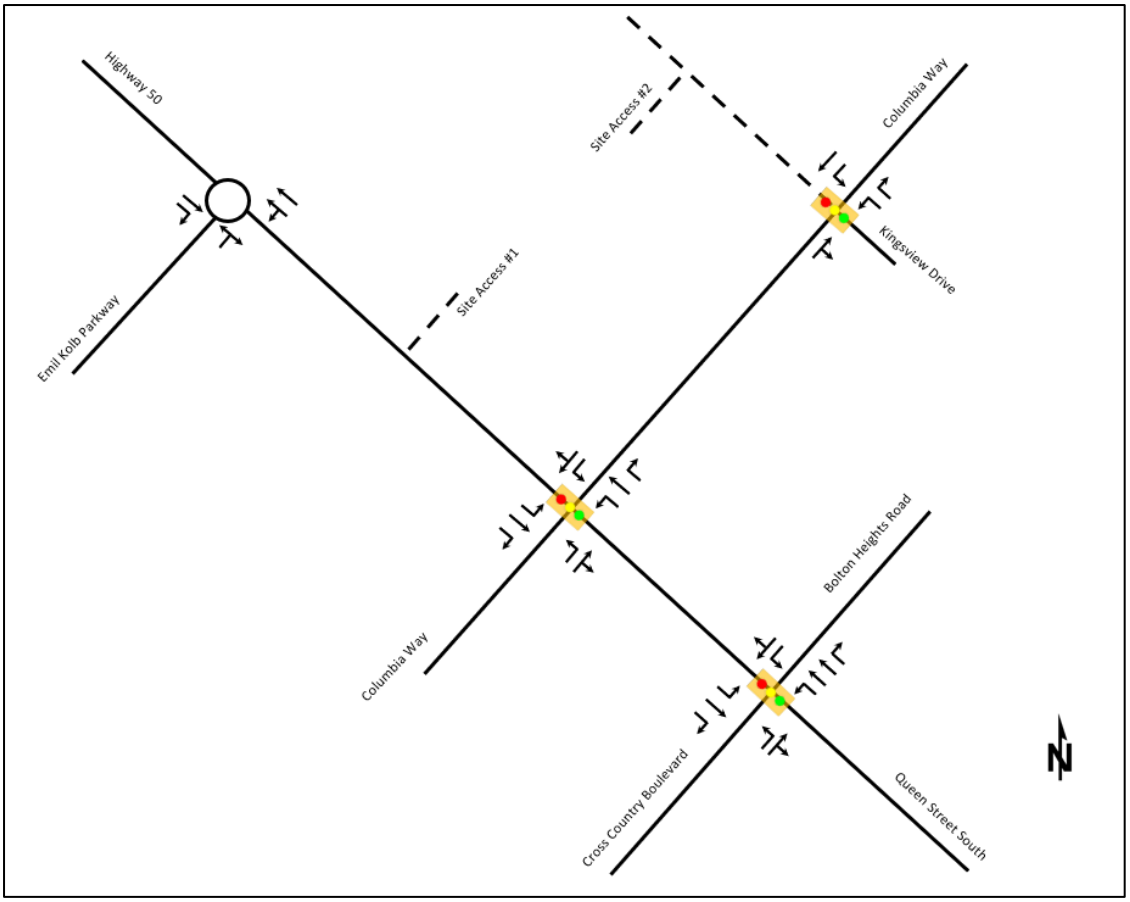


Figure 11: 2028 Future Background Traffic Volumes

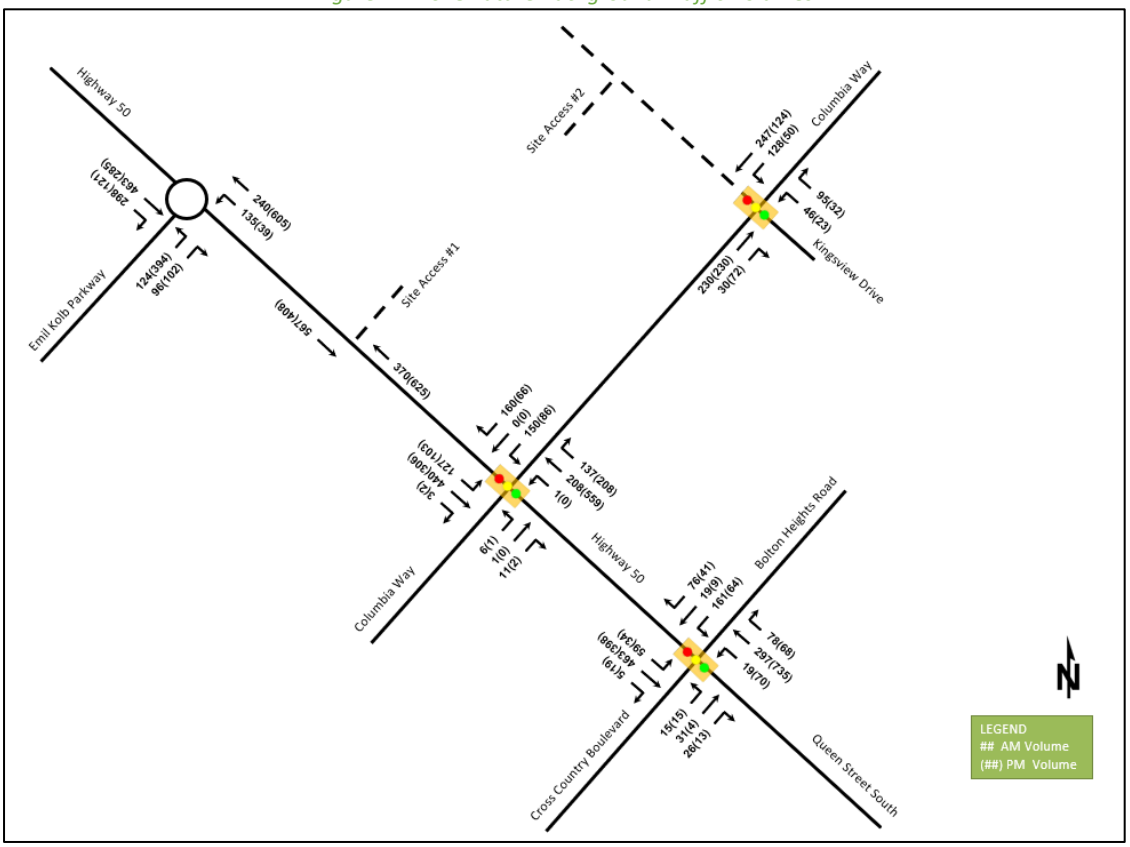


Figure 12: 2030 Future Background Traffic Volumes

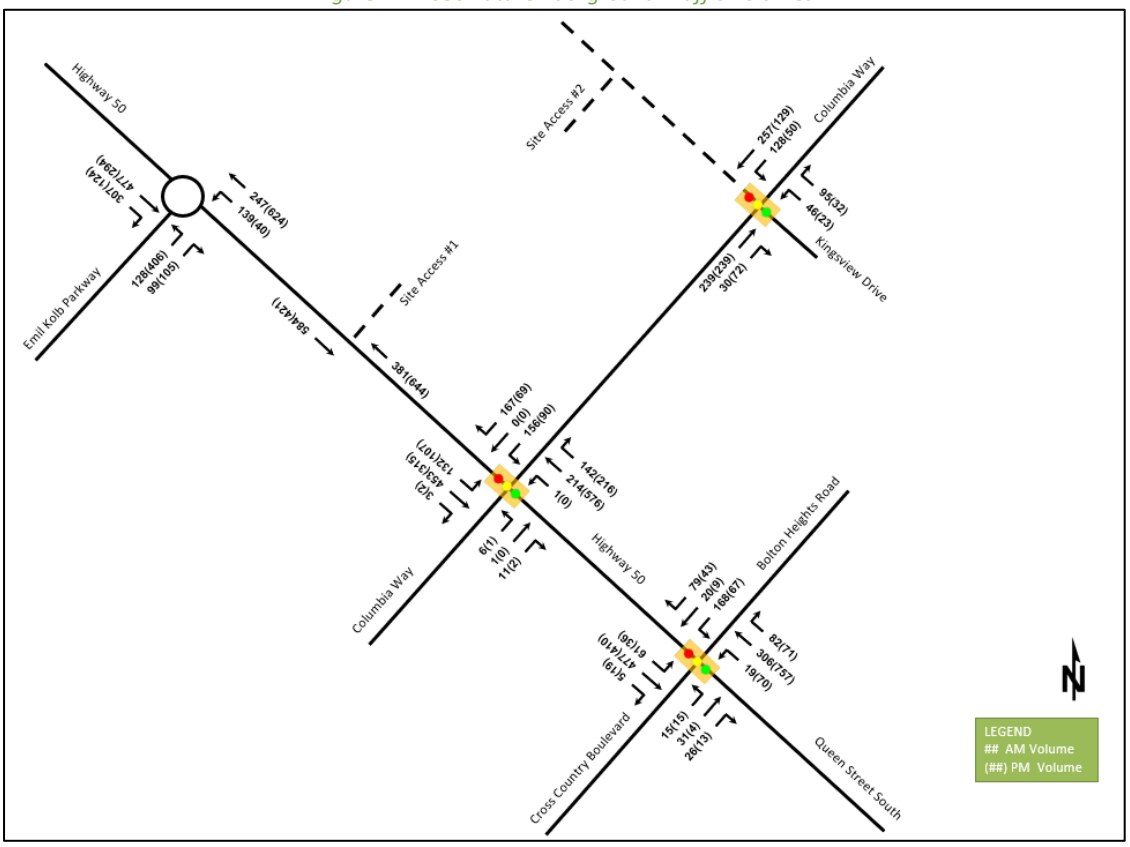


Figure 13: 2033 Future Background Traffic Volumes

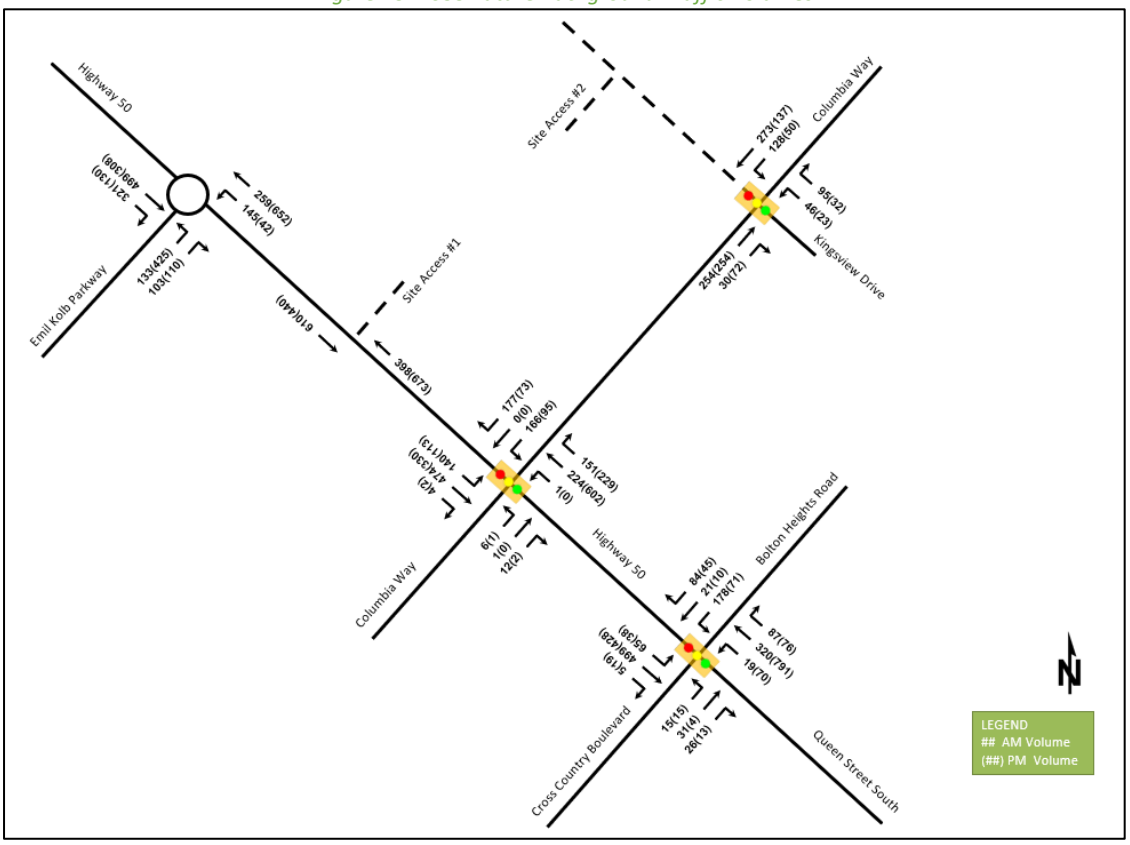
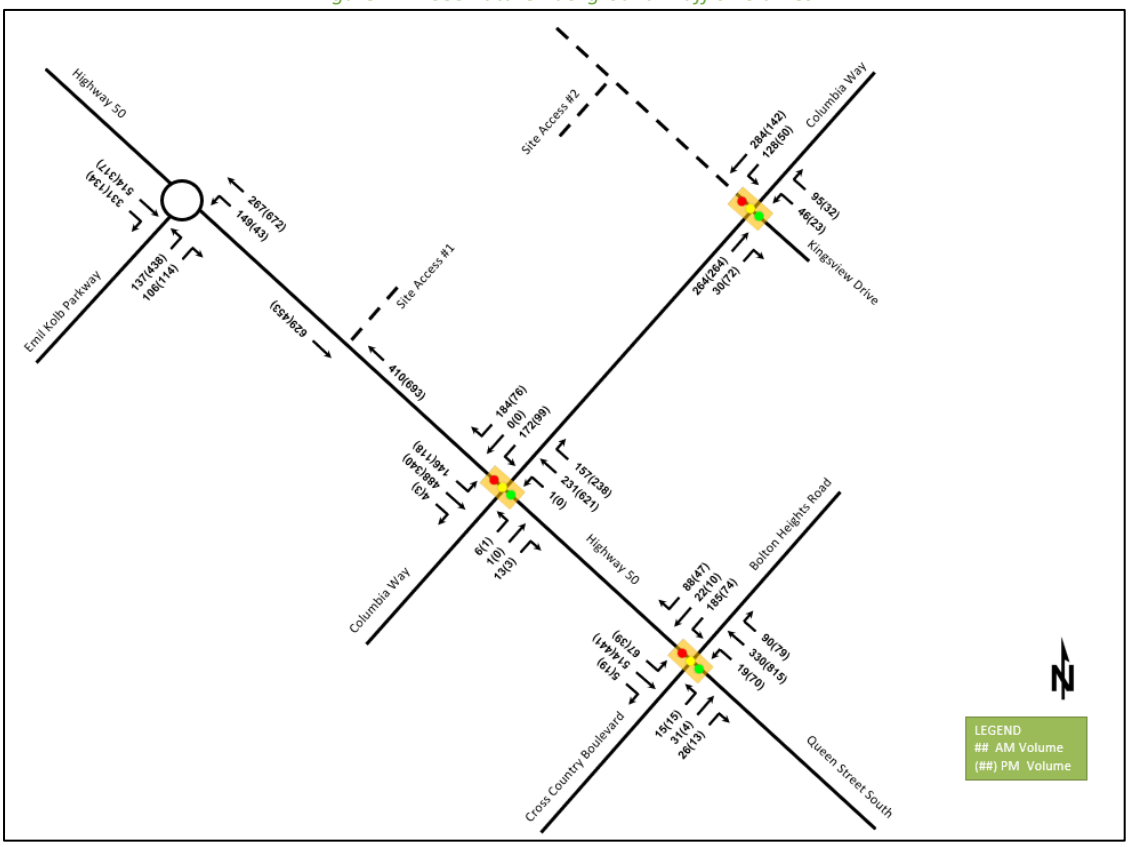


Figure 14: 2035 Future Background Traffic Volumes



4 Forecasting

4.1 Development-Generated Travel Demand

4.1.1 Trip Generation and Mode Shares

The ITE Trip Generation Manual 11th Edition has been reviewed to determine the appropriate trip generation rate equations for the proposed land uses. The vehicle trip fitted curve equations were used to determine appropriate vehicle trip generation rates. The Multifamily Housing (Low-Rise) trip generation rates have been used to estimate trips for stacked townhouse units. Multifamily Housing (Mid-Rise) trip generation rates have been used to estimate trips for the apartment units. Strip Retail (<40k) trip generation rates have been used to estimate trips for the retail land use.

The applicability of the land uses and the GFA of surveyed sites compared to the proposed GFA on site were considered when selecting an ITE trip generation manual land use code. Businesses that are unlikely to be located in ground floor commercial spaces of a residential building, such as a hardware store, were not considered. Further, the remaining land use data was examined to ensure that the proposed commercial GFA falls within the data range of the ITE survey. As a result, the comparable land uses were narrowed down to a Strip Retail Plaza, a Convenience Store, a Supermarket, and a Variety Store. A Strip Retail Plaza was selected as the most applicable land use, as tenants of the proposed commercial space could include a variety of commercial establishments, some with higher and some with lower trip generation. Thus, compared to other homogenous short-listed land uses, a Strip Retail Plaza dataset provides a more sensible representation of a multi-tenant commercial space. Further, considering that a Strip Retail Plaza is described as an open-air plaza in ITE, the resulting trip generation is likely conservative, as commercial units in mixed-use buildings are likely to have a higher number of non-auto trips. Thus, a Strip Retail Plaza was considered as an appropriate conservative land use category for the site's vehicle trip generation calculations.

Table 7 summarizes the resulting vehicle trip rates for the proposed land uses within Phase 1, Table 8 summarizes the vehicle trip rates for the proposed land uses within Phase 2, and Table 9 summarizes the vehicle trip rates for the proposed land uses within Phase 3.

Table 7: Vehicle Trip Generation Trip Rates Phase 1

Dwelling Type	ITE LUC	Peak Hour	Vehicle Trip Rate
Multifamily Housing (Low-Rise)	220	AM	0.41
		PM	0.52

LUC – Land Use Code

Table 8: Vehicle Trip Generation Trip Rates Phase 2

Dwelling Type	ITE LUC	Peak Hour	Vehicle Trip Rate
Multifamily Housing (Mid-Rise)	221	AM	0.41
		PM	0.39
Strip Retail Plaza (<40k)	822	AM	2.33
		PM	6.51

LUC – Land Use Code

Table 9: Vehicle Trip Generation Trip Rates Phase 3

Dwelling Type	ITE LUC	Peak Hour	Vehicle Trip Rate
Multifamily Housing (Mid-Rise)	221	AM	0.36
		PM	0.39

LUC – Land Use Code

The vehicle trip rates shown above have been calculated using the fitted curve equations, where applicable, and the unit counts or GFA for each land use. Using the above vehicle trip rates, the total vehicle trip generation for the proposed development has been estimated for Phase 1, Phase 2, and Phase 3 of the proposed development.

As Phases 1 and 3 are solely residential land uses, no internal capture rates or pass-by rates have been considered for the vehicle trip generation. The resulting vehicle trip generation for Phase 1 (2028) and Phase 3 (2030) are summarized in Table 10 and Table 13, respectively. Phase 2 of the proposed development incudes residential and retail land uses. As these land uses are in the same building, they will experience synergy trips and qualify for internal capture reduction as per the ITE Trip Generation Handbook 3rd Edition Section 6.5.1 criteria. The unconstrained internal capture values from Tables 6.1 and 6.2 of the ITE Trip Generation Handbook were applied to the lower trip generator (retail) within the mixed uses, shown in Table 11. The ITE Trip Generation Tables 6.1 and 6.2 are included in Appendix F. The resulting trip generation for Phase 3 (2033) is summarized in Table *12***Error! Reference source not found.**.

Table 10: Vehicle Trip Generation – Phase 1 (2028)

Phase 1 (2028)	Land Use	Units/GFA	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
	Multifamily Housing (Low-Rise)	228 units	23	71	94	75	44	119

Table 11: Internal Capture Rates

Land Use	AM		PM	
	In	Out	In	Out
Retail	17%	14%	10%	26%

Table 12: Vehicle Trip Generation – Phase 2 (2030)

Phase 2 (2030)	Land Use	Units/GFA	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
	Multifamily Housing (Mid-Rise)	393 units	37	124	161	94	60	154
	Strip Retail Plaza (<40k)	18,579 s.f.	26	17	43	60	61	121
	Retail Internal Capture		-4	-2	-6	-6	-16	-22
	Strip Retail Plaza (<40k) – Net	18,579 s.f.	22	15	37	53	44	97
	Phase 3 Total		59	139	198	148	105	253

Table 13: Vehicle Trip Generation – Phase 3 (2030)

Phase 3 (2030)	Land Use	Units/GFA	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
	Multifamily Housing (Mid-Rise)	141 units	11	39	50	34	21	55

Table 14 below illustrates the total trip generation by land use for all phases of the development.

Table 14: Total Vehicle Trip Generation – All Phases

Phase	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Phase 1 (2028)	23	71	94	75	44	119
Phase 2 (2030)	59	139	198	148	105	253
Phase 3 (2030)	11	39	50	34	21	55
Total Trips All Phases	93	249	342	257	170	427

As shown above, 342 AM and 427 PM net new peak hour vehicle trips are projected for the future 2030 future horizon as a result of the proposed development.

Mode share information has been provided within the *Region of Peel 50% Sustainable Mode Share Target Background Paper* and was compared to Transportation Tomorrow Survey (TTS) mode shares as shown in Table 15. Given that the auto mode share has increased since 2011, the 2016 mode shares were not on target to meet the Peel Region target mode shares. Thus, to ensure a conservative approach, the 2016 TTS mode shares have been used in the analysis. It is important to note that the 2016 TTS mode shares include a rounding error of 2%, resulting in a total of 98%. Travel modes that are not specified in the table, including motorcycle, taxi, and school bus, are encompassed in the "Other" category.

Table 15: Mode Share Comparison

Travel Mode	2011 Mode Share	2041 Target Mode Share	2016 TTS Mode Share
Auto Driver	71.0%	64.7%	72%
Auto Passenger	8.2%	9.8%	11%
Transit	2.0%	4.8%	-
Walk & Cycle	3.5%	3.9%	1%
Other	15.3%	16.8%	14%
Total	100%	100%	98%

The *Transportation Tomorrow Survey (TTS) Travel Summaries – Regional Municipality of Peel – Wards* report outlines basic characteristics and trip information by ward for the 2016 survey. The proposed development is within Ward 4 of the Town of Caledon. Trips made by residents of Ward 4 by mode are provided for the time period of 6:00 – 9:00 AM as well as for a 24-hour period. These mode shares are listed below in Table 16. An excerpt of the report detailing the mode share information for Ward 4 can be seen in Appendix G. It is important to note that the study area currently has minimal non-auto infrastructure with limited plans to expand active mode networks in the area. However, to account for the introduction of transit in Bolton since 2016, the transit mode share has been increased by 3%, which includes 2% of rounding error previously included in 2016 TTS mode share estimates, and 1% of other trips such as taxi trips shifting to transit. The rest of the most share estimates from the 2016 TTS were carried forward in the analysis to ensure a conservative approach. The resulting mode shares used in the analysis herein are also listed in Table 16.

Table 16: Mode Share Assumptions

Travel Mode	6:00-9:00 A.M. Mode Share	24 Hour Mode Share	Mode Share Used
Auto Driver	72%	79%	72%
Auto Passenger	11%	12%	11%
Transit	-	1%	3%
Walk & Cycle	1%	1%	1%
Other	14%	7%	13%
Total	98%	100%	100%

Using the adjusted mode shares and vehicle trip generation, the trips by mode have been projected. Table 17 summarizes the Phase 1 (2028) trip generation by mode and Table 18 summarizes trip generation for all three phases.

Table 17: Trip Generation by Mode – Phase 1 (2028)

Travel Mode	Mode Share	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto Driver	72%	23	71	94	75	44	119
Auto Passenger	11%	4	11	14	11	7	18
Transit	3%	1	3	4	3	2	5
Walk & Cycle	1%	0	1	1	1	1	2
Other	13%	4	13	17	14	8	21
Total	**100%**	**32**	**99**	**131**	**104**	**61**	**165**

Table 18: Trip Generation by Mode – All Phases

Travel Mode	Mode Share	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto Driver	72%	93	249	342	257	170	427
Auto Passenger	11%	14	38	52	39	26	65
Transit	3%	4	10	14	11	7	18
Walk & Cycle	1%	1	3	5	4	2	6
Other	13%	17	45	62	46	31	77
Total	**100%**	**129**	**346**	**475**	**357**	**236**	**593**

As shown above, Phase 1 is projected to generate 94 AM and 119 PM peak hour two-way automobile trips. In total, 131 AM and 165 PM peak hour two-way person trips are projected for Phase 1 of the development. The total of all phases is expected to generate 342AM and 427 PM peak hour two-way automobile trips, and a total of 475 AM and 593 PM peak hour two-way person trips in the future 2030 horizon.

4.1.2 Trip Distribution

To understand the travel patterns of the subject development, the Transportation Tomorrow Survey (TTS) has been reviewed to determine the future travel patterns for the traffic zone containing the proposed development (traffic zone 3003). As the existing travel patterns for the traffic zone 3003 are not representative of the future expected travel patterns, the adjacent traffic zone (3193) has been analyzed as a proxy zone, given its existing land uses are similar to the proposed primarily residential land uses of traffic zone 3003.

This information was then used to develop an overall trip distribution for proxy traffic zone 3193. The resulting trip distribution for traffic zone 3193 is illustrated in Table 19 below and has been applied to the proposed development. The origin-destination data generated from the 2016 Transportation Tomorrow Survey is shown in Appendix H.

Table 19: TTS Trip Distribution – Zone 3193

To/From	Percent of Trips
North	10%
South	60%
East	20%
West	10%
Total	100%

4.1.3 Trip Assignment

Using the distribution outlined above, turning movement splits, and access to major transportation infrastructure, the trips generated by the site have been assigned to the Study Area road network. The future total lane configuration is shown in Figure 15. Figure 16 illustrates the 2028 (Phase 1) new site traffic generated volumes, and Figure 17 illustrates the 2030 (Phases 1 to 3) new site traffic generated volumes.

Figure 15: Future Total Lane Configurations

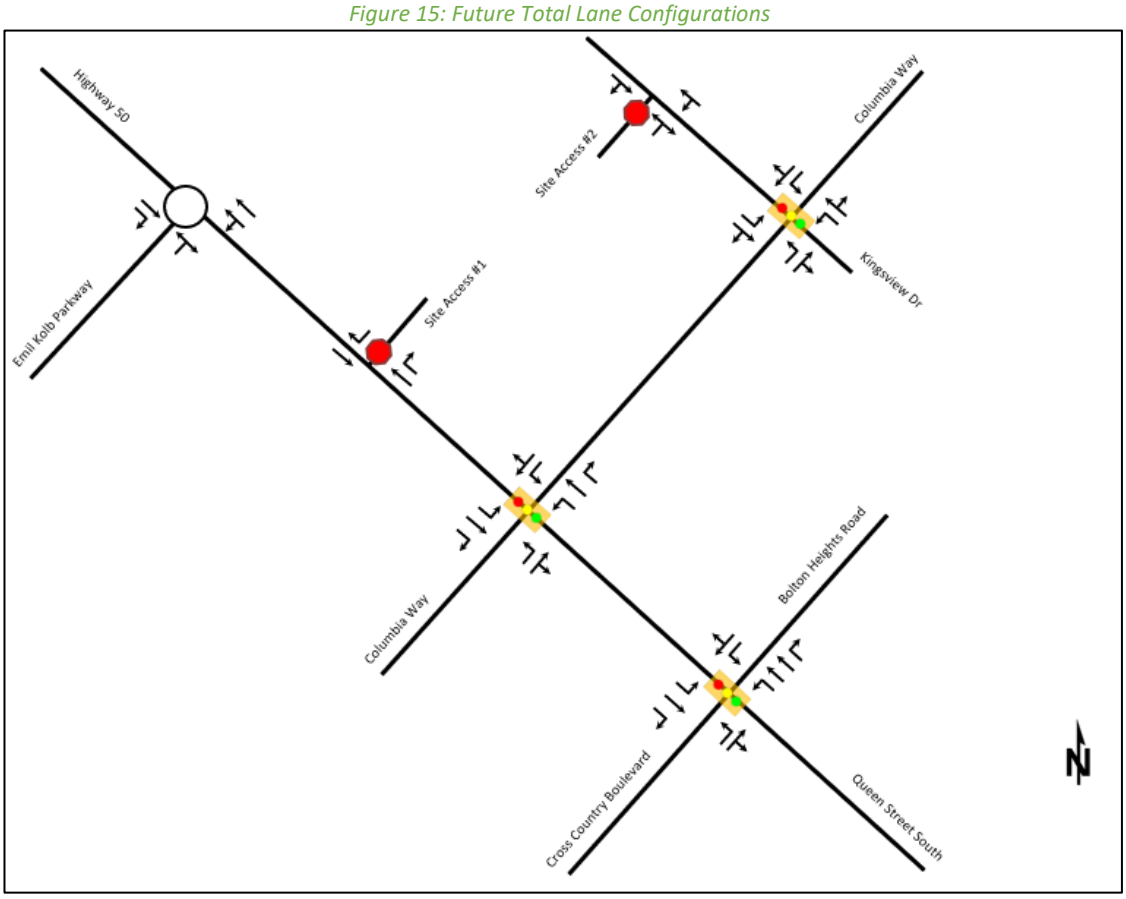


Figure 16: New Site Generated Auto Volumes – Phase 1

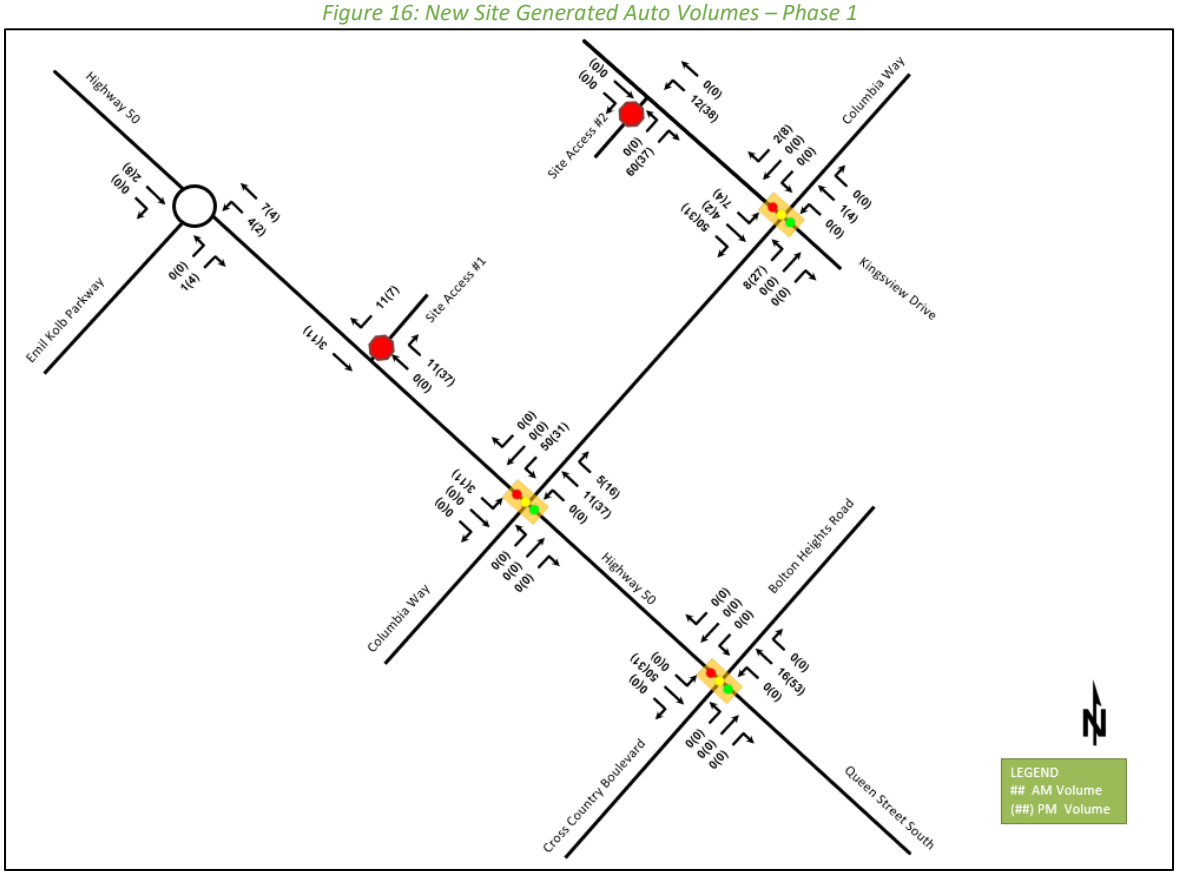
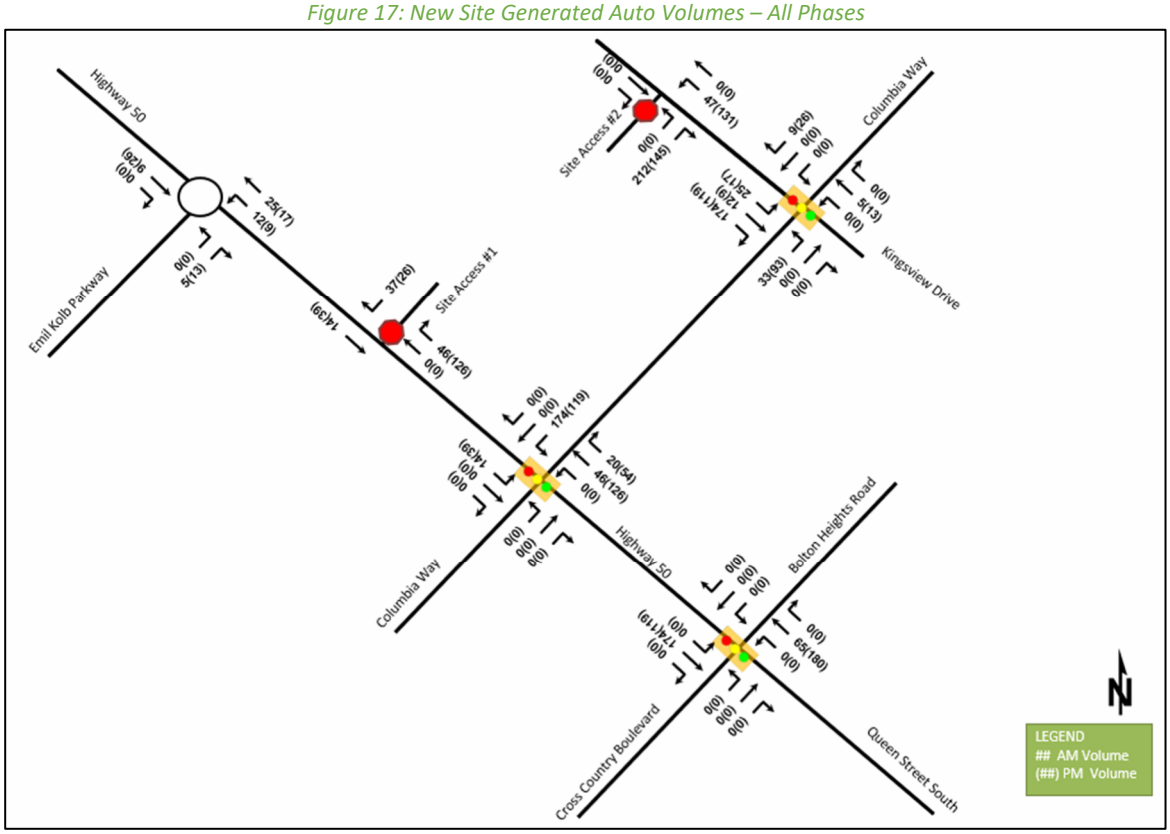


Figure 17: New Site Generated Auto Volumes – All Phases



4.1.4 Future Total Travel Demands

The site generated traffic has been combined with the 2028, 2030, 2033, and 2035 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 west leg. Access configuration details are discussed further in Section 6.1. The 2028 future total traffic volumes are illustrated in Figure 18, the 2030 future total traffic volumes are illustrated in Figure 19, the 2033 future total traffic volumes are illustrated in Figure 20, and the 2035 future total traffic volumes are illustrated in Figure 21.

Figure 18: 2028 Future Total Traffic

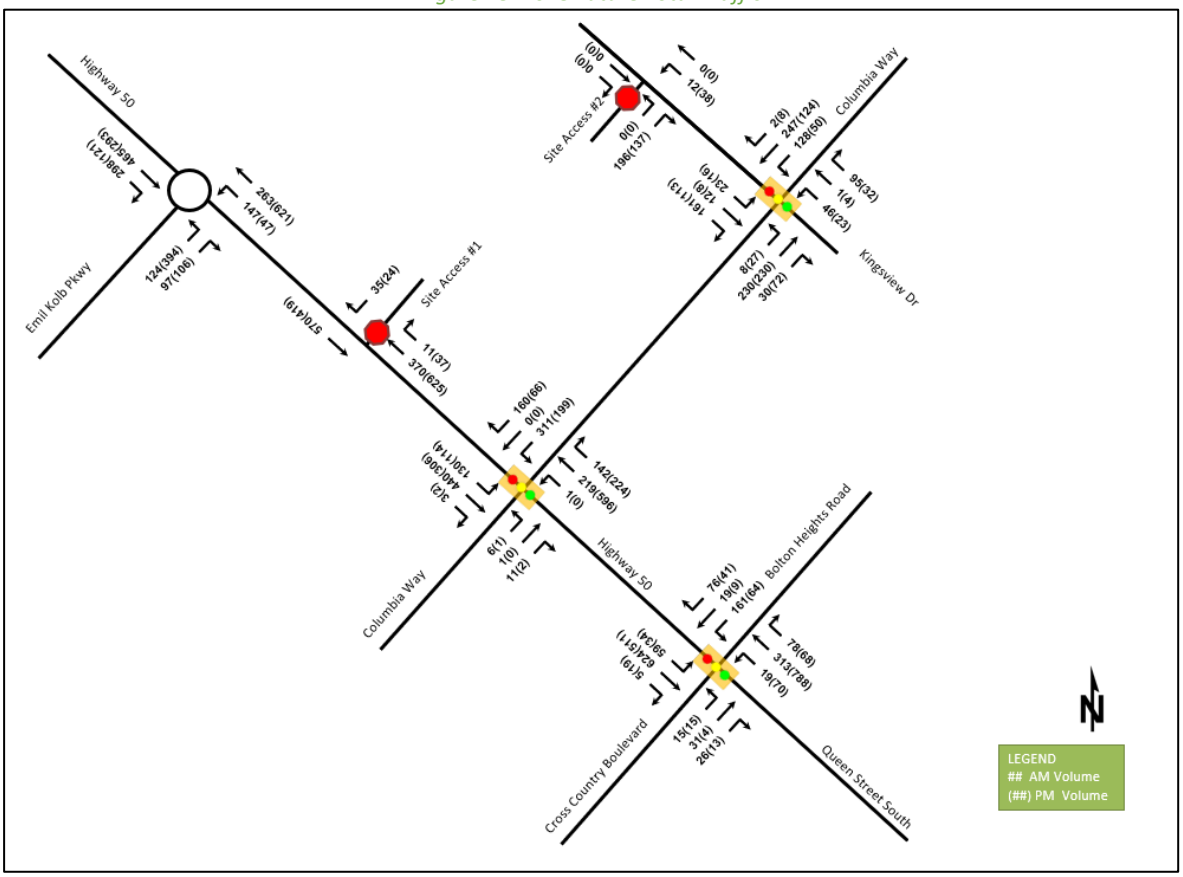


Figure 19: 2030 Future Total Traffic

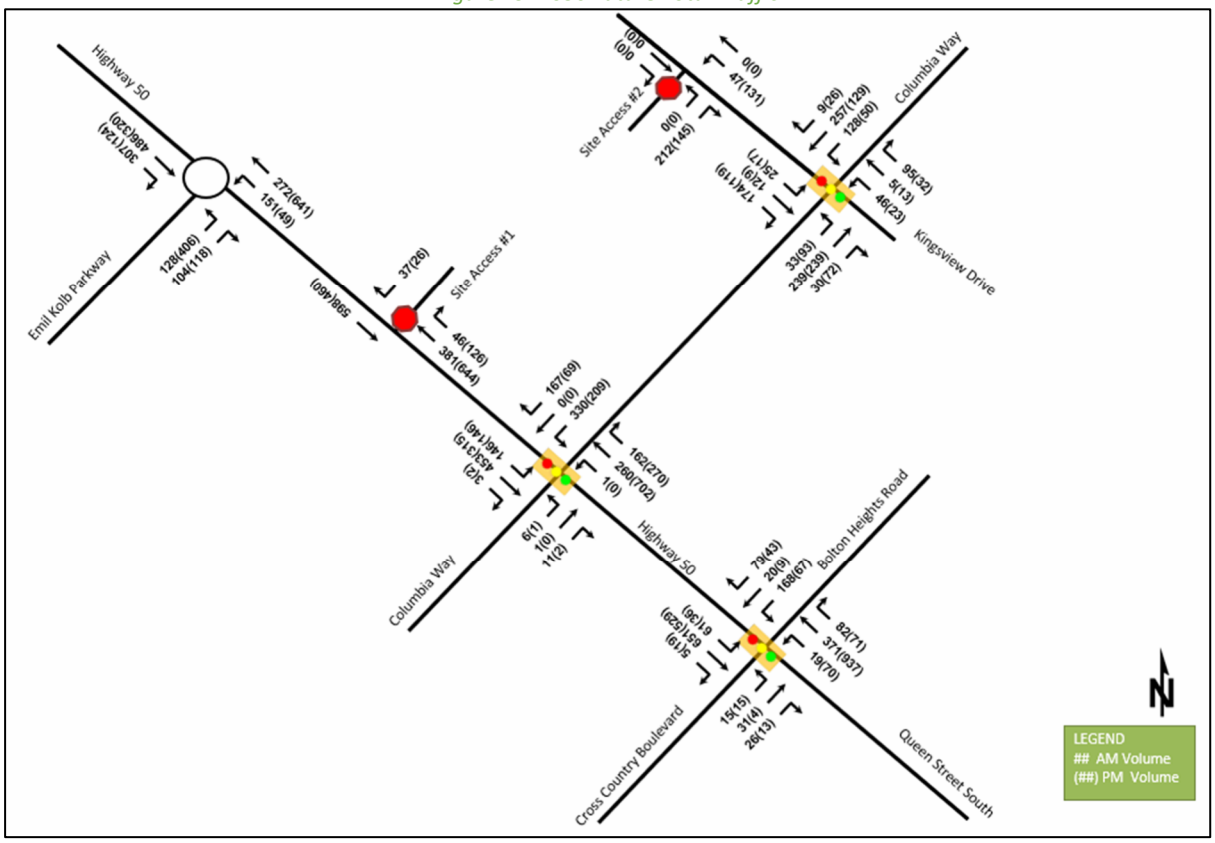


Figure 20: 2033 Future Total Traffic

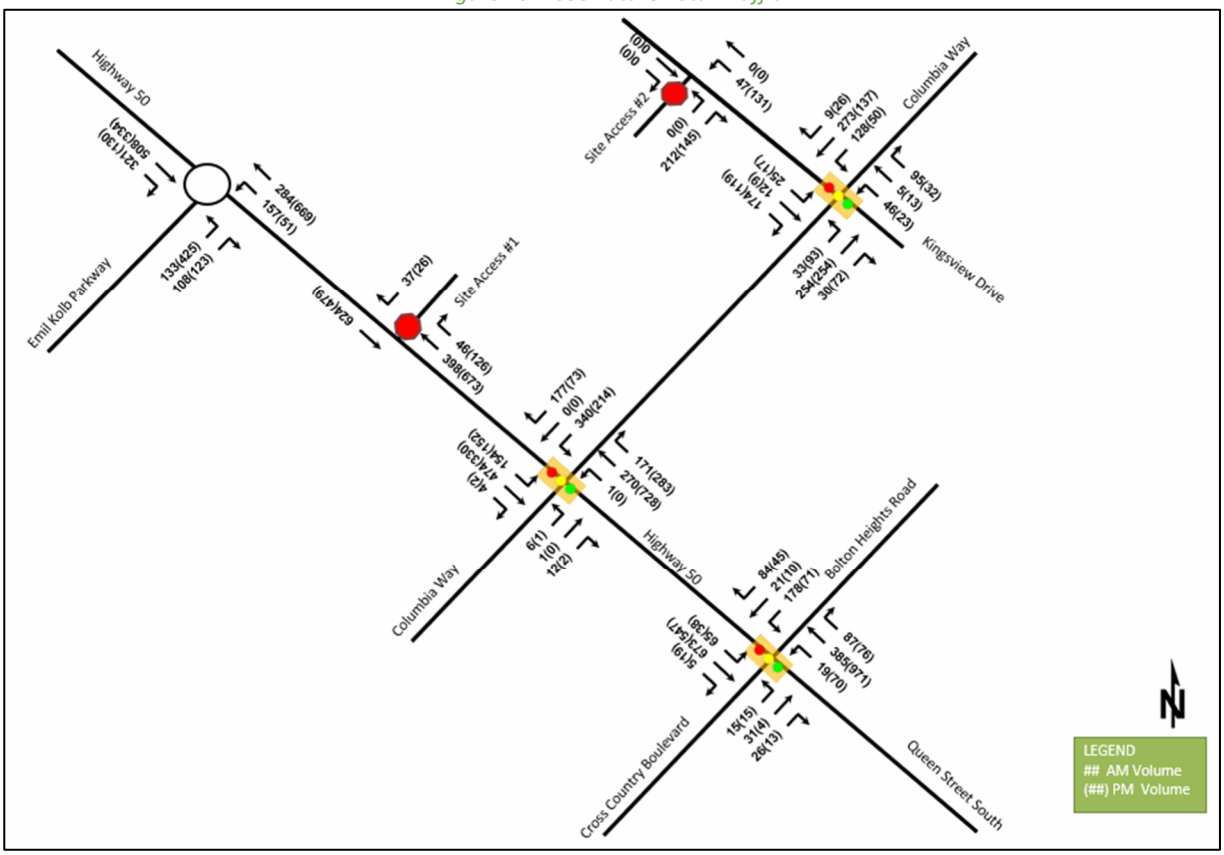
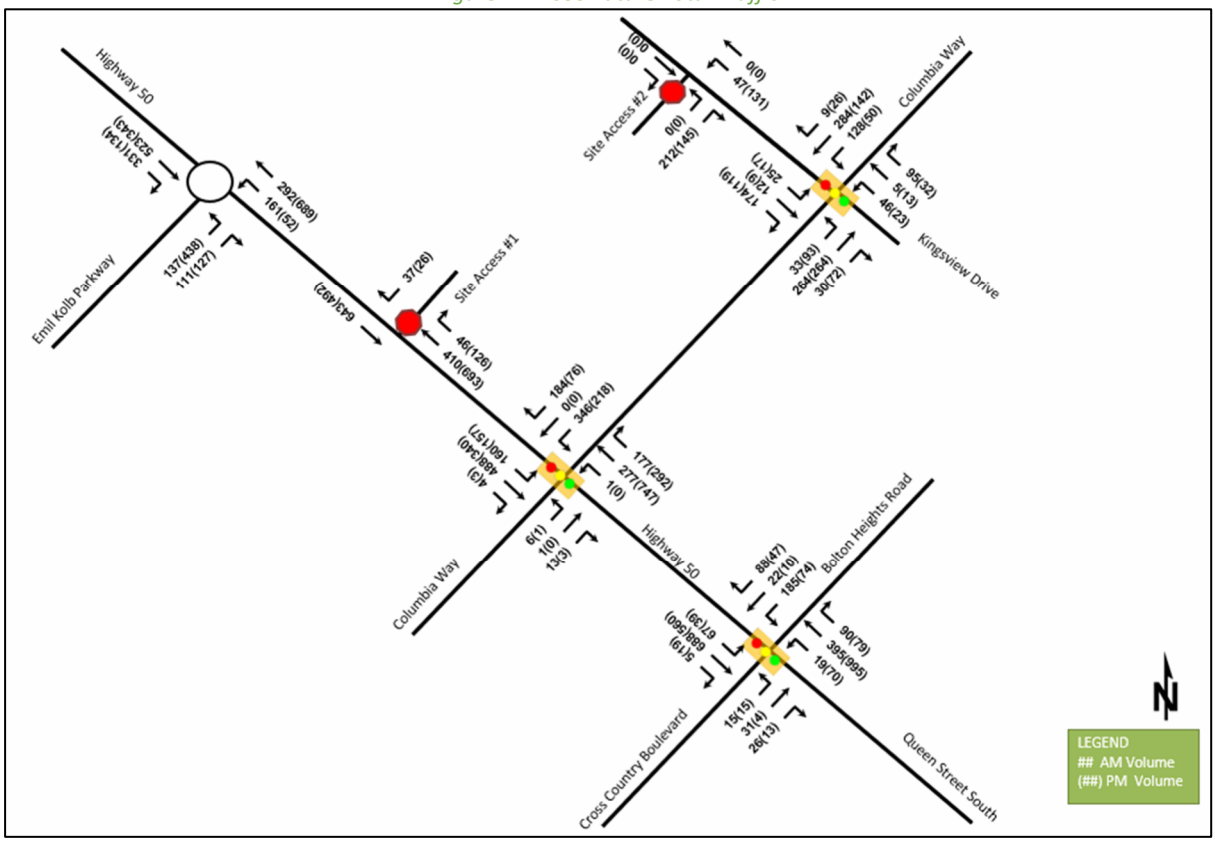


Figure 21: 2035 Future Total Traffic



5 Operational Analysis

To understand the operational characteristics of the Study Area intersections, a Synchro model (Version 11) and a Sidra model (Version 8.0) have been used to model the Study Area intersections.

The Study Area intersections have been coded in Synchro based on aerial photos. Turning lane storage lengths have been rounded to the closest five metres, and where visible, detectors have been measured. Synchro defaults have been applied to those detectors not visible. The Synchro model has been coded using the existing traffic signal timing, provided by Peel Region which can be found in Appendix B.

The Heavy Vehicle percentages (HV%) have been calculated for each movement, based on the existing turning movement counts for the Study Area intersections and have been applied to the 2023 existing horizon analysis horizon. Any calculated heavy vehicle percentages below 2% have been input as 2% to remain consistent with the Synchro default of 2%. Heavy Vehicle Percentage calculations can be found in Appendix I.

Pedestrian and cyclist volumes, as shown in Figure 7 and Figure 8 above, have been considered within the analysis. At the two site access intersections where no pedestrian or cyclist volumes are available, a conservative assumption of 5 pedestrians/h and 5 cyclists/h has been used.

All other parameters have been coded using the Region of Peel and the Town of Caledon guidelines, as well as accepted best practices and default parameters, where applicable.

LOS has been defined using the HCM 2000 definition for LOS at signalized intersections summarized in Table 20, and unsignalized intersections summarized in Table 21.

Table 20: Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (Seconds/Vehicle)
A	≤10
B	>10 – 20
C	>20 – 35
D	>35 – 55
E	>55 – 80
F	>80

Table 21: Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (Second/Vehicle)
A	0 – 10
B	>10 – 25
C	>15 – 25
D	>25 – 35
E	>35 – 50
F	>50

The vehicle LOS for the roundabout modelled in Sidra has been based on the HCM 2010 average delay criteria.

Criteria for critical movements and critical intersections for both signalized and unsignalized intersections will be considered as outlined by the Region of Peel Traffic Impact Study Guidelines, and the Town of Caledon TIS Terms of Reference Guidelines. Critical movements and critical intersections and both signalized and unsignalized intersections have been defined as; overall intersections, through movements, or shared through / turning movements with a v/c ratio of 0.90 or above, exclusive turning movements with v/c ratios greater than 1.00, and 95th percentile queue lengths that exceed available storage lengths. Additionally, for unsignalized intersections, movements which have also greater than LOS E are considered critical. Critical movements are identified in red below.

5.1 2023 Existing Conditions Operational Analysis

Table 22 summarizes the operational analysis, and Table 23 summarizes the 95th percentile queues for each movement for the 2023 existing conditions during both the AM and PM peak periods. Critical movements, as defined above, have been identified. Existing Synchro and Sidra worksheets are included in Appendix J.

Table 22: 2023 Existing Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	D	42	0.09	D	43	0.10
	EBT/R	D	42	0.15	D	43	0.03
	WBL	C	34	0.45	C	35	0.20
	WBT/R	C	31	0.10	C	34	0.05
	NBL	A	8	0.04	A	8	0.11
	NBT	A	9	0.13	A	9	0.29
	NBR	A	8	0.05	A	7	0.04
	SBL	A	9	0.08	A	8	0.07
	SBT	B	13	0.37	B	10	0.30
	SBR	A	8	0.00	A	7	0.01
	Overall	**B**	**17**	**0.41**	**B**	**12**	**0.29**
Highway 50 & Columbia Way ***Signalized***	EBL	D	40	0.04	D	45	0.01
	EBT/R	D	40	0.01	D	45	0.00
	WBL	D	52	0.66	D	55	0.59
	WBT/R	D	40	0.11	D	45	0.04
	NBL	A	7	0.00	A	0	0.00
	NBT	A	7	0.15	A	8	0.35
	NBR	B	17	0.09	B	14	0.12
	SBL	A	5	0.15	A	3	0.14
	SBT	A	6	0.30	A	3	0.19
	SBR	A	4	0.00	A	3	0.00
	Overall	**B**	**17**	**0.36**	**B**	**12**	**0.38**
Columbia Way & Kingsview Drive ***Signalized***	EBT/R	A	4	0.17	A	2	0.20
	WBL/T	A	4	0.32	A	3	0.14
	NBL/R	D	39	0.33	D	28	0.31
	Overall	**B**	**11**	**0.32**	**A**	**7**	**0.21**
Highway 50 & Emil Kolb Parkway ***Roundabout***	EBL	A	9	0.17	A	7	0.27
	EBL/R	A	7	0.17	A	7	0.27
	NBL/T	A	5	0.18	A	9	0.35
	NBT	A	5	0.18	A	8	0.35
	SBT	A	9	0.55	A	6	0.25
	SBR	A	7	0.29	A	5	0.11
	Overall	**A**	**7**	**0.45**	**A**	**7**	**0.35**

Table 23: 2023 Existing Conditions Queue Lengths

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	30	8	8
	EBT/R	135	15	6
	WBL	80	34	16
	WBT/R	350	13	8
	NBL	60	7	16
	NBT	895	25	60
	NBR	50	6	5
	SBL	30	16	11
	SBT	350	100	81
	SBR	40	m0	1

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Columbia Way *Signalized*	EBL	5	4	2
	EBT/R	85	5	0
	WBL	30	**45**	30
	WBT/R	210	0	0
	NBL	120	m<1	0
	NBT	230	42	125
	NBR	230	22	36
	SBL	70	16	11
	SBT	1000	49	26
	SBR	25	0	0
Columbia Way & Kingsview Drive *Signalized*	EBT/R	210	19	18
	WBL/T	900	33	12
	NBL/R	60	24	15
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	1250	4	8
	EBR	300	4	8
	NBL	1000	4	9
	NBT	280	4	9
	SBT	1230	18	8
	SBR	140	9	3
Notes:	m indicates that the volume for the 95th percentile queue is metred by an upstream signal # indicates the volume for the 95th percentile cycle exceeds capacity			

As shown above, the existing Study Area intersections operate satisfactorily during the peak hours with no over capacity movements noted. No critical movements are noted with the exception of the westbound left-turn lane at the intersection of Highway 50 and Columbia Way. In the AM peak period, the 95th percentile queue of the westbound left-turn movement exceeds the available storage length. As the future plans for Highway 50 include an extension of the westbound left-turn lane storage length to 90 metres, no mitigation measures are proposed at this time.

5.2 Future Background Conditions

5.2.1 Future Background Intersection Control

All methods of intersection control were coded to be consistent with the existing intersection control for all Study Area intersections in the future background analysis horizons.

The signal timing at the intersection of Columbia Way at Kingsview Drive has been adjusted for all future analysis horizons to accommodate the intersection configuration changes as discussed in further detail below. Amber Clearance, All Red Clearance, Flash Don't Walk times have been calculated using the methodology provided in the OTM Book 12- Traffic Signals. A walk time of 7 seconds and a pedestrian walking speed of 1.0 m/s have been assumed. The minimum initial values were taken from the Region of Peel, as well as OTM Book 12 – Traffic Signals as applicable. The signal timing at the intersection of Highway 50 at Columbia Way has also been adjusted to account for higher pedestrian traffic in the future and allow for a longer flash don't walk time, calculated using 1.2 m/s walking speed. The cycle lengths used at the intersection of Highway 50 and Columbia Way were set 90 seconds in the AM peak period, and 90 seconds in the PM peak period. The cycle lengths used at the intersection of Kingsview Drive and Columbia Way were also set to 90 seconds in the AM peak period, and 90 seconds in the PM peak period. The signal timing splits have been optimized and the same control types as the existing types have been used.

5.2.2 Future Background Intersection Design

No changes to the intersection design of Highway 50/ Queen Street at Cross Country Boulevard / Bolton Heights Road or Emil Kolb Parkway at Highway 50 have been considered for any of the future background analysis horizons as no changes to the intersections are planned. As discussed in Section 3.1.1, the Columbia Way improvements will impact the intersection configuration of Highway 50 at Columbia Way and Columbia Way at Kingsview Drive at all future background analysis horizons. The changes to these intersections are discussed below.

5.2.2.1 Highway 50 and Columbia Way

The Columbia Way improvements shown in Appendix D indicate the only change to the intersection configuration of Highway 50 and Columbia Way as a result of the future Columbia Way improvements is the extension of the auxiliary westbound left-turn lane. The existing westbound left-turn lane has a 30-metre storage portion and a 90-metre taper portion. The Columbia Way improvements propose a left-turn lane with a storage length of 90 metres and a taper length of 70 metres.

5.2.2.2 Columbia Way at Kingsview Drive

The Columbia Way improvements shown in Appendix D indicate a new intersection configuration of an auxiliary northbound left-turn lane, a northbound right-turn lane, an auxiliary westbound left-turn lane, a westbound through lane, and a shared eastbound through / right-turn lane. The existing intersection configuration consists of a shared northbound right-turn / left-turn lane, a shared westbound right-turn / through lane, and a shared eastbound through / right-turn lane. The proposed auxiliary westbound left-turn lane will have a storage distance of 40 metres and a taper distance of 55 metres. The proposed auxiliary northbound left-turn lane will have a storage distance of 25 metres, and a taper distance of 20 metres.

5.2.3 2028 Future Background Operational Analysis

The 2028 future background intersection volumes have been analyzed to allow for a comparison between the future volumes with and without the proposed development. Signal timing splits have been optimized at all signalized intersections. Table 24 summarizes the operational analysis, and Table 25 summarizes the 95th percentile queue of each movement for the 2028 future background conditions during both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the signal control and intersection configuration identified in Section 5.2.1 and Section 5.2.2, respectively. 2028 Future Background Synchro and Sidra worksheets are included in Appendix K.

Table 24: 2028 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	D	46	0.12	D	38	0.09
	EBT/R	D	46	0.20	D	38	0.03
	WBL	D	40	0.58	D	41	0.35
	WBT/R	C	35	0.12	D	38	0.08
	NBL	A	7	0.04	A	4	0.10
	NBT	A	7	0.13	A	5	0.28
	NBR	A	7	0.05	A	4	0.04
	SBL	A	7	0.09	A	4	0.07
	SBT	A	10	0.38	A	5	0.29
	SBR	A	7	0.00	A	4	0.01
	Overall	**B**	**17**	**0.44**	**A**	**8**	**0.30**

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Columbia Way *Signalized*	EBL	C	31	0.04	C	35	0.01
	EBT/R	C	31	0.01	C	35	0.00
	WBL	D	41	0.65	D	40	0.53
	WBT/R	C	31	0.11	C	35	0.04
	NBL	A	5	0.00	A	0	0.00
	NBT	A	6	0.17	A	5	0.40
	NBR	A	5	0.10	A	4	0.13
	SBL	A	6	0.17	A	4	0.18
	SBT	A	7	0.35	A	4	0.22
	SBR	A	5	0.00	A	3	0.00
	Overall	**B**	**14**	**0.41**	**A**	**9**	**0.42**
Columbia Way & Kingsview Drive *Signalized*	EBT/R	A	4	0.20	A	3	0.22
	WBL	A	4	0.17	A	3	0.07
	WBT	A	3	0.18	A	3	0.10
	NBL	C	30	0.21	C	35	0.16
	NBR	C	30	0.06	C	34	0.02
	Overall	**A**	**9**	**0.20**	**A**	**6**	**0.21**
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	A	10	0.19	A	8	0.30
	EBL/R	A	8	0.19	A	8	0.30
	NBL/T	A	6	0.20	A	10	0.39
	NBT	A	6	0.20	A	9	0.30
	SBT	A	10	0.49	A	6	0.27
	SBR	A	7	0.32	A	5	0.12
	Overall	**A**	**8**	**0.49**	**A**	**8**	**0.39**

Table 25: 2028 Future Background Conditions Queue Lengths

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd *Signalized*	EBL	30	8	6
	EBT/R	135	15	5
	WBL	80	37	18
	WBT/R	350	13	9
	NBL	60	6	15
	NBT	895	26	59
	NBR	50	7	6
	SBL	30	14	9
	SBT	350	93	69
	SBR	40	0	1
Highway 50 & Columbia Way *Signalized*	EBL	5	4	1
	EBT/R	85	4	0
	WBL	30	40	25
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	230	24	69
	NBR	230	6	7
	SBL	70	17	15
	SBT	1000	54	34
	SBR	25	0	0

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Columbia Way & Kingsview Drive *Signalized*	EBT/R	210	34	38
	WBL	40	20	9
	WBT	900	33	18
	NBL	25	13	9
	NBR	60	10	6
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	1250	5	9
	EBL/R	300	5	9
	NBL/T	1000	4	11
	NBT	280	4	11
	SBT	1230	20	8
	SBR	140	10	4
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of background growth to reflect the 2028 future horizon, the Study Area intersections operate similarly to the existing conditions with no over-capacity movements noted. Additionally, no critical movements were noted at any of the Study Area intersections, and as such, no mitigation measures were proposed.

5.2.4 2030 Future Background Operational Analysis

The 2030 future background intersection volumes have been analyzed to allow for a comparison between the future volumes with and without the proposed development. Signal timing splits have been optimized at all signalized intersections. Table 26 summarizes the operational analysis, and Table 27 summarizes the 95th percentile queue of each movement for the 2030 future background conditions in both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the identified signal control and intersection configuration in Section 5.2.1 and Section 5.2.2, respectively. 2030 Future Background Synchro and Sidra worksheets are included in Appendix L.

Table 26: 2030 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd *Signalized*	EBL	D	41	0.08	D	36	0.08
	EBT/R	D	42	0.14	D	36	0.02
	WBL	D	40	0.58	D	39	0.32
	WBT/R	C	33	0.12	D	36	0.07
	NBL	A	8	0.04	A	5	0.10
	NBT	A	8	0.14	A	6	0.30
	NBR	A	8	0.05	A	5	0.05
	SBL	A	8	0.09	A	5	0.08
	SBT	B	11	0.40	A	6	0.31
	SBR	A	7	0.00	A	4	0.01
	Overall	**B**	**17**	**0.47**	**A**	**9**	**0.31**
Highway 50 & Columbia Way *Signalized*	EBL	C	31	0.04	D	35	0.01
	EBT/R	C	30	0.01	D	35	0.00
	WBL	D	41	0.65	D	44	0.59
	WBT/R	C	31	0.12	D	36	0.05
	NBL	A	5	0.00	A	0	0.00
	NBT	A	6	0.18	A	5	0.41
	NBR	A	5	0.10	A	4	0.14
	SBL	A	6	0.18	A	4	0.18
	SBT	A	7	0.36	A	4	0.23
	SBR	A	5	0.00	A	3	0.00
	Overall	**B**	**14**	**0.42**	**A**	**9**	**0.44**

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Columbia Way & Kingsview Drive *Signalized*	EBT/R	A	4	0.20	A	3	0.23
	WBL	A	4	0.17	A	3	0.07
	WBT	A	4	0.19	A	3	0.10
	NBL	C	30	0.21	C	35	0.16
	NBR	C	29	0.12	C	34	0.02
	Overall	**A**	**9**	**0.20**	**A**	**6**	**0.22**
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	A	10	0.20	A	8	0.31
	EBL/R	A	8	0.20	A	8	0.31
	NBL/T	A	6	0.20	B	10	0.40
	NBT	A	6	0.20	A	9	0.40
	SBT	A	10	0.51	A	6	0.28
	SBR	A	7	0.33	A	5	0.13
	Overall	**A**	**8**	**0.51**	**A**	**8**	**0.40**

Table 27: 2030 Future Background Conditions Queue Lengths

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd *Signalized*	EBL	30	7	7
	EBT/R	135	14	6
	WBL	80	36	20
	WBT/R	350	13	10
	NBL	60	7	13
	NBT	895	28	51
	NBR	50	8	6
	SBL	30	15	8
	SBT	350	102	60
	SBR	40	0	1
Highway 50 & Columbia Way *Signalized*	EBL	5	4	2
	EBT/R	85	4	0
	WBL	30	41	28
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	230	26	61
	NBR	230	7	6
	SBL	70	18	13
	SBT	1000	57	30
	SBR	25	0	0
Columbia Way & Kingsview Drive *Signalized*	EBT/R	210	35	39
	WBL	40	20	9
	WBT	900	34	18
	NBL	25	13	9
	NBR	60	10	6
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	1250	5	9
	EBL/R	300	5	9
	NBL/T	1000	4	12
	NBT	280	5	12
	SBT	1230	21	9
	SBR	140	11	4
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of background growth to reflect the 2030 future horizon, the Study Area intersections operate in a similar manner to the existing conditions and 2028 future background horizon with no over-capacity

movements noted. Additionally, no critical movements were noted at any of the Study Area intersections, and as such, no mitigation measures were proposed.

5.2.5 2033 Future Background Operational Analysis

The 2033 future background intersection volumes have been analyzed to allow for a comparison between the future volumes with and without the proposed development. Signal timing splits have been optimized at all signalized intersections. Table 28 summarizes the operational analysis, and Table 29 summarizes the 95th percentile queue of each movement for the 2033 future background conditions in both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the identified signal control and intersection configuration in Section 5.2.1 and Section 5.2.2, respectively. 2033 Future Background Synchro and Sidra worksheets are included in Appendix M.

Table 28: 2033 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	D	46	0.12	D	38	0.09
	EBT/R	D	46	0.20	D	37	0.03
	WBL	D	42	0.64	D	41	0.38
	WBT/R	C	35	0.13	D	38	0.08
	NBL	A	7	0.04	A	4	0.10
	NBT	A	7	0.14	A	5	0.30
	NBR	A	7	0.06	A	4	0.05
	SBL	A	7	0.10	A	4	0.08
	SBT	A	10	0.41	A	6	0.31
	SBR	A	7	0.00	A	4	0.01
	Overall	**B**	**17**	**0.48**	**A**	**9**	**0.32**
Highway 50 & Columbia Way ***Signalized***	EBL	C	30	0.04	C	34	0.01
	EBT/R	C	30	0.01	C	34	0.00
	WBL	D	40	0.66	D	41	0.57
	WBT/R	C	30	0.12	C	35	0.05
	NBL	A	5	0.00	A	0	0.00
	NBT	A	6	0.19	A	6	0.44
	NBR	A	6	0.11	A	4	0.15
	SBL	A	6	0.20	A	5	0.21
	SBT	A	8	0.38	A	4	0.24
	SBR	A	5	0.00	A	3	0.00
	Overall	**B**	**14**	**0.45**	**A**	**9**	**0.46**
Columbia Way & Kingsview Drive ***Signalized***	EBT/R	A	4	0.21	A	3	0.24
	WBL	A	4	0.17	A	3	0.07
	WBT	A	4	0.20	A	3	0.11
	NBL	C	30	0.21	D	35	0.16
	NBR	C	30	0.06	C	34	0.02
	Overall	**A**	**9**	**0.21**	**A**	**6**	**0.23**
Highway 50 & Emil Kolb Parkway ***Roundabout***	EBL	B	10	0.21	A	8	0.33
	EBL/R	A	8	0.21	A	8	0.33
	NBL/T	A	6	0.21	B	11	0.43
	NBT	A	6	0.21	A	10	0.43
	SBT	B	11	0.53	A	6	0.30
	SBR	A	18	0.35	A	5	0.13
	Overall	**A**	**8**	**0.53**	**A**	**8**	**0.43**

Table 29: 2033 Future Background Conditions Queue Lengths

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	30	8	6
	EBT/R	135	15	5
	WBL	80	41	19
	WBT/R	350	14	9
	NBL	60	6	15
	NBT	895	28	64
	NBR	50	8	7
	SBL	30	15	10
	SBT	350	102	75
	SBR	40	0	1
Highway 50 & Columbia Way ***Signalized***	EBL	5	4	1
	EBT/R	85	4	0
	WBL	30	43	27
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	230	28	77
	NBR	230	7	8
	SBL	70	20	16
	SBT	1000	63	36
	SBR	25	0	0
Columbia Way & Kingsview Drive ***Signalized***	EBT/R	210	37	42
	WBL	40	20	9
	WBT	900	37	19
	NBL	25	13	9
	NBR	60	10	7
Highway 50 & Emil Kolb Parkway ***Roundabout***	EBL	1250	6	10
	EBL/R	300	6	10
	NBL/T	1000	5	14
	NBT	280	5	14
	SBT	1230	23	10
	SBR	140	12	4
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of background growth to reflect the 2033 future horizon, the Study Area intersections operate in a similar manner to the existing conditions and 2028 and 2030 future background horizons with no over-capacity movements noted. Additionally, no critical movements were noted at any of the Study Area intersections, and as such, no mitigation measures were proposed.

5.2.6 2035 Future Background Operational Analysis

The 2035 future background intersection volumes have been analyzed to allow for a comparison between the future volumes with and without the proposed development. Signal timing splits have been optimized at all signalized intersections. Table 30 summarizes the operational analysis, and Table 31 summarizes the 95th percentile queue of each movement for the 2035 future background conditions in both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the identified signal control and intersection configuration in Section 5.2.1 and Section 5.2.2, respectively. 2035 Future Background Synchro and Sidra worksheets are included in Appendix N.

Table 30: 2035 Future Background Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	D	41	0.08	D	38	0.09
	EBT/R	D	42	0.14	D	37	0.03
	WBL	D	42	0.64	D	41	0.39
	WBT/R	C	33	0.13	D	38	0.08
	NBL	A	8	0.04	A	4	0.10
	NBT	A	8	0.15	A	5	0.31
	NBR	A	8	0.06	A	4	0.05
	SBL	A	8	0.10	A	4	0.09
	SBT	B	11	0.43	A	6	0.32
	SBR	A	7	0.00	A	4	0.01
	Overall	**B**	**17**	**0.51**	**A**	**9**	**0.33**
Highway 50 & Columbia Way ***Signalized***	EBL	C	30	0.04	C	34	0.01
	EBT/R	C	29	0.01	C	34	0.00
	WBL	D	40	0.67	D	42	0.58
	WBT/R	C	30	0.12	C	35	0.05
	NBL	A	5	0.00	A	0	0.00
	NBT	A	6	0.20	A	6	0.45
	NBR	A	6	0.11	A	4	0.15
	SBL	A	7	0.21	A	5	0.22
	SBT	A	8	0.40	A	5	0.25
	SBR	A	5	0.00	A	3	0.00
	Overall	**B**	**14**	**0.46**	**A**	**9**	**0.47**
Columbia Way & Kingsview Drive ***Signalized***	EBT/R	A	4	0.22	A	3	0.25
	WBL	A	4	0.18	A	3	0.07
	WBT	A	4	0.21	A	3	0.11
	NBL	C	30	0.21	D	36	0.16
	NBR	C	29	0.06	D	35	0.02
	Overall	**A**	**8**	**0.22**	**A**	**6**	**0.24**
Highway 50 & Emil Kolb Parkway ***Roundabout***	EBL	B	11	0.22	A	8	0.34
	EBL/R	A	8	0.22	A	8	0.34
	NBL/T	A	6	0.22	B	11	0.45
	NBT	A	6	0.22	B	10	0.45
	SBT	B	11	0.55	A	6	0.30
	SBR	A	8	0.34	A	5	0.14
	Overall	**A**	**9**	**0.55**	**A**	**8**	**0.45**

Table 31: 2035 Future Background Conditions Queue Lengths

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	30	7	6
	EBT/R	135	14	5
	WBL	80	40	20
	WBT/R	350	14	9
	NBL	60	7	15
	NBT	895	30	66
	NBR	50	8	7
	SBL	30	17	10
	SBT	350	112	78
	SBR	40	0	1

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Columbia Way *Signalized*	EBL	5	4	1
	EBT/R	85	5	0
	WBL	30	44	28
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	230	29	80
	NBR	230	7	8
	SBL	70	21	17
	SBT	1000	66	38
	SBR	25	0	0
Columbia Way & Kingsview Drive *Signalized*	EBT/R	210	38	43
	WBL	40	20	9
	WBT	900	38	19
	NBL	25	13	9
	NBR	60	10	7
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	1250	6	11
	EBL/R	300	6	11
	NBL/T	1000	5	15
	NBT	280	5	15
	SBT	1230	25	10
	SBR	140	12	4
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of background growth to reflect the 2035 future horizon, the Study Area intersections operate in a similar manner to the existing conditions and the 2026, 2028, and 2033 future background horizons with no over-capacity movements noted. Additionally, no critical movements were noted at any of the Study Area intersections, and as such, no mitigation measures were proposed.

5.3 Future Total Conditions

5.3.1 Future Total Intersection Control

All methods of intersection control will be consistent with the existing intersection control for all Study Area intersections in the future total analysis horizons. The signal timing at the intersections of Highway 50 at Columbia Way, and Columbia Way at Kingsview Drive have been adjusted for all future analysis horizons to accommodate the intersection configuration changes as discussed in Section 5.2.1 above.

Using the Ontario Traffic Manual (OTM) Book 12 Justification 7 methodology for examining traffic control signal warrants, both proposed accesses were reviewed. A summary of the traffic control signal warrants analysis for future total conditions can be found in Table 32. Traffic control warrant sheets have been included in Appendix O.

Table 32: Signalization Warrant Summary

Intersection	Horizon	Warranted?
Site Access #1 and Highway 50	2028 FT	No
	2030 FT	
	2033 FT	
	2035 FT	
Site Access #2 and Kingsview Drive	2028 FT	No
	2030 FT	
	2033 FT	
	2035 FT	

As indicated above, intersection signalization warrants are not met at either of the Site Access intersections in any future total analysis horizons.

Therefore, Site Access #1 has been analyzed as an unsignalized right-in / right-out only intersection with stop-control on the east leg, and Site Access #2 has been analyzed as an unsignalized full-movement intersection with stop-control on the west leg.

5.3.2 Future Total Intersection Design

All Study Area intersections have been analyzed with the same configuration as the future background analysis horizons. The Site Access intersection configurations are as follows:

5.3.2.1 Site Access #1 and Highway 50

The intersection of Site Access #1 and Highway 50 has been analyzed as a right-in / right-out unsignalized intersection with a stop-control on the east leg. The south leg consists of a northbound lane and an auxiliary right-turn lane, the north leg consists of a through lane, and the east leg consists of a right-turn lane. The implementation of the auxiliary northbound right-turn lane follows the Region of Peel requirement to provide an auxiliary turn lane for new developments accessing regional roads and generating over 100 peak hour vehicle trips.

5.3.2.2 Site Access #2 and Kingsview Drive

The intersection of Site Access #2 and Kingsview Drive has been analyzed as an unsignalized intersection with a stop-control on the west leg. The west leg consists of a shared left-turn / right-turn lane, the north leg consists of a shared through/right-turn lane, and the south leg consists of a shared left-turn / through lane. As currently there are no future plans to extend Kingsview Drive beyond the proposed development, there will be no traffic opposing northbound left turn movements into the site at Site Access #2 within the horizons analysed herein. As a result, no northbound left-turn lane is required at Site Access #2.

5.3.3 2028 Future Total Operational Analysis

The proposed development's Phase 1 trip generation has been added to the 2028 future background traffic volumes to project the impact of the new traffic on the future road network. Signal timing splits have been optimized at all signalized intersections. Table 33 summarizes the operational analysis, and Table 34 summarizes the 95th percentile queue of each movement for the 2028 future total conditions in both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the identified signal control and intersection configuration in Section 5.3.1 and Section 5.3.2, respectively. 2028 Future Total Synchro and Sidra worksheets are included in Appendix P.

Table 33: 2028 Future Total Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	D	46	0.12	D	38	0.09
	EBT/R	D	46	0.20	D	38	0.03
	WBL	D	40	0.58	D	41	0.35
	WBT/R	C	35	0.12	D	38	0.08
	NBL	A	7	0.04	A	4	0.10
	NBT	A	7	0.14	A	5	0.30
	NBR	A	7	0.05	A	4	0.04
	SBL	A	7	0.09	A	4	0.07
	SBT	B	10	0.42	A	5	0.31
	SBR	A	7	0.00	A	4	0.01
	Overall	**B**	**16**	**0.48**	**A**	**8**	**0.32**

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Columbia Way *Signalized*	EBL	C	28	0.03	C	34	0.01
	EBT/R	C	28	0.01	C	34	0.00
	WBL	D	40	0.70	D	45	0.65
	WBT/R	C	29	0.11	C	34	0.04
	NBL	A	6	0.00	A	0	0.00
	NBT	A	7	0.20	A	6	0.44
	NBR	A	6	0.10	A	4	0.14
	SBL	A	7	0.19	A	5	0.21
	SBT	A	9	0.37	A	5	0.23
	SBR	A	6	0.00	A	4	0.00
	Overall	**B**	**15**	**0.45**	**A**	**10**	**0.47**
Columbia Way & Kingsview Drive *Signalized*	EBL	A	3	0.01	A	3	0.03
	EBT/R	A	4	0.20	A	3	0.23
	WBL	A	4	0.17	A	3	0.07
	WBT/R	A	4	0.19	A	3	0.11
	NBL	C	30	0.27	C	33	0.19
	NBT/R	C	29	0.07	C	32	0.05
	SBL	C	28	0.04	C	32	0.03
	SBT/R	C	28	0.05	C	32	0.03
	Overall	**B**	**10**	**0.21**	**A**	**8**	**0.22**
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	A	10	0.19	A	8	0.30
	EBL/R	A	8	0.19	A	8	0.30
	NBL/T	A	6	0.20	A	10	0.39
	NBT	A	6	0.20	A	9	0.39
	SBT	A	10	0.49	A	6	0.28
	SBR	A	7	0.32	A	5	0.12
	Overall	**A**	**8**	**0.49**	**A**	**8**	**0.39**
Highway 50 & Site Access #1 *Unsignalized*	WBR	B	11	0.02	B	13	0.01
	NBT	A	0	0.22	A	0	0.37
	NBR	A	0	0.01	A	0	0.02
	SBT	A	0	0.34	A	0	0.25
	Overall	**A**	**<1**	**-**	**A**	**<1**	**-**
Kingsview Drive & Site Access #2 *Unsignalized*	EBL/R	A	9	0.06	A	9	0.03
	NBL/T	A	8	0.01	A	8	0.02
	SBT/R	A	0	0.00	A	0	0.00
	Overall	**A**	**9**	**-**	**A**	**8**	**-**

Table 34: 2028 Future Total Conditions Queue Lengths

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd *Signalized*	EBL	30	8	6
	EBT/R	135	15	5
	WBL	80	37	18
	WBT/R	350	13	9
	NBL	60	6	15
	NBT	895	27	64
	NBR	50	7	6
	SBL	30	14	9
	SBT	350	105	75
	SBR	40	0	1

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Columbia Way ***Signalized***	EBL	5	4	1
	EBT/R	85	4	0
	WBL	90	49	33
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	235	30	76
	NBR	235	8	8
	SBL	70	21	16
	SBT	1000	63	34
	SBR	25	0	0
Columbia Way & Kingsview Drive ***Signalized***	EBL	15	3	6
	EBT/R	210	34	39
	WBL	40	20	9
	WBT/R	900	33	18
	NBL	25	13	8
	NBT/R	60	10	7
	SBL	15	4	3
	SBT/R	120	8	6
Highway 50 & Emil Kolb Parkway ***Roundabout***	EBL	1250	5	9
	EBL/R	300	5	9
	NBL/T	1000	4	11
	NBT	280	4	11
	SBT	1230	20	6
	SBR	140	11	5
Highway 50 & Site Access #1 ***Unsignalized***	WBR	195	<1	<1
	NBT	100	0	0
	NBR	30	0	0
	SBT	970	0	0
Kingsview Drive & Site Access #2 ***Unsignalized***	EBL/R	75	2	<1
	NBL/T	100	1	<1
	SBT/R	25	0	0
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of the Phase 1 site generated traffic to the 2028 future background traffic, the Study Area intersections operate in a similar manner to the 2028 future background analysis with no over-capacity movements noted. Additionally, no critical movements are noted at any of the Study Area intersections, and as such, no mitigation measures are proposed. Site Access #1 and Site Access #2 both operate well with no noted over-capacity or critical movements and therefore no mitigation measures are proposed for the site access intersections.

5.3.4 2030 Future Total Operational Analysis

The proposed development's Phase 1, Phase 2, and Phase 3 trip generation has been added to the 2030 future background traffic volumes to project the impact of the new traffic on the future road network. Signal timing splits have been optimized at all signalized intersections. Table 35 summarizes the operational analysis, and Table 36 summarizes the 95th percentile queue of each movement for the 2030 future total conditions in both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the identified signal control and intersection configuration in Section 5.3.1 and Section 5.3.2, respectively. 2030 Future Total Synchro and Sidra worksheets are included in Appendix Q.

Table 35: 2030 Future Total Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	D	41	0.08	C	34	0.06
	EBT/R	D	42	0.14	C	34	0.02
	WBL	D	40	0.58	D	36	0.27
	WBT/R	C	33	0.12	C	34	0.06
	NBL	A	8	0.05	A	6	0.13
	NBT	A	8	0.16	A	7	0.39
	NBR	A	8	0.05	A	5	0.05
	SBL	A	8	0.10	A	6	0.10
	SBT	B	13	0.54	A	8	0.41
	SBR	A	7	0.00	A	5	0.01
	Overall	**B**	**17**	**0.57**	**A**	**10**	**0.38**
Highway 50 & Columbia Way ***Signalized***	EBL	C	22	0.02	C	28	0.00
	EBT/R	C	22	0.01	C	28	0.00
	WBL	D	38	0.78	D	44	0.75
	WBT/R	C	23	0.12	C	28	0.04
	NBL	A	9	0.00	A	0	0.00
	NBT	B	11	0.27	B	11	0.58
	NBR	A	10	0.11	A	7	0.17
	SBL	B	12	0.26	B	11	0.40
	SBT	B	13	0.45	A	7	0.26
	SBR	A	9	0.00	A	6	0.00
	Overall	**B**	**19**	**0.57**	**B**	**14**	**0.62**
Columbia Way & Kingsview Drive ***Signalized***	EBL	A	4	0.04	A	4	0.11
	EBT/R	A	5	0.22	A	5	0.25
	WBL	A	5	0.18	A	4	0.07
	WBT/R	A	5	0.21	A	4	0.13
	NBL	C	27	0.26	C	28	0.16
	NBT/R	C	25	0.08	C	28	0.09
	SBL	C	26	0.12	C	28	0.10
	SBT/R	C	26	0.16	C	28	0.12
	Overall	**B**	**12**	**0.22**	**B**	**10**	**0.23**
Highway 50 & Emil Kolb Parkway ***Roundabout***	EBL	A	10	0.21	A	8	0.33
	EBL/R	A	8	0.21	A	8	0.33
	NBL/T	A	6	0.22	B	11	0.42
	NBT	A	6	0.22	A	10	0.42
	SBT	B	10	0.52	A	6	0.30
	SBR	A	7	0.33	A	5	0.13
	Overall	**A**	**8**	**0.52**	**A**	**8**	**0.42**
Highway 50 & Site Access #1 ***Unsignalized***	WBR	B	11	0.05	B	13	0.05
	NBT	A	0	0.22	A	0	0.38
	NBR	A	0	0.03	A	0	0.07
	SBT	A	0	0.35	A	0	0.27
	Overall	**A**	**<1**	**-**	**A**	**<1**	**-**

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Kingsview Drive & Site Access #2 ***Unsignalized***	EBL/R	A	9	0.18	A	9	0.14
	NBL/T	A	7	0.03	A	7	0.08
	SBT/R	A	0	0.00	A	0	0.00
	Overall	**A**	**9**	**-**	**A**	**8**	**-**

Table 36: 2030 Future Total Conditions Queue Lengths

Intersection	Mvmnt	Storage / Link Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	30	7	6
	EBT/R	135	14	5
	WBL	80	36	18
	WBT/R	350	13	9
	NBL	60	7	15
	NBT	895	34	79
	NBR	50	8	7
	SBL	30	15	10
	SBT	350	152	98
	SBR	40	0	1
Highway 50 & Columbia Way ***Signalized***	EBL	5	3	1
	EBT/R	85	3	0
	WBL	90	68	54
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	235	45	110
	NBR	235	10	9
	SBL	70	30	29
	SBT	1000	84	39
	SBR	25	0	0
Columbia Way & Kingsview Drive ***Signalized***	EBL	15	7	15
	EBT/R	210	35	40
	WBL	40	20	9
	WBT/R	900	36	20
	NBL	25	13	8
	NBT/R	60	10	8
	SBL	15	8	6
	SBT/R	120	15	12
Highway 50 & Emil Kolb Parkway ***Roundabout***	EBL	1250	5	10
	EBL/R	300	5	10
	NBL/T	1000	5	13
	NBT	280	5	13
	SBT	1230	22	10
	SBR	140	11	4
Highway 50 & Site Access #1 ***Unsignalized***	WBR	195	1	1
	NBT	100	0	0
	NBR	30	0	0
	SBT	970	0	0
Kingsview Drive & Site Access #2 ***Unsignalized***	EBL/R	75	5	4
	NBL/T	100	1	2
	SBR/R	25	0	0
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of the Phase 1, Phase 2, and Phase 3 site generated traffic to the 2030 future background traffic, the Study Area intersections operate in a similar manner to the 2028 future total analysis, and the 2030 future background analysis, with no over-capacity movements noted. Additionally, no critical movements are noted at any of the Study Area intersections, and as such, no mitigation measures are proposed. Site Access #1 and Site Access #2 both operate well with no noted over-capacity or critical movements and therefore no mitigation measures are proposed for the site access intersections.

5.3.5 2033 Future Total Operational Analysis

The proposed development's Phase 1, Phase 2, and Phase 3 trip generation has been added to the 2033 future background traffic volumes to project the impact of the new traffic on the future road network. Signal timing splits have been optimized at all signalized intersections. Table 37 summarizes the operational analysis, and Table 38 summarizes the 95th percentile queue of each movement for the 2033 future total conditions in both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the identified signal control and intersection configuration in Section 5.3.1 and Section 5.3.2, respectively. 2033 Future Total Synchro and Sidra worksheets are included in Appendix R.

Table 37: 2033 Future Total Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd ***Signalized***	EBL	D	41	0.08	D	38	0.09
	EBT/R	D	42	0.14	D	37	0.03
	WBL	D	41	0.62	D	41	0.38
	WBT/R	C	33	0.13	D	38	0.08
	NBL	A	8	0.06	A	5	0.12
	NBT	A	8	0.17	A	6	0.37
	NBR	A	8	0.06	A	4	0.05
	SBL	A	8	0.11	A	5	0.10
	SBT	B	13	0.57	A	6	0.40
	SBR	A	7	0.00	A	4	0.01
	Overall	**B**	**17**	**0.60**	**A**	**8**	**0.40**
Highway 50 & Columbia Way ***Signalized***	EBL	C	21	0.02	C	28	0.00
	EBT/R	C	21	0.01	C	28	0.00
	WBL	D	38	0.80	D	45	0.77
	WBT/R	C	22	0.12	C	28	0.05
	NBL	A	10	0.00	A	0	0.00
	NBT	B	12	0.29	B	11	0.60
	NBR	B	11	0.12	A	7	0.18
	SBL	B	13	0.29	B	12	0.44
	SBT	B	15	0.48	A	7	0.27
	SBR	A	10	0.00	A	6	0.00
	Overall	**B**	**19**	**0.60**	**B**	**15**	**0.64**
Columbia Way & Kingsview Drive ***Signalized***	EBL	A	4	0.05	A	4	0.11
	EBT/R	A	5	0.23	A	5	0.26
	WBL	A	5	0.19	A	4	0.07
	WBT/R	A	5	0.22	A	4	0.14
	NBL	C	27	0.26	C	28	0.16
	NBT/R	C	25	0.08	C	28	0.09
	SBL	C	26	0.12	C	28	0.10
	SBT/R	C	26	0.16	C	28	0.12
	Overall	**B**	**12**	**0.23**	**B**	**10**	**0.24**

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	B	10	0.22	A	9	0.35
	EBL/R	A	8	0.22	A	9	0.35
	NBL/T	A	6	0.23	B	11	0.45
	NBT	A	6	0.23	B	10	0.45
	SBT	B	11	0.55	A	6	0.32
	SBR	A	8	0.35	A	5	0.14
	Overall	**A**	**9**	**0.55**	**A**	**9**	**0.45**
Highway 50 & Site Access #1 *Unsignalized*	WBR	B	11	0.06	B	13	0.06
	NBT	A	0	0.23	A	0	0.40
	NBR	A	0	0.03	A	0	0.07
	SBT	A	0	0.37	A	0	0.28
	Overall	**A**	**<1**	**-**	**A**	**<1**	**-**
Kingsview Drive & Site Access #2 *Unsignalized*	EBL/R	A	9	0.20	A	9	0.14
	NBL/T	A	7	0.03	A	7	0.08
	SBT/R	A	0	0.00	A	0	0.00
	Overall	**A**	**9**	**-**	**A**	**8**	**-**

Table 38: 2033 Future Total Conditions Queue Lengths

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd *Signalized*	EBL	30	7	6
	EBT/R	135	14	5
	WBL	80	38	19
	WBT/R	350	13	9
	NBL	60	7	15
	NBT	895	35	82
	NBR	50	8	7
	SBL	30	16	10
	SBT	350	165	103
	SBR	40	0	1
Highway 50 & Columbia Way *Signalized*	EBL	5	3	1
	EBT/R	85	3	0
	WBL	90	72	56
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	235	49	113
	NBR	235	11	9
	SBL	70	33	30
	SBT	1000	92	40
	SBR	25	0	0
Columbia Way & Kingsview Drive *Signalized*	EBL	15	7	15
	EBT/R	210	38	43
	WBL	40	21	9
	WBT/R	900	38	22
	NBL	25	13	8
	NBT/R	60	10	8
	SBL	15	8	6
	SBT/R	120	15	12

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	1250	6	11
	EBL/R	300	6	11
	NBL/T	1000	5	15
	NBT	280	5	15
	SBT	1230	24	11
	SBR	140	12	4
Highway 50 & Site Access #1 *Unsignalized*	WBR	195	1	1
	NBT	100	0	0
	NBR	30	0	0
	SBT	970	0	0
Kingsview Drive & Site Access #2 *Unsignalized*	EBL/R	75	6	4
	NBL/T	100	1	2
	SBT/R	25	0	0
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of the Phase 1, Phase 2, and Phase 3 site generated traffic to the 2033 future background traffic, the Study Area intersections operate in a similar manner to the 2030 future total analysis, and the 2033 future background analysis, with no over-capacity movements noted. Additionally, no critical movements are noted at any of the Study Area intersections, and as such, no mitigation measures are proposed. Site Access #1 and Site Access #2 both operate well with no noted over-capacity movements and therefore no mitigation measures are proposed for the site access intersections.

5.3.6 2035 Future Total Operational Analysis

The proposed development's Phase 1, Phase 2, and Phase 3 trip generation has been added to the 2035 future background traffic volumes to project the impact of the new traffic on the future road network. Signal timing splits have been optimized at all signalized intersections. Table 39 summarizes the operational analysis, and Table 40 summarizes the 95th percentile queue of each movement for the 2035 future total conditions in both the AM and PM peak periods. Critical movements, as defined above have been identified. The intersections have been analyzed based on the identified signal control and intersection configuration in Section 5.3.1 and Section 5.3.2, respectively. 2035 Future Total Synchro and Sidra worksheets are included in Appendix S.

Table 39: 2035 Future Total Conditions Operational Analysis

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Cross Country Blvd / Bolton Heights Rd *Signalized*	EBL	D	41	0.08	D	38	0.09
	EBT/R	D	42	0.14	D	37	0.03
	WBL	D	42	0.64	D	41	0.39
	WBT/R	C	33	0.13	D	38	0.08
	NBL	A	8	0.06	A	5	0.12
	NBT	A	8	0.18	A	6	0.38
	NBR	A	8	0.06	A	4	0.05
	SBL	A	8	0.11	A	5	0.11
	SBT	B	13	0.58	A	6	0.41
	SBR	A	7	0.00	A	4	0.01
	Overall	**B**	**17**	**0.62**	**A**	**9**	**0.41**

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		LOS	Delay	V/C	LOS	Delay	V/C
Highway 50 & Columbia Way *Signalized*	EBL	C	21	0.02	C	28	0.00
	EBT/R	C	21	0.01	C	28	0.00
	WBL	D	38	0.80	D	45	0.77
	WBT/R	C	22	0.12	C	28	0.05
	NBL	A	10	0.00	A	0	0.00
	NBT	B	12	0.30	B	12	0.62
	NBR	B	11	0.12	A	7	0.19
	SBL	B	13	0.30	B	13	0.47
	SBT	B	15	0.49	A	8	0.28
	SBR	A	10	0.00	A	6	0.00
	Overall	**B**	**20**	**0.61**	**B**	**15**	**0.65**
Columbia Way & Kingsview Drive *Signalized*	EBL	A	4	0.05	A	4	0.11
	EBT/R	A	5	0.24	A	5	0.27
	WBL	A	5	0.19	A	4	0.07
	WBT/R	A	5	0.23	A	4	0.14
	NBL	C	27	0.26	C	28	0.16
	NBT/R	C	25	0.08	C	28	0.09
	SBL	C	26	0.12	C	28	0.10
	SBT/R	C	26	0.16	C	28	0.12
	Overall	**B**	**12**	**0.24**	**B**	**10**	**0.25**
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	B	11	0.23	A	9	0.36
	EBL/R	A	9	0.23	A	9	0.36
	NBL/T	A	6	0.24	B	12	0.46
	NBT	A	6	0.24	B	10	0.46
	SBT	B	12	0.57	A	7	0.33
	SBR	A	8	0.36	A	5	0.14
	Overall	**A**	**9**	**0.57**	**A**	**9**	**0.46**
Highway 50 & Site Access #1 *Unsignalized*	WBR	B	11	0.06	B	13	0.06
	NBT	A	0	0.24	A	0	0.41
	NBR	A	0	0.03	A	0	0.07
	SBT	A	0	0.38	A	0	0.29
	Overall	**A**	**<1**	**-**	**A**	**<1**	**-**
Kingsview Drive & Site Access #2 *Unsignalized*	EBL/R	A	9	0.20	A	9	0.14
	NBL/T	A	7	0.03	A	7	0.08
	SBT/R	A	0	0.00	A	0	0.00
	Overall	**A**	**9**	**-**	**A**	**8**	**-**

Table 40: 2035 Future Total Conditions Queue Lengths

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Cross Country Blvd / Bolton Heights Rd *Signalized*	EBL	30	7	6
	EBT/R	135	14	5
	WBL	80	40	20
	WBT/R	350	14	9
	NBL	60	7	15
	NBT	895	36	85
	NBR	50	8	7
	SBL	30	17	10
	SBT	350	171	107
	SBR	40	0	1

Intersection	Mvmnt	Storage Dist (m)	AM Q (95th)	PM Q (95th)
Highway 50 & Columbia Way *Signalized*	EBL	5	3	1
	EBT/R	85	4	0
	WBL	90	75	57
	WBT/R	210	0	0
	NBL	120	1	0
	NBT	235	50	118
	NBR	235	11	9
	SBL	70	34	33
	SBT	1000	93	41
	SBR	25	0	0
Columbia Way & Kingsview Drive *Signalized*	EBL	15	7	15
	EBT/R	210	39	44
	WBL	40	21	9
	WBT/R	900	40	22
	NBL	25	13	8
	NBT/R	60	10	8
	SBL	15	8	6
	SBT/R	120	15	12
Highway 50 & Emil Kolb Parkway *Roundabout*	EBL	1250	6	11
	EBL/R	300	6	11
	NBL/T	1000	5	17
	NBT	280	6	17
	SBT	1230	26	11
	SBR	140	13	4
Highway 50 & Site Access #1 *Unsignalized*	WBR	195	1	1
	NBT	100	0	0
	NBR	30	0	0
	SBT	970	0	0
Kingsview Drive & Site Access #2 *Unsignalized*	EBL/R	75	6	4
	NBL/T	100	1	2
	SBT/R	25	0	0
Notes:	# indicates the volume for the 95th percentile cycle exceeds capacity			

With the addition of the Phase 1, Phase 2, and Phase 3 site generated traffic to the 2035 future background traffic, the Study Area intersections operate in a similar manner to the 2033 future total analysis, and the 2035 future background analysis, with no over-capacity movements noted. Additionally, no critical movements are noted at any of the Study Area intersections, and as such, no mitigation measures are proposed. Site Access #1 and Site Access #2 both operate well with no noted over-capacity or critical movements and therefore no mitigation measures are proposed for the site access intersections.

5.4 Sensitivity Analysis

A sensitivity analysis has been conducted to examine traffic performance during the school PM peak from 2:15 to 3:15 PM at the intersection of Columbia Way and Kingsview Drive. This scenario captures the period where traffic volumes are expected to be the highest as students are leaving the school. Figure 22 shows the 2023 existing volumes and Figure 23 shows the 2035 future total volumes during the school PM peak hour at Kingsview Drive and Columbia Way intersection. The 2035 future total volumes include an overlap between the school's PM peak hour and the proposed development's peak hour. This is conservative as the school PM peak hour and the PM peak hour of the proposed development are unlikely to overlap. The 2035 Future Total Synchro analysis results are summarized in Table 41 and the Synchro worksheets are included in Appendix T.

Figure 22: 2023 Existing Volumes – AM and School PM Peak

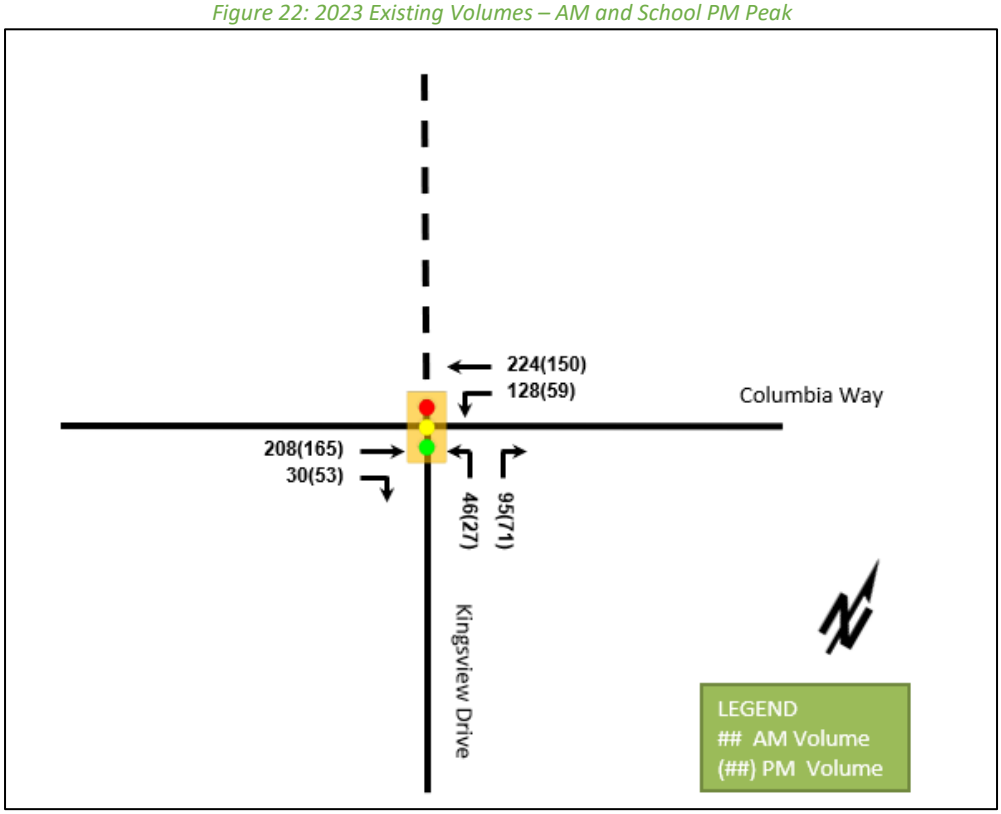


Figure 23: 2035 Future Total Volumes – AM and School PM Peak

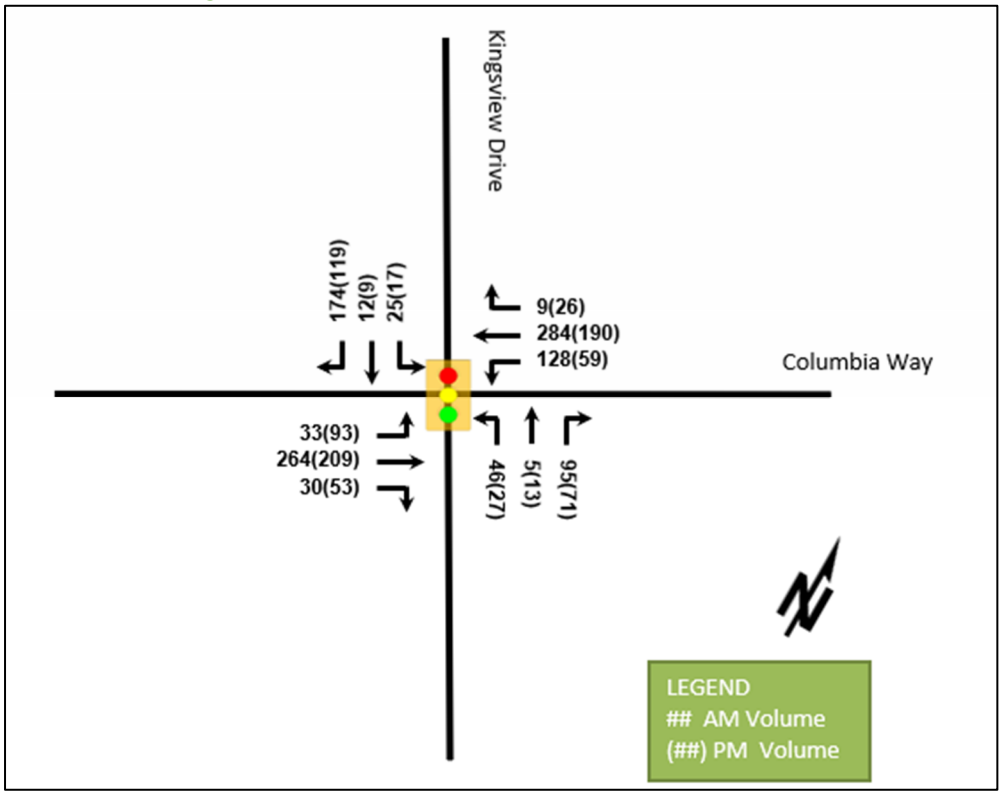


Table 41: 2035 Future Total Sensitivity Analysis

Intersection	Mvmnt	Mid-Day Peak Hour			
		LOS	V/C	Del (s)	Q (95th)
Columbia Way & Kingsview Drive *Signalized*	EBL	A	0.12	4	15
	EBT/R	A	0.21	4	34
	WBL	A	0.08	4	10
	WBT/R	A	0.19	4	29
	NBL	C	0.18	28	9
	NBT/R	C	0.12	27	11
	SBL	C	0.10	27	6
	SBT/R	C	0.12	27	12
	Overall	**B**	**0.21**	**11**	**-**

As shown above, the resulting traffic volumes from the mid-day peak operate with no over-capacity or critical movements noted. The analysis shows that the current capacity is sufficient to accommodate the expected traffic volumes in both the school PM peak and Columbia Way PM peak periods. Therefore, no mitigation measures are proposed to support the 2035 Future Total volumes at the Columbia Way and Kingsview Drive intersection.

6 Site Plan Review

6.1 Site Access

As discussed above, the proposed development will have two unsignalized accesses. Site Access #1 will be a right-in / right-out access, with a stop control on the westbound approach, and Site Access #2 is proposed as a full-movement access, with a stop control on the eastbound approach. Site Access #1 is located on Highway 50, approximately 125 metres north of Columbia Way, and Site Access #2 is located on a future extension of Kingsview Drive, approximately 115 metres north of Columbia Way. These distances were measured between inner pavement curbs of the roadways. Both site accesses and the Kingsview Drive extension to site Access #2 will be constructed in conjunction with Phase 1.

As no significant vertical or horizontal curvatures are present on the boundary road network, there are no anticipated limitations on the sight lines at the proposed accesses. Further access sight distance analysis will be performed as part of the future site plan application should this be warranted.

6.2 Auxiliary Turn Lanes

A northbound right-turn lane will be provided at Site Access #1 as the future total volumes at this access exceed 100 vehicles per hour threshold for auxiliary lane requirement specified in the 2013 Region of Peel Road Characterization Study. The Region of Peel has requested that a Functional Design Study is included as part of the TIA to support the proposed northbound right turn lane.

The preliminary minimum taper length for the proposed northbound right-turn lane at the Site Access #1 and Highway 50 intersection has been determined based on Table 9.14.2 of the Transportation Association of Canada's (TAC) Geometric Design Guide for an 80 km/h design speed. Table 9.14.1 includes requirements for right turn lanes without auxiliary lanes. However, the upstream intersection of Highway 50 and Columbia Way restricts the taper ratio and length to 17:1 and 30 metres, respectively. Thus, providing the physical limitations, the northbound left turn lane was designed using Table 9.14.2. A minimum storage length of 30 metres was provided in accordance with the Region of Peel's Public Standard Drawings 5-14 and 5-1-5. The storage length was calculated based on the following formula (TAC Formula 9.14.1):

$$S = \frac{NL}{30}$$

Where:

$$S = Storage\ Length\ (m)$$
$$N = Design\ Volume\ of\ turning\ vehicles\ (v/h)$$
$$L = Length\ (m) occupied\ by\ each\ vehicle$$

The resulting right-turn lane preliminary minimum design criteria is shown in Table 42 below.

Table 42: Site Access #1 Future Total WBR - Preliminary Minimum Design Criteria

Design Standard	Design Speed	Storage	Taper Ratio	Taper	Total Lane Length
TAC	80 km/h	30 m	17:1	59.5 m	89.5 m

Based on TAC design guidelines, the northbound right-turn lane at Site Access #1 should be a minimum of 89.5 metres long with a storage length of 30 metres, and a taper of 59.5 metres. The functional design for the northbound right turn lane at Site Access #1 and Highway 50 can be seen in Appendix U.

6.2.1 Loading Areas

A total of four loading areas are provided within the proposed development, including one loading space to support Phase 1 of the proposed development, two loading spaces to support Phase 2, and one loading space to support Phase 3. Loading spaces within the mid-rise residential buildings will be shared between waste collection and residents / tenants, and the building management will ensure that no loading occurs during waste collection periods. Further details regarding loading operations will be provided as part of the Site Plan Application stage of the proposed development.

6.3 Site Circulation

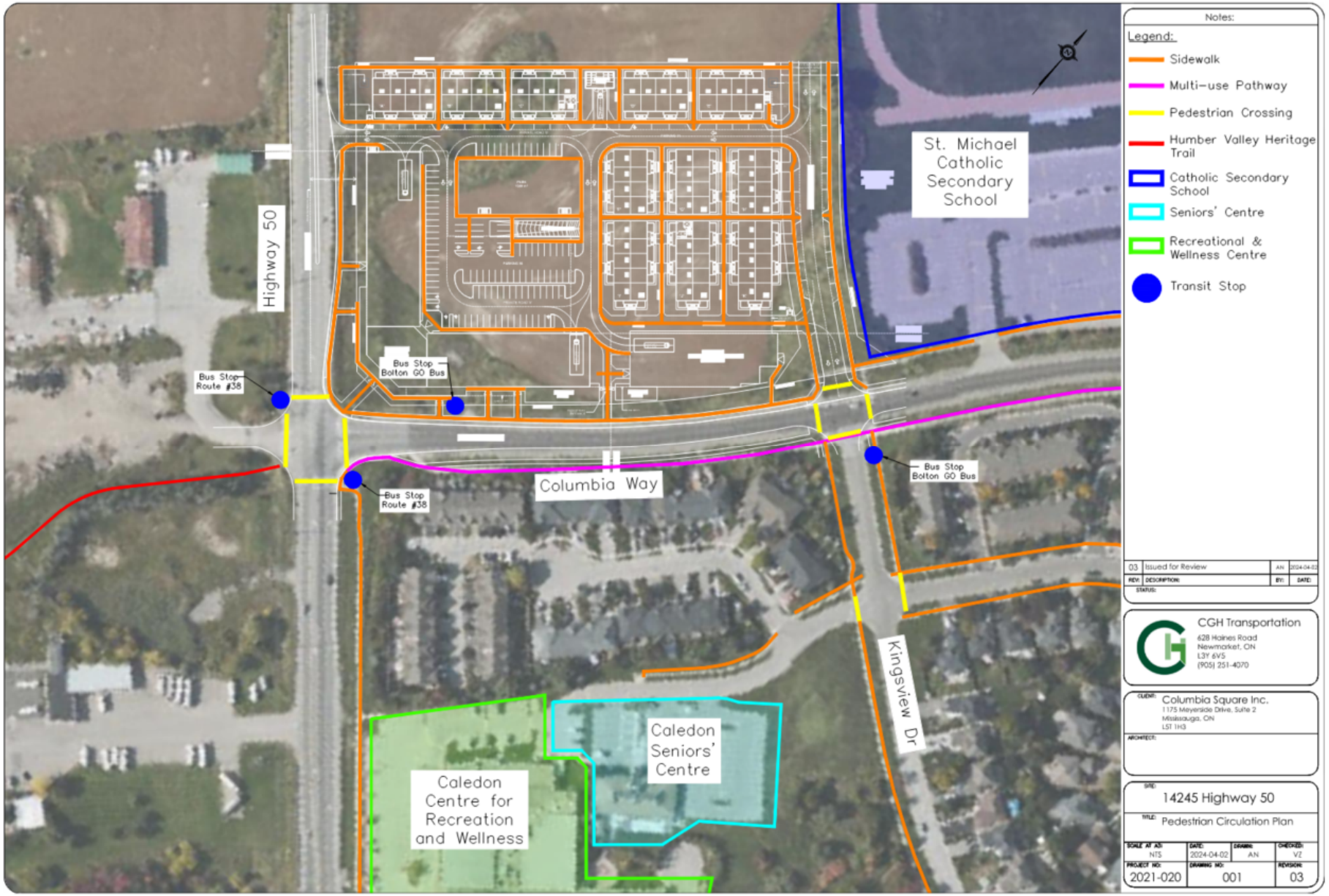
6.3.1 Turning Template Analysis

The proposed site plan and access configuration have been reviewed using the Region of Peel waste collection vehicle. All the vehicle paths are accommodated by the proposed curbs and driveways for both inbound and outbound movements. The turning template diagrams are provided in Appendix V. Additionally, Region of Peel staff have indicated that stop signs may be replaced with an automatic flashing warning system and signage for pedestrians to be aware when trucks are backing out of loading bays. Therefore, a flashing warning was implemented in lieu of stop signs at waste collection areas. The signs warning pedestrians about a reversing vehicle will be included as part of the Pavement Markings and Signage Plan during the Site Plan Application stage of the proposed development.

6.3.2 Pedestrian Circulation

There are numerous active transportation facilities and destinations within one superblock of the proposed development. This includes St. Michael Catholic Secondary School, Caledon Centre for Recreation and Wellness, Caledon Senior's Centre, Humber Valley Heritage Trail, and stops to local Bolton Line Bus Routes as well as the Bolton GO Transit Route #38. Prior to the build-out of the proposed site, a multi-use path will also be provided along Columbia Way as part of the planned Columbia Way improvements. Additionally, a comprehensive pedestrian network will be provided within the proposed development, ensuring that sidewalks are provided along all major pedestrian desire routes. Figure 24 illustrates pedestrian linkages throughout the site as well as connections to the nearby facilities.

Figure 24: Pedestrian Circulation Plan



6.4 Transportation Demand Management

Transportation Demand Management (TDM) is a set of measures and initiatives implemented to encourage the use of non-auto modes of travel and decrease reliance on single vehicle occupancy. The proposed development encourages and facilitates the use of pedestrian, cycling, and transit facilities. The recommended high-level TDM plan for Columbia Square is as follows with further details to be determined as part of the site plan application:

6.4.1 Active Transportation Measures

The proposed development will provide on-site pedestrian facilities adjacent to the internal road network as well as between building entrances and parking areas. Sidewalks are also provided along the southern frontage of the site on the north side of Columbia Way, as well as on the western frontage of the site on the east side of Highway 50, as shown in Figure 24. These facilities will encourage pedestrian trips to and from the site.

Per the 2021 Town of Caledon Zoning By-Law, no bicycle parking spaces are required. However, to encourage sustainable transportation and to future proof the proposed development the long-term bicycle parking was provided at a rate of 0.28 resident spaces per unit. This exceeds the forecast target number of cyclists, as per the 2019 Region of Peel Long Range Transportation Plan (LRTP) target mode shares, by 330%. Additionally, short term bicycle parking spaces and EV charging stations for micro-mobility devices will be provided near commercial entrances. The exact location and number of the proposed short-term bicycle parking spaces will be determined during the Site Plan Application stage of the proposed development. The proposed bicycle parking provisions will serve as a strong incentive for cycling trips for residents and patrons of the proposed developments.

6.4.2 Transit Measures

Transit stops for the Bolton Line route as well as the Bolton GO Transit Route #38 are located around the perimeter of the proposed development, as shown in Figure 24. The comprehensive on-site sidewalk network allows for direct pedestrian connections from site to the municipal sidewalk network, and transit. Providing transit discount cards to commercial staff is recommended to incentivize non-auto trips to the commercial component of the proposed development. Details pertaining to transit discount cards will be provided at the Site Plan Application stage of the proposed development.

6.4.3 Education and Travel Planning

Education and travel planning measures include the recommended provision of transit and active mode information to residents and retail employees using online links to relevant transit information, active transportation facilities, and community resources such as Smart Commute.

6.4.4 Reduced Parking

Fewer vehicle parking spaces are provided at the proposed development than are required by the Town of Caledon Zoning By-law Sections 10 and 20. Providing a reduced number of parking spaces will incentivize telecommuting, carpooling, and transit trips to work. As discussed in Section 2.4, the existing transit Bolton Line transit route includes a transfer point at Highway 50 and Queen Street, connecting to Brampton Transit, which provides access to York University, Downtown Brampton, and Mount Pleasant GO Station. GO Transit Bus Route #38 provides one-way peak period service between Malton GO Station and the Bolton area, and Malton GO Station includes connections to Toronto Union Station and Mount Pleasant GO Station.

6.5 Parking

6.5.1 Parking Requirements

The proposed development will have a total of 1,099 parking spaces. Of these spaces, 331 are part of Phase 1, 572 are part of Phase 2, and 196 are part of Phase 3. Underground parking plans can be seen in Appendix W. The auto parking requirements for the proposed development have been determined using the Town of Caledon Zoning

By-law Section 5 (Revised 2021). Table 43 summarizes the required and provided parking for the proposed development.

Table 43: Parking Statistics Summary - Town of Caledon Zoning By-law

Land Use	Units/GFA	Required Parking Rate	Required Parking	Provided Parking Rate	Provided Parking	Surplus / Deficit
Phase 1						
Townhouse	228 units	1.5/unit	342	1.32/unit	300	-42
Townhouse - Visitor		0.25/unit	57	0.14/unit	31	-26
Phase 2						
Apartment	393 units	1.5/unit	590	1.21/unit	474	-116
Apartment - Visitor		0.25/unit	98	0.08/unit	30	-68
Retail	1726 s.m.	1/20 m^2	86	1/25 s.m.	68	-18
Phase 3						
Apartment	141 units	1.50/unit	212	1.25/unit	176	-36
Apartment - Visitor		0.25/unit	35	0.14/unit	20	-15
Total	-	-	**1420**	-	**1099**	**-321**

As discussed with Town staff, when evaluating an applicable required parking rate, the stacked townhouse units have been considered apartment units as opposed to traditional townhouse units. The stacked townhouse units will not have a private driveway and garage allocated to each unit and will instead have a shared underground parking garage, as is more typical of an apartment. A required parking rate of 1.5 spaces / unit has been used to determine the required number of stacked townhouse parking spaces, as shown above.

6.5.2 Residential Parking Justification

6.5.2.1 City of Brampton Zoning By-law Section 10 and Section 20

City of Brampton Zoning By-Law parking requirements for apartments and multiple residential dwellings as well as retail have been reviewed to gain insight into parking requirement standards of an adjacent municipality. The parking space requirements are summarized in Table 44.

Table 44: Parking Statistics Summary – City of Brampton Zoning By-law

Land Use	Parking Rate
Apartment	1.00/unit
Apartment - Visitor	0.20/unit
Retail	1/23 m^2

As shown above, the City of Brampton parking rates are lower, however it is important to note that the City of Brampton has a more comprehensive transit network when compared to Bolton. To account for this, 2016 6:00 AM to 9:00 AM TTS Mode Shares in Caledon's Ward 4 were compared to Brampton's mode shares and are summarized in Table 45 below.

Table 45: 2016 TT Mode Shares – Caledon Ward 4 vs. Brampton

Travel Mode	Caledon Ward 4	Brampton
Auto Driver	72%	64%
Auto Passenger	11%	13%
Transit	-	10%
Walk & Cycle	1%	8%
Other	14%	5%
Total	98%	100%

Using the auto mode shares of 72% and 64%, a parking adjustment factor of 1.125 was derived to account for the difference in auto mode share between Caledon's Ward 4 and Brampton. Using this conversion factor, the City of Brampton parking requirements have been adjusted and are summarized in Table 46 below.

Table 46: Parking Statistics Summary – City of Brampton Zoning By-law, Adjusted

Land Use	Parking Rate	Adjusted Parking Rate
Apartment	1.00/unit	1.125/unit
Apartment - Visitor	0.20/unit	0.225/unit
Retail	1/23 m^2	1/26 m^2

As shown above, when adjusted to reflect the difference in auto mode shares, the City of Brampton residential parking rate requirements are lower than the proposed parking rates at the subject development. Thus, the proposed parking supply rate of 1.35 to 1.39 spaces per resident and 0.22 to 0.23 spaces per visitor should be sufficient to support the proposed development. The retail component parking requirement is also lower than the parking requirement specified in the Town of Caledon Zoning By-Law.

6.5.2.2 Proxy Parking Demand Surveys

In order to further support a reduced apartment unit parking rate, proxy parking demand surveys have been analyzed at 50 Ann Street and 60 Ann Street. Both apartment buildings at 50 Ann Street and 60 Ann Street in the Town of Caledon have reduced required minimum parking rates as per Site Specific Zoning By-law requirements. 50 Ann Street has 72 residential units, and 79 parking spaces, built based on a minimum residential occupant parking rate of 1.00 spaces per unit, and a minimum residential visitor parking rate of 0.10 spaces per unit.

60 Ann Street has 71 residential units, and 104 parking spaces, built based on a minimum residential occupant parking rate of 1.00 spaces per unit, and a minimum residential visitor parking rate of 0.20 spaces per unit. As 95 resident parking spaces and 9 visitor parking spaces are noted at 60 Ann Street, the resident parking space supply has been calculated to be 1.34 spaces per unit, and the resident visitor parking space supply has been calculated at a rate of 0.13 spaces per unit.

As part of the *50 Ann Street Transportation Impact Study (2018)*, prepared by BA Group, a proxy parking demand survey was performed at 60 Ann Street. Excerpts from the study can be found in Appendix X. Parking utilization data was collected on February 20, 2018, February 23, 2018, February 24, 2018, and February 25, 2018. Residential occupant parking demands were noted at a maximum of 1.00 spaces per unit, with an average rate of 0.79 spaces per unit. Residential visitor parking demands were noted to range between 0.00 and 0.10 spaces per unit, with an average rate of 0.07 spaces per unit. Table 47 provides a summary of maximum parking demand rates surveyed at 50 Ann Street.

Table 47: Parking Survey Summary – 50 Ann Street

Land Use	Parking Rate
Apartment	1.00/unit
Apartment - Visitor	0.10/unit

Based on the parking demand survey at 50 Ann Street, the proposed parking supply rate of 1.35 to 1.39 spaces per resident and 0.22 to 0.23 spaces per visitor is sufficient to support the proposed development.

6.5.3 Retail Parking Justification

The subject site is proposed to include a total of 706 apartment units, including townhouse units and mid-rise residential units. All units on site will share a common above ground and underground parking lots for resident and visitor parking spaces. A total of 156 resident visitor parking spaces are proposed and will be provided upon the full build-out. The retail components of the proposed development will be built during the last phase, and as specified in Table 43, a total of 85 retail parking spaces are required.

Using the adjusted City of Brampton parking requirements, as described in section 6.4.2.2, combined with the maximum surveyed residential visitor parking rate at 50 Ann Street, expected retail and residential visitor parking demand has been calculated and is summarized in Table 48.

Table 48: Visitor and Retail Parking Justification

Land Use	Units/GFA	Surveyed Parking Rate at 50 Ann Street	City of Brampton Parking Rate Adjusted by Mode Share	Required Parking	Provided Parking	Surplus / Deficit
Apartment - Visitor	762 units	0.10/unit	-	76	111	+35
Retail	1726 m^2	-	1/26 m^2	66	68	+2
			Total	**142**	**179**	**+37**

Using the adjusted City of Brampton parking requirements specified in Table 46, a total of 66 retail parking spaces should be required. Using the maximum surveyed residential visitor parking rate of 0.10 spaces per unit, a total of 76 visitor parking spaces should be sufficient to meet the visitor parking demand at the proposed development. As a result, the total proposed residential visitor and retail parking of 179 parking spaces is expected to meet retail and residential visitor parking demand in excess.

6.5.4 Proposed Parking

The parking requirement based on residential, visitor, and retail parking justification provided above as well as the proposed parking provisions are summarized in Table 49.

Table 49: Parking Statistics Summary – Justification Approach

Land Use	Units/GFA	Required Parking Rate	Required Parking	Provided Parking Rate	Provided Parking	Surplus / (Deficit)
Phase 1						
Townhouse	228 units	1.125/unit *	257	1.32/unit	300	+43
Townhouse - Visitor		0.10/unit**	23	0.14/unit	31	+8
Phase 2						
Apartment	393 units	1.125/unit *	442	1.21/unit	474	+32
Apartment - Visitor		0.10/unit**	39	0.08/unit	30	-9
Retail	1726 m^2	1/26 m^2*	66	1 /25 m^2	68	+2
Phase 3						
Apartment	141	1.125/unit *	159	1.25/unit	176	+17
Apartment - Visitor		0.10/unit**	14	0.14/unit	20	+6
Total	**-**	**-**	**1000**	**-**	**1099**	**+99**

* -City of Brampton Parking By-Law requirement adjusted for higher auto mode shares in Caledon's Ward 4

** -Maximum observed parking demand at 50 Ann Street in Caledon

As summarized in Table 49 above, the proposed parking supply exceeds the parking requirement derived using justification outlined in Sections 6.5.2 and 6.5.3.

6.5.5 Barrier Free Parking Spaces

Barrier free or accessible parking space requirements for the proposed development have been determined based on the Town of Caledon By-law 2015-058. The required number of accessible parking spaces is calculated as a percentage of the total parking spaces required. The resulting parking requirements and provisions are summarized in Table 50.

Table 50: Parking Statistics Summary - Town of Caledon Zoning By-law

Land Use	Units / GFA	Required Parking Rate	Required Parking	Required Accessible Parking Rate	Required Accessible Parking	Provided Accessible Parking
Phase 1						
Townhouse	228 units	1.5/unit	342	2 + 2% of required parking	9	16
Townhouse - Visitor		0.25/unit	57	4% of required parking	2	2
Phase 1 Total	-	-	**399**	-	**11**	**18**
Phase 2						
Apartment	393 units	1.5/unit	590	2 + 2% of required parking	14	16
Apartment - Visitor		0.25/unit	98	4% of required parking	4	5
Retail	1726 s.m.	1/20 m^2	86	4% of required parking	3	3
Phase 2 Total	-	-	**774**	-	**21**	**24**
Phase 3						
Apartment	141 units	1.50/unit	212	2 + 2% of required parking	6	Accounted for in Phases 1 & 2
Apartment - Visitor		0.25/unit	35	4% of required parking	1	
Phase 3 Total	-	-	**247**	-	**8**	
Total	-	-	**1420**	-	**40**	**42**

As shown above, the proposed development will provide an adequate number of accessible parking spaces.

7 Conclusions & Recommendations

This Transportation Impact Study presents the trip generation, Study Area road network impact, and parking requirements of the proposed 14245 Highway 50 mixed-use residential development. The TIS includes the following:

Introduction and Proposed Site:

- The development, referred to as 14245 Highway 50, will include 228 townhouse units, 534 mid-rise apartment units, and 1,726 square metres of retail space.
- A total of 1092 parking spaces are proposed to support the proposed development, located at surface level and two underground parking levels.
- The full-build-out and occupancy of the proposed development will occur in phases, with completion of Phase 1 expected to occur in 2028, and the full build-out of Phase 2 and Phase 3 expected by 2030.
- The proposed development will have two unsignalized accesses. One access is proposed onto Highway 50 (Site Access #1) and the other onto a future expansion of Kingsview Drive (Site Access #2).
- The application is for a Zoning By-law Amendment/Official Plan Amendment

Existing Conditions:

- Sidewalks are noted on one side of Columbia Way, Cross Country Boulevard, and on Highway 50 / Queen Street North south of Columbia Way, and on both sides of Kingsview Drive and Bolton Heights Road in the Study Area.
- Limited cycling infrastructure is provided in the Study Area with on-street bike lanes provided on Bolton Heights Road, and paved shoulders on the majority of Highway 50 / Queen Street North.
- Local and inter-regional transit is provided within the Study Area. The local Bolton Line provides peak period services along Highway 50 between Queen Street and Columbia Way. The GO Transit Bus Route 38 provides one-way peak period service between Malton GO Station and the Bolton area.
- A compound annual growth rate of 1.5% was selected for Highway 50 and Emil Kolb Parkway. A compound annual growth rate of 2% was selected for Bolton Heights, and Columbia Way. No growth rate has been applied to the tuning movements in and out of Kingsview Drive or in and out of Cross Country Boulevard at Highway 50 / Queen Street South, no growth rate has been applied to the eastbound left-turn, eastbound right-turn, northbound left-turn, and southbound right-turn movements.
- All Study Area intersections operate with well with no over-capacity movements noted, and only one critical movement noted. This critical movement is expected to be resolved with the future Columbia Way improvements.

Future Background:

- The full build-out future horizons of 2028 and 2030, as well as the full build-out horizons plus 5 years of 2033, and 2035 will be evaluated.
- No background developments have been considered as part of the background conditions.
- Planned improvements to Columbia Way within the Study Area have been considered and include; an urban reconstruction, a multi-use pathway on the south side of the road, and intersection configuration changes.
- A compound annual growth rate of 1.5% was selected for Highway 50 and Emil Kolb Parkway. A compound annual growth rate of 2% was selected for Bolton Heights, and Columbia Way. No growth rate has been applied to the tuning movements in and out of Kingsview Drive or in and out of Cross Country Boulevard at Highway 50 / Queen Street South, no growth rate has been applied to the eastbound left-turn, eastbound right-turn, northbound left-turn, and southbound right-turn movements.

- All Study Area intersections operate with well with no critical or over-capacity movements noted in all future background analysis horizons.

Forecasting:

- The proposed development is anticipated to generate 94 two-way vehicle trips during the AM peak and 119 two-way vehicle trips during the PM peak for Phase 1 of the development.
- The proposed development is anticipated to generate 342 two-way vehicle trips during the AM peak and 427 two-way vehicle trips during the PM peak for Phase 1, Phase 2, and Phase 3 of the development.
- Based on the projected mode shares, a total of 131 AM and 165 PM new peak hour two-way person trips are projected as a result of Phase 1 of the proposed development.
- Based on the projected mode shares, a total of 475 AM and 593 PM net new peak hour two-way person trips are projected as a result of Phase 1, Phase 2, and Phase 3 of the proposed development.
- Using the 2016 Transportation Tomorrow Survey (TTS), distribution of the site trips is estimated to be 10% to the north, 60% to the south, 20% to the east, and 10% to the west.

Future Total:

- With the addition of the site traffic volumes, the Study Area intersections and site accesses operate well in all future total analysis horizons with no over-capacity movements noted.
- No critical movements are noted at any of the Study Area intersections or site accesses in any of the future total analysis horizons.
- The implementation of the auxiliary northbound right-turn lane at Site Access #1 follows the Region of Peel requirement to provide an auxiliary turn lane for new developments accessing regional roads and generating over 100 peak hour vehicle trips.
- Site Access #2 does not require an auxiliary northbound left-turn lane at any of the future analysis horizons as there are currently no futures plans of extending Kingsview Drive beyond the proposed development.

Site Plan and Parking Review:

- The proposed development will have a total of 1092 parking spaces. Of these spaces, 331 are part of Phase 1, 572 are part of Phase 2, and 189 are part of Phase 3.
- Using the Town of Caledon Zoning By-law, the City of Brampton Zoning By-law, proxy parking demand surveys for similar developments, and previously approved residential and residential visitor parking rates, the proposed parking supply at 14245 Highway 50 is considered appropriate.
- 30 barrier free parking spaces are proposed, which satisfies the required number of barrier free parking spaces for the proposed development.
- Four loading spaces are proposed to service the subject site.
- Bicycle parking and storage areas are provided within the proposed development.

Transportation Demand Management Measures:

- Transit, active mode, parking, education, and travel planning transportation demand management plan measures have been recommended in order to reduce reliance on single occupant vehicle trips.

The 14245 Highway 50 development will have a minor transportation impact on the Study Area road network. The proposed accesses will operate with reasonable LOS and delays on the turning movements into and out of the site where applicable. It is recommended that, from a transportation perspective, the proposed development application proceed.

Prepared By:

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Viktoriya.Zaytseva @CGHTransportation.com

Reviewed By:

Mark Crockford, P. Eng.
905-251-4070
Mark.Crockford@CGHTransportation.com

Appendix A

Scope Confirmation

Technical Memorandum

To:	Rosalie Shan – Region of Peel Arash Olia -Town of Caledon Jillian Britto -Town of Caledon	Date:	2021-05-28
Cc:	Jason Afonso – GSAI Gursimran Saini – GSAI Robin Marinac – CGH Transportation		
From:	Mark Crockford	Project Number:	2021-020

Re: 14245 Highway 50 Transportation Impact Study – Terms of Reference

We have been asked to undertake a Transportation Impact Study (TIS) to support the Official Plan Amendment and Zoning By-law Amendment application for the Wyndecliffe Developments Inc. property located at 14245 Highway 50 in Caledon. The subject site is currently a greenfield and is planned as a mixed-use development including residential and commercial uses. The residential land uses are split between mid-rise and townhouse style buildings. Additionally, one of the mid-rise buildings is anticipated to be a retirement community. A total of 102 townhouse units, 234 mid-rise units, 250 retirement units, and 2,000 square metres of retail space. The retail space is anticipated to be located on the ground floor of the buildings fronting onto Highway 50 and Columbia Way. One access onto Highway 50 and one access onto Columbia Way are proposed to serve the subject development. The estimated full-build out and occupancy of the development will occur in phases, with the full build-out of Phase 1 expected to occur in 2026, and the full build-out of Phase 2 and Phase 3 is expected by 2028. The preliminary concept plan is shown in Attachment 1.

We have prepared the following TIS scope of work for review and endorsement by the Town of Caledon, and Region of Peel staff. Please let us know if you have any comments or additions. All data requests have been underlined.

Transportation Impact Study Requirements:

The study will be in accordance with the Region of Peel's *Guidelines for the Preparation of Traffic Impact Study Guidelines* and the Town of Caledon's *Transportation Impact Studies Terms of Reference and Guidelines*.

Proposed Development Overview:

- A description of the proposed development and any planned active mode facilities.
- Outline of land use as it relates to the development and site statistics.
- Identification of proposed site access locations.

Study Area:

- An overview of the transportation network existing conditions will be documented (including transit, cycling, pedestrian and automobile modes)
- An overview of the study area road network will be provided including the road classification and descriptions of:
    - Columbia Way
    - Highway 50
    - Emil Kolb Parkway
    - Kingsview Drive

- The following intersections will be included in the Transportation Impact Study:
    - Columbia Way at Highway 50 (existing)
    - Emil Kolb Parkway at Highway 50 (existing)
    - Columbia Way at Kingsview Drive (existing)
    - Site Access #1 at Highway 50 (new)
    - Site Access #2 at Columbia Way (new)
- The following sources are available for Turning Movement Count (TMC) data:
    - **Source 1:** TMC availability has been requested from Peel Region staff for the existing intersections of Emil Kolb Parkway at Highway 50, and Columbia Way at Highway 50. TMC availability has also been requested from Town of Caledon staff for the intersection of Columbia Way and Kingsview Drive.
    - **Source 2:** If TMCs are unavailable at the Study Area intersections, current TMCs can be collected by a third-party consultant, however, it should be noted that this data will be collected during COVID-19 lockdown measures and may not represent normal traffic conditions.
- Signal Timing Plans for study area intersections for the intersection of Highway 50 and Columbia Way have been requested from Peel Region staff, and for the intersection of Columbia Way and Kingsview Drive from Town of Caledon staff.
- A growth rate for Highway 50 north and south of Columbia Way, Highway 50 north and south of Emil Kolb Parkway, and Emil Kolb Parkway west of Highway 50 has been requested from the Region of Peel to determine the existing 2021 volumes.
- A growth rate for Columbia Way east of Highway 50, Kingsview Drive south of Columbia Way is requested from the Town of Caledon to determine the existing 2021 traffic volumes. In the event that this information is not available, historical AADTs will be used to determine a growth rate (if available).
- Collision data at the existing study area intersections has been requested from the Region of Peel and Town of Caledon.

Study Horizon & Peak Periods:

- Base year 2021, followed by a build-out future horizon of 2026, and build-out plus five years horizon of 2031 for Phase 1. A build-out future horizon of 2028, and a build-out plus five years horizon of 2033 for Phase 2 and Phase 3 will be considered.
- AM, and PM peak hour periods.

Background Growth:

- A growth rate for Highway 50 north and south of Columbia Way, Highway 50 north and south of Emil Kolb Parkway, and Emil Kolb Parkway west of Highway 50 has been requested from the Region of Peel to determine 2026, 2028, 2031, and 2033 background traffic volumes.
- A growth rate for Columbia Way east of Highway 50, Kingsview Drive south of Columbia Way is requested from the Town of Caledon to determine 2026, 2028, 2031, and 2033 background traffic volumes. In the event that this information is not available, historical AADTs will be used to determine a growth rate (if available).
- No surrounding background developments expected to impact the proposed Study Area have been identified. Please advise if any background developments should be considered.

Changes to Area Transportation Network:

- Improvements are planned for Columbia Way between Highway 50 and Caledon King Townline. Construction has been planned to begin in 2022 or 2023, and as such, any changes to Columbia Way, will be considered in all future horizons based on The Columbia Way Class EA Public Information Centre Design Alternative document. Additional information surrounding the anticipated year of completion, as well as the design to be used is requested from Town of Caledon staff.

- The recommended pedestrian network within the *Caledon Transportation Master Plan (2017)* proposes a future roadside walking route on Columbia Way within the Study Area. Additional information surrounding the timing of this improvement is requested from Town of Caledon staff.
- The recommended cycling network within the *Caledon Transportation Master Plan (2017)* proposes future shared on-road cycling routes on Columbia Way and Kingsview Drive within the Study Area. Additional information surrounding the timing of this improvement is requested from Town of Caledon staff.

Development Site Traffic:

- Trip generation: ITE Trip Generation Manual 10th Edition
- Existing Modal Split: Consideration given to both Transportation Tomorrow Survey (TTS) as well as projected mode shares from the *Region of Peel 50% Sustainable Mode Share Target Background Paper*.
- Trip distribution and assignment of auto trips: TTS, surrounding area characteristics
- Trip reductions as required (i.e. Pass-by, Synergy, etc.) as per ITE Trip Generation Handbook 3rd Edition.

Analysis:

- Traffic analysis to be performed using Synchro 10 on Study Area network intersections to determine the LOS, delay, V / C ratio and the 95th percentile queues for both signalized and unsignalized intersections as well as individual movements using Highway Capacity Manual 2000 (HCM) methodology
    - Heavy Vehicle %, pedestrian volumes, and cyclist volumes will be taken from the collected TMC data. Where information is not available, a Heavy Vehicle % of 2% will be used.
    - Other Synchro inputs will be based on site observations, Peel Region's *Regional Guidelines for Using Synchro (2010),* as well as Synchro default parameters.
- Traffic analysis to be performed using Sidra on Study Area network roundabouts to determine the LOS, delay, V / C ratio and the 95th percentile queues for the overall intersection as well as individual movements using Highway Capacity Manual 2010 (HCM) methodology as HCM 2000 is not offered in Sidra
    - Heavy Vehicle %, pedestrian volumes, and cyclist volumes will be taken from the collected TMC data. Where information is not available, a Heavy Vehicle % of 2% will be used.
    - Other Sidra inputs will be based on site observations, Peel Region's *Regional Guidelines for Using Synchro (2010)* where applicable*,* as well as Sidra default parameters.
- A qualitative transit, cycling, and pedestrian analysis in consideration of any planned improvements
- Access location analysis including a sight distance evaluation
- Site parking, loading and circulation to be considered where necessary

Recommendations:

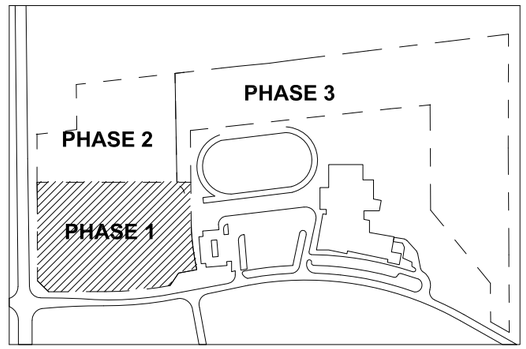
- Any recommended offsite and onsite improvements or mitigation measures, which may include turn lane requirements, pedestrian / cycling / transit amenities, TDM measures, construction impacts, safety measures etc.

Additionally, the Bolton Transportation Master Plan is requested from Town of Caledon staff.

Attachment 1

Proposed Concept Plan

KEYPLAN



Statistics

Mixed-Use Buildings

Building	Building Type	Building GFA (ft2)	Net Building Area (ft2) (15% Deduction included)	Net Unit Size (ft2)	# Units	Proposed Retail (1/2 Ground Level)
B1&B2	Mixed-use	231,500	196,700	840	**234**	21,500

Parking

Block	Zoning Requirement	Parking Required (Residential) Including Visitors	Parking Required (Retail) 1 Space each 20.0m2	Total Parking Required	Parking Provided (1 level of underground)	Parking Provided (above grade)	Total Parking Provided
B	1.0 Space +0.25 Visitor (Mixed-use)	410	100	**510**	392	128	**520**

Total Parking Required **510**

Total Parking Provided **520**

Retirement Building

Building	Building Type	Building GFA (ft2)	Net Building Area (ft2) (15% Deduction included)	Net Unit Size (ft2)	# Units	Proposed Retail (1/2 Ground Level)
A	Retirement	197,000	167,500	670	**250**	N/A

Parking

Block	Zoning Requirement	Parking Required (Residential) Including Visitors	Parking Required (Retail) 1 Space each 20.0m2	Total Parking Required	Parking Provided (1 level of underground)	Parking Provided (above grade)	Total Parking Provided
A	0.5 Space per Unit	125	N/A	125	151	43	**194**

Total Parking Required **125**

Total Parking Provided **194**

Townhouses

Block	Building	Unit Size	Unit Area (ft2)	#Unit	Proposed Retail
C	Back to Back Townhouse	4.5m x 10.0m	1,550	**102**	N/A

Total Parking Provided

- Under Building	102
- Visitor	26
	128

Total Units **586**

DRAWING TITLE:

CONCEPT PLAN

PROJECT:

COLUMBIA SQUARE

DATE:	March 04, 2021
MBTW JOB NO.:	WDI001
DESIGNED BY: / DRAWN BY:	CONCEPT NO.:
SCALE:	1:1000

mbtw wai
landscape architecture | urban design | design guidance | architecture | golf design | leisure design
255 Wicksteed Ave., Unit 1A | Toronto, Ontario, Canada M4H 1G8
T: (416) 449-7767 | F: (416) 449-1803 | www.mbtw-wai.com

Robin Marinac

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: July 13, 2021 1:49 PM
To: Robin Marinac
Cc: Arash Olia; Drew Haines; Mark Crockford
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Hi Robin,

I've shared a OneDrive link with yourself and Mark, link is below too. Let me know if you have any trouble accessing the folder.

https://caledonca-my.sharepoint.com/:f:/g/personal/jillian_britto_caledon_ca/ElhVhtBafZ1Buq-72JO95pQBa4cOb3zyQohTXom_xTFUeg?e=rqY8Fu

Regards,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: Tuesday, July 13, 2021 9:21 AM
To: Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Arash Olia <Arash.Olia@caledon.ca>; Drew Haines <drew.haines@caledon.ca>; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Hi Jillian,

Thank you for confirming the background developments and for providing the Bolton TMP excerpts. If possible, can you please send the full document?

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: July 9, 2021 1:10 PM
To: Robin Marinac <robin.marinac@cghtransportation.com>
Cc: Arash Olia <Arash.Olia@caledon.ca>; Drew Haines <drew.haines@caledon.ca>; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Hi Robin,

Thank you for your patience. There are no background developments that will contribute significant traffic to the intersections within your study area.

The Bolton TMP is quite a large file, I've provided excerpts of the future roadway and AT improvements. Please let me know if you need the entire report and I'll try to get it to you early next week.

Regards,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: Friday, July 9, 2021 11:01 AM
To: Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Arash Olia <Arash.Olia@caledon.ca>; Drew Haines <drew.haines@caledon.ca>; Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Hi Jillian,

I know that you mentioned you would be providing us with background developments to be considered in our study. I was also wondering if you could provide any material regarding the Bolton Transportation Master Plan.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: July 6, 2021 9:04 AM

To: Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Arash Olia <Arash.Olia@caledon.ca>; Drew Haines <drew.haines@caledon.ca>; Shan, Rosalie <rosalie.shan@peelregion.ca>; Jason Afonso <jasona@gsai.ca>; Gursimran Saini <GursimranS@gsai.ca>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Hi Jillian,

Thank you for the feedback below, it has been very helpful as we move forward with out TIS. I look forward to hearing back from you on the background developments.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: June 29, 2021 11:26 AM
To: Robin Marinac <robin.marinac@cghtransportation.com>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Arash Olia <Arash.Olia@caledon.ca>; Drew Haines <drew.haines@caledon.ca>; Shan, Rosalie <rosalie.shan@peelregion.ca>; Jason Afonso <jasona@gsai.ca>; Gursimran Saini <GursimranS@gsai.ca>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Good morning Robin,

Hope you are doing well.

Thank you for providing a terms of reference for the TIS report for the proposed Columbia Square development.

Please see below comments from Town Transportation and Engineering staff; I am waiting for confirmation on the background developments and will send a follow-up email once I hear back from my Planning colleagues.

- Please add the Highway 50 at Bolton Heights Road intersections to the study area.
- Please use the attached AADT data to determine growth rates on Town roads. If AADT data is unavailable, please use an annual 2% growth rate on Town roads except local roads. Growth is not required to be applied to local roads if all the appropriate background developments are included in the analysis.
- I will send a follow-up email for the background developments. Please also reach out to the Region to confirm the background developments they will need added to the background analysis.
- Please refer to this website for the latest information on the Columbia Way EA:
    - Feb 2021 PIC: https://www.caledon.ca/en/town-services/resources/Transit/195072-PIC1-Online-Webinar-vf-Revised_Feb-24.pdf
    - Road design: https://www.caledon.ca/en/town-services/resources/Transit/195072-ROAD-DESIGN-Columbia-Way-.pdf
- Please follow the Town's DSM (https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/Development-Standards-Manual.pdf) for the design of any public/condo roads and intersection design on Town roads.
- The rest of the proposed scope is acceptable.

Please note that these are preliminary comments that could change upon the completion of the Official Plan and TMP update.

Please feel free to reach out to us if you have any questions or concerns.

Regards,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: Thursday, June 17, 2021 9:10 AM
To: Arash Olia <Arash.Olia@caledon.ca>; Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Good morning Arash and Jillian,

I just wanted to check in with you and see when you might be able to provide some feedback on our submitted TIS Terms of Reference.

Additionally, a couple of weeks ago I submitted a request for traffic data through the Caledon website. I've not heard anything back, so I'm hoping you can point me in the right direction so that we can obtain the cost and availability information for the below information quickly:

-TMC at Columbia Way and Kingsview Drive – The Town does not have recent traffic data.
-STP at Columbia Way and Kingsview Drive – Please reach out to Rebecca Caughey the Region of Peel (rebecca.caughey@peelregion.ca)
-Existing and historical AADT data on Columbia Way east of Highway 50 and east of Kingsview Drive, as well as existing and historical AADT data on Kingsview Drive south of Columbia Way. – Please see attached image of available AADT data.
-Historical collision data at the intersection of Columbia Way and Kingsview Drive. – One accident in the last five years, see attached collision report.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: May 28, 2021 4:27 PM
To: Arash.Olia@caledon.ca; Jillian.Britto@caledon.ca; Shan, Rosalie <rosalie.shan@peelregion.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Jason Afonso <jasona@gsai.ca>; Gursimran Saini <GursimranS@gsai.ca>
Subject: 14245 Highway 50 TIS Terms of Reference

Hi Rosalie, Arash, and Jillian,

Please find attached our draft TIS Terms of Reference for your review. We have drawn from both the Region of Peel and the Town of Caledon TIS Guidelines. Please let us know if you have any comments or questions as we would like to ensure that our TOR reflects the appropriate scope of work to support the proposed development at 14245 Highway 50.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

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Robin Marinac

From: Shan, Rosalie <rosalie.shan@peelregion.ca>
Sent: July 6, 2021 9:42 AM
To: Robin Marinac
Cc: Mark Crockford
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Good morning Robin and Mark,

Thank you for the circulation and follow up.

We agree with the proposed terms and reference and would like to ask one addition analysis on the right-turn lane warrants on the proposed right-in/right-out access on highway 50.

Please also find and the link here for the detailed Region of Peel TIS formatting and contact information for background traffic (growth rate, AADT, signal timing, etc.). Let me know if you have any questions or concerns.

Regards,
Rosalie Shan, P.Eng., MScE
Technical Analyst
Traffic Development & Permits
Region of Peel
10 Peel Centre Drive Suite B, 4th Floor
Brampton, ON L6T 4B9
905 791-7800 Ext. 7999

From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: July 6, 2021 9:10 AM
To: Shan, Rosalie <rosalie.shan@peelregion.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Hi Rosalie,

As mentioned by Jillian below, I just wanted to request that as part of your review of your Terms of Reference document, the Region indicates the background developments to be considered.

I was also hoping you could tell me when you will be able to provide us with feedback on our Terms of Reference document.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: June 29, 2021 11:26 AM
To: Robin Marinac <robin.marinac@cghtransportation.com>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Arash Olia <Arash.Olia@caledon.ca>; Drew Haines <drew.haines@caledon.ca>; Shan, Rosalie <rosalie.shan@peelregion.ca>; Jason Afonso <jasona@gsai.ca>; Gursimran Saini <GursimranS@gsai.ca>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Good morning Robin,

Hope you are doing well.

Thank you for providing a terms of reference for the TIS report for the proposed Columbia Square development.

Please see below comments from Town Transportation and Engineering staff; I am waiting for confirmation on the background developments and will send a follow-up email once I hear back from my Planning colleagues.

- Please add the Highway 50 at Bolton Heights Road intersections to the study area.
- Please use the attached AADT data to determine growth rates on Town roads. If AADT data is unavailable, please use an annual 2% growth rate on Town roads except local roads. Growth is not required to be applied to local roads if all the appropriate background developments are included in the analysis.
- I will send a follow-up email for the background developments. Please also reach out to the Region to confirm the background developments they will need added to the background analysis.
- Please refer to this website for the latest information on the Columbia Way EA:
    - Feb 2021 PIC: https://www.caledon.ca/en/town-services/resources/Transit/195072-PIC1-Online-Webinar-vf-Revised_Feb-24.pdf
    - Road design: https://www.caledon.ca/en/town-services/resources/Transit/195072-ROAD-DESIGN-Columbia-Way-.pdf
- Please follow the Town's DSM (https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/Development-Standards-Manual.pdf) for the design of any public/condo roads and intersection design on Town roads.
- The rest of the proposed scope is acceptable.

Please note that these are preliminary comments that could change upon the completion of the Official Plan and TMP update.

Please feel free to reach out to us if you have any questions or concerns.

Regards,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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<GursimranS@gsai.ca>
Subject: 14245 Highway 50 TIS Terms of Reference

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Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

Appendix B

Traffic Data

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Project #23-198 - CGH Transportation

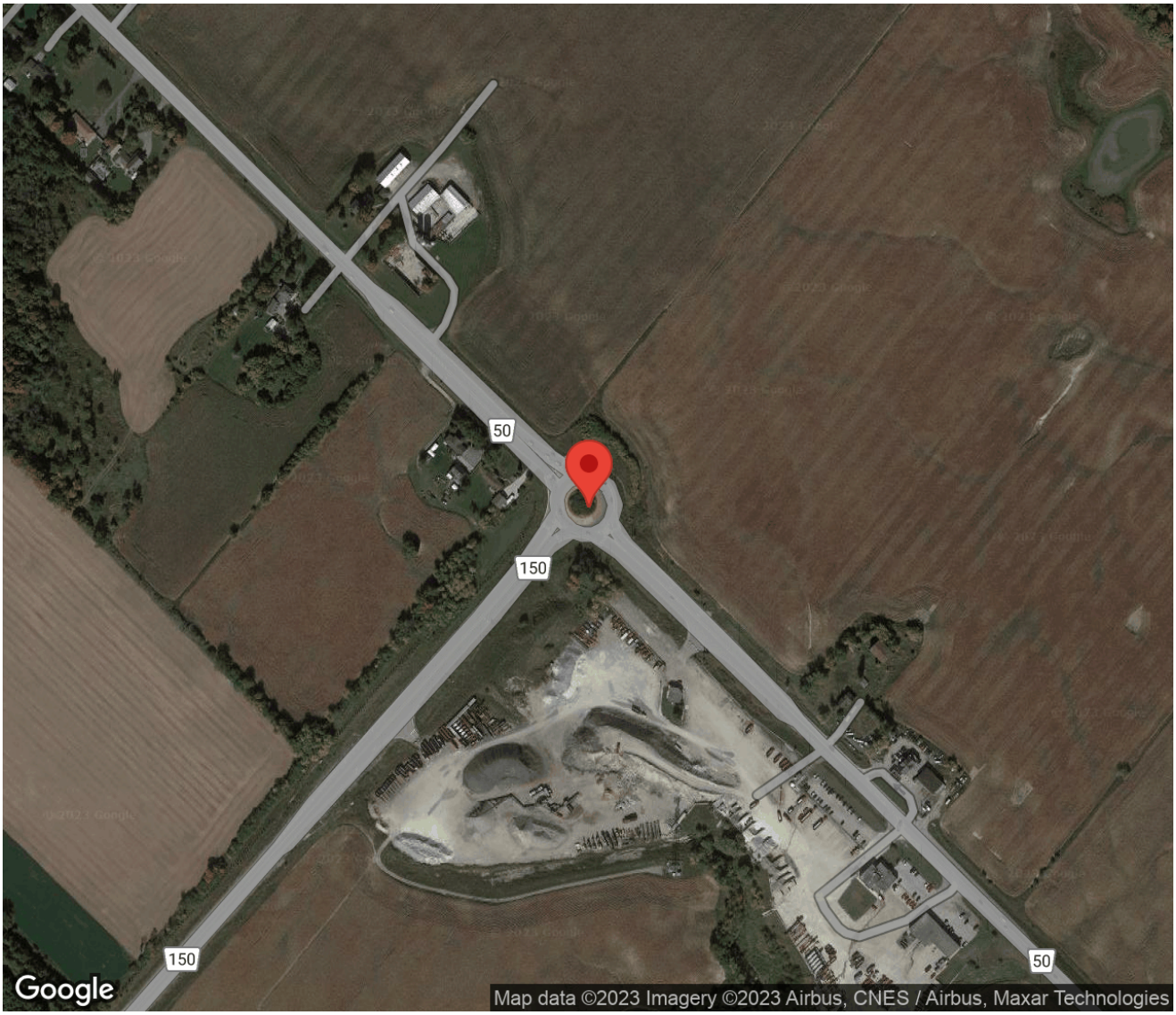
Intersection Count Report

Intersection:	Emil Kolb Pkwy & Hwy 50
Municipality:	Caledon
Count Date:	Tuesday, Jun 27, 2023
Site Code:	2319800001
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:30
Weather:	Clear
Comments:	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Map

Intersection:	Emil Kolb Pkwy & Hwy 50
Site Code:	2319800001
Municipality:	Caledon
Count Date:	Jun 27, 2023



Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection:	Emil Kolb Pkwy & Hwy 50
Site Code:	2319800001
Municipality:	Caledon
Count Date:	Jun 27, 2023

Hwy 50 - Traffic Summary

	North Approach Totals						South Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	0	421	256	0	677	0	95	167	0	0	262	0	939
08:00 - 09:00	0	390	240	0	630	0	109	246	0	0	355	0	985
BREAK													
16:00 - 17:00	0	254	117	0	371	0	43	529	0	0	572	0	943
17:00 - 18:00	0	279	110	0	389	0	41	546	0	0	587	0	976
18:00 - 18:30	0	106	50	0	156	0	19	225	0	0	244	0	400
GRAND TOTAL	**0**	**1450**	**773**	**0**	**2223**	**0**	**307**	**1713**	**0**	**0**	**2020**	**0**	**4243**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection:	Emil Kolb Pkwy & Hwy 50
Site Code:	2319800001
Municipality:	Caledon
Count Date:	Jun 27, 2023

Emil Kolb Pkwy - Traffic Summary

	East Approach Totals						West Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	0	0	0	0	0	0	108	0	68	0	176	0	176
08:00 - 09:00	0	0	0	0	0	0	99	0	67	0	166	0	166
BREAK													
16:00 - 17:00	0	0	0	0	0	0	336	0	97	0	433	0	433
17:00 - 18:00	0	0	0	0	0	0	313	0	88	0	401	0	401
18:00 - 18:30	0	0	0	0	0	0	90	0	33	0	123	0	123
GRAND TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**946**	**0**	**353**	**0**	**1299**	**0**	**1299**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Municipality: Caledon
Count Date: Jun 27, 2023

North Approach - Hwy 50

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	
07:00	0	77	45	0	122	0	3	6	0	9	0	0	0	0	0	0
07:15	0	118	51	0	169	0	3	9	0	12	0	0	0	0	0	0
07:30	0	86	62	0	148	0	5	5	0	10	0	0	0	0	0	0
07:45	0	119	75	0	194	0	10	3	0	13	0	0	0	0	0	0
08:00	0	95	56	0	151	0	7	7	0	14	0	0	0	0	0	0
08:15	0	104	62	0	166	0	4	7	0	11	0	0	0	0	0	0
08:30	0	82	39	0	121	0	2	5	0	7	0	0	0	0	0	0
08:45	0	92	57	0	149	0	4	7	0	11	0	0	0	0	0	0
SUBTOTAL	0	773	447	0	1220	0	38	49	0	87	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Municipality: Caledon
Count Date: Jun 27, 2023

North Approach - Hwy 50

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	0	50	18	0	68	0	2	3	0	5	0	0	0	0	0	0
16:15	0	64	29	0	93	0	4	7	0	11	0	0	0	0	0	0
16:30	0	69	24	0	93	0	2	5	0	7	0	0	0	0	0	0
16:45	0	60	24	0	84	0	3	7	0	10	0	0	0	0	0	0
17:00	0	71	22	0	93	0	1	4	0	5	0	0	0	0	0	0
17:15	0	56	20	0	76	0	3	6	0	9	0	0	0	0	0	0
17:30	0	82	27	0	109	0	1	2	0	3	0	0	0	0	0	0
17:45	0	63	27	0	90	0	2	2	0	4	0	0	0	0	0	0
18:00	0	52	23	0	75	0	1	3	0	4	0	0	0	0	0	0
18:15	0	53	19	0	72	0	0	5	0	5	0	0	0	0	0	0
SUBTOTAL	0	620	233	0	853	0	19	44	0	63	0	0	0	0	0	0
GRAND TOTAL	0	1393	680	0	2073	0	57	93	0	150	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Municipality: Caledon
Count Date: Jun 27, 2023

South Approach - Hwy 50

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	
07:00	14	23	0	0	37	0	2	0	0	2	0	0	0	0	0	0
07:15	27	37	0	0	64	1	2	0	0	3	0	0	0	0	0	0
07:30	22	43	0	0	65	0	5	0	0	5	0	0	0	0	0	0
07:45	27	48	0	0	75	4	7	0	0	11	0	0	0	0	0	0
08:00	39	57	0	0	96	2	7	0	0	9	0	0	0	0	0	0
08:15	27	48	0	0	75	4	8	0	0	12	0	0	0	0	0	0
08:30	20	61	0	0	81	3	4	0	0	7	0	0	0	0	0	0
08:45	14	56	0	0	70	0	5	0	0	5	0	0	0	0	0	0
SUBTOTAL	190	373	0	0	563	14	40	0	0	54	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Municipality: Caledon
Count Date: Jun 27, 2023

South Approach - Hwy 50

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	17	114	0	0	131	3	0	0	0	3	0	0	0	0	0	0
16:15	8	139	0	0	147	0	1	0	0	1	0	0	0	0	0	0
16:30	8	142	0	0	150	1	2	0	0	3	0	0	0	0	0	0
16:45	5	131	0	0	136	1	0	0	0	1	0	0	0	0	0	0
17:00	9	139	0	0	148	2	1	0	0	3	0	0	0	0	0	0
17:15	9	146	0	0	155	1	1	0	0	2	0	0	0	0	0	0
17:30	13	133	0	0	146	1	1	0	0	2	0	0	0	0	0	0
17:45	6	123	0	0	129	0	2	0	0	2	0	0	0	0	0	0
18:00	10	114	0	0	124	0	0	0	0	0	0	0	0	0	0	0
18:15	9	110	0	0	119	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	94	1291	0	0	1385	9	9	0	0	18	0	0	0	0	0	0
GRAND TOTAL	284	1664	0	0	1948	23	49	0	0	72	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Municipality: Caledon
Count Date: Jun 27, 2023

West Approach - Emil Kolb Pkwy

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
07:00	20	0	7	0	27	7	0	1	0	8	0	0	0	0	0	0
07:15	19	0	9	0	28	1	0	3	0	4	0	0	0	0	0	0
07:30	19	0	14	0	33	6	0	4	0	10	0	0	0	0	0	0
07:45	27	0	27	0	54	9	0	3	0	12	0	0	0	0	0	0
08:00	11	0	23	0	34	12	0	0	0	12	0	0	0	0	0	0
08:15	18	0	17	0	35	13	0	1	0	14	0	0	0	0	0	0
08:30	13	0	10	0	23	7	0	0	0	7	0	0	0	0	0	0
08:45	18	0	15	0	33	7	0	1	0	8	0	0	0	0	0	0
SUBTOTAL	145	0	122	0	267	62	0	13	0	75	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Municipality: Caledon
Count Date: Jun 27, 2023

West Approach - Emil Kolb Pkwy

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	76	0	23	0	99	2	0	2	0	4	0	0	0	0	0	0
16:15	82	0	21	0	103	6	0	3	0	9	0	0	0	0	0	0
16:30	83	0	21	0	104	1	0	0	0	1	0	0	0	0	0	0
16:45	84	0	25	0	109	2	0	2	0	4	0	0	0	0	0	0
17:00	59	0	24	0	83	0	0	0	0	0	0	0	0	0	0	0
17:15	131	0	23	0	154	6	0	0	0	6	0	0	0	0	0	0
17:30	50	0	24	0	74	6	0	0	0	6	0	0	0	0	0	0
17:45	57	0	16	0	73	4	0	1	0	5	0	0	0	0	0	0
18:00	51	0	23	0	74	2	0	1	0	3	0	0	0	0	0	0
18:15	36	0	9	0	45	1	0	0	0	1	0	0	0	0	0	0
SUBTOTAL	709	0	209	0	918	30	0	9	0	39	0	0	0	0	0	0
GRAND TOTAL	854	0	331	0	1185	92	0	22	0	114	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	07:30:00
To:	09:00:00	To:	08:30:00

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Hwy 50 runs N/S

North Approach

	Out	In	Total
Cars	659	271	930
Trucks	48	67	115
Bicycles	0	0	0
	707	**338**	**1045**

Hwy 50

Bicycles	0	0	0
Trucks	22	26	0
Cars	255	404	0
Totals	**277**	**430**	**0**

Peds: 0

Emil Kolb Pkwy

			Totals
0	0	0	**0**
0	40	75	**115**
0	8	81	**89**

Peds: 0

Peds: 0

Peds: 0

West Approach

	Out	In	Total
Cars	156	370	526
Trucks	48	32	80
Bicycles	0	0	0
	204	**402**	**606**

Totals	**125**	**223**	**0**
Cars	115	196	0
Trucks	10	27	0
Bicycles	0	0	0

Hwy 50

South Approach

	Out	In	Total
Cars	311	485	796
Trucks	37	34	71
Bicycles	0	0	0
	348	**519**	**867**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Count Date: Jun 27, 2023
Period: 07:00 - 09:00

Peak Hour Data (07:30 - 08:30)

Start Time	North Approach Hwy 50						South Approach Hwy 50						East Approach						West Approach Emil Kolb Pkwy						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:30		91	67	0	0	158	22	48		0	0	70				0			25		18	0	0	43	271
07:45		129	78	0	0	207	31	55		0	0	86				0			36		30	0	0	66	359
08:00		102	63	0	0	165	41	64		0	0	105				0			23		23	0	0	46	316
08:15		108	69	0	0	177	31	56		0	0	87				0			31		18	0	0	49	313
Grand Total		**430**	**277**	**0**	**0**	**707**	**125**	**223**		**0**	**0**	**348**				**0**	**0**		**115**		**89**	**0**	**0**	**204**	**1259**
Approach %		60.8	39.2	0		-	35.9	64.1		0		-					-		56.4		43.6	0		-	
Totals %		34.2	22	0		56.2	9.9	17.7		0		27.6					0		9.1		7.1	0		16.2	
PHF		**0.83**	**0.89**	**0**		**0.85**	**0.76**	**0.87**		**0**		**0.83**					**0**		**0.8**		**0.74**	**0**		**0.77**	**0.88**
Cars		404	255	0		659	115	196		0		311					0		75		81	0		156	1126
% Cars		94	92.1	0		93.2	92	87.9		0		89.4					0		65.2		91	0		76.5	89.4
Trucks		26	22	0		48	10	27		0		37					0		40		8	0		48	133
% Trucks		6	7.9	0		6.8	8	12.1		0		10.6					0		34.8		9	0		23.5	10.6
Bicycles		0	0	0		0	0	0		0		0					0		0		0	0		0	0
% Bicycles		0	0	0		0	0	0		0		0					0		0		0	0		0	0
Peds					0	-					0	-				0	-						0	-	0
% Peds					0	-					0	-				0	-						0	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	16:00:00	From:	16:30:00
To:	18:30:00	To:	17:30:00

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Unsignalized Intersection ****

Major Road: Hwy 50 runs N/S

North Approach

	Out	In	Total
Cars	346	915	1261
Trucks	31	13	44
Bicycles	0	0	0
	377	**928**	**1305**

Hwy 50

Bicycles	0	0	0
Trucks	22	9	0
Cars	90	256	0
Totals	**112**	**265**	**0**

Peds: 0

Emil Kolb Pkwy

			Totals
0	0	0	**0**
0	9	357	**366**
0	2	93	**95**

Peds: 0

Peds: 0

Peds: 0

West Approach

	Out	In	Total
Cars	450	121	571
Trucks	11	27	38
Bicycles	0	0	0
	461	**148**	**609**

Totals	**36**	**562**	**0**
Cars	31	558	0
Trucks	5	4	0
Bicycles	0	0	0

Hwy 50

South Approach

	Out	In	Total
Cars	589	349	938
Trucks	9	11	20
Bicycles	0	0	0
	598	**360**	**958**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Emil Kolb Pkwy & Hwy 50
Site Code: 2319800001
Count Date: Jun 27, 2023
Period: 16:00 - 18:30

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Hwy 50						South Approach Hwy 50						East Approach						West Approach Emil Kolb Pkwy						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:30		71	29	0	0	100	9	144		0	0	153					0		84		21	0	0	105	358
16:45		63	31	0	0	94	6	131		0	0	137					0		86		27	0	0	113	344
17:00		72	26	0	0	98	11	140		0	0	151					0		59		24	0	0	83	332
17:15		59	26	0	0	85	10	147		0	0	157					0		137		23	0	0	160	402
Grand Total		**265**	**112**	**0**	**0**	**377**	**36**	**562**		**0**	**0**	**598**					**0**	**0**	**366**		**95**	**0**	**0**	**461**	**1436**
Approach %		70.3	29.7	0		-	6	94		0		-						-	79.4		20.6	0		-	
Totals %		18.5	7.8	0		26.3	2.5	39.1		0		41.6						0	25.5		6.6	0		32.1	
PHF		**0.92**	**0.9**	**0**		**0.94**	**0.82**	**0.96**		**0**		**0.95**						**0**	**0.67**		**0.88**	**0**		**0.72**	**0.89**
Cars		256	90	0		346	31	558		0		589						0	357		93	0		450	1385
% Cars		96.6	80.4	0		91.8	86.1	99.3		0		98.5						0	97.5		97.9	0		97.6	96.4
Trucks		9	22	0		31	5	4		0		9						0	9		2	0		11	51
% Trucks		3.4	19.6	0		8.2	13.9	0.7		0		1.5						0	2.5		2.1	0		2.4	3.6
Bicycles		0	0	0		0	0	0		0		0						0	0		0	0		0	0
% Bicycles		0	0	0		0	0	0		0		0						0	0		0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

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Project #23-198 - CGH Transportation

Intersection Count Report

Intersection:	Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Municipality:	Caledon
Count Date:	Tuesday, Jun 27, 2023
Site Code:	2319800002
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 16:00-18:30
Weather:	Clear
Comments:	

Ontario Traffic Inc.
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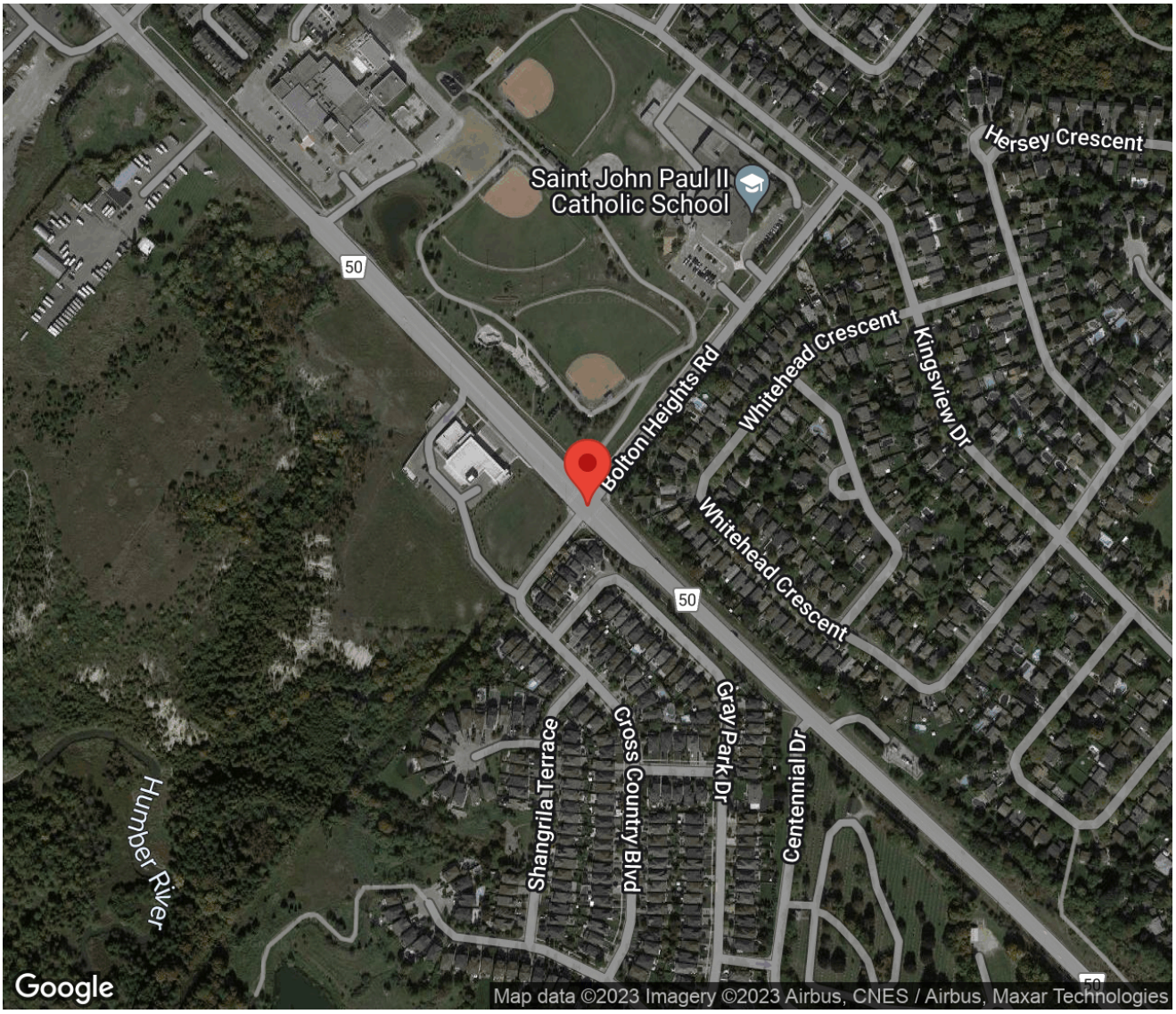
Traffic Count Map

Intersection:	Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code:	2319800002
Municipality:	Caledon
Count Date:	Jun 27, 2023



Ontario Traffic Inc.
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Traffic Count Summary

Intersection:	Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code:	2319800002
Municipality:	Caledon
Count Date:	Jun 27, 2023

Queen St N - Traffic Summary

	North Approach Totals						South Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	14	446	3	0	463	0	12	223	24	0	259	2	722
08:00 - 09:00	53	419	6	0	478	12	22	277	74	0	373	5	851
BREAK													
16:00 - 17:00	24	335	13	1	373	4	80	677	73	0	830	5	1203
17:00 - 18:00	30	340	17	1	388	0	62	716	68	0	846	0	1234
18:00 - 18:30	13	210	9	0	232	0	34	301	24	0	359	0	591
GRAND TOTAL	**134**	**1750**	**48**	**2**	**1934**	**16**	**210**	**2194**	**263**	**0**	**2667**	**12**	**4601**

Ontario Traffic Inc.
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Traffic Count Summary

Intersection:	Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code:	2319800002
Municipality:	Caledon
Count Date:	Jun 27, 2023

Bolton Heights Rd - Traffic Summary

	East Approach Totals						West Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	77	3	28	0	108	1	10	5	25	0	40	1	148
08:00 - 09:00	140	21	72	0	233	2	10	32	20	0	62	6	295
BREAK													
16:00 - 17:00	55	13	29	0	97	3	10	6	16	0	32	3	129
17:00 - 18:00	46	11	37	0	94	0	22	6	11	0	39	1	133
18:00 - 18:30	32	3	14	0	49	0	4	3	7	0	14	0	63
GRAND TOTAL	**350**	**51**	**180**	**0**	**581**	**6**	**56**	**52**	**79**	**0**	**187**	**11**	**768**

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

North Approach - Queen St N

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
07:00	4	98	0	0	102	0	4	1	0	5	0	0	0	0	0	0
07:15	1	97	1	0	99	1	6	0	0	7	0	0	0	0	0	0
07:30	2	104	0	0	106	0	4	0	0	4	0	0	0	0	0	0
07:45	6	132	1	0	139	0	1	0	0	1	0	0	0	0	0	0
08:00	14	104	2	0	120	0	2	1	0	3	0	0	0	0	0	0
08:15	22	85	1	0	108	1	2	0	0	3	0	0	0	0	0	11
08:30	9	98	0	0	107	1	6	0	0	7	0	0	0	0	0	1
08:45	6	120	1	0	127	0	2	1	0	3	0	0	0	0	0	0
SUBTOTAL	64	838	6	0	908	3	27	3	0	33	0	0	0	0	0	12

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

North Approach - Queen St N

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	7	82	4	0	93	0	4	0	0	4	0	0	0	0	0	0
16:15	3	81	5	0	89	0	2	0	0	2	0	0	0	0	0	0
16:30	2	86	4	0	92	1	3	0	0	4	0	0	0	0	0	4
16:45	10	75	0	1	86	1	2	0	0	3	0	0	0	0	0	0
17:00	3	64	4	1	72	0	2	0	0	2	0	0	0	0	0	0
17:15	12	83	3	0	98	0	3	0	0	3	0	0	0	0	0	0
17:30	7	81	4	0	92	0	3	0	0	3	0	0	0	0	0	0
17:45	8	104	5	0	117	0	0	1	0	1	0	0	0	0	0	0
18:00	4	94	6	0	104	0	1	0	0	1	0	0	0	0	0	0
18:15	9	115	3	0	127	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	65	865	38	2	970	2	20	1	0	23	0	0	0	0	0	4
GRAND TOTAL	129	1703	44	2	1878	5	47	4	0	56	0	0	0	0	0	16

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

South Approach - Queen St N

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
07:00	3	54	1	0	58	0	3	1	0	4	0	0	0	0	0	1
07:15	2	50	6	0	58	1	1	1	0	3	0	0	0	0	0	0
07:30	2	45	6	0	53	0	2	0	0	2	0	0	0	0	0	0
07:45	3	67	9	0	79	1	1	0	0	2	0	0	0	0	0	1
08:00	5	73	19	0	97	0	3	0	0	3	0	0	0	0	0	3
08:15	6	58	32	0	96	0	3	1	0	4	0	0	0	0	0	0
08:30	3	68	9	0	80	1	3	1	0	5	0	0	0	0	0	1
08:45	7	62	11	0	80	0	7	1	0	8	0	0	0	0	0	1
SUBTOTAL	31	477	93	0	601	3	23	5	0	31	0	0	0	0	0	7

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

South Approach - Queen St N

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	11	146	14	0	171	1	4	0	0	5	0	0	0	0	0	4
16:15	17	183	18	0	218	1	0	0	0	1	0	0	0	0	0	0
16:30	26	167	28	0	221	0	1	0	0	1	0	0	0	0	0	1
16:45	23	176	12	0	211	1	0	1	0	2	0	0	0	0	0	0
17:00	11	186	19	0	216	0	6	0	0	6	0	0	0	0	0	0
17:15	19	184	19	0	222	0	0	0	0	0	0	0	0	0	0	0
17:30	12	177	14	0	203	0	0	0	0	0	0	0	0	0	0	0
17:45	20	163	16	0	199	0	0	0	0	0	0	0	0	0	0	0
18:00	18	155	13	0	186	1	3	0	0	4	0	0	0	0	0	0
18:15	15	140	11	0	166	0	3	0	0	3	0	0	0	0	0	0
SUBTOTAL	172	1677	164	0	2013	4	17	1	0	22	0	0	0	0	0	5
GRAND TOTAL	**203**	**2154**	**257**	**0**	**2614**	**7**	**40**	**6**	**0**	**53**	**0**	**0**	**0**	**0**	**0**	**12**

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

East Approach - Bolton Heights Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
07:00	18	0	12	0	30	0	0	1	0	1	0	0	0	0	0	1
07:15	11	1	6	0	18	0	0	0	0	0	0	0	0	0	0	0
07:30	23	0	3	0	26	0	0	2	0	2	0	0	0	0	0	0
07:45	25	2	4	0	31	0	0	0	0	0	0	0	0	0	0	0
08:00	28	0	4	0	32	0	0	0	0	0	0	0	0	0	0	2
08:15	53	10	27	0	90	1	0	4	0	5	0	0	0	0	0	0
08:30	38	5	27	0	70	1	0	3	0	4	0	0	0	0	0	0
08:45	19	5	7	0	31	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	215	23	90	0	328	2	1	10	0	13	0	0	0	0	0	3

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

East Approach - Bolton Heights Rd

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
16:00	13	1	3	0	17	0	0	0	0	0	0	0	0	0	0	3
16:15	11	5	11	0	27	0	0	0	0	0	0	0	0	0	0	0
16:30	14	5	6	0	25	0	0	1	0	1	0	0	0	0	0	0
16:45	17	2	8	0	27	0	0	0	0	0	0	0	0	0	0	0
17:00	5	4	6	0	15	0	0	0	0	0	0	0	0	0	0	0
17:15	9	4	9	0	22	0	0	0	0	0	0	0	0	0	0	0
17:30	16	1	15	0	32	0	0	0	0	0	0	1	0	0	1	0
17:45	16	1	7	0	24	0	0	0	0	0	0	0	0	0	0	0
18:00	17	1	6	0	24	0	0	0	0	0	0	0	0	0	0	0
18:15	15	2	8	0	25	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	133	26	79	0	238	0	0	1	0	1	0	1	0	0	1	3
GRAND TOTAL	**348**	**49**	**169**	**0**	**566**	**2**	**1**	**11**	**0**	**14**	**0**	**1**	**0**	**0**	**1**	**6**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

West Approach - Cross Country Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
07:00	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0
07:15	1	1	9	0	11	0	0	0	0	0	0	0	0	0	0	0
07:30	4	1	3	0	8	0	0	0	0	0	0	0	0	0	0	1
07:45	5	1	12	0	18	0	0	0	0	0	0	0	0	0	0	0
08:00	4	8	2	0	14	0	0	0	0	0	0	0	0	0	0	0
08:15	3	18	6	0	27	0	0	0	0	0	0	0	0	0	0	5
08:30	3	3	6	0	12	0	1	0	0	1	0	0	0	0	0	1
08:45	0	2	5	0	7	0	0	1	0	1	0	0	0	0	0	0
SUBTOTAL	20	36	44	0	100	0	1	1	0	2	0	0	0	0	0	7

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Municipality: Caledon
Count Date: Jun 27, 2023

West Approach - Cross Country Blvd

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	3	0	5	0	8	0	1	0	0	1	0	0	0	0	0	0
16:15	1	2	0	0	3	0	1	0	0	1	0	0	0	0	0	0
16:30	4	0	5	0	9	0	0	0	0	0	0	0	0	0	0	3
16:45	2	1	6	0	9	0	1	0	0	1	0	0	0	0	0	0
17:00	8	2	2	0	12	0	0	0	0	0	0	0	0	0	0	0
17:15	4	0	2	0	6	1	0	0	0	1	0	0	0	0	0	0
17:30	7	2	0	0	9	0	0	0	0	0	0	0	0	0	0	1
17:45	2	2	7	0	11	0	0	0	0	0	0	0	0	0	0	0
18:00	1	0	4	0	5	0	0	0	0	0	0	0	0	0	0	0
18:15	3	3	3	0	9	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	35	12	34	0	81	1	3	0	0	4	0	0	0	0	0	4
GRAND TOTAL	**55**	**48**	**78**	**0**	**181**	**1**	**4**	**1**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**11**

Peak Hour Diagram

Specified Period
From: 07:00:00
To: 09:00:00

One Hour Peak
From: 07:45:00
To: 08:45:00

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Queen St N runs N/S

North Approach

	Out	In	Total
Cars	474	343	817
Trucks	14	17	31
Bicycles	0	0	0
	488	**360**	**848**

Queen St N

Bicycles	0	0	0	0
Trucks	1	11	2	0
Cars	4	419	51	0
Totals	**5**	**430**	**53**	**0**

Peds: 12

East Approach

	Out	In	Total
Cars	223	150	373
Trucks	9	5	14
Bicycles	0	0	0
	232	**155**	**387**

Cross Country Blvd

			Totals
0	0	0	**0**
0	0	15	**15**
0	1	30	**31**
0	0	26	**26**

Peds: 6

Peds: 2

Bolton Heights Rd

Totals			
0	0	0	0
69	62	7	0
17	17	0	0
146	144	2	0

Peds: 5

West Approach

	Out	In	Total
Cars	71	38	109
Trucks	1	3	4
Bicycles	0	0	0
	72	**41**	**113**

Totals	**19**	**276**	**71**	**0**
Cars	17	266	69	0
Trucks	2	10	2	0
Bicycles	0	0	0	0

Queen St N

South Approach

	Out	In	Total
Cars	352	589	941
Trucks	14	13	27
Bicycles	0	0	0
	366	**602**	**968**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Count Date: Jun 27, 2023
Period: 07:00 - 09:00

Peak Hour Data (07:45 - 08:45)

Start Time	North Approach Queen St N						South Approach Queen St N						East Approach Bolton Heights Rd						West Approach Cross Country Blvd						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:45	6	133	1	0	0	140	4	68	9	0	1	81	25	2	4	0	0	31	5	1	12	0	0	18	270
08:00	14	106	3	0	0	123	5	76	19	0	3	100	28	0	4	0	2	32	4	8	2	0	0	14	269
08:15	23	87	1	0	11	111	6	61	33	0	0	100	54	10	31	0	0	95	3	18	6	0	5	27	333
08:30	10	104	0	0	1	114	4	71	10	0	1	85	39	5	30	0	0	74	3	4	6	0	1	13	286
Grand Total	**53**	**430**	**5**	**0**	**12**	**488**	**19**	**276**	**71**	**0**	**5**	**366**	**146**	**17**	**69**	**0**	**2**	**232**	**15**	**31**	**26**	**0**	**6**	**72**	**1158**
Approach %	10.9	88.1	1	0		-	5.2	75.4	19.4	0		-	62.9	7.3	29.7	0		-	20.8	43.1	36.1	0		-	
Totals %	4.6	37.1	0.4	0		42.1	1.6	23.8	6.1	0		31.6	12.6	1.5	6	0		20	1.3	2.7	2.2	0		6.2	
PHF	**0.58**	**0.81**	**0.42**	**0**		**0.87**	**0.79**	**0.91**	**0.54**	**0**		**0.92**	**0.68**	**0.43**	**0.56**	**0**		**0.61**	**0.75**	**0.43**	**0.54**	**0**		**0.67**	**0.87**
Cars	51	419	4	0		474	17	266	69	0		352	144	17	62	0		223	15	30	26	0		71	1120
% Cars	96.2	97.4	80	0		97.1	89.5	96.4	97.2	0		96.2	98.6	100	89.9	0		96.1	100	96.8	100	0		98.6	96.7
Trucks	2	11	1	0		14	2	10	2	0		14	2	0	7	0		9	0	1	0	0		1	38
% Trucks	3.8	2.6	20	0		2.9	10.5	3.6	2.8	0		3.8	1.4	0	10.1	0		3.9	0	3.2	0	0		1.4	3.3
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					12	-					5	-					2	-					6	-	25
% Peds					48	-					20	-					8	-					24	-	

Ontario Traffic Inc.
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Peak Hour Diagram

Specified Period		One Hour Peak	
From:	16:00:00	From:	17:15:00
To:	18:30:00	To:	18:15:00

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Queen St N runs N/S

North Approach

	Out	In	Total
Cars	411	730	1141
Trucks	8	4	12
Bicycles	0	0	0
	419	**734**	**1153**

Queen St N

Bicycles	0	0	0	0
Trucks	1	7	0	0
Cars	18	362	31	0
Totals	**19**	**369**	**31**	**0**

Peds: 0

East Approach

	Out	In	Total
Cars	102	97	199
Trucks	0	0	0
Bicycles	1	0	1
	103	**97**	**200**

Cross Country Blvd

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	1	14	**15**
0	0	4	**4**
0	0	13	**13**

Peds: 1

Peds: 0

Bolton Heights Rd

Totals	Cars	Trucks	Bicycles
0	0	0	0
37	37	0	0
8	7	0	1
58	58	0	0

Peds: 0

West Approach

	Out	In	Total
Cars	31	94	125
Trucks	1	2	3
Bicycles	0	1	1
	32	**97**	**129**

Totals	**70**	**682**	**62**	**0**
Cars	69	679	62	0
Trucks	1	3	0	0
Bicycles	0	0	0	0

Queen St N

South Approach

	Out	In	Total
Cars	810	433	1243
Trucks	4	7	11
Bicycles	0	0	0
	814	**440**	**1254**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 50 - Queen St N & Bolton Heights Rd - Cross Country Blvd
Site Code: 2319800002
Count Date: Jun 27, 2023
Period: 16:00 - 18:30

Peak Hour Data (17:15 - 18:15)

Start Time	North Approach Queen St N						South Approach Queen St N						East Approach Bolton Heights Rd						West Approach Cross Country Blvd						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
17:15	12	86	3	0	0	101	19	184	19	0	0	222	9	4	9	0	0	22	5	0	2	0	0	7	352
17:30	7	84	4	0	0	95	12	177	14	0	0	203	16	2	15	0	0	33	7	2	0	0	1	9	340
17:45	8	104	6	0	0	118	20	163	16	0	0	199	16	1	7	0	0	24	2	2	7	0	0	11	352
18:00	4	95	6	0	0	105	19	158	13	0	0	190	17	1	6	0	0	24	1	0	4	0	0	5	324
Grand Total	**31**	**369**	**19**	**0**	**0**	**419**	**70**	**682**	**62**	**0**	**0**	**814**	**58**	**8**	**37**	**0**	**0**	**103**	**15**	**4**	**13**	**0**	**1**	**32**	**1368**
Approach %	7.4	88.1	4.5	0		-	8.6	83.8	7.6	0		-	56.3	7.8	35.9	0		-	46.9	12.5	40.6	0		-	
Totals %	2.3	27	1.4	0		30.6	5.1	49.9	4.5	0		59.5	4.2	0.6	2.7	0		7.5	1.1	0.3	1	0		2.3	
PHF	**0.65**	**0.89**	**0.79**	**0**		**0.89**	**0.88**	**0.93**	**0.82**	**0**		**0.92**	**0.85**	**0.5**	**0.62**	**0**		**0.78**	**0.54**	**0.5**	**0.46**	**0**		**0.73**	**0.97**
Cars	31	362	18	0		411	69	679	62	0		810	58	7	37	0		102	14	4	13	0		31	1354
% Cars	100	98.1	94.7	0		98.1	98.6	99.6	100	0		99.5	100	87.5	100	0		99	93.3	100	100	0		96.9	99
Trucks	0	7	1	0		8	1	3	0	0		4	0	0	0	0		0	1	0	0	0		1	13
% Trucks	0	1.9	5.3	0		1.9	1.4	0.4	0	0		0.5	0	0	0	0		0	6.7	0	0	0		3.1	1
Bicycles	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	1
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	12.5	0	0		1	0	0	0	0		0	0.1
Peds					0	-					0	-					0	-					1	-	1
% Peds					0	-					0	-					0	-					100	-	

Ontario Traffic Inc.
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Project #23-198 - CGH Transportation

Intersection Count Report

Intersection:	Hwy 50 & Columbia Way
Municipality:	Caledon
Count Date:	Tuesday, Jun 27, 2023
Site Code:	2319800003
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-18:00
Weather:	Clear
Comments:	

Ontario Traffic Inc.
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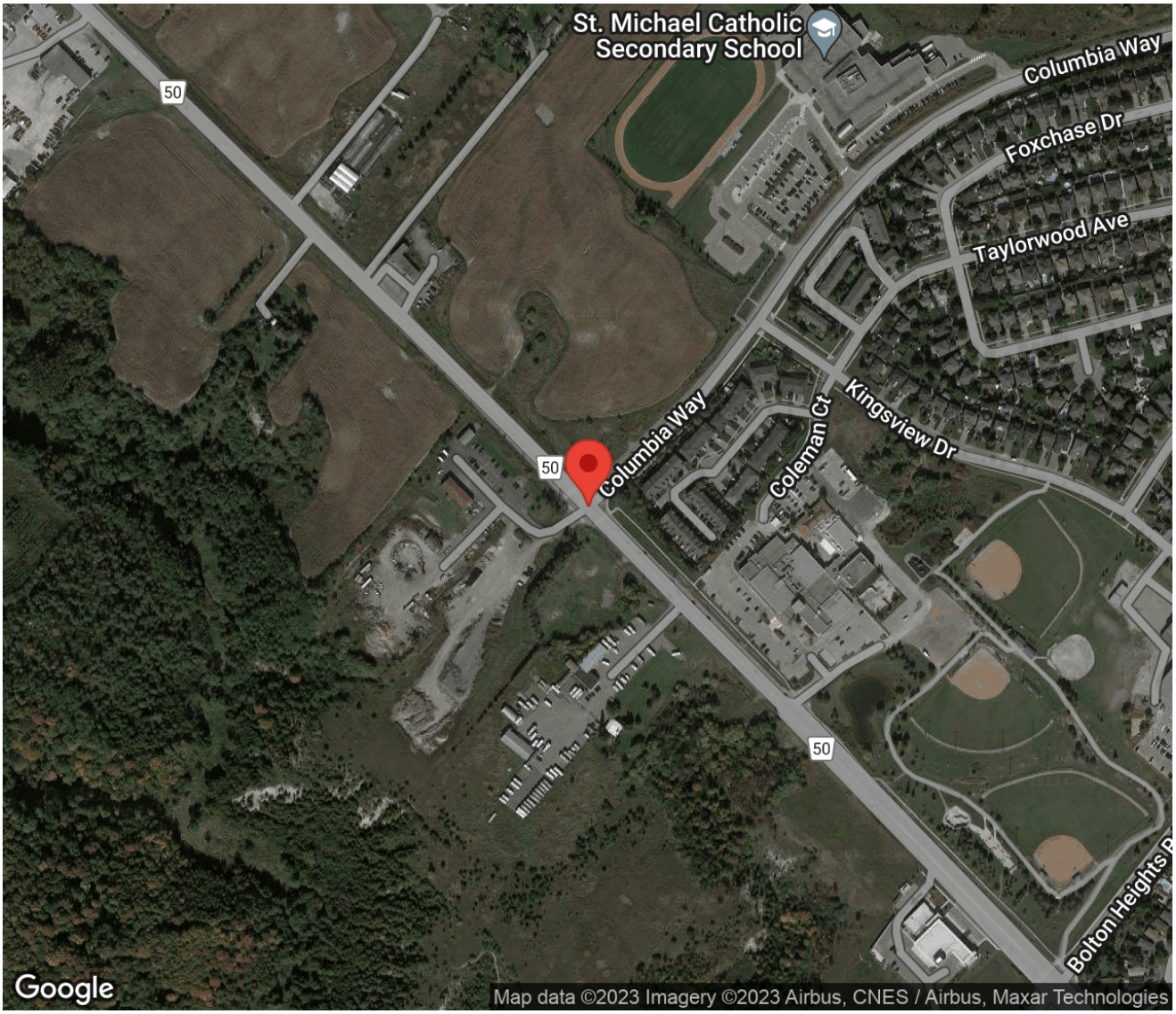
Traffic Count Map

Intersection:	Hwy 50 & Columbia Way
Site Code:	2319800003
Municipality:	Caledon
Count Date:	Jun 27, 2023



Ontario Traffic Inc.
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Traffic Count Summary

Intersection:	Hwy 50 & Columbia Way
Site Code:	2319800003
Municipality:	Caledon
Count Date:	Jun 27, 2023

Hwy 50 - Traffic Summary

	North Approach Totals						South Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	86	395	4	0	485	0	1	149	82	0	232	0	717
08:00 - 09:00	79	356	3	0	438	0	3	224	117	0	344	0	782
09:00 - 10:00	61	350	1	0	412	0	1	162	113	0	276	0	688
10:00 - 11:00	46	306	1	0	353	0	2	261	114	0	377	0	730
11:00 - 12:00	32	250	6	0	288	0	4	321	88	0	413	0	701
12:00 - 13:00	45	252	6	0	303	0	5	276	118	0	399	0	702
13:00 - 14:00	28	249	7	0	284	0	1	348	121	0	470	0	754
14:00 - 15:00	65	246	14	0	325	0	3	380	126	0	509	0	834
15:00 - 16:00	73	224	2	0	299	0	0	512	148	1	661	0	960
16:00 - 17:00	90	265	1	0	356	0	1	511	165	0	677	0	1033
17:00 - 18:00	98	265	3	0	366	0	0	501	186	1	688	0	1054
GRAND TOTAL	**703**	**3158**	**48**	**0**	**3909**	**0**	**21**	**3645**	**1378**	**2**	**5046**	**0**	**8955**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Municipality: Caledon
Count Date: Jun 27, 2023

Columbia Way - Traffic Summary

	East Approach Totals						West Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	116	0	122	0	238	0	4	1	5	0	10	0	248
08:00 - 09:00	128	0	116	0	244	0	4	0	7	0	11	0	255
09:00 - 10:00	151	1	70	0	222	0	4	1	2	0	7	0	229
10:00 - 11:00	115	1	50	0	166	0	3	0	0	0	3	0	169
11:00 - 12:00	77	1	43	0	121	0	5	0	3	0	8	0	129
12:00 - 13:00	89	0	34	0	123	0	4	1	11	0	16	0	139
13:00 - 14:00	78	0	33	0	111	0	7	0	2	0	9	0	120
14:00 - 15:00	94	2	67	0	163	0	6	1	1	0	8	0	171
15:00 - 16:00	110	0	60	0	170	0	21	4	6	0	31	0	201
16:00 - 17:00	88	0	61	0	149	0	2	0	0	0	2	0	151
17:00 - 18:00	75	0	61	0	136	2	1	0	2	0	3	0	139
GRAND TOTAL	**1121**	**5**	**717**	**0**	**1843**	**2**	**61**	**8**	**39**	**0**	**108**	**0**	**1951**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Municipality: Caledon
Count Date: Jun 27, 2023

North Approach - Hwy 50

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
07:00	5	75	4	0	84	3	3	0	0	6	0	0	0	0	0	0
07:15	12	100	0	0	112	2	2	0	0	4	0	0	0	0	0	0
07:30	16	92	0	0	108	4	4	0	0	8	0	0	0	0	0	0
07:45	38	115	0	0	153	6	4	0	0	10	0	0	0	0	0	0
08:00	27	93	1	0	121	3	2	1	0	6	0	0	0	0	0	0
08:15	20	93	1	0	114	1	5	0	0	6	0	0	0	0	0	0
08:30	11	74	0	0	85	1	1	0	0	2	0	0	0	0	0	0
08:45	16	84	0	0	100	0	4	0	0	4	0	0	0	0	0	0
09:00	15	93	0	0	108	1	3	0	0	4	0	0	0	0	0	0
09:15	12	95	0	0	107	1	1	0	0	2	0	0	0	0	0	0
09:30	15	71	1	0	87	0	1	0	0	1	0	0	0	0	0	0
09:45	17	86	0	0	103	0	0	0	0	0	0	0	0	0	0	0
10:00	14	64	0	0	78	2	0	0	0	2	0	0	0	0	0	0
10:15	6	70	0	0	76	2	2	0	0	4	0	0	0	0	0	0
10:30	11	80	1	0	92	1	2	0	0	3	0	0	0	0	0	0
10:45	10	87	0	0	97	0	1	0	0	1	0	0	0	0	0	0
11:00	7	56	0	0	63	1	3	1	0	5	0	0	0	0	0	0
11:15	8	68	2	0	78	0	1	0	0	1	0	0	0	0	0	0
11:30	9	60	1	0	70	0	0	1	0	1	0	0	0	0	0	0
11:45	7	61	1	0	69	0	1	0	0	1	0	0	0	0	0	0

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
12:00	14	56	3	0	73	0	3	0	0	3	0	0	0	0	0	0
12:15	10	64	3	0	77	0	1	0	0	1	0	0	0	0	0	0
12:30	9	58	0	0	67	0	4	0	0	4	0	0	0	0	0	0
12:45	12	64	0	0	76	0	2	0	0	2	0	0	0	0	0	0
13:00	9	58	2	0	69	1	1	1	0	3	0	0	0	0	0	0
13:15	2	61	3	0	66	1	2	0	0	3	0	0	0	0	0	0
13:30	5	70	1	0	76	1	1	0	0	2	0	0	0	0	0	0
13:45	6	55	0	0	61	3	1	0	0	4	0	0	0	0	0	0
14:00	11	60	1	0	72	4	3	0	0	7	0	0	0	0	0	0
14:15	11	54	2	0	67	2	7	2	0	11	0	0	0	0	0	0
14:30	19	54	2	0	75	2	5	0	0	7	0	0	0	0	0	0
14:45	12	58	4	0	74	4	5	3	0	12	0	0	0	0	0	0
15:00	14	56	0	0	70	1	1	0	0	2	0	0	0	0	0	0
15:15	15	51	1	0	67	1	2	0	0	3	0	0	0	0	0	0
15:30	22	50	0	0	72	0	0	1	0	1	0	0	0	0	0	0
15:45	18	63	0	0	81	2	1	0	0	3	0	0	0	0	0	0
16:00	17	54	0	0	71	1	2	0	0	3	0	0	0	0	0	0
16:15	26	68	0	0	94	1	2	1	0	4	0	0	0	0	0	0
16:30	27	67	0	0	94	0	2	0	0	2	0	0	0	0	0	0
16:45	18	68	0	0	86	0	2	0	0	2	0	0	0	0	0	0
17:00	28	71	0	0	99	0	1	0	0	1	0	0	0	0	0	0
17:15	22	63	0	0	85	0	0	2	0	2	0	0	0	0	0	0
17:30	25	78	0	0	103	0	1	0	0	1	0	0	0	0	0	0
17:45	22	50	0	0	72	1	1	1	0	3	0	0	0	0	0	0
SUBTOTAL	650	3068	34	0	3752	53	90	14	0	157	0	0	0	0	0	0
GRAND TOTAL	**650**	**3068**	**34**	**0**	**3752**	**53**	**90**	**14**	**0**	**157**	**0**	**0**	**0**	**0**	**0**	**0**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Municipality: Caledon
Count Date: Jun 27, 2023

South Approach - Hwy 50

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
07:00	1	28	9	0	38	0	2	0	0	2	0	0	0	0	0	0
07:15	0	37	8	0	45	0	1	1	0	2	0	0	0	0	0	0
07:30	0	38	20	0	58	0	2	6	0	8	0	0	0	0	0	0
07:45	0	38	31	0	69	0	3	7	0	10	0	0	0	0	0	0
08:00	1	50	30	0	81	0	6	1	0	7	0	0	0	0	0	0
08:15	0	48	29	0	77	0	8	0	0	8	0	0	0	0	0	0
08:30	1	61	31	0	93	0	5	1	0	6	0	0	0	0	0	0
08:45	1	43	22	0	66	0	3	3	0	6	0	0	0	0	0	0
09:00	0	38	19	0	57	0	3	0	0	3	0	0	0	0	0	0
09:15	0	35	26	0	61	0	2	0	0	2	0	0	0	0	0	0
09:30	1	45	24	0	70	0	0	0	0	0	0	0	0	0	0	0
09:45	0	37	43	0	80	0	2	1	0	3	0	0	0	0	0	0
10:00	0	40	30	0	70	0	3	0	0	3	0	0	0	0	0	0
10:15	0	70	34	0	104	0	2	0	0	2	0	0	0	0	0	0
10:30	0	65	23	0	88	0	2	0	0	2	0	0	0	0	0	0
10:45	2	76	27	0	105	0	3	0	0	3	0	0	0	0	0	0
11:00	1	78	16	0	95	0	3	0	0	3	0	0	0	0	0	0
11:15	0	73	27	0	100	0	1	1	0	2	0	0	0	0	0	0
11:30	1	81	26	0	108	0	1	0	0	1	0	0	0	0	0	0
11:45	2	82	18	0	102	0	2	0	0	2	0	0	0	0	0	0

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
12:00	1	69	26	0	96	1	1	0	0	2	0	0	0	0	0	0
12:15	0	70	26	0	96	0	2	0	0	2	0	0	0	0	0	0
12:30	2	72	30	0	104	0	1	0	0	1	0	0	0	0	0	0
12:45	1	60	36	0	97	0	1	0	0	1	0	0	0	0	0	0
13:00	0	97	28	0	125	0	3	2	0	5	0	0	0	0	0	0
13:15	0	87	32	0	119	0	1	1	0	2	0	0	0	0	0	0
13:30	1	79	29	0	109	0	2	0	0	2	0	0	0	0	0	0
13:45	0	77	26	0	103	0	2	3	0	5	0	0	0	0	0	0
14:00	0	101	23	0	124	1	0	1	0	2	0	0	0	0	0	0
14:15	2	86	31	0	119	0	3	0	0	3	0	0	0	0	0	0
14:30	0	92	32	0	124	0	3	1	0	4	0	0	0	0	0	0
14:45	0	95	37	0	132	0	0	1	0	1	0	0	0	0	0	0
15:00	0	120	46	0	166	0	11	5	0	16	0	0	0	0	0	0
15:15	0	118	29	0	147	0	4	1	0	5	0	0	0	0	0	0
15:30	0	134	33	0	167	0	1	0	0	1	0	0	0	0	0	0
15:45	0	119	32	1	152	0	5	2	0	7	0	0	0	0	0	0
16:00	0	124	41	0	165	0	1	0	0	1	0	0	0	0	0	0
16:15	0	124	42	0	166	0	1	0	0	1	0	0	0	0	0	0
16:30	1	136	40	0	177	0	0	1	0	1	0	0	0	0	0	0
16:45	0	125	41	0	166	0	0	0	0	0	0	0	0	0	0	0
17:00	0	127	49	0	176	0	2	1	0	3	0	0	0	0	0	0
17:15	0	137	48	0	185	0	1	0	0	1	0	0	0	0	0	0
17:30	0	126	49	0	175	0	1	0	0	1	0	0	0	0	0	0
17:45	0	105	39	1	145	0	2	0	0	2	0	0	0	0	0	0
SUBTOTAL	19	3543	1338	2	4902	2	102	40	0	144	0	0	0	0	0	0
GRAND TOTAL	**19**	**3543**	**1338**	**2**	**4902**	**2**	**102**	**40**	**0**	**144**	**0**	**0**	**0**	**0**	**0**	**0**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Municipality: Caledon
Count Date: Jun 27, 2023

East Approach - Columbia Way

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
07:00	21	0	13	0	34	0	0	1	0	1	0	0	0	0	0	0
07:15	24	0	33	0	57	2	0	1	0	3	0	0	0	0	0	0
07:30	32	0	28	0	60	1	0	2	0	3	0	0	0	0	0	0
07:45	36	0	38	0	74	0	0	6	0	6	0	0	0	0	0	0
08:00	39	0	38	0	77	0	0	5	0	5	0	0	0	0	0	0
08:15	28	0	25	0	53	0	0	3	0	3	0	0	0	0	0	0
08:30	28	0	25	0	53	0	0	1	0	1	0	0	0	0	0	0
08:45	33	0	19	0	52	0	0	0	0	0	0	0	0	0	0	0
09:00	38	0	16	0	54	1	0	0	0	1	0	0	0	0	0	0
09:15	31	0	11	0	42	0	0	0	0	0	0	0	0	0	0	0
09:30	44	0	18	0	62	1	0	0	0	1	0	0	0	0	0	0
09:45	36	0	24	0	60	0	1	1	0	2	0	0	0	0	0	0
10:00	30	0	10	0	40	0	0	2	0	2	0	0	0	0	0	0
10:15	26	0	13	0	39	0	0	1	0	1	0	0	0	0	0	0
10:30	35	0	12	0	47	0	0	0	0	0	0	0	0	0	0	0
10:45	24	0	11	0	35	0	1	1	0	2	0	0	0	0	0	0
11:00	17	0	14	0	31	1	0	0	0	1	0	0	0	0	0	0
11:15	16	0	8	0	24	0	0	1	0	1	0	0	0	0	0	0
11:30	22	0	9	0	31	0	0	0	0	0	0	0	0	0	0	0
11:45	20	1	11	0	32	1	0	0	0	1	0	0	0	0	0	0

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
12:00	24	0	12	0	36	0	0	0	0	0	0	0	0	0	0	0
12:15	28	0	11	0	39	0	0	1	0	1	0	0	0	0	0	0
12:30	13	0	5	0	18	0	0	1	0	1	0	0	0	0	0	0
12:45	23	0	4	0	27	1	0	0	0	1	0	0	0	0	0	0
13:00	27	0	6	0	33	1	0	0	0	1	0	0	0	0	0	0
13:15	20	0	7	0	27	0	0	0	0	0	0	0	0	0	0	0
13:30	15	0	10	0	25	0	0	1	0	1	0	0	0	0	0	0
13:45	15	0	8	0	23	0	0	1	0	1	0	0	0	0	0	0
14:00	21	0	10	0	31	2	1	0	0	3	0	0	0	0	0	0
14:15	27	0	21	0	48	8	0	7	0	15	0	0	0	0	0	0
14:30	18	0	14	0	32	0	0	0	0	0	0	0	0	0	0	0
14:45	18	1	13	0	32	0	0	2	0	2	0	0	0	0	0	0
15:00	21	0	23	0	44	1	0	4	0	5	0	0	0	0	0	0
15:15	29	0	11	0	40	2	0	1	0	3	0	0	0	0	0	0
15:30	32	0	11	0	43	1	0	0	0	1	0	0	0	0	0	0
15:45	24	0	10	0	34	0	0	0	0	0	0	0	0	0	0	0
16:00	24	0	18	0	42	0	0	0	0	0	0	0	0	0	0	0
16:15	19	0	18	0	37	0	0	1	0	1	0	0	0	0	0	0
16:30	21	0	10	0	31	1	0	0	0	1	0	0	0	0	0	0
16:45	22	0	12	0	34	1	0	2	0	3	0	0	0	0	0	0
17:00	20	0	13	0	33	0	0	0	0	0	0	0	0	0	0	0
17:15	19	0	8	0	27	1	0	0	0	1	0	0	0	0	0	0
17:30	15	0	25	0	40	0	0	0	0	0	0	0	0	0	0	1
17:45	20	0	15	0	35	0	0	0	0	0	0	0	0	0	0	1
SUBTOTAL	1095	2	671	0	1768	26	3	46	0	75	0	0	0	0	0	2
GRAND TOTAL	1095	2	671	0	1768	26	3	46	0	75	0	0	0	0	0	2

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Municipality: Caledon
Count Date: Jun 27, 2023

West Approach - Columbia Way

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	2	0	2	2	0	1	0	3	0	0	0	0	0	0
07:45	2	1	2	0	5	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	1	0	4	0	5	0	0	1	0	1	0	0	0	0	0	0
08:30	0	0	1	0	1	2	0	1	0	3	0	0	0	0	0	0
08:45	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
09:00	2	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0
09:45	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	1	0	0	0	1	2	0	0	0	2	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0
11:15	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0
11:30	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0
11:45	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
12:00	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
12:15	2	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0
12:30	1	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0
12:45	1	0	6	0	7	0	0	0	0	0	0	0	0	0	0	0
13:00	2	0	0	0	2	1	0	1	0	2	0	0	0	0	0	0
13:15	2	0	0	0	2	1	0	0	0	1	0	0	0	0	0	0
13:30	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
13:45	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
14:00	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0
14:15	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0
14:30	1	1	0	0	2	1	0	0	0	1	0	0	0	0	0	0
14:45	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	17	2	5	0	24	0	0	0	0	0	0	0	0	0	0	0
15:30	3	2	0	0	5	1	0	0	0	1	0	0	0	0	0	0
15:45	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
16:30	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	44	7	34	0	85	17	1	5	0	23	0	0	0	0	0	0
GRAND TOTAL	44	7	34	0	85	17	1	5	0	23	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	07:30:00
To:	10:00:00	To:	08:30:00

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 50 runs N/S

North Approach

	Out	In	Total
Cars	496	306	802
Trucks	30	37	67
Bicycles	0	0	0
	526	**343**	**869**

Hwy 50

Bicycles	0	0	0	0
Trucks	1	15	14	0
Cars	2	393	101	0
Totals	**3**	**408**	**115**	**0**

East Approach

	Out	In	Total
Cars	264	212	476
Trucks	17	28	45
Bicycles	0	0	0
	281	**240**	**521**

Peds: 0

Columbia Way

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	2	3	**5**
0	0	1	**1**
0	2	8	**10**

Peds: 0

Peds: 0

Columbia Way

	Totals	Cars	Trucks	Bicycles
	0	0	0	0
	145	129	16	0
	0	0	0	0
	136	135	1	0

Peds: 0

West Approach

	Out	In	Total
Cars	12	3	15
Trucks	4	1	5
Bicycles	0	0	0
	16	**4**	**20**

Hwy 50

Totals	**1**	**193**	**124**	**0**
Cars	1	174	110	0
Trucks	0	19	14	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	285	536	821
Trucks	33	18	51
Bicycles	0	0	0
	318	**554**	**872**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection:	Hwy 50 & Columbia Way
Site Code:	2319800003
Count Date:	Jun 27, 2023
Period:	07:00 - 10:00

Peak Hour Data (07:30 - 08:30)

Start Time	North Approach Hwy 50						South Approach Hwy 50						East Approach Columbia Way						West Approach Columbia Way						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:30	20	96	0	0	0	116	0	40	26	0	0	66	33	0	30	0	0	63	2	0	3	0	0	5	250
07:45	44	119	0	0	0	163	0	41	38	0	0	79	36	0	44	0	0	80	2	1	2	0	0	5	327
08:00	30	95	2	0	0	127	1	56	31	0	0	88	39	0	43	0	0	82	0	0	0	0	0	0	297
08:15	21	98	1	0	0	120	0	56	29	0	0	85	28	0	28	0	0	56	1	0	5	0	0	6	267
Grand Total	**115**	**408**	**3**	**0**	**0**	**526**	**1**	**193**	**124**	**0**	**0**	**318**	**136**	**0**	**145**	**0**	**0**	**281**	**5**	**1**	**10**	**0**	**0**	**16**	**1141**
Approach %	21.9	77.6	0.6	0		-	0.3	60.7	39	0		-	48.4	0	51.6	0		-	31.3	6.3	62.5	0		-	
Totals %	10.1	35.8	0.3	0		46.1	0.1	16.9	10.9	0		27.9	11.9	0	12.7	0		24.6	0.4	0.1	0.9	0		1.4	
PHF	**0.65**	**0.86**	**0.38**	**0**		**0.81**	**0.25**	**0.86**	**0.82**	**0**		**0.9**	**0.87**	**0**	**0.82**	**0**		**0.86**	**0.63**	**0.25**	**0.5**	**0**		**0.67**	**0.87**
Cars	101	393	2	0		496	1	174	110	0		285	135	0	129	0		264	3	1	8	0		12	1057
% Cars	87.8	96.3	66.7	0		94.3	100	90.2	88.7	0		89.6	99.3	0	89	0		94	60	100	80	0		75	92.6
Trucks	14	15	1	0		30	0	19	14	0		33	1	0	16	0		17	2	0	2	0		4	84
% Trucks	12.2	3.7	33.3	0		5.7	0	9.8	11.3	0		10.4	0.7	0	11	0		6	40	0	20	0		25	7.4
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	10:00:00	From:	10:15:00
To:	14:00:00	To:	11:15:00

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 50 runs N/S

North Approach

	Out	In	Total
Cars	328	340	668
Trucks	13	15	28
Bicycles	0	0	0
	341	**355**	**696**

Hwy 50

Bicycles	0	0	0	0
Trucks	1	8	4	0
Cars	1	293	34	0
Totals	**2**	**301**	**38**	**0**

East Approach

	Out	In	Total
Cars	152	134	286
Trucks	4	4	8
Bicycles	0	0	0
	156	**138**	**294**

Columbia Way

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	3	1	**4**
0	0	0	**0**
0	0	1	**1**

Peds: 0

Peds: 0

Peds: 0

Columbia Way

Totals	Cars	Trucks	Bicycles
0	0	0	0
52	50	2	0
1	0	1	0
103	102	1	0

West Approach

	Out	In	Total
Cars	2	4	6
Trucks	3	2	5
Bicycles	0	0	0
	5	**6**	**11**

Hwy 50

Totals	**3**	**299**	**100**	**0**
Cars	3	289	100	0
Trucks	0	10	0	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	392	396	788
Trucks	10	9	19
Bicycles	0	0	0
	402	**405**	**807**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection:	Hwy 50 & Columbia Way
Site Code:	2319800003
Count Date:	Jun 27, 2023
Period:	10:00 - 14:00

Peak Hour Data (10:15 - 11:15)

Start Time	North Approach Hwy 50						South Approach Hwy 50						East Approach Columbia Way						West Approach Columbia Way						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
10:15	8	72	0	0	0	80	0	72	34	0	0	106	26	0	14	0	0	40	3	0	0	0	0	3	229
10:30	12	82	1	0	0	95	0	67	23	0	0	90	35	0	12	0	0	47	0	0	0	0	0	0	232
10:45	10	88	0	0	0	98	2	79	27	0	0	108	24	1	12	0	0	37	0	0	0	0	0	0	243
11:00	8	59	1	0	0	68	1	81	16	0	0	98	18	0	14	0	0	32	1	0	1	0	0	2	200
Grand Total	**38**	**301**	**2**	**0**	**0**	**341**	**3**	**299**	**100**	**0**	**0**	**402**	**103**	**1**	**52**	**0**	**0**	**156**	**4**	**0**	**1**	**0**	**0**	**5**	**904**
Approach %	11.1	88.3	0.6	0		-	0.7	74.4	24.9	0		-	66	0.6	33.3	0		-	80	0	20	0		-	
Totals %	4.2	33.3	0.2	0		37.7	0.3	33.1	11.1	0		44.5	11.4	0.1	5.8	0		17.3	0.4	0	0.1	0		0.6	
PHF	**0.79**	**0.86**	**0.5**	**0**		**0.87**	**0.38**	**0.92**	**0.74**	**0**		**0.93**	**0.74**	**0.25**	**0.93**	**0**		**0.83**	**0.33**	**0**	**0.25**	**0**		**0.42**	**0.93**
Cars	34	293	1	0		328	3	289	100	0		392	102	0	50	0		152	1	0	1	0		2	874
% Cars	89.5	97.3	50	0		96.2	100	96.7	100	0		97.5	99	0	96.2	0		97.4	25	0	100	0		40	96.7
Trucks	4	8	1	0		13	0	10	0	0		10	1	1	2	0		4	3	0	0	0		3	30
% Trucks	10.5	2.7	50	0		3.8	0	3.3	0	0		2.5	1	100	3.8	0		2.6	75	0	0	0		60	3.3
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Specified Period		One Hour Peak	
From:	14:00:00	From:	16:45:00
To:	18:00:00	To:	17:45:00

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 50 runs N/S

North Approach

	Out	In	Total
Cars	373	574	947
Trucks	6	6	12
Bicycles	0	0	0
	379	**580**	**959**

Hwy 50

Bicycles	0	0	0	0
Trucks	2	4	0	0
Cars	0	280	93	0
Totals	**2**	**284**	**93**	**0**

East Approach

	Out	In	Total
Cars	134	280	414
Trucks	4	1	5
Bicycles	0	0	0
	138	**281**	**419**

Columbia Way

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	0	1	**1**
0	0	0	**0**
0	0	2	**2**

Peds: 0

Peds: 0

Peds: 1

Columbia Way

Totals	Cars	Trucks	Bicycles
0	0	0	0
60	58	2	0
0	0	0	0
78	76	2	0

Peds: 0

West Approach

	Out	In	Total
Cars	3	0	3
Trucks	0	2	2
Bicycles	0	0	0
	3	**2**	**5**

Totals	**0**	**519**	**188**	**0**
Cars	0	515	187	0
Trucks	0	4	1	0
Bicycles	0	0	0	0

Hwy 50

South Approach

	Out	In	Total
Cars	702	358	1060
Trucks	5	6	11
Bicycles	0	0	0
	707	**364**	**1071**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 50 & Columbia Way
Site Code: 2319800003
Count Date: Jun 27, 2023
Period: 14:00 - 18:00

Peak Hour Data (16:45 - 17:45)

Start Time	North Approach Hwy 50						South Approach Hwy 50						East Approach Columbia Way						West Approach Columbia Way						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:45	18	70	0	0	0	88	0	125	41	0	0	166	23	0	14	0	0	37	0	0	0	0	0	0	291
17:00	28	72	0	0	0	100	0	129	50	0	0	179	20	0	13	0	0	33	0	0	1	0	0	1	313
17:15	22	63	2	0	0	87	0	138	48	0	0	186	20	0	8	0	0	28	0	0	0	0	0	0	301
17:30	25	79	0	0	0	104	0	127	49	0	0	176	15	0	25	0	1	40	1	0	1	0	0	2	322
Grand Total	**93**	**284**	**2**	**0**	**0**	**379**	**0**	**519**	**188**	**0**	**0**	**707**	**78**	**0**	**60**	**0**	**1**	**138**	**1**	**0**	**2**	**0**	**0**	**3**	**1227**
Approach %	24.5	74.9	0.5	0		-	0	73.4	26.6	0		-	56.5	0	43.5	0		-	33.3	0	66.7	0		-	
Totals %	7.6	23.1	0.2	0		30.9	0	42.3	15.3	0		57.6	6.4	0	4.9	0		11.2	0.1	0	0.2	0		0.2	
PHF	**0.83**	**0.9**	**0.25**	**0**		**0.91**	**0**	**0.94**	**0.94**	**0**		**0.95**	**0.85**	**0**	**0.6**	**0**		**0.86**	**0.25**	**0**	**0.5**	**0**		**0.38**	**0.95**
Cars	93	280	0	0		373	0	515	187	0		702	76	0	58	0		134	1	0	2	0		3	1212
% Cars	100	98.6	0	0		98.4	0	99.2	99.5	0		99.3	97.4	0	96.7	0		97.1	100	0	100	0		100	98.8
Trucks	0	4	2	0		6	0	4	1	0		5	2	0	2	0		4	0	0	0	0		0	15
% Trucks	0	1.4	100	0		1.6	0	0.8	0.5	0		0.7	2.6	0	3.3	0		2.9	0	0	0	0		0	1.2
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					0	-					0	-					1	-					0	-	1
% Peds					0	-					0	-					100	-					0	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Project #23-198 - CGH Transportation

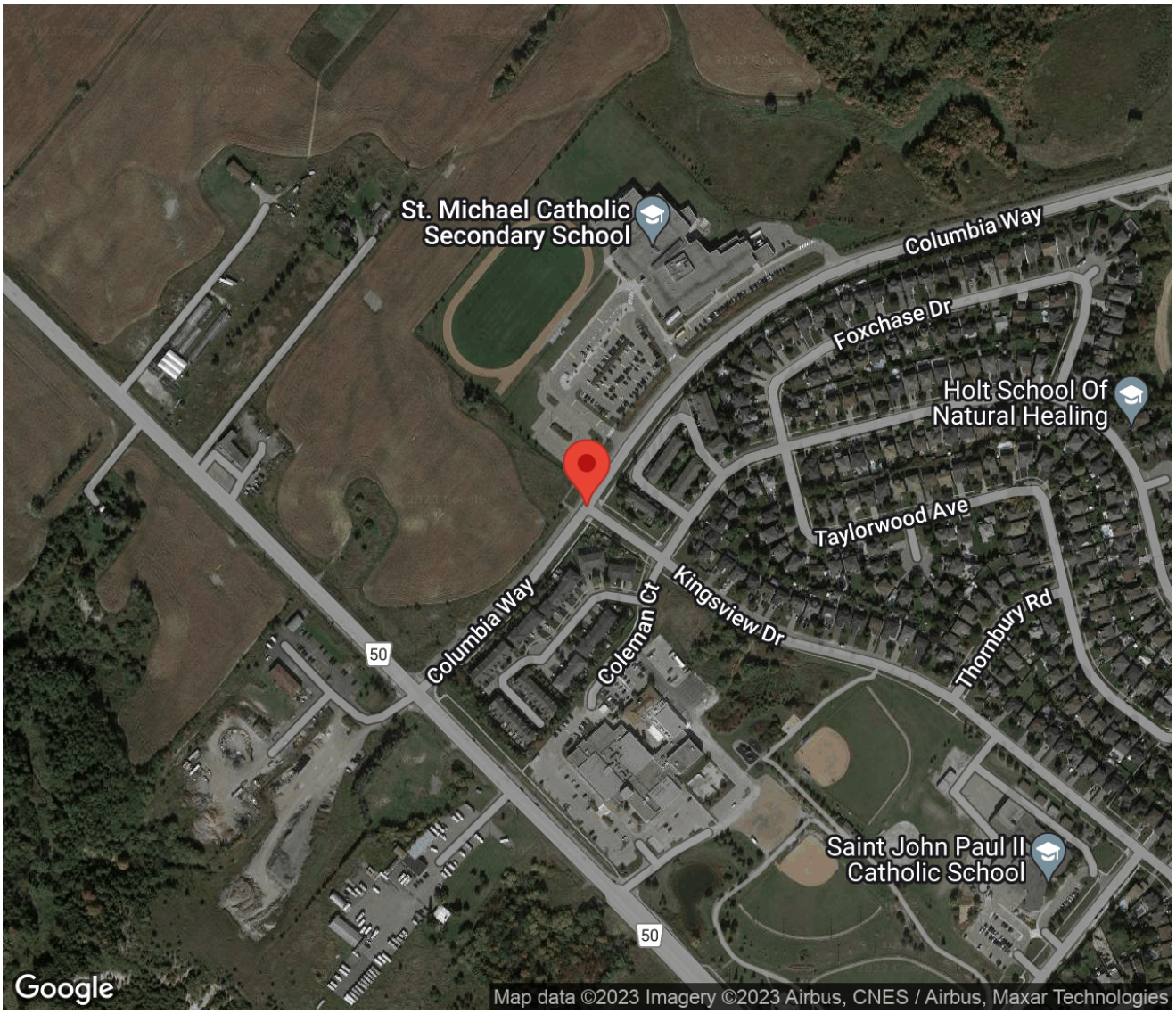
Intersection Count Report

Intersection:	Columbia Way & Kingsview Dr
Municipality:	Caledon
Count Date:	Tuesday, Jun 27, 2023
Site Code:	2319800004
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-18:00
Weather:	Clear
Comments:	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Map

Intersection:	Columbia Way & Kingsview Dr
Site Code:	2319800004
Municipality:	Caledon
Count Date:	Jun 27, 2023



Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Municipality: Caledon
Count Date: Jun 27, 2023

Kingsview Dr - Traffic Summary

Hour	North Approach Totals						South Approach Totals						Total
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	0	0	0	0	0	0	33	0	42	0	75	0	75
08:00 - 09:00	0	0	0	0	0	0	49	0	93	0	142	0	142
09:00 - 10:00	0	0	0	0	0	0	23	0	35	0	58	3	58
10:00 - 11:00	0	0	0	0	0	0	21	0	42	0	63	0	63
11:00 - 12:00	0	0	0	0	0	0	27	0	29	0	56	4	56
12:00 - 13:00	0	0	0	0	0	0	25	0	25	0	50	3	50
13:00 - 14:00	0	0	0	0	0	0	20	0	19	0	39	1	39
14:00 - 15:00	0	0	0	0	0	0	25	0	31	0	56	2	56
15:00 - 16:00	0	0	0	0	0	0	33	0	86	0	119	0	119
16:00 - 17:00	0	0	0	0	0	0	30	0	39	0	69	0	69
17:00 - 18:00	0	0	0	0	0	0	27	0	27	0	54	6	54
GRAND TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**313**	**0**	**468**	**0**	**781**	**19**	**781**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Municipality: Caledon
Count Date: Jun 27, 2023

Columbia Way - Traffic Summary

Hour	East Approach Totals (Includes Cars, Trucks, Bicycles)						West Approach Totals (Includes Cars, Trucks, Bicycles)						Total
	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	
07:00 - 08:00	25	205	0	0	230	2	0	157	12	0	169	1	399
08:00 - 09:00	133	195	0	0	328	3	0	160	36	0	196	1	524
09:00 - 10:00	32	199	0	0	231	19	0	151	23	0	174	5	405
10:00 - 11:00	33	145	0	0	178	4	0	128	33	0	161	1	339
11:00 - 12:00	26	94	0	0	120	2	0	97	23	0	120	3	240
12:00 - 13:00	24	98	0	0	122	2	0	118	46	0	164	0	286
13:00 - 14:00	26	92	0	0	118	6	0	116	32	0	148	0	266
14:00 - 15:00	59	137	0	0	196	0	0	145	48	0	193	0	389
15:00 - 16:00	37	136	0	0	173	0	0	173	51	1	225	0	398
16:00 - 17:00	44	118	0	0	162	0	0	190	65	0	255	0	417
17:00 - 18:00	50	110	0	0	160	0	0	213	71	0	284	0	444
GRAND TOTAL	**489**	**1529**	**0**	**0**	**2018**	**38**	**0**	**1648**	**440**	**1**	**2089**	**11**	**4107**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Municipality: Caledon
Count Date: Jun 27, 2023

South Approach - Kingsview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	
07:00	10	0	8	0	18	0	0	0	0	0	0	0	0	0	0	0
07:15	10	0	11	0	21	0	0	0	0	0	0	0	0	0	0	0
07:30	5	0	9	0	14	0	0	0	0	0	0	0	0	0	0	0
07:45	8	0	13	0	21	0	0	1	0	1	0	0	0	0	0	0
08:00	13	0	29	0	42	0	0	0	0	0	0	0	0	0	0	0
08:15	15	0	30	0	45	0	0	0	0	0	0	0	0	0	0	0
08:30	10	0	21	0	31	0	0	1	0	1	0	0	0	0	0	0
08:45	11	0	12	0	23	0	0	0	0	0	0	0	0	0	0	0
09:00	8	0	11	0	19	1	0	0	0	1	0	0	0	0	0	1
09:15	5	0	6	0	11	0	0	0	0	0	0	0	0	0	0	0
09:30	3	0	9	0	12	0	0	0	0	0	0	0	0	0	0	0
09:45	6	0	9	0	15	0	0	0	0	0	0	0	0	0	0	2
10:00	5	0	4	0	9	0	0	0	0	0	0	0	0	0	0	0
10:15	6	0	12	0	18	0	0	0	0	0	0	0	0	0	0	0
10:30	3	0	12	0	15	0	0	0	0	0	0	0	0	0	0	0
10:45	6	0	13	0	19	1	0	1	0	2	0	0	0	0	0	0
11:00	7	0	4	0	11	0	0	1	0	1	0	0	0	0	0	0
11:15	6	0	7	0	13	1	0	0	0	1	0	0	0	0	0	2
11:30	4	0	8	0	12	0	0	0	0	0	0	0	0	0	0	1
11:45	8	0	9	0	17	1	0	0	0	1	0	0	0	0	0	1

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
12:00	10	0	6	0	16	0	0	0	0	0	0	0	0	0	0	1
12:15	7	0	11	0	18	0	0	1	0	1	0	0	0	0	0	2
12:30	3	0	3	0	6	0	0	0	0	0	0	0	0	0	0	0
12:45	5	0	4	0	9	0	0	0	0	0	0	0	0	0	0	0
13:00	2	0	5	0	7	0	0	0	0	0	0	0	0	0	0	0
13:15	6	0	3	0	9	0	0	0	0	0	0	0	0	0	0	1
13:30	7	0	7	0	14	1	0	0	0	1	0	0	0	0	0	0
13:45	4	0	4	0	8	0	0	0	0	0	0	0	0	0	0	0
14:00	7	0	7	0	14	0	0	0	0	0	0	0	0	0	0	0
14:15	6	0	5	0	11	0	0	0	0	0	0	0	0	0	0	2
14:30	6	0	6	0	12	0	0	0	0	0	0	0	0	0	0	0
14:45	5	0	13	0	18	1	0	0	0	1	0	0	0	0	0	0
15:00	8	0	43	0	51	1	0	4	0	5	0	0	0	0	0	0
15:15	5	0	10	0	15	2	0	0	0	2	0	0	0	0	0	0
15:30	9	0	11	0	20	0	0	1	0	1	0	0	0	0	0	0
15:45	8	0	15	0	23	0	0	2	0	2	0	0	0	0	0	0
16:00	14	0	2	0	16	0	0	0	0	0	0	0	0	0	0	0
16:15	8	0	14	0	22	0	0	0	0	0	0	0	0	0	0	0
16:30	4	0	12	0	16	1	0	0	0	1	0	0	0	0	0	0
16:45	3	0	11	0	14	0	0	0	0	0	0	0	0	0	0	0
17:00	7	0	10	0	17	0	0	0	0	0	0	0	0	0	0	1
17:15	4	0	5	0	9	1	0	0	0	1	0	0	0	0	0	0
17:30	9	0	6	0	15	0	0	0	0	0	0	0	0	0	0	3
17:45	6	0	6	0	12	0	0	0	0	0	0	0	0	0	0	2
SUBTOTAL	302	0	456	0	758	11	0	12	0	23	0	0	0	0	0	19
GRAND TOTAL	302	0	456	0	758	11	0	12	0	23	0	0	0	0	0	19

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Municipality: Caledon
Count Date: Jun 27, 2023

East Approach - Columbia Way

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
07:00	2	24	0	0	26	0	1	0	0	1	0	0	0	0	0	0
07:15	2	47	0	0	49	0	3	0	0	3	0	0	0	0	0	0
07:30	5	55	0	0	60	1	3	0	0	4	0	0	0	0	0	0
07:45	15	66	0	0	81	0	6	0	0	6	0	0	0	0	0	2
08:00	46	64	0	0	110	4	5	0	0	9	0	0	0	0	0	1
08:15	49	38	0	0	87	1	3	0	0	4	0	0	0	0	0	2
08:30	13	42	0	0	55	0	0	0	0	0	0	0	0	0	0	0
08:45	20	42	0	0	62	0	1	0	0	1	0	0	0	0	0	0
09:00	10	45	0	0	55	0	0	0	0	0	0	0	0	0	0	2
09:15	4	38	0	0	42	0	0	0	0	0	0	0	0	0	0	5
09:30	7	59	0	0	66	0	1	0	0	1	0	0	0	0	0	5
09:45	11	54	0	0	65	0	2	0	0	2	0	0	0	0	0	7
10:00	9	35	0	0	44	1	2	0	0	3	0	0	0	0	0	2
10:15	3	33	0	0	36	0	0	0	0	0	0	0	0	0	0	2
10:30	13	44	0	0	57	0	1	0	0	1	0	0	0	0	0	0
10:45	6	29	0	0	35	1	1	0	0	2	0	0	0	0	0	0
11:00	4	24	0	0	28	0	1	0	0	1	0	0	0	0	0	0
11:15	12	18	0	0	30	0	0	0	0	0	0	0	0	0	0	2
11:30	6	27	0	0	33	1	0	0	0	1	0	0	0	0	0	0
11:45	3	24	0	0	27	0	0	0	0	0	0	0	0	0	0	0

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
12:00	4	25	0	0	29	0	0	0	0	0	0	0	0	0	0	0
12:15	6	33	0	0	39	0	1	0	0	1	0	0	0	0	0	0
12:30	6	15	0	0	21	1	1	0	0	2	0	0	0	0	0	2
12:45	7	22	0	0	29	0	1	0	0	1	0	0	0	0	0	0
13:00	7	31	0	0	38	0	1	0	0	1	0	0	0	0	0	2
13:15	7	21	0	0	28	1	0	0	0	1	0	0	0	0	0	4
13:30	4	18	0	0	22	0	1	0	0	1	0	0	0	0	0	0
13:45	7	20	0	0	27	0	0	0	0	0	0	0	0	0	0	0
14:00	7	23	0	0	30	0	3	0	0	3	0	0	0	0	0	0
14:15	10	42	0	0	52	1	15	0	0	16	0	0	0	0	0	0
14:30	14	26	0	0	40	0	0	0	0	0	0	0	0	0	0	0
14:45	27	27	0	0	54	0	1	0	0	1	0	0	0	0	0	0
15:00	6	35	0	0	41	1	4	0	0	5	0	0	0	0	0	0
15:15	10	35	0	0	45	0	1	0	0	1	0	0	0	0	0	0
15:30	6	34	0	0	40	0	1	0	0	1	0	0	0	0	0	0
15:45	14	26	0	0	40	0	0	0	0	0	0	0	0	0	0	0
16:00	14	28	0	0	42	0	0	0	0	0	0	0	0	0	0	0
16:15	10	29	0	0	39	0	1	0	0	1	0	0	0	0	0	0
16:30	10	27	0	0	37	0	0	0	0	0	0	0	0	0	0	0
16:45	10	30	0	0	40	0	3	0	0	3	0	0	0	0	0	0
17:00	13	27	0	0	40	0	0	0	0	0	0	0	0	0	0	0
17:15	17	23	0	0	40	0	0	0	0	0	0	0	0	0	0	0
17:30	10	32	0	0	42	0	0	0	0	0	0	0	0	0	0	0
17:45	10	28	0	0	38	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	476	1465	0	0	1941	13	64	0	0	77	0	0	0	0	0	38
GRAND TOTAL	476	1465	0	0	1941	13	64	0	0	77	0	0	0	0	0	38

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Municipality: Caledon
Count Date: Jun 27, 2023

West Approach - Columbia Way

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
07:00	0	12	2	0	14	0	0	1	0	1	0	0	0	0	0	0
07:15	0	19	1	0	20	0	5	0	0	5	0	0	0	0	0	0
07:30	0	33	3	0	36	0	10	0	0	10	0	0	0	0	0	0
07:45	0	66	4	0	70	0	12	1	0	13	0	0	0	0	0	1
08:00	0	51	6	0	57	0	4	0	0	4	0	0	0	0	0	1
08:15	0	39	10	0	49	0	1	0	0	1	0	0	0	0	0	0
08:30	0	33	9	0	42	0	2	0	0	2	0	0	0	0	0	0
08:45	0	28	10	0	38	0	2	1	0	3	0	0	0	0	0	0
09:00	0	31	3	0	34	0	1	0	0	1	0	0	0	0	0	0
09:15	0	34	4	0	38	0	1	0	0	1	0	0	0	0	0	0
09:30	0	31	8	0	39	0	0	0	0	0	0	0	0	0	0	3
09:45	0	52	8	0	60	0	1	0	0	1	0	0	0	0	0	2
10:00	0	37	6	0	43	0	2	0	0	2	0	0	0	0	0	0
10:15	0	33	8	0	41	0	3	0	0	3	0	0	0	0	0	0
10:30	0	26	8	0	34	0	1	0	0	1	0	0	0	0	0	1
10:45	0	26	11	0	37	0	0	0	0	0	0	0	0	0	0	0
11:00	0	21	2	0	23	0	1	0	0	1	0	0	0	0	0	0
11:15	0	27	8	0	35	0	0	0	0	0	0	0	0	0	0	0
11:30	0	29	6	0	35	0	1	0	0	1	0	0	0	0	0	0
11:45	0	18	7	0	25	0	0	0	0	0	0	0	0	0	0	3

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
12:00	0	27	13	0	40	0	0	0	0	0	0	0	0	0	0	0
12:15	0	25	12	0	37	0	0	0	0	0	0	0	0	0	0	0
12:30	0	23	16	0	39	0	0	0	0	0	0	0	0	0	0	0
12:45	0	43	5	0	48	0	0	0	0	0	0	0	0	0	0	0
13:00	0	30	7	0	37	0	1	1	0	2	0	0	0	0	0	0
13:15	0	27	7	0	34	0	3	0	0	3	0	0	0	0	0	0
13:30	0	26	9	0	35	0	1	0	0	1	0	0	0	0	0	0
13:45	0	23	8	0	31	0	5	0	0	5	0	0	0	0	0	0
14:00	0	24	10	0	34	0	6	0	0	6	0	0	0	0	0	0
14:15	0	32	10	0	42	0	2	0	0	2	0	0	0	0	0	0
14:30	0	40	12	0	52	0	2	1	0	3	0	0	0	0	0	0
14:45	0	36	13	0	49	0	3	2	0	5	0	0	0	0	0	0
15:00	0	44	15	1	60	0	6	0	0	6	0	0	0	0	0	0
15:15	0	35	11	0	46	0	2	0	0	2	0	0	0	0	0	0
15:30	0	42	15	0	57	0	0	0	0	0	0	0	0	0	0	0
15:45	0	40	10	0	50	0	4	0	0	4	0	0	0	0	0	0
16:00	0	43	15	0	58	0	1	0	0	1	0	0	0	0	0	0
16:15	0	50	18	0	68	0	1	0	0	1	0	0	0	0	0	0
16:30	0	47	20	0	67	0	1	0	0	1	0	0	0	0	0	0
16:45	0	47	12	0	59	0	0	0	0	0	0	0	0	0	0	0
17:00	0	61	16	0	77	0	1	0	0	1	0	0	0	0	0	0
17:15	0	50	20	0	70	0	0	0	0	0	0	0	0	0	0	0
17:30	0	50	24	0	74	0	0	0	0	0	0	0	0	0	0	0
17:45	0	50	11	0	61	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	0	1561	433	1	1995	0	87	7	0	94	0	0	0	0	0	11
GRAND TOTAL	0	1561	433	1	1995	0	87	7	0	94	0	0	0	0	0	11

Peak Hour Diagram

Specified Period
From: 07:00:00
To: 10:00:00

One Hour Peak
From: 07:45:00
To: 08:45:00

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Columbia Way runs E/W

East Approach

	Out	In	Total
Cars	333	282	615
Trucks	19	21	40
Bicycles	0	0	0
	352	**303**	**655**

Peds: 0

Columbia Way

			Totals
0	0	0	**0**
0	19	189	**208**
0	1	29	**30**

Peds: 2

N
W E
S

Peds: 5

Columbia Way

	Totals			
	0	0	0	0
	224	210	14	0
	128	123	5	0

Peds: 0

West Approach

	Out	In	Total
Cars	218	256	474
Trucks	20	14	34
Bicycles	0	0	0
	238	**270**	**508**

Totals	46	95	0
Cars	46	93	0
Trucks	0	2	0
Bicycles	0	0	0

Kingsview Dr

South Approach

	Out	In	Total
Cars	139	152	291
Trucks	2	6	8
Bicycles	0	0	0
	141	**158**	**299**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Count Date: Jun 27, 2023
Period: 07:00 - 10:00

Peak Hour Data (07:45 - 08:45)

Start Time	North Approach						South Approach Kingsview Dr						East Approach Columbia Way						West Approach Columbia Way						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:45					0		8		14	0	0	22	15	72		0	2	87		78	5	0	1	83	192
08:00					0		13		29	0	0	42	50	69		0	1	119		55	6	0	1	61	222
08:15					0		15		30	0	0	45	50	41		0	2	91		40	10	0	0	50	186
08:30					0		10		22	0	0	32	13	42		0	0	55		35	9	0	0	44	131
Grand Total					**0**	**0**	**46**		**95**	**0**	**0**	**141**	**128**	**224**		**0**	**5**	**352**		**208**	**30**	**0**	**2**	**238**	**731**
Approach %						-	32.6		67.4	0		-	36.4	63.6		0		-		87.4	12.6	0		-	
Totals %						0	6.3		13	0		19.3	17.5	30.6		0		48.2		28.5	4.1	0		32.6	
PHF						**0**	**0.77**		**0.79**	**0**		**0.78**	**0.64**	**0.78**		**0**		**0.74**		**0.67**	**0.75**	**0**		**0.72**	**0.82**
Cars						0	46		93	0		139	123	210		0		333		189	29	0		218	690
% Cars						0	100		97.9	0		98.6	96.1	93.8		0		94.6		90.9	96.7	0		91.6	94.4
Trucks						0	0		2	0		2	5	14		0		19		19	1	0		20	41
% Trucks						0	0		2.1	0		1.4	3.9	6.3		0		5.4		9.1	3.3	0		8.4	5.6
Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
% Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
Peds					0	-					0	-					5	-					2	-	7
% Peds					0	-					0	-					71.4	-					28.6	-	

Peak Hour Diagram

Specified Period
From: 10:00:00
To: 14:00:00

One Hour Peak
From: 10:00:00
To: 11:00:00

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Columbia Way runs E/W

East Approach

	Out	In	Total
Cars	172	163	335
Trucks	6	7	13
Bicycles	0	0	0
	178	**170**	**348**

Peds: 0

Columbia Way

			Totals
0	0	0	**0**
0	6	122	**128**
0	0	33	**33**

Peds: 1

N
W E
S

Peds: 4

Columbia Way

	Totals			
	0	0	0	0
	145	141	4	0
	33	31	2	0

Peds: 0

West Approach

	Out	In	Total
Cars	155	161	316
Trucks	6	5	11
Bicycles	0	0	0
	161	**166**	**327**

Totals	21	42	0
Cars	20	41	0
Trucks	1	1	0
Bicycles	0	0	0

Kingsview Dr

South Approach

	Out	In	Total
Cars	61	64	125
Trucks	2	2	4
Bicycles	0	0	0
	63	**66**	**129**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Count Date: Jun 27, 2023
Period: 10:00 - 14:00

Peak Hour Data (10:00 - 11:00)

Start Time	North Approach						South Approach Kingsview Dr						East Approach Columbia Way						West Approach Columbia Way						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
10:00					0		5		4	0	0	9	10	37		0	2	47		39	6	0	0	45	101
10:15					0		6		12	0	0	18	3	33		0	2	36		36	8	0	0	44	98
10:30					0		3		12	0	0	15	13	45		0	0	58		27	8	0	1	35	108
10:45					0		7		14	0	0	21	7	30		0	0	37		26	11	0	0	37	95
Grand Total					**0**	**0**	**21**		**42**	**0**	**0**	**63**	**33**	**145**		**0**	**4**	**178**		**128**	**33**	**0**	**1**	**161**	**402**
Approach %						-	33.3		66.7	0		-	18.5	81.5		0		-		79.5	20.5	0		-	
Totals %						0	5.2		10.4	0		15.7	8.2	36.1		0		44.3		31.8	8.2	0		40	
PHF						**0**	**0.75**		**0.75**	**0**		**0.75**	**0.63**	**0.81**		**0**		**0.77**		**0.82**	**0.75**	**0**		**0.89**	**0.93**
Cars						0	20		41	0		61	31	141		0		172		122	33	0		155	388
% Cars						0	95.2		97.6	0		96.8	93.9	97.2		0		96.6		95.3	100	0		96.3	96.5
Trucks						0	1		1	0		2	2	4		0		6		6	0	0		6	14
% Trucks						0	4.8		2.4	0		3.2	6.1	2.8		0		3.4		4.7	0	0		3.7	3.5
Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
% Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
Peds					0	-					0	-					4	-					1	-	5
% Peds					0	-					0	-					80	-					20	-	

Peak Hour Diagram

Specified Period
From: 14:00:00
To: 18:00:00

One Hour Peak
From: 14:15:00
To: 15:15:00

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Count Date: Jun 27, 2023

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Columbia Way runs E/W

East Approach

	Out	In	Total
Cars	187	219	406
Trucks	22	17	39
Bicycles	0	0	0
	209	**236**	**445**

Columbia Way

			Totals
0	0	1	**1**
0	13	152	**165**
0	3	50	**53**

Peds: 0

Peds: 0

Peds: 0

N

W E

S

Peds: 2

Columbia Way

	Totals			
	0	0	0	0
	150	130	20	0
	59	57	2	0

West Approach

	Out	In	Total
Cars	203	156	359
Trucks	16	22	38
Bicycles	0	0	0
	219	**178**	**397**

Totals	27	71	0
Cars	25	67	0
Trucks	2	4	0
Bicycles	0	0	0

Kingsview Dr

South Approach

	Out	In	Total
Cars	92	107	199
Trucks	6	5	11
Bicycles	0	0	0
	98	**112**	**210**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Columbia Way & Kingsview Dr
Site Code: 2319800004
Count Date: Jun 27, 2023
Period: 14:00 - 18:00

Peak Hour Data (14:15 - 15:15)

Start Time	North Approach						South Approach Kingsview Dr						East Approach Columbia Way						West Approach Columbia Way						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
14:15					0		6		5	0	2	11	11	57		0	0	68		34	10	0	0	44	123
14:30					0		6		6	0	0	12	14	26		0	0	40		42	13	0	0	55	107
14:45					0		6		13	0	0	19	27	28		0	0	55		39	15	0	0	54	128
15:00					0		9		47	0	0	56	7	39		0	0	46		50	15	1	0	66	168
Grand Total					**0**	**0**	**27**		**71**	**0**	**2**	**98**	**59**	**150**		**0**	**0**	**209**		**165**	**53**	**1**	**0**	**219**	**526**
Approach %						-	27.6		72.4	0		-	28.2	71.8		0		-		75.3	24.2	0.5		-	
Totals %						0	5.1		13.5	0		18.6	11.2	28.5		0		39.7		31.4	10.1	0.2		41.6	
PHF						**0**	**0.75**		**0.38**	**0**		**0.44**	**0.55**	**0.66**		**0**		**0.77**		**0.83**	**0.88**	**0.25**		**0.83**	**0.78**
Cars						0	25		67	0		92	57	130		0		187		152	50	1		203	482
% Cars						0	92.6		94.4	0		93.9	96.6	86.7		0		89.5		92.1	94.3	100		92.7	91.6
Trucks						0	2		4	0		6	2	20		0		22		13	3	0		16	44
% Trucks						0	7.4		5.6	0		6.1	3.4	13.3		0		10.5		7.9	5.7	0		7.3	8.4
Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
% Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
Peds					0	-					2	-					0	-					0	-	2
% Peds					0	-					100	-					0	-					0	-	

Appendix C

Collision Data

50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_427)

FROM: JANUARY 1, 2015 TO: DECEMBER 31, 2020

Accident No.	Location	Municipality	Accident Da	Acciden	Acciden	Environme	Light	Road 1 Surfa	Road 2 Surfa	Classification Of Accident	Initial Impact Type	Vehicle 1 In	Vehicle 2 In	Vehicle 1 Manoeu	Vehicle 2 Manoeuver	Apparent Driver 1 Action	Apparent Driver 2	Driver 1 Cor	Driver 2 Cor	Vehicle 1 Ty	Vehicle 2 Type
20035041	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2020-01-26	2020	19:30	02 - Rain	07 - Dark	02 - Wet	02 - Wet	03 - P.D. only	03 - Rear end	01 - North	01 - North	01 - Going ahead	10 - Stopped	02 - Following too close	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	01 - Automobile, station wagon
16077836	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-03-10	2016	03:50	02 - Rain	08 - Dark, artificial	02 - Wet	02 - Wet	03 - P.D. only	03 - Rear end	02 - South	02 - South	01 - Going ahead	10 - Stopped	04 - Speed too fast for co	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	05 - Pick-up truck
16322202	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-09-17	2016	13:02	02 - Rain	01 - Daylight	02 - Wet	02 - Wet	03 - P.D. only	03 - Rear end	01 - North	01 - North	01 - Going ahead	02 - Slowing or stopp	02 - Following too close	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	01 - Automobile, station wagon
16426852	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-12-19	2016	17:00	01 - Clear	07 - Dark	01 - Dry	01 - Dry	02 - Non-fatal injury	05 - Turning mover	01 - North	02 - South	01 - Going ahead	04 - Turning left	07 - Disobeyed traffic co	06 - Improper tur	08 - Inatten	08 - Inatten	01 - Automo	04 - Passenger van
18407300	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2018-09-13	2018	19:50	01 - Clear	08 - Dark, artificial	01 - Dry	01 - Dry	03 - P.D. only	03 - Rear end	01 - North	01 - North	01 - Going ahead	02 - Slowing or stopp	02 - Following too close	01 - Driving prope	01 - Normal	01 - Normal	05 - Pick-up	01 - Automobile, station wagon
17044384	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2017-03-21	2017	04:25	01 - Clear	07 - Dark	01 - Dry	01 - Dry	03 - P.D. only	03 - Rear end	02 - South	02 - South	01 - Going ahead	10 - Stopped	99 - Other	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	01 - Automobile, station wagon
18117666	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2018-03-27	2018	08:00	02 - Rain	01 - Daylight	02 - Wet	02 - Wet	03 - P.D. only	03 - Rear end	02 - South	02 - South	01 - Going ahead	10 - Stopped	02 - Following too close	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	05 - Pick-up truck
16386450	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-11-11	2016	08:42	01 - Clear	01 - Daylight	01 - Dry	01 - Dry	03 - P.D. only	03 - Rear end	02 - South	02 - South	01 - Going ahead	10 - Stopped	02 - Following too close	01 - Driving prope	08 - Inatten	01 - Normal	01 - Automo	01 - Automobile, station wagon
16433556	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-12-27	2016	09:16	01 - Clear	01 - Daylight	01 - Dry	01 - Dry	02 - Non-fatal injury	03 - Rear end	02 - South	02 - South	01 - Going ahead	10 - Stopped	02 - Following too close	01 - Driving prope			01 - Automo	01 - Automobile, station wagon
16168181	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-05-27	2016	08:59	01 - Clear	01 - Daylight	01 - Dry	01 - Dry	03 - P.D. only	05 - Turning mover	01 - North	02 - South	01 - Going ahead	04 - Turning left	07 - Disobeyed traffic co	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	01 - Automobile, station wagon
16081879	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-08-28	2016	15:10	01 - Clear	01 - Daylight	01 - Dry	01 - Dry	03 - P.D. only	03 - Rear end	02 - South	02 - South	02 - Slowing or sto	10 - Stopped	02 - Following too close	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	01 - Automobile, station wagon
16010620	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2016-01-11	2016	17:30	01 - Clear	05 - Dusk	01 - Dry	01 - Dry	03 - P.D. only	03 - Rear end	01 - North	01 - North	01 - Going ahead	10 - Stopped	99 - Other	01 - Driving prope	08 - Inatten	01 - Normal	01 - Automo	05 - Pick-up truck
15273765	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2015-08-10	2015	18:30	02 - Rain	01 - Daylight	02 - Wet	02 - Wet	03 - P.D. only	03 - Rear end	02 - South	02 - South		02 - Slowing or stopp		01 - Driving prope		01 - Normal		01 - Automobile, station wagon
15428101	50 HY @ COLUMBIA WAY/CAL WORKS YARD (INT_4	CALEDON	2015-12-20	2015	18:40	01 - Clear	07 - Dark	01 - Dry		03 - P.D. only	03 - Rear end	02 - South	02 - South	01 - Going ahead	02 - Slowing or stopp	04 - Speed too fast for co	01 - Driving prope	01 - Normal	01 - Normal	01 - Automo	01 - Automobile, station wagon

TOTAL COLLISION: 14

50 HY btwn COLUMBIA WAY/CAL WORKS YARD & EMIL KOLB PY (1147)

FROM: JANUARY 1, 2015 TO: DECEMBER 31, 2020

Accident No.	Location	Municipality	Accident Da	Acciden	Accider	Environm	Light	Road 1 Surfa	Classification Of Accident	Initial Impact Type	Vehicle 1 Ini	Vehicle 2 Ini	Vehicle 1 Manoeu	Vehicle 2 Manoeuver	Apparent Driver 1 Actior	Apparent Driver 2	Vehicle 1 Ty	Vehicle 2 Type
18249749	50 HY btwn COLUMBIA WAY/CAL WORKS YARD & E	CALEDON	2018-06-15	2018	04:42	01 - Clear	07 - Dark	01 - Dry	03 - P.D. only	07 - SMV other	02 - South		01 - Going ahead		01 - Driving properly		01 - Automo	
16344400	50 HY btwn COLUMBIA WAY/CAL WORKS YARD & E	CALEDON	2016-10-06	2016	18:57	01 - Clear	05 - Dusk	01 - Dry	03 - P.D. only	03 - Rear end	01 - North	01 - North	01 - Going ahead	02 - Slowing or stopp	02 - Following too close	01 - Driving prope	05 - Pick-up	01 - Automobile, station wagon
16385943	50 HY btwn COLUMBIA WAY/CAL WORKS YARD & E	CALEDON	2016-11-11	2016	06:00	01 - Clear	01 - Dayl	01 - Dry	03 - P.D. only	07 - SMV other	02 - South		01 - Going ahead		01 - Driving properly		01 - Automo	
16381082	50 HY btwn COLUMBIA WAY/CAL WORKS YARD & E	CALEDON	2016-11-06	2016	21:11	01 - Clear	07 - Dark	01 - Dry	03 - P.D. only	07 - SMV other	02 - South		01 - Going ahead		01 - Driving properly		01 - Automo	
15000207	50 HY btwn COLUMBIA WAY/CAL WORKS YARD & E	CALEDON	2015-01-12	2015	20:20	01 - Clear	07 - Dark	01 - Dry	02 - Non-fatal injury	05 - Turning moven	01 - North	02 - South	04 - Turning left	01 - Going ahead	08 - Failed to yield right-	01 - Driving prope	01 - Automo	01 - Automobile, station wagon
15425507	50 HY btwn COLUMBIA WAY/CAL WORKS YARD & E	CALEDON	2015-12-18	2015	12:00	01 - Clear	01 - Dayl	01 - Dry	03 - P.D. only	99 - Other	04 - West	04 - West	06 - Making "U" tu	01 - Going ahead	06 - Improper turn	01 - Driving prope	06 - Deliver	05 - Pick-up truck
TOTAL COLLISION: 6																		

Collision Details Report

From: **To:**

Location ..... COLUMBIA WY @ KINGSVIEW DR

Traffic Control.... Traffic gate **Total Collisions....** 5

Collision ID	Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	Driver Action	No. Ped
11-00297	2011-Feb-25, Fri,18:58	Clear	Turning movement	P.D. only	Dry	West	Turning left	Automobile, station wagon	Other motor vehicle		
						East	Going ahead	Automobile, station wagon			
Comments:											
11-00406	2011-Mar-23, Wed,07:25	Snow	Rear end	P.D. only	Ice	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle		
						North	Stopped	Automobile, station wagon	Other motor vehicle		
Comments:											
17116493	2017-Apr-04, Tue,22:50	Rain	Rear end	P.D. only	Wet	North	Stopped	Automobile, station wagon	Other motor vehicle		
						North	Slowing or stopping	Pick-up truck	Other motor vehicle		
Comments:	R- Statement #1: V2 STOPPED ON R1 AT RED LIGHT. V1 REAR ENDED V2.										
11-00101	2011-Jan-17, Mon,08:25	Clear	Rear end	P.D. only	Wet	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle		
						West	Stopped	Passenger van	Other motor vehicle		
Comments:											
16-050936	2016-Feb-18, Thu,12:55	Clear	Turning movement	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle		
						West	Turning left	Automobile, station wagon	Other motor vehicle		
Comments:	d1 charged										

Appendix D

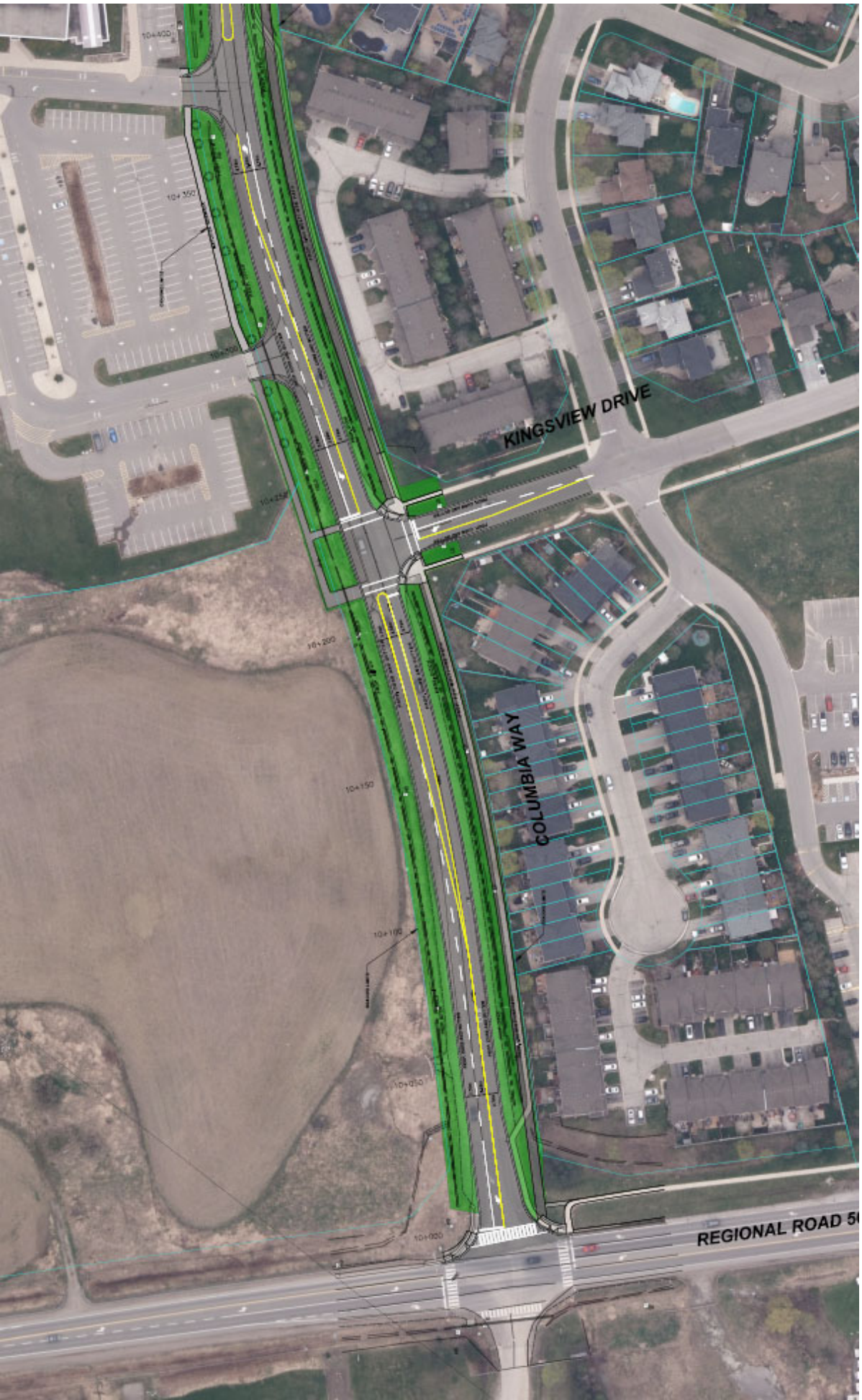
Columbia Way Road Design

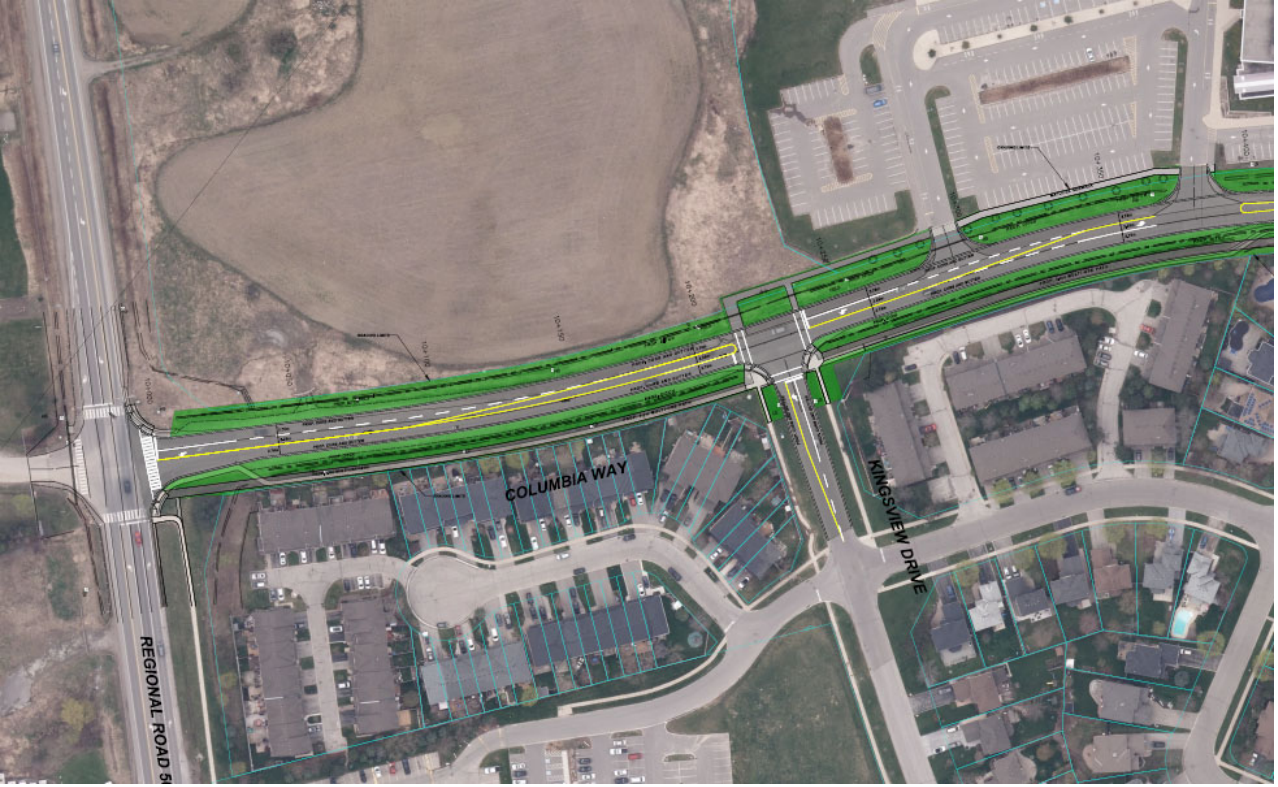
COLUMBIA WAY CLASS EA
PUBLIC INFORMATION CENTRE
DESIGN ALTERNATIVES

TOWN OF CALEDON

R.V. Anderson Associates Limited
engineering • environment • infrastructure

COLUMBIA WAY
KINGSVIEW DRIVE
REGIONAL ROAD 5


KINGSVIEW DRIVE
COLUMBIA WAY
REGIONAL ROAD 5


COLUMBIA WAY
KINGSVIEW DRIVE
REGIONAL ROAD 5

COLUMBIA WAY
KINGSVIEW DRIVE
REGIONAL ROAD 5

Appendix E

Growth Rate Confirmation

AADT			Growth	
Location	Year	Volume	Growth Range	Growth Rate
Midblock Columbia Way	2016	4885	2016-2017	5%
	2017	5153	2017-2019	-3%
	2019	4890	2016-2019	0%

2

AADT			Growth	
Location	Year	Volume	Growth Range	Growth Rate
Midblock Kingsview Drive	2014	1462	2014-2016	27%
	2016	2373	2016-2017	0%
	2017	2384	2014-2017	18%

AADT			Growth	
Location	Year	Volume	Growth Range	Growth Rate
Midblock Bolton Heights	2016	3329	2016-2017	-8%
	2017	2827	2017-2020	2%
	2020	2971	2016-2020	-3%

2

Traffic Volume - Midblock (3)

Road Name: COLUMBIA WAY

id-Block information from TES

Year	Volume
2019	4890
2017	5153
2016	4885

Road Name: KINGSVIEW DR

id-Block information from TES

Year	Volume
2017	2384
2016	2373
2014	1462

Road Name: BOLTON HEIGHTS RD

id-Block information from TES

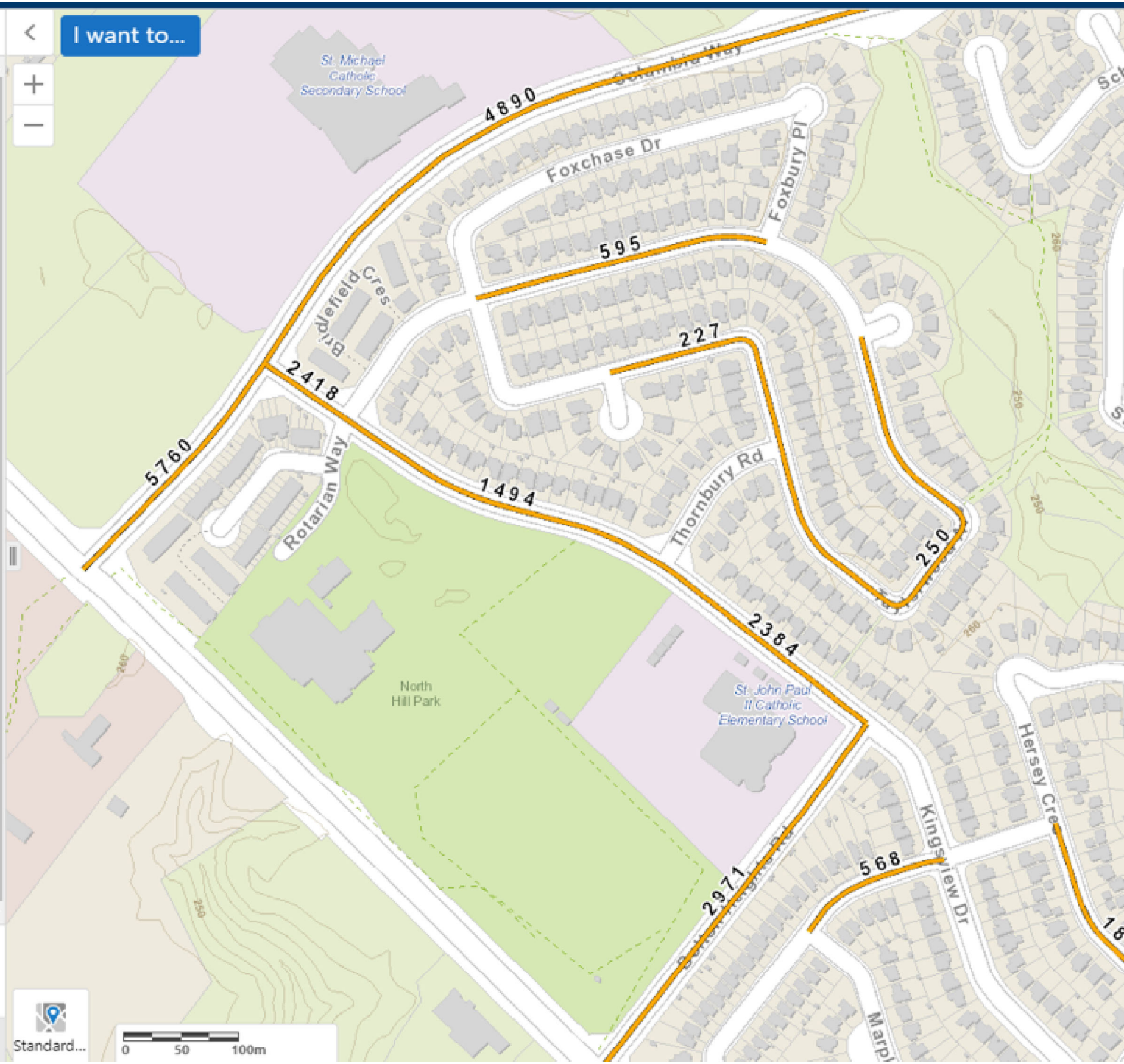
Year	Volume
2020	2971
2017	2827
2016	3329

isplaying 1 - 3 (Total: 3)

Page 1 of 1

Home Layers Traffic Volum...

I want to...



Robin Marinac

From: Jillian Britto <Jillian.Britto@caledon.ca>
Sent: June 29, 2021 11:26 AM
To: Robin Marinac
Cc: Mark Crockford; Arash Olia; Drew Haines; Shan, Rosalie; Jason Afonso; Gursimran Saini
Subject: RE: 14245 Highway 50 TIS Terms of Reference
Attachments: Caledon AADT Data_20210629.png; Columbia @ Kingsview Collision Details Report_20210629.pdf

Good morning Robin,

Hope you are doing well.

Thank you for providing a terms of reference for the TIS report for the proposed Columbia Square development.

Please see below comments from Town Transportation and Engineering staff; I am waiting for confirmation on the background developments and will send a follow-up email once I hear back from my Planning colleagues.

- Please add the Highway 50 at Bolton Heights Road intersections to the study area.
- Please use the attached AADT data to determine growth rates on Town roads. If AADT data is unavailable, please use an annual 2% growth rate on Town roads except local roads. Growth is not required to be applied to local roads if all the appropriate background developments are included in the analysis.
- I will send a follow-up email for the background developments. Please also reach out to the Region to confirm the background developments they will need added to the background analysis.
- Please refer to this website for the latest information on the Columbia Way EA:
    - Feb 2021 PIC: https://www.caledon.ca/en/town-services/resources/Transit/195072-PIC1-Online-Webinar-vf-Revised_Feb-24.pdf
    - Road design: https://www.caledon.ca/en/town-services/resources/Transit/195072-ROAD-DESIGN-Columbia-Way-.pdf
- Please follow the Town's DSM (https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/Development-Standards-Manual.pdf) for the design of any public/condo roads and intersection design on Town roads.
- The rest of the proposed scope is acceptable.

Please note that these are preliminary comments that could change upon the completion of the Official Plan and TMP update.

Please feel free to reach out to us if you have any questions or concerns.

Regards,

Jillian Britto, P.Eng.
Coordinator, Transportation Development
Transportation Engineering
Engineering Services

Office: 905.584.2272 x 4108
Email: Jillian.Britto@caledon.ca

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

From: Robin Marinac <robin.marinac@cghtransportation.com>
Sent: Thursday, June 17, 2021 9:10 AM
To: Arash Olia <Arash.Olia@caledon.ca>; Jillian Britto <Jillian.Britto@caledon.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>
Subject: RE: 14245 Highway 50 TIS Terms of Reference

Good morning Arash and Jillian,

I just wanted to check in with you and see when you might be able to provide some feedback on our submitted TIS Terms of Reference.

Additionally, a couple of weeks ago I submitted a request for traffic data through the Caledon website. I've not heard anything back, so I'm hoping you can point me in the right direction so that we can obtain the cost and availability information for the below information quickly:

-TMC at Columbia Way and Kingsview Drive – The Town does not have recent traffic data.
-STP at Columbia Way and Kingsview Drive – Please reach out to Rebecca Caughey the Region of Peel (rebecca.caughey@peelregion.ca)
-Existing and historical AADT data on Columbia Way east of Highway 50 and east of Kingsview Drive, as well as existing and historical AADT data on Kingsview Drive south of Columbia Way. – Please see attached image of available AADT data.
-Historical collision data at the intersection of Columbia Way and Kingsview Drive. – One accident in the last five years, see attached collision report.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

From: Robin Marinac
Sent: May 28, 2021 4:27 PM
To: Arash.Olia@caledon.ca; Jillian.Britto@caledon.ca; Shan, Rosalie <rosalie.shan@peelregion.ca>
Cc: Mark Crockford <mark.crockford@cghtransportation.com>; Jason Afonso <jasona@gsai.ca>; Gursimran Saini <GursimranS@gsai.ca>
Subject: 14245 Highway 50 TIS Terms of Reference

Hi Rosalie, Arash, and Jillian,

Please find attached our draft TIS Terms of Reference for your review. We have drawn from both the Region of Peel and the Town of Caledon TIS Guidelines. Please let us know if you have any comments or questions as we would like to ensure that our TOR reflects the appropriate scope of work to support the proposed development at 14245 Highway 50.

Kind regards,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

Robin Marinac

From: Jay, Robert <robert.jay@peelregion.ca>
Sent: July 14, 2021 10:09 AM
To: Robin Marinac
Cc: Kuczynski, Roman; Chen, Tiggy; Saiyed, Sabbir
Subject: RE: 14245 Highway 50 TIS Growth Rate Request
Attachments: Hwy50southofEmilKolbPkwy-2021July14.pdf

Hi Robin,

As requested, I have attached our estimated CAGR values for Highway 50 south of Emil Kolb Parkway.

Unfortunately, we do not have sufficient data for an Emil Kolb Parkway corridor growth rate, however the attached values for Highway 50 may help provide a good context to the area. Please note that these are raw estimates based on possible future growth, as stated in the PDF document. Please use your professional judgement when using these values.

Thank you,

Robbie Jay
Transportation Planner
Transportation System Planning
Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON L6T 4B9
(905) 791-7800 x6456
robert.jay@peelregion.ca

Region of Peel
working with you

From: Sent: July 13, 2021 1:43 PM
To: Kuczynski, Roman <roman.kuczynski@peelregion.ca>
Cc: sabbir.sayed@peelregion.ca
Subject: 14245 Highway 50 TIS Growth Rate Request

Hello Roman,

I am a traffic consultant looking to obtain growth rate data for use in a TIS. I previously requested growth rate data a few weeks ago from the general portal email but after coming across your contact information, I wonder if I was incorrect in previous attempt to request this information. Hopefully I am correct now!

I am looking to obtain growth rates for all available horizons for the segments of Highway 50 and Emil Kolb Parkway as highlighted in the attached image.

Thank you very much in advance for your help,
Robin Marinac

Robin Marinac, EIT
CGH Transportation Inc.
P: 437-242-5183
E: robin.marinac@cghtransportation.com

Date: July 14, 2021
From: Robin Marinac, CGH Transportation Inc.
Re: Growth Rates Data Request – Highway 50 south of Emil Kolb Parkway

Robin,
Here are the estimated CAGR values for Highway 50 south of Emil Kolb Parkway:

2016 – 2021	2021 – 2031
0.5%	1.5%

These growth rates are estimated based on multiple sources including Peel Travel Demand forecasting model, ATR and land use/forecasts data. Please note that this area in the Town of Caledon may be further affected by future growth, as well as a possible Settlement Area Boundary Expansion (after 2031 and beyond). Please use your professional judgement when using these values.

If you require further assistance, please contact me at robert.jay@peelregion.ca.

Regards,

Robbie Jay
Transportation Planner, Transportation System Planning
Transportation Division, Public Works Services, Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, ON L6T 4B9
W: (905) 791-7800 x6456
E: robert.jay@peelregion.ca

Appendix F

Tables 6.1 & 6.2 from ITE Trip Generation Manual

Table 6.1 Unconstrained Internal Person Trip Capture Rates for Trip Origins within a Mixed-Use Development

		WEEKDAY	
		AM Peak Hour	PM Peak Hour
From OFFICE	To Retail	28%	20%
	To Restaurant	63%	4%
	To Cinema/Entertainment	0%	0%
	To Residential	1%	2%
	To Hotel	0%	0%
From RETAIL	To Office	29%	2%
	To Restaurant	13%	29%
	To Cinema/Entertainment	0%	4%
	To Residential	14%	26%
	To Hotel	0%	5%
From RESTAURANT	To Office	31%	3%
	To Retail	14%	41%
	To Cinema/Entertainment	0%	8%
	To Residential	4%	18%
	To Hotel	3%	7%
From CINEMA/ENTERTAINMENT	To Office	0%	2%
	To Retail	0%	21%
	To Restaurant	0%	31%
	To Residential	0%	8%
	To Hotel	0%	2%
From RESIDENTIAL	To Office	2%	4%
	To Retail	1%	42%
	To Restaurant	20%	21%
	To Cinema/Entertainment	0%	0%
	To Hotel	0%	3%
From HOTEL	To Office	75%	0%
	To Retail	14%	16%
	To Restaurant	9%	68%
	To Cinema/Entertainment	0%	0%
	To Residential	0%	2%

Source: Bochner, B., K. Hooper, B. Sperry, and R. Dunphy. NCHRP Report 684: *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments.* Washington, DC: Transportation Research Board, Tables 99 and 100, 2011.

Table 6.2 Unconstrained Internal Person Trip Capture Rates for Trip Destinations within a Mixed-Use Development

		Weekday	
		AM Peak Hour	PM Peak Hour
To OFFICE	From Retail	4%	31%
	From Restaurant	14%	30%
	From Cinema/Entertainment	0%	6%
	From Residential	3%	57%
	From Hotel	3%	0%
To RETAIL	From Office	32%	8%
	From Restaurant	8%	50%
	From Cinema/Entertainment	0%	4%
	From Residential	17%	10%
	From Hotel	4%	2%
To RESTAURANT	From Office	23%	2%
	From Retail	50%	29%
	From Cinema/Entertainment	0%	3%
	From Residential	20%	14%
	From Hotel	6%	5%
To CINEMA/ENTERTAINMENT	From Office	0%	1%
	From Retail	0%	26%
	From Restaurant	0%	32%
	From Residential	0%	0%
	From Hotel	0%	0%
To RESIDENTIAL	From Office	0%	4%
	From Retail	2%	46%
	From Restaurant	5%	16%
	From Cinema/Entertainment	0%	4%
	From Hotel	0%	0%
To HOTEL	From Office	0%	0%
	From Retail	0%	17%
	From Restaurant	4%	71%
	From Cinema/Entertainment	0%	1%
	From Residential	0%	12%

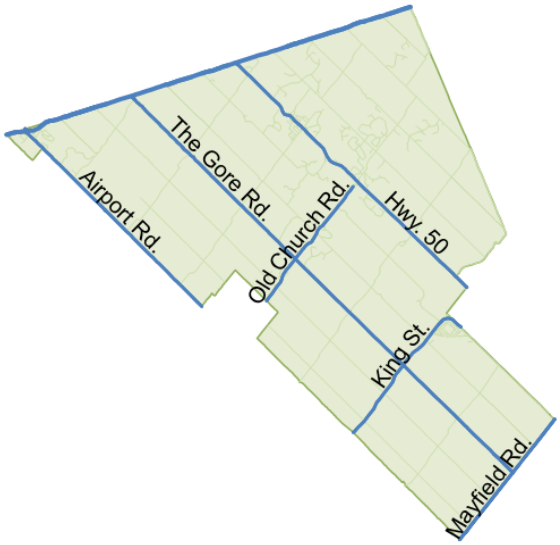
Source: Bochner, B., K. Hooper, B. Sperry, and R. Dunphy. NCHRP Report 684: *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments.* Washington, DC: Transportation Research Board, Tables 101 and 102, 2011.

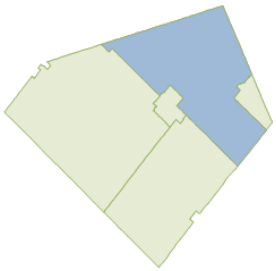
Appendix G

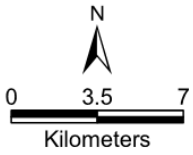
Ward 4 TTS Report

CGH TRANSPORTATION

TOWN OF CALEDON
WARD 4







WARD 4

HOUSEHOLD CHARACTERISTICS

Households	Dwelling Type			Household Size					Number of Available Vehicles					Household Averages				
	House	Townhouse	Apartment	1	2	3	4	5+	0	1	2	3	4+	Persons	Workers	Drivers	Vehicles	Trips/Day
4,700	94%	5%	1%	10%	33%	17%	25%	15%	1%	16%	43%	25%	15%	3.2	2.0	2.4	2.5	6.4

POPULATION CHARACTERISTICS

Population	Age							Daily Trips per Person (age 11+)	Daily Work Trips per Worker	Population	Employment Type			Student	Licensed	Transit Pass
	0-10	11-15	16-25	26-45	46-64	65+	Median				Full Time	Part Time	At Home			
										Male						
										7,300	49%	8%	4%	24%	78%	3%
										Female						
14,900	10%	9%	14%	23%	30%	14%	41.7	2.2	0.72	7,600	36%	9%	7%	25%	72%	4%

TRIPS MADE BY RESIDENTS OF TOWN OF CALEDON - WARD 4

Time Period	Trips	% 24hr	Trip Purpose				Mode of Travel						Median Trip Length (km)			
			HB-W	HB-S	HB-D	N-HB	Driver	Pass.	Transit	GO Train	Walk & Cycle	Other	Driver	Pass.	Transit	GO Train
6-9 AM	7,600	25.6%	53%	21%	17%	9%	72%	11%	*	0%	1%	14%	21.3	29.4	*	48.7
24 Hrs	29,900		36%	14%	35%	15%	79%	12%	1%	0%	1%	7%	16.7	15.0	19.9	48.7

TRIPS MADE TO TOWN OF CALEDON - WARD 4 - BY RESIDENTS OF THE TTS AREA

Time Period	Trips	% 24 hr	Trip Purpose				Mode of Travel						Median Trip Length (km)			
			Work	School	Home	Other	Driver	Pass.	Transit	GO Train	Walk & Cycle	Other	Driver	Pass.	Transit	GO Train
6-9 AM	3,500	18.1%	45%	37%	5%	13%	60%	11%	*	*	9%	21%	18.6	9.5	*	*
24 Hrs	19,400		14%	7%	66%	13%	75%	12%	*	0%	3%	9%	16.6	12.6	*	48.7

Appendix H

TTS Data

Fri Nov 26 2021 15:14:04 GMT-0500 (Eastern Standard Time) - Run Time: 2545ms

Cross Tabulation Query Form - Trip - 2016 v1.1

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 3193
and
Start time of trip - start_time In 700-1000
and
Primary travel mode of trip - mode_prime In D)

Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
2135	3193	17
2418	3193	22
2616	3193	58
2657	3193	28
2659	3193	20
3002	3193	99
3003	3193	31
3108	3193	14
3153	3193	44
3190	3193	84
3192	3193	159
3193	3193	241
3194	3193	48
3198	3193	9
3199	3193	50
3447	3193	18
3460	3193	17
3465	3193	14
3468	3193	19
3496	3193	15
4173	3193	12
8376	3193	32
8553	3193	29
8562	3193	30

Fri Nov 26 2021 15:12:36 GMT-0500 (Eastern Standard Time) - Run Time: 2315ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
(2006 GTA zone of origin - gta06_orig In 3193
and
Start time of trip - start_time In 700-1000
and
Primary travel mode of trip - mode_prime In D)

Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
3193	68	13
3193	74	8
3193	113	12
3193	125	11
3193	126	17
3193	131	31
3193	133	8
3193	135	17
3193	204	16
3193	296	21
3193	298	22
3193	299	39
3193	307	14
3193	310	35
3193	322	23
3193	335	19
3193	354	22
3193	355	30
3193	356	25
3193	357	27
3193	358	20
3193	371	85
3193	372	12
3193	373	30
3193	378	25
3193	379	21
3193	388	22

3193	392	47
3193	443	16
3193	460	22
3193	529	8
3193	1209	22
3193	2003	39
3193	2017	25
3193	2021	10
3193	2045	16
3193	2062	44
3193	2069	11
3193	2070	27
3193	2093	28
3193	2106	29
3193	2110	21
3193	2113	8
3193	2369	12
3193	2375	29
3193	2393	15
3193	2558	11
3193	2604	22
3193	2623	22
3193	2624	13
3193	2653	10
3193	2656	39
3193	2667	22
3193	2669	23
3193	3003	60
3193	3014	14
3193	3190	168
3193	3191	108
3193	3192	203
3193	3193	241
3193	3194	137
3193	3195	20
3193	3197	41
3193	3199	9
3193	3325	9
3193	3337	30
3193	3342	8
3193	3351	11
3193	3357	34
3193	3385	14
3193	3417	48
3193	3419	14
3193	3420	14
3193	3421	13

3193	3422	8
3193	3460	17
3193	3480	21
3193	3494	71
3193	3516	48
3193	3609	26
3193	3612	8
3193	3620	9
3193	3626	9
3193	3683	15
3193	3696	19
3193	3700	9
3193	3701	35
3193	3710	8
3193	3717	14
3193	3815	16
3193	3836	12
3193	4024	20
3193	4060	9
3193	4159	16
3193	6260	13
3193	8403	13
3193	8405	14
3193	8415	14
3193	8509	14
3193	8553	43
3193	8562	30
3193	8592	9
3193	8663	13

Fri Nov 26 2021 15:21:37 GMT-0500 (Eastern Standard Time) - Run Time: 2393ms

Cross Tabulation Query Form - Trip - 2016 v1.1

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 3193
and
Start time of trip - start_time In 1600-1900
and
Primary travel mode of trip - mode_prime In D)

Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
38	3193	23
51	3193	11
59	3193	8
68	3193	13
69	3193	11
126	3193	17
174	3193	15
204	3193	33
210	3193	31
298	3193	22
299	3193	17
307	3193	14
310	3193	35
322	3193	23
335	3193	11
337	3193	31
354	3193	11
355	3193	15
356	3193	25
357	3193	35
367	3193	15
373	3193	30
376	3193	39
378	3193	41
379	3193	21
388	3193	22
392	3193	47

402	3193	27
409	3193	19
443	3193	16
476	3193	14
1209	3193	22
1224	3193	43
2015	3193	23
2017	3193	37
2021	3193	10
2041	3193	8
2062	3193	44
2071	3193	19
2081	3193	11
2083	3193	8
2110	3193	21
2112	3193	8
2113	3193	8
2375	3193	29
2377	3193	16
2393	3193	15
2623	3193	22
2624	3193	13
2654	3193	10
2656	3193	39
2669	3193	23
2670	3193	9
3007	3193	12
3108	3193	10
3151	3193	8
3153	3193	40
3190	3193	198
3191	3193	148
3192	3193	92
3193	3193	253
3194	3193	89
3195	3193	9
3197	3193	74
3199	3193	6
3324	3193	21
3337	3193	30
3342	3193	8
3351	3193	11
3357	3193	34
3417	3193	23
3422	3193	17
3474	3193	14
3516	3193	23

3517	3193	20
3700	3193	9
3701	3193	35
3709	3193	24
3815	3193	43
3836	3193	12
4024	3193	20
4159	3193	16
4193	3193	14
7234	3193	11
8562	3193	44
8663	3193	13

Fri Nov 26 2021 15:20:42 GMT-0500 (Eastern Standard Time) - Run Time: 2609ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig
Column: 2006 GTA zone of destination - gta06_dest

Filters:
(2006 GTA zone of origin - gta06_orig In 3193
and
Start time of trip - start_time In 1600-1900
and
Primary travel mode of trip - mode_prime In D)

Trip 2016
ROW : gta06_orig
COLUMN : gta06_dest

gta06_orig	gta06_dest	total
3193	355	31
3193	476	14
3193	2034	25
3193	2070	8
3193	2104	19
3193	3002	99
3193	3100	14
3193	3153	67
3193	3190	144
3193	3191	26
3193	3192	49
3193	3193	253
3193	3194	119
3193	3197	88
3193	3325	8
3193	3357	8
3193	3379	8
3193	3447	18
3193	3465	14
3193	3468	19
3193	3611	30
3193	3635	36
3193	3709	20
3193	4173	12
3193	8372	25
3193	8403	43
3193	8561	44

3193 8562 8

Appendix I

Heavy Vehicle Percentage Calculations

[1] Bolton Heights Dr/Cross Country Blvd @ Hwy 50/Queen St S												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	2	10	2	2	11	1	0	1	0	2	0	7
Total Volume	19	276	71	53	430	5	15	31	26	146	17	69
HV%	11%	4%	3%	4%	3%	20%	2%	3%	2%	2%	2%	10%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	1	3	0	0	7	1	1	0	0	0	0	0
Total Volume	70	682	62	31	369	19	15	4	13	58	8	37
HV%	2%	2%	2%	2%	2%	5%	7%	2%	2%	2%	2%	2%

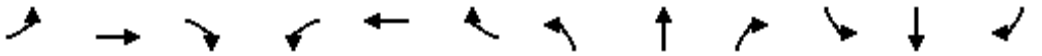
[2] Columbia Way @ Hwy 50/Queen St S												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	19	14	14	15	1	2	0	2	1	0	16
Total Volume	1	193	124	115	408	3	5	1	10	136	0	145
HV%	2%	10%	11%	12%	4%	33%	40%	2%	20%	2%	2%	11%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	0	4	1	0	4	2	0	0	0	2	0	2
Total Volume	0	519	188	93	284	2	1	0	2	78	0	60
HV%	2%	2%	2%	2%	2%	100%	2%	2%	2%	3%	2%	3%

[3] Kingsview Dr @ Columbia Way												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	1		1					6	0	2	4	
Total Volume	46	0	95	0	0	0	0	208	30	128	224	0
HV%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	2		4					13	3	2	20	
Total Volume	23	0	32	0	0	0	0	208	72	50	112	0
HV%	9%	2%	13%	2%	2%	2%	2%	6%	4%	4%	18%	2%

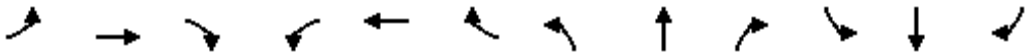
[4] Emil Kolb Pkwy @ Hwy 50/Queen St S												
AM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	10	27			26	22	40		8			
Total Volume	125	223	0	0	430	277	115	0	89	0	0	0
HV%	8%	12%	2%	2%	6%	8%	35%	2%	9%	2%	2%	2%
PM												
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
HV Volume	5	4			9	22	9		2			
Total Volume	36	562	0	0	265	112	366	0	95	0	0	0
HV%	14%	2%	2%	2%	3%	20%	2%	2%	2%	2%	2%	2%

Appendix J

Existing Synchro and Sidra Worksheets



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	146	17	69	19	276	71	53	430	5
Future Volume (vph)	15	31	26	146	17	69	19	276	71	53	430	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.98		0.99	0.98		0.99		0.97	0.99		0.96
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1681	0	1750	1344	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.701			0.567			0.463			0.582		
Satd. Flow (perm)	1279	1681	0	1037	1344	0	797	3510	1531	1067	1865	1312
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			69				80			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		5	5		6
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	146	17	69	19	276	71	53	430	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	146	86	0	19	276	71	53	430	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	



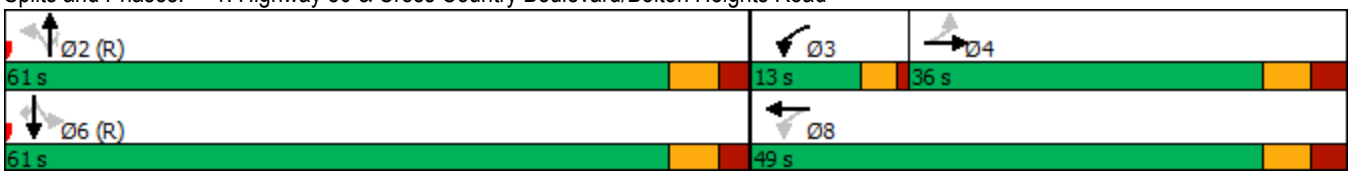
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		13.0	49.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.7%	32.7%		11.8%	44.5%		55.5%	55.5%	55.5%	55.5%	55.5%	55.5%
Maximum Green (s)	28.9	28.9		9.0	41.9		54.4	54.4	54.4	54.4	54.4	54.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	15	15			5		8	8	8	24	24	24
Act Effct Green (s)	16.4	16.4		29.9	26.8		69.5	69.5	69.5	69.5	69.5	69.5
Actuated g/C Ratio	0.15	0.15		0.27	0.24		0.63	0.63	0.63	0.63	0.63	0.63
v/c Ratio	0.08	0.21		0.43	0.23		0.04	0.12	0.07	0.08	0.36	0.01
Control Delay	35.1	23.7		32.7	9.6		12.8	10.7	3.0	12.8	15.3	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	23.7		32.7	9.6		12.8	10.7	3.0	12.8	15.3	0.0
LOS	D	C		C	A		B	B	A	B	B	A
Approach Delay		26.1			24.1			9.3			14.8	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		26.9	3.0		1.2	9.5	0.0	3.6	34.9	0.0
Queue Length 95th (m)	7.6	14.9		33.7	12.2		6.1	24.1	6.0	15.6	100.0	m0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	336	460		342	554		503	2218	997	674	1179	858
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	0.04	0.12		0.43	0.16		0.04	0.12	0.07	0.08	0.36	0.01

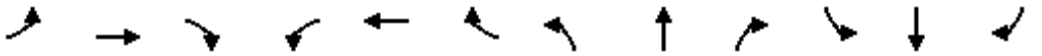
Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 15.6	Intersection LOS: B
Intersection Capacity Utilization 69.3%	ICU Level of Service C
Analysis Period (min) 15	

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

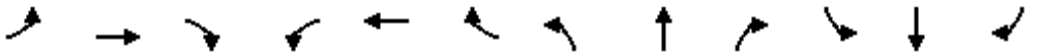
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



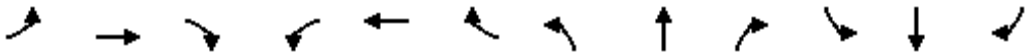


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	146	17	69	19	276	71	53	430	5
Future Volume (vph)	15	31	26	146	17	69	19	276	71	53	430	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1675		1744	1342		1634	3510	1533	1742	1865	1313
Flt Permitted	0.70	1.00		0.57	1.00		0.46	1.00	1.00	0.58	1.00	1.00
Satd. Flow (perm)	1279	1675		1040	1342		796	3510	1533	1067	1865	1313
Peak-hour factor, PHF	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)	15	31	26	146	17	69	19	276	71	53	430	5
RTOR Reduction (vph)	0	23	0	0	51	0	0	0	27	0	0	2
Lane Group Flow (vph)	15	34	0	146	35	0	19	276	44	53	430	3
Confl. Peds. (#/hr)	12		5	5		12	6		5	5		6
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	14.8	14.8		28.2	28.2		68.1	68.1	68.1	68.1	68.1	68.1
Effective Green, g (s)	14.8	14.8		28.2	28.2		68.1	68.1	68.1	68.1	68.1	68.1
Actuated g/C Ratio	0.13	0.13		0.26	0.26		0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	225		326	344		492	2173	949	660	1154	812
v/s Ratio Prot		0.02		c0.04	0.03			0.08			c0.23	
v/s Ratio Perm	0.01			c0.08			0.02		0.03	0.05		0.00
v/c Ratio	0.09	0.15		0.45	0.10		0.04	0.13	0.05	0.08	0.37	0.00
Uniform Delay, d1	41.7	42.1		33.3	31.2		8.2	8.7	8.2	8.4	10.4	8.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.02	1.12	1.00
Incremental Delay, d2	0.2	0.3		1.0	0.1		0.1	0.1	0.1	0.2	0.9	0.0
Delay (s)	41.9	42.4		34.3	31.4		8.3	8.8	8.3	8.8	12.6	8.0
Level of Service	D	D		C	C		A	A	A	A	B	A
Approach Delay (s)		42.3			33.2			8.7			12.1	
Approach LOS		D			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	10	136	0	145	1	193	124	115	408	3
Future Volume (vph)	5	1	10	136	0	145	1	193	124	115	408	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	30.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			90.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96		0.99		0.97	0.99		0.97
Frt		0.864			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1322	0	1750	1382	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.578			0.750			0.510			0.636		
Satd. Flow (perm)	767	1322	0	1362	1382	0	955	1746	1420	1081	1847	1185
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			670				124			30
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			1016.8	
Travel Time (s)		4.8			20.9			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	5	1	10	136	0	145	1	193	124	115	408	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	11	0	136	145	0	1	193	124	115	408	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	



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	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	45.0	45.0		45.0	45.0		65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	40.9%	40.9%		40.9%	40.9%		59.1%	59.1%	59.1%	59.1%	59.1%	59.1%
Maximum Green (s)	39.0	39.0		39.0	39.0		58.3	58.3	58.3	58.3	58.3	58.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	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
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	16.7	16.7		16.7	16.7		80.6	80.6	80.6	80.6	80.6	80.6
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.73	0.73	0.73	0.73	0.73	0.73
v/c Ratio	0.04	0.05		0.66	0.19		0.00	0.15	0.12	0.15	0.30	0.00
Control Delay	37.0	19.8		58.3	0.5		9.0	7.9	4.7	5.8	6.4	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.0	19.8		58.3	0.5		9.0	7.9	4.7	5.8	6.4	0.0
LOS	D	B		E	A		A	A	A	A	A	A
Approach Delay		25.2			28.5			6.6			6.2	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	0.9	0.2		27.8	0.0		0.1	9.8	0.0	6.4	25.9	0.0
Queue Length 95th (m)	4.0	4.9		44.8	0.0		m0.9	41.4	21.2	15.2	48.8	0.0
Internal Link Dist (m)		29.3			207.8			617.5			992.8	
Turn Bay Length (m)	5.0			30.0			120.0			70.0		25.0
Base Capacity (vph)	271	475		482	922		699	1279	1073	792	1353	876
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.02		0.28	0.16		0.00	0.15	0.12	0.15	0.30	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: 0.66	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 68.8%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 2: Highway 50 & Columbia Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	10	136	0	145	1	193	124	115	408	3
Future Volume (vph)	5	1	10	136	0	145	1	193	124	115	408	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.0	6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.95		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1261	1313		1725	1372		1778	1746	1422	1615	1847	1186
Flt Permitted	0.58	1.00		0.75	1.00		0.51	1.00	1.00	0.64	1.00	1.00
Satd. Flow (perm)	767	1313		1363	1372		955	1746	1422	1082	1847	1186
Peak-hour factor, PHF	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)	5	1	10	136	0	145	1	193	124	115	408	3
RTOR Reduction (vph)	0	8	0	0	123	0	0	0	33	0	0	1
Lane Group Flow (vph)	5	3	0	136	22	0	1	193	91	115	408	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	16.7	16.7		16.7	16.7		80.6	80.6	80.6	80.6	80.6	80.6
Effective Green, g (s)	16.7	16.7		16.7	16.7		80.6	80.6	80.6	80.6	80.6	80.6
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	6.0	6.0		6.0	6.0		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	116	199		206	208		699	1279	1041	792	1353	869
v/s Ratio Prot		0.00			0.02			0.11			c0.22	
v/s Ratio Perm	0.01			c0.10			0.00		0.06	0.11		0.00
v/c Ratio	0.04	0.01		0.66	0.11		0.00	0.15	0.09	0.15	0.30	0.00
Uniform Delay, d1	39.8	39.6		44.0	40.2		3.9	4.4	4.2	4.4	5.0	3.9
Progression Factor	1.00	1.00		1.00	1.00		1.69	1.46	4.04	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.0		7.7	0.2		0.0	0.2	0.2	0.4	0.6	0.0
Delay (s)	40.0	39.7		51.7	40.4		6.7	6.7	17.1	4.8	5.6	3.9
Level of Service	D	D		D	D		A	A	B	A	A	A
Approach Delay (s)		39.8			45.9			10.8			5.4	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.7
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	208	30	128	224	46	95
Future Volume (vph)	208	30	128	224	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			1.00	0.96	
Frt	0.983				0.909	
Flt Protected				0.982	0.984	
Satd. Flow (prot)	1786	0	0	1809	1599	0
Flt Permitted				0.799	0.984	
Satd. Flow (perm)	1786	0	0	1465	1590	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	14				95	
Link Speed (k/h)	40			40	40	
Link Distance (m)	231.8			207.6	217.2	
Travel Time (s)	20.9			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Adj. Flow (vph)	208	30	128	224	46	95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	238	0	0	352	141	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru		
Leading Detector (m)	10.0		2.0	10.0	7.0	
Trailing Detector (m)	0.0		0.0	0.0	-3.0	
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	
Detector 1 Size(m)	0.6		2.0	0.6	10.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Prot	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	2			6	4	
Permitted Phases			6			
Detector Phase	2		6	6	4	
Switch Phase						
Minimum Initial (s)	8.0		8.0	8.0	8.0	
Minimum Split (s)	25.0		25.0	25.0	25.9	
Total Split (s)	70.0		70.0	70.0	30.0	
Total Split (%)	70.0%		70.0%	70.0%	30.0%	
Maximum Green (s)	64.0		64.0	64.0	23.1	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	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?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	8.0		8.0	8.0	8.0	
Flash Dont Walk (s)	7.0		7.0	7.0	7.0	
Pedestrian Calls (#/hr)	3		0	0	0	
Act Effct Green (s)	69.0			69.0	9.7	
Actuated g/C Ratio	0.75			0.75	0.11	
v/c Ratio	0.18			0.32	0.56	
Control Delay	3.7			4.9	22.7	
Queue Delay	0.0			0.0	0.0	
Total Delay	3.7			4.9	22.7	
LOS	A			A	C	
Approach Delay	3.7			4.9	22.7	
Approach LOS	A			A	C	
Queue Length 50th (m)	8.2			14.9	7.3	
Queue Length 95th (m)	18.6			32.3	23.8	
Internal Link Dist (m)	207.8			183.6	193.2	
Turn Bay Length (m)						
Base Capacity (vph)	1347			1102	474	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.18			0.32	0.30	

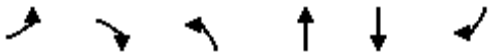
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 91.7			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 8.0		Intersection LOS: A	
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: Kingsview Drivew & Columbia Way

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	208	30	128	224	46	95
Future Volume (vph)	208	30	128	224	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.0			6.0	6.9	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	1.00			1.00	0.96	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.98			1.00	0.91	
Flt Protected	1.00			0.98	0.98	
Satd. Flow (prot)	1787			1802	1590	
Flt Permitted	1.00			0.80	0.98	
Satd. Flow (perm)	1787			1466	1590	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	208	30	128	224	46	95
RTOR Reduction (vph)	3	0	0	0	85	0
Lane Group Flow (vph)	235	0	0	352	56	0
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	4	
Permitted Phases			6			
Actuated Green, G (s)	69.0			69.0	9.7	
Effective Green, g (s)	69.0			69.0	9.7	
Actuated g/C Ratio	0.75			0.75	0.11	
Clearance Time (s)	6.0			6.0	6.9	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1346			1104	168	
v/s Ratio Prot	0.13				c0.04	
v/s Ratio Perm				c0.24		
v/c Ratio	0.17			0.32	0.33	
Uniform Delay, d1	3.2			3.7	38.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.3			0.8	1.2	
Delay (s)	3.5			4.4	39.1	
Level of Service	A			A	D	
Approach Delay (s)	3.5			4.4	39.1	
Approach LOS	A			A	D	

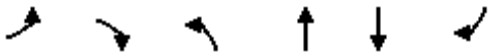
Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	91.6	Sum of lost time (s)	12.9
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	115	89	125	223	430	277
Future Volume (vph)	115	89	125	223	430	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.935					0.850
Flt Protected	0.973			0.982		
Satd. Flow (prot)	2964	0	0	3240	1830	1512
Flt Permitted	0.973			0.982		
Satd. Flow (perm)	2964	0	0	3240	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	115	89	125	223	430	277
Shared Lane Traffic (%)						
Lane Group Flow (vph)	204	0	0	348	430	277
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

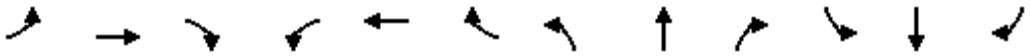
Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	115	89	125	223	430	277
Future Volume (veh/h)	115	89	125	223	430	277
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	115	89	125	223	430	277
Approach Volume (veh/h)	204			348	707	
Crossing Volume (veh/h)	430			115	125	
High Capacity (veh/h)	987			1266	1256	
High v/c (veh/h)	0.21			0.27	0.56	
Low Capacity (veh/h)	802			1053	1044	
Low v/c (veh/h)	0.25			0.33	0.68	

Intersection Summary			
Maximum v/c High	0.56		
Maximum v/c Low	0.68		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	58	8	37	70	682	62	31	369	19
Future Volume (vph)	15	4	13	58	8	37	70	682	62	31	369	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.97		0.99	0.98		0.99		0.97	1.00		0.97
Frt		0.885			0.877				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1587	0	1750	1431	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.728			0.573			0.517			0.376		
Satd. Flow (perm)	1273	1587	0	1048	1431	0	968	3579	1546	706	1883	1502
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			37				80			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	58	8	37	70	682	62	31	369	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	58	45	0	70	682	62	31	369	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

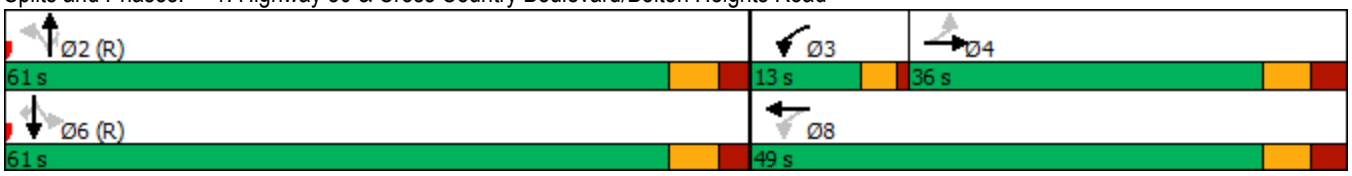


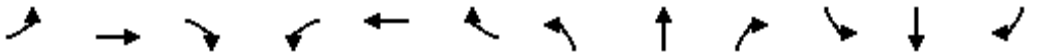
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		13.0	49.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.7%	32.7%		11.8%	44.5%		55.5%	55.5%	55.5%	55.5%	55.5%	55.5%
Maximum Green (s)	28.9	28.9		9.0	41.9		54.4	54.4	54.4	54.4	54.4	54.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	15	15			5		8	8	8	24	24	24
Act Effct Green (s)	16.4	16.4		26.2	24.1		76.5	76.5	76.5	76.5	76.5	76.5
Actuated g/C Ratio	0.15	0.15		0.24	0.22		0.70	0.70	0.70	0.70	0.70	0.70
v/c Ratio	0.08	0.07		0.19	0.13		0.10	0.27	0.06	0.06	0.28	0.02
Control Delay	35.1	18.0		27.9	10.2		12.1	10.8	2.2	14.1	13.5	1.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	18.0		27.9	10.2		12.1	10.8	2.2	14.1	13.5	1.0
LOS	D	B		C	B		B	B	A	B	B	A
Approach Delay		26.0			20.1			10.2			13.0	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	3.1	0.8		10.2	1.4		4.5	26.5	0.0	1.9	40.3	0.1
Queue Length 95th (m)	7.6	6.0		15.6	8.2		16.3	60.0	4.5	10.5	80.8	0.5
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	334	426		315	567		673	2490	1100	491	1310	1069
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	0.04	0.04		0.18	0.08		0.10	0.27	0.06	0.06	0.28	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.28	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 61.6%	ICU Level of Service B
Analysis Period (min) 15	

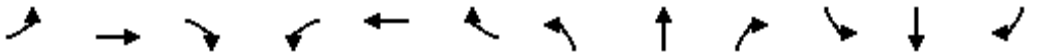
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



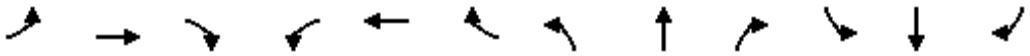


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	58	8	37	70	682	62	31	369	19
Future Volume (vph)	15	4	13	58	8	37	70	682	62	31	369	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1661	1577		1743	1428		1779	3579	1548	1782	1883	1504
Flt Permitted	0.73	1.00		0.57	1.00		0.52	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	1272	1577		1051	1428		967	3579	1548	706	1883	1504
Peak-hour factor, PHF	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)	15	4	13	58	8	37	70	682	62	31	369	19
RTOR Reduction (vph)	0	11	0	0	29	0	0	0	22	0	0	7
Lane Group Flow (vph)	15	6	0	58	16	0	70	682	40	31	369	12
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	13.2	13.2		24.7	24.7		71.6	71.6	71.6	71.6	71.6	71.6
Effective Green, g (s)	13.2	13.2		24.7	24.7		71.6	71.6	71.6	71.6	71.6	71.6
Actuated g/C Ratio	0.12	0.12		0.22	0.22		0.65	0.65	0.65	0.65	0.65	0.65
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	152	189		283	320		629	2329	1007	459	1225	978
v/s Ratio Prot		0.00		c0.01	0.01			0.19			c0.20	
v/s Ratio Perm	0.01			c0.03			0.07		0.03	0.04		0.01
v/c Ratio	0.10	0.03		0.20	0.05		0.11	0.29	0.04	0.07	0.30	0.01
Uniform Delay, d1	43.1	42.7		34.3	33.5		7.2	8.3	6.9	7.0	8.3	6.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.11	1.15	1.00
Incremental Delay, d2	0.3	0.1		0.4	0.1		0.4	0.3	0.1	0.3	0.6	0.0
Delay (s)	43.4	42.8		34.6	33.5		7.6	8.6	7.0	8.1	10.2	6.8
Level of Service	D	D		C	C		A	A	A	A	B	A
Approach Delay (s)		43.1			34.2			8.4			9.9	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	78	0	60	0	519	188	93	284	2
Future Volume (vph)	1	0	2	78	0	60	0	519	188	93	284	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	30.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			90.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96				0.97	1.00		0.97
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1504	0	1733	1490	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.718			0.757						0.457		
Satd. Flow (perm)	1305	1504	0	1361	1490	0	1883	1883	1545	857	1883	788
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		536			299				188			30
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			1016.8	
Travel Time (s)		4.8			20.9			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	2	78	0	60	0	519	188	93	284	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	2	0	78	60	0	0	519	188	93	284	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	



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	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		20.0	20.0	20.0	20.0	20.0	20.0
Minimum Split (s)	25.0	25.0		25.0	25.0		30.7	30.7	30.7	30.7	30.7	30.7
Total Split (s)	45.0	45.0		45.0	45.0		65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	40.9%	40.9%		40.9%	40.9%		59.1%	59.1%	59.1%	59.1%	59.1%	59.1%
Maximum Green (s)	39.0	39.0		39.0	39.0		58.3	58.3	58.3	58.3	58.3	58.3
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.7	2.7	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	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
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		16.0	16.0	16.0	16.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	12.3	12.3		12.3	12.3			89.2	89.2	89.2	89.2	89.2
Actuated g/C Ratio	0.11	0.11		0.11	0.11			0.81	0.81	0.81	0.81	0.81
v/c Ratio	0.01	0.00		0.52	0.14			0.34	0.15	0.13	0.19	0.00
Control Delay	40.0	0.0		57.2	0.7			9.1	3.4	4.2	3.8	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	0.0		57.2	0.7			9.1	3.4	4.2	3.8	0.0
LOS	D	A		E	A			A	A	A	A	A
Approach Delay		13.3			32.6			7.6			3.9	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	0.2	0.0		16.1	0.0			55.0	0.0	4.2	13.2	0.0
Queue Length 95th (m)	1.7	0.0		29.7	0.0			124.7	36.4	10.5	25.7	0.0
Internal Link Dist (m)		29.3			207.8			617.5			992.8	
Turn Bay Length (m)	5.0			30.0						70.0		25.0
Base Capacity (vph)	462	879		482	721			1526	1288	694	1526	644
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.16	0.08			0.34	0.15	0.13	0.19	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: 0.52	
Intersection Signal Delay: 9.3	Intersection LOS: A
Intersection Capacity Utilization 71.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	78	0	60	0	519	188	93	284	2
Future Volume (vph)	1	0	2	78	0	60	0	519	188	93	284	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.0	6.0		6.0	6.0			6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.95		1.00	0.95			1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1727	1483		1708	1468			1883	1547	1780	1883	789
Flt Permitted	0.72	1.00		0.76	1.00			1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)	1305	1483		1360	1468			1883	1547	856	1883	789
Peak-hour factor, PHF	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)	1	0	2	78	0	60	0	519	188	93	284	2
RTOR Reduction (vph)	0	2	0	0	54	0	0	0	40	0	0	0
Lane Group Flow (vph)	1	0	0	78	6	0	0	519	148	93	284	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	10.7	10.7		10.7	10.7			86.6	86.6	86.6	86.6	86.6
Effective Green, g (s)	10.7	10.7		10.7	10.7			86.6	86.6	86.6	86.6	86.6
Actuated g/C Ratio	0.10	0.10		0.10	0.10			0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	6.0	6.0		6.0	6.0			6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	126	144		132	142			1482	1217	673	1482	621
v/s Ratio Prot		0.00			0.00			c0.28			0.15	
v/s Ratio Perm	0.00			c0.06					0.10	0.11		0.00
v/c Ratio	0.01	0.00		0.59	0.04			0.35	0.12	0.14	0.19	0.00
Uniform Delay, d1	44.9	44.8		47.6	45.0			3.4	2.8	2.8	2.9	2.5
Progression Factor	1.00	1.00		1.00	1.00			2.10	5.13	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		6.9	0.1			0.6	0.2	0.4	0.3	0.0
Delay (s)	44.9	44.8		54.5	45.1			7.9	14.3	3.2	3.2	2.5
Level of Service	D	D		D	D			A	B	A	A	A
Approach Delay (s)		44.8			50.4			9.6			3.2	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.7
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	208	72	50	112	23	32
Future Volume (vph)	208	72	50	112	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99			1.00	0.97	
Frt	0.965				0.921	
Flt Protected				0.985	0.980	
Satd. Flow (prot)	1702	0	0	1628	1484	0
Flt Permitted				0.851	0.980	
Satd. Flow (perm)	1702	0	0	1402	1474	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	35				32	
Link Speed (k/h)	40			40	40	
Link Distance (m)	231.8			207.6	217.2	
Travel Time (s)	20.9			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Adj. Flow (vph)	208	72	50	112	23	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	280	0	0	162	55	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.5			3.5	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	
Detector Template	Thru		Left	Thru		
Leading Detector (m)	10.0		2.0	10.0	7.0	
Trailing Detector (m)	0.0		0.0	0.0	-3.0	
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	
Detector 1 Size(m)	0.6		2.0	0.6	10.0	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Prot	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Protected Phases	2			6	4	
Permitted Phases			6			
Detector Phase	2		6	6	4	
Switch Phase						
Minimum Initial (s)	8.0		8.0	8.0	8.0	
Minimum Split (s)	25.0		25.0	25.0	25.9	
Total Split (s)	70.0		70.0	70.0	30.0	
Total Split (%)	70.0%		70.0%	70.0%	30.0%	
Maximum Green (s)	64.0		64.0	64.0	23.1	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	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?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Max		Max	Max	None	
Walk Time (s)	8.0		8.0	8.0	8.0	
Flash Dont Walk (s)	7.0		7.0	7.0	7.0	
Pedestrian Calls (#/hr)	3		0	0	0	
Act Effct Green (s)	80.4			80.4	8.7	
Actuated g/C Ratio	0.86			0.86	0.09	
v/c Ratio	0.19			0.13	0.33	
Control Delay	2.4			2.6	27.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	2.4			2.6	27.5	
LOS	A			A	C	
Approach Delay	2.4			2.6	27.5	
Approach LOS	A			A	C	
Queue Length 50th (m)	9.0			5.8	4.2	
Queue Length 95th (m)	17.7			12.1	14.7	
Internal Link Dist (m)	207.8			183.6	193.2	
Turn Bay Length (m)						
Base Capacity (vph)	1476			1212	394	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.19			0.13	0.14	

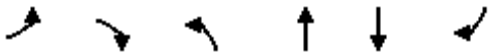
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 93			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.33			
Intersection Signal Delay: 5.2		Intersection LOS: A	
Intersection Capacity Utilization 47.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Kingsview Drivew & Columbia Way

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	208	72	50	112	23	32
Future Volume (vph)	208	72	50	112	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.0			6.0	6.9	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.99			1.00	0.96	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.97			1.00	0.92	
Flt Protected	1.00			0.98	0.98	
Satd. Flow (prot)	1703			1622	1462	
Flt Permitted	1.00			0.85	0.98	
Satd. Flow (perm)	1703			1402	1462	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	208	72	50	112	23	32
RTOR Reduction (vph)	7	0	0	0	30	0
Lane Group Flow (vph)	273	0	0	162	25	0
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	4	
Permitted Phases			6			
Actuated Green, G (s)	77.8			77.8	5.2	
Effective Green, g (s)	77.8			77.8	5.2	
Actuated g/C Ratio	0.81			0.81	0.05	
Clearance Time (s)	6.0			6.0	6.9	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1381			1137	79	
v/s Ratio Prot	c0.16				c0.02	
v/s Ratio Perm				0.12		
v/c Ratio	0.20			0.14	0.31	
Uniform Delay, d1	2.0			1.9	43.6	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.3			0.3	2.3	
Delay (s)	2.4			2.2	45.9	
Level of Service	A			A	D	
Approach Delay (s)	2.4			2.2	45.9	
Approach LOS	A			A	D	

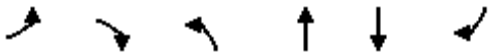
Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	12.9
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	366	95	36	562	265	112
Future Volume (vph)	366	95	36	562	265	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.969					0.850
Flt Protected	0.962			0.997		
Satd. Flow (prot)	3406	0	0	3543	1865	1361
Flt Permitted	0.962			0.997		
Satd. Flow (perm)	3406	0	0	3543	1865	1361
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	14%	2%	3%	20%
Adj. Flow (vph)	366	95	36	562	265	112
Shared Lane Traffic (%)						
Lane Group Flow (vph)	461	0	0	598	265	112
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	366	95	36	562	265	112
Future Volume (veh/h)	366	95	36	562	265	112
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	366	95	36	562	265	112
Approach Volume (veh/h)	461			598	377	
Crossing Volume (veh/h)	265			366	36	
High Capacity (veh/h)	1125			1039	1346	
High v/c (veh/h)	0.41			0.58	0.28	
Low Capacity (veh/h)	926			848	1126	
Low v/c (veh/h)	0.50			0.71	0.33	

Intersection Summary			
Maximum v/c High	0.58		
Maximum v/c Low	0.71		
Intersection Capacity Utilization	54.0%	ICU Level of Service	A

MOVEMENT SUMMARY

Site: 101 [2023 Existing AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	125	8.0	125	8.0	0.180	5.3	LOS A	0.5	3.7	0.20	0.11	0.20	49.7
2	T1	All MCs	223	12.0	223	12.0	0.180	5.5	LOS A	0.5	4.0	0.21	0.11	0.21	51.9
Approach			348	10.6	348	10.6	0.180	5.4	LOS A	0.5	4.0	0.21	0.11	0.21	51.1
North: Highway 50															
8	T1	All MCs	430	6.0	430	6.0	0.449	8.8	LOS A	2.4	17.6	0.38	0.20	0.38	50.3
9	R2	All MCs	277	8.0	277	8.0	0.293	6.7	LOS A	1.3	9.4	0.31	0.16	0.31	53.2
Approach			707	6.8	707	6.8	0.449	8.0	LOS A	2.4	17.6	0.35	0.19	0.35	51.4
West: Emil Kolb Parkway															
10	L2	All MCs	115	35.0	115	35.0	0.170	8.8	LOS A	0.6	4.3	0.49	0.40	0.49	47.8
12	R2	All MCs	89	9.0	89	9.0	0.170	7.1	LOS A	0.6	4.3	0.49	0.40	0.49	52.1
Approach			204	23.7	204	23.7	0.170	8.0	LOS A	0.6	4.3	0.49	0.40	0.49	49.5
All Vehicles			1259	10.6	1259	10.6	0.449	7.3	LOS A	2.4	17.6	0.34	0.20	0.34	51.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2023 Existing PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

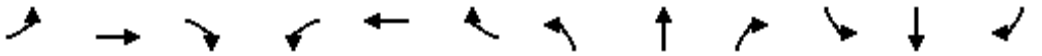
Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	36	14.0	36	14.0	0.353	9.2	LOS A	1.2	8.7	0.43	0.33	0.43	49.1
2	T1	All MCs	562	2.0	562	2.0	0.353	8.2	LOS A	1.2	8.7	0.42	0.32	0.42	50.5
Approach			598	2.7	598	2.7	0.353	8.3	LOS A	1.2	8.7	0.42	0.32	0.42	50.5
North: Highway 50															
8	T1	All MCs	265	3.0	265	3.0	0.248	5.5	LOS A	1.1	7.7	0.15	0.05	0.15	52.7
9	R2	All MCs	112	20.0	112	20.0	0.114	4.6	LOS A	0.4	3.2	0.13	0.04	0.13	54.4
Approach			377	8.1	377	8.1	0.248	5.2	LOS A	1.1	7.7	0.14	0.05	0.14	53.2
West: Emil Kolb Parkway															
10	L2	All MCs	366	2.0	366	2.0	0.271	7.1	LOS A	1.1	7.9	0.43	0.30	0.43	49.4
12	R2	All MCs	95	2.0	95	2.0	0.271	7.1	LOS A	1.1	7.9	0.43	0.30	0.43	50.8
Approach			461	2.0	461	2.0	0.271	7.1	LOS A	1.1	7.9	0.43	0.30	0.43	49.7
All Vehicles			1436	3.9	1436	3.9	0.353	7.1	LOS A	1.2	8.7	0.35	0.24	0.35	50.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix K

2028 FB Synchro and Sidra Worksheets



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	161	19	76	19	297	78	59	463	5
Future Volume (vph)	15	31	26	161	19	76	19	297	78	59	463	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.98		0.99	0.98		0.99		0.97	1.00		0.96
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1681	0	1750	1345	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.695			0.525			0.452			0.570		
Satd. Flow (perm)	1268	1681	0	961	1345	0	778	3510	1541	1050	1865	1312
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			76				80			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	161	19	76	19	297	78	59	463	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	161	95	0	19	297	78	59	463	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

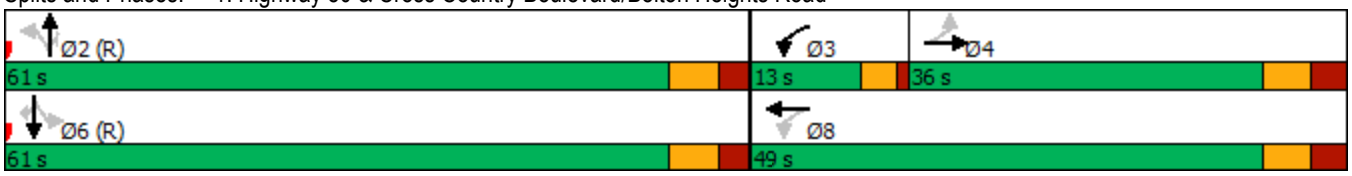
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		13.0	49.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.7%	32.7%		11.8%	44.5%		55.5%	55.5%	55.5%	55.5%	55.5%	55.5%
Maximum Green (s)	28.9	28.9		9.0	41.9		54.4	54.4	54.4	54.4	54.4	54.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		5	5	5	6	6	6
Act Effct Green (s)	12.4	12.4		25.9	22.8		73.5	73.5	73.5	73.5	73.5	73.5
Actuated g/C Ratio	0.11	0.11		0.24	0.21		0.67	0.67	0.67	0.67	0.67	0.67
v/c Ratio	0.10	0.27		0.55	0.28		0.04	0.13	0.07	0.08	0.37	0.01
Control Delay	40.8	28.2		40.2	11.5		10.3	8.6	2.9	10.0	11.4	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.8	28.2		40.2	11.5		10.3	8.6	2.9	10.0	11.4	0.0
LOS	D	C		D	B		B	A	A	B	B	A
Approach Delay		30.8			29.5			7.6			11.1	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		29.9	3.4		1.2	10.3	0.0	3.8	37.4	0.0
Queue Length 95th (m)	7.6	14.9		36.7	13.0		6.1	25.8	7.1	13.9	92.5	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	333	460		294	559		519	2343	1055	701	1245	902
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	0.05	0.12		0.55	0.17		0.04	0.13	0.07	0.08	0.37	0.01

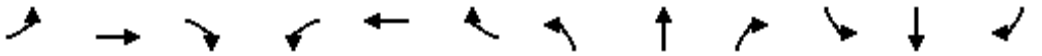
Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 14.9	Intersection LOS: B
Intersection Capacity Utilization 71.6%	ICU Level of Service C
Analysis Period (min) 15	

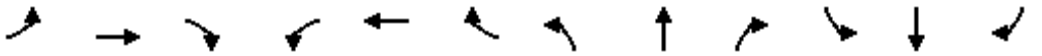
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



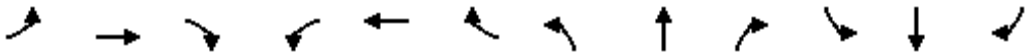


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	161	19	76	19	297	78	59	463	5
Future Volume (vph)	15	31	26	161	19	76	19	297	78	59	463	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1671		1744	1342		1635	3510	1543	1750	1865	1313
Flt Permitted	0.70	1.00		0.53	1.00		0.45	1.00	1.00	0.57	1.00	1.00
Satd. Flow (perm)	1269	1671		964	1342		778	3510	1543	1051	1865	1313
Peak-hour factor, PHF	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)	15	31	26	161	19	76	19	297	78	59	463	5
RTOR Reduction (vph)	0	23	0	0	59	0	0	0	27	0	0	2
Lane Group Flow (vph)	15	34	0	161	36	0	19	297	51	59	463	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	10.8	10.8		24.2	24.2		72.1	72.1	72.1	72.1	72.1	72.1
Effective Green, g (s)	10.8	10.8		24.2	24.2		72.1	72.1	72.1	72.1	72.1	72.1
Actuated g/C Ratio	0.10	0.10		0.22	0.22		0.66	0.66	0.66	0.66	0.66	0.66
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	124	164		278	295		509	2300	1011	688	1222	860
v/s Ratio Prot		0.02		c0.05	0.03			0.08			c0.25	
v/s Ratio Perm	0.01			c0.08			0.02		0.03	0.06		0.00
v/c Ratio	0.12	0.20		0.58	0.12		0.04	0.13	0.05	0.09	0.38	0.00
Uniform Delay, d1	45.3	45.6		36.9	34.4		6.7	7.1	6.8	6.9	8.7	6.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.6		2.9	0.2		0.1	0.1	0.1	0.2	0.9	0.0
Delay (s)	45.7	46.3		39.9	34.6		6.8	7.2	6.8	7.2	9.6	6.6
Level of Service	D	D		D	C		A	A	A	A	A	A
Approach Delay (s)		46.2			37.9			7.1			9.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	150	0	160	1	208	137	127	440	3
Future Volume (vph)	6	1	11	150	0	160	1	208	137	127	440	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.97		0.99	0.96		1.00		0.97	0.99		0.97
Frt		0.862			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1322	0	1691	1434	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.621			0.750			0.484			0.628		
Satd. Flow (perm)	826	1322	0	1321	1434	0	908	1746	1426	1071	1847	1190
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			629				137			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			1016.8	
Travel Time (s)		4.8			21.4			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	11	150	0	160	1	208	137	127	440	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	12	0	150	160	0	1	208	137	127	440	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

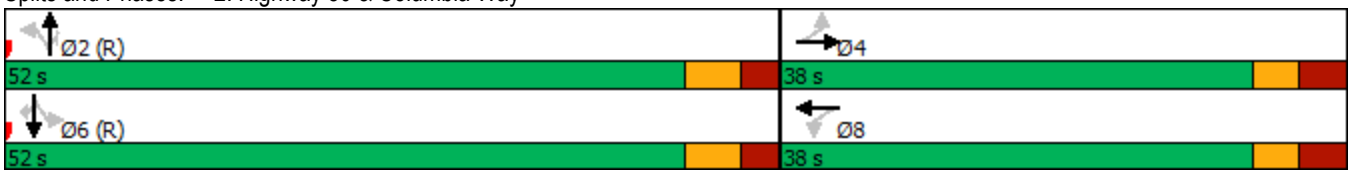


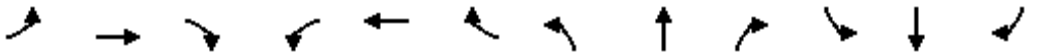
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	38.0	38.0		38.0	38.0		52.0	52.0	52.0	52.0	52.0	52.0
Total Split (%)	42.2%	42.2%		42.2%	42.2%		57.8%	57.8%	57.8%	57.8%	57.8%	57.8%
Maximum Green (s)	31.6	31.6		31.6	31.6		45.6	45.6	45.6	45.6	45.6	45.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	15.8	15.8		15.8	15.8		61.4	61.4	61.4	61.4	61.4	61.4
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.04	0.05		0.65	0.21		0.00	0.17	0.13	0.17	0.35	0.00
Control Delay	28.0	15.6		46.5	0.6		6.0	6.5	1.6	6.9	7.7	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	15.6		46.5	0.6		6.0	6.5	1.6	6.9	7.7	0.0
LOS	C	B		D	A		A	A	A	A	A	A
Approach Delay		19.7			22.8			4.5			7.5	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	0.9	0.2		24.3	0.0		0.1	11.3	0.0	6.9	27.6	0.0
Queue Length 95th (m)	3.8	4.3		39.9	0.0		0.6	24.4	6.4	17.1	53.8	0.0
Internal Link Dist (m)		29.3			213.8			617.5			992.8	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	290	471		463	911		619	1190	1015	730	1259	824
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.03		0.32	0.18		0.00	0.17	0.13	0.17	0.35	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 10.7	Intersection LOS: B
Intersection Capacity Utilization 63.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	150	0	160	1	208	137	127	440	3
Future Volume (vph)	6	1	11	150	0	160	1	208	137	127	440	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1264	1316		1673	1426		1782	1746	1427	1620	1847	1191
Flt Permitted	0.62	1.00		0.75	1.00		0.48	1.00	1.00	0.63	1.00	1.00
Satd. Flow (perm)	826	1316		1320	1426		908	1746	1427	1070	1847	1191
Peak-hour factor, PHF	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)	6	1	11	150	0	160	1	208	137	127	440	3
RTOR Reduction (vph)	0	9	0	0	132	0	0	0	44	0	0	1
Lane Group Flow (vph)	6	3	0	150	28	0	1	208	93	127	440	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	15.8	15.8		15.8	15.8		61.4	61.4	61.4	61.4	61.4	61.4
Effective Green, g (s)	15.8	15.8		15.8	15.8		61.4	61.4	61.4	61.4	61.4	61.4
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	145	231		231	250		619	1191	973	729	1260	812
v/s Ratio Prot		0.00			0.02			0.12			c0.24	
v/s Ratio Perm	0.01			c0.11			0.00		0.07	0.12		0.00
v/c Ratio	0.04	0.01		0.65	0.11		0.00	0.17	0.10	0.17	0.35	0.00
Uniform Delay, d1	30.8	30.7		34.5	31.2		4.5	5.2	4.9	5.2	6.0	4.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		6.2	0.2		0.0	0.3	0.2	0.5	0.8	0.0
Delay (s)	30.9	30.7		40.7	31.4		4.6	5.5	5.1	5.7	6.7	4.6
Level of Service	C	C		D	C		A	A	A	A	A	A
Approach Delay (s)		30.8			35.9			5.3			6.5	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

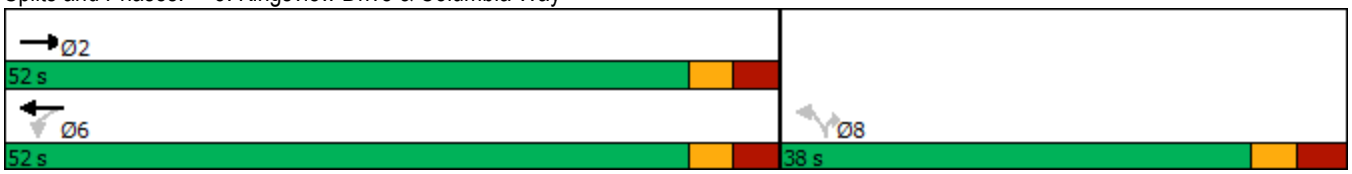
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	230	30	128	247	46	95
Future Volume (vph)	230	30	128	247	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.8	3.8	3.2	3.8	3.5	3.5
Storage Length (m)		0.0	40.0		25.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			55.0		20.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		1.00		0.99	0.97
Frt	0.984					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1851	0	1691	1904	1750	1566
Flt Permitted			0.599		0.950	
Satd. Flow (perm)	1851	0	1061	1904	1735	1513
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	11					95
Link Speed (k/h)	40			40	40	
Link Distance (m)	237.8			207.6	217.2	
Travel Time (s)	21.4			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Adj. Flow (vph)	230	30	128	247	46	95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	260	0	128	247	46	95
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.2			3.2	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.97	0.97	1.06	0.97	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru		Right
Leading Detector (m)	10.0		2.0	10.0	7.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	10.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	7.0	7.0
Minimum Split (s)	39.2		39.2	39.2	33.5	33.5
Total Split (s)	52.0		52.0	52.0	38.0	38.0
Total Split (%)	57.8%		57.8%	57.8%	42.2%	42.2%
Maximum Green (s)	45.8		45.8	45.8	31.5	31.5
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.2		3.2	3.2	3.5	3.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2		6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Max		Max	Max	None	None
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0		25.0	25.0	20.0	20.0
Pedestrian Calls (#/hr)	5		5	5	5	5
Act Effct Green (s)	54.5		54.5	54.5	10.9	10.9
Actuated g/C Ratio	0.74		0.74	0.74	0.15	0.15
v/c Ratio	0.19		0.16	0.18	0.18	0.31
Control Delay	5.8		6.6	5.9	26.9	8.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	5.8		6.6	5.9	26.9	8.5
LOS	A		A	A	C	A
Approach Delay	5.8			6.2	14.5	
Approach LOS	A			A	B	
Queue Length 50th (m)	8.7		4.4	8.5	5.6	0.0
Queue Length 95th (m)	33.9		20.2	33.2	12.5	9.9
Internal Link Dist (m)	213.8			183.6	193.2	
Turn Bay Length (m)			40.0		25.0	
Base Capacity (vph)	1367		782	1404	747	705
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.19		0.16	0.18	0.06	0.13

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 73.9	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.31	

Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

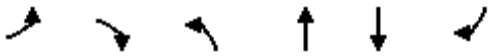
Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	230	30	128	247	46	95
Future Volume (vph)	230	30	128	247	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.2	3.8	3.5	3.5
Total Lost time (s)	6.2		6.2	6.2	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00		1.00	1.00	0.99	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1852		1684	1904	1738	1501
Flt Permitted	1.00		0.60	1.00	0.95	1.00
Satd. Flow (perm)	1852		1061	1904	1738	1501
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	230	30	128	247	46	95
RTOR Reduction (vph)	3	0	0	0	0	83
Lane Group Flow (vph)	257	0	128	247	46	12
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Actuated Green, G (s)	53.1		53.1	53.1	9.4	9.4
Effective Green, g (s)	53.1		53.1	53.1	9.4	9.4
Actuated g/C Ratio	0.71		0.71	0.71	0.12	0.12
Clearance Time (s)	6.2		6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1307		749	1344	217	187
v/s Ratio Prot	c0.14			0.13		
v/s Ratio Perm			0.12		c0.03	0.01
v/c Ratio	0.20		0.17	0.18	0.21	0.06
Uniform Delay, d1	3.8		3.7	3.7	29.6	29.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3		0.5	0.3	0.5	0.1
Delay (s)	4.1		4.2	4.0	30.1	29.2
Level of Service	A		A	A	C	C
Approach Delay (s)	4.1			4.1	29.5	
Approach LOS	A			A	C	

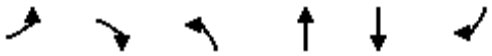
Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	12.7
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



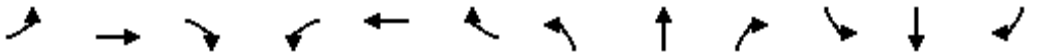
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	124	96	135	240	463	298
Future Volume (vph)	124	96	135	240	463	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.935					0.850
Flt Protected	0.973			0.982		
Satd. Flow (prot)	2964	0	0	3240	1830	1512
Flt Permitted	0.973			0.982		
Satd. Flow (perm)	2964	0	0	3240	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	124	96	135	240	463	298
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	0	0	375	463	298
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

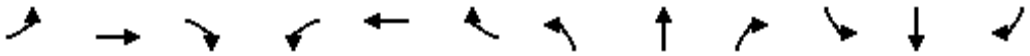


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	124	96	135	240	463	298
Future Volume (veh/h)	124	96	135	240	463	298
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	124	96	135	240	463	298
Approach Volume (veh/h)	220			375	761	
Crossing Volume (veh/h)	463			124	135	
High Capacity (veh/h)	961			1257	1246	
High v/c (veh/h)	0.23			0.30	0.61	
Low Capacity (veh/h)	779			1045	1035	
Low v/c (veh/h)	0.28			0.36	0.74	

Intersection Summary			
Maximum v/c High	0.61		
Maximum v/c Low	0.74		
Intersection Capacity Utilization	51.5%	ICU Level of Service	A



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	64	9	41	70	735	68	34	398	19
Future Volume (vph)	15	4	13	64	9	41	70	735	68	34	398	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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		0.99	0.98		1.00		0.97	1.00		0.97
Frt		0.885			0.877				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1591	0	1750	1431	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.724			0.746			0.520			0.368		
Satd. Flow (perm)	1266	1591	0	1365	1431	0	975	3579	1548	691	1883	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			41				68			45
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	64	9	41	70	735	68	34	398	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	64	50	0	70	735	68	34	398	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

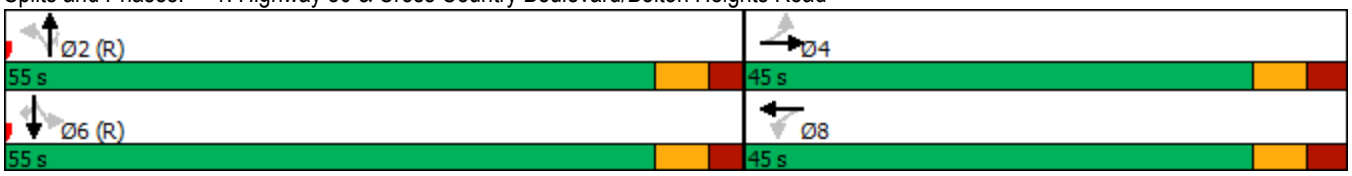


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	45.0	45.0		45.0	45.0		55.0	55.0	55.0	55.0	55.0	55.0
Total Split (%)	45.0%	45.0%		45.0%	45.0%		55.0%	55.0%	55.0%	55.0%	55.0%	55.0%
Maximum Green (s)	37.9	37.9		37.9	37.9		48.4	48.4	48.4	48.4	48.4	48.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	15.0	15.0		15.0	15.0		75.6	75.6	75.6	75.6	75.6	75.6
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.76	0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.08	0.07		0.31	0.20		0.09	0.27	0.06	0.07	0.28	0.02
Control Delay	31.4	16.3		38.2	13.4		7.7	6.8	2.8	8.2	7.6	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	16.3		38.2	13.4		7.7	6.8	2.8	8.2	7.6	0.9
LOS	C	B		D	B		A	A	A	A	A	A
Approach Delay		23.4			27.3			6.5			7.4	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	2.7	0.7		11.9	1.6		2.9	18.6	0.0	1.4	19.3	0.0
Queue Length 95th (m)	6.1	4.9		17.5	8.6		14.8	58.6	6.4	8.7	69.1	1.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	479	611		517	567		737	2706	1187	522	1424	1148
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03		0.12	0.09		0.09	0.27	0.06	0.07	0.28	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	

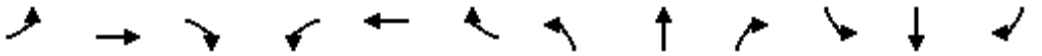
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.31	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 61.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

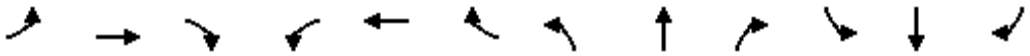


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	64	9	41	70	735	68	34	398	19
Future Volume (vph)	15	4	13	64	9	41	70	735	68	34	398	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1662	1580		1738	1425		1780	3579	1550	1783	1883	1506
Flt Permitted	0.72	1.00		0.75	1.00		0.52	1.00	1.00	0.37	1.00	1.00
Satd. Flow (perm)	1267	1580		1365	1425		973	3579	1550	691	1883	1506
Peak-hour factor, PHF	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)	15	4	13	64	9	41	70	735	68	34	398	19
RTOR Reduction (vph)	0	11	0	0	36	0	0	0	18	0	0	5
Lane Group Flow (vph)	15	6	0	64	14	0	70	735	50	34	398	14
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.4	13.4		13.4	13.4		72.9	72.9	72.9	72.9	72.9	72.9
Effective Green, g (s)	13.4	13.4		13.4	13.4		72.9	72.9	72.9	72.9	72.9	72.9
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	211		182	190		709	2609	1129	503	1372	1097
v/s Ratio Prot		0.00			0.01			0.21			c0.21	
v/s Ratio Perm	0.01			c0.05			0.07		0.03	0.05		0.01
v/c Ratio	0.09	0.03		0.35	0.08		0.10	0.28	0.04	0.07	0.29	0.01
Uniform Delay, d1	37.9	37.6		39.4	37.9		4.0	4.6	3.8	3.9	4.7	3.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		1.2	0.2		0.3	0.3	0.1	0.3	0.5	0.0
Delay (s)	38.2	37.7		40.5	38.1		4.2	4.9	3.9	4.1	5.2	3.7
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		37.9			39.4			4.8			5.0	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	86	0	66	0	559	208	103	306	2
Future Volume (vph)	1	0	2	86	0	66	0	559	208	103	306	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96				0.97	1.00		0.97
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1507	0	1675	1543	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.714			0.757						0.425		
Satd. Flow (perm)	1302	1507	0	1320	1543	0	1883	1883	1552	798	1883	792
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		544			308				208			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			1016.8	
Travel Time (s)		4.8			20.9			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	2	86	0	66	0	559	208	103	306	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	2	0	86	66	0	0	559	208	103	306	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

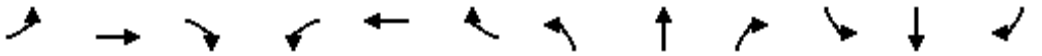


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	31.0	31.0		31.0	31.0		59.0	59.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%		34.4%	34.4%		65.6%	65.6%	65.6%	65.6%	65.6%	65.6%
Maximum Green (s)	24.6	24.6		24.6	24.6		52.6	52.6	52.6	52.6	52.6	52.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	12.7	12.7		12.7	12.7			68.7	68.7	68.7	68.7	68.7
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.01	0.00		0.46	0.14			0.39	0.17	0.17	0.21	0.00
Control Delay	29.0	0.0		42.2	0.6			6.5	1.3	6.0	5.2	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	0.0		42.2	0.6			6.5	1.3	6.0	5.2	0.0
LOS	C	A		D	A			A	A	A	A	A
Approach Delay		9.7			24.1			5.1			5.4	
Approach LOS		A			C			A			A	
Queue Length 50th (m)	0.2	0.0		14.1	0.0			30.7	0.0	4.6	14.2	0.0
Queue Length 95th (m)	1.4	0.0		24.9	0.0			69.3	7.2	14.5	33.6	0.0
Internal Link Dist (m)		29.3			207.8			617.5			992.8	
Turn Bay Length (m)	5.0			90.0						70.0		25.0
Base Capacity (vph)	355	807		360	645			1436	1233	609	1436	614
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.24	0.10			0.39	0.17	0.17	0.21	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 7.4	Intersection LOS: A
Intersection Capacity Utilization 64.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	86	0	66	0	559	208	103	306	2
Future Volume (vph)	1	0	2	86	0	66	0	559	208	103	306	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.95		1.00	0.95			1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1495		1657	1530			1883	1553	1784	1883	792
Flt Permitted	0.71	1.00		0.76	1.00			1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)	1302	1495		1319	1530			1883	1553	797	1883	792
Peak-hour factor, PHF	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)	1	0	2	86	0	66	0	559	208	103	306	2
RTOR Reduction (vph)	0	2	0	0	58	0	0	0	55	0	0	1
Lane Group Flow (vph)	1	0	0	86	8	0	0	559	153	103	306	1
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	11.1	11.1		11.1	11.1			66.1	66.1	66.1	66.1	66.1
Effective Green, g (s)	11.1	11.1		11.1	11.1			66.1	66.1	66.1	66.1	66.1
Actuated g/C Ratio	0.12	0.12		0.12	0.12			0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	160	184		162	188			1382	1140	585	1382	581
v/s Ratio Prot		0.00			0.01			c0.30			0.16	
v/s Ratio Perm	0.00			c0.07					0.10	0.13		0.00
v/c Ratio	0.01	0.00		0.53	0.04			0.40	0.13	0.18	0.22	0.00
Uniform Delay, d1	34.6	34.6		37.0	34.8			4.5	3.5	3.6	3.8	3.2
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		3.3	0.1			0.9	0.2	0.7	0.4	0.0
Delay (s)	34.6	34.6		40.3	34.9			5.4	3.8	4.3	4.2	3.2
Level of Service	C	C		D	C			A	A	A	A	A
Approach Delay (s)		34.6			38.0			5.0			4.2	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	230	72	50	124	23	32
Future Volume (vph)	230	72	50	124	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.8	3.8	3.2	3.8	3.5	3.5
Storage Length (m)		0.0	40.0		25.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			55.0		20.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00		0.99	0.97
Frt	0.968					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1769	0	1658	1646	1638	1413
Flt Permitted			0.576		0.950	
Satd. Flow (perm)	1769	0	1001	1646	1624	1366
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	26					32
Link Speed (k/h)	40			40	40	
Link Distance (m)	231.8			207.6	217.2	
Travel Time (s)	20.9			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Adj. Flow (vph)	230	72	50	124	23	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	302	0	50	124	23	32
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.2			3.2	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.97	0.97	1.06	0.97	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru		Right
Leading Detector (m)	10.0		2.0	10.0	7.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	10.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	5.0	5.0
Minimum Split (s)	39.2		39.2	39.2	33.5	33.5
Total Split (s)	54.5		54.5	54.5	37.0	37.0
Total Split (%)	59.6%		59.6%	59.6%	40.4%	40.4%
Maximum Green (s)	48.3		48.3	48.3	30.5	30.5
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.2		3.2	3.2	3.5	3.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2		6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Max		Max	Max	None	None
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0		25.0	25.0	20.0	20.0
Pedestrian Calls (#/hr)	5		5	5	5	5
Act Effct Green (s)	64.7		64.7	64.7	10.1	10.1
Actuated g/C Ratio	0.82		0.82	0.82	0.13	0.13
v/c Ratio	0.21		0.06	0.09	0.11	0.16
Control Delay	4.7		5.4	4.9	30.5	11.9
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	4.7		5.4	4.9	30.5	11.9
LOS	A		A	A	C	B
Approach Delay	4.7			5.0	19.7	
Approach LOS	A			A	B	
Queue Length 50th (m)	9.4		1.5	3.9	3.5	0.0
Queue Length 95th (m)	37.9		8.9	17.6	8.5	6.3
Internal Link Dist (m)	207.8			183.6	193.2	
Turn Bay Length (m)			40.0		25.0	
Base Capacity (vph)	1450		818	1344	632	551
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.21		0.06	0.09	0.04	0.06

Intersection Summary	
Area Type:	Other
Cycle Length: 91.5	
Actuated Cycle Length: 79.2	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.21	

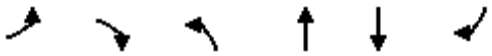
Intersection Signal Delay: 6.4	Intersection LOS: A
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	230	72	50	124	23	32
Future Volume (vph)	230	72	50	124	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.2	3.8	3.5	3.5
Total Lost time (s)	6.2		6.2	6.2	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	0.99	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1769		1651	1646	1625	1346
Flt Permitted	1.00		0.58	1.00	0.95	1.00
Satd. Flow (perm)	1769		1001	1646	1625	1346
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	230	72	50	124	23	32
RTOR Reduction (vph)	6	0	0	0	0	29
Lane Group Flow (vph)	296	0	50	124	23	3
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Actuated Green, G (s)	61.9		61.9	61.9	7.4	7.4
Effective Green, g (s)	61.9		61.9	61.9	7.4	7.4
Actuated g/C Ratio	0.75		0.75	0.75	0.09	0.09
Clearance Time (s)	6.2		6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1335		755	1242	146	121
v/s Ratio Prot	c0.17			0.08		
v/s Ratio Perm			0.05		c0.01	0.00
v/c Ratio	0.22		0.07	0.10	0.16	0.02
Uniform Delay, d1	3.0		2.6	2.7	34.4	34.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		0.2	0.2	0.5	0.1
Delay (s)	3.3		2.8	2.8	34.9	34.1
Level of Service	A		A	A	C	C
Approach Delay (s)	3.3			2.8	34.4	
Approach LOS	A			A	C	

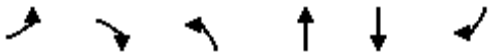
Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	82.0	Sum of lost time (s)	12.7
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	394	102	39	605	285	121
Future Volume (vph)	394	102	39	605	285	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.969					0.850
Flt Protected	0.962			0.997		
Satd. Flow (prot)	3303	0	0	3561	1812	1408
Flt Permitted	0.962			0.997		
Satd. Flow (perm)	3303	0	0	3561	1812	1408
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	5%	2%	6%	16%
Adj. Flow (vph)	394	102	39	605	285	121
Shared Lane Traffic (%)						
Lane Group Flow (vph)	496	0	0	644	285	121
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 57.3%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	394	102	39	605	285	121
Future Volume (veh/h)	394	102	39	605	285	121
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	394	102	39	605	285	121
Approach Volume (veh/h)	496			644	406	
Crossing Volume (veh/h)	285			394	39	
High Capacity (veh/h)	1107			1016	1343	
High v/c (veh/h)	0.45			0.63	0.30	
Low Capacity (veh/h)	910			828	1123	
Low v/c (veh/h)	0.55			0.78	0.36	

Intersection Summary			
Maximum v/c High	0.63		
Maximum v/c Low	0.78		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B

MOVEMENT SUMMARY

Site: 101 [2028 FB AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	135	8.0	135	8.0	0.196	5.5	LOS A	0.5	4.1	0.21	0.12	0.21	49.6
2	T1	All MCs	240	12.0	240	12.0	0.196	5.7	LOS A	0.6	4.4	0.22	0.12	0.22	51.8
Approach			375	10.6	375	10.6	0.196	5.6	LOS A	0.6	4.4	0.22	0.12	0.22	50.9
North: Highway 50															
8	T1	All MCs	463	6.0	463	6.0	0.489	9.6	LOS A	2.7	20.2	0.42	0.23	0.42	49.8
9	R2	All MCs	298	8.0	298	8.0	0.319	7.1	LOS A	1.4	10.5	0.33	0.18	0.33	52.9
Approach			761	6.8	761	6.8	0.489	8.6	LOS A	2.7	20.2	0.39	0.21	0.39	51.0
West: Emil Kolb Parkway															
10	L2	All MCs	124	35.0	124	35.0	0.190	9.5	LOS A	0.6	4.9	0.51	0.43	0.51	47.4
12	R2	All MCs	96	9.0	96	9.0	0.190	7.6	LOS A	0.6	4.9	0.51	0.43	0.51	51.7
Approach			220	23.7	220	23.7	0.190	8.6	LOS A	0.6	4.9	0.51	0.43	0.51	49.1
All Vehicles			1356	10.6	1356	10.6	0.489	7.8	LOS A	2.7	20.2	0.36	0.22	0.36	50.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2028 FB PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

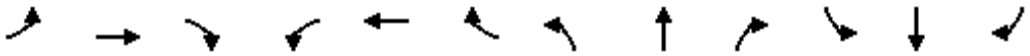
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	39	14.0	39	14.0	0.388	9.9	LOS A	1.5	10.6	0.46	0.38	0.50	48.7
2	T1	All MCs	605	2.0	605	2.0	0.388	8.9	LOS A	1.5	10.6	0.45	0.37	0.49	50.1
Approach			644	2.7	644	2.7	0.388	8.9	LOS A	1.5	10.6	0.45	0.37	0.49	50.0
North: Highway 50															
8	T1	All MCs	285	3.0	285	3.0	0.267	5.7	LOS A	1.2	8.5	0.16	0.05	0.16	52.5
9	R2	All MCs	121	20.0	121	20.0	0.124	4.7	LOS A	0.4	3.5	0.14	0.05	0.14	54.3
Approach			406	8.1	406	8.1	0.267	5.4	LOS A	1.2	8.5	0.15	0.05	0.15	53.0
West: Emil Kolb Parkway															
10	L2	All MCs	394	2.0	394	2.0	0.298	7.6	LOS A	1.2	8.9	0.46	0.32	0.46	49.1
12	R2	All MCs	102	2.0	102	2.0	0.298	7.6	LOS A	1.2	8.9	0.46	0.32	0.46	50.5
Approach			496	2.0	496	2.0	0.298	7.6	LOS A	1.2	8.9	0.46	0.32	0.46	49.4
All Vehicles			1546	3.9	1546	3.9	0.388	7.6	LOS A	1.5	10.6	0.37	0.27	0.39	50.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix L

2030 FB Synchro and Sidra Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	168	20	79	19	306	82	61	477	5
Future Volume (vph)	15	31	26	168	20	79	19	306	82	61	477	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.98		0.99	0.98		1.00		0.97	1.00		0.96
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1682	0	1750	1345	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.693			0.574			0.437			0.565		
Satd. Flow (perm)	1264	1682	0	1050	1345	0	753	3510	1541	1041	1865	1311
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			79				82			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	168	20	79	19	306	82	61	477	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	168	99	0	19	306	82	61	477	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

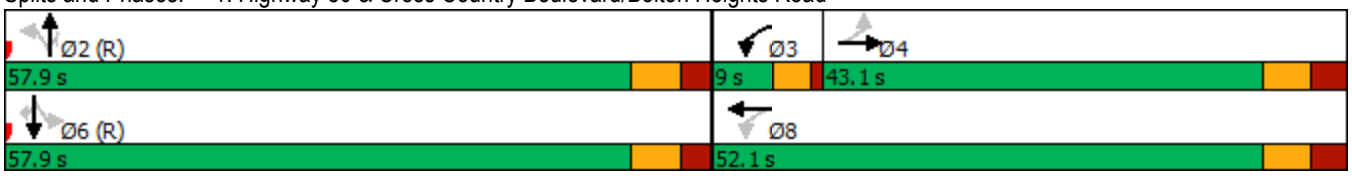


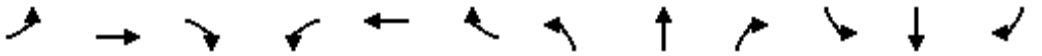
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	43.1	43.1		9.0	52.1		57.9	57.9	57.9	57.9	57.9	57.9
Total Split (%)	39.2%	39.2%		8.2%	47.4%		52.6%	52.6%	52.6%	52.6%	52.6%	52.6%
Maximum Green (s)	36.0	36.0		5.0	45.0		51.3	51.3	51.3	51.3	51.3	51.3
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		5	5	5	6	6	6
Act Effct Green (s)	17.4	17.4		27.7	24.6		71.7	71.7	71.7	71.7	71.7	71.7
Actuated g/C Ratio	0.16	0.16		0.25	0.22		0.65	0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.08	0.20		0.55	0.27		0.04	0.13	0.08	0.09	0.39	0.01
Control Delay	32.9	22.2		38.7	10.0		12.6	10.1	3.5	12.0	13.3	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	22.2		38.7	10.0		12.6	10.1	3.5	12.0	13.3	0.0
LOS	C	C		D	A		B	B	A	B	B	A
Approach Delay		24.4			28.1			8.9			13.1	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		32.9	3.7		1.0	9.2	0.0	3.4	33.5	0.0
Queue Length 95th (m)	6.9	13.5		36.2	12.7		6.5	28.2	7.9	15.2	102.1	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	413	567		303	596		490	2287	1032	678	1215	882
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	0.04	0.10		0.55	0.17		0.04	0.13	0.08	0.09	0.39	0.01

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 15.5	Intersection LOS: B
Intersection Capacity Utilization 72.6%	ICU Level of Service C
Analysis Period (min) 15	

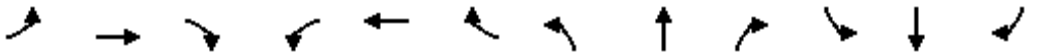
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



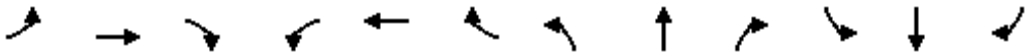


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	168	20	79	19	306	82	61	477	5
Future Volume (vph)	15	31	26	168	20	79	19	306	82	61	477	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1676		1744	1343		1635	3510	1543	1750	1865	1313
Flt Permitted	0.69	1.00		0.57	1.00		0.44	1.00	1.00	0.57	1.00	1.00
Satd. Flow (perm)	1264	1676		1054	1343		752	3510	1543	1042	1865	1313
Peak-hour factor, PHF	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)	15	31	26	168	20	79	19	306	82	61	477	5
RTOR Reduction (vph)	0	22	0	0	60	0	0	0	30	0	0	2
Lane Group Flow (vph)	15	35	0	168	39	0	19	306	52	61	477	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Effective Green, g (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Actuated g/C Ratio	0.14	0.14		0.24	0.24		0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	181	240		288	317		480	2243	986	665	1191	839
v/s Ratio Prot		0.02		c0.03	0.03			0.09			c0.26	
v/s Ratio Perm	0.01			c0.10			0.03		0.03	0.06		0.00
v/c Ratio	0.08	0.14		0.58	0.12		0.04	0.14	0.05	0.09	0.40	0.00
Uniform Delay, d1	40.8	41.2		36.8	33.0		7.3	7.8	7.4	7.6	9.6	7.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3		3.0	0.2		0.2	0.1	0.1	0.3	1.0	0.0
Delay (s)	41.0	41.5		39.8	33.2		7.5	8.0	7.5	7.9	10.6	7.2
Level of Service	D	D		D	C		A	A	A	A	B	A
Approach Delay (s)		41.4			37.3			7.9			10.3	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	156	0	167	1	214	142	132	453	3
Future Volume (vph)	6	1	11	156	0	167	1	214	142	132	453	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.97		0.99	0.97		1.00		0.97	0.99		0.97
Frt		0.862			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1323	0	1691	1435	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.606			0.750			0.474			0.624		
Satd. Flow (perm)	806	1323	0	1321	1435	0	890	1746	1425	1064	1847	1189
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			568				142			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			1016.8	
Travel Time (s)		4.8			21.4			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	11	156	0	167	1	214	142	132	453	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	12	0	156	167	0	1	214	142	132	453	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

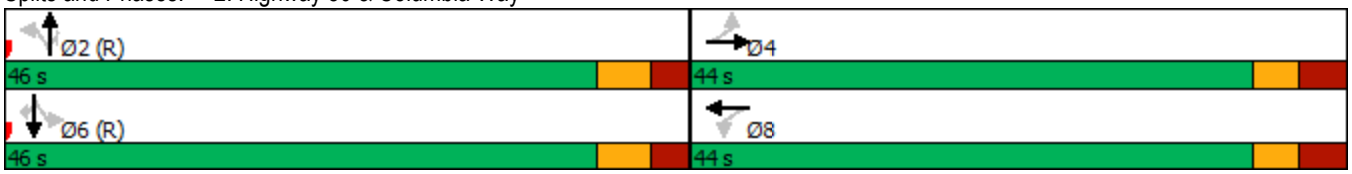


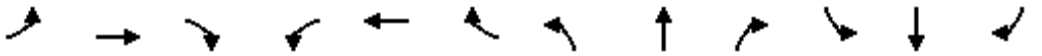
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	44.0	44.0		44.0	44.0		46.0	46.0	46.0	46.0	46.0	46.0
Total Split (%)	48.9%	48.9%		48.9%	48.9%		51.1%	51.1%	51.1%	51.1%	51.1%	51.1%
Maximum Green (s)	37.6	37.6		37.6	37.6		39.6	39.6	39.6	39.6	39.6	39.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	16.3	16.3		16.3	16.3		60.9	60.9	60.9	60.9	60.9	60.9
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.04	0.05		0.65	0.23		0.00	0.18	0.14	0.18	0.36	0.00
Control Delay	27.7	15.2		46.2	0.7		7.0	6.7	1.7	7.2	8.1	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	15.2		46.2	0.7		7.0	6.7	1.7	7.2	8.1	0.0
LOS	C	B		D	A		A	A	A	A	A	A
Approach Delay		19.4			22.7			4.7			7.9	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	0.9	0.2		25.2	0.0		0.1	12.0	0.0	7.4	29.4	0.0
Queue Length 95th (m)	3.7	4.2		41.1	0.0		0.6	25.5	6.6	18.2	57.0	0.0
Internal Link Dist (m)		29.3			213.8			617.5			992.8	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	336	559		551	930		601	1181	1009	719	1249	817
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.02		0.28	0.18		0.00	0.18	0.14	0.18	0.36	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 10.9	Intersection LOS: B
Intersection Capacity Utilization 64.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	156	0	167	1	214	142	132	453	3
Future Volume (vph)	6	1	11	156	0	167	1	214	142	132	453	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1264	1317		1673	1427		1783	1746	1427	1620	1847	1191
Flt Permitted	0.61	1.00		0.75	1.00		0.47	1.00	1.00	0.62	1.00	1.00
Satd. Flow (perm)	807	1317		1320	1427		889	1746	1427	1065	1847	1191
Peak-hour factor, PHF	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)	6	1	11	156	0	167	1	214	142	132	453	3
RTOR Reduction (vph)	0	9	0	0	137	0	0	0	46	0	0	1
Lane Group Flow (vph)	6	3	0	156	30	0	1	214	96	132	453	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	16.3	16.3		16.3	16.3		60.9	60.9	60.9	60.9	60.9	60.9
Effective Green, g (s)	16.3	16.3		16.3	16.3		60.9	60.9	60.9	60.9	60.9	60.9
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	146	238		239	258		601	1181	965	720	1249	805
v/s Ratio Prot		0.00			0.02			0.12			c0.25	
v/s Ratio Perm	0.01			c0.12			0.00		0.07	0.12		0.00
v/c Ratio	0.04	0.01		0.65	0.12		0.00	0.18	0.10	0.18	0.36	0.00
Uniform Delay, d1	30.4	30.2		34.2	30.8		4.7	5.4	5.0	5.4	6.2	4.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		6.3	0.2		0.0	0.3	0.2	0.6	0.8	0.0
Delay (s)	30.5	30.3		40.5	31.0		4.7	5.7	5.3	5.9	7.1	4.7
Level of Service	C	C		D	C		A	A	A	A	A	A
Approach Delay (s)		30.4			35.6			5.5			6.8	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

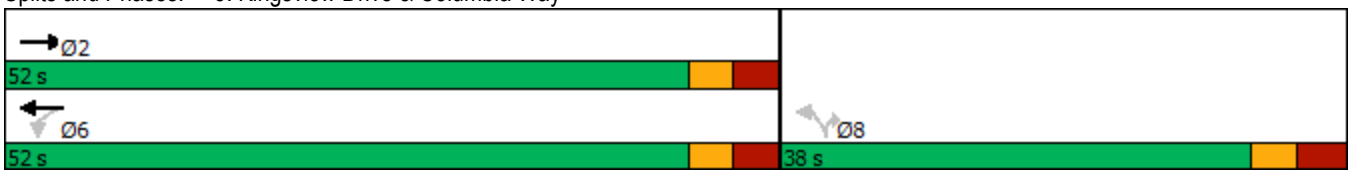
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	239	30	128	257	46	95
Future Volume (vph)	239	30	128	257	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.8	3.8	3.2	3.8	3.5	3.5
Storage Length (m)		0.0	40.0		25.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			55.0		20.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		1.00		0.99	0.97
Frt	0.985					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1853	0	1691	1904	1750	1566
Flt Permitted			0.594		0.950	
Satd. Flow (perm)	1853	0	1052	1904	1735	1513
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	10					95
Link Speed (k/h)	40			40	40	
Link Distance (m)	237.8			207.6	217.2	
Travel Time (s)	21.4			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Adj. Flow (vph)	239	30	128	257	46	95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	269	0	128	257	46	95
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.2			3.2	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.97	0.97	1.06	0.97	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru		Right
Leading Detector (m)	10.0		2.0	10.0	7.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	10.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	7.0	7.0
Minimum Split (s)	39.2		39.2	39.2	33.5	33.5
Total Split (s)	52.0		52.0	52.0	38.0	38.0
Total Split (%)	57.8%		57.8%	57.8%	42.2%	42.2%
Maximum Green (s)	45.8		45.8	45.8	31.5	31.5
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.2		3.2	3.2	3.5	3.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2		6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Max		Max	Max	None	None
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0		25.0	25.0	20.0	20.0
Pedestrian Calls (#/hr)	5		5	5	5	5
Act Effct Green (s)	54.5		54.5	54.5	10.9	10.9
Actuated g/C Ratio	0.74		0.74	0.74	0.15	0.15
v/c Ratio	0.20		0.17	0.18	0.18	0.31
Control Delay	5.8		6.7	5.9	26.9	8.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	5.8		6.7	5.9	26.9	8.5
LOS	A		A	A	C	A
Approach Delay	5.8			6.2	14.5	
Approach LOS	A			A	B	
Queue Length 50th (m)	9.1		4.4	8.9	5.6	0.0
Queue Length 95th (m)	35.3		20.3	34.4	12.5	9.9
Internal Link Dist (m)	213.8			183.6	193.2	
Turn Bay Length (m)			40.0		25.0	
Base Capacity (vph)	1368		775	1404	747	705
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.20		0.17	0.18	0.06	0.13

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 73.9	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.31	

Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way



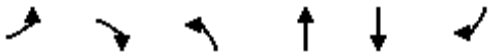
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	239	30	128	257	46	95
Future Volume (vph)	239	30	128	257	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.2	3.8	3.5	3.5
Total Lost time (s)	6.2		6.2	6.2	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00		1.00	1.00	0.99	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1853		1684	1904	1738	1501
Flt Permitted	1.00		0.59	1.00	0.95	1.00
Satd. Flow (perm)	1853		1052	1904	1738	1501
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	239	30	128	257	46	95
RTOR Reduction (vph)	3	0	0	0	0	83
Lane Group Flow (vph)	266	0	128	257	46	12
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Actuated Green, G (s)	53.1		53.1	53.1	9.4	9.4
Effective Green, g (s)	53.1		53.1	53.1	9.4	9.4
Actuated g/C Ratio	0.71		0.71	0.71	0.12	0.12
Clearance Time (s)	6.2		6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1308		742	1344	217	187
v/s Ratio Prot	c0.14			0.13		
v/s Ratio Perm			0.12		c0.03	0.01
v/c Ratio	0.20		0.17	0.19	0.21	0.06
Uniform Delay, d1	3.8		3.7	3.8	29.6	29.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		0.5	0.3	0.5	0.1
Delay (s)	4.1		4.2	4.1	30.1	29.2
Level of Service	A		A	A	C	C
Approach Delay (s)	4.1			4.1	29.5	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	12.7
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	128	99	139	247	477	307
Future Volume (vph)	128	99	139	247	477	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.935					0.850
Flt Protected	0.973			0.982		
Satd. Flow (prot)	2964	0	0	3240	1830	1512
Flt Permitted	0.973			0.982		
Satd. Flow (perm)	2964	0	0	3240	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	128	99	139	247	477	307
Shared Lane Traffic (%)						
Lane Group Flow (vph)	227	0	0	386	477	307
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

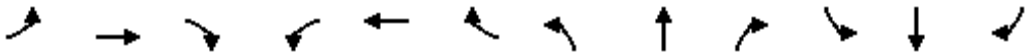
Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 52.7%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	128	99	139	247	477	307
Future Volume (veh/h)	128	99	139	247	477	307
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	128	99	139	247	477	307
Approach Volume (veh/h)	227			386	784	
Crossing Volume (veh/h)	477			128	139	
High Capacity (veh/h)	951			1253	1242	
High v/c (veh/h)	0.24			0.31	0.63	
Low Capacity (veh/h)	770			1041	1032	
Low v/c (veh/h)	0.29			0.37	0.76	

Intersection Summary			
Maximum v/c High	0.63		
Maximum v/c Low	0.76		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	67	9	43	70	757	71	36	410	19
Future Volume (vph)	15	4	13	67	9	43	70	757	71	36	410	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.97		0.99	0.98		1.00		0.97	1.00		0.97
Frt		0.885			0.876				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1589	0	1750	1428	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.723			0.746			0.507			0.356		
Satd. Flow (perm)	1265	1589	0	1365	1428	0	950	3579	1549	668	1883	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			43				71			45
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	67	9	43	70	757	71	36	410	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	67	52	0	70	757	71	36	410	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

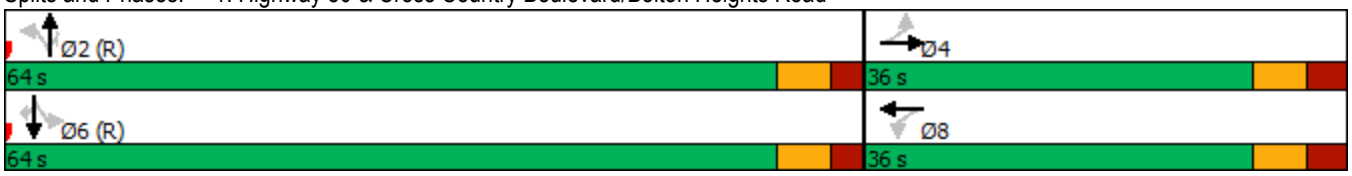


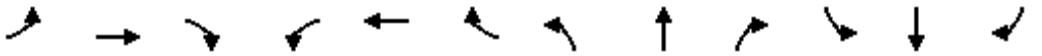
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0	64.0	64.0	64.0	64.0
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Maximum Green (s)	28.9	28.9		28.9	28.9		57.4	57.4	57.4	57.4	57.4	57.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	15	15		5	5		8	8	8	24	24	24
Act Effct Green (s)	17.0	17.0		17.0	17.0		73.6	73.6	73.6	73.6	73.6	73.6
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.74	0.74	0.74	0.74	0.74	0.74
v/c Ratio	0.07	0.06		0.29	0.19		0.10	0.29	0.06	0.07	0.30	0.02
Control Delay	29.6	15.6		35.6	12.4		8.1	7.4	2.5	8.4	8.2	0.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	15.6		35.6	12.4		8.1	7.4	2.5	8.4	8.2	0.7
LOS	C	B		D	B		A	A	A	A	A	A
Approach Delay		22.2			25.5			7.1			7.9	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	2.7	0.7		12.4	1.6		2.9	19.5	0.0	1.5	20.3	0.0
Queue Length 95th (m)	6.9	5.5		20.3	9.8		12.5	50.7	5.5	7.6	60.0	0.9
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	365	468		394	443		699	2635	1159	491	1386	1119
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	0.04	0.04		0.17	0.12		0.10	0.29	0.06	0.07	0.30	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 62.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

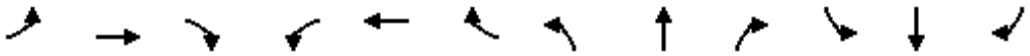




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	67	9	43	70	757	71	36	410	19
Future Volume (vph)	15	4	13	67	9	43	70	757	71	36	410	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1662	1582		1738	1424		1780	3579	1550	1783	1883	1505
Flt Permitted	0.72	1.00		0.75	1.00		0.51	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)	1265	1582		1365	1424		950	3579	1550	668	1883	1505
Peak-hour factor, PHF	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)	15	4	13	67	9	43	70	757	71	36	410	19
RTOR Reduction (vph)	0	11	0	0	36	0	0	0	21	0	0	6
Lane Group Flow (vph)	15	6	0	67	16	0	70	757	50	36	410	13
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	15.4	15.4		15.4	15.4		70.9	70.9	70.9	70.9	70.9	70.9
Effective Green, g (s)	15.4	15.4		15.4	15.4		70.9	70.9	70.9	70.9	70.9	70.9
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.71	0.71	0.71	0.71	0.71	0.71
Clearance Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	243		210	219		673	2537	1098	473	1335	1067
v/s Ratio Prot		0.00			0.01			0.21			c0.22	
v/s Ratio Perm	0.01			c0.05			0.07		0.03	0.05		0.01
v/c Ratio	0.08	0.02		0.32	0.07		0.10	0.30	0.05	0.08	0.31	0.01
Uniform Delay, d1	36.2	35.9		37.6	36.2		4.6	5.4	4.4	4.5	5.4	4.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.0		0.9	0.1		0.3	0.3	0.1	0.3	0.6	0.0
Delay (s)	36.4	36.0		38.5	36.3		4.9	5.7	4.5	4.8	6.0	4.3
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		36.2			37.6			5.5			5.8	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	90	0	69	0	576	216	107	315	2
Future Volume (vph)	1	0	2	90	0	69	0	576	216	107	315	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96				0.97	1.00		0.97
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1507	0	1675	1542	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.712			0.757						0.417		
Satd. Flow (perm)	1299	1507	0	1320	1542	0	1883	1883	1552	783	1883	792
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		549			311				216			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			1016.8	
Travel Time (s)		4.8			20.9			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	2	90	0	69	0	576	216	107	315	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	2	0	90	69	0	0	576	216	107	315	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

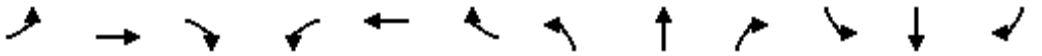


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	29.0	29.0		29.0	29.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.2%	32.2%		32.2%	32.2%		67.8%	67.8%	67.8%	67.8%	67.8%	67.8%
Maximum Green (s)	22.6	22.6		22.6	22.6		54.6	54.6	54.6	54.6	54.6	54.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	12.0	12.0		12.0	12.0			69.4	69.4	69.4	69.4	69.4
Actuated g/C Ratio	0.13	0.13		0.13	0.13			0.77	0.77	0.77	0.77	0.77
v/c Ratio	0.01	0.00		0.51	0.15			0.40	0.17	0.18	0.22	0.00
Control Delay	31.0	0.0		45.8	0.6			6.0	1.1	5.4	4.7	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	0.0		45.8	0.6			6.0	1.1	5.4	4.7	0.0
LOS	C	A		D	A			A	A	A	A	A
Approach Delay		10.3			26.2			4.7			4.9	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	0.2	0.0		14.8	0.0			32.4	0.0	4.8	14.8	0.0
Queue Length 95th (m)	1.5	0.0		27.7	0.0			61.3	6.3	12.9	29.5	0.0
Internal Link Dist (m)		29.3			207.8			617.5			992.8	
Turn Bay Length (m)	5.0			90.0						70.0		25.0
Base Capacity (vph)	326	789		331	620			1451	1245	603	1451	620
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.27	0.11			0.40	0.17	0.18	0.22	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 65.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	90	0	69	0	576	216	107	315	2
Future Volume (vph)	1	0	2	90	0	69	0	576	216	107	315	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.95		1.00	0.95			1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1493		1657	1529			1883	1553	1784	1883	792
Flt Permitted	0.71	1.00		0.76	1.00			1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)	1299	1493		1319	1529			1883	1553	784	1883	792
Peak-hour factor, PHF	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)	1	0	2	90	0	69	0	576	216	107	315	2
RTOR Reduction (vph)	0	2	0	0	61	0	0	0	56	0	0	1
Lane Group Flow (vph)	1	0	0	90	8	0	0	576	160	107	315	1
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	10.4	10.4		10.4	10.4			66.8	66.8	66.8	66.8	66.8
Effective Green, g (s)	10.4	10.4		10.4	10.4			66.8	66.8	66.8	66.8	66.8
Actuated g/C Ratio	0.12	0.12		0.12	0.12			0.74	0.74	0.74	0.74	0.74
Clearance Time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	150	172		152	176			1397	1152	581	1397	587
v/s Ratio Prot		0.00			0.01			c0.31			0.17	
v/s Ratio Perm	0.00			c0.07					0.10	0.14		0.00
v/c Ratio	0.01	0.00		0.59	0.05			0.41	0.14	0.18	0.23	0.00
Uniform Delay, d1	35.2	35.2		37.8	35.4			4.3	3.3	3.5	3.6	3.0
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		6.1	0.1			0.9	0.3	0.7	0.4	0.0
Delay (s)	35.2	35.2		43.8	35.5			5.2	3.6	4.2	4.0	3.0
Level of Service	D	D		D	D			A	A	A	A	A
Approach Delay (s)		35.2			40.2			4.8			4.0	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	239	72	50	129	23	32
Future Volume (vph)	239	72	50	129	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.8	3.8	3.2	3.8	3.5	3.5
Storage Length (m)		0.0	40.0		25.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			55.0		20.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00		0.99	0.97
Frt	0.969					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1771	0	1658	1646	1638	1413
Flt Permitted			0.571		0.950	
Satd. Flow (perm)	1771	0	992	1646	1624	1366
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	25					32
Link Speed (k/h)	40			40	40	
Link Distance (m)	231.8			207.6	217.2	
Travel Time (s)	20.9			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Adj. Flow (vph)	239	72	50	129	23	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	311	0	50	129	23	32
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.2			3.2	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.97	0.97	1.06	0.97	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru		Right
Leading Detector (m)	10.0		2.0	10.0	7.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	10.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	5.0	5.0
Minimum Split (s)	39.2		39.2	39.2	33.5	33.5
Total Split (s)	54.5		54.5	54.5	37.0	37.0
Total Split (%)	59.6%		59.6%	59.6%	40.4%	40.4%
Maximum Green (s)	48.3		48.3	48.3	30.5	30.5
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.2		3.2	3.2	3.5	3.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2		6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Max		Max	Max	None	None
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0		25.0	25.0	20.0	20.0
Pedestrian Calls (#/hr)	5		5	5	5	5
Act Effct Green (s)	64.7		64.7	64.7	10.1	10.1
Actuated g/C Ratio	0.82		0.82	0.82	0.13	0.13
v/c Ratio	0.21		0.06	0.10	0.11	0.16
Control Delay	4.7		5.4	4.9	30.5	11.9
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	4.7		5.4	4.9	30.5	11.9
LOS	A		A	A	C	B
Approach Delay	4.7			5.0	19.7	
Approach LOS	A			A	B	
Queue Length 50th (m)	9.8		1.5	4.0	3.5	0.0
Queue Length 95th (m)	39.4		8.9	18.2	8.5	6.3
Internal Link Dist (m)	207.8			183.6	193.2	
Turn Bay Length (m)			40.0		25.0	
Base Capacity (vph)	1451		810	1344	632	551
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.21		0.06	0.10	0.04	0.06

Intersection Summary	
Area Type:	Other
Cycle Length: 91.5	
Actuated Cycle Length: 79.2	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.21	

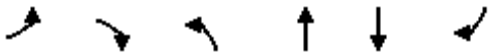
Intersection Signal Delay: 6.3	Intersection LOS: A
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	239	72	50	129	23	32
Future Volume (vph)	239	72	50	129	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.2	3.8	3.5	3.5
Total Lost time (s)	6.2		6.2	6.2	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	0.99	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1771		1652	1646	1625	1346
Flt Permitted	1.00		0.57	1.00	0.95	1.00
Satd. Flow (perm)	1771		993	1646	1625	1346
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	239	72	50	129	23	32
RTOR Reduction (vph)	6	0	0	0	0	29
Lane Group Flow (vph)	305	0	50	129	23	3
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Actuated Green, G (s)	61.9		61.9	61.9	7.4	7.4
Effective Green, g (s)	61.9		61.9	61.9	7.4	7.4
Actuated g/C Ratio	0.75		0.75	0.75	0.09	0.09
Clearance Time (s)	6.2		6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1336		749	1242	146	121
v/s Ratio Prot	c0.17			0.08		
v/s Ratio Perm			0.05		c0.01	0.00
v/c Ratio	0.23		0.07	0.10	0.16	0.02
Uniform Delay, d1	3.0		2.6	2.7	34.4	34.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		0.2	0.2	0.5	0.1
Delay (s)	3.4		2.8	2.8	34.9	34.1
Level of Service	A		A	A	C	C
Approach Delay (s)	3.4			2.8	34.4	
Approach LOS	A			A	C	

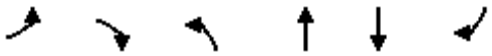
Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	82.0	Sum of lost time (s)	12.7
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	406	105	40	624	294	124
Future Volume (vph)	406	105	40	624	294	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.969					0.850
Flt Protected	0.962			0.997		
Satd. Flow (prot)	3303	0	0	3561	1812	1408
Flt Permitted	0.962			0.997		
Satd. Flow (perm)	3303	0	0	3561	1812	1408
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	5%	2%	6%	16%
Adj. Flow (vph)	406	105	40	624	294	124
Shared Lane Traffic (%)						
Lane Group Flow (vph)	511	0	0	664	294	124
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 58.8%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	406	105	40	624	294	124
Future Volume (veh/h)	406	105	40	624	294	124
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	406	105	40	624	294	124
Approach Volume (veh/h)	511			664	418	
Crossing Volume (veh/h)	294			406	40	
High Capacity (veh/h)	1100			1006	1342	
High v/c (veh/h)	0.46			0.66	0.31	
Low Capacity (veh/h)	903			819	1123	
Low v/c (veh/h)	0.57			0.81	0.37	

Intersection Summary			
Maximum v/c High	0.66		
Maximum v/c Low	0.81		
Intersection Capacity Utilization	58.8%	ICU Level of Service	B

MOVEMENT SUMMARY

Site: 101 [2030 FB AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	139	8.0	139	8.0	0.202	5.6	LOS A	0.6	4.2	0.22	0.12	0.22	49.5
2	T1	All MCs	247	12.0	247	12.0	0.202	5.8	LOS A	0.6	4.5	0.23	0.13	0.23	51.7
Approach			386	10.6	386	10.6	0.202	5.7	LOS A	0.6	4.5	0.23	0.13	0.23	50.9
North: Highway 50															
8	T1	All MCs	477	6.0	477	6.0	0.506	10.0	LOS A	2.9	21.3	0.44	0.24	0.44	49.6
9	R2	All MCs	307	8.0	307	8.0	0.330	7.3	LOS A	1.5	11.0	0.34	0.19	0.34	52.8
Approach			784	6.8	784	6.8	0.506	8.9	LOS A	2.9	21.3	0.40	0.22	0.40	50.8
West: Emil Kolb Parkway															
10	L2	All MCs	128	35.0	128	35.0	0.200	9.8	LOS A	0.7	5.1	0.52	0.44	0.52	47.2
12	R2	All MCs	99	9.0	99	9.0	0.200	7.8	LOS A	0.7	5.1	0.52	0.44	0.52	51.5
Approach			227	23.7	227	23.7	0.200	8.9	LOS A	0.7	5.1	0.52	0.44	0.52	49.0
All Vehicles			1397	10.6	1397	10.6	0.506	8.0	LOS A	2.9	21.3	0.37	0.23	0.37	50.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2030 FB PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

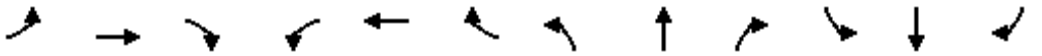
Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	40	14.0	40	14.0	0.404	10.2	LOS B	1.7	11.9	0.47	0.41	0.55	48.5
2	T1	All MCs	624	2.0	624	2.0	0.404	9.2	LOS A	1.7	11.9	0.46	0.40	0.54	49.9
Approach			664	2.7	664	2.7	0.404	9.3	LOS A	1.7	11.9	0.46	0.40	0.54	49.8
North: Highway 50															
8	T1	All MCs	294	3.0	294	3.0	0.276	5.8	LOS A	1.2	8.9	0.17	0.06	0.17	52.5
9	R2	All MCs	124	20.0	124	20.0	0.127	4.7	LOS A	0.4	3.6	0.14	0.05	0.14	54.3
Approach			418	8.0	418	8.0	0.276	5.5	LOS A	1.2	8.9	0.16	0.05	0.16	53.0
West: Emil Kolb Parkway															
10	L2	All MCs	406	2.0	406	2.0	0.310	7.8	LOS A	1.3	9.3	0.47	0.33	0.47	48.9
12	R2	All MCs	105	2.0	105	2.0	0.310	7.8	LOS A	1.3	9.3	0.47	0.33	0.47	50.3
Approach			511	2.0	511	2.0	0.310	7.8	LOS A	1.3	9.3	0.47	0.33	0.47	49.2
All Vehicles			1593	3.9	1593	3.9	0.404	7.8	LOS A	1.7	11.9	0.38	0.29	0.42	50.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix M

2033 FB Synchro and Sidra Worksheets



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	178	21	84	19	320	87	65	499	5
Future Volume (vph)	15	31	26	178	21	84	19	320	87	65	499	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.98		0.99	0.98		1.00		0.97	1.00		0.96
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1681	0	1750	1345	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.689			0.525			0.428			0.558		
Satd. Flow (perm)	1257	1681	0	961	1345	0	737	3510	1541	1028	1865	1312
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			84				87			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	178	21	84	19	320	87	65	499	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	178	105	0	19	320	87	65	499	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

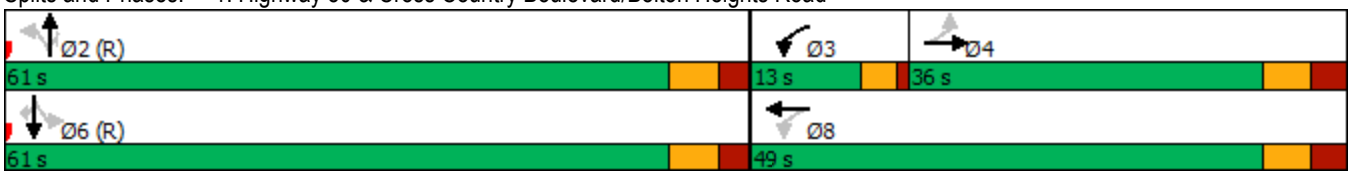
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		13.0	49.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.7%	32.7%		11.8%	44.5%		55.5%	55.5%	55.5%	55.5%	55.5%	55.5%
Maximum Green (s)	28.9	28.9		9.0	41.9		54.4	54.4	54.4	54.4	54.4	54.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		2	2	2	6	6	6
Act Effct Green (s)	12.4	12.4		25.9	22.8		73.5	73.5	73.5	73.5	73.5	73.5
Actuated g/C Ratio	0.11	0.11		0.24	0.21		0.67	0.67	0.67	0.67	0.67	0.67
v/c Ratio	0.11	0.27		0.61	0.30		0.04	0.14	0.08	0.09	0.40	0.01
Control Delay	40.9	28.2		42.6	11.5		10.4	8.7	2.8	10.1	11.7	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	28.2		42.6	11.5		10.4	8.7	2.8	10.1	11.7	0.0
LOS	D	C		D	B		B	A	A	B	B	A
Approach Delay		30.8			31.1			7.5			11.4	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		33.5	3.7		1.2	11.2	0.0	4.2	41.3	0.0
Queue Length 95th (m)	7.6	14.9		40.5	13.7		6.1	27.6	7.8	15.2	101.6	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	330	460		294	564		492	2343	1058	686	1245	902
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	0.05	0.12		0.61	0.19		0.04	0.14	0.08	0.09	0.40	0.01

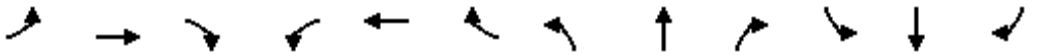
Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 74.1%	ICU Level of Service D
Analysis Period (min) 15	

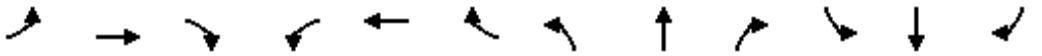
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



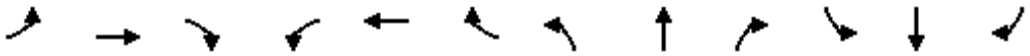


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	178	21	84	19	320	87	65	499	5
Future Volume (vph)	15	31	26	178	21	84	19	320	87	65	499	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1671		1744	1342		1635	3510	1543	1750	1865	1313
Flt Permitted	0.69	1.00		0.53	1.00		0.43	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)	1257	1671		964	1342		736	3510	1543	1028	1865	1313
Peak-hour factor, PHF	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)	15	31	26	178	21	84	19	320	87	65	499	5
RTOR Reduction (vph)	0	23	0	0	66	0	0	0	30	0	0	2
Lane Group Flow (vph)	15	34	0	178	39	0	19	320	57	65	499	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	10.8	10.8		24.2	24.2		72.1	72.1	72.1	72.1	72.1	72.1
Effective Green, g (s)	10.8	10.8		24.2	24.2		72.1	72.1	72.1	72.1	72.1	72.1
Actuated g/C Ratio	0.10	0.10		0.22	0.22		0.66	0.66	0.66	0.66	0.66	0.66
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	123	164		278	295		482	2300	1011	673	1222	860
v/s Ratio Prot		0.02		c0.05	0.03			0.09			c0.27	
v/s Ratio Perm	0.01			c0.09			0.03		0.04	0.06		0.00
v/c Ratio	0.12	0.20		0.64	0.13		0.04	0.14	0.06	0.10	0.41	0.00
Uniform Delay, d1	45.3	45.6		37.5	34.5		6.7	7.2	6.8	7.0	8.9	6.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.6		5.0	0.2		0.2	0.1	0.1	0.3	1.0	0.0
Delay (s)	45.7	46.3		42.4	34.7		6.9	7.3	6.9	7.3	9.9	6.6
Level of Service	D	D		D	C		A	A	A	A	A	A
Approach Delay (s)		46.2			39.6			7.2			9.6	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	12	166	0	177	1	224	151	140	474	4
Future Volume (vph)	6	1	12	166	0	177	1	224	151	140	474	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.97		0.99	0.97		1.00		0.97	0.99		0.97
Frt		0.862			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1321	0	1691	1435	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.587			0.749			0.457			0.619		
Satd. Flow (perm)	781	1321	0	1319	1435	0	858	1746	1425	1056	1847	1189
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			552				151			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			1016.8	
Travel Time (s)		4.8			21.4			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	12	166	0	177	1	224	151	140	474	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	13	0	166	177	0	1	224	151	140	474	4
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

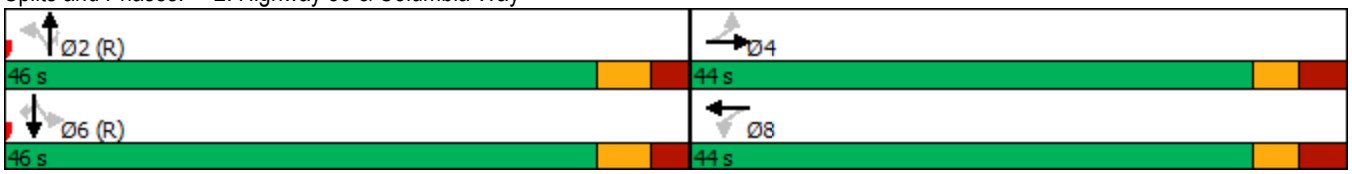


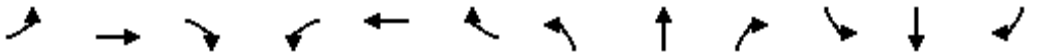
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	44.0	44.0		44.0	44.0		46.0	46.0	46.0	46.0	46.0	46.0
Total Split (%)	48.9%	48.9%		48.9%	48.9%		51.1%	51.1%	51.1%	51.1%	51.1%	51.1%
Maximum Green (s)	37.6	37.6		37.6	37.6		39.6	39.6	39.6	39.6	39.6	39.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	17.1	17.1		17.1	17.1		60.1	60.1	60.1	60.1	60.1	60.1
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.67	0.67	0.67	0.67	0.67	0.67
v/c Ratio	0.04	0.05		0.66	0.25		0.00	0.19	0.15	0.20	0.38	0.00
Control Delay	26.8	14.2		45.8	0.8		7.0	7.1	1.7	7.8	8.7	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.8	14.2		45.8	0.8		7.0	7.1	1.7	7.8	8.7	0.0
LOS	C	B		D	A		A	A	A	A	A	A
Approach Delay		18.2			22.6			5.0			8.5	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	0.9	0.2		26.8	0.0		0.1	13.0	0.0	8.2	32.2	0.0
Queue Length 95th (m)	3.7	4.4		42.9	0.0		0.7	27.9	7.0	20.0	62.8	0.0
Internal Link Dist (m)		29.3			213.8			617.5			992.8	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	326	558		551	920		573	1166	1002	705	1233	807
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.02		0.30	0.19		0.00	0.19	0.15	0.20	0.38	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 11.2	Intersection LOS: B
Intersection Capacity Utilization 64.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	12	166	0	177	1	224	151	140	474	4
Future Volume (vph)	6	1	12	166	0	177	1	224	151	140	474	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1265	1314		1673	1428		1783	1746	1427	1621	1847	1191
Flt Permitted	0.59	1.00		0.75	1.00		0.46	1.00	1.00	0.62	1.00	1.00
Satd. Flow (perm)	781	1314		1319	1428		857	1746	1427	1055	1847	1191
Peak-hour factor, PHF	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)	6	1	12	166	0	177	1	224	151	140	474	4
RTOR Reduction (vph)	0	10	0	0	143	0	0	0	50	0	0	1
Lane Group Flow (vph)	6	3	0	166	34	0	1	224	101	140	474	3
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	17.1	17.1		17.1	17.1		60.1	60.1	60.1	60.1	60.1	60.1
Effective Green, g (s)	17.1	17.1		17.1	17.1		60.1	60.1	60.1	60.1	60.1	60.1
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.67	0.67	0.67	0.67	0.67	0.67
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	148	249		250	271		572	1165	952	704	1233	795
v/s Ratio Prot		0.00			0.02			0.13			c0.26	
v/s Ratio Perm	0.01			c0.13			0.00		0.07	0.13		0.00
v/c Ratio	0.04	0.01		0.66	0.12		0.00	0.19	0.11	0.20	0.38	0.00
Uniform Delay, d1	29.8	29.6		33.8	30.2		5.0	5.7	5.3	5.7	6.7	5.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		6.5	0.2		0.0	0.4	0.2	0.6	0.9	0.0
Delay (s)	29.9	29.6		40.3	30.4		5.0	6.1	5.6	6.4	7.6	5.0
Level of Service	C	C		D	C		A	A	A	A	A	A
Approach Delay (s)		29.7			35.2			5.9			7.3	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

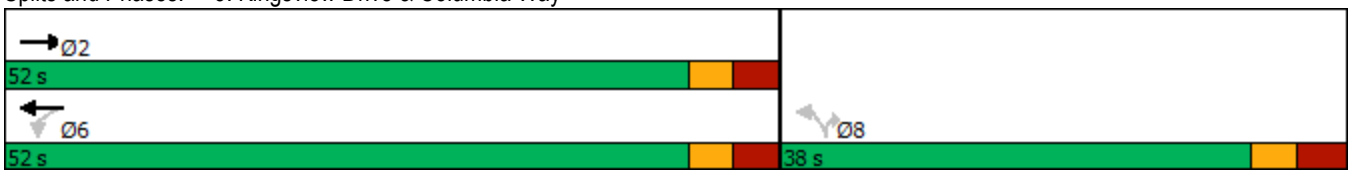
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	254	30	128	273	46	95
Future Volume (vph)	254	30	128	273	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.8	3.8	3.2	3.8	3.5	3.5
Storage Length (m)		0.0	40.0		25.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			55.0		20.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		1.00		0.99	0.97
Frt	0.986					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1855	0	1691	1904	1750	1566
Flt Permitted			0.586		0.950	
Satd. Flow (perm)	1855	0	1038	1904	1735	1513
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	10					95
Link Speed (k/h)	40			40	40	
Link Distance (m)	237.8			207.6	217.2	
Travel Time (s)	21.4			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Adj. Flow (vph)	254	30	128	273	46	95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	284	0	128	273	46	95
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.2			3.2	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.97	0.97	1.06	0.97	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru		Right
Leading Detector (m)	10.0		2.0	10.0	7.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	10.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	7.0	7.0
Minimum Split (s)	39.2		39.2	39.2	33.5	33.5
Total Split (s)	52.0		52.0	52.0	38.0	38.0
Total Split (%)	57.8%		57.8%	57.8%	42.2%	42.2%
Maximum Green (s)	45.8		45.8	45.8	31.5	31.5
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.2		3.2	3.2	3.5	3.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2		6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Max		Max	Max	None	None
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0		25.0	25.0	20.0	20.0
Pedestrian Calls (#/hr)	5		5	5	5	5
Act Effct Green (s)	54.5		54.5	54.5	10.9	10.9
Actuated g/C Ratio	0.74		0.74	0.74	0.15	0.15
v/c Ratio	0.21		0.17	0.19	0.18	0.31
Control Delay	5.9		6.7	6.0	26.9	8.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	5.9		6.7	6.0	26.9	8.5
LOS	A		A	A	C	A
Approach Delay	5.9			6.2	14.5	
Approach LOS	A			A	B	
Queue Length 50th (m)	9.7		4.4	9.6	5.6	0.0
Queue Length 95th (m)	37.3		20.4	36.5	12.5	9.9
Internal Link Dist (m)	213.8			183.6	193.2	
Turn Bay Length (m)			40.0		25.0	
Base Capacity (vph)	1370		765	1404	747	705
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.21		0.17	0.19	0.06	0.13

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 73.9	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.31	

Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

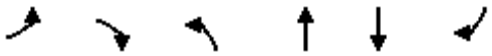
Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	254	30	128	273	46	95
Future Volume (vph)	254	30	128	273	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.2	3.8	3.5	3.5
Total Lost time (s)	6.2		6.2	6.2	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00		1.00	1.00	0.99	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1855		1684	1904	1738	1501
Flt Permitted	1.00		0.59	1.00	0.95	1.00
Satd. Flow (perm)	1855		1038	1904	1738	1501
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	254	30	128	273	46	95
RTOR Reduction (vph)	3	0	0	0	0	83
Lane Group Flow (vph)	281	0	128	273	46	12
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Actuated Green, G (s)	53.1		53.1	53.1	9.4	9.4
Effective Green, g (s)	53.1		53.1	53.1	9.4	9.4
Actuated g/C Ratio	0.71		0.71	0.71	0.12	0.12
Clearance Time (s)	6.2		6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1309		732	1344	217	187
v/s Ratio Prot	c0.15			0.14		
v/s Ratio Perm			0.12		c0.03	0.01
v/c Ratio	0.21		0.17	0.20	0.21	0.06
Uniform Delay, d1	3.8		3.7	3.8	29.6	29.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		0.5	0.3	0.5	0.1
Delay (s)	4.2		4.2	4.1	30.1	29.2
Level of Service	A		A	A	C	C
Approach Delay (s)	4.2			4.2	29.5	
Approach LOS	A			A	C	

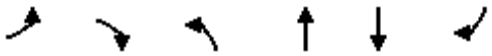
Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	75.2	Sum of lost time (s)	12.7
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



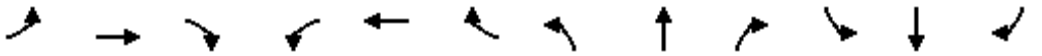
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	133	103	145	259	499	321
Future Volume (vph)	133	103	145	259	499	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.935					0.850
Flt Protected	0.973			0.982		
Satd. Flow (prot)	2964	0	0	3240	1830	1512
Flt Permitted	0.973			0.982		
Satd. Flow (perm)	2964	0	0	3240	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	133	103	145	259	499	321
Shared Lane Traffic (%)						
Lane Group Flow (vph)	236	0	0	404	499	321
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

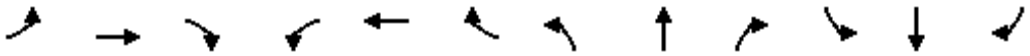


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	133	103	145	259	499	321
Future Volume (veh/h)	133	103	145	259	499	321
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	133	103	145	259	499	321
Approach Volume (veh/h)	236			404	820	
Crossing Volume (veh/h)	499			133	145	
High Capacity (veh/h)	934			1248	1236	
High v/c (veh/h)	0.25			0.32	0.66	
Low Capacity (veh/h)	755			1037	1026	
Low v/c (veh/h)	0.31			0.39	0.80	

Intersection Summary			
Maximum v/c High	0.66		
Maximum v/c Low	0.80		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	71	10	45	70	791	76	38	428	19
Future Volume (vph)	15	4	13	71	10	45	70	791	76	38	428	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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		0.99	0.98		1.00		0.97	1.00		0.97
Frt		0.885			0.877				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1591	0	1750	1431	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.721			0.746			0.499			0.344		
Satd. Flow (perm)	1261	1591	0	1365	1431	0	936	3579	1548	646	1883	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			45				76			45
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	71	10	45	70	791	76	38	428	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	71	55	0	70	791	76	38	428	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

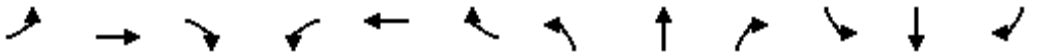


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		44.0	44.0		56.0	56.0	56.0	56.0	56.0	56.0
Total Split (%)	44.0%	44.0%		44.0%	44.0%		56.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Maximum Green (s)	36.9	36.9		36.9	36.9		49.4	49.4	49.4	49.4	49.4	49.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	15.3	15.3		15.3	15.3		75.3	75.3	75.3	75.3	75.3	75.3
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.75	0.75	0.75	0.75	0.75	0.75
v/c Ratio	0.08	0.07		0.34	0.21		0.10	0.29	0.06	0.08	0.30	0.02
Control Delay	31.1	16.2		38.8	13.2		7.9	7.0	2.6	8.3	7.9	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	16.2		38.8	13.2		7.9	7.0	2.6	8.3	7.9	0.9
LOS	C	B		D	B		A	A	A	A	A	A
Approach Delay		23.2			27.6			6.7			7.6	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	2.7	0.7		13.1	1.8		3.0	20.9	0.0	1.6	21.8	0.0
Queue Length 95th (m)	6.1	4.9		18.9	9.0		14.9	63.8	6.8	9.6	75.3	1.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	465	595		503	556		704	2695	1184	486	1418	1144
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03		0.14	0.10		0.10	0.29	0.06	0.08	0.30	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	

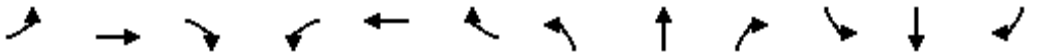
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 63.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

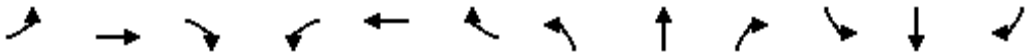


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	71	10	45	70	791	76	38	428	19
Future Volume (vph)	15	4	13	71	10	45	70	791	76	38	428	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1662	1581		1738	1426		1780	3579	1550	1784	1883	1505
Flt Permitted	0.72	1.00		0.75	1.00		0.50	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	1261	1581		1365	1426		936	3579	1550	647	1883	1505
Peak-hour factor, PHF	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)	15	4	13	71	10	45	70	791	76	38	428	19
RTOR Reduction (vph)	0	11	0	0	39	0	0	0	21	0	0	5
Lane Group Flow (vph)	15	6	0	71	16	0	70	791	55	38	428	14
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.7	13.7		13.7	13.7		72.6	72.6	72.6	72.6	72.6	72.6
Effective Green, g (s)	13.7	13.7		13.7	13.7		72.6	72.6	72.6	72.6	72.6	72.6
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	216		187	195		679	2598	1125	469	1367	1092
v/s Ratio Prot		0.00			0.01			0.22			c0.23	
v/s Ratio Perm	0.01			c0.05			0.07		0.04	0.06		0.01
v/c Ratio	0.09	0.03		0.38	0.08		0.10	0.30	0.05	0.08	0.31	0.01
Uniform Delay, d1	37.7	37.4		39.3	37.7		4.1	4.8	3.9	4.0	4.9	3.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		1.3	0.2		0.3	0.3	0.1	0.3	0.6	0.0
Delay (s)	37.9	37.4		40.6	37.8		4.4	5.1	4.0	4.3	5.5	3.8
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		37.7			39.4			5.0			5.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	95	0	73	0	602	229	113	330	2
Future Volume (vph)	1	0	2	95	0	73	0	602	229	113	330	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96				0.97	1.00		0.97
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1507	0	1675	1543	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.709			0.757						0.399		
Satd. Flow (perm)	1293	1507	0	1320	1543	0	1883	1883	1552	750	1883	792
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		525			287				229			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			1016.8	
Travel Time (s)		4.8			20.9			38.5			61.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	2	95	0	73	0	602	229	113	330	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	2	0	95	73	0	0	602	229	113	330	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

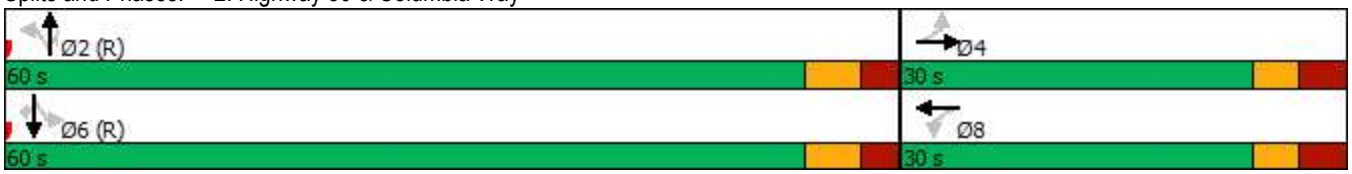


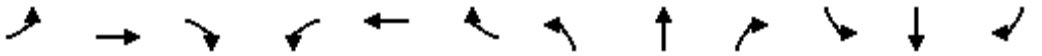
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	30.0	30.0		30.0	30.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	23.6	23.6		23.6	23.6		53.6	53.6	53.6	53.6	53.6	53.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	13.0	13.0		13.0	13.0			68.3	68.3	68.3	68.3	68.3
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.01	0.00		0.50	0.16			0.42	0.19	0.20	0.23	0.00
Control Delay	29.0	0.0		43.1	0.7			7.0	1.3	6.4	5.4	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	0.0		43.1	0.7			7.0	1.3	6.4	5.4	0.0
LOS	C	A		D	A			A	A	A	A	A
Approach Delay		9.7			24.7			5.4			5.6	
Approach LOS		A			C			A			A	
Queue Length 50th (m)	0.2	0.0		15.5	0.0			35.4	0.0	5.3	16.0	0.0
Queue Length 95th (m)	1.4	0.0		27.0	0.0			76.8	7.5	16.2	36.4	0.0
Internal Link Dist (m)		29.3			207.8			617.5			992.8	
Turn Bay Length (m)	5.0			90.0						70.0		25.0
Base Capacity (vph)	339	782		346	616			1429	1233	569	1429	611
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.27	0.12			0.42	0.19	0.20	0.23	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 7.7	Intersection LOS: A
Intersection Capacity Utilization 67.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	95	0	73	0	602	229	113	330	2
Future Volume (vph)	1	0	2	95	0	73	0	602	229	113	330	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96			1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1495		1657	1531			1883	1553	1784	1883	792
Flt Permitted	0.71	1.00		0.76	1.00			1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	1294	1495		1319	1531			1883	1553	749	1883	792
Peak-hour factor, PHF	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)	1	0	2	95	0	73	0	602	229	113	330	2
RTOR Reduction (vph)	0	2	0	0	64	0	0	0	62	0	0	1
Lane Group Flow (vph)	1	0	0	95	9	0	0	602	167	113	330	1
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	11.4	11.4		11.4	11.4			65.8	65.8	65.8	65.8	65.8
Effective Green, g (s)	11.4	11.4		11.4	11.4			65.8	65.8	65.8	65.8	65.8
Actuated g/C Ratio	0.13	0.13		0.13	0.13			0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	189		167	193			1376	1135	547	1376	579
v/s Ratio Prot		0.00			0.01			c0.32			0.18	
v/s Ratio Perm	0.00			c0.07					0.11	0.15		0.00
v/c Ratio	0.01	0.00		0.57	0.05			0.44	0.15	0.21	0.24	0.00
Uniform Delay, d1	34.3	34.3		37.0	34.5			4.8	3.6	3.8	3.9	3.3
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		4.4	0.1			1.0	0.3	0.9	0.4	0.0
Delay (s)	34.4	34.3		41.4	34.6			5.8	3.9	4.7	4.4	3.3
Level of Service	C	C		D	C			A	A	A	A	A
Approach Delay (s)		34.3			38.4			5.3			4.4	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	254	72	50	137	23	32
Future Volume (vph)	254	72	50	137	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.8	3.8	3.2	3.8	3.5	3.5
Storage Length (m)		0.0	40.0		25.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			55.0		20.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00		0.99	0.97
Frt	0.970					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1773	0	1658	1646	1638	1413
Flt Permitted			0.563		0.950	
Satd. Flow (perm)	1773	0	979	1646	1624	1365
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	24					32
Link Speed (k/h)	40			40	40	
Link Distance (m)	231.8			207.6	217.2	
Travel Time (s)	20.9			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Adj. Flow (vph)	254	72	50	137	23	32
Shared Lane Traffic (%)						
Lane Group Flow (vph)	326	0	50	137	23	32
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.2			3.2	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.97	0.97	1.06	0.97	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru		Right
Leading Detector (m)	10.0		2.0	10.0	7.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	10.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	5.0	5.0
Minimum Split (s)	39.2		39.2	39.2	33.5	33.5
Total Split (s)	55.5		55.5	55.5	37.0	37.0
Total Split (%)	60.0%		60.0%	60.0%	40.0%	40.0%
Maximum Green (s)	49.3		49.3	49.3	30.5	30.5
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.2		3.2	3.2	3.5	3.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2		6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Max		Max	Max	None	None
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0		25.0	25.0	20.0	20.0
Pedestrian Calls (#/hr)	5		5	5	5	5
Act Effct Green (s)	65.8		65.8	65.8	10.1	10.1
Actuated g/C Ratio	0.82		0.82	0.82	0.13	0.13
v/c Ratio	0.22		0.06	0.10	0.11	0.16
Control Delay	4.7		5.4	4.8	31.1	12.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	4.7		5.4	4.8	31.1	12.1
LOS	A		A	A	C	B
Approach Delay	4.7			5.0	20.1	
Approach LOS	A			A	C	
Queue Length 50th (m)	10.4		1.5	4.3	3.5	0.0
Queue Length 95th (m)	41.5		8.8	19.1	8.6	6.5
Internal Link Dist (m)	207.8			183.6	193.2	
Turn Bay Length (m)			40.0		25.0	
Base Capacity (vph)	1456		802	1348	624	544
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.22		0.06	0.10	0.04	0.06

Intersection Summary	
Area Type:	Other
Cycle Length: 92.5	
Actuated Cycle Length: 80.3	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.22	

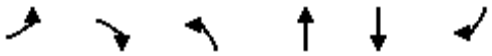
Intersection Signal Delay: 6.3	Intersection LOS: A
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	254	72	50	137	23	32
Future Volume (vph)	254	72	50	137	23	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.2	3.8	3.5	3.5
Total Lost time (s)	6.2		6.2	6.2	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	0.99		1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00		1.00	1.00	0.99	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1774		1652	1646	1625	1346
Flt Permitted	1.00		0.56	1.00	0.95	1.00
Satd. Flow (perm)	1774		980	1646	1625	1346
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	254	72	50	137	23	32
RTOR Reduction (vph)	6	0	0	0	0	29
Lane Group Flow (vph)	320	0	50	137	23	3
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	6%	4%	4%	18%	9%	13%
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Actuated Green, G (s)	62.9		62.9	62.9	7.5	7.5
Effective Green, g (s)	62.9		62.9	62.9	7.5	7.5
Actuated g/C Ratio	0.76		0.76	0.76	0.09	0.09
Clearance Time (s)	6.2		6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1342		741	1245	146	121
v/s Ratio Prot	c0.18			0.08		
v/s Ratio Perm			0.05		c0.01	0.00
v/c Ratio	0.24		0.07	0.11	0.16	0.02
Uniform Delay, d1	3.0		2.6	2.7	34.9	34.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		0.2	0.2	0.5	0.1
Delay (s)	3.4		2.8	2.9	35.4	34.5
Level of Service	A		A	A	D	C
Approach Delay (s)	3.4			2.8	34.9	
Approach LOS	A			A	C	

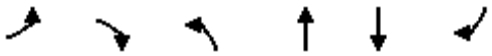
Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	12.7
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	425	110	42	652	308	130
Future Volume (vph)	425	110	42	652	308	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.969					0.850
Flt Protected	0.962			0.997		
Satd. Flow (prot)	3303	0	0	3561	1812	1408
Flt Permitted	0.962			0.997		
Satd. Flow (perm)	3303	0	0	3561	1812	1408
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	5%	2%	6%	16%
Adj. Flow (vph)	425	110	42	652	308	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	535	0	0	694	308	130
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	425	110	42	652	308	130
Future Volume (veh/h)	425	110	42	652	308	130
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	425	110	42	652	308	130
Approach Volume (veh/h)	535			694	438	
Crossing Volume (veh/h)	308			425	42	
High Capacity (veh/h)	1087			991	1340	
High v/c (veh/h)	0.49			0.70	0.33	
Low Capacity (veh/h)	892			806	1121	
Low v/c (veh/h)	0.60			0.86	0.39	

Intersection Summary			
Maximum v/c High	0.70		
Maximum v/c Low	0.86		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B

MOVEMENT SUMMARY

Site: 101 [2033 FB AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	145	8.0	145	8.0	0.213	5.7	LOS A	0.6	4.5	0.23	0.13	0.23	49.4
2	T1	All MCs	259	12.0	259	12.0	0.213	5.9	LOS A	0.6	4.8	0.24	0.13	0.24	51.6
Approach			404	10.6	404	10.6	0.213	5.8	LOS A	0.6	4.8	0.23	0.13	0.23	50.8
North: Highway 50															
8	T1	All MCs	499	6.0	499	6.0	0.533	10.5	LOS B	3.2	23.3	0.46	0.26	0.46	49.2
9	R2	All MCs	321	8.0	321	8.0	0.347	7.6	LOS A	1.6	11.8	0.36	0.20	0.36	52.6
Approach			820	6.8	820	6.8	0.533	9.4	LOS A	3.2	23.3	0.42	0.24	0.42	50.5
West: Emil Kolb Parkway															
10	L2	All MCs	133	35.0	133	35.0	0.214	10.2	LOS B	0.7	5.5	0.53	0.46	0.53	47.0
12	R2	All MCs	103	9.0	103	9.0	0.214	8.2	LOS A	0.7	5.5	0.53	0.46	0.53	51.2
Approach			236	23.7	236	23.7	0.214	9.3	LOS A	0.7	5.5	0.53	0.46	0.53	48.7
All Vehicles			1460	10.6	1460	10.6	0.533	8.4	LOS A	3.2	23.3	0.39	0.24	0.39	50.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2033 FB PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

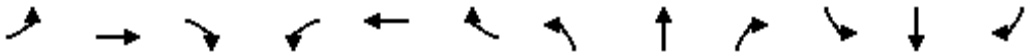
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	42	14.0	42	14.0	0.428	10.8	LOS B	1.9	13.9	0.49	0.45	0.63	48.2
2	T1	All MCs	652	2.0	652	2.0	0.428	9.7	LOS A	1.9	13.9	0.48	0.44	0.61	49.5
Approach			694	2.7	694	2.7	0.428	9.8	LOS A	1.9	13.9	0.48	0.44	0.61	49.4
North: Highway 50															
8	T1	All MCs	308	3.0	308	3.0	0.290	6.0	LOS A	1.3	9.5	0.17	0.06	0.17	52.4
9	R2	All MCs	130	20.0	130	20.0	0.133	4.8	LOS A	0.5	3.8	0.14	0.05	0.14	54.2
Approach			438	8.0	438	8.0	0.290	5.6	LOS A	1.3	9.5	0.16	0.06	0.16	52.9
West: Emil Kolb Parkway															
10	L2	All MCs	425	2.0	425	2.0	0.329	8.2	LOS A	1.4	10.0	0.49	0.35	0.49	48.7
12	R2	All MCs	110	2.0	110	2.0	0.329	8.2	LOS A	1.4	10.0	0.49	0.35	0.49	50.1
Approach			535	2.0	535	2.0	0.329	8.2	LOS A	1.4	10.0	0.49	0.35	0.49	49.0
All Vehicles			1667	3.9	1667	3.9	0.428	8.2	LOS A	1.9	13.9	0.40	0.31	0.46	50.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix N

2035 FB Synchro and Sidra Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	185	22	88	19	330	90	67	514	5
Future Volume (vph)	15	31	26	185	22	88	19	330	90	67	514	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.99		0.99	0.98		1.00		0.98	1.00		0.97
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1686	0	1750	1347	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.686			0.574			0.412			0.553		
Satd. Flow (perm)	1252	1686	0	1050	1347	0	710	3510	1547	1019	1865	1317
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			88				90			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)						1						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	185	22	88	19	330	90	67	514	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	185	110	0	19	330	90	67	514	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

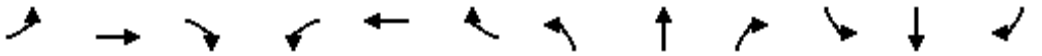


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	43.1	43.1		9.0	52.1		57.9	57.9	57.9	57.9	57.9	57.9
Total Split (%)	39.2%	39.2%		8.2%	47.4%		52.6%	52.6%	52.6%	52.6%	52.6%	52.6%
Maximum Green (s)	36.0	36.0		5.0	45.0		51.3	51.3	51.3	51.3	51.3	51.3
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		5	5	5	6	6	6
Act Effct Green (s)	17.4	17.4		27.7	24.6		71.7	71.7	71.7	71.7	71.7	71.7
Actuated g/C Ratio	0.16	0.16		0.25	0.22		0.65	0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.08	0.20		0.61	0.30		0.04	0.14	0.09	0.10	0.42	0.01
Control Delay	32.9	22.2		41.1	9.9		12.6	10.1	3.4	12.0	13.8	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	22.2		41.1	9.9		12.6	10.1	3.4	12.0	13.8	0.0
LOS	C	C		D	A		B	B	A	B	B	A
Approach Delay		24.4			29.5			8.9			13.5	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		36.7	4.1		1.0	10.0	0.0	3.7	37.1	0.0
Queue Length 95th (m)	6.9	13.5		39.7	13.5		6.5	30.3	8.3	16.6	112.2	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	409	569		303	603		462	2287	1039	664	1215	886
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	0.04	0.10		0.61	0.18		0.04	0.14	0.09	0.10	0.42	0.01

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	

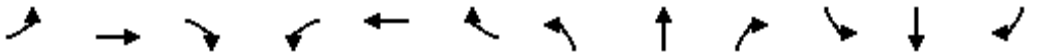
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 16.0	Intersection LOS: B
Intersection Capacity Utilization 75.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

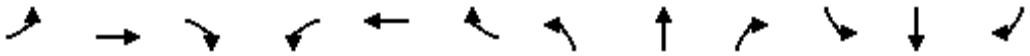


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	185	22	88	19	330	90	67	514	5
Future Volume (vph)	15	31	26	185	22	88	19	330	90	67	514	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1686		1744	1347		1636	3510	1547	1750	1865	1317
Flt Permitted	0.69	1.00		0.57	1.00		0.41	1.00	1.00	0.55	1.00	1.00
Satd. Flow (perm)	1252	1686		1054	1347		709	3510	1547	1018	1865	1317
Peak-hour factor, PHF	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)	15	31	26	185	22	88	19	330	90	67	514	5
RTOR Reduction (vph)	0	22	0	0	67	0	0	0	32	0	0	2
Lane Group Flow (vph)	15	35	0	185	43	0	19	330	58	67	514	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Effective Green, g (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Actuated g/C Ratio	0.14	0.14		0.24	0.24		0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	242		288	318		453	2243	988	650	1191	841
v/s Ratio Prot		0.02		c0.04	0.03			0.09			c0.28	
v/s Ratio Perm	0.01			c0.12			0.03		0.04	0.07		0.00
v/c Ratio	0.08	0.14		0.64	0.13		0.04	0.15	0.06	0.10	0.43	0.00
Uniform Delay, d1	40.8	41.2		37.5	33.1		7.4	7.9	7.4	7.7	9.9	7.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3		4.8	0.2		0.2	0.1	0.1	0.3	1.1	0.0
Delay (s)	41.0	41.5		42.3	33.3		7.5	8.0	7.6	8.0	11.0	7.2
Level of Service	D	D		D	C		A	A	A	A	B	A
Approach Delay (s)		41.4			39.0			7.9			10.7	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	13	172	0	184	1	231	157	146	488	4
Future Volume (vph)	6	1	13	172	0	184	1	231	157	146	488	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.861			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1363	0	1691	1487	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.573			0.748			0.446			0.615		
Satd. Flow (perm)	769	1363	0	1331	1487	0	840	1746	1471	1055	1847	1228
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			566				157			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			1016.8	
Travel Time (s)		4.8			21.4			38.5			61.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	13	172	0	184	1	231	157	146	488	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	14	0	172	184	0	1	231	157	146	488	4
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm

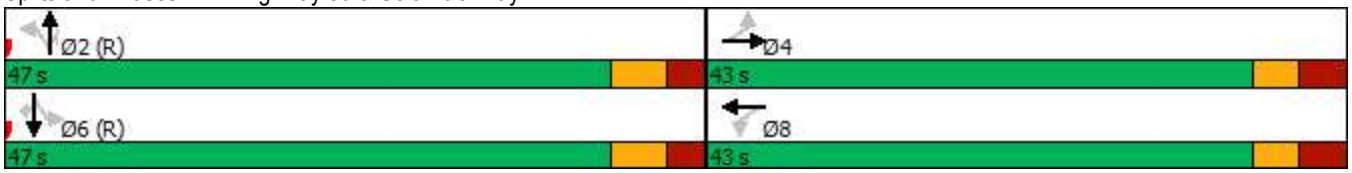


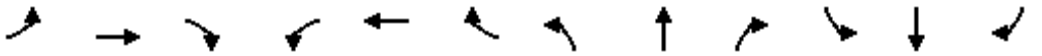
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	43.0	43.0		43.0	43.0		47.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	47.8%	47.8%		47.8%	47.8%		52.2%	52.2%	52.2%	52.2%	52.2%	52.2%
Maximum Green (s)	36.6	36.6		36.6	36.6		40.6	40.6	40.6	40.6	40.6	40.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	17.4	17.4		17.4	17.4		59.8	59.8	59.8	59.8	59.8	59.8
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.66	0.66	0.66	0.66	0.66	0.66
v/c Ratio	0.04	0.05		0.67	0.25		0.00	0.20	0.15	0.21	0.40	0.00
Control Delay	26.5	13.6		45.7	0.8		7.0	7.3	1.7	8.0	9.0	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	13.6		45.7	0.8		7.0	7.3	1.7	8.0	9.0	0.0
LOS	C	B		D	A		A	A	A	A	A	A
Approach Delay		17.4			22.5			5.1			8.7	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	0.9	0.2		27.8	0.0		0.1	13.6	0.0	8.7	34.0	0.0
Queue Length 95th (m)	3.6	4.5		43.9	0.0		0.7	29.0	7.2	21.2	65.9	0.0
Internal Link Dist (m)		29.3			213.8			617.5			992.8	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	312	562		541	940		558	1160	1030	701	1227	829
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.02		0.32	0.20		0.00	0.20	0.15	0.21	0.40	0.00

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: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 11.3		Intersection LOS: B	
Intersection Capacity Utilization 64.5%		ICU Level of Service C	

Analysis Period (min) 15

Splits and Phases: 2: Highway 50 & Columbia Way





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	13	172	0	184	1	231	157	146	488	4
Future Volume (vph)	6	1	13	172	0	184	1	231	157	146	488	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1275	1362		1691	1487		1789	1746	1471	1630	1847	1228
Flt Permitted	0.57	1.00		0.75	1.00		0.45	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	769	1362		1332	1487		841	1746	1471	1054	1847	1228
Peak-hour factor, PHF	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)	6	1	13	172	0	184	1	231	157	146	488	4
RTOR Reduction (vph)	0	10	0	0	148	0	0	0	53	0	0	1
Lane Group Flow (vph)	6	4	0	172	36	0	1	231	104	146	488	3
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	17.4	17.4		17.4	17.4		59.8	59.8	59.8	59.8	59.8	59.8
Effective Green, g (s)	17.4	17.4		17.4	17.4		59.8	59.8	59.8	59.8	59.8	59.8
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.66	0.66	0.66	0.66	0.66	0.66
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	148	263		257	287		558	1160	977	700	1227	815
v/s Ratio Prot		0.00			0.02			0.13			c0.26	
v/s Ratio Perm	0.01			c0.13			0.00		0.07	0.14		0.00
v/c Ratio	0.04	0.01		0.67	0.12		0.00	0.20	0.11	0.21	0.40	0.00
Uniform Delay, d1	29.5	29.4		33.6	30.0		5.1	5.8	5.5	5.9	6.9	5.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		6.5	0.2		0.0	0.4	0.2	0.7	1.0	0.0
Delay (s)	29.6	29.4		40.1	30.2		5.1	6.2	5.7	6.6	7.9	5.1
Level of Service	C	C		D	C		A	A	A	A	A	A
Approach Delay (s)		29.5			35.0			6.0			7.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

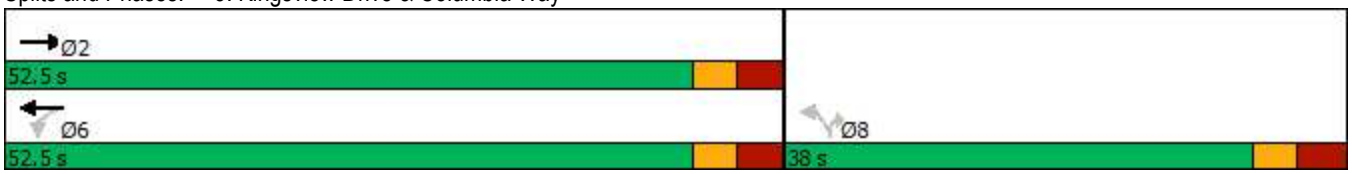
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	264	30	128	284	46	95
Future Volume (vph)	264	30	128	284	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.8	3.8	3.2	3.8	3.5	3.5
Storage Length (m)		0.0	40.0		25.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			55.0		20.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		1.00		0.99	0.97
Frt	0.986					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1855	0	1691	1904	1750	1566
Flt Permitted			0.580		0.950	
Satd. Flow (perm)	1855	0	1028	1904	1735	1513
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	9					95
Link Speed (k/h)	40			40	40	
Link Distance (m)	237.8			207.6	217.2	
Travel Time (s)	21.4			18.7	19.5	
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Adj. Flow (vph)	264	30	128	284	46	95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	294	0	128	284	46	95
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.2			3.2	3.5	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.97	0.97	1.06	0.97	1.01	1.01
Turning Speed (k/h)		15	25		25	15
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru		Right
Leading Detector (m)	10.0		2.0	10.0	7.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	-3.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	10.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	7.0	7.0
Minimum Split (s)	39.2		39.2	39.2	33.5	33.5
Total Split (s)	52.5		52.5	52.5	38.0	38.0
Total Split (%)	58.0%		58.0%	58.0%	42.0%	42.0%
Maximum Green (s)	46.3		46.3	46.3	31.5	31.5
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	3.2		3.2	3.2	3.5	3.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2		6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Max		Max	Max	None	None
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	25.0		25.0	25.0	20.0	20.0
Pedestrian Calls (#/hr)	5		5	5	5	5
Act Effct Green (s)	54.9		54.9	54.9	10.9	10.9
Actuated g/C Ratio	0.74		0.74	0.74	0.15	0.15
v/c Ratio	0.21		0.17	0.20	0.18	0.31
Control Delay	5.9		6.7	6.0	27.2	8.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	5.9		6.7	6.0	27.2	8.5
LOS	A		A	A	C	A
Approach Delay	5.9			6.2	14.6	
Approach LOS	A			A	B	
Queue Length 50th (m)	10.1		4.4	10.0	5.7	0.0
Queue Length 95th (m)	38.6		20.3	38.0	12.6	10.0
Internal Link Dist (m)	213.8			183.6	193.2	
Turn Bay Length (m)			40.0		25.0	
Base Capacity (vph)	1372		759	1407	742	701
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.21		0.17	0.20	0.06	0.14

Intersection Summary	
Area Type:	Other
Cycle Length: 90.5	
Actuated Cycle Length: 74.3	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.31	

Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	264	30	128	284	46	95
Future Volume (vph)	264	30	128	284	46	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.8	3.8	3.2	3.8	3.5	3.5
Total Lost time (s)	6.2		6.2	6.2	6.5	6.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.96
Flpb, ped/bikes	1.00		1.00	1.00	0.99	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1856		1684	1904	1738	1500
Flt Permitted	1.00		0.58	1.00	0.95	1.00
Satd. Flow (perm)	1856		1029	1904	1738	1500
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	264	30	128	284	46	95
RTOR Reduction (vph)	3	0	0	0	0	83
Lane Group Flow (vph)	291	0	128	284	46	12
Confl. Peds. (#/hr)		5	5		5	5
Confl. Bikes (#/hr)		5				5
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%
Turn Type	NA		Perm	NA	Perm	Perm
Protected Phases	2			6		
Permitted Phases			6		8	8
Actuated Green, G (s)	53.6		53.6	53.6	9.4	9.4
Effective Green, g (s)	53.6		53.6	53.6	9.4	9.4
Actuated g/C Ratio	0.71		0.71	0.71	0.12	0.12
Clearance Time (s)	6.2		6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1314		728	1348	215	186
v/s Ratio Prot	c0.16			0.15		
v/s Ratio Perm			0.12		c0.03	0.01
v/c Ratio	0.22		0.18	0.21	0.21	0.06
Uniform Delay, d1	3.8		3.7	3.8	29.8	29.3
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		0.5	0.4	0.5	0.1
Delay (s)	4.2		4.2	4.1	30.3	29.4
Level of Service	A		A	A	C	C
Approach Delay (s)	4.2			4.2	29.7	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	75.7	Sum of lost time (s)	12.7
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix O

Traffic Control Warrants

Highway 50 at Site Access #1
2028 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	513	107%	6%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	7	6%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	508	106%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Kingsview Drive at Site Access #2
2028 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	37	5%	5%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	36	21%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	13	2%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Highway 50 at Site Access #1
2030 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	580	80%	14%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	24	14%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	564	78%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Kingsview Drive at Site Access #2
2030 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	134	19%	19%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	134	79%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	45	6%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Highway 50 at Site Access #1
2033 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	602	84%	14%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	24	14%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	587	81%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Kingsview Drive at Site Access #2
2033 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	134	19%	19%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	134	79%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	45	6%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Highway 50 at Site Access #1
2035 FT

Justification #7

Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	618	86%	14%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	24	14%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	603	84%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Kingsview Drive at Site Access #2
2035 FT

Justification #7

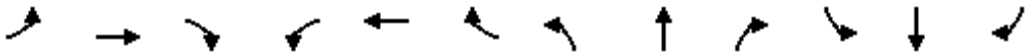
Justification	Description	Minimum Requirement 1 Lane Highway		Minimum Requirement 2 or More Lanes		Compliance Sectional		Compliance Entire %	Signal
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	134	19%	19%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	134	79%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	45	6%	0%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	0	0%		

Notes
1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes, AHV = PM/2 or (AM + PM) / 4, including amplifcation factors
4. T-intersection factor corrected, applies only to 1B

Appendix P

2028 FT Synchro and Sidra Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	161	19	76	19	313	78	59	513	5
Future Volume (vph)	15	31	26	161	19	76	19	313	78	59	513	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.98		0.99	0.98		1.00		0.97	1.00		0.96
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1681	0	1750	1345	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.695			0.525			0.418			0.562		
Satd. Flow (perm)	1268	1681	0	961	1345	0	720	3510	1541	1035	1865	1312
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			76				80			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	161	19	76	19	313	78	59	513	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	161	95	0	19	313	78	59	513	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

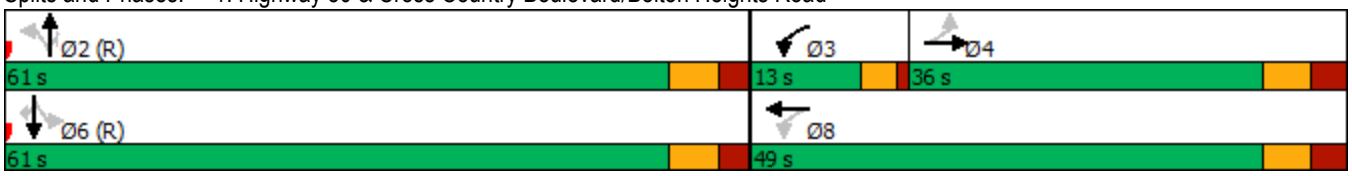


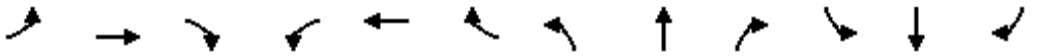
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	36.0	36.0		13.0	49.0		61.0	61.0	61.0	61.0	61.0	61.0
Total Split (%)	32.7%	32.7%		11.8%	44.5%		55.5%	55.5%	55.5%	55.5%	55.5%	55.5%
Maximum Green (s)	28.9	28.9		9.0	41.9		54.4	54.4	54.4	54.4	54.4	54.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		5	5	5	6	6	6
Act Effct Green (s)	12.4	12.4		25.9	22.8		73.5	73.5	73.5	73.5	73.5	73.5
Actuated g/C Ratio	0.11	0.11		0.24	0.21		0.67	0.67	0.67	0.67	0.67	0.67
v/c Ratio	0.10	0.27		0.55	0.28		0.04	0.13	0.07	0.09	0.41	0.01
Control Delay	40.8	28.2		40.2	11.5		10.4	8.6	2.9	10.1	11.9	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.8	28.2		40.2	11.5		10.4	8.6	2.9	10.1	11.9	0.0
LOS	D	C		D	B		B	A	A	B	B	A
Approach Delay		30.8			29.5			7.6			11.6	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		29.9	3.4		1.2	10.9	0.0	3.8	42.9	0.0
Queue Length 95th (m)	7.6	14.9		36.7	13.0		6.1	27.1	7.1	13.9	105.3	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	333	460		294	559		480	2343	1055	691	1245	902
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	0.05	0.12		0.55	0.17		0.04	0.13	0.07	0.09	0.41	0.01

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 14.9	Intersection LOS: B
Intersection Capacity Utilization 74.3%	ICU Level of Service D
Analysis Period (min) 15	

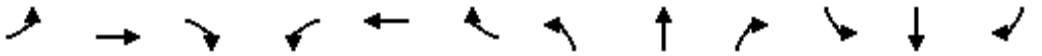
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



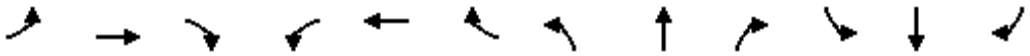


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	161	19	76	19	313	78	59	513	5
Future Volume (vph)	15	31	26	161	19	76	19	313	78	59	513	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1671		1744	1342		1636	3510	1543	1750	1865	1313
Flt Permitted	0.70	1.00		0.53	1.00		0.42	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)	1269	1671		964	1342		720	3510	1543	1035	1865	1313
Peak-hour factor, PHF	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)	15	31	26	161	19	76	19	313	78	59	513	5
RTOR Reduction (vph)	0	23	0	0	59	0	0	0	27	0	0	2
Lane Group Flow (vph)	15	34	0	161	36	0	19	313	51	59	513	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	10.8	10.8		24.2	24.2		72.1	72.1	72.1	72.1	72.1	72.1
Effective Green, g (s)	10.8	10.8		24.2	24.2		72.1	72.1	72.1	72.1	72.1	72.1
Actuated g/C Ratio	0.10	0.10		0.22	0.22		0.66	0.66	0.66	0.66	0.66	0.66
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	124	164		278	295		471	2300	1011	678	1222	860
v/s Ratio Prot		0.02		c0.05	0.03			0.09			c0.28	
v/s Ratio Perm	0.01			c0.08			0.03		0.03	0.06		0.00
v/c Ratio	0.12	0.20		0.58	0.12		0.04	0.14	0.05	0.09	0.42	0.00
Uniform Delay, d1	45.3	45.6		36.9	34.4		6.7	7.2	6.8	6.9	9.0	6.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.6		2.9	0.2		0.2	0.1	0.1	0.3	1.1	0.0
Delay (s)	45.7	46.3		39.9	34.6		6.9	7.3	6.8	7.2	10.1	6.6
Level of Service	D	D		D	C		A	A	A	A	B	A
Approach Delay (s)		46.2			37.9			7.2			9.7	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	200	0	160	1	219	142	130	440	3
Future Volume (vph)	6	1	11	200	0	160	1	219	142	130	440	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.97		0.99	0.96		1.00		0.97	0.99		0.97
Frt		0.862			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1322	0	1691	1434	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.639			0.750			0.472			0.621		
Satd. Flow (perm)	850	1322	0	1321	1434	0	886	1746	1426	1059	1847	1190
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			611				142			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			135.5	
Travel Time (s)		4.8			21.4			38.5			8.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	11	200	0	160	1	219	142	130	440	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	12	0	200	160	0	1	219	142	130	440	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

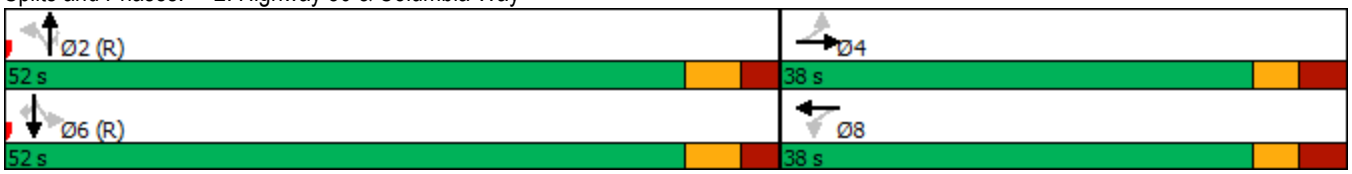


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	38.0	38.0		38.0	38.0		52.0	52.0	52.0	52.0	52.0	52.0
Total Split (%)	42.2%	42.2%		42.2%	42.2%		57.8%	57.8%	57.8%	57.8%	57.8%	57.8%
Maximum Green (s)	31.6	31.6		31.6	31.6		45.6	45.6	45.6	45.6	45.6	45.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	19.4	19.4		19.4	19.4		57.8	57.8	57.8	57.8	57.8	57.8
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio	0.03	0.04		0.70	0.20		0.00	0.20	0.15	0.19	0.37	0.00
Control Delay	24.5	13.4		45.2	0.6		8.0	8.3	2.1	8.9	9.8	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	13.4		45.2	0.6		8.0	8.3	2.1	8.9	9.8	0.0
LOS	C	B		D	A		A	A	A	A	A	A
Approach Delay		17.1			25.4			5.8			9.5	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	0.8	0.1		32.2	0.0		0.1	13.9	0.0	8.2	31.8	0.0
Queue Length 95th (m)	3.5	3.9		48.7	0.0		0.7	30.3	7.6	20.6	63.3	0.0
Internal Link Dist (m)		29.3			213.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	298	471		463	899		569	1121	966	680	1186	779
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.03		0.43	0.18		0.00	0.20	0.15	0.19	0.37	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 65.9%	ICU Level of Service C
Analysis Period (min) 15	

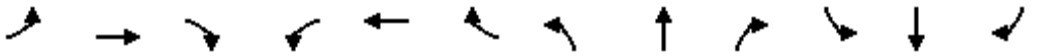
Splits and Phases: 2: Highway 50 & Columbia Way



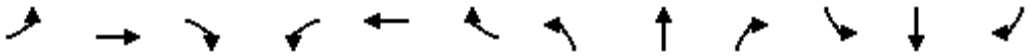
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	200	0	160	1	219	142	130	440	3
Future Volume (vph)	6	1	11	200	0	160	1	219	142	130	440	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1264	1319		1673	1429		1782	1746	1427	1620	1847	1191
Flt Permitted	0.64	1.00		0.75	1.00		0.47	1.00	1.00	0.62	1.00	1.00
Satd. Flow (perm)	850	1319		1320	1429		886	1746	1427	1060	1847	1191
Peak-hour factor, PHF	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)	6	1	11	200	0	160	1	219	142	130	440	3
RTOR Reduction (vph)	0	9	0	0	126	0	0	0	51	0	0	1
Lane Group Flow (vph)	6	3	0	200	34	0	1	219	91	130	440	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	19.4	19.4		19.4	19.4		57.8	57.8	57.8	57.8	57.8	57.8
Effective Green, g (s)	19.4	19.4		19.4	19.4		57.8	57.8	57.8	57.8	57.8	57.8
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	183	284		284	308		569	1121	916	680	1186	764
v/s Ratio Prot		0.00			0.02			0.13			c0.24	
v/s Ratio Perm	0.01			c0.15			0.00		0.06	0.12		0.00
v/c Ratio	0.03	0.01		0.70	0.11		0.00	0.20	0.10	0.19	0.37	0.00
Uniform Delay, d1	27.9	27.8		32.6	28.4		5.8	6.6	6.2	6.6	7.6	5.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		7.7	0.2		0.0	0.4	0.2	0.6	0.9	0.0
Delay (s)	28.0	27.8		40.3	28.5		5.8	7.0	6.4	7.2	8.5	5.8
Level of Service	C	C		D	C		A	A	A	A	A	A
Approach Delay (s)		27.8			35.1			6.7			8.2	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	230	30	128	247	2	46	1	95	7	4	50
Future Volume (vph)	8	230	30	128	247	2	46	1	95	7	4	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		0.99	0.97		0.99	0.97	
Frt		0.983			0.999			0.852			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1849	0	1691	1902	0	1750	1552	0	1789	1571	0
Flt Permitted	0.605			0.599			0.722			0.695		
Satd. Flow (perm)	1134	1849	0	1061	1902	0	1320	1552	0	1299	1571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			1			95			50	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		237.8			207.6			217.2			123.9	
Travel Time (s)		21.4			18.7			19.5			11.2	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	8	230	30	128	247	2	46	1	95	7	4	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	260	0	128	249	0	46	96	0	7	54	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

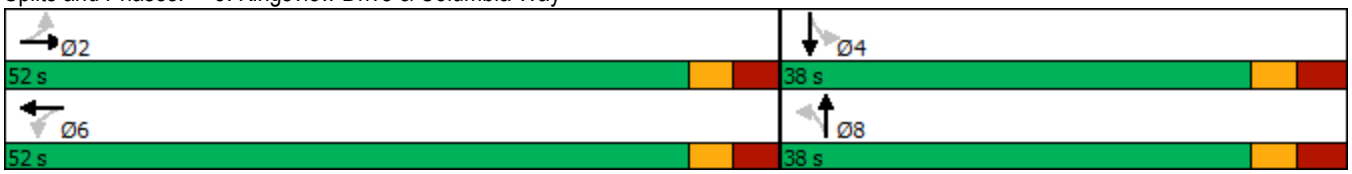


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	52.0	52.0		52.0	52.0		38.0	38.0		38.0	38.0	
Total Split (%)	57.8%	57.8%		57.8%	57.8%		42.2%	42.2%		42.2%	42.2%	
Maximum Green (s)	45.8	45.8		45.8	45.8		31.5	31.5		31.5	31.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	52.1	52.1		52.1	52.1		11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.15	0.15		0.15	0.15	
v/c Ratio	0.01	0.19		0.17	0.18		0.23	0.30		0.04	0.19	
Control Delay	6.8	5.9		6.8	6.0		27.6	8.4		23.1	9.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.8	5.9		6.8	6.0		27.6	8.4		23.1	9.8	
LOS	A	A		A	A		C	A		C	A	
Approach Delay		6.0			6.3			14.6			11.3	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	0.3	8.8		4.4	8.7		5.3	0.1		0.8	0.5	
Queue Length 95th (m)	2.5	33.9		20.2	33.2		12.8	10.1		3.6	8.0	
Internal Link Dist (m)		213.8			183.6			193.2			99.9	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	824	1347		771	1383		585	741		576	724	
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	0.01	0.19		0.17	0.18		0.08	0.13		0.01	0.07	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 71.7	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.30	

Intersection Signal Delay: 7.9	Intersection LOS: A
Intersection Capacity Utilization 62.0%	ICU Level of Service B
Analysis Period (min) 15	

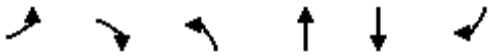
Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	230	30	128	247	2	46	1	95	7	4	50
Future Volume (vph)	8	230	30	128	247	2	46	1	95	7	4	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1782	1849		1684	1901		1739	1539		1779	1561	
Flt Permitted	0.60	1.00		0.60	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	1134	1849		1061	1901		1321	1539		1301	1561	
Peak-hour factor, PHF	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)	8	230	30	128	247	2	46	1	95	7	4	50
RTOR Reduction (vph)	0	3	0	0	0	0	0	83	0	0	43	0
Lane Group Flow (vph)	8	257	0	128	249	0	46	13	0	7	11	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	50.8	50.8		50.8	50.8		9.5	9.5		9.5	9.5	
Effective Green, g (s)	50.8	50.8		50.8	50.8		9.5	9.5		9.5	9.5	
Actuated g/C Ratio	0.70	0.70		0.70	0.70		0.13	0.13		0.13	0.13	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	789	1286		738	1322		171	200		169	203	
v/s Ratio Prot		c0.14			0.13			0.01			0.01	
v/s Ratio Perm	0.01			0.12			c0.03			0.01		
v/c Ratio	0.01	0.20		0.17	0.19		0.27	0.07		0.04	0.05	
Uniform Delay, d1	3.4	3.9		3.8	3.9		28.6	27.9		27.8	27.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.5	0.3		0.9	0.1		0.1	0.1	
Delay (s)	3.4	4.3		4.4	4.2		29.5	28.0		27.9	27.9	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		4.2			4.3			28.5			27.9	
Approach LOS		A			A			C			C	

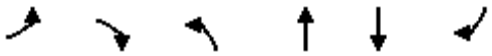
Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	12.7
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



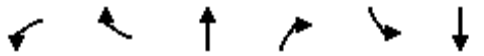
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	124	97	139	247	465	298
Future Volume (vph)	124	97	139	247	465	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.934					0.850
Flt Protected	0.973			0.982		
Satd. Flow (prot)	2962	0	0	3240	1830	1512
Flt Permitted	0.973			0.982		
Satd. Flow (perm)	2962	0	0	3240	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	124	97	139	247	465	298
Shared Lane Traffic (%)						
Lane Group Flow (vph)	221	0	0	386	465	298
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		



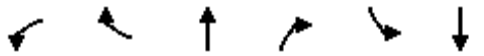
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	124	97	139	247	465	298
Future Volume (veh/h)	124	97	139	247	465	298
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	124	97	139	247	465	298
Approach Volume (veh/h)	221			386	763	
Crossing Volume (veh/h)	465			124	139	
High Capacity (veh/h)	960			1257	1242	
High v/c (veh/h)	0.23			0.31	0.61	
Low Capacity (veh/h)	778			1045	1032	
Low v/c (veh/h)	0.28			0.37	0.74	

Intersection Summary			
Maximum v/c High	0.61		
Maximum v/c Low	0.74		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	11	370	11	0	570
Future Volume (vph)	0	11	370	11	0	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	85.7		135.5			881.3
Travel Time (s)	10.3		8.1			52.9
Confl. Peds. (#/hr)		5		5		
Confl. Bikes (#/hr)				5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	11	370	11	0	570
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	11	370	11	0	570
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

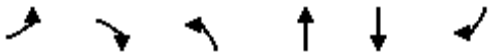
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 41.5%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	11	370	11	0	570
Future Volume (Veh/h)	0	11	370	11	0	570
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)	0	11	370	11	0	570
Pedestrians	5					5
Lane Width (m)	3.5					3.7
Walking Speed (m/s)	1.0					1.0
Percent Blockage	0					1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.97	0.97			0.97	
vC, conflicting volume	945	380			386	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	925	340			346	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	287	672			1165	

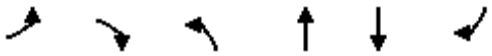
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	11	370	11	570
Volume Left	0	0	0	0
Volume Right	11	0	11	0
cSH	672	1700	1700	1700
Volume to Capacity	0.02	0.22	0.01	0.34
Queue Length 95th (m)	0.4	0.0	0.0	0.0
Control Delay (s)	10.5	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	10.5	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	60	12	0	0	0
Future Volume (vph)	0	60	12	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	58.6			123.9	109.1	
Travel Time (s)	7.0			11.2	9.8	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	60	12	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	0	0	12	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

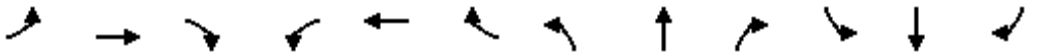
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		



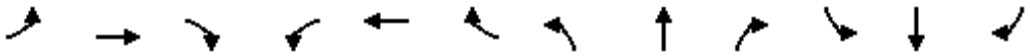
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	60	12	0	0	0
Future Volume (Veh/h)	0	60	12	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	60	12	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				124		
pX, platoon unblocked						
vC, conflicting volume	29	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	29	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	99			
cM capacity (veh/h)	973	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	60	12	0
Volume Left	0	12	0
Volume Right	60	0	0
cSH	1073	1608	1700
Volume to Capacity	0.06	0.01	0.00
Queue Length 95th (m)	1.3	0.2	0.0
Control Delay (s)	8.6	7.3	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	7.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.3		
Intersection Capacity Utilization	13.7%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	64	9	41	70	788	68	34	429	19
Future Volume (vph)	15	4	13	64	9	41	70	788	68	34	429	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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		0.99	0.98		1.00		0.97	1.00		0.97
Frt		0.885			0.877				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1591	0	1750	1431	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.724			0.746			0.499			0.346		
Satd. Flow (perm)	1266	1591	0	1365	1431	0	936	3579	1548	650	1883	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			41				68			45
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	64	9	41	70	788	68	34	429	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	64	50	0	70	788	68	34	429	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

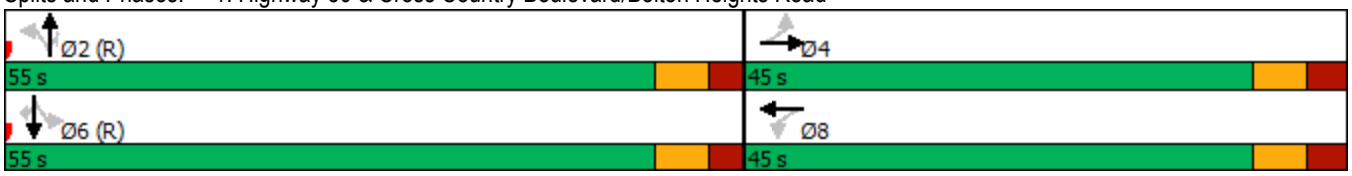


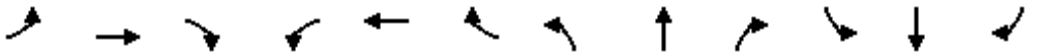
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	45.0	45.0		45.0	45.0		55.0	55.0	55.0	55.0	55.0	55.0
Total Split (%)	45.0%	45.0%		45.0%	45.0%		55.0%	55.0%	55.0%	55.0%	55.0%	55.0%
Maximum Green (s)	37.9	37.9		37.9	37.9		48.4	48.4	48.4	48.4	48.4	48.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	15.0	15.0		15.0	15.0		75.6	75.6	75.6	75.6	75.6	75.6
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.76	0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.08	0.07		0.31	0.20		0.10	0.29	0.06	0.07	0.30	0.02
Control Delay	31.4	16.3		38.2	13.4		7.8	6.9	2.8	8.2	7.8	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	16.3		38.2	13.4		7.8	6.9	2.8	8.2	7.8	0.9
LOS	C	B		D	B		A	A	A	A	A	A
Approach Delay		23.4			27.3			6.7			7.5	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	2.7	0.7		11.9	1.6		2.9	20.3	0.0	1.4	21.2	0.0
Queue Length 95th (m)	6.1	4.9		17.5	8.6		14.9	63.5	6.4	8.8	75.4	1.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	479	611		517	567		707	2706	1187	491	1424	1148
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03		0.12	0.09		0.10	0.29	0.06	0.07	0.30	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.31	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 62.7%	ICU Level of Service B
Analysis Period (min) 15	

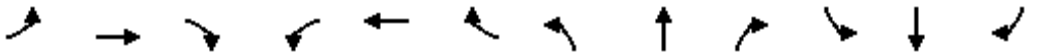
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



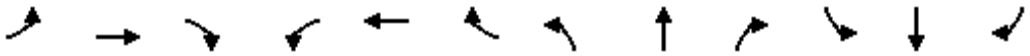


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	64	9	41	70	788	68	34	429	19
Future Volume (vph)	15	4	13	64	9	41	70	788	68	34	429	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1662	1580		1738	1425		1780	3579	1550	1784	1883	1506
Flt Permitted	0.72	1.00		0.75	1.00		0.50	1.00	1.00	0.35	1.00	1.00
Satd. Flow (perm)	1267	1580		1365	1425		936	3579	1550	650	1883	1506
Peak-hour factor, PHF	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)	15	4	13	64	9	41	70	788	68	34	429	19
RTOR Reduction (vph)	0	11	0	0	36	0	0	0	18	0	0	5
Lane Group Flow (vph)	15	6	0	64	14	0	70	788	50	34	429	14
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.4	13.4		13.4	13.4		72.9	72.9	72.9	72.9	72.9	72.9
Effective Green, g (s)	13.4	13.4		13.4	13.4		72.9	72.9	72.9	72.9	72.9	72.9
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	211		182	190		682	2609	1129	473	1372	1097
v/s Ratio Prot		0.00			0.01			0.22			c0.23	
v/s Ratio Perm	0.01			c0.05			0.07		0.03	0.05		0.01
v/c Ratio	0.09	0.03		0.35	0.08		0.10	0.30	0.04	0.07	0.31	0.01
Uniform Delay, d1	37.9	37.6		39.4	37.9		4.0	4.7	3.8	3.9	4.8	3.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		1.2	0.2		0.3	0.3	0.1	0.3	0.6	0.0
Delay (s)	38.2	37.7		40.5	38.1		4.3	5.0	3.9	4.2	5.4	3.7
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		37.9			39.4			4.9			5.2	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	117	0	66	0	596	224	114	306	2
Future Volume (vph)	1	0	2	117	0	66	0	596	224	114	306	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96				0.97	1.00		0.97
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1507	0	1675	1543	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.714			0.757						0.399		
Satd. Flow (perm)	1302	1507	0	1320	1543	0	1883	1883	1552	750	1883	792
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		544			283				224			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			135.5	
Travel Time (s)		4.8			20.9			38.5			8.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	2	117	0	66	0	596	224	114	306	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	2	0	117	66	0	0	596	224	114	306	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	



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	
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		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	31.0	31.0		31.0	31.0		59.0	59.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%		34.4%	34.4%		65.6%	65.6%	65.6%	65.6%	65.6%	65.6%
Maximum Green (s)	24.6	24.6		24.6	24.6		52.6	52.6	52.6	52.6	52.6	52.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	13.9	13.9		13.9	13.9			67.4	67.4	67.4	67.4	67.4
Actuated g/C Ratio	0.15	0.15		0.15	0.15			0.75	0.75	0.75	0.75	0.75
v/c Ratio	0.00	0.00		0.57	0.14			0.42	0.18	0.20	0.22	0.00
Control Delay	28.0	0.0		45.3	0.6			7.4	1.3	6.8	5.7	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	0.0		45.3	0.6			7.4	1.3	6.8	5.7	0.0
LOS	C	A		D	A			A	A	A	A	A
Approach Delay		9.3			29.2			5.7			5.9	
Approach LOS		A			C			A			A	
Queue Length 50th (m)	0.2	0.0		19.1	0.0			37.4	0.0	5.8	15.7	0.0
Queue Length 95th (m)	1.4	0.0		32.7	0.0			75.7	7.5	16.4	33.6	0.0
Internal Link Dist (m)		29.3			207.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0						70.0		25.0
Base Capacity (vph)	355	807		360	627			1410	1219	562	1410	603
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.33	0.11			0.42	0.18	0.20	0.22	0.00

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: 65	
Control Type: Actuated-Coordinated	

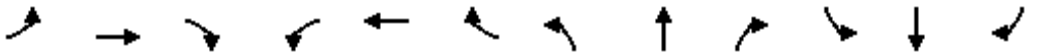
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 67.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way

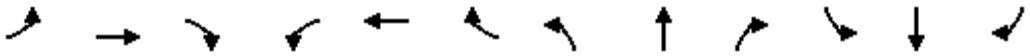
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	117	0	66	0	596	224	114	306	2
Future Volume (vph)	1	0	2	117	0	66	0	596	224	114	306	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96			1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1497		1657	1532			1883	1553	1784	1883	792
Flt Permitted	0.71	1.00		0.76	1.00			1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	1302	1497		1319	1532			1883	1553	749	1883	792
Peak-hour factor, PHF	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)	1	0	2	117	0	66	0	596	224	114	306	2
RTOR Reduction (vph)	0	2	0	0	57	0	0	0	62	0	0	1
Lane Group Flow (vph)	1	0	0	117	9	0	0	596	162	114	306	1
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	12.3	12.3		12.3	12.3			64.9	64.9	64.9	64.9	64.9
Effective Green, g (s)	12.3	12.3		12.3	12.3			64.9	64.9	64.9	64.9	64.9
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.72	0.72	0.72	0.72	0.72
Clearance Time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	177	204		180	209			1357	1119	540	1357	571
v/s Ratio Prot		0.00			0.01			c0.32			0.16	
v/s Ratio Perm	0.00			c0.09					0.10	0.15		0.00
v/c Ratio	0.01	0.00		0.65	0.04			0.44	0.14	0.21	0.23	0.00
Uniform Delay, d1	33.6	33.5		36.8	33.7			5.1	3.9	4.1	4.2	3.5
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		8.1	0.1			1.0	0.3	0.9	0.4	0.0
Delay (s)	33.6	33.5		44.9	33.8			6.2	4.2	5.0	4.6	3.5
Level of Service	C	C		D	C			A	A	A	A	A
Approach Delay (s)		33.6			40.9			5.6			4.7	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	230	72	50	124	8	23	4	32	4	2	31
Future Volume (vph)	27	230	72	50	124	8	23	4	32	4	2	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	1.00		0.99	0.97		0.99	0.97	
Frt		0.964			0.991			0.867			0.859	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1761	0	1658	1642	0	1638	1445	0	1789	1566	0
Flt Permitted	0.673			0.576			0.736			0.734		
Satd. Flow (perm)	1260	1761	0	1001	1642	0	1258	1445	0	1371	1566	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			5			32			31	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		231.8			207.6			217.2			125.5	
Travel Time (s)		20.9			18.7			19.5			11.3	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Adj. Flow (vph)	27	230	72	50	124	8	23	4	32	4	2	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	302	0	50	132	0	23	36	0	4	33	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

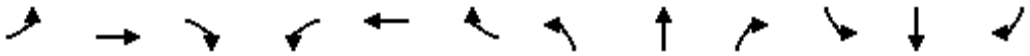


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	54.5	54.5		54.5	54.5		37.0	37.0		37.0	37.0	
Total Split (%)	59.6%	59.6%		59.6%	59.6%		40.4%	40.4%		40.4%	40.4%	
Maximum Green (s)	48.3	48.3		48.3	48.3		30.5	30.5		30.5	30.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	60.4	60.4		60.4	60.4		10.0	10.0		10.6	10.6	
Actuated g/C Ratio	0.80	0.80		0.80	0.80		0.13	0.13		0.14	0.14	
v/c Ratio	0.03	0.21		0.06	0.10		0.14	0.16		0.02	0.13	
Control Delay	5.8	5.0		5.8	5.0		28.3	12.3		25.2	11.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	5.8	5.0		5.8	5.0		28.3	12.3		25.2	11.3	
LOS	A	A		A	A		C	B		C	B	
Approach Delay		5.1			5.2			18.5			12.8	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	0.8	9.5		1.5	4.0		3.3	0.6		0.6	0.3	
Queue Length 95th (m)	5.6	38.5		9.0	18.4		8.1	6.9		2.7	6.4	
Internal Link Dist (m)		207.8			183.6			193.2			101.5	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	1011	1418		803	1318		514	609		560	658	
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	0.21		0.06	0.10		0.04	0.06		0.01	0.05	

Intersection Summary	
Area Type:	Other
Cycle Length: 91.5	
Actuated Cycle Length: 75.3	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.21	

Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 60.9%	ICU Level of Service B
Analysis Period (min) 15	

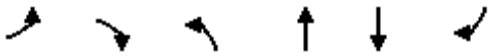
Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	230	72	50	124	8	23	4	32	4	2	31
Future Volume (vph)	27	230	72	50	124	8	23	4	32	4	2	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.96		1.00	0.96	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1780	1763		1652	1642		1626	1429		1777	1548	
Flt Permitted	0.67	1.00		0.58	1.00		0.74	1.00		0.73	1.00	
Satd. Flow (perm)	1260	1763		1001	1642		1259	1429		1372	1548	
Peak-hour factor, PHF	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)	27	230	72	50	124	8	23	4	32	4	2	31
RTOR Reduction (vph)	0	7	0	0	1	0	0	29	0	0	28	0
Lane Group Flow (vph)	27	295	0	50	131	0	23	7	0	4	5	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	57.7	57.7		57.7	57.7		7.6	7.6		7.6	7.6	
Effective Green, g (s)	57.7	57.7		57.7	57.7		7.6	7.6		7.6	7.6	
Actuated g/C Ratio	0.74	0.74		0.74	0.74		0.10	0.10		0.10	0.10	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	932	1304		740	1214		122	139		133	150	
v/s Ratio Prot		c0.17			0.08			0.00			0.00	
v/s Ratio Perm	0.02			0.05			c0.02			0.00		
v/c Ratio	0.03	0.23		0.07	0.11		0.19	0.05		0.03	0.03	
Uniform Delay, d1	2.7	3.2		2.8	2.9		32.4	31.9		31.9	31.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.2	0.2		0.8	0.2		0.1	0.1	
Delay (s)	2.8	3.6		3.0	3.0		33.1	32.1		32.0	32.0	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		3.5			3.0			32.5			32.0	
Approach LOS		A			A			C			C	

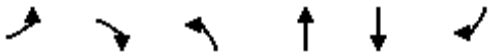
Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	78.0	Sum of lost time (s)	12.7
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



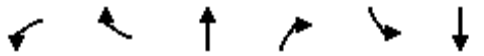
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	394	106	41	609	293	121
Future Volume (vph)	394	106	41	609	293	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.968					0.850
Flt Protected	0.962			0.997		
Satd. Flow (prot)	3301	0	0	3561	1812	1408
Flt Permitted	0.962			0.997		
Satd. Flow (perm)	3301	0	0	3561	1812	1408
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	5%	2%	6%	16%
Adj. Flow (vph)	394	106	41	609	293	121
Shared Lane Traffic (%)						
Lane Group Flow (vph)	500	0	0	650	293	121
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		



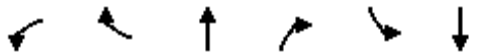
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	394	106	41	609	293	121
Future Volume (veh/h)	394	106	41	609	293	121
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	394	106	41	609	293	121
Approach Volume (veh/h)	500			650	414	
Crossing Volume (veh/h)	293			394	41	
High Capacity (veh/h)	1100			1016	1341	
High v/c (veh/h)	0.45			0.64	0.31	
Low Capacity (veh/h)	904			828	1122	
Low v/c (veh/h)	0.55			0.79	0.37	

Intersection Summary			
Maximum v/c High	0.64		
Maximum v/c Low	0.79		
Intersection Capacity Utilization	58.0%	ICU Level of Service	B



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	7	625	37	0	419
Future Volume (vph)	0	7	625	37	0	419
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	61.8		135.5			881.3
Travel Time (s)	7.4		8.1			52.9
Confl. Peds. (#/hr)		5		5		
Confl. Bikes (#/hr)				5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	7	625	37	0	419
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	7	625	37	0	419
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

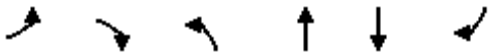
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.4%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	7	625	37	0	419
Future Volume (Veh/h)	0	7	625	37	0	419
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)	0	7	625	37	0	419
Pedestrians	5					5
Lane Width (m)	3.5					3.7
Walking Speed (m/s)	1.0					1.0
Percent Blockage	0					1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.87	0.87			0.87	
vC, conflicting volume	1049	635			667	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	979	501			538	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	239	489			888	

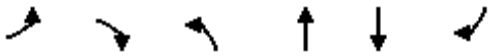
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	7	625	37	419
Volume Left	0	0	0	0
Volume Right	7	0	37	0
cSH	489	1700	1700	1700
Volume to Capacity	0.01	0.37	0.02	0.25
Queue Length 95th (m)	0.3	0.0	0.0	0.0
Control Delay (s)	12.5	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	12.5	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	37	38	0	0	0
Future Volume (vph)	0	37	38	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	67.3			125.5	83.4	
Travel Time (s)	8.1			11.3	7.5	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	37	38	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	0	0	38	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	37	38	0	0	0
Future Volume (Veh/h)	0	37	38	0	0	0
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)	0	37	38	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				126		
pX, platoon unblocked						
vC, conflicting volume	81	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	81	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	98			
cM capacity (veh/h)	895	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	37	38	0
Volume Left	0	38	0
Volume Right	37	0	0
cSH	1073	1608	1700
Volume to Capacity	0.03	0.02	0.00
Queue Length 95th (m)	0.8	0.6	0.0
Control Delay (s)	8.5	7.3	0.0
Lane LOS	A	A	
Approach Delay (s)	8.5	7.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 101 [2028 FT AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	139	8.0	139	8.0	0.202	5.6	LOS A	0.6	4.2	0.22	0.12	0.22	49.5
2	T1	All MCs	247	12.0	247	12.0	0.202	5.7	LOS A	0.6	4.5	0.23	0.12	0.23	51.7
Approach			386	10.6	386	10.6	0.202	5.7	LOS A	0.6	4.5	0.22	0.12	0.22	50.9
North: Highway 50															
8	T1	All MCs	465	6.0	465	6.0	0.494	9.7	LOS A	2.8	20.4	0.43	0.23	0.43	49.7
9	R2	All MCs	298	8.0	298	8.0	0.320	7.2	LOS A	1.4	10.5	0.34	0.19	0.34	52.9
Approach			763	6.8	763	6.8	0.494	8.7	LOS A	2.8	20.4	0.39	0.22	0.39	50.9
West: Emil Kolb Parkway															
10	L2	All MCs	124	35.0	124	35.0	0.192	9.5	LOS A	0.6	4.9	0.51	0.43	0.51	47.4
12	R2	All MCs	97	9.0	97	9.0	0.192	7.6	LOS A	0.6	4.9	0.51	0.43	0.51	51.7
Approach			221	23.6	221	23.6	0.192	8.6	LOS A	0.6	4.9	0.51	0.43	0.51	49.1
All Vehicles			1370	10.6	1370	10.6	0.494	7.9	LOS A	2.8	20.4	0.36	0.22	0.36	50.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2028 FT PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Roundabout

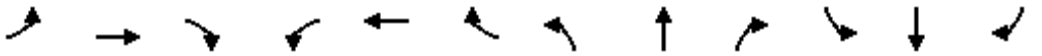
Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	41	14.0	41	14.0	0.392	10.0	LOS A	1.5	10.9	0.46	0.38	0.51	48.6
2	T1	All MCs	609	2.0	609	2.0	0.392	8.9	LOS A	1.5	10.9	0.45	0.37	0.49	50.0
Approach			650	2.8	650	2.8	0.392	9.0	LOS A	1.5	10.9	0.45	0.37	0.50	49.9
North: Highway 50															
8	T1	All MCs	293	3.0	293	3.0	0.276	5.8	LOS A	1.2	8.9	0.17	0.06	0.17	52.5
9	R2	All MCs	121	20.0	121	20.0	0.124	4.7	LOS A	0.4	3.5	0.14	0.05	0.14	54.3
Approach			414	8.0	414	8.0	0.276	5.5	LOS A	1.2	8.9	0.16	0.06	0.16	53.0
West: Emil Kolb Parkway															
10	L2	All MCs	394	2.0	394	2.0	0.303	7.7	LOS A	1.3	9.0	0.46	0.33	0.46	49.0
12	R2	All MCs	106	2.0	106	2.0	0.303	7.7	LOS A	1.3	9.0	0.46	0.33	0.46	50.4
Approach			500	2.0	500	2.0	0.303	7.7	LOS A	1.3	9.0	0.46	0.33	0.46	49.3
All Vehicles			1564	3.9	1564	3.9	0.392	7.7	LOS A	1.5	10.9	0.38	0.28	0.40	50.5

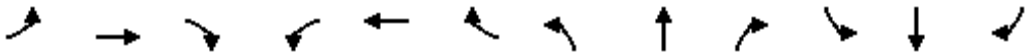
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix Q

2030 FT Synchro and Sidra Worksheets



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	168	20	79	19	368	82	61	638	5
Future Volume (vph)	15	31	26	168	20	79	19	368	82	61	638	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.98		0.99	0.98				0.97	1.00		0.96
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1682	0	1750	1345	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.693			0.574			0.331			0.533		
Satd. Flow (perm)	1264	1682	0	1050	1345	0	573	3510	1541	982	1865	1311
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			79				82			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	168	20	79	19	368	82	61	638	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	168	99	0	19	368	82	61	638	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

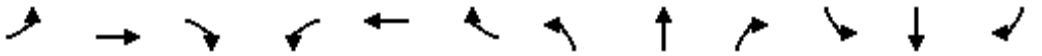


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		9.0	53.0		57.0	57.0	57.0	57.0	57.0	57.0
Total Split (%)	40.0%	40.0%		8.2%	48.2%		51.8%	51.8%	51.8%	51.8%	51.8%	51.8%
Maximum Green (s)	36.9	36.9		5.0	45.9		50.4	50.4	50.4	50.4	50.4	50.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		5	5	5	6	6	6
Act Effct Green (s)	17.4	17.4		27.7	24.6		71.7	71.7	71.7	71.7	71.7	71.7
Actuated g/C Ratio	0.16	0.16		0.25	0.22		0.65	0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.08	0.20		0.55	0.27		0.05	0.16	0.08	0.10	0.53	0.01
Control Delay	32.9	22.2		38.7	10.0		12.9	10.2	3.5	12.0	15.7	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	22.2		38.7	10.0		12.9	10.2	3.5	12.0	15.7	0.0
LOS	C	C		D	A		B	B	A	B	B	A
Approach Delay		24.4			28.1			9.1			15.3	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		32.9	3.7		1.0	11.2	0.0	3.4	50.6	0.0
Queue Length 95th (m)	6.9	13.5		36.2	12.7		6.6	33.6	7.9	15.4	152.0	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	424	581		303	607		373	2287	1032	639	1215	882
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	0.04	0.10		0.55	0.16		0.05	0.16	0.08	0.10	0.53	0.01

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	

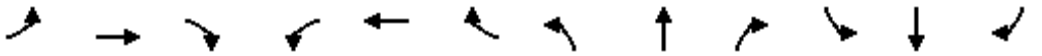
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 16.1	Intersection LOS: B
Intersection Capacity Utilization 81.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

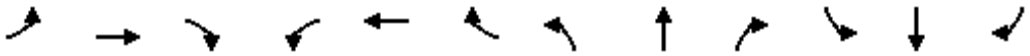


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	168	20	79	19	368	82	61	638	5
Future Volume (vph)	15	31	26	168	20	79	19	368	82	61	638	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1676		1744	1343		1638	3510	1543	1750	1865	1313
Flt Permitted	0.69	1.00		0.57	1.00		0.33	1.00	1.00	0.53	1.00	1.00
Satd. Flow (perm)	1264	1676		1054	1343		571	3510	1543	981	1865	1313
Peak-hour factor, PHF	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)	15	31	26	168	20	79	19	368	82	61	638	5
RTOR Reduction (vph)	0	22	0	0	60	0	0	0	30	0	0	2
Lane Group Flow (vph)	15	35	0	168	39	0	19	368	52	61	638	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Effective Green, g (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Actuated g/C Ratio	0.14	0.14		0.24	0.24		0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	181	240		288	317		364	2243	986	626	1191	839
v/s Ratio Prot		0.02		c0.03	0.03			0.10			c0.34	
v/s Ratio Perm	0.01			c0.10			0.03		0.03	0.06		0.00
v/c Ratio	0.08	0.14		0.58	0.12		0.05	0.16	0.05	0.10	0.54	0.00
Uniform Delay, d1	40.8	41.2		36.8	33.0		7.4	8.0	7.4	7.6	10.9	7.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3		3.0	0.2		0.3	0.2	0.1	0.3	1.7	0.0
Delay (s)	41.0	41.5		39.8	33.2		7.7	8.2	7.5	8.0	12.6	7.2
Level of Service	D	D		D	C		A	A	A	A	B	A
Approach Delay (s)		41.4			37.3			8.0			12.2	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	317	0	167	1	257	160	145	453	3
Future Volume (vph)	6	1	11	317	0	167	1	257	160	145	453	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.97		0.99	0.97		1.00		0.97	0.99		0.97
Frt		0.862			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1323	0	1691	1435	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.651			0.750			0.429			0.596		
Satd. Flow (perm)	866	1323	0	1321	1435	0	805	1746	1425	1017	1847	1189
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			501				160			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			135.5	
Travel Time (s)		4.8			21.4			38.5			8.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	11	317	0	167	1	257	160	145	453	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	12	0	317	167	0	1	257	160	145	453	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

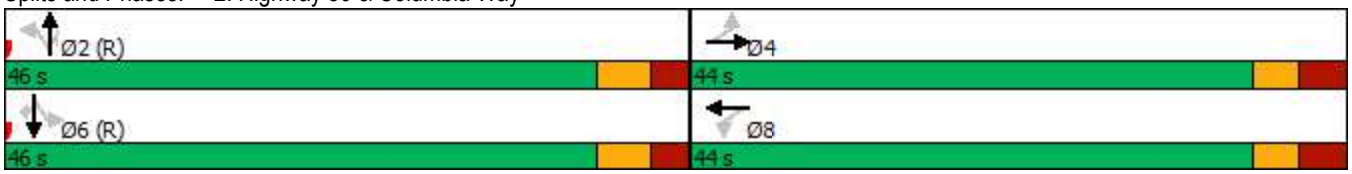


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	44.0	44.0		44.0	44.0		46.0	46.0	46.0	46.0	46.0	46.0
Total Split (%)	48.9%	48.9%		48.9%	48.9%		51.1%	51.1%	51.1%	51.1%	51.1%	51.1%
Maximum Green (s)	37.6	37.6		37.6	37.6		39.6	39.6	39.6	39.6	39.6	39.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	27.6	27.6		27.6	27.6		49.6	49.6	49.6	49.6	49.6	49.6
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.55	0.55	0.55	0.55	0.55	0.55
v/c Ratio	0.02	0.03		0.78	0.21		0.00	0.27	0.19	0.26	0.45	0.00
Control Delay	17.8	9.8		41.5	0.6		13.0	13.3	3.0	14.3	15.5	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	9.8		41.5	0.6		13.0	13.3	3.0	14.3	15.5	0.0
LOS	B	A		D	A		B	B	A	B	B	A
Approach Delay		12.4			27.4			9.4			15.1	
Approach LOS		B			C			A			B	
Queue Length 50th (m)	0.7	0.1		49.6	0.0		0.1	22.0	0.0	12.3	43.8	0.0
Queue Length 95th (m)	2.9	3.3		68.4	0.0		0.9	45.1	10.3	29.5	83.5	0.0
Internal Link Dist (m)		29.3			213.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	361	559		551	891		443	962	857	560	1017	673
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.02		0.58	0.19		0.00	0.27	0.19	0.26	0.45	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 17.4	Intersection LOS: B
Intersection Capacity Utilization 73.3%	ICU Level of Service D
Analysis Period (min) 15	

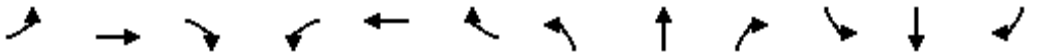
Splits and Phases: 2: Highway 50 & Columbia Way



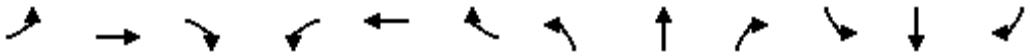
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	11	317	0	167	1	257	160	145	453	3
Future Volume (vph)	6	1	11	317	0	167	1	257	160	145	453	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.96		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1264	1322		1673	1433		1783	1746	1426	1621	1847	1190
Flt Permitted	0.65	1.00		0.75	1.00		0.43	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	867	1322		1320	1433		805	1746	1426	1017	1847	1190
Peak-hour factor, PHF	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)	6	1	11	317	0	167	1	257	160	145	453	3
RTOR Reduction (vph)	0	8	0	0	116	0	0	0	72	0	0	1
Lane Group Flow (vph)	6	4	0	317	51	0	1	257	88	145	453	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	27.6	27.6		27.6	27.6		49.6	49.6	49.6	49.6	49.6	49.6
Effective Green, g (s)	27.6	27.6		27.6	27.6		49.6	49.6	49.6	49.6	49.6	49.6
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.55	0.55	0.55	0.55	0.55	0.55
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	265	405		404	439		443	962	785	560	1017	655
v/s Ratio Prot		0.00			0.04			0.15			c0.25	
v/s Ratio Perm	0.01			c0.24			0.00		0.06	0.14		0.00
v/c Ratio	0.02	0.01		0.78	0.12		0.00	0.27	0.11	0.26	0.45	0.00
Uniform Delay, d1	21.8	21.7		28.5	22.4		9.1	10.6	9.7	10.6	12.0	9.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		9.6	0.1		0.0	0.7	0.3	1.1	1.4	0.0
Delay (s)	21.8	21.7		38.1	22.6		9.1	11.3	10.0	11.7	13.4	9.1
Level of Service	C	C		D	C		A	B	A	B	B	A
Approach Delay (s)		21.7			32.7			10.8			13.0	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	239	30	128	257	9	46	5	95	25	12	174
Future Volume (vph)	33	239	30	128	257	9	46	5	95	25	12	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		0.99	0.97		0.99	0.97	
Frt		0.983			0.995			0.857			0.860	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1849	0	1691	1893	0	1750	1563	0	1789	1570	0
Flt Permitted	0.595			0.594			0.622			0.692		
Satd. Flow (perm)	1115	1849	0	1052	1893	0	1138	1563	0	1294	1570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			3			95			174	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		237.8			207.6			217.2			123.9	
Travel Time (s)		21.4			18.7			19.5			11.2	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	33	239	30	128	257	9	46	5	95	25	12	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	269	0	128	266	0	46	100	0	25	186	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

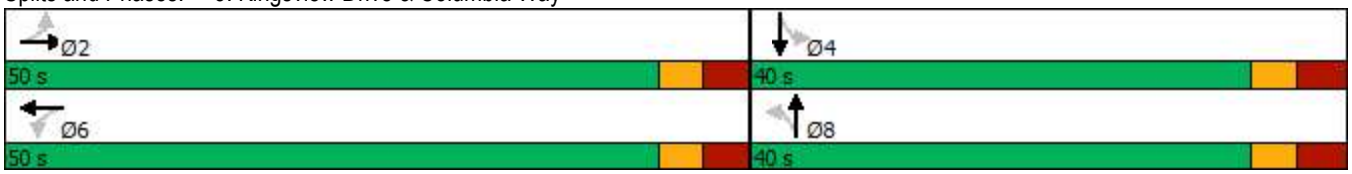


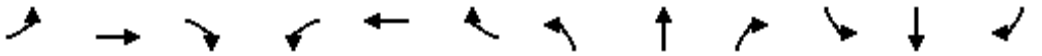
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	50.0	50.0		50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.8	43.8		43.8	43.8		33.5	33.5		33.5	33.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.66	0.66		0.66	0.66		0.16	0.16		0.16	0.16	
v/c Ratio	0.04	0.22		0.18	0.21		0.26	0.31		0.12	0.47	
Control Delay	6.7	6.5		7.3	6.6		27.2	8.6		24.0	9.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.7	6.5		7.3	6.6		27.2	8.6		24.0	9.0	
LOS	A	A		A	A		C	A		C	A	
Approach Delay		6.5			6.8			14.5			10.8	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.1	9.3		4.5	9.4		5.1	0.6		2.7	1.3	
Queue Length 95th (m)	6.6	35.4		20.4	35.5		12.6	10.4		8.0	14.6	
Internal Link Dist (m)		213.8			183.6			193.2			99.9	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	736	1224		694	1250		546	800		622	845	
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	0.22		0.18	0.21		0.08	0.13		0.04	0.22	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 70.5	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.47	

Intersection Signal Delay: 8.6	Intersection LOS: A
Intersection Capacity Utilization 75.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way





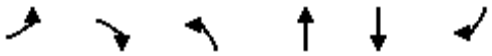
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	239	30	128	257	9	46	5	95	25	12	174
Future Volume (vph)	33	239	30	128	257	9	46	5	95	25	12	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1782	1850		1685	1893		1741	1557		1779	1562	
Flt Permitted	0.60	1.00		0.59	1.00		0.62	1.00		0.69	1.00	
Satd. Flow (perm)	1117	1850		1053	1893		1139	1557		1297	1562	
Peak-hour factor, PHF	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)	33	239	30	128	257	9	46	5	95	25	12	174
RTOR Reduction (vph)	0	3	0	0	1	0	0	80	0	0	147	0
Lane Group Flow (vph)	33	266	0	128	265	0	46	20	0	25	39	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Effective Green, g (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.66	0.66		0.66	0.66		0.16	0.16		0.16	0.16	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	738	1223		696	1252		179	245		204	246	
v/s Ratio Prot		c0.14			0.14			0.01			0.03	
v/s Ratio Perm	0.03			0.12			c0.04			0.02		
v/c Ratio	0.04	0.22		0.18	0.21		0.26	0.08		0.12	0.16	
Uniform Delay, d1	4.2	4.7		4.6	4.7		26.0	25.3		25.4	25.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.6	0.4		0.8	0.1		0.3	0.3	
Delay (s)	4.3	5.1		5.2	5.1		26.7	25.4		25.7	25.9	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		5.0			5.1			25.8			25.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	70.3	Sum of lost time (s)	12.7
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

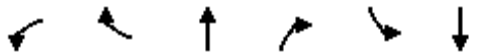
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	128	103	151	270	486	307
Future Volume (vph)	128	103	151	270	486	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.933					0.850
Flt Protected	0.973			0.982		
Satd. Flow (prot)	2963	0	0	3240	1830	1512
Flt Permitted	0.973			0.982		
Satd. Flow (perm)	2963	0	0	3240	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	128	103	151	270	486	307
Shared Lane Traffic (%)						
Lane Group Flow (vph)	231	0	0	421	486	307
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 54.3%		ICU Level of Service A	
Analysis Period (min) 15			



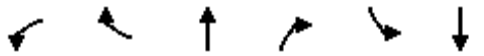
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	128	103	151	270	486	307
Future Volume (veh/h)	128	103	151	270	486	307
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	128	103	151	270	486	307
Approach Volume (veh/h)	231			421	793	
Crossing Volume (veh/h)	486			128	151	
High Capacity (veh/h)	944			1253	1231	
High v/c (veh/h)	0.24			0.34	0.64	
Low Capacity (veh/h)	764			1041	1021	
Low v/c (veh/h)	0.30			0.40	0.78	

Intersection Summary			
Maximum v/c High	0.64		
Maximum v/c Low	0.78		
Intersection Capacity Utilization	54.3%	ICU Level of Service	A



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	35	381	43	0	597
Future Volume (vph)	0	35	381	43	0	597
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	85.7		135.5			881.3
Travel Time (s)	10.3		8.1			52.9
Confl. Peds. (#/hr)		5		5		
Confl. Bikes (#/hr)				5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	35	381	43	0	597
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	35	381	43	0	597
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

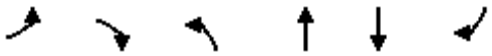
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	35	381	43	0	597
Future Volume (Veh/h)	0	35	381	43	0	597
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)	0	35	381	43	0	597
Pedestrians	5					5
Lane Width (m)	3.5					3.7
Walking Speed (m/s)	1.0					1.0
Percent Blockage	0					1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	983	391			429	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	951	322			362	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	270	670			1121	

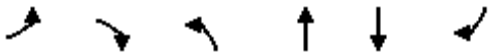
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	35	381	43	597
Volume Left	0	0	0	0
Volume Right	35	0	43	0
cSH	670	1700	1700	1700
Volume to Capacity	0.05	0.22	0.03	0.35
Queue Length 95th (m)	1.3	0.0	0.0	0.0
Control Delay (s)	10.7	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	10.7	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	196	45	0	0	0
Future Volume (vph)	0	196	45	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	58.6			123.9	109.1	
Travel Time (s)	7.0			11.2	9.8	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	196	45	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	196	0	0	45	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

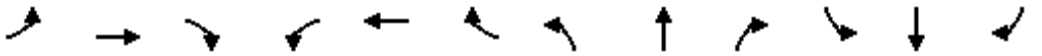
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		



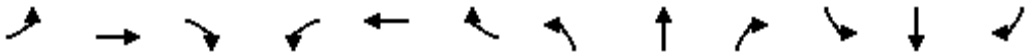
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	196	45	0	0	0
Future Volume (Veh/h)	0	196	45	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	196	45	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				124		
pX, platoon unblocked						
vC, conflicting volume	95	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	82	97			
cM capacity (veh/h)	875	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	196	45	0
Volume Left	0	45	0
Volume Right	196	0	0
cSH	1073	1608	1700
Volume to Capacity	0.18	0.03	0.00
Queue Length 95th (m)	5.1	0.7	0.0
Control Delay (s)	9.1	7.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	7.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	67	9	43	70	937	71	36	529	19
Future Volume (vph)	15	4	13	67	9	43	70	937	71	36	529	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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		0.99	0.98		1.00		0.97	1.00		0.97
Frt		0.885			0.876				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1591	0	1750	1429	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.723			0.746			0.421			0.281		
Satd. Flow (perm)	1265	1591	0	1365	1429	0	790	3579	1548	528	1883	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			43				71			45
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	67	9	43	70	937	71	36	529	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	67	52	0	70	937	71	36	529	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

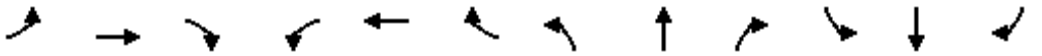


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		44.0	44.0		56.0	56.0	56.0	56.0	56.0	56.0
Total Split (%)	44.0%	44.0%		44.0%	44.0%		56.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Maximum Green (s)	36.9	36.9		36.9	36.9		49.4	49.4	49.4	49.4	49.4	49.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	15	15		5	5		8	8	8	24	24	24
Act Effct Green (s)	19.9	19.9		19.9	19.9		70.8	70.8	70.8	70.8	70.8	70.8
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.71	0.71	0.71	0.71	0.71	0.71
v/c Ratio	0.06	0.05		0.25	0.16		0.13	0.37	0.06	0.10	0.40	0.02
Control Delay	25.5	12.9		31.2	10.2		11.0	10.2	3.4	11.6	11.7	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.5	12.9		31.2	10.2		11.0	10.2	3.4	11.6	11.7	0.9
LOS	C	B		C	B		B	B	A	B	B	A
Approach Delay		18.8			22.1			9.8			11.3	
Approach LOS		B			C			A			B	
Queue Length 50th (m)	2.7	0.7		12.4	1.6		3.0	25.8	0.0	1.5	28.4	0.0
Queue Length 95th (m)	6.1	4.9		18.1	8.8		15.4	78.6	6.6	9.5	98.3	1.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	466	595		503	554		559	2533	1116	373	1333	1077
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03		0.13	0.09		0.13	0.37	0.06	0.10	0.40	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	

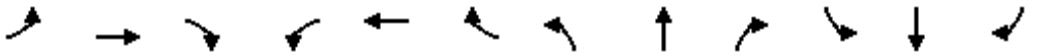
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.40	
Intersection Signal Delay: 11.3	Intersection LOS: B
Intersection Capacity Utilization 68.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

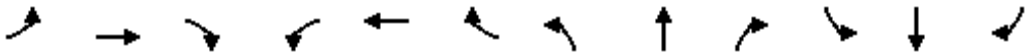


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	67	9	43	70	937	71	36	529	19
Future Volume (vph)	15	4	13	67	9	43	70	937	71	36	529	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1662	1585		1738	1426		1782	3579	1550	1785	1883	1505
Flt Permitted	0.72	1.00		0.75	1.00		0.42	1.00	1.00	0.28	1.00	1.00
Satd. Flow (perm)	1265	1585		1365	1426		790	3579	1550	527	1883	1505
Peak-hour factor, PHF	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)	15	4	13	67	9	43	70	937	71	36	529	19
RTOR Reduction (vph)	0	11	0	0	35	0	0	0	23	0	0	6
Lane Group Flow (vph)	15	6	0	67	17	0	70	937	48	36	529	13
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	18.3	18.3		18.3	18.3		68.0	68.0	68.0	68.0	68.0	68.0
Effective Green, g (s)	18.3	18.3		18.3	18.3		68.0	68.0	68.0	68.0	68.0	68.0
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	231	290		249	260		537	2433	1054	358	1280	1023
v/s Ratio Prot		0.00			0.01			0.26			c0.28	
v/s Ratio Perm	0.01			c0.05			0.09		0.03	0.07		0.01
v/c Ratio	0.06	0.02		0.27	0.06		0.13	0.39	0.05	0.10	0.41	0.01
Uniform Delay, d1	33.8	33.5		35.1	33.8		5.6	6.9	5.3	5.5	7.1	5.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		0.6	0.1		0.5	0.5	0.1	0.6	1.0	0.0
Delay (s)	33.9	33.5		35.7	33.9		6.1	7.4	5.4	6.1	8.1	5.2
Level of Service	C	C		D	C		A	A	A	A	A	A
Approach Delay (s)		33.7			34.9			7.2			7.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	209	0	69	0	702	270	146	315	2
Future Volume (vph)	1	0	2	209	0	69	0	702	270	146	315	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96				0.97	1.00		0.97
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1507	0	1675	1543	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.712			0.757						0.302		
Satd. Flow (perm)	1299	1507	0	1320	1543	0	1883	1883	1552	568	1883	792
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		534			222				270			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			135.5	
Travel Time (s)		4.8			20.9			38.5			8.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	2	209	0	69	0	702	270	146	315	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	2	0	209	69	0	0	702	270	146	315	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

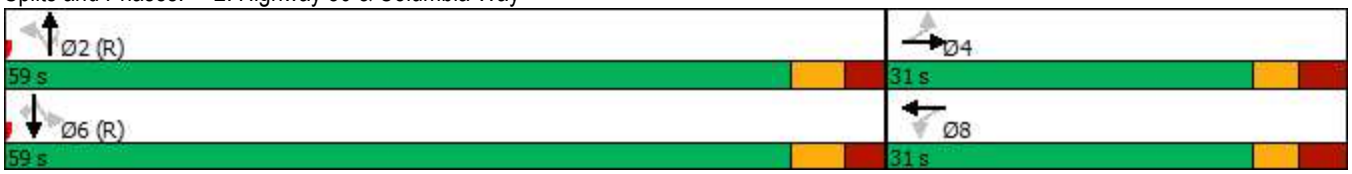


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	31.0	31.0		31.0	31.0		59.0	59.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%		34.4%	34.4%		65.6%	65.6%	65.6%	65.6%	65.6%	65.6%
Maximum Green (s)	24.6	24.6		24.6	24.6		52.6	52.6	52.6	52.6	52.6	52.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	0
Act Effct Green (s)	19.1	19.1		19.1	19.1			58.1	58.1	58.1	58.1	58.1
Actuated g/C Ratio	0.21	0.21		0.21	0.21			0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.00	0.00		0.75	0.14			0.58	0.25	0.40	0.26	0.00
Control Delay	25.0	0.0		49.2	0.6			12.4	1.7	13.1	8.3	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	0.0		49.2	0.6			12.4	1.7	13.1	8.3	0.0
LOS	C	A		D	A			B	A	B	A	A
Approach Delay		8.3			37.2			9.4			9.8	
Approach LOS		A			D			A			A	
Queue Length 50th (m)	0.1	0.0		33.7	0.0			62.8	0.0	11.0	21.2	0.0
Queue Length 95th (m)	1.3	0.0		53.6	0.0			109.7	9.2	28.6	39.2	0.0
Internal Link Dist (m)		29.3			207.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0						70.0		25.0
Base Capacity (vph)	355	799		360	583			1216	1098	366	1216	525
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.58	0.12			0.58	0.25	0.40	0.26	0.00

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: 65	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 14.0	Intersection LOS: B
Intersection Capacity Utilization 79.3%	ICU Level of Service D
Analysis Period (min) 15	

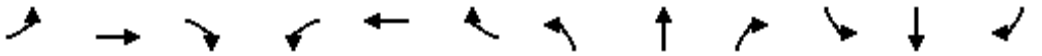
Splits and Phases: 2: Highway 50 & Columbia Way



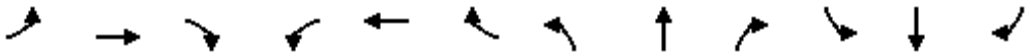
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	209	0	69	0	702	270	146	315	2
Future Volume (vph)	1	0	2	209	0	69	0	702	270	146	315	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96			1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1504		1657	1540			1883	1553	1785	1883	792
Flt Permitted	0.71	1.00		0.76	1.00			1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	1299	1504		1319	1540			1883	1553	568	1883	792
Peak-hour factor, PHF	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)	1	0	2	209	0	69	0	702	270	146	315	2
RTOR Reduction (vph)	0	2	0	0	54	0	0	0	96	0	0	1
Lane Group Flow (vph)	1	0	0	209	15	0	0	702	174	146	315	1
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	19.1	19.1		19.1	19.1			58.1	58.1	58.1	58.1	58.1
Effective Green, g (s)	19.1	19.1		19.1	19.1			58.1	58.1	58.1	58.1	58.1
Actuated g/C Ratio	0.21	0.21		0.21	0.21			0.65	0.65	0.65	0.65	0.65
Clearance Time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	275	319		279	326			1215	1002	366	1215	511
v/s Ratio Prot		0.00			0.01			c0.37			0.17	
v/s Ratio Perm	0.00			c0.16					0.11	0.26		0.00
v/c Ratio	0.00	0.00		0.75	0.04			0.58	0.17	0.40	0.26	0.00
Uniform Delay, d1	27.9	27.9		33.2	28.2			9.0	6.4	7.6	6.8	5.7
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		10.5	0.1			2.0	0.4	3.2	0.5	0.0
Delay (s)	28.0	27.9		43.7	28.3			11.0	6.7	10.8	7.3	5.7
Level of Service	C	C		D	C			B	A	B	A	A
Approach Delay (s)		27.9			39.9			9.8			8.4	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	239	72	50	129	26	23	13	32	17	9	119
Future Volume (vph)	93	239	72	50	129	26	23	13	32	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	0.99		0.99	0.98		0.99	0.97	
Frt		0.965			0.975			0.893			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1763	0	1658	1634	0	1638	1525	0	1789	1572	0
Flt Permitted	0.659			0.571			0.675			0.728		
Satd. Flow (perm)	1234	1763	0	992	1634	0	1155	1525	0	1360	1572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			16			32			119	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		231.8			207.6			217.2			125.5	
Travel Time (s)		20.9			18.7			19.5			11.3	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Adj. Flow (vph)	93	239	72	50	129	26	23	13	32	17	9	119
Shared Lane Traffic (%)												
Lane Group Flow (vph)	93	311	0	50	155	0	23	45	0	17	128	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

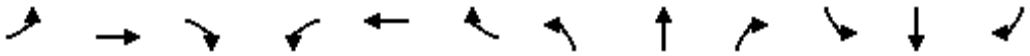


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0		39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%		43.3%	43.3%	
Maximum Green (s)	44.8	44.8		44.8	44.8		32.5	32.5		32.5	32.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	50.9	50.9		50.9	50.9		10.2	10.2		10.5	10.5	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.15	0.15		0.15	0.15	
v/c Ratio	0.10	0.24		0.07	0.13		0.14	0.18		0.08	0.38	
Control Delay	6.4	6.0		6.5	5.5		25.4	13.3		24.0	9.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.4	6.0		6.5	5.5		25.4	13.3		24.0	9.3	
LOS	A	A		A	A		C	B		C	A	
Approach Delay		6.1			5.8			17.4			11.0	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	2.9	9.9		1.5	4.4		2.6	1.4		1.9	1.0	
Queue Length 95th (m)	14.7	40.3		9.1	20.4		7.7	8.3		6.3	12.2	
Internal Link Dist (m)		207.8			183.6			193.2			101.5	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	897	1287		721	1191		541	731		637	799	
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	0.10	0.24		0.07	0.13		0.04	0.06		0.03	0.16	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 70.1	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.38	

Intersection Signal Delay: 7.8	Intersection LOS: A
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

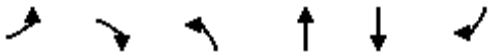
Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	239	72	50	129	26	23	13	32	17	9	119
Future Volume (vph)	93	239	72	50	129	26	23	13	32	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.89		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1781	1765		1652	1634		1629	1517		1778	1559	
Flt Permitted	0.66	1.00		0.57	1.00		0.67	1.00		0.73	1.00	
Satd. Flow (perm)	1235	1765		994	1634		1157	1517		1362	1559	
Peak-hour factor, PHF	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)	93	239	72	50	129	26	23	13	32	17	9	119
RTOR Reduction (vph)	0	7	0	0	5	0	0	28	0	0	104	0
Lane Group Flow (vph)	93	304	0	50	150	0	23	17	0	17	24	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.6	49.6		49.6	49.6		9.0	9.0		9.0	9.0	
Effective Green, g (s)	49.6	49.6		49.6	49.6		9.0	9.0		9.0	9.0	
Actuated g/C Ratio	0.70	0.70		0.70	0.70		0.13	0.13		0.13	0.13	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	859	1227		691	1136		146	191		171	196	
v/s Ratio Prot		c0.17			0.09			0.01			0.02	
v/s Ratio Perm	0.08			0.05			c0.02			0.01		
v/c Ratio	0.11	0.25		0.07	0.13		0.16	0.09		0.10	0.12	
Uniform Delay, d1	3.6	4.0		3.5	3.6		27.8	27.5		27.6	27.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.2	0.2		0.5	0.2		0.3	0.3	
Delay (s)	3.8	4.5		3.7	3.9		28.3	27.7		27.8	27.9	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		4.3			3.8			27.9			27.9	
Approach LOS		A			A			C			C	

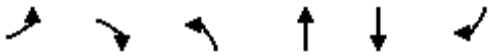
Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	12.7
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



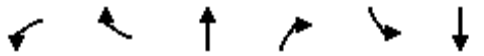
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	406	118	49	641	320	124
Future Volume (vph)	406	118	49	641	320	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.966					0.850
Flt Protected	0.963			0.996		
Satd. Flow (prot)	3299	0	0	3557	1812	1408
Flt Permitted	0.963			0.996		
Satd. Flow (perm)	3299	0	0	3557	1812	1408
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	5%	2%	6%	16%
Adj. Flow (vph)	406	118	49	641	320	124
Shared Lane Traffic (%)						
Lane Group Flow (vph)	524	0	0	690	320	124
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		



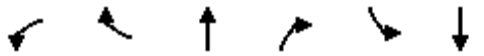
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	406	118	49	641	320	124
Future Volume (veh/h)	406	118	49	641	320	124
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	406	118	49	641	320	124
Approach Volume (veh/h)	524			690	444	
Crossing Volume (veh/h)	320			406	49	
High Capacity (veh/h)	1077			1006	1333	
High v/c (veh/h)	0.49			0.69	0.33	
Low Capacity (veh/h)	883			819	1114	
Low v/c (veh/h)	0.59			0.84	0.40	

Intersection Summary			
Maximum v/c High	0.69		
Maximum v/c Low	0.84		
Intersection Capacity Utilization	61.3%	ICU Level of Service	B



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	26	644	126	0	460
Future Volume (vph)	0	26	644	126	0	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	61.8		135.5			881.3
Travel Time (s)	7.4		8.1			52.9
Confl. Peds. (#/hr)		5		5		
Confl. Bikes (#/hr)				5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	26	644	126	0	460
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	644	126	0	460
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

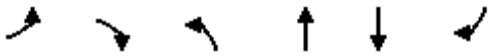
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.4%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	26	644	126	0	460
Future Volume (Veh/h)	0	26	644	126	0	460
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)	0	26	644	126	0	460
Pedestrians	5					5
Lane Width (m)	3.5					3.7
Walking Speed (m/s)	1.0					1.0
Percent Blockage	0					1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.79	0.79			0.79	
vC, conflicting volume	1109	654			775	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1007	434			587	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	211	489			781	

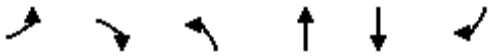
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	26	644	126	460
Volume Left	0	0	0	0
Volume Right	26	0	126	0
cSH	489	1700	1700	1700
Volume to Capacity	0.05	0.38	0.07	0.27
Queue Length 95th (m)	1.3	0.0	0.0	0.0
Control Delay (s)	12.8	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	12.8	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	145	131	0	0	0
Future Volume (vph)	0	145	131	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	67.3			125.5	83.4	
Travel Time (s)	8.1			11.3	7.5	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	145	131	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	145	0	0	131	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	145	131	0	0	0
Future Volume (Veh/h)	0	145	131	0	0	0
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)	0	145	131	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				126		
pX, platoon unblocked						
vC, conflicting volume	267	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	267	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	86	92			
cM capacity (veh/h)	660	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	145	131	0
Volume Left	0	131	0
Volume Right	145	0	0
cSH	1073	1608	1700
Volume to Capacity	0.14	0.08	0.00
Queue Length 95th (m)	3.5	2.0	0.0
Control Delay (s)	8.9	7.4	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	7.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 101 [2030 FT AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	151	8.0	151	8.0	0.222	5.8	LOS A	0.6	4.7	0.22	0.12	0.22	49.4
2	T1	All MCs	272	12.0	272	12.0	0.222	6.0	LOS A	0.7	5.1	0.24	0.13	0.24	51.5
Approach			423	10.6	423	10.6	0.222	5.9	LOS A	0.7	5.1	0.23	0.13	0.23	50.8
North: Highway 50															
8	T1	All MCs	486	6.0	486	6.0	0.523	10.4	LOS B	3.0	22.3	0.46	0.26	0.46	49.3
9	R2	All MCs	307	8.0	307	8.0	0.334	7.4	LOS A	1.5	11.1	0.36	0.20	0.36	52.7
Approach			793	6.8	793	6.8	0.523	9.2	LOS A	3.0	22.3	0.42	0.24	0.42	50.5
West: Emil Kolb Parkway															
10	L2	All MCs	128	35.0	128	35.0	0.206	9.9	LOS A	0.7	5.3	0.53	0.45	0.53	47.1
12	R2	All MCs	104	9.0	104	9.0	0.206	8.0	LOS A	0.7	5.3	0.53	0.45	0.53	51.5
Approach			232	23.3	232	23.3	0.206	9.0	LOS A	0.7	5.3	0.53	0.45	0.53	48.9
All Vehicles			1448	10.5	1448	10.5	0.523	8.2	LOS A	3.0	22.3	0.38	0.24	0.38	50.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2030 FT PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

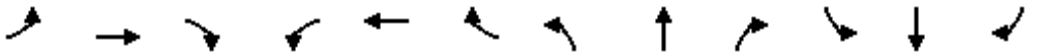
Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	49	14.0	49	14.0	0.420	10.5	LOS B	1.8	13.2	0.48	0.43	0.59	48.2
2	T1	All MCs	641	2.0	641	2.0	0.420	9.5	LOS A	1.8	13.2	0.47	0.41	0.57	49.7
Approach			690	2.9	690	2.9	0.420	9.6	LOS A	1.8	13.2	0.47	0.41	0.57	49.6
North: Highway 50															
8	T1	All MCs	320	3.0	320	3.0	0.304	6.2	LOS A	1.4	10.1	0.19	0.07	0.19	52.2
9	R2	All MCs	124	20.0	124	20.0	0.128	4.8	LOS A	0.4	3.6	0.16	0.06	0.16	54.2
Approach			444	7.7	444	7.7	0.304	5.8	LOS A	1.4	10.1	0.18	0.07	0.18	52.7
West: Emil Kolb Parkway															
10	L2	All MCs	406	2.0	406	2.0	0.326	8.2	LOS A	1.4	9.8	0.49	0.36	0.49	48.7
12	R2	All MCs	118	2.0	118	2.0	0.326	8.2	LOS A	1.4	9.8	0.49	0.36	0.49	50.2
Approach			524	2.0	524	2.0	0.326	8.2	LOS A	1.4	9.8	0.49	0.36	0.49	49.0
All Vehicles			1658	3.9	1658	3.9	0.420	8.1	LOS A	1.8	13.2	0.40	0.31	0.44	50.2

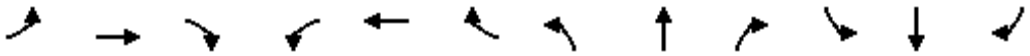
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix R

2033 FT Synchro and Sidra Worksheets



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	178	21	84	19	385	87	65	673	5
Future Volume (vph)	15	31	26	178	21	84	19	385	87	65	673	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.98		0.99	0.98				0.97	1.00		0.96
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1682	0	1750	1345	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.689			0.574			0.310			0.524		
Satd. Flow (perm)	1257	1682	0	1050	1345	0	537	3510	1541	966	1865	1311
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			84				87			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	178	21	84	19	385	87	65	673	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	178	105	0	19	385	87	65	673	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

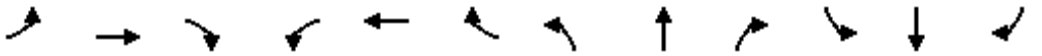


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		9.0	53.0		57.0	57.0	57.0	57.0	57.0	57.0
Total Split (%)	40.0%	40.0%		8.2%	48.2%		51.8%	51.8%	51.8%	51.8%	51.8%	51.8%
Maximum Green (s)	36.9	36.9		5.0	45.9		50.4	50.4	50.4	50.4	50.4	50.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		2	2	2	6	6	6
Act Effct Green (s)	17.4	17.4		27.7	24.6		71.7	71.7	71.7	71.7	71.7	71.7
Actuated g/C Ratio	0.16	0.16		0.25	0.22		0.65	0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.08	0.20		0.59	0.29		0.05	0.17	0.08	0.10	0.55	0.01
Control Delay	32.9	22.2		40.1	9.9		13.0	10.2	3.5	12.1	16.4	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	22.2		40.1	9.9		13.0	10.2	3.5	12.1	16.4	0.0
LOS	C	C		D	A		B	B	A	B	B	A
Approach Delay		24.4			28.9			9.1			15.9	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		35.1	3.9		1.0	11.8	0.0	3.6	55.1	0.0
Queue Length 95th (m)	6.9	13.5		38.3	13.1		6.7	35.2	8.3	16.3	164.7	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	421	581		303	610		350	2287	1035	629	1215	882
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	0.04	0.10		0.59	0.17		0.05	0.17	0.08	0.10	0.55	0.01

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 110	
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	

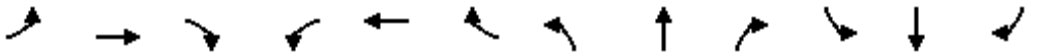
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 83.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

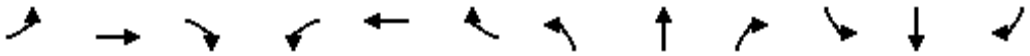


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	178	21	84	19	385	87	65	673	5
Future Volume (vph)	15	31	26	178	21	84	19	385	87	65	673	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1676		1744	1343		1639	3510	1543	1751	1865	1313
Flt Permitted	0.69	1.00		0.57	1.00		0.31	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	1257	1676		1054	1343		534	3510	1543	965	1865	1313
Peak-hour factor, PHF	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)	15	31	26	178	21	84	19	385	87	65	673	5
RTOR Reduction (vph)	0	22	0	0	64	0	0	0	31	0	0	2
Lane Group Flow (vph)	15	35	0	178	41	0	19	385	56	65	673	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Effective Green, g (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Actuated g/C Ratio	0.14	0.14		0.24	0.24		0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	180	240		288	317		341	2243	986	616	1191	839
v/s Ratio Prot		0.02		c0.03	0.03			0.11			c0.36	
v/s Ratio Perm	0.01			c0.11			0.04		0.04	0.07		0.00
v/c Ratio	0.08	0.14		0.62	0.13		0.06	0.17	0.06	0.11	0.57	0.00
Uniform Delay, d1	40.8	41.2		37.2	33.1		7.4	8.0	7.4	7.7	11.2	7.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3		3.9	0.2		0.3	0.2	0.1	0.3	1.9	0.0
Delay (s)	41.0	41.5		41.1	33.3		7.7	8.2	7.5	8.0	13.2	7.2
Level of Service	D	D		D	C		A	A	A	A	B	A
Approach Delay (s)		41.4			38.2			8.1			12.7	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	12	340	0	177	1	270	171	154	474	4
Future Volume (vph)	6	1	12	340	0	177	1	270	171	154	474	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.97		0.99	0.97		1.00		0.97	1.00		0.97
Frt		0.862			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1322	0	1691	1436	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.640			0.749			0.404			0.581		
Satd. Flow (perm)	852	1322	0	1319	1436	0	759	1746	1425	992	1847	1189
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			470				171			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			135.5	
Travel Time (s)		4.8			21.4			38.5			8.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	12	340	0	177	1	270	171	154	474	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	13	0	340	177	0	1	270	171	154	474	4
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	



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	
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		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Maximum Green (s)	38.6	38.6		38.6	38.6		38.6	38.6	38.6	38.6	38.6	38.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	29.2	29.2		29.2	29.2		48.0	48.0	48.0	48.0	48.0	48.0
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.53	0.53	0.53	0.53	0.53	0.53
v/c Ratio	0.02	0.03		0.80	0.23		0.00	0.29	0.20	0.29	0.48	0.01
Control Delay	16.8	8.8		41.0	0.7		14.0	14.5	3.2	15.8	17.1	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	8.8		41.0	0.7		14.0	14.5	3.2	15.8	17.1	0.0
LOS	B	A		D	A		B	B	A	B	B	A
Approach Delay		11.3			27.2			10.1			16.7	
Approach LOS		B			C			B			B	
Queue Length 50th (m)	0.7	0.1		52.8	0.0		0.1	24.4	0.0	13.9	48.7	0.0
Queue Length 95th (m)	2.8	3.3		72.2	0.0		1.0	49.3	10.9	32.9	91.8	0.0
Internal Link Dist (m)		29.3			213.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	365	573		565	884		405	931	840	529	985	653
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.02		0.60	0.20		0.00	0.29	0.20	0.29	0.48	0.01

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: 65	
Control Type: Actuated-Coordinated	

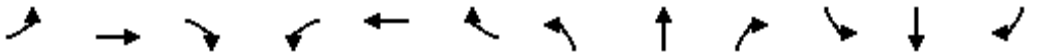
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 18.2	Intersection LOS: B
Intersection Capacity Utilization 75.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Highway 50 & Columbia Way

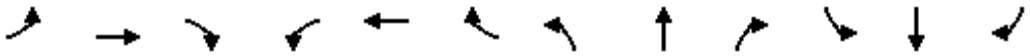
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	12	340	0	177	1	270	171	154	474	4
Future Volume (vph)	6	1	12	340	0	177	1	270	171	154	474	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.96		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1264	1319		1673	1434		1783	1746	1426	1621	1847	1190
Flt Permitted	0.64	1.00		0.75	1.00		0.40	1.00	1.00	0.58	1.00	1.00
Satd. Flow (perm)	852	1319		1319	1434		758	1746	1426	991	1847	1190
Peak-hour factor, PHF	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)	6	1	12	340	0	177	1	270	171	154	474	4
RTOR Reduction (vph)	0	8	0	0	120	0	0	0	80	0	0	2
Lane Group Flow (vph)	6	5	0	340	57	0	1	270	91	154	474	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	29.2	29.2		29.2	29.2		48.0	48.0	48.0	48.0	48.0	48.0
Effective Green, g (s)	29.2	29.2		29.2	29.2		48.0	48.0	48.0	48.0	48.0	48.0
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.53	0.53	0.53	0.53	0.53	0.53
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	276	427		427	465		404	931	760	528	985	634
v/s Ratio Prot		0.00			0.04			0.15			c0.26	
v/s Ratio Perm	0.01			c0.26			0.00		0.06	0.16		0.00
v/c Ratio	0.02	0.01		0.80	0.12		0.00	0.29	0.12	0.29	0.48	0.00
Uniform Delay, d1	20.7	20.6		27.7	21.4		9.8	11.6	10.5	11.6	13.2	9.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		9.9	0.1		0.0	0.8	0.3	1.4	1.7	0.0
Delay (s)	20.7	20.6		37.6	21.5		9.8	12.4	10.8	13.0	14.9	9.8
Level of Service	C	C		D	C		A	B	B	B	B	A
Approach Delay (s)		20.7			32.1			11.8			14.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	254	30	128	273	9	46	5	95	25	12	174
Future Volume (vph)	33	254	30	128	273	9	46	5	95	25	12	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		0.99	0.97		0.99	0.97	
Frt		0.984			0.995			0.857			0.860	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1851	0	1691	1893	0	1750	1563	0	1789	1570	0
Flt Permitted	0.587			0.586			0.622			0.692		
Satd. Flow (perm)	1101	1851	0	1038	1893	0	1138	1563	0	1294	1570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			3			95			174	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		237.8			207.6			217.2			123.9	
Travel Time (s)		21.4			18.7			19.5			11.2	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	33	254	30	128	273	9	46	5	95	25	12	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	284	0	128	282	0	46	100	0	25	186	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

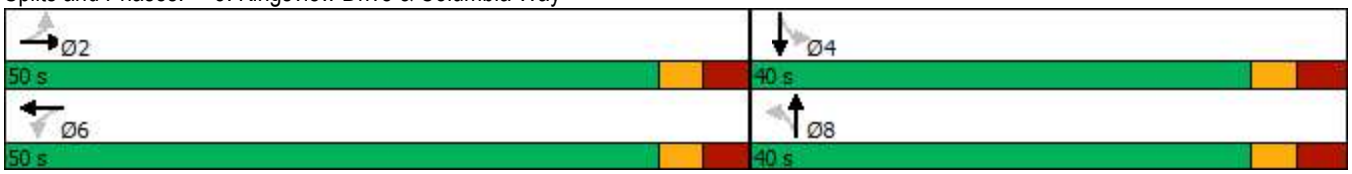


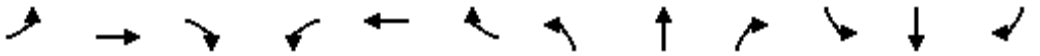
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	50.0	50.0		50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.8	43.8		43.8	43.8		33.5	33.5		33.5	33.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.66	0.66		0.66	0.66		0.16	0.16		0.16	0.16	
v/c Ratio	0.05	0.23		0.19	0.23		0.26	0.31		0.12	0.47	
Control Delay	6.7	6.6		7.3	6.7		27.2	8.6		24.0	9.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.7	6.6		7.3	6.7		27.2	8.6		24.0	9.0	
LOS	A	A		A	A		C	A		C	A	
Approach Delay		6.6			6.9			14.5			10.8	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.1	10.0		4.5	10.1		5.1	0.6		2.7	1.3	
Queue Length 95th (m)	6.6	37.6		20.5	37.8		12.6	10.4		8.0	14.6	
Internal Link Dist (m)		213.8			183.6			193.2			99.9	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	726	1225		685	1250		546	800		622	845	
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	0.05	0.23		0.19	0.23		0.08	0.13		0.04	0.22	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 70.5	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.47	

Intersection Signal Delay: 8.6	Intersection LOS: A
Intersection Capacity Utilization 75.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way

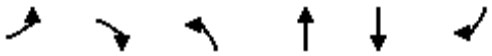




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	254	30	128	273	9	46	5	95	25	12	174
Future Volume (vph)	33	254	30	128	273	9	46	5	95	25	12	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1783	1852		1685	1893		1741	1557		1779	1562	
Flt Permitted	0.59	1.00		0.59	1.00		0.62	1.00		0.69	1.00	
Satd. Flow (perm)	1101	1852		1038	1893		1139	1557		1297	1562	
Peak-hour factor, PHF	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)	33	254	30	128	273	9	46	5	95	25	12	174
RTOR Reduction (vph)	0	3	0	0	1	0	0	80	0	0	147	0
Lane Group Flow (vph)	33	281	0	128	281	0	46	20	0	25	39	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Effective Green, g (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.66	0.66		0.66	0.66		0.16	0.16		0.16	0.16	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	728	1225		686	1252		179	245		204	246	
v/s Ratio Prot		c0.15			0.15			0.01			0.03	
v/s Ratio Perm	0.03			0.12			c0.04			0.02		
v/c Ratio	0.05	0.23		0.19	0.22		0.26	0.08		0.12	0.16	
Uniform Delay, d1	4.2	4.7		4.6	4.7		26.0	25.3		25.4	25.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4		0.6	0.4		0.8	0.1		0.3	0.3	
Delay (s)	4.3	5.2		5.2	5.1		26.7	25.4		25.7	25.9	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		5.1			5.2			25.8			25.9	
Approach LOS		A			A			C			C	

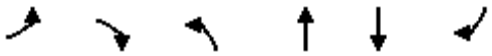
Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	70.3	Sum of lost time (s)	12.7
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



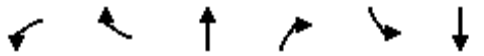
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	133	108	157	284	508	321
Future Volume (vph)	133	108	157	284	508	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.933					0.850
Flt Protected	0.973			0.983		
Satd. Flow (prot)	2964	0	0	3243	1830	1512
Flt Permitted	0.973			0.983		
Satd. Flow (perm)	2964	0	0	3243	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	133	108	157	284	508	321
Shared Lane Traffic (%)						
Lane Group Flow (vph)	241	0	0	441	508	321
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		



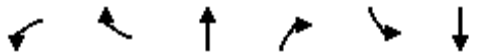
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	133	108	157	284	508	321
Future Volume (veh/h)	133	108	157	284	508	321
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	133	108	157	284	508	321
Approach Volume (veh/h)	241			441	829	
Crossing Volume (veh/h)	508			133	157	
High Capacity (veh/h)	927			1248	1225	
High v/c (veh/h)	0.26			0.35	0.68	
Low Capacity (veh/h)	749			1037	1016	
Low v/c (veh/h)	0.32			0.43	0.82	

Intersection Summary			
Maximum v/c High	0.68		
Maximum v/c Low	0.82		
Intersection Capacity Utilization	56.3%	ICU Level of Service	B



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	37	398	46	0	624
Future Volume (vph)	0	37	398	46	0	624
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	85.7		135.5			881.3
Travel Time (s)	10.3		8.1			52.9
Confl. Peds. (#/hr)		5		5		
Confl. Bikes (#/hr)				5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	37	398	46	0	624
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	37	398	46	0	624
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

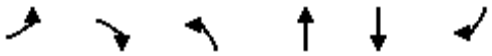
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.4%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	37	398	46	0	624
Future Volume (Veh/h)	0	37	398	46	0	624
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)	0	37	398	46	0	624
Pedestrians	5					5
Lane Width (m)	3.5					3.7
Walking Speed (m/s)	1.0					1.0
Percent Blockage	0					1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.93	0.93			0.93	
vC, conflicting volume	1027	408			449	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	993	330			374	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	253	657			1100	

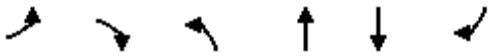
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	37	398	46	624
Volume Left	0	0	0	0
Volume Right	37	0	46	0
cSH	657	1700	1700	1700
Volume to Capacity	0.06	0.23	0.03	0.37
Queue Length 95th (m)	1.4	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	10.8	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	212	47	0	0	0
Future Volume (vph)	0	212	47	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	58.6			123.9	109.1	
Travel Time (s)	7.0			11.2	9.8	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	212	47	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	212	0	0	47	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

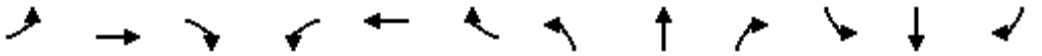
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		



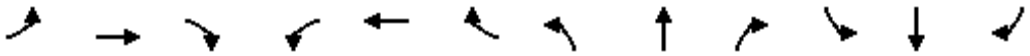
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	212	47	0	0	0
Future Volume (Veh/h)	0	212	47	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	212	47	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				124		
pX, platoon unblocked						
vC, conflicting volume	99	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	99	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	80	97			
cM capacity (veh/h)	869	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	212	47	0
Volume Left	0	47	0
Volume Right	212	0	0
cSH	1073	1608	1700
Volume to Capacity	0.20	0.03	0.00
Queue Length 95th (m)	5.6	0.7	0.0
Control Delay (s)	9.2	7.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.2	7.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	71	10	45	70	971	76	38	547	19
Future Volume (vph)	15	4	13	71	10	45	70	971	76	38	547	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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		0.99	0.98		1.00		0.97	1.00		0.97
Frt		0.885			0.877				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1591	0	1750	1431	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.721			0.746			0.426			0.278		
Satd. Flow (perm)	1261	1591	0	1365	1431	0	800	3579	1548	523	1883	1504
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			45				76			45
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	71	10	45	70	971	76	38	547	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	71	55	0	70	971	76	38	547	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

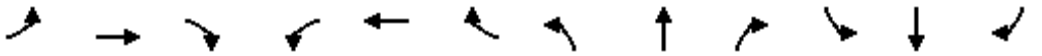


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		44.0	44.0		56.0	56.0	56.0	56.0	56.0	56.0
Total Split (%)	44.0%	44.0%		44.0%	44.0%		56.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Maximum Green (s)	36.9	36.9		36.9	36.9		49.4	49.4	49.4	49.4	49.4	49.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	15.3	15.3		15.3	15.3		75.3	75.3	75.3	75.3	75.3	75.3
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.75	0.75	0.75	0.75	0.75	0.75
v/c Ratio	0.08	0.07		0.34	0.21		0.12	0.36	0.06	0.10	0.39	0.02
Control Delay	31.1	16.2		38.8	13.2		8.2	7.6	2.6	8.8	8.8	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	16.2		38.8	13.2		8.2	7.6	2.6	8.8	8.8	0.9
LOS	C	B		D	B		A	A	A	A	A	A
Approach Delay		23.2			27.6			7.3			8.5	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	2.7	0.7		13.1	1.8		3.0	27.5	0.0	1.6	30.3	0.0
Queue Length 95th (m)	6.1	4.9		18.9	9.0		15.4	82.4	6.8	9.9	102.9	1.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	465	595		503	556		602	2695	1184	394	1418	1144
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03		0.14	0.10		0.12	0.36	0.06	0.10	0.39	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	

Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.39	
Intersection Signal Delay: 9.3	Intersection LOS: A
Intersection Capacity Utilization 69.3%	ICU Level of Service C
Analysis Period (min) 15	

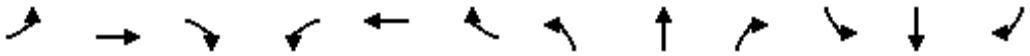
Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	71	10	45	70	971	76	38	547	19
Future Volume (vph)	15	4	13	71	10	45	70	971	76	38	547	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97		1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1662	1581		1738	1426		1782	3579	1550	1785	1883	1505
Flt Permitted	0.72	1.00		0.75	1.00		0.43	1.00	1.00	0.28	1.00	1.00
Satd. Flow (perm)	1261	1581		1365	1426		799	3579	1550	522	1883	1505
Peak-hour factor, PHF	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)	15	4	13	71	10	45	70	971	76	38	547	19
RTOR Reduction (vph)	0	11	0	0	39	0	0	0	21	0	0	5
Lane Group Flow (vph)	15	6	0	71	16	0	70	971	55	38	547	14
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.7	13.7		13.7	13.7		72.6	72.6	72.6	72.6	72.6	72.6
Effective Green, g (s)	13.7	13.7		13.7	13.7		72.6	72.6	72.6	72.6	72.6	72.6
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	216		187	195		580	2598	1125	378	1367	1092
v/s Ratio Prot		0.00			0.01			0.27			c0.29	
v/s Ratio Perm	0.01			c0.05			0.09		0.04	0.07		0.01
v/c Ratio	0.09	0.03		0.38	0.08		0.12	0.37	0.05	0.10	0.40	0.01
Uniform Delay, d1	37.7	37.4		39.3	37.7		4.1	5.2	3.9	4.0	5.3	3.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		1.3	0.2		0.4	0.4	0.1	0.5	0.9	0.0
Delay (s)	37.9	37.4		40.6	37.8		4.5	5.6	4.0	4.6	6.2	3.8
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		37.7			39.4			5.4			6.0	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	214	0	73	0	728	283	152	330	2
Future Volume (vph)	1	0	2	214	0	73	0	728	283	152	330	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96		0.99	0.96				0.97	1.00		0.97
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1507	0	1675	1543	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.709			0.757						0.287		
Satd. Flow (perm)	1293	1507	0	1320	1543	0	1883	1883	1552	540	1883	792
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		525			216				283			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			135.5	
Travel Time (s)		4.8			20.9			38.5			8.1	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	2	214	0	73	0	728	283	152	330	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	2	0	214	73	0	0	728	283	152	330	2
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	

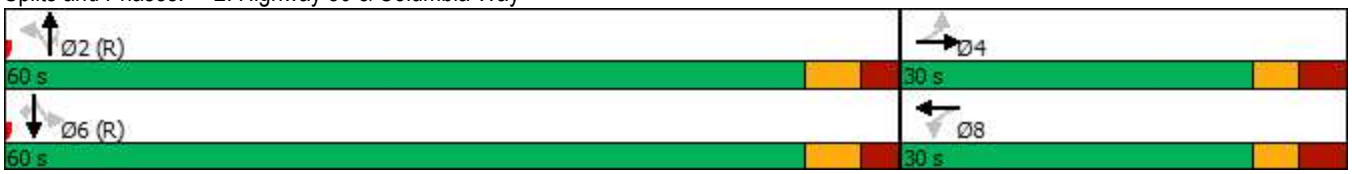


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	30.0	30.0		30.0	30.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	23.6	23.6		23.6	23.6		53.6	53.6	53.6	53.6	53.6	53.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	19.1	19.1		19.1	19.1			58.1	58.1	58.1	58.1	58.1
Actuated g/C Ratio	0.21	0.21		0.21	0.21			0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.00	0.00		0.76	0.15			0.60	0.26	0.44	0.27	0.00
Control Delay	25.0	0.0		50.7	0.6			12.8	1.7	14.2	8.3	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	0.0		50.7	0.6			12.8	1.7	14.2	8.3	0.0
LOS	C	A		D	A			B	A	B	A	A
Approach Delay		8.3			38.0			9.7			10.1	
Approach LOS		A			D			A			B	
Queue Length 50th (m)	0.1	0.0		34.6	0.0			67.2	0.0	12.0	22.7	0.0
Queue Length 95th (m)	1.3	0.0		55.9	0.0			112.6	9.1	30.4	39.9	0.0
Internal Link Dist (m)		29.3			207.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0						70.0		25.0
Base Capacity (vph)	339	782		346	563			1215	1102	348	1215	525
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.62	0.13			0.60	0.26	0.44	0.27	0.00

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: 70	
Control Type: Actuated-Coordinated	

Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

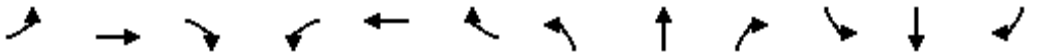
Splits and Phases: 2: Highway 50 & Columbia Way



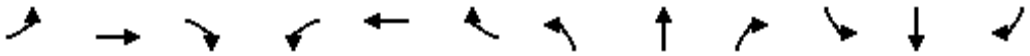
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	2	214	0	73	0	728	283	152	330	2
Future Volume (vph)	1	0	2	214	0	73	0	728	283	152	330	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96		1.00	0.96			1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1504		1657	1540			1883	1553	1786	1883	792
Flt Permitted	0.71	1.00		0.76	1.00			1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)	1294	1504		1319	1540			1883	1553	539	1883	792
Peak-hour factor, PHF	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)	1	0	2	214	0	73	0	728	283	152	330	2
RTOR Reduction (vph)	0	2	0	0	58	0	0	0	100	0	0	1
Lane Group Flow (vph)	1	0	0	214	15	0	0	728	183	152	330	1
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	19.1	19.1		19.1	19.1			58.1	58.1	58.1	58.1	58.1
Effective Green, g (s)	19.1	19.1		19.1	19.1			58.1	58.1	58.1	58.1	58.1
Actuated g/C Ratio	0.21	0.21		0.21	0.21			0.65	0.65	0.65	0.65	0.65
Clearance Time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	274	319		279	326			1215	1002	347	1215	511
v/s Ratio Prot		0.00			0.01			c0.39			0.18	
v/s Ratio Perm	0.00			c0.16					0.12	0.28		0.00
v/c Ratio	0.00	0.00		0.77	0.05			0.60	0.18	0.44	0.27	0.00
Uniform Delay, d1	27.9	27.9		33.4	28.2			9.2	6.4	7.9	6.9	5.7
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		11.9	0.1			2.2	0.4	4.0	0.6	0.0
Delay (s)	28.0	27.9		45.3	28.3			11.4	6.8	11.9	7.4	5.7
Level of Service	C	C		D	C			B	A	B	A	A
Approach Delay (s)		27.9			40.9			10.1			8.8	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	254	72	50	137	26	23	13	32	17	9	119
Future Volume (vph)	93	254	72	50	137	26	23	13	32	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	1.00		0.99	0.98		0.99	0.97	
Frt		0.967			0.976			0.893			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1767	0	1658	1634	0	1638	1525	0	1789	1572	0
Flt Permitted	0.654			0.563			0.675			0.728		
Satd. Flow (perm)	1225	1767	0	979	1634	0	1155	1525	0	1360	1572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			15			32			119	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		231.8			207.6			217.2			125.5	
Travel Time (s)		20.9			18.7			19.5			11.3	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Adj. Flow (vph)	93	254	72	50	137	26	23	13	32	17	9	119
Shared Lane Traffic (%)												
Lane Group Flow (vph)	93	326	0	50	163	0	23	45	0	17	128	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

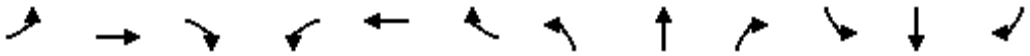


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0		39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%		43.3%	43.3%	
Maximum Green (s)	44.8	44.8		44.8	44.8		32.5	32.5		32.5	32.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	50.9	50.9		50.9	50.9		10.2	10.2		10.5	10.5	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.15	0.15		0.15	0.15	
v/c Ratio	0.10	0.25		0.07	0.14		0.14	0.18		0.08	0.38	
Control Delay	6.4	6.1		6.5	5.6		25.4	13.3		24.0	9.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.4	6.1		6.5	5.6		25.4	13.3		24.0	9.3	
LOS	A	A		A	A		C	B		C	A	
Approach Delay		6.2			5.8			17.4			11.0	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	2.9	10.6		1.5	4.7		2.6	1.4		1.9	1.0	
Queue Length 95th (m)	14.8	42.7		9.1	21.5		7.7	8.3		6.3	12.2	
Internal Link Dist (m)		207.8			183.6			193.2			101.5	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	890	1290		711	1191		541	731		637	799	
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	0.10	0.25		0.07	0.14		0.04	0.06		0.03	0.16	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 70.1	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.38	

Intersection Signal Delay: 7.8	Intersection LOS: A
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

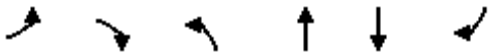
Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	254	72	50	137	26	23	13	32	17	9	119
Future Volume (vph)	93	254	72	50	137	26	23	13	32	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.89		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1781	1768		1653	1635		1629	1517		1778	1559	
Flt Permitted	0.65	1.00		0.56	1.00		0.67	1.00		0.73	1.00	
Satd. Flow (perm)	1226	1768		980	1635		1157	1517		1362	1559	
Peak-hour factor, PHF	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)	93	254	72	50	137	26	23	13	32	17	9	119
RTOR Reduction (vph)	0	7	0	0	5	0	0	28	0	0	104	0
Lane Group Flow (vph)	93	319	0	50	158	0	23	17	0	17	24	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.6	49.6		49.6	49.6		9.0	9.0		9.0	9.0	
Effective Green, g (s)	49.6	49.6		49.6	49.6		9.0	9.0		9.0	9.0	
Actuated g/C Ratio	0.70	0.70		0.70	0.70		0.13	0.13		0.13	0.13	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	852	1229		681	1137		146	191		171	196	
v/s Ratio Prot		c0.18			0.10			0.01			0.02	
v/s Ratio Perm	0.08			0.05			c0.02			0.01		
v/c Ratio	0.11	0.26		0.07	0.14		0.16	0.09		0.10	0.12	
Uniform Delay, d1	3.6	4.0		3.5	3.7		27.8	27.5		27.6	27.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.2	0.3		0.5	0.2		0.3	0.3	
Delay (s)	3.8	4.5		3.7	3.9		28.3	27.7		27.8	27.9	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		4.4			3.9			27.9			27.9	
Approach LOS		A			A			C			C	

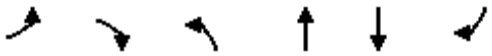
Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	12.7
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



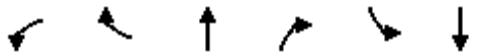
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	425	123	51	669	334	130
Future Volume (vph)	425	123	51	669	334	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.966					0.850
Flt Protected	0.963			0.996		
Satd. Flow (prot)	3299	0	0	3557	1812	1408
Flt Permitted	0.963			0.996		
Satd. Flow (perm)	3299	0	0	3557	1812	1408
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	5%	2%	6%	16%
Adj. Flow (vph)	425	123	51	669	334	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	548	0	0	720	334	130
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 63.5%		ICU Level of Service B	
Analysis Period (min) 15			



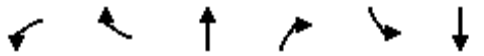
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	425	123	51	669	334	130
Future Volume (veh/h)	425	123	51	669	334	130
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	425	123	51	669	334	130
Approach Volume (veh/h)	548			720	464	
Crossing Volume (veh/h)	334			425	51	
High Capacity (veh/h)	1065			991	1331	
High v/c (veh/h)	0.51			0.73	0.35	
Low Capacity (veh/h)	872			806	1112	
Low v/c (veh/h)	0.63			0.89	0.42	

Intersection Summary			
Maximum v/c High	0.73		
Maximum v/c Low	0.89		
Intersection Capacity Utilization	63.5%	ICU Level of Service	B



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	26	673	126	0	479
Future Volume (vph)	0	26	673	126	0	479
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	61.8		135.5			881.3
Travel Time (s)	7.4		8.1			52.9
Confl. Peds. (#/hr)		5		5		
Confl. Bikes (#/hr)				5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	26	673	126	0	479
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	673	126	0	479
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

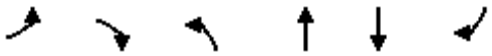
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.0%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	26	673	126	0	479
Future Volume (Veh/h)	0	26	673	126	0	479
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)	0	26	673	126	0	479
Pedestrians	5					5
Lane Width (m)	3.5					3.7
Walking Speed (m/s)	1.0					1.0
Percent Blockage	0					1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.78	0.78			0.78	
vC, conflicting volume	1157	683			804	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1060	452			607	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	192	469			753	

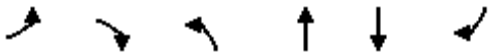
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	26	673	126	479
Volume Left	0	0	0	0
Volume Right	26	0	126	0
cSH	469	1700	1700	1700
Volume to Capacity	0.06	0.40	0.07	0.28
Queue Length 95th (m)	1.3	0.0	0.0	0.0
Control Delay (s)	13.1	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	13.1	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	145	131	0	0	0
Future Volume (vph)	0	145	131	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	67.3			125.5	83.4	
Travel Time (s)	8.1			11.3	7.5	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	145	131	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	145	0	0	131	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	145	131	0	0	0
Future Volume (Veh/h)	0	145	131	0	0	0
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)	0	145	131	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				126		
pX, platoon unblocked						
vC, conflicting volume	267	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	267	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	86	92			
cM capacity (veh/h)	660	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	145	131	0
Volume Left	0	131	0
Volume Right	145	0	0
cSH	1073	1608	1700
Volume to Capacity	0.14	0.08	0.00
Queue Length 95th (m)	3.5	2.0	0.0
Control Delay (s)	8.9	7.4	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	7.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 101 [2033 FT AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	157	8.0	157	8.0	0.232	5.9	LOS A	0.7	5.0	0.23	0.13	0.23	49.3
2	T1	All MCs	284	12.0	284	12.0	0.232	6.1	LOS A	0.7	5.4	0.24	0.14	0.24	51.4
Approach			441	10.6	441	10.6	0.232	6.0	LOS A	0.7	5.4	0.24	0.14	0.24	50.7
North: Highway 50															
8	T1	All MCs	508	6.0	508	6.0	0.550	11.0	LOS B	3.3	24.4	0.49	0.28	0.49	48.9
9	R2	All MCs	321	8.0	321	8.0	0.352	7.7	LOS A	1.6	11.9	0.37	0.21	0.37	52.5
Approach			829	6.8	829	6.8	0.550	9.7	LOS A	3.3	24.4	0.45	0.26	0.45	50.2
West: Emil Kolb Parkway															
10	L2	All MCs	133	35.0	133	35.0	0.220	10.4	LOS B	0.7	5.7	0.54	0.47	0.54	46.8
12	R2	All MCs	108	9.0	108	9.0	0.220	8.3	LOS A	0.7	5.7	0.54	0.47	0.54	51.2
Approach			241	23.3	241	23.3	0.220	9.5	LOS A	0.7	5.7	0.54	0.47	0.54	48.6
All Vehicles			1511	10.5	1511	10.5	0.550	8.6	LOS A	3.3	24.4	0.40	0.25	0.40	50.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2033 FT PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

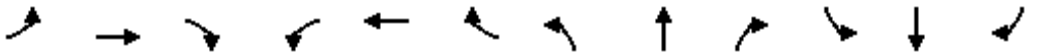
Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	51	14.0	51	14.0	0.445	11.1	LOS B	2.1	15.2	0.50	0.47	0.67	47.9
2	T1	All MCs	669	2.0	669	2.0	0.445	10.0	LOS B	2.1	15.2	0.49	0.46	0.65	49.3
Approach			720	2.9	720	2.9	0.445	10.1	LOS B	2.1	15.2	0.49	0.46	0.65	49.2
North: Highway 50															
8	T1	All MCs	334	3.0	334	3.0	0.318	6.4	LOS A	1.5	10.8	0.20	0.08	0.20	52.1
9	R2	All MCs	130	20.0	130	20.0	0.135	4.9	LOS A	0.5	3.8	0.16	0.06	0.16	54.1
Approach			464	7.8	464	7.8	0.318	5.9	LOS A	1.5	10.8	0.19	0.07	0.19	52.6
West: Emil Kolb Parkway															
10	L2	All MCs	425	2.0	425	2.0	0.346	8.6	LOS A	1.5	10.6	0.51	0.38	0.51	48.5
12	R2	All MCs	123	2.0	123	2.0	0.346	8.6	LOS A	1.5	10.6	0.51	0.38	0.51	49.9
Approach			548	2.0	548	2.0	0.346	8.6	LOS A	1.5	10.6	0.51	0.38	0.51	48.8
All Vehicles			1732	3.9	1732	3.9	0.445	8.5	LOS A	2.1	15.2	0.41	0.33	0.48	49.9

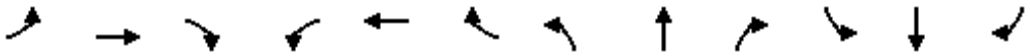
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix S

2035 FT Synchro and Sidra Worksheets



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	185	22	88	19	395	90	67	688	5
Future Volume (vph)	15	31	26	185	22	88	19	395	90	67	688	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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	0.99		0.99	0.98				0.98	1.00		0.97
Frt		0.932			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1750	1686	0	1750	1347	0	1644	3510	1585	1755	1865	1361
Flt Permitted	0.686			0.574			0.300			0.519		
Satd. Flow (perm)	1252	1686	0	1050	1347	0	519	3510	1547	956	1865	1317
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			88				90			80
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)						1						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	31	26	185	22	88	19	395	90	67	688	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	57	0	185	110	0	19	395	90	67	688	5
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	



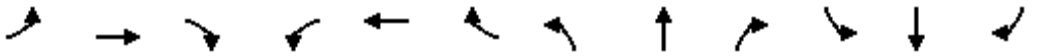
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		5.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		9.0	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		9.0	53.0		57.0	57.0	57.0	57.0	57.0	57.0
Total Split (%)	40.0%	40.0%		8.2%	48.2%		51.8%	51.8%	51.8%	51.8%	51.8%	51.8%
Maximum Green (s)	36.9	36.9		5.0	45.9		50.4	50.4	50.4	50.4	50.4	50.4
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		1.0	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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)	28.0	28.0			28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5			12		5	5	5	6	6	6
Act Effct Green (s)	17.4	17.4		27.7	24.6		71.7	71.7	71.7	71.7	71.7	71.7
Actuated g/C Ratio	0.16	0.16		0.25	0.22		0.65	0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.08	0.20		0.61	0.30		0.06	0.17	0.09	0.11	0.57	0.01
Control Delay	32.9	22.2		41.1	9.9		13.1	10.3	3.4	12.1	16.7	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	22.2		41.1	9.9		13.1	10.3	3.4	12.1	16.7	0.0
LOS	C	C		D	A		B	B	A	B	B	A
Approach Delay		24.4			29.5			9.1			16.2	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	3.1	6.4		36.7	4.1		1.0	12.2	0.0	3.8	56.9	0.0
Queue Length 95th (m)	6.9	13.5		39.7	13.5		6.7	36.1	8.3	16.8	170.9	0.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	419	582		303	613		338	2287	1039	623	1215	886
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	0.04	0.10		0.61	0.18		0.06	0.17	0.09	0.11	0.57	0.01

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 36 (33%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 85

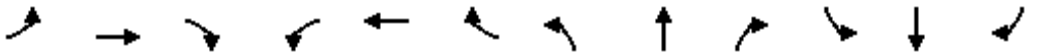
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 16.8	Intersection LOS: B
Intersection Capacity Utilization 84.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

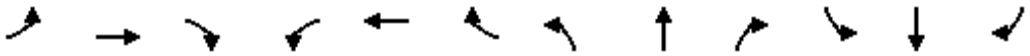


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	31	26	185	22	88	19	395	90	67	688	5
Future Volume (vph)	15	31	26	185	22	88	19	395	90	67	688	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1733	1686		1744	1347		1639	3510	1547	1751	1865	1317
Flt Permitted	0.69	1.00		0.57	1.00		0.30	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	1252	1686		1054	1347		518	3510	1547	956	1865	1317
Peak-hour factor, PHF	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)	15	31	26	185	22	88	19	395	90	67	688	5
RTOR Reduction (vph)	0	22	0	0	67	0	0	0	32	0	0	2
Lane Group Flow (vph)	15	35	0	185	43	0	19	395	58	67	688	3
Confl. Peds. (#/hr)	12		5	5		12	6		2	2		6
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	2%	3%	2%	2%	2%	10%	11%	4%	3%	4%	3%	20%
Parking (#/hr)					0	0						
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
Actuated Green, G (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Effective Green, g (s)	15.8	15.8		26.0	26.0		70.3	70.3	70.3	70.3	70.3	70.3
Actuated g/C Ratio	0.14	0.14		0.24	0.24		0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	7.1	7.1		4.0	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	242		288	318		331	2243	988	610	1191	841
v/s Ratio Prot		0.02		c0.04	0.03			0.11			c0.37	
v/s Ratio Perm	0.01			c0.12			0.04		0.04	0.07		0.00
v/c Ratio	0.08	0.14		0.64	0.13		0.06	0.18	0.06	0.11	0.58	0.00
Uniform Delay, d1	40.8	41.2		37.5	33.1		7.4	8.1	7.4	7.7	11.4	7.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3		4.8	0.2		0.3	0.2	0.1	0.4	2.0	0.0
Delay (s)	41.0	41.5		42.3	33.3		7.8	8.2	7.6	8.1	13.4	7.2
Level of Service	D	D		D	C		A	A	A	A	B	A
Approach Delay (s)		41.4			39.0			8.1			12.9	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	13	346	0	184	1	277	177	160	488	4
Future Volume (vph)	6	1	13	346	0	184	1	277	177	160	488	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.861			0.850				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1275	1363	0	1691	1487	0	1789	1746	1471	1630	1847	1228
Flt Permitted	0.630			0.748			0.393			0.574		
Satd. Flow (perm)	845	1363	0	1331	1487	0	740	1746	1471	985	1847	1228
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			485				177			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			237.8			641.5			135.5	
Travel Time (s)		4.8			21.4			38.5			8.1	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
Adj. Flow (vph)	6	1	13	346	0	184	1	277	177	160	488	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	14	0	346	184	0	1	277	177	160	488	4
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-0.2	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	11.2	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm

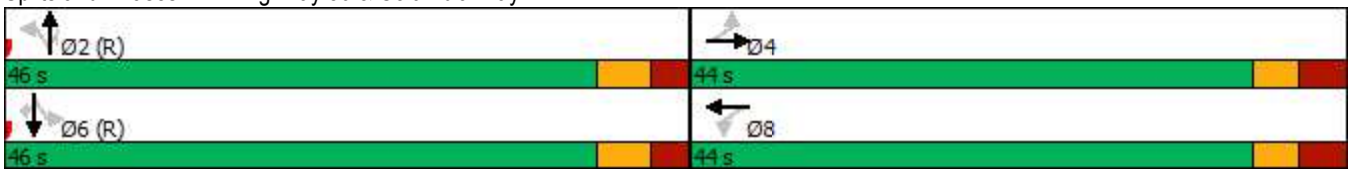


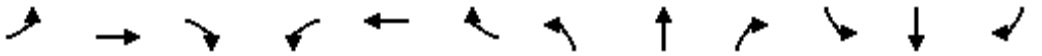
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	44.0	44.0		44.0	44.0		46.0	46.0	46.0	46.0	46.0	46.0
Total Split (%)	48.9%	48.9%		48.9%	48.9%		51.1%	51.1%	51.1%	51.1%	51.1%	51.1%
Maximum Green (s)	37.6	37.6		37.6	37.6		39.6	39.6	39.6	39.6	39.6	39.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	29.1	29.1		29.1	29.1		48.1	48.1	48.1	48.1	48.1	48.1
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.53	0.53	0.53	0.53	0.53	0.53
v/c Ratio	0.02	0.03		0.81	0.23		0.00	0.30	0.20	0.30	0.49	0.01
Control Delay	17.2	8.6		41.8	0.7		13.0	14.3	3.0	15.8	17.1	0.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	8.6		41.8	0.7		13.0	14.3	3.0	15.8	17.1	0.0
LOS	B	A		D	A		B	B	A	B	B	A
Approach Delay		11.2			27.5			9.9			16.7	
Approach LOS		B			C			A			B	
Queue Length 50th (m)	0.7	0.1		53.8	0.0		0.1	25.2	0.0	14.7	50.9	0.0
Queue Length 95th (m)	2.8	3.5		75.1	0.0		1.0	49.5	10.8	33.7	93.2	0.0
Internal Link Dist (m)		29.3			213.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0			120.0			70.0		25.0
Base Capacity (vph)	353	577		556	903		395	934	869	526	987	676
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.02		0.62	0.20		0.00	0.30	0.20	0.30	0.49	0.01

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: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 18.2		Intersection LOS: B	
Intersection Capacity Utilization 74.2%		ICU Level of Service D	

Analysis Period (min) 15

Splits and Phases: 2: Highway 50 & Columbia Way

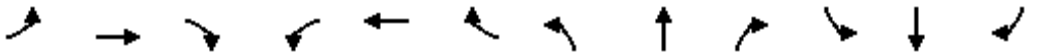




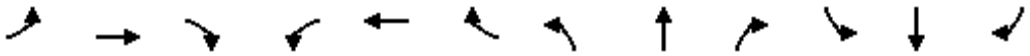
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1	13	346	0	184	1	277	177	160	488	4
Future Volume (vph)	6	1	13	346	0	184	1	277	177	160	488	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1275	1362		1691	1487		1789	1746	1471	1630	1847	1228
Flt Permitted	0.63	1.00		0.75	1.00		0.39	1.00	1.00	0.57	1.00	1.00
Satd. Flow (perm)	845	1362		1332	1487		740	1746	1471	985	1847	1228
Peak-hour factor, PHF	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)	6	1	13	346	0	184	1	277	177	160	488	4
RTOR Reduction (vph)	0	9	0	0	125	0	0	0	82	0	0	2
Lane Group Flow (vph)	6	5	0	346	59	0	1	277	95	160	488	2
Heavy Vehicles (%)	40%	2%	20%	2%	2%	11%	2%	10%	11%	12%	4%	33%
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
Actuated Green, G (s)	29.1	29.1		29.1	29.1		48.1	48.1	48.1	48.1	48.1	48.1
Effective Green, g (s)	29.1	29.1		29.1	29.1		48.1	48.1	48.1	48.1	48.1	48.1
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.53	0.53	0.53	0.53	0.53	0.53
Clearance Time (s)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	273	440		430	480		395	933	786	526	987	656
v/s Ratio Prot		0.00			0.04			0.16			c0.26	
v/s Ratio Perm	0.01			c0.26			0.00		0.06	0.16		0.00
v/c Ratio	0.02	0.01		0.80	0.12		0.00	0.30	0.12	0.30	0.49	0.00
Uniform Delay, d1	20.8	20.7		27.9	21.5		9.8	11.6	10.4	11.6	13.3	9.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		10.5	0.1		0.0	0.8	0.3	1.5	1.8	0.0
Delay (s)	20.8	20.7		38.3	21.6		9.8	12.4	10.7	13.1	15.0	9.8
Level of Service	C	C		D	C		A	B	B	B	B	A
Approach Delay (s)		20.7			32.5			11.8			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	264	30	128	284	9	46	5	95	25	12	174
Future Volume (vph)	33	264	30	128	284	9	46	5	95	25	12	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		0.99	0.97		0.99	0.97	
Frt		0.985			0.995			0.857			0.860	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1853	0	1691	1893	0	1750	1563	0	1789	1570	0
Flt Permitted	0.581			0.580			0.622			0.692		
Satd. Flow (perm)	1089	1853	0	1028	1893	0	1138	1563	0	1294	1570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			2			95			174	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		237.8			207.6			217.2			123.9	
Travel Time (s)		21.4			18.7			19.5			11.2	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	33	264	30	128	284	9	46	5	95	25	12	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	294	0	128	293	0	46	100	0	25	186	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

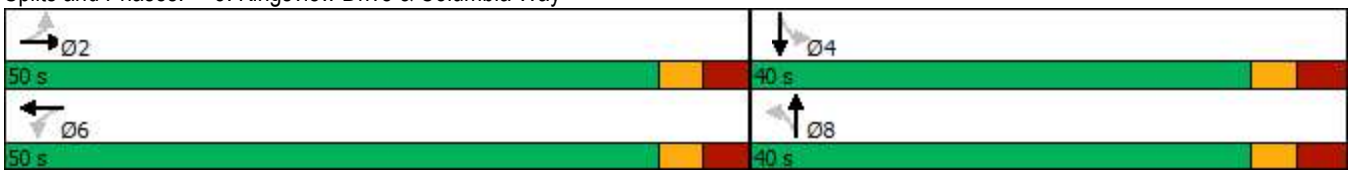


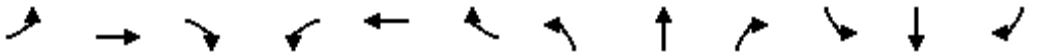
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	50.0	50.0		50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.8	43.8		43.8	43.8		33.5	33.5		33.5	33.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.66	0.66		0.66	0.66		0.16	0.16		0.16	0.16	
v/c Ratio	0.05	0.24		0.19	0.23		0.26	0.31		0.12	0.47	
Control Delay	6.7	6.7		7.3	6.8		27.2	8.6		24.0	9.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.7	6.7		7.3	6.8		27.2	8.6		24.0	9.0	
LOS	A	A		A	A		C	A		C	A	
Approach Delay		6.7			6.9			14.5			10.8	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.1	10.4		4.5	10.6		5.1	0.6		2.7	1.3	
Queue Length 95th (m)	6.7	39.0		20.5	39.5		12.6	10.4		8.0	14.6	
Internal Link Dist (m)		213.8			183.6			193.2			99.9	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	719	1226		678	1250		546	800		622	845	
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	0.05	0.24		0.19	0.23		0.08	0.13		0.04	0.22	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 70.5	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.47	

Intersection Signal Delay: 8.6	Intersection LOS: A
Intersection Capacity Utilization 75.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Kingsview Drive & Columbia Way

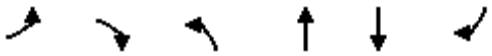




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	264	30	128	284	9	46	5	95	25	12	174
Future Volume (vph)	33	264	30	128	284	9	46	5	95	25	12	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.96		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1783	1853		1685	1894		1741	1557		1779	1562	
Flt Permitted	0.58	1.00		0.58	1.00		0.62	1.00		0.69	1.00	
Satd. Flow (perm)	1090	1853		1029	1894		1139	1557		1297	1562	
Peak-hour factor, PHF	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)	33	264	30	128	284	9	46	5	95	25	12	174
RTOR Reduction (vph)	0	3	0	0	1	0	0	80	0	0	147	0
Lane Group Flow (vph)	33	291	0	128	292	0	46	20	0	25	39	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Effective Green, g (s)	46.5	46.5		46.5	46.5		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.66	0.66		0.66	0.66		0.16	0.16		0.16	0.16	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	720	1225		680	1252		179	245		204	246	
v/s Ratio Prot		c0.16			0.15			0.01			0.03	
v/s Ratio Perm	0.03			0.12			c0.04			0.02		
v/c Ratio	0.05	0.24		0.19	0.23		0.26	0.08		0.12	0.16	
Uniform Delay, d1	4.2	4.8		4.6	4.8		26.0	25.3		25.4	25.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.5		0.6	0.4		0.8	0.1		0.3	0.3	
Delay (s)	4.3	5.2		5.2	5.2		26.7	25.4		25.7	25.9	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		5.1			5.2			25.8			25.9	
Approach LOS		A			A			C			C	

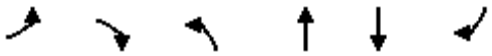
Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	70.3	Sum of lost time (s)	12.7
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



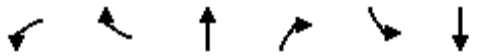
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	137	111	161	292	523	331
Future Volume (vph)	137	111	161	292	523	331
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.933					0.850
Flt Protected	0.973			0.983		
Satd. Flow (prot)	2964	0	0	3243	1830	1512
Flt Permitted	0.973			0.983		
Satd. Flow (perm)	2964	0	0	3243	1830	1512
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	24%	2%	10%	11%	5%	8%
Adj. Flow (vph)	137	111	161	292	523	331
Shared Lane Traffic (%)						
Lane Group Flow (vph)	248	0	0	453	523	331
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		



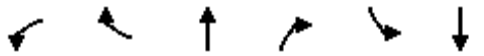
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	137	111	161	292	523	331
Future Volume (veh/h)	137	111	161	292	523	331
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	137	111	161	292	523	331
Approach Volume (veh/h)	248			453	854	
Crossing Volume (veh/h)	523			137	161	
High Capacity (veh/h)	916			1244	1221	
High v/c (veh/h)	0.27			0.36	0.70	
Low Capacity (veh/h)	739			1033	1012	
Low v/c (veh/h)	0.34			0.44	0.84	

Intersection Summary			
Maximum v/c High	0.70		
Maximum v/c Low	0.84		
Intersection Capacity Utilization	57.7%	ICU Level of Service	B



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	37	410	46	0	643
Future Volume (vph)	0	37	410	46	0	643
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	85.7		135.5			881.3
Travel Time (s)	10.3		8.1			52.9
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	37	410	46	0	643
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	37	410	46	0	643
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

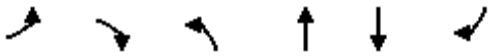
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	37	410	46	0	643
Future Volume (Veh/h)	0	37	410	46	0	643
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)	0	37	410	46	0	643
Pedestrians	5					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.93	0.93			0.93	
vC, conflicting volume	1058	415			461	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1025	334			384	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	241	655			1088	

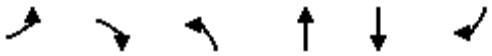
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	37	410	46	643
Volume Left	0	0	0	0
Volume Right	37	0	46	0
cSH	655	1700	1700	1700
Volume to Capacity	0.06	0.24	0.03	0.38
Queue Length 95th (m)	1.4	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	10.8	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	212	47	0	0	0
Future Volume (vph)	0	212	47	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	58.6			123.9	109.1	
Travel Time (s)	7.0			11.2	9.8	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	212	47	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	212	0	0	47	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

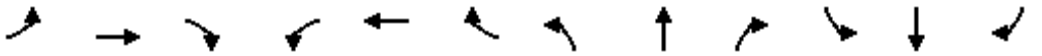
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		



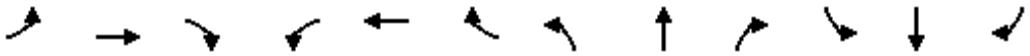
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	212	47	0	0	0
Future Volume (Veh/h)	0	212	47	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	212	47	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				124		
pX, platoon unblocked						
vC, conflicting volume	99	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	99	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	80	97			
cM capacity (veh/h)	869	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	212	47	0
Volume Left	0	47	0
Volume Right	212	0	0
cSH	1073	1608	1700
Volume to Capacity	0.20	0.03	0.00
Queue Length 95th (m)	5.6	0.7	0.0
Control Delay (s)	9.2	7.3	0.0
Lane LOS	A	A	
Approach Delay (s)	9.2	7.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	74	10	47	70	995	79	39	560	19
Future Volume (vph)	15	4	13	74	10	47	70	995	79	39	560	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	30.0		0.0	80.0		0.0	60.0		50.0	30.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	15.0			20.0			90.0			75.0		
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					0.98
Frt		0.885			0.876				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1668	1630	0	1750	1437	0	1789	3579	1601	1789	1883	1555
Flt Permitted	0.720			0.746			0.418			0.269		
Satd. Flow (perm)	1264	1630	0	1374	1437	0	787	3579	1601	507	1883	1521
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			47				79			45
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		118.1			218.1			718.5			641.5	
Travel Time (s)		10.6			19.6			43.1			38.5	
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)						1						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Adj. Flow (vph)	15	4	13	74	10	47	70	995	79	39	560	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	17	0	74	57	0	70	995	79	39	560	19
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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.16	1.01	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	7.0	7.0		7.0	7.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	

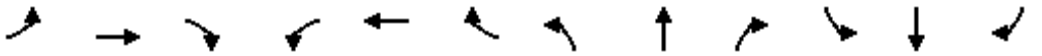


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	43.1	43.1		43.1	43.1		32.6	32.6	32.6	32.6	32.6	32.6
Total Split (s)	44.0	44.0		44.0	44.0		56.0	56.0	56.0	56.0	56.0	56.0
Total Split (%)	44.0%	44.0%		44.0%	44.0%		56.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Maximum Green (s)	36.9	36.9		36.9	36.9		49.4	49.4	49.4	49.4	49.4	49.4
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	3.1	3.1		3.1	3.1		2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	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	8.0
Flash Dont Walk (s)	28.0	28.0		28.0	28.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	15.4	15.4		15.4	15.4		75.2	75.2	75.2	75.2	75.2	75.2
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.75	0.75	0.75	0.75	0.75	0.75
v/c Ratio	0.08	0.06		0.35	0.22		0.12	0.37	0.06	0.10	0.40	0.02
Control Delay	31.0	16.1		39.0	13.0		8.2	7.7	2.6	8.9	8.9	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	16.1		39.0	13.0		8.2	7.7	2.6	8.9	8.9	0.9
LOS	C	B		D	B		A	A	A	A	A	A
Approach Delay		23.1			27.7			7.4			8.7	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	2.7	0.7		13.7	1.8		3.1	28.6	0.0	1.7	31.5	0.0
Queue Length 95th (m)	6.1	4.9		19.5	9.3		15.4	84.9	6.9	10.2	106.5	1.0
Internal Link Dist (m)		94.1			194.1			694.5			617.5	
Turn Bay Length (m)	30.0			80.0			60.0		50.0	30.0		40.0
Base Capacity (vph)	466	609		507	559		591	2692	1223	381	1416	1155
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03		0.15	0.10		0.12	0.37	0.06	0.10	0.40	0.02

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 57 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	

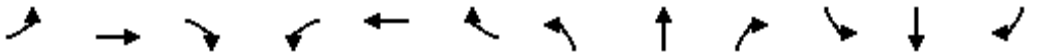
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.40	
Intersection Signal Delay: 9.4	Intersection LOS: A
Intersection Capacity Utilization 67.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Highway 50 & Cross Country Boulevard/Bolton Heights Road

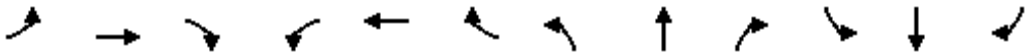


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	4	13	74	10	47	70	995	79	39	560	19
Future Volume (vph)	15	4	13	74	10	47	70	995	79	39	560	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1668	1631		1750	1436		1788	3579	1601	1789	1883	1521
Flt Permitted	0.72	1.00		0.75	1.00		0.42	1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)	1264	1631		1375	1436		786	3579	1601	507	1883	1521
Peak-hour factor, PHF	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)	15	4	13	74	10	47	70	995	79	39	560	19
RTOR Reduction (vph)	0	11	0	0	41	0	0	0	22	0	0	5
Lane Group Flow (vph)	15	6	0	74	16	0	70	995	57	39	560	14
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	7%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%
Parking (#/hr)					0	0						
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	13.8	13.8		13.8	13.8		72.5	72.5	72.5	72.5	72.5	72.5
Effective Green, g (s)	13.8	13.8		13.8	13.8		72.5	72.5	72.5	72.5	72.5	72.5
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.72	0.72	0.72	0.72	0.72	0.72
Clearance Time (s)	7.1	7.1		7.1	7.1		6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	174	225		189	198		569	2594	1160	367	1365	1102
v/s Ratio Prot		0.00			0.01			0.28			c0.30	
v/s Ratio Perm	0.01			c0.05			0.09		0.04	0.08		0.01
v/c Ratio	0.09	0.03		0.39	0.08		0.12	0.38	0.05	0.11	0.41	0.01
Uniform Delay, d1	37.6	37.3		39.3	37.6		4.2	5.2	3.9	4.1	5.4	3.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.0		1.3	0.2		0.4	0.4	0.1	0.6	0.9	0.0
Delay (s)	37.8	37.3		40.6	37.8		4.6	5.7	4.0	4.7	6.3	3.8
Level of Service	D	D		D	D		A	A	A	A	A	A
Approach Delay (s)		37.6			39.4			5.5			6.1	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	218	0	76	0	747	292	157	340	3
Future Volume (vph)	1	0	3	218	0	76	0	747	292	157	340	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Storage Length (m)	5.0		0.0	90.0		0.0	120.0		0.0	70.0		25.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	5.0			70.0			50.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor									0.98	1.00		
Frt		0.850			0.850				0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1750	1566	0	1675	1603	0	1883	1883	1601	1789	1883	816
Flt Permitted	0.708			0.756						0.275		
Satd. Flow (perm)	1304	1566	0	1333	1603	0	1883	1883	1567	518	1883	816
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		524			210				292			41
Link Speed (k/h)		40			40			60			60	
Link Distance (m)		53.3			231.8			641.5			135.5	
Travel Time (s)		4.8			20.9			38.5			8.1	
Confl. Peds. (#/hr)									1	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	1	0	3	218	0	76	0	747	292	157	340	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	3	0	218	76	0	0	747	292	157	340	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.06	0.97	1.06	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	1		1	1		1	2	1	1	2	1
Detector Template							Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	11.0	11.0		11.0	11.0		2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	-3.0	-3.0		-3.0	-3.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	14.0	14.0		14.0	14.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)								9.4			9.4	
Detector 2 Size(m)								0.6			0.6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												

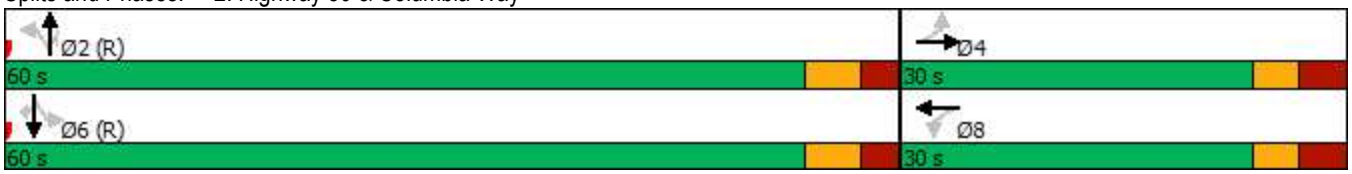


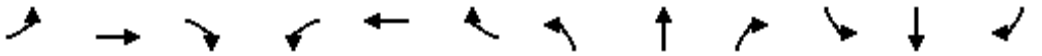
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	27.4	27.4		27.4	27.4		36.4	36.4	36.4	36.4	36.4	36.4
Total Split (s)	30.0	30.0		30.0	30.0		60.0	60.0	60.0	60.0	60.0	60.0
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
Maximum Green (s)	23.6	23.6		23.6	23.6		53.6	53.6	53.6	53.6	53.6	53.6
Yellow Time (s)	3.0	3.0		3.0	3.0		3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4		3.4	3.4		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)	6.4	6.4		6.4	6.4		6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		23.0	23.0	23.0	23.0	23.0	23.0
Pedestrian Calls (#/hr)	5	5		5	5		5	5	5	5	5	5
Act Effct Green (s)	19.2	19.2		19.2	19.2			58.0	58.0	58.0	58.0	58.0
Actuated g/C Ratio	0.21	0.21		0.21	0.21			0.64	0.64	0.64	0.64	0.64
v/c Ratio	0.00	0.00		0.77	0.15			0.62	0.26	0.47	0.28	0.01
Control Delay	25.0	0.0		50.7	0.6			13.2	1.7	15.4	8.4	0.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay	25.0	0.0		50.7	0.6			13.2	1.7	15.4	8.4	0.0
LOS	C	A		D	A			B	A	B	A	A
Approach Delay		6.3			37.8			9.9			10.6	
Approach LOS		A			D			A			B	
Queue Length 50th (m)	0.1	0.0		35.2	0.0			70.4	0.0	12.8	23.6	0.0
Queue Length 95th (m)	1.3	0.0		57.0	0.0			117.5	9.2	33.0	41.3	0.0
Internal Link Dist (m)		29.3			207.8			617.5			111.5	
Turn Bay Length (m)	5.0			90.0						70.0		25.0
Base Capacity (vph)	341	797		349	575			1213	1113	333	1213	540
Starvation Cap Reductn	0	0		0	0			0	0	0	0	0
Spillback Cap Reductn	0	0		0	0			0	0	0	0	0
Storage Cap Reductn	0	0		0	0			0	0	0	0	0
Reduced v/c Ratio	0.00	0.00		0.62	0.13			0.62	0.26	0.47	0.28	0.01

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: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	

Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 82.8%	ICU Level of Service E
Analysis Period (min) 15	

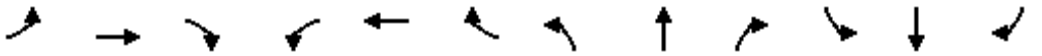
Splits and Phases: 2: Highway 50 & Columbia Way



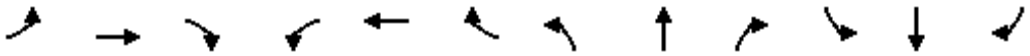


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	218	0	76	0	747	292	157	340	3
Future Volume (vph)	1	0	3	218	0	76	0	747	292	157	340	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.2	3.8	3.2	3.7	3.7	3.7	3.7	3.7	3.7
Total Lost time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	1566		1675	1603			1883	1567	1789	1883	816
Flt Permitted	0.71	1.00		0.76	1.00			1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)	1303	1566		1332	1603			1883	1567	517	1883	816
Peak-hour factor, PHF	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)	1	0	3	218	0	76	0	747	292	157	340	3
RTOR Reduction (vph)	0	2	0	0	60	0	0	0	104	0	0	1
Lane Group Flow (vph)	1	1	0	218	16	0	0	747	188	157	340	2
Confl. Peds. (#/hr)									1	1		
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%	100%
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
Actuated Green, G (s)	19.2	19.2		19.2	19.2			58.0	58.0	58.0	58.0	58.0
Effective Green, g (s)	19.2	19.2		19.2	19.2			58.0	58.0	58.0	58.0	58.0
Actuated g/C Ratio	0.21	0.21		0.21	0.21			0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	6.4	6.4		6.4	6.4			6.4	6.4	6.4	6.4	6.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	277	334		284	341			1213	1009	333	1213	525
v/s Ratio Prot		0.00			0.01			c0.40			0.18	
v/s Ratio Perm	0.00			c0.16					0.12	0.30		0.00
v/c Ratio	0.00	0.00		0.77	0.05			0.62	0.19	0.47	0.28	0.00
Uniform Delay, d1	27.9	27.9		33.3	28.1			9.4	6.5	8.2	6.9	5.7
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0		11.7	0.1			2.3	0.4	4.7	0.6	0.0
Delay (s)	27.9	27.9		45.0	28.2			11.8	6.9	12.9	7.5	5.7
Level of Service	C	C		D	C			B	A	B	A	A
Approach Delay (s)		27.9			40.7			10.4			9.2	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	264	72	50	142	26	23	13	32	17	9	119
Future Volume (vph)	93	264	72	50	142	26	23	13	32	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	1.00		0.99	0.98		0.99	0.97	
Frt		0.968			0.977			0.893			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1769	0	1658	1635	0	1638	1525	0	1789	1572	0
Flt Permitted	0.651			0.558			0.675			0.728		
Satd. Flow (perm)	1219	1769	0	970	1635	0	1155	1525	0	1360	1572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			15			32			119	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		231.8			207.6			217.2			125.5	
Travel Time (s)		20.9			18.7			19.5			11.3	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Adj. Flow (vph)	93	264	72	50	142	26	23	13	32	17	9	119
Shared Lane Traffic (%)												
Lane Group Flow (vph)	93	336	0	50	168	0	23	45	0	17	128	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

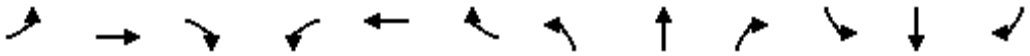


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	51.0	51.0		51.0	51.0		39.0	39.0		39.0	39.0	
Total Split (%)	56.7%	56.7%		56.7%	56.7%		43.3%	43.3%		43.3%	43.3%	
Maximum Green (s)	44.8	44.8		44.8	44.8		32.5	32.5		32.5	32.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	50.9	50.9		50.9	50.9		10.2	10.2		10.5	10.5	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.15	0.15		0.15	0.15	
v/c Ratio	0.10	0.26		0.07	0.14		0.14	0.18		0.08	0.38	
Control Delay	6.4	6.2		6.5	5.6		25.4	13.3		24.0	9.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.4	6.2		6.5	5.6		25.4	13.3		24.0	9.3	
LOS	A	A		A	A		C	B		C	A	
Approach Delay		6.2			5.8			17.4			11.0	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	2.9	11.0		1.5	4.9		2.6	1.4		1.9	1.0	
Queue Length 95th (m)	14.8	44.4		9.1	22.1		7.7	8.3		6.3	12.2	
Internal Link Dist (m)		207.8			183.6			193.2			101.5	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	886	1291		705	1192		541	731		637	799	
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	0.10	0.26		0.07	0.14		0.04	0.06		0.03	0.16	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 70.1	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.38	

Intersection Signal Delay: 7.8	Intersection LOS: A
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

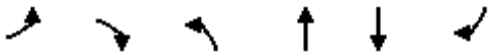
Splits and Phases: 3: Kingsview Drive & Columbia Way



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	264	72	50	142	26	23	13	32	17	9	119
Future Volume (vph)	93	264	72	50	142	26	23	13	32	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.89		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1781	1770		1653	1635		1629	1517		1778	1559	
Flt Permitted	0.65	1.00		0.56	1.00		0.67	1.00		0.73	1.00	
Satd. Flow (perm)	1220	1770		971	1635		1157	1517		1362	1559	
Peak-hour factor, PHF	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)	93	264	72	50	142	26	23	13	32	17	9	119
RTOR Reduction (vph)	0	7	0	0	5	0	0	28	0	0	104	0
Lane Group Flow (vph)	93	329	0	50	163	0	23	17	0	17	24	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.6	49.6		49.6	49.6		9.0	9.0		9.0	9.0	
Effective Green, g (s)	49.6	49.6		49.6	49.6		9.0	9.0		9.0	9.0	
Actuated g/C Ratio	0.70	0.70		0.70	0.70		0.13	0.13		0.13	0.13	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	848	1231		675	1137		146	191		171	196	
v/s Ratio Prot		c0.19			0.10			0.01			0.02	
v/s Ratio Perm	0.08			0.05			c0.02			0.01		
v/c Ratio	0.11	0.27		0.07	0.14		0.16	0.09		0.10	0.12	
Uniform Delay, d1	3.6	4.1		3.5	3.7		27.8	27.5		27.6	27.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.2	0.3		0.5	0.2		0.3	0.3	
Delay (s)	3.8	4.6		3.7	3.9		28.3	27.7		27.8	27.9	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		4.4			3.9			27.9			27.9	
Approach LOS		A			A			C			C	

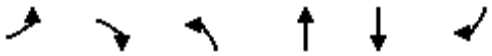
Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	12.7
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



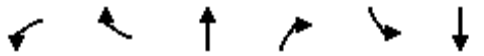
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	438	127	52	689	343	134
Future Volume (vph)	438	127	52	689	343	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	300.0	0.0			140.0
Storage Lanes	2	0	0			1
Taper Length (m)	15.0		15.0			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.966					0.850
Flt Protected	0.963			0.997		
Satd. Flow (prot)	3299	0	0	3560	1812	1408
Flt Permitted	0.963			0.997		
Satd. Flow (perm)	3299	0	0	3560	1812	1408
Link Speed (k/h)	70			60	60	
Link Distance (m)	329.6			146.1	569.5	
Travel Time (s)	17.0			8.8	34.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	5%	2%	6%	16%
Adj. Flow (vph)	438	127	52	689	343	134
Shared Lane Traffic (%)						
Lane Group Flow (vph)	565	0	0	741	343	134
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.4			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	3.0			3.0	3.0	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	25	15	25			15
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 65.1%		ICU Level of Service C	
Analysis Period (min) 15			



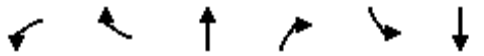
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	438	127	52	689	343	134
Future Volume (veh/h)	438	127	52	689	343	134
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	438	127	52	689	343	134
Approach Volume (veh/h)	565			741	477	
Crossing Volume (veh/h)	343			438	52	
High Capacity (veh/h)	1058			981	1330	
High v/c (veh/h)	0.53			0.76	0.36	
Low Capacity (veh/h)	865			797	1111	
Low v/c (veh/h)	0.65			0.93	0.43	

Intersection Summary			
Maximum v/c High	0.76		
Maximum v/c Low	0.93		
Intersection Capacity Utilization	65.1%	ICU Level of Service	C



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	26	693	126	0	492
Future Volume (vph)	0	26	693	126	0	492
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.7	3.5	3.7	3.7
Storage Length (m)	0.0	0.0		30.0	0.0	
Storage Lanes	0	1		1	0	
Taper Length (m)	15.0				15.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected						
Satd. Flow (prot)	0	1593	1883	1566	0	1883
Flt Permitted						
Satd. Flow (perm)	0	1593	1883	1566	0	1883
Link Speed (k/h)	30		60			60
Link Distance (m)	61.8		135.5			881.3
Travel Time (s)	7.4		8.1			52.9
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	26	693	126	0	492
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	693	126	0	492
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.7			3.7
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	3.0		3.0			3.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	0.99	1.01	0.99	0.99
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

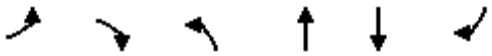
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.5%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	26	693	126	0	492
Future Volume (Veh/h)	0	26	693	126	0	492
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)	0	26	693	126	0	492
Pedestrians	5					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			136			
pX, platoon unblocked	0.77	0.77			0.77	
vC, conflicting volume	1190	698			824	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1096	456			620	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			100	
cM capacity (veh/h)	180	462			734	

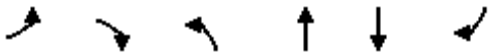
Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	26	693	126	492
Volume Left	0	0	0	0
Volume Right	26	0	126	0
cSH	462	1700	1700	1700
Volume to Capacity	0.06	0.41	0.07	0.29
Queue Length 95th (m)	1.4	0.0	0.0	0.0
Control Delay (s)	13.3	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	13.3	0.0		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	145	131	0	0	0
Future Volume (vph)	0	145	131	0	0	0
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						
Frt	0.865					
Flt Protected				0.950		
Satd. Flow (prot)	1629	0	0	1789	1883	0
Flt Permitted				0.950		
Satd. Flow (perm)	1629	0	0	1789	1883	0
Link Speed (k/h)	30			40	40	
Link Distance (m)	67.3			125.5	83.4	
Travel Time (s)	8.1			11.3	7.5	
Confl. Peds. (#/hr)			5			
Confl. Bikes (#/hr)		5				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	145	131	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	145	0	0	131	0	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)	3.0			3.0	3.0	
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
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	145	131	0	0	0
Future Volume (Veh/h)	0	145	131	0	0	0
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)	0	145	131	0	0	0
Pedestrians	5					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				126		
pX, platoon unblocked						
vC, conflicting volume	267	5	5			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	267	5	5			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	86	92			
cM capacity (veh/h)	660	1073	1608			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	145	131	0
Volume Left	0	131	0
Volume Right	145	0	0
cSH	1073	1608	1700
Volume to Capacity	0.14	0.08	0.00
Queue Length 95th (m)	3.5	2.0	0.0
Control Delay (s)	8.9	7.4	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	7.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 101 [2035 FT AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	161	8.0	161	8.0	0.240	6.0	LOS A	0.7	5.2	0.24	0.14	0.24	49.3
2	T1	All MCs	292	12.0	292	12.0	0.240	6.2	LOS A	0.7	5.6	0.25	0.14	0.25	51.4
Approach			453	10.6	453	10.6	0.240	6.1	LOS A	0.7	5.6	0.24	0.14	0.24	50.6
North: Highway 50															
8	T1	All MCs	523	6.0	523	6.0	0.569	11.5	LOS B	3.5	25.9	0.51	0.30	0.51	48.6
9	R2	All MCs	331	8.0	331	8.0	0.364	7.9	LOS A	1.7	12.5	0.38	0.22	0.38	52.3
Approach			854	6.8	854	6.8	0.569	10.1	LOS B	3.5	25.9	0.46	0.27	0.46	50.0
West: Emil Kolb Parkway															
10	L2	All MCs	137	35.0	137	35.0	0.231	10.8	LOS B	0.8	5.9	0.55	0.48	0.55	46.6
12	R2	All MCs	111	9.0	111	9.0	0.231	8.6	LOS A	0.8	5.9	0.55	0.48	0.55	51.0
Approach			248	23.4	248	23.4	0.231	9.8	LOS A	0.8	5.9	0.55	0.48	0.55	48.4
All Vehicles			1555	10.5	1555	10.5	0.569	8.9	LOS A	3.5	25.9	0.41	0.26	0.41	49.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2035 FT PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

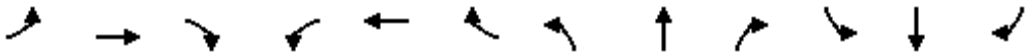
Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Highway 50															
1	L2	All MCs	52	14.0	52	14.0	0.462	11.6	LOS B	2.3	16.7	0.51	0.50	0.72	47.6
2	T1	All MCs	689	2.0	689	2.0	0.462	10.4	LOS B	2.3	16.7	0.50	0.49	0.70	49.0
Approach			741	2.8	741	2.8	0.462	10.5	LOS B	2.3	16.7	0.50	0.49	0.70	48.9
North: Highway 50															
8	T1	All MCs	343	3.0	343	3.0	0.327	6.5	LOS A	1.6	11.2	0.21	0.08	0.21	52.0
9	R2	All MCs	134	20.0	134	20.0	0.139	4.9	LOS A	0.5	4.0	0.16	0.06	0.16	54.1
Approach			477	7.8	477	7.8	0.327	6.0	LOS A	1.6	11.2	0.19	0.07	0.19	52.6
West: Emil Kolb Parkway															
10	L2	All MCs	438	2.0	438	2.0	0.360	8.9	LOS A	1.6	11.1	0.52	0.39	0.52	48.3
12	R2	All MCs	127	2.0	127	2.0	0.360	8.9	LOS A	1.6	11.1	0.52	0.39	0.52	49.7
Approach			565	2.0	565	2.0	0.360	8.9	LOS A	1.6	11.1	0.52	0.39	0.52	48.6
All Vehicles			1783	3.9	1783	3.9	0.462	8.8	LOS A	2.3	16.7	0.43	0.35	0.51	49.7

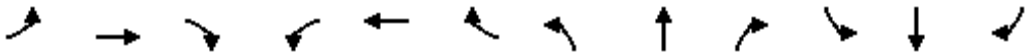
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 2010 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix T

2035 FT Sensitivity Analysis Synchro Worksheets



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	209	53	59	190	26	27	13	71	17	9	119
Future Volume (vph)	93	209	53	59	190	26	27	13	71	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Storage Length (m)	15.0		0.0	40.0		0.0	25.0		0.0	15.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	15.0			55.0			20.0			15.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	1.00		0.99	0.97		0.99	0.97	
Frt		0.970			0.982			0.873			0.861	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1773	0	1658	1637	0	1638	1465	0	1789	1572	0
Flt Permitted	0.623			0.597			0.675			0.702		
Satd. Flow (perm)	1167	1773	0	1037	1637	0	1155	1465	0	1312	1572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			11			71			119	
Link Speed (k/h)		40			40			40			40	
Link Distance (m)		115.9			207.6			217.2			62.7	
Travel Time (s)		10.4			18.7			19.5			5.6	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			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
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Adj. Flow (vph)	93	209	53	59	190	26	27	13	71	17	9	119
Shared Lane Traffic (%)												
Lane Group Flow (vph)	93	262	0	59	216	0	27	84	0	17	128	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)		3.0			3.0			3.0			3.0	
Two way Left Turn Lane												
Headway Factor	0.99	0.97	0.97	1.06	0.97	0.99	1.01	0.99	1.01	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			Thru			Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		7.0	10.0		7.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-3.0	0.0		-3.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		10.0	0.6		10.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

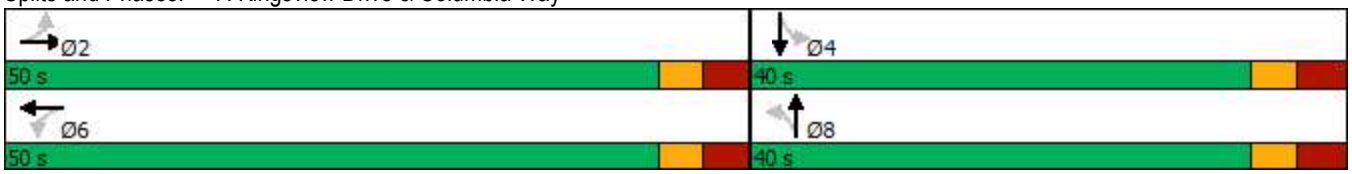


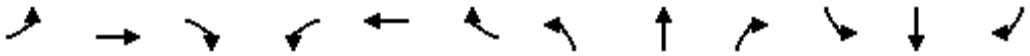
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		7.0	7.0	
Minimum Split (s)	39.2	39.2		39.2	39.2		33.5	33.5		33.5	33.5	
Total Split (s)	50.0	50.0		50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%		55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.8	43.8		43.8	43.8		33.5	33.5		33.5	33.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.2	3.2		3.2	3.2		3.5	3.5		3.5	3.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	25.0	25.0		25.0	25.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	5	5		5	5		5	5		5	5	
Act Effct Green (s)	49.0	49.0		49.0	49.0		10.2	10.2		10.5	10.5	
Actuated g/C Ratio	0.72	0.72		0.72	0.72		0.15	0.15		0.15	0.15	
v/c Ratio	0.11	0.20		0.08	0.18		0.16	0.30		0.08	0.37	
Control Delay	6.6	5.9		6.6	6.1		25.2	11.0		23.5	9.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.6	5.9		6.6	6.1		25.2	11.0		23.5	9.1	
LOS	A	A		A	A		C	B		C	A	
Approach Delay		6.1			6.2			14.5			10.7	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	3.0	8.1		1.8	6.8		3.0	1.4		1.8	1.0	
Queue Length 95th (m)	14.8	33.8		10.4	29.2		8.6	10.7		6.2	12.1	
Internal Link Dist (m)		91.9			183.6			193.2			38.7	
Turn Bay Length (m)	15.0			40.0			25.0			15.0		
Base Capacity (vph)	838	1279		745	1179		573	762		651	840	
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	0.11	0.20		0.08	0.18		0.05	0.11		0.03	0.15	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 68.2	
Natural Cycle: 75	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.37	

Intersection Signal Delay: 7.9	Intersection LOS: A
Intersection Capacity Utilization 70.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Kingsview Drive & Columbia Way





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	209	53	59	190	26	27	13	71	17	9	119
Future Volume (vph)	93	209	53	59	190	26	27	13	71	17	9	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.8	3.8	3.2	3.8	3.7	3.5	3.7	3.5	3.7	3.7	3.7
Total Lost time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1782	1773		1652	1638		1629	1456		1779	1560	
Flt Permitted	0.62	1.00		0.60	1.00		0.67	1.00		0.70	1.00	
Satd. Flow (perm)	1169	1773		1039	1638		1157	1456		1315	1560	
Peak-hour factor, PHF	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)	93	209	53	59	190	26	27	13	71	17	9	119
RTOR Reduction (vph)	0	6	0	0	3	0	0	62	0	0	104	0
Lane Group Flow (vph)	93	256	0	59	213	0	27	22	0	17	24	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	2%	6%	4%	4%	18%	2%	9%	2%	13%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	47.7	47.7		47.7	47.7		9.0	9.0		9.0	9.0	
Effective Green, g (s)	47.7	47.7		47.7	47.7		9.0	9.0		9.0	9.0	
Actuated g/C Ratio	0.69	0.69		0.69	0.69		0.13	0.13		0.13	0.13	
Clearance Time (s)	6.2	6.2		6.2	6.2		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	803	1218		714	1125		150	188		170	202	
v/s Ratio Prot		c0.14			0.13			0.02			0.02	
v/s Ratio Perm	0.08			0.06			c0.02			0.01		
v/c Ratio	0.12	0.21		0.08	0.19		0.18	0.12		0.10	0.12	
Uniform Delay, d1	3.7	4.0		3.6	3.9		26.9	26.7		26.6	26.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4		0.2	0.4		0.6	0.3		0.3	0.3	
Delay (s)	4.0	4.4		3.8	4.3		27.5	27.0		26.9	27.0	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		4.3			4.2			27.1			27.0	
Approach LOS		A			A			C			C	

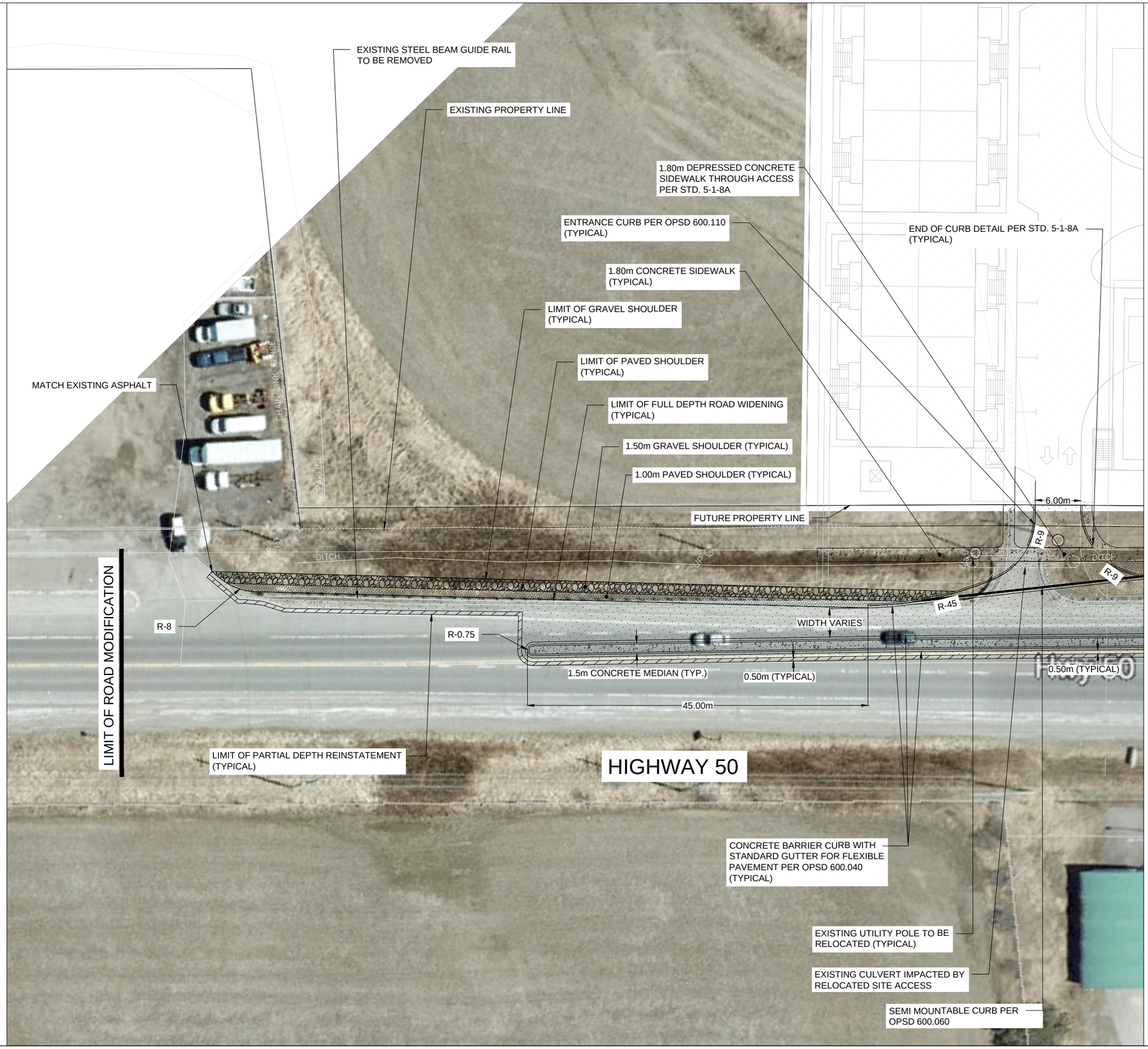
Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	69.4	Sum of lost time (s)	12.7
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Appendix U

Functional Design

CGH TRANSPORTATION



Notes:

LEGEND

- CONCRETE MEDIAN
- FULL DEPTH ROAD STRUCTURE REINSTATEMENT & WIDENING
- ASPHALT SHOULDER STRUCTURE
- PARTIAL DEPTH ASPHALT REINSTATEMENT
- GRANULAR SHOULDER

NOTES:

- ROADSIDE SAFETY MITIGATION TO BE INVESTIGATED AS PART OF THE DETAILED DESIGN PROCESS.
- ALL SIGNAGE AND PAVEMENT MARKINGS TO BE IMPLEMENTED PER OTM GUIDANCE

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

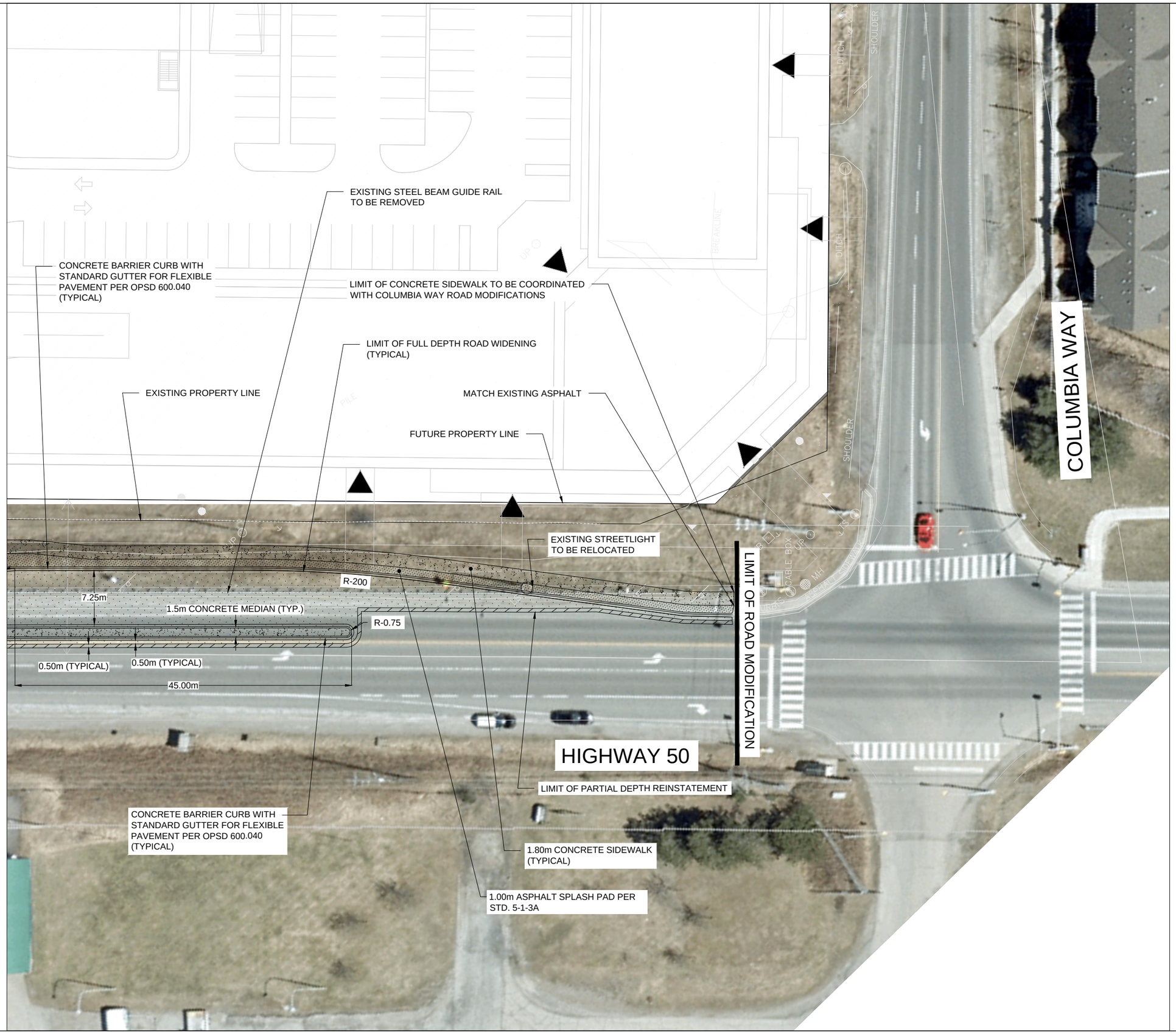
ARCHITECT:

SITE: 14245 Highway 50

TITLE: Geometry and General Layout (1)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	001	01



Notes:

LEGEND

- CONCRETE MEDIAN
- FULL DEPTH ROAD STRUCTURE REINSTATEMENT & WIDENING
- ASPHALT SHOULDER STRUCTURE
- PARTIAL DEPTH ASPHALT REINSTATEMENT
- GRANULAR SHOULDER

NOTES:

- ROADSIDE SAFETY MITIGATION TO BE INVESTIGATED AS PART OF THE DETAILED DESIGN PROCESS.
- ALL SIGNAGE AND PAVEMENT MARKINGS TO BE IMPLEMENTED PER OTM GUIDANCE

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01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

ARCHITECT:

SITE: 14245 Highway 50

TITLE: Geometry and General Layout (2)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	002	01

1	SOLID YELLOW, 10cm
2	SOLID WHITE, 60cm
3	3-6-3 BROKEN WHITE, 10cm
4	SOLID WHITE, 10cm
5	SYMBOLS

NOTES:

1. 3-6-3 DENOTES PAVEMENT MARKING LINE SPACING (I.E,. 3 m LINE, 6 m GAP, 3 m LINE)
2. USE ◯ TO DENOTE THERMO-PLASTIC DURABLE PAVEMENT MARKINGS..
3. ALL PAVEMENT MARKINGS AND SIGANGE SHALL BE INSTALLED OR REINSTATED PER OTM GUIDANCE.

Rb-3 (OTM)
600mm x 1100mm


Rb-25 (OTM)
600mm x 750mm

Rb-42t (OTM)
300mm x 600mm


Wa-33R (OTM)
300mm x 900mm

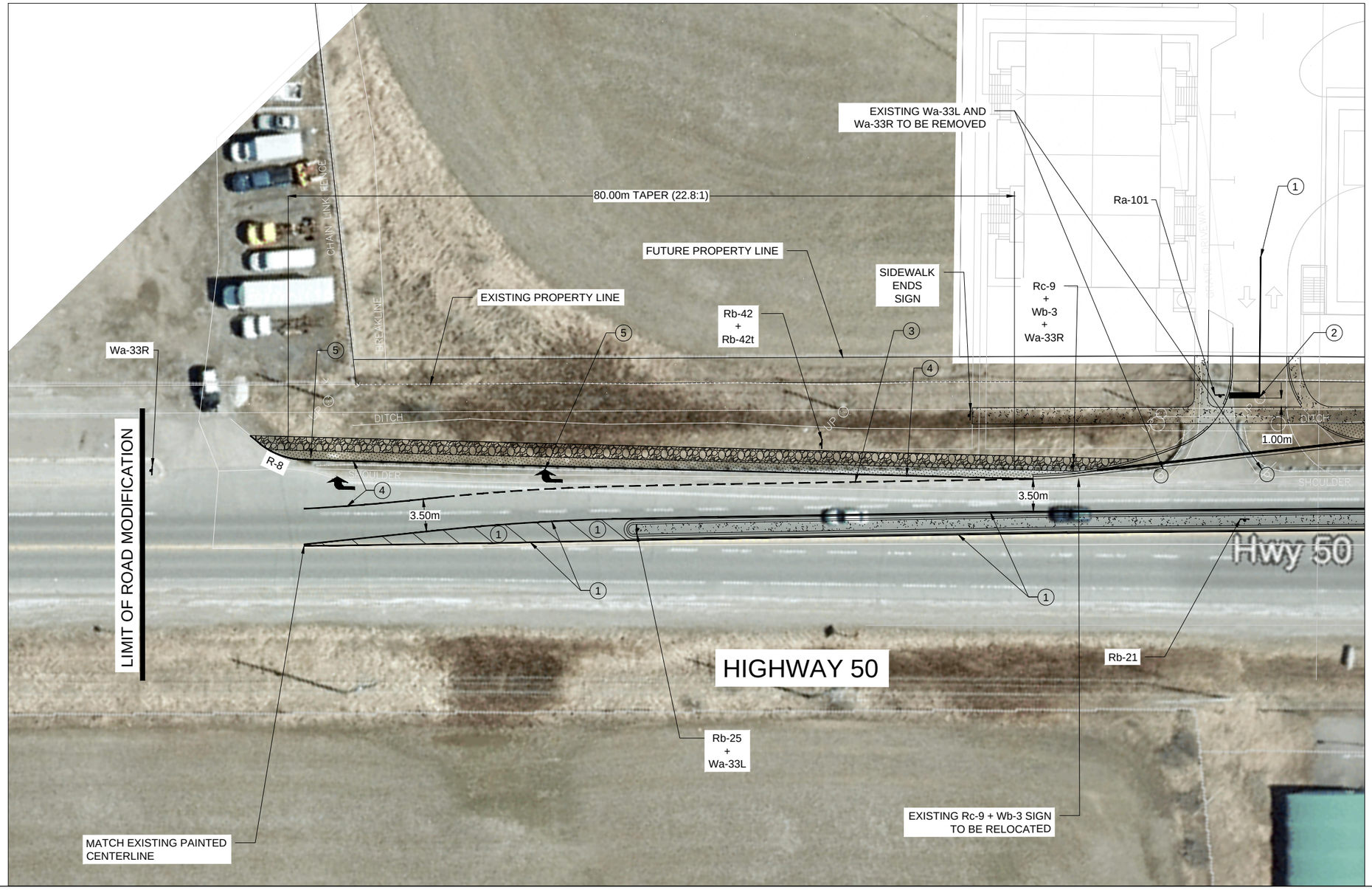
Wc-12t (OTM)
300mm x 600mm


Rb-21 (OTM)
300mm x 900mm


Rb-42 (OTM)
600mm x 600mm


Wa-33L (OTM)
300mm x 900mm


Wc-11 (OTM)
600mm x 600mm



Notes:

NOTES:

- ROADSIDE SAFETY MITIGATION TO BE INVESTIGATED AS PART OF THE DETAILED DESIGN PROCESS.
- ALL SIGNAGE AND PAVEMENT MARKINGS TO BE IMPLEMENTED PER OTM GUIDANCE

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

ARCHITECT:

SITE: 14245 Highway 50

TITLE: Pavement Marking & Signage (1)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	003	01

1	SOLID YELLOW, 10cm
2	SOLID WHITE, 60cm
3	3-6-3 BROKEN WHITE, 10cm
4	SOLID WHITE, 10cm
5	SYMBOLS

NOTES:

1. 3-6-3 DENOTES PAVEMENT MARKING LINE SPACING (I.E,. 3 m LINE, 6 m GAP, 3 m LINE)
2. USE ◯ TO DENOTE THERMO-PLASTIC DURABLE PAVEMENT MARKINGS..
3. ALL PAVEMENT MARKINGS AND SIGANGE SHALL BE INSTALLED OR REINSTATED PER OTM GUIDANCE.

Rb-3 (OTM)
600mm x 1100mm

Rb-25 (OTM)
600mm x 750mm

Rb-42t (OTM)
300mm x 600mm

Wa-33R (OTM)
300mm x 900mm

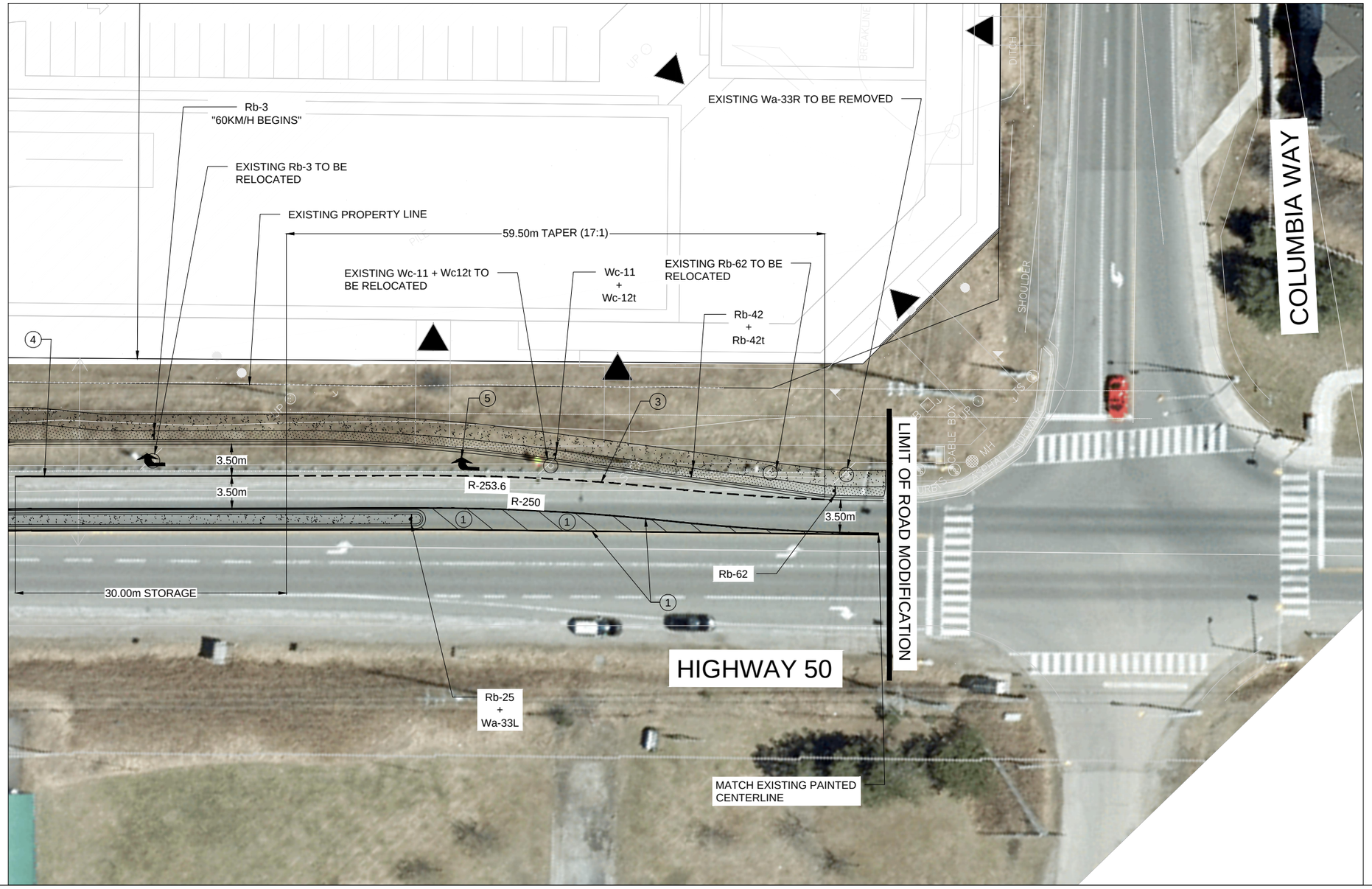
Wc-12t (OTM)
300mm x 600mm

Rb-21 (OTM)
300mm x 900mm

Rb-42 (OTM)
600mm x 600mm

Wa-33L (OTM)
300mm x 900mm

Wc-11 (OTM)
600mm x 600mm



Notes:

NOTES:

- ROADSIDE SAFETY MITIGATION TO BE INVESTIGATED AS PART OF THE DETAILED DESIGN PROCESS
- ALL SIGNAGE AND PAVEMENT MARKINGS TO BE IMPLEMENTED PER OTM GUIDANCE

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

ARCHITECT:

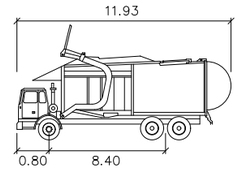
SITE: 14245 Highway 50

TITLE: Pavement Marking & Signage (2)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	004	01

Notes:



Peel Region Garbage

	meters
Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 40.3

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

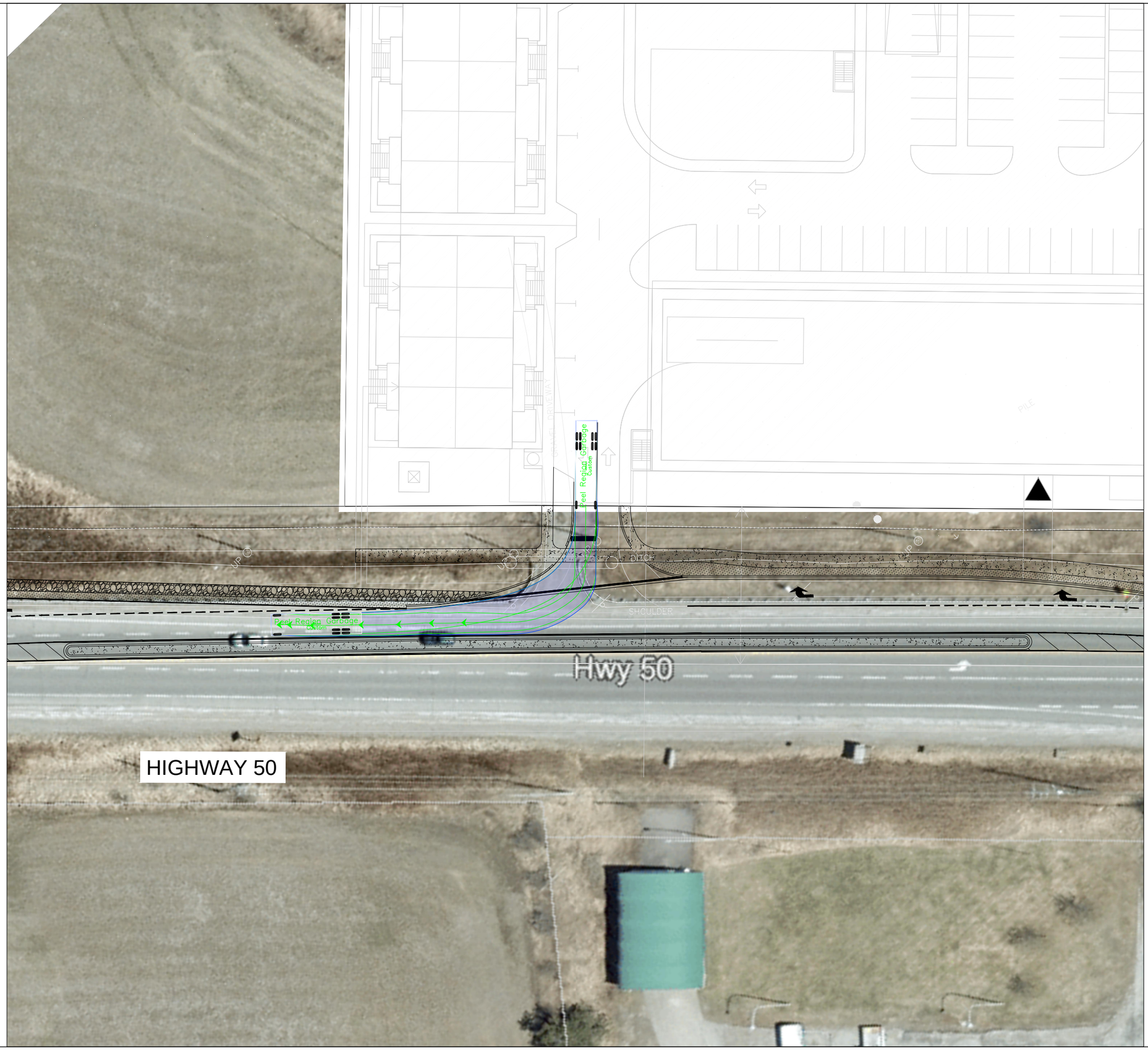
ARCHITECT:

SITE: 14245 Highway 50

TITLE: Turning Movement Analysis
Peel Region Garbage (1)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	005	01



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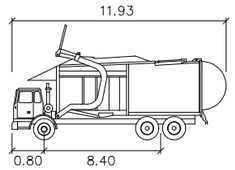


Peel Region Garbage

meters

Width	: 2.77
Track	: 2.77
Lock to Lock Time	: 6.0
Steering Angle	: 40.3

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

ARCHITECT:

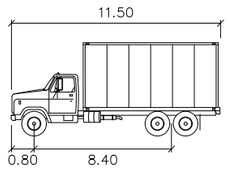
SITE: 14245 Highway 50

TITLE: Turning Movement Analysis
Peel Region Garbage (2)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	006	01

Notes:



HSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

ARCHITECT:

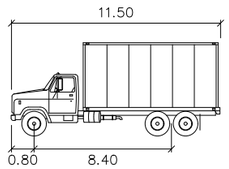
SITE: 14245 Highway 50

TITLE: Turning Movement Analysis
HSU Turning Movements (1)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	007	01

Notes:



HSU

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

REV:	DESCRIPTION:	BY:	DATE:
01	Issued for Review	BB	2023-10-12

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Wyndecliffe Developments Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON.
L5T 1H3

ARCHITECT:

SITE: 14245 Highway 50

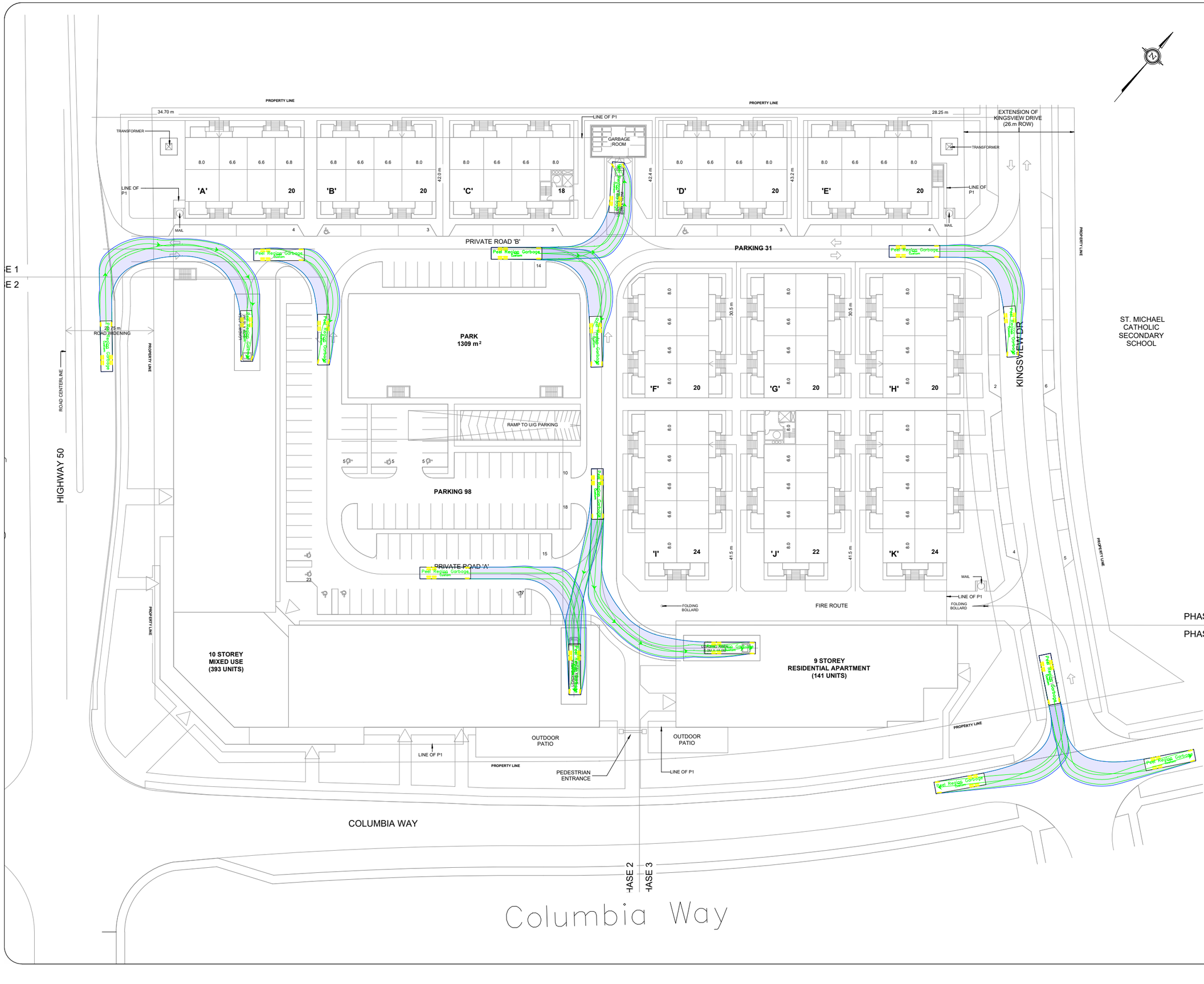
TITLE: Turning Movement Analysis
HSU Turning Movements (2)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2023-10-12	BB	AL

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	008	01

Appendix V

Turning Templates



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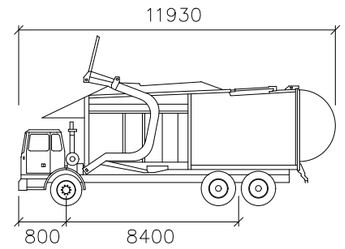


Peel Region Garbage

	mm
Width	: 2770
Track	: 2770
Lock to Lock Time	: 6.0
Steering Angle	: 40.3

REV:	DESCRIPTION:	BY:	DATE:
03	Issued for Review	AN	2024-04-02

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Columbia Square Inc.
1175 Meyerside Drive, Suite 2
Mlssissauga, ON
L5T 1H3

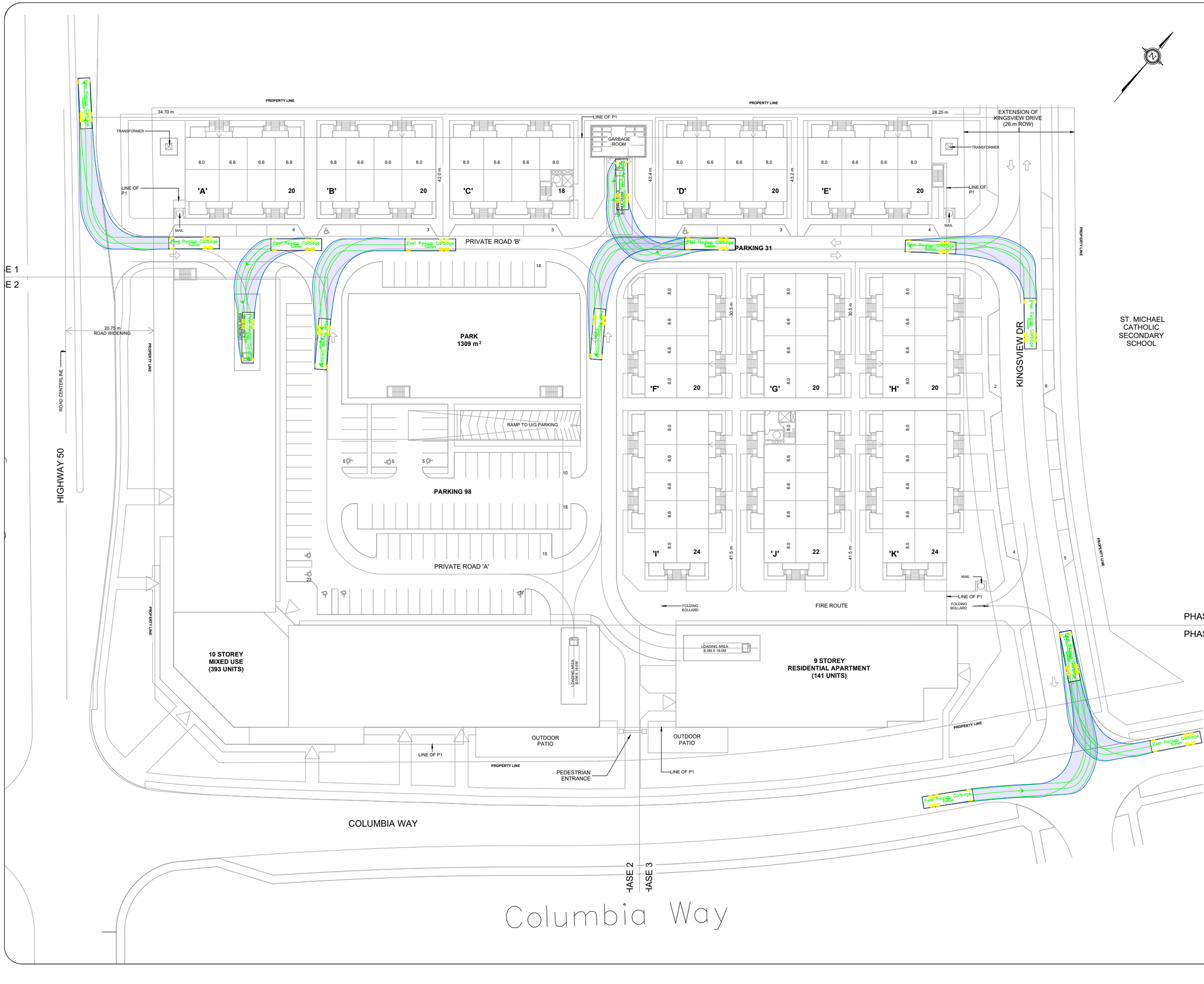
ARCHITECT:

SITE: 14245 Highway 50

TITLE: Turning Movement Analysis
Peel Region Garbage (1)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2024-04-02	AN	VZ

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	001	03



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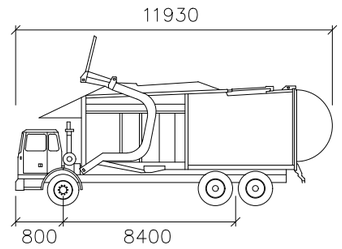


Peel Region Garbage

	mm
Width	: 2770
Track	: 2770
Lock to Lock Time	: 6.0
Steering Angle	: 40.3

REV:	DESCRIPTION:	BY:	DATE:
03	Issued for Review	AN	2024-04-02

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Columbia Square Inc.
1175 Meyerside Drive, Suite 2
Mlssissauga, ON
L5T 1H3

ARCHITECT:

SITE: 14245 Highway 50

TITLE: Turning Movement Analysis
Peel Region Garbage (2)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2024-04-02	AN	VZ

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	002	03

PROPERTY LINE

34.70 m

TRANSFORMER

LINE OF P1

'A' 20 | 8.0 6.6 6.6 6.8

'B' 20 | 6.8 6.6 6.6 8.0

'C' 18 | 8.0 6.6 6.6 8.0

42.0 m

GARBAGE ROOM

LOADING AREA 8.0M X 18.0M

42.4 m

'D' 20 | 8.0 6.6 6.6 8.0

'E' 20 | 8.0 6.6 6.6 8.0

43.2 m

28.25 m

EXTENSION OF KINGSVIEW DRIVE (26.m ROW)

TRANSFORMER

LINE OF P1

MAIL

4 3 3 3 4

Peel Region Garbage Bottom

PRIVATE ROAD 'B'

PARKING 31

20.75 m ROAD WIDENING

PROPERTY LINE

ROAD CENTERLINE

HIGHWAY 50

PARK 1309 m²

RAMP TO U/G PARKING

5 5 5

PARKING 98

14 10 18 15 23 17

PRIVATE ROAD 'A'

'F' 20 | 8.0 6.6 6.6 6.6 8.0

'G' 20 | 8.0 6.6 6.6 6.6 8.0

'H' 20 | 8.0 6.6 6.6 6.6 8.0

30.5 m

'I' 24 | 8.0 6.6 6.6 6.6 8.0

'J' 22 | 8.0 6.6 6.6 6.6 8.0

'K' 24 | 8.0 6.6 6.6 6.6 8.0

41.5 m

KINGSVIEW DR

2 6 4 5

PROPERTY LINE

ST. MICHAEL CATHOLIC SECONDARY SCHOOL

FOLDING BOLLARD

FIRE ROUTE

10 STOREY MIXED USE (393 UNITS)

9 STOREY RESIDENTIAL APARTMENT (141 UNITS)

LOADING AREA 8.0M X 18.0M

OUTDOOR PATIO

OUTDOOR PATIO

LINE OF P1

PROPERTY LINE

PEDESTRIAN ENTRANCE

LINE OF P1

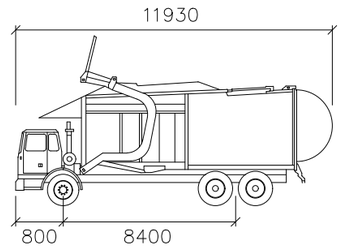
COLUMBIA WAY

PHASE 2

PHASE 3

Columbia Way

Notes:



Peel Region Garbage

	mm
Width	: 2770
Track	: 2770
Lock to Lock Time	: 6.0
Steering Angle	: 40.3

REV:	DESCRIPTION:	BY:	DATE:
03	Issued for Review	AN	2024-04-02

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Columbia Square Inc.
1175 Meyerside Drive, Suite 2
Mlssissauga, ON
L5T 1H3

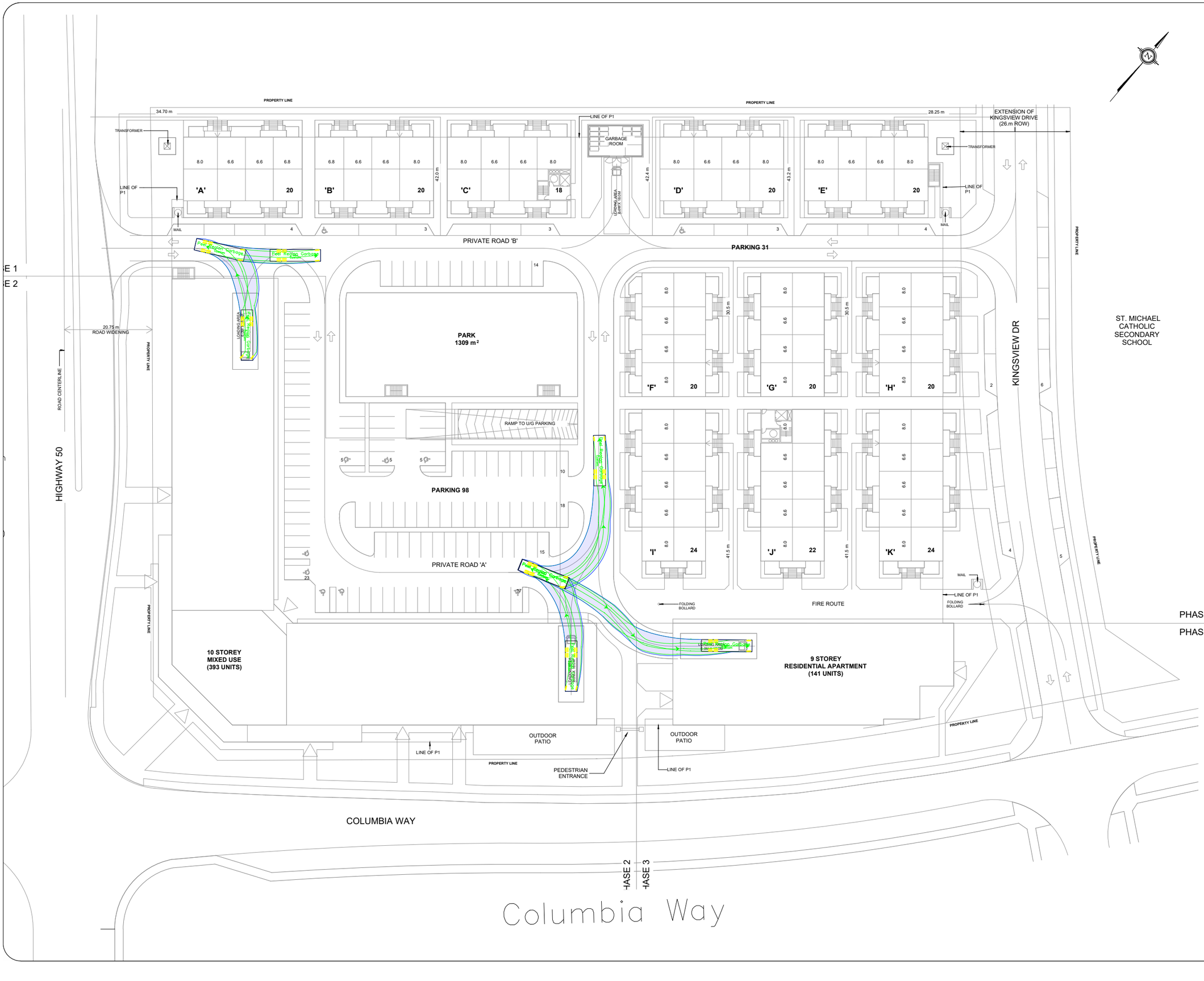
ARCHITECT:

SITE: 14245 Highway 50

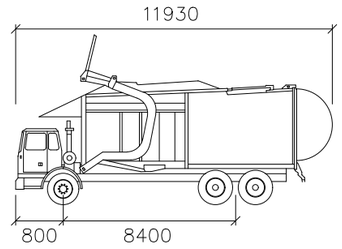
TITLE: Turning Movement Analysis
Peel Region Garbage (3)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2024-04-02	AN	VZ

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	003	03



Notes:



Peel Region Garbage

	mm
Width	: 2770
Track	: 2770
Lock to Lock Time	: 6.0
Steering Angle	: 40.3

REV:	DESCRIPTION:	BY:	DATE:
03	Issued for Review	AN	2024-04-02

STATUS:

CGH Transportation
628 Haines Road
Newmarket, ON
L3Y 6V5
(905) 251-4070

CLIENT: Columbia Square Inc.
1175 Meyerside Drive, Suite 2
Mississauga, ON
L5T 1H3

ARCHITECT:

SITE: 14245 Highway 50

TITLE: Turning Movement Analysis
Peel Region Garbage (4)

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2024-04-02	AN	VZ

PROJECT NO:	DRAWING NO:	REVISION:
2021-020	004	03

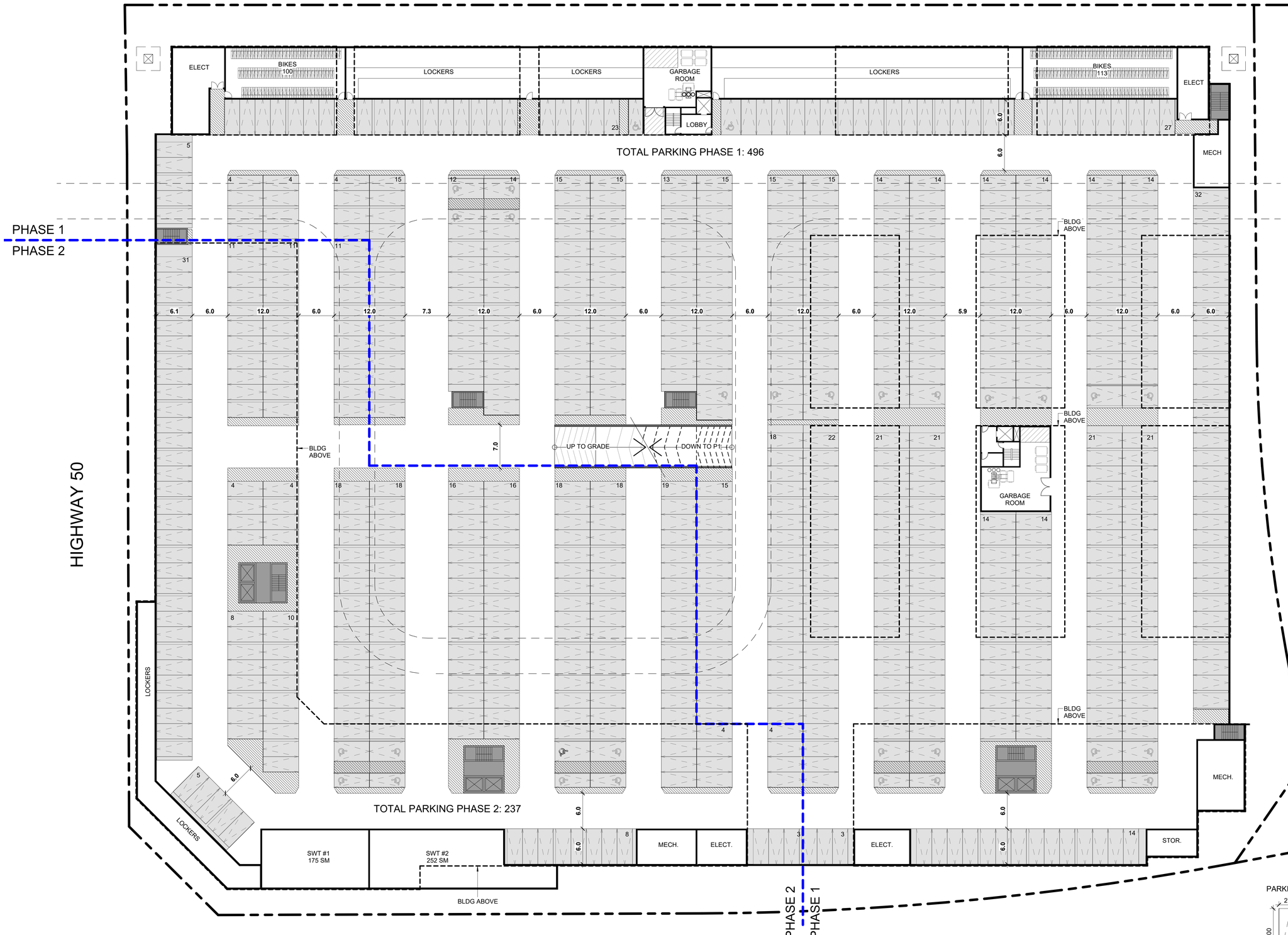
Appendix W

Underground Parking Plans

COLUMBIA SQUARE

BOLTON, ONTARIO

No.	Description	Date
1	ISSUED FOR OPA	2023/12/15
16	ISSUED FOR OPA/ZBA	2024/03/25



Context Plan

Project North

Stamp

Clients

Columbia Square Inc.

KFA architects + planners inc.
197 SPADINA AVE • SUITE 500
TORONTO • ON • M5T 2C8
416.633.6226 – telephone
www.kfarchitecture.com

Project No.:	20065
Scale:	As indicated
Issue Date:	07/24/2023
Drawn By:	

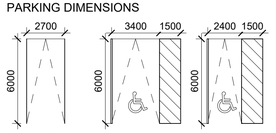
Title

P1 LEVEL PLAN
PHASES 1, 2, 3

No.

A102

PARKING DIMENSIONS

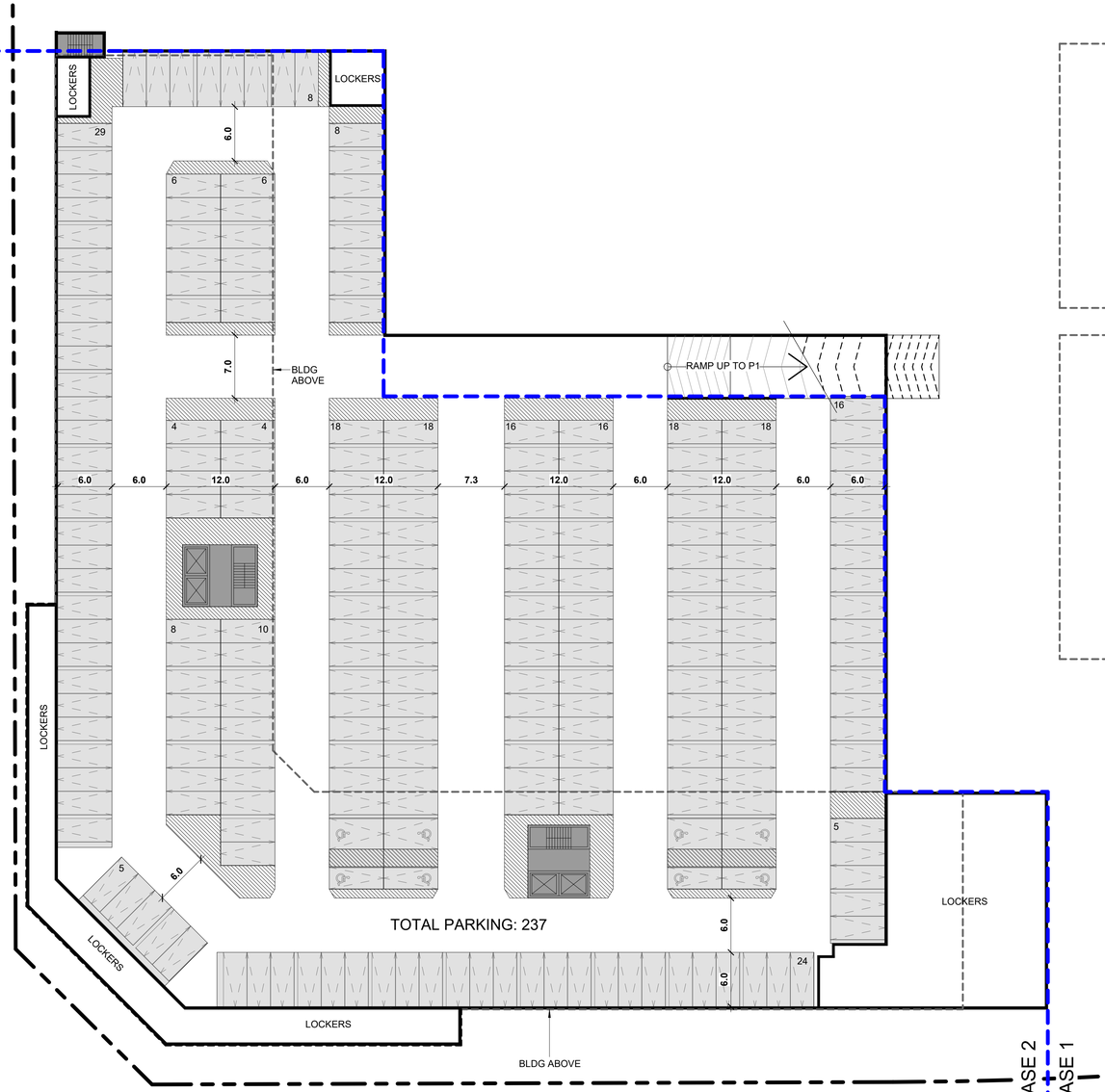


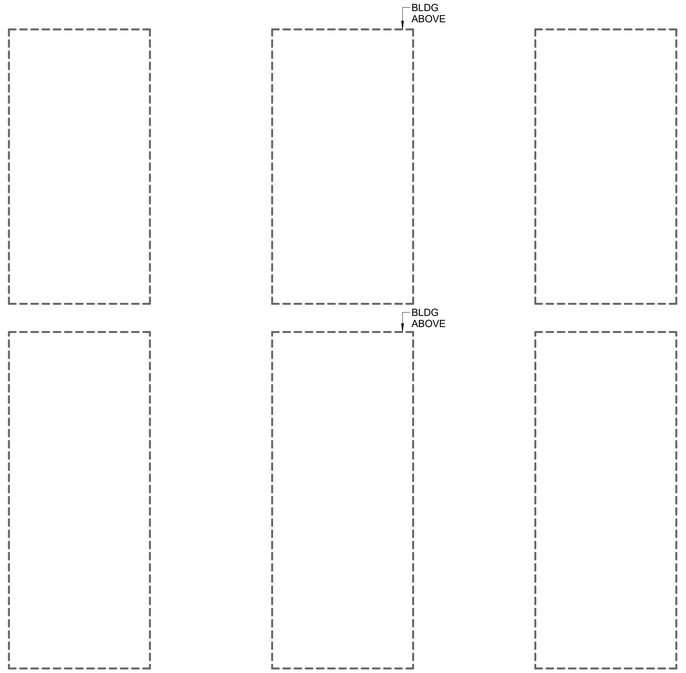
COLUMBIA SQUARE

BOLTON, ONTARIO

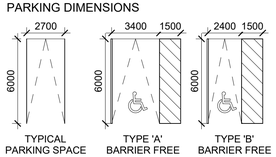
No.	Description	Date
1	ISSUED FOR OPA	2023/12/15
16	ISSUED FOR OPA/ZBA	2024/03/25

PHASE 1
PHASE 2





PARKING DIMENSIONS



Context Plan

Project North

Stamp

Clients

Columbia Square Inc.

KFA architects + planners inc.
197 SPADINA AVE - SUITE 500
TORONTO - ON - M5T 2C8
416.633.6226 - telephone
www.kfarchitecture.com

Project No.:	20065
Scale:	As indicated
Issue Date:	07/24/2023
Drawn By:	

Title

P2 LEVEL PLAN
PHASES 1, 2, 3

No.

A101

Appendix X

Parking Survey Data

50 Ann Street
Residential Development
Town of Caledon

Transportation Impact Study

Prepared For: Brookfield Residential (Ontario) Limited

February 27, 2018

3.0 VEHICLE PARKING CONSIDERATIONS

3.1 APPLICABLE ZONING BY-LAW REQUIREMENT

The Town of Caledon's Zoning By-law 2006-50 includes a parking requirement rate of 1.75 spaces per unit of which 1.5 spaces is required for residents and 0.25 is required for visitors.

Application of this rate to the site results in a requirement of 108 resident parking spaces (1.5 spaces/unit) and 18 visitor parking spaces (0.25 spaces/unit), for a total of 126 parking spaces (1.75 spaces/unit) based on the proposed 72 residential units.

3.2 PROPOSED PARKING SUPPLY

The development is providing 79 parking spaces (1.10 spaces/unit). This is 47 spaces less than Caledon's Zoning By-law requirement.

3.3 PROXY PARKING DEMAND SURVEYS

In order to assess the parking demand of proxy residential developments of similar scale, location, and transportation context, parking demand surveys were undertaken at the adjacent 60 Ann Street (River's Edge building) comprising 71 residential units, all of which are occupied. It is noteworthy that this development was built based on a Site Specific Zoning By-law requirement of 1.2 spaces per unit of which 1.0 space per unit was for residents and 0.2 spaces / unit is for visitors. The reduced parking rate was granted in recognition of the site's proximity to the amenities and transit of downtown.

These parking demand surveys were undertaken on Tuesday February 20th 2018 at 3:00 a.m. to assess the peak resident parking demand, and then from Friday February 23rd to Sunday February 25th 2018 to assess the peak visitor parking demand. During the weekend study, parking demand was also assessed at the adjacent Ann & Samuel Sterne Municipal Parking Lot and the on-street parking spaces on Ann Street. The results of the survey are summarized in **Table 1**. Detailed parking surveys are attached for reference in **Appendix B**.

TABLE 1 PEAK PARKING DEMANDS

Time	60 Ann Street[1, 2]		Public Parking Spaces			
	Visitor Spaces	Resident Spaces	Ann Street On-Street	Municipal Off-Street	Total	Vacant
Supply	*9* *0.13*	*95* *1.34*	*6*	*77*	*83*	--
Tue. Feb. 20, 2018 – 3:00 AM	**0** **0.00**	**71** **1.00**	**--**	**--**	**--**	**--**
Fri. Feb. 23, 2018 – 9:00 PM	6 0.08	--	0	9	9	74
Sat. Feb. 24, 2018 – 5:00 PM	**7** **0.10**	**--**	**0**	**16**	**16**	**67**
Sun. Feb. 25, 2018 – 3:00 PM	5 0.07	--	0	20	20	63

Notes:
1. Resident supply of 95 spaces includes 8 tandem which counted as 16 spaces in the supply. Without these tandem spaces, the 87 spaces represents a rate of 1.23 spaces/unit.
2. Penthouse private door closed, unable to determine occupancy of the two spaces within.

Based on the results of these surveys, the maximum resident parking demand rate was observed to be **1.00 spaces / unit**. The maximum visitor parking demand rate which occurred on the Saturday at 5:00 p.m. was observed to be **0.10 spaces / unit**. Combined, this results in a maximum parking demand rate of **1.10 spaces / unit**. No visitors to the River's Edge building were observed to park elsewhere, i.e. the municipal off-street parking lot, or the Ann Street on-street spaces and then walk to the site. During these peak periods, there was an ample number of vacant spaces in the public off-street and on-street parking areas.

3.4 ADEQUACY OF THE PROPOSED PARKING SUPPLY

Based on the parking demand surveys undertaken at the adjacent River's Edge site which is virtually identical with respect to scale, location and transportation context, the proposed 79 parking spaces for a combined rate of 1.10 parking spaces / unit (1.00 spaces / unit for residents, 0.10 spaces / unit for visitors) can appropriately accommodate the expected parking demand of the proposed development. In the event of periods of higher visitor parking demand such as on holidays, there is ample public on and off-street parking available in close proximity.

The location of the proposed site in downtown Bolton provides easy access to a number of commercial retail and service amenities as well as opportunities to use local recreational trails. As part of this development, bicycle parking spaces are proposed on site to the exterior of the building to encourage and support travel by bicycle, particularly for visitors. These factors contribute to a reduced need for residents to own and travel by car and visitors to travel to the site by car.

Not providing an overabundance of parking on-site represents good transportation planning and is consistent with the Town's objectives in their *Transportation Master Plan (Paradigm, November 2017)* to promote non-auto modes and increase their recognition as a viable means of transportation in order to realize the benefits for users and non-users including reduced road congestion, improved health, recreation and enjoyment, environmental protection and economic development.